No. 19-55376

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

VIRGINIA DUNCAN; RICHARD LEWIS; PATRICK LOVETTE; DAVID MARGUGLIO; CHRISTOPHER WADDELL; CALIFORNIA RIFLE & PISTOL ASSOCIATION, INC., a California Corporation,

Plaintiffs-Appellees,

v.

XAVIER BECERRA, in his official capacity as Attorney General of the State of California,

Defendant-Appellant.

On Appeal from the United States District Court for the Southern District of California,
No. 3:17-cv-01017-BEN-JLB

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IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF CALIFORNIA

VIRGINIA DUNCAN, et al., Plaintiffs, **v.** **XAVIER BECERRA, in his official capacity as Attorney General of the State of California, et al.,** Defendants.	17-cv-1017-BEN-JLB **EXPERT REPORT OF DR. CHRISTOPHER S. KOPER** Judge: Hon. Roger T. Benitez Action Filed: May 17, 2017

EXPERT REPORT OF DR. CHRISTOPHER S. KOPER

I. ASSIGNMENT

I was retained by counsel for Defendant California Attorney General Xavier Becerra for the purpose of preparing an expert report on the potential efficacy of California's new ban on possession of large capacity ammunition magazines.

II. QUALIFICATIONS AND BACKGROUND

I am an Associate Professor for the Department of Criminology, Law and Society at George Mason University, in Fairfax, Virginia and the principal fellow of George Mason's Center for Evidence-Based Crime Policy. I have been studying firearms issues since 1994. My primary areas of focus are firearms policy and policing issues. My credentials, experience, and background are stated in my curriculum vitae, a true and correct copy of which is attached as Exhibit A.

In 1997, my colleague Jeffrey Roth and I conducted a study on the impact of Title XI, Subtitle A of the Violent Crime Control and Law Enforcement Act of 1994 (hereinafter the "federal assault weapons ban" or the "federal ban"), for the United States Department of Justice and the United States Congress.[1] I updated the original 1997 study in 2004[2] and briefly revisited the issue again by re-examining my 2004 report in 2013.[3] To my knowledge, these are the most comprehensive studies to have examined the efficacy of the federal ban on assault weapons and ammunition feeding devices holding more than ten rounds of ammunition

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[1] Jeffrey A. Roth & Christopher S. Koper, *Impact Evaluation of the Public Safety and Recreational Firearms Use Protection Act of 1994: Final Report* (1997), attached hereto as Exhibit B (hereinafter, "*Impact Evaluation*").

[2] Christopher S. Koper, *An Updated Assessment of the Federal Assault Weapons Ban: Impacts on Gun Markets and Gun Violence, 1994-2003* (2004), attached hereto as Exhibit C (hereinafter, "*Updated Assessment of the Federal Assault Weapons Ban*").

[3] Christopher S. Koper, *America's Experience with the Federal Assault Weapons Ban, 1994- 2004: Key Findings and Implications*, ch. 12, 157-171, in Reducing Gun Violence in America: Informing Policy with Evidence (Daniel S. Webster & Jon S. Vernick eds. 2013), attached hereto as Exhibit D (hereinafter "*America's Experience with the Federal Assault Weapons Ban*").

(hereinafter referred to as "large-capacity magazines" or "LCMs").[4] My 1997 study was based on limited data, especially with regard to the criminal use of large-capacity magazines. As a result, my conclusions on the impact of the federal ban are most accurately and completely set forth in my 2004 and 2013 reports.

This report summarizes some of the key findings of those studies regarding the federal ban and its impact on crime prevention and public safety. I also discuss the results of a new research study I directed that investigated current levels of criminal activity with high capacity semiautomatic weapons as measured in several local and national data sources.[5] Based upon my findings, I then provide some opinions on the potential impact and efficacy of prohibitions and restrictions on large-capacity magazines, like those contained in California Penal Code section 32310 (hereinafter, "Section 32310").

As discussed below, it is my considered opinion that California's LCM ban has the potential to prevent and limit shootings, particularly those involving high numbers of shots and victims, and thus is likely to advance California's interests in protecting its populace from the dangers of such shootings.

III. RETENTION AND COMPENSATION

I am being compensated for my time on this case on an hourly basis at a rate of $150 per hour. My compensation is not contingent on the results of my analysis or the substance of my testimony.

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[4] As discussed below, there have been some additional academic and non-academic studies that have examined more limited aspects of the ban's effects.

[5] Christopher S. Koper et al., *Criminal Use of Assault Weapons and High Capacity Semiautomatic Firearms: An Updated Examination of Local and National Sources*, Journal of Urban Health (October 2, 2017) DOI 10.1007/s11524-017-0205-7, *available at* http://em.rdcu.be/wf/click?upn=KP7O1RED-2BlD0F9LDqGVeSCtPCwMbqH-2BMWBUHgPpsN5I-3D_aLASUIDI3T0TZ55mA5wcKyxiF1pNAQ-2FS0QcxHHbBP65v2wnicdu8DEAbXOHNYJipa4WGEmYqVQvkFcdtrFEsYjZAuWYuv7oZRi5azzY-2B5kRSTavg1BTwrdRnUNdQZVTcHVKQjHpPzJRCNjuQtSjVJuN-2F-2BNTasWPxQOVBf1pq1NLGA3TvS1NOwbCbQHSILbi3GAhoVkr0iwOIrRLgL8INPZXWLjKU6PJ-2F84jalWCxLaJiY74BdpLrwOkfJQ3Cvy-2F04YQt1UhIlsfJNdtP7DBeGw-3D-3D (last visited Oct. 5, 2017).

IV. BASES FOR OPINION AND MATERIAL COVERED

The opinions I provide in this expert report are based solely on the findings of the materials cited in the footnotes and text, as well as the materials attached as exhibits to this report.

V. OPINION

A. Summary of Findings

Based on my research, I found, among other things, that assault pistols are used disproportionately in crime in general, and that assault weapons more broadly were disproportionately used in murder and other serious crimes in some jurisdictions for which there was data. I also found that assault weapons and other firearms with large capacity magazines are used in a higher share of mass public shootings and killings of law enforcement officers.

The evidence also suggests that gun attacks with semiautomatics—especially assault weapons and other guns equipped with large capacity magazines—tend to result in more shots fired, more persons wounded, and more wounds per victim, than do gun attacks with other firearms. There is evidence that victims who receive more than one gunshot wound are substantially more likely to die than victims who receive only one wound. Thus, it appears that crimes committed with these weapons are likely to result in more injuries, and more lethal injuries, than crimes committed with other firearms.

In addition, there is some evidence to suggest that assault weapons are more attractive to criminals, due to the weapons' military-style features and particularly large magazines. Based on these and other findings in my studies discussed below, it is my considered opinion that California's recently enacted ban on large capacity magazines, which is in some ways stronger than the federal ban that I studied, is likely to advance California's interest in protecting public safety. Specifically, it has the potential to: (1) reduce the number of crimes committed with firearms with large capacity magazines; (2) reduce the number of shots fired in gun crimes; (3)

reduce the number of gunshot victims in such crimes; (4) reduce the number of wounds per gunshot victim; (5) reduce the lethality of gunshot injuries when they do occur; and (6) reduce the substantial societal costs that flow from shootings.

B. Criminal Uses and Dangers of Large-Capacity Magazines

Large-capacity magazines allow semiautomatic weapons to fire more than 10 rounds without the need for a shooter to reload the weapon.[6] Large-capacity magazines come in a variety of sizes, including but not limited to 17-round magazines, 25- or 30-round magazines, and drums with the capacity to accept up to 100 rounds.

The ability to accept a detachable magazine, including a large-capacity magazine, is a common feature of guns typically defined as assault weapons.[7] In addition, LCMs are frequently used with guns that fall outside of the definition of an assault weapon.

LCMs are particularly dangerous because they facilitate the rapid firing of high numbers of rounds. This increased firing capacity thereby potentially increases injuries and deaths from gun violence. *See* Updated Assessment of the Federal Assault Weapons Ban at 97 (noting that "studies ... suggest that attacks with semiautomatics—including [assault weapons] and other semiautomatics with LCMs—result in more shots fired, persons wounded, and wounds per victim than do other gun attacks").

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[6] A semiautomatic weapon is a gun that fires one bullet for each pull of the trigger and, after each round of ammunition is fired, automatically loads the next round and cocks itself for the next shot, thereby permitting a faster rate of fire relative to non-automatic firearms. Semiautomatics are not to be confused with fully automatic weapons (*i.e.*, machine guns), which fire continuously so long as the trigger is depressed. Fully automatic weapons have been illegal to own in the United States without a federal permit since 1934. *See Updated Assessment of the Federal Assault Weapons Ban*, at 4 n.1.

[7] Although the precise definition used by various federal, state, and local statutes has varied, the term "assault weapons" generally includes semiautomatic pistols, rifles, and shotguns with military features conducive to military and potential criminal applications but unnecessary in shooting sports or for self-defense.

As such, semiautomatics equipped with LCMs have frequently been employed in highly publicized mass shootings, and are disproportionately used in the murders of law enforcement officers, crimes for which weapons with greater firepower would seem particularly useful. *See Updated Assessment of the Federal Assault Weapons Ban* at 14-19, 87.

During the 1980s and early 1990s, semiautomatic firearms equipped with LCMs were involved in a number of highly publicized mass murder incidents that first raised public concerns and fears about the accessibility of high powered, military-style weaponry and other guns capable of discharging high numbers of rounds in a short period of time. For example:

- On July 18, 1984, James Huberty killed 21 persons and wounded 19 others in a San Ysidro, California McDonald's restaurant, using an Uzi carbine, a shotgun, and another semiautomatic handgun, and equipped with a 25-round LCM;
- On January 17, 1989, Patrick Purdy used a civilian version of the AK-47 military rifle and a 75-round LCM to open fire in a Stockton, California schoolyard, killing five children and wounding 29 other persons;
- On September 14, 1989, Joseph Wesbecker, armed with an AK-47 rifle, two MAC-11 handguns, a number of other firearms, and multiple 30-round magazines, killed seven and wounded 15 people at his former workplace in Louisville, Kentucky;
- On October 16, 1991, George Hennard, armed with two semiautomatic handguns with LCMs (and reportedly a supply of extra LCMs), killed 22 people and wounded another 23 in Killeen, Texas;
- On July 1, 1993, Gian Luigi Ferri, armed with two Intratec TEC-DC9 assault pistols and 40- to 50-round magazines, killed nine and wounded six at the law offices of Pettit & Martin in San Francisco, California; and
- On December 7, 1993, Colin Ferguson, armed with a handgun and multiple LCMs, opened fire on commuters on a Long Island Rail Road train, killing 6 and wounding 19.

See Updated Assessment of the Federal Assault Weapons Ban at 14.[8]

More recently, in the years since the expiration of the federal ban in 2004, there has been another well-publicized series of mass shooting incidents involving previously banned assault weapons and/or LCMs. Some of the more notorious of these incidents include:

- On April 16, 2007, Seung-Hui Cho, armed with a handgun and multiple LCMs, killed 33 (including himself) and wounded 23 on the campus of Virginia Tech in Blacksburg, Virginia;
- On January 8, 2011, Jared Loughner, armed with a handgun and multiple LCMs, killed 6 and wounded 13, including Congresswoman Gabrielle Giffords, in Tucson, Arizona;
- On July 20, 2012, James Holmes, armed with a Smith & Wesson M&P 15 assault rifle, 100-round LCMs, and other firearms, killed 12 and wounded 58 in a movie theater in Aurora, Colorado;
- On December 14, 2012, Adam Lanza, armed with a Bushmaster AR-15-style assault rifle, two handguns, and multiple LCMs, killed 26 (20 of whom were young children) and wounded 2 at Sandy Hook Elementary School in Newtown, Connecticut;
- On December 2, 2015, Syed Rizwan Farook and Tashfeen Malik, armed with 2 AR-15 style rifles, semiautomatic handguns, and LCMs, killed 14 and injured 21 at a workplace party in San Bernardino, California; and

[8] Additional details regarding these incidents were obtained from: Violence Policy Center, *Mass Shootings in the United States Involving High-Capacity Ammunition Magazines*, *available at* http://www.vpc.org/fact_sht/VPCshootinglist.pdf (hereinafter, "Violence Policy Center Report"); Mark Follman, Gavin Aronsen & Deanna Pan, *US Mass Shootings, 1982-2012: Data from Mother Jones' Investigation*, updated Feb. 27, 2013, *available at* http://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data (hereinafter, "Follman, Aronsen & Pan 2013"); and Mark Follman, Gavin Aronsen & Jaeah Lee, *More Than Half of Mass Shooters Used Assault Weapons and High-Capacity Magazines*, Feb. 27, 2013, *available at* http://www.motherjones.com/politics/2013/02/assault-weapons-highcapacity-magazines-mass-shootings-feinstein (hereinafter, "Pollman, Aronsen & Lee 2013").

- On June 12, 2016, Omar Mateen, armed with a Sig Sauer MCX rifle, a Glock 17 semiautomatic handgun, and LCMs, killed 49 and injured 53 in a nightclub in Orlando, Florida.[9]

There is evidence to suggest that the particularly large ammunition capacities of assault weapons, along with their military-style features, are more attractive to criminals than lawful users. *See Updated Assessment of the Federal Assault Weapons Ban* at 17-18. The available evidence also suggests that large-capacity magazines, along with assault weapons, pose particular dangers by their large and disproportionate involvement in two aspects of crime and violence: mass shootings and murders of police. *See Updated Assessment of the Federal Assault Weapons Ban* at 14- 19, 87.

With respect to mass shootings, the available evidence before the federal assault weapons ban was enacted in 1994 and after its expiration in 2004 both support this conclusion. Prior to the federal ban, assault weapons or other semiautomatics with LCMs were involved in 6, or 40%, of 15 mass shooting incidents occurring between 1984 and 1993 in which 6 or more persons were killed or a total of 12 or more were wounded. See *Updated Assessment of the Federal Assault Weapons Ban* at 14.[10]

More recently, a *Mother Jones* media investigation and compilation of 62 public mass shooting incidents that involved the death of four or more people, over the period 1982-2012, showed that, of the cases where magazine capacity could be determined, 31 of 36 cases, or 86%, involved a large-capacity magazine. Including

[9] For details on these incidents, see Marc Follman et al., *US Mass Shootings, 1982-2017: Data from Mother Jones' Investigation*, Mother Jones (June 14, 2017) *available at* http://www.motherjones.com/politics/2012/12/mass-shootings-mother-jones-full-data/.

[10] These figures are based on tabulations conducted by my research team and me using data reported in Gary Kleck, *Targeting Guns: Firearms and Their Control* (1997) at 124-26.

all cases, including those where magazine capacity could not be determined, exactly half of the cases (31 of 62) are known to have involved an LCM.[11]

LCMs, because they can be and are used both with assault weapons and guns that fall outside the definition of an assault weapon, appear to present even greater dangers to crime and violence than assault weapons alone.

Prior to the federal assault weapons ban, for example, guns with LCMs were used in roughly 13-26% of most gun crimes (as opposed to somewhere between about 1% and 8% for assault weapons alone). *See Updated Assessment of the Federal Assault Weapons Ban* at 15, 18-19; *see also America's Experience with the Federal Assault Weapons Ban* at 161-62. More recent data discussed below suggest that guns with LCMs now represent an even higher share of guns used in crime.

It also appears that guns with LCMs have been used disproportionately in murders of police. Specifically, data from prior to the federal ban indicated that LCMs were used in 31% to 41% of gun murders of police in contrast to their use in 13-26% of gun crimes overall. *See Updated Assessment of the Federal Assault Weapons Ban* at 18; *see also America's Experience with the Federal Assault Weapons Ban* at 162. More recent data discussed below also show a similar pattern of guns with LCMs being more common among weapons used in gun murders of police.

In addition, the available evidence suggests that gun attacks with semiautomatics—including both assault weapons and guns equipped with LCMs—tend to result in more shots fired, more persons wounded, and more wounds inflicted per victim than do attacks with other firearms. *See Updated Assessment of*

[11] This investigation and compilation of data on mass shootings was done by reporters at *Mother Jones* magazine. *See* Follman, Aronsen & Pan 2013; *see also* Follman Aronsen & Lee 2013; Mark Follman, Gavin Aronsen & Deanna Pan, *A Guide to Mass Shootings in America* (updated Feb. 27, 2013), *available at* http://www.motherjones.com/politics/2012/07/mass-shootings-map.

the Federal Assault Weapons Ban at 97; *see also America's Experience with the Federal Assault Weapons Ban* at 166-67.

For example, in mass shooting incidents that resulted in at least 6 deaths or at least 12 total gunshot victims from 1984 through 1993, offenders who clearly possessed assault weapons or other semiautomatics with LCMs wounded or killed an average of 29 victims in comparison to an average of 13 victims wounded or killed by other offenders. *See Updated Assessment of the Federal Assault Weapons Ban* at 85-86; *see also America's Experience with the Federal Assault Weapons Ban* at 167.

Working under my direction, Luke Dillon, a graduate student at George Mason University, recently analyzed the *Mother Jones* data from 1982 through 2012 for his Master's thesis, and compared the number of deaths and fatalities of the 62 mass shootings identified therein to determine how the presence of assault weapons and LCMs impacted the outcome.[12] With respect to LCMs, Mr. Dillon compared cases where an LCM was known to have been used (or at least possessed by the shooter) against cases where either an LCM was not used or not known to have been used. He found that the LCM cases (which included assault weapons) had significantly higher numbers of fatalities and casualties: an average of 10.19 fatalities in LCM cases compared to 6.35 fatalities in non-LCM/unknown cases. Mr. Dillon also found an average of 12.39 people were shot but not killed in public mass shootings involving LCMs, compared to just 3.55 people shot in the non-LCM/unknown LCM shootings. These findings reflect a total victim differential of 22.58 killed or wounded in the LCM cases compared to 9.9 in the non-

[12] *See* Luke Dillon, Mass Shootings in the United States: An Exploratory Study of the Trends from 1982 to 2012 (2013) (unpublished M.A. thesis, George Mason University, Department of Criminology, Law and Society).

LCM/unknown LCM cases.[13] All of these differences were statistically significant and not a result of mere chance.

Similarly, a study of handguns attacks in Jersey City, New Jersey during the 1990s found that the average number of victims wounded in gunfire incidents involving semiautomatic pistols was 15% higher than in those involving revolvers. The study further found that attackers using semiautomatics to fire more than ten shots were responsible for nearly 5% of all gunshot victims and that 100% of these incidents involved injury to at least one victim. *See Updated Assessment of the Federal Assault Weapons Ban* at 84-86, 90-91; *see also America's Experience with the Federal Assault Weapons Ban* at 167.[14]

Similar evidence comes from other local studies. Between 1992 and 1995, gun homicide victims in Milwaukee who were killed by guns with LCMs had 55% more gunshot wounds than those victims killed by non-LCM firearms. Further, a study of gun homicides in Iowa City (IA), Youngstown (OH), and Bethlehem (PA) from 1994 through 1998 found gun homicide victims killed by pistols averaged 4.5 gunshot wounds as compared to 2 gunshot wounds for those killed by revolvers. *See Updated Assessment of the Federal Assault Weapons Ban* at 86.

And, in an analysis I conducted of guns recovered by police in Baltimore, I also found LCMs to be associated with gun crimes that resulted in more lethal and injurious outcomes. For instance, I found, among other things, that guns used in shootings that resulted in gunshot victimizations were 17% to 26% more likely to

[13] The patterns were also very similar when comparing the LCM cases against just those cases in which it was clear that an LCM was not used (though this was a very small number).

[14] Note that these data were collected in the 1990s during the years of the federal LCM ban and in a city that was also subject to state-level LCM restrictions on magazines holding more than 15 rounds. Hence, these findings may not generalize well to other locations and the current timeframe. More specifically, given recent increases in the use of firearms with LCMs as discussed below, the Jersey City results may understate the current share of gunshot victimizations resulting from incidents with more than 10 shots fired.

have LCMs than guns used in gunfire cases with no wounded victims, and guns linked to murders were 8% to 17% more likely to have LCMs than guns linked to non-fatal gunshot victimizations. *See Updated Assessment of the Federal Assault Weapons Ban* at 87.

In short, while tentative, the available evidence suggests more often than not that attacks with semiautomatics, particularly those equipped with LCMs, result in more shots fired, leading both to more injuries and injuries of greater severity. Such attacks also appear to result in more wounds per victim. This is significant because gunshot victims who are shot more than once are more than 60% more likely to die than victims who receive only one gunshot wound. *See Updated Assessment of the Federal Assault Weapons Ban* at 87 (citing studies showing 63% increase and 61% increase, respectively, in fatality rates among gunshot victims suffering more than one wound).

In addition, diminishing the number of victims of shootings by even a small percentage can result in significant cost savings because of the significant social costs of shootings, as discussed herein.

C. Effects of the 1994 Federal Assault Weapons Ban

1. Provisions of the Federal Assault Weapons Ban

Enacted on September 13, 1994—in the wake of many of the mass shootings described above—the federal assault weapons ban imposed prohibitions and restrictions on the manufacture, transfer, and possession of both certain semiautomatic firearms designated as assault weapons and certain LCMs. Pub. L. No. 103-322, tit. XI, subtit. A, 108 Stat. 1796, 1996-2010 (codified as former 18 U.S.C. § 922(v), (w)(1) (1994).

The federal assault weapons ban was to expire after ten years, unless renewed by Congress. Pub. L. No. 103-322, tit. XI, § 110105(2). Congress did not renew

the ban, and thus, by its own terms, the federal ban expired on September 13, 2004.[15]

a. Banned Assault Weapons and Features

As noted, the federal assault weapons ban imposed a ten-year ban on the manufacture, transfer, or possession of what the statute defined as "semiautomatic assault weapons." The federal ban was not a prohibition on all semiautomatic firearms; rather, it was directed against those semiautomatics having features that are useful in military and criminal applications but that are unnecessary in shooting sports or for self-defense.

Banned firearms were identified under the federal law in two ways: (i) by specific make and model; and (ii) by enumerating certain military-style features and generally prohibiting those semiautomatic firearms having two or more of those features.

First, the federal ban specifically prohibited 18 models and variations of semiautomatic guns by name (*e.g.*, the Intratec TEC-9 pistol and the Colt AR-15 rifle), as well as revolving cylinder shotguns. This list also included a number of foreign rifles that the federal government had banned from importation into the country beginning in 1989 (*e.g.*, the Avtomat Kalashnikov models). And, indeed, several of the guns banned by name were civilian copies of military weapons and accepted ammunition magazines made for those military weapons. A list of the weapons banned by name in the 1994 law is set forth in Table 2-1 of the *Updated Assessment of the Federal Assault Weapons Ban* at 5.

Second, the federal assault weapons ban contained a "features test" provision that generally prohibited other semiautomatic guns having two or more military-

[15] I understand that California prohibited assault weapons in 1989, before the federal ban, but grandfathered most existing assault weapons; and that California prohibited large-capacity magazines in 2000 but grandfathered existing LCMs. I am not aware of any specific studies of the effects of these California laws on gun markets or gun violence.

style features. Examples of such features include pistol grips on rifles, flash suppressors, folding rifle stocks, threaded barrels for attaching silencers, and the ability to accept detachable magazines. This "features test" of the federal ban is described more fully in Table 2-2 of the *Updated Assessment of the Federal Assault Weapons Ban* at 6, and in Table 12-1 of *America's Experience with the Federal Assault Weapons Ban* at 160.

b. Banned Large-Capacity Magazines

The federal ban also prohibited most ammunition feeding devices holding more than ten rounds of ammunition (which I have referred to herein as "large-capacity magazines" or "LCMs"). The federal ban on LCMs extended to LCMs or similar devices that had the capacity to accept more than ten rounds of ammunition, or that could be "readily restored or converted or to accept" more than ten rounds of ammunition.[16]

c. Exemptions and Limitations to the Federal Ban

The 1994 federal assault weapons ban contained several important exemptions that limited its potential impact, especially in the short-term. *See Updated Assessment of the Federal Assault Weapons Ban* at 10-11.

First, assault weapons and LCMs manufactured before the effective date of the ban were "grandfathered" in and thus legal to own and transfer. Estimates suggest that there may have been upward of 1.5 million assault weapons and 25-50 million LCMs thus exempted from the federal ban. Moreover, an additional 4.8 million pre-ban LCMs were imported into the country from 1994 through 2000 under the grandfathering exemption. Importers were also authorized to import another 42 million pre-ban LCMs, which may have arrived after 2000. *See Updated*

[16] Technically, the ban prohibited any magazine, belt, drum, feed strip, or similar device that had the capacity to accept more than 10 rounds of ammunition, or which could be readily converted or restored to accept more than 10 rounds of ammunition. The ban exempted attached tubular devices capable of operating only with 22 caliber rimfire (*i.e.*, low velocity) ammunition.

Assessment of the Federal Assault Weapons Ban at 10; *see also America's Experience with the Federal Assault Weapons Ban* at 160-61.

Furthermore, although the 1994 law banned "copies or duplicates" of the named firearms banned by make and model, federal authorities emphasized exact copies in enforcing this provision. Similarly, the federal ban did not apply to a semiautomatic weapon possessing only one military-style feature listed in the ban's features test provision.[17] Thus, many civilian rifles patterned after military weapons were legal under the ban with only slight modifications. *See Updated Assessment of the Federal Assault Weapons Ban* at 10-11.[18]

D. Impact of the Federal Assault Weapons Ban

This section of my report discusses the empirical evidence of the impact of the federal assault weapons ban. I understand that the Plaintiffs in this litigation contend that California's prohibition on the possession of LCMs will not have an effect on crime or gunshot victimization because criminal users of firearms will not comply with California's ban. In my opinion, that contention misunderstands the effect of possession bans. The issue is not only whether criminals will be unwilling to comply with such laws, though this could be an important consideration depending on the severity of penalties for possession or use. The issue is also how possession bans affect the availability of weapons for offenders. Examining the

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[17] It should be noted, however, that any firearms imported into the country must still meet the "sporting purposes test" established under the federal Gun Control Act of 1968. In 1989, the federal Bureau of Alcohol, Tobacco, Firearms and Explosives ("ATF") determined that foreign semiautomatic rifles having any one of a number of named military features (including those listed in the features test of the 1994 federal assault weapons ban) fail the sporting purposes test and cannot be imported into the country. In 1998, the ability to accept an LCM made for a military rifle was added to the list of disqualifying features. Consequently, it was possible for foreign rifles to pass the features test of the federal assault weapons ban, but not meet the sporting purposes test for imports. *See Updated Assessment of the Federal Assault Weapons Ban* at 10 n.7.

[18] Examples of some of these modified, legal versions of banned guns that manufacturers produced in an effort to evade the ban are listed in Table 2-1 of the *Updated Assessment of the Federal Assault Weapons Ban* at 5.

effects of the federal ban on LCMs could cast some light on how a state or local prohibition on possession of LCMs may diminish their availability for offenders. It is difficult, however, to assess trends in LCM use because of limited information. *See infra* at 20. For that reason, this section discusses the impacts of the federal ban both on LCM use, for which information is limited, and on ownership and use of assault weapons, for which there is more information.

1. Assault Weapons

Prior to the federal ban, the best estimates are that there were approximately 1.5 million privately owned assault weapons in the United States (less than 1% of the total civilian gun stock). *See America's Experience with the Federal Assault Weapons Ban* at 160-61; *see also Updated Assessment of the Federal Assault Weapons Ban* at 10.

Although there was a surge in production of assault weapon-type firearms as Congress debated the ban in 1994, the federal ban's restriction of new assault weapon supply helped drive up the prices for many assault weapons (notably assault pistols) and appeared to make them less accessible and affordable to criminal users. *See America's Experience with the Federal Assault Weapons Ban* at 162-63; *see also Updated Assessment of the Federal Assault Weapons Ban* at 25-38.

Analyses that my research team and I conducted of several national and local databases on guns recovered by law enforcement indicated that crimes with assault weapons declined after the federal assault weapons ban was enacted in 1994.

In particular, across six major cities (Baltimore, Miami, Milwaukee, Boston, St. Louis, and Anchorage), the share of gun crimes involving assault weapons declined by 17% to 72%, based on data covering all or portions of the 1995-2003 post-ban period. *See Updated Assessment of the Federal Assault Weapons Ban* at 2, 46-60; *see also America's Experience with the Federal Assault Weapons Ban* at 163.

This analysis of local data is consistent with patterns found in the national data on guns recovered by law enforcement agencies around the country and reported to the ATF for investigative gun tracing.[19] Specifically, although the interpretation is complicated by changes in tracing practices that occurred during this time, the national gun tracing data suggests that use of assault weapons in crime declined with the onset of the 1994 federal assault weapons ban, as the percentage of gun traces for assault weapons fell 70% between 1992-93 and 2001-02 (from 5.4% to 1.6%). And, notably, this downward trend did not begin until 1994, the year the federal ban was enacted. *See Updated Assessment of the Federal Assault Weapons Ban* at 2, 39-46, 51-52; *see also America's Experience with the Federal Assault Weapons Ban* at 163.[20]

In short, the analysis that my research team and I conducted indicates that the criminal use of assault weapons declined after the federal assault weapons ban was enacted in 1994, independently of trends in gun crime. *See Updated Assessment of the Federal Assault Weapons Ban* at 51-52; *see also America's Experience with the Federal Assault Weapons Ban* at 163.

This decline in crimes with assault weapons was due primarily to a reduction in the use of assault pistols. Assessment of trends in the use of assault rifles was complicated by the rarity of crimes with such rifles and by the substitution in some cases of post-ban rifles that were very similar to the banned models. In general, however, the decline in assault weapon use was only partially offset by substitution

[19] A gun trace is an investigation that typically tracks a gun from its manufacture to its first point of sale by a licensed dealer. It is undertaken by the ATF, upon request by a law enforcement agency. The trace is generally initiated when the requesting law enforcement agency provides ATF with a trace request including identifying information about the firearm, such as make, model and serial number. For a full discussion of the use of ATF gun tracing data, see section 6.2 of *Updated Assessment of the Federal Assault Weapons Ban* at 40-46.

[20] These findings are consistent with other tracing analyses conducted by ATF and the Brady Center to Prevent Gun Violence. *See Updated Assessment of the Federal Assault Weapons Ban* at 44 n.43.

of post-ban assault weapon-type models. Even counting the post-ban models as assault weapons, the share of crime guns that were assault weapons fell 24% to 60% across most of the local jurisdictions studied. Patterns in the local data sources also suggested that crimes with assault weapons were becoming increasingly rare as the years passed. *See Updated Assessment of the Federal Assault Weapons Ban* at 46-52; *see also America's Experience with the Federal Assault Weapons Ban* at 163-64.

Thus, while developing a national estimate of the number of assault weapons crimes prevented by the federal ban is complicated by the range of estimates of assault weapon use and changes therein derived from different data sources, tentatively, it appears that the federal ban prevented a few thousand crimes with assault weapons annually. For example, using 2% as the best estimate of the share of gun crimes involving assault weapons prior to the ban, and 40% as a reasonable estimate of the post-ban drop in this figure, implies that almost 2,900 murders, robberies, and assaults with assault weapons were prevented in 2002. *See Updated Assessment of the Federal Assault Weapons Ban* at 52 n.61.[21] If this tentative conclusion is correct, then contrary to Plaintiffs' contention, prohibitions like the federal ban do have an impact on criminal users of guns.

2. Large-Capacity Magazines

Assessing trends in LCM use is much more difficult because there was, and is, no national data source on crimes with LCMs, and few local jurisdictions maintain this sort of information.

It was possible, nonetheless, to examine trends in the use of guns with LCMs in four jurisdictions: Baltimore, Milwaukee, Anchorage, and Louisville. In all four

[21] While it seems likely that some or all of these crimes happened regardless, as perpetrators merely substituted some other gun for the assault weapon, it also seems likely that the number of victims per shooting incident, and the number of wounds inflicted per victim, was diminished in some of those instances.

jurisdictions, the overall share of crime guns equipped with LCMs rose or remained steady through at least the late 1990s. This failure to reduce overall LCM use for at least several years after the federal ban was likely due to the immense stock of exempted pre-ban magazines, which, as noted, was enhanced by post-ban imports. *See Updated Assessment of the Federal Assault Weapons Ban* at 68-79; *see also America's Experience with the Federal Assault Weapons Ban* at 164.

My studies did show that crimes with LCMs may have been decreasing by the early 2000s, but the available data in the four cities I investigated were too limited and inconsistent to draw any clear overall conclusions in this regard. *See America's Experience with the Federal Assault Weapons Ban* at 164; *Updated Assessment of the Federal Assault Weapons Ban* at 68-79.

However, a later investigation by *The Washington Post* of LCM use in Virginia, analyzing data maintained by the Virginia State Police as to guns recovered in crimes by local law enforcement officers across the state, suggests that the ban may have had a more substantial impact on the supply of LCMs to criminal users by the time it expired in 2004. In Virginia, the share of recovered guns with LCMs generally varied between 13% and 16% from 1994 through 2000 but fell to 9% by 2004. Following expiration of the federal ban in 2004, the share of Virginia crime guns with an LCM rose to 20% by 2010. *See America's Experience with the Federal Assault Weapons Ban* at 165.[22] These data suggest that the federal ban

[22] The results of *The Washington Post's* original investigation (which are what are conveyed in *America's Experience with the Federal Assault Weapons Ban* at 165) are reported in David S. Fallis & James V. Grimaldi, *Va. Data Show Drop in Criminal Firepower During Assault Gun Ban*, Wash. Post, Jan. 23, 2011, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2011/01/22/AR2011012203452.html, and attached as Exhibit E to this report. In early 2013, *The Washington Post* updated this analysis, and slightly revised the figures it reported by identifying and excluding from its counts more than 1,000 .22-caliber rifles with large-capacity tubular magazines, which were not subject to the federal ban (and which are similarly not subject to California's ban on large-capacity magazines). *See* David S. Fallis, *Data Indicate Drop in High-Capacity Magazines During Federal Gun Ban*, Wash. Post, Jan. 10, 2013, *available at* https://www.washingtonpost.com/investigations/data-point-to-drop-in-high-capacity-magazines-during-federal-gun-ban/2013/01/10/d56d3bb6-4b91-11e2-
(continued...)

may have been reducing the use of LCMs in gun crime by the time it expired in 2004, and that it could have had a stronger impact had it remained in effect.

3. Summary of Results of the Federal Assault Weapons Ban

The federal ban's exemption of millions of pre-ban assault weapons and LCMs meant that the effects of the law would occur only gradually—and that those effects were still unfolding when the ban expired in 2004. Nevertheless, while the ban did not appear to have a measurable effect on overall gun crime during the limited time it was in effect, as just discussed, my studies and others do appear to show a significant impact on the number of gun crimes involving assault weapons and a possibly significant impact (based on *The Washington Post's* analysis of Virginia data, see Fallis, *supra*, at Exhibits E & F) on those crimes involving LCMs.[23]

Moreover, as set forth in my 2013 book chapter, there is evidence that, had the federal ban remained in effect longer (or were it renewed), it could conceivably have yielded significant additional societal benefits as well, potentially preventing hundreds of gunshot victimizations annually and producing millions of dollars of

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(…continued)
a6a6-aabac85e8036_story.html?utm_term=.44aa13f8e442, and attached as Exhibit F to this report. This updated data is reported above.

[23] In our initial 1997 study on the impact of the federal assault weapons ban, Jeffrey Roth and I also estimated that gun murders were about 7% lower than expected in 1995 (the first year after the ban), adjusting for pre-existing trends. *See Impact Evaluation* at 6, 79-85. However, the very limited post-ban data available for that study precluded a definitive judgment as to whether this drop was statistically meaningful. My later findings on LCM use made it difficult to credit the ban with this effect, however, and I did not update it for the 2004 report. *See Updated Assessment of the Federal Assault Weapons Ban* at 92 n.109. Other national studies of trends in gun violence have failed to find an effect of the federal ban on gun murders (which is consistent with my conclusions in the 2004 report but must also be interpreted in light of the ban's limitations and delayed effects as discussed above), though they also suggest that the ban may have reduced fatalities and injuries from public mass shootings. Mark Gius, *An Examination of the Effects of Concealed Weapons Laws and Assault Weapons Bans on State-Level Murder Rates*, 21 Applied Econ. Letters 265, 265-267 (Nov. 26, 2013) (hereinafter, "Gius 2013"); Mark Gius, *The Impact of State and Federal Assault Weapons Bans on Public Mass Shootings*, 22 Applied Econ. Letters 281, 281-84 (Aug. 1, 2014) (hereinafter, "Gius 2014").

cost savings per year in medical care alone. Indeed, reducing shootings by even a very small margin could produce substantial long term savings for society, especially as the shootings prevented accrue over many years. *See America's Experience with the Federal Assault Weapons Ban* at 166-67; *see also Updated Assessment of the Federal Assault Weapons Ban* at 100 n.118. Some studies have shown that the lifetime medical costs for gunshot injuries are about $28,894 (adjusted for inflation). Thus, even a 1% reduction in gunshot victimizations at the national level would result in roughly $18,781,100 in lifetime medical costs savings from the shootings prevented each year. *See America's Experience with the Federal Assault Weapons Ban* at 166-67; *see also Updated Assessment of the Federal Assault Weapons Ban* at 100 n.18.

The cost savings potentially could be substantially higher if one looks beyond just medical costs. For example, some estimates suggest that the full societal costs of gun violence—including medical, criminal justice, and other government and private costs (both tangible and intangible)— could be as high as $1 million per shooting. Based on those estimates, even a 1% decrease in shootings nationally could result in roughly $650 million in cost savings to society from shootings prevented each year. *See America's Experience with the Federal Assault Weapons Ban*at 166-67.

E. More Recent Research on Criminal Use of Large Capacity Magazines

To provide an updated examination of the assault weapons and LCM issue, my colleagues and I recently investigated current levels of criminal activity with assault weapons and other high capacity semiautomatic firearms in the United States using several local and national data sources.[24] I focus here on the results pertaining to the use of guns with LCMs overall. Sources for this portion of the

[24] See Koper et al., *supra* note 5.

analysis included guns recovered by police in eight large cities (Hartford, CT; Syracuse, NY; Baltimore, MD; Richmond, VA; Minneapolis, MN; Milwaukee, WI; Kansas City, MO; and Seattle, WA), guns used in murders of police throughout the nation, and guns used in firearm mass murder incidents in which at least four people were murdered with a firearm (irrespective of the number of additional victims shot but not killed). The use of guns with LCMs was measured precisely for the Syracuse, Baltimore, and Richmond analyses, which were based on data sources having an indicator for magazine capacity, and some of the mass murder incidents. For other analyses, use of guns with LCMs was approximated based on recoveries of semiautomatic firearm models that are commonly manufactured and sold with LCMs. I refer to these guns collectively as LCM firearms.

In short, the findings of this study reinforce many of the points made above based on my earlier research. In the police databases, which covered varying time periods from 2008 through 2014, LCM firearms generally accounted for 22-36% of crime guns, with some estimates upwards of 40% for cases involving shootings.[25] Although these estimates may overstate LCM use somewhat (since some estimates were based on measurement of LCM compatible firearms that may not all have been equipped with LCMs), they suggest that LCMs are used in a substantial share of gun crimes. Consistent with prior research, we also found that LCM firearms are more heavily represented among guns used in murders of police and mass murders. For the period of 2009 through 2013, LCM firearms constituted 41% of guns used in murders of police, with annual estimates ranging from 35% to 48%. Further, our analysis of a sample of 145 mass murders that occurred from 2009 through 2015 suggested that LCM firearms were involved in as many as 57% of these incidents

[25] An exception is that crime guns were least likely to be equipped with LCMs in Syracuse (14.6%). This may be attributable to New York State LCM restrictions that have been in effect since the early 2000s, but our study did not address this question.

based on cases for which a definitive determination could be made (as a caveat, precise data on the guns and magazines used were not available for most cases). The identified LCM cases typically occurred in public locations (80%) and resulted in more than twice as many people shot on average as did other incidents—a statistically significant difference that is not likely due to chance (13.7 victims on average for LCM cases versus 5.2 for other cases).

Our study also revealed that LCM firearms have grown substantially as a share of guns used in crime since the expiration of the federal LCM ban. This conclusion is based on guns used in murders of police nationally (2003-2013) as well as guns recovered by police in Baltimore (2004-2014), Richmond (2003-2009), and Minneapolis (2006-2014).[26] For these data sources and time frames, the percentage of guns that were LCM firearms increased (in relative terms) by 33-49% in the Baltimore, Minneapolis, and national data, and by 112% in the Richmond data.[27]

This upward trend in criminal use of LCM firearms implies possible increases in the level of gunfire and injury per gun attack since the expiration of the federal LCM ban. Consistent with this inference, national data that we compiled from the federal Centers for Disease Control and Prevention and the Federal Bureau of Investigation show that gun homicides and assault-related non-fatal shootings rose by about 29% relative to the level of overall reported violent gun crimes (homicides, assaults, and robberies) between 2003-2005 and 2010-2012.[28]

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[26] Note that Maryland restricted LCMs with more than 20 rounds throughout this period and extended these restrictions to LCMs with more than 10 rounds in 2013.

[27] For example, the share of guns used in police murders that were LCM firearms rose from 30.4% for the 2003-2007 period to 40.6% for the 2009-2013 period (a relative increase of 33.6%). In the Richmond data, LCM firearms increased from 10.4% of guns recovered by police for the 2003-2004 period to 22% for the 2008-2009 period (a relative increase of 111.5%).

[28] See Koper et al., *supra* note 5. This trend was driven by assault-weapon-related non-fatal shootings, which have been trending upward since the early 2000s and recently reached their highest rates since 1995. *See* Katherine A. Fowler et al., *Firearm Injuries in the United States*, 79 Preventive Med. 5, 5-14 (Oct. 2015).

Although the correlation of these trends does not prove causation, they suggest the possibility that greater use of LCM firearms has contributed to higher levels of shootings in recent years.

VI. SECTION 32310 -- CALIFORNIA'S LARGE-CAPACITY MAGAZINE PROHIBITION

A. The LCM Ban

On July 1, 2016, the State of California enacted Senate Bill No. 1446 (2015-2016 Reg. Sess.), which prohibited the possession of LCMs (defined under Section 16740 as "a feeding device with the capacity to accept more than 10 rounds") beginning on July 1, 2017. Cal. Stats. 2016, ch. 58 (SB 1446) § 1. SB 1446, which went into effect on January 1, 2017, amended Section 32310 to state that, beginning on July 1, 2017, any person possessing an LCM, with exemptions not relevant here, would be guilty of an infraction punishable by a fine starting at $100 for the first offense. Cal. Stats. 2016, ch. 58 (S.B. 1446) § 1 (amending Section 32310 to add a new subdivision (c).). The law also provided that anyone possessing an LCM may, prior to July 1, 2017, dispose of the magazine by any of the following means: (1) removing it from the state; (1) selling it to a licensed firearms dealer; (3) destroying it; or (4) surrendering it to a law enforcement agency for destruction. Cal. Stats. 2016, ch. 58 (S.B. 1446) § 1 (amending Section 32310 to add a new subdivision (d)). The Senate Bill Analysis noted that the amendments were necessary because the prior version of the law, which did not prohibition possession of LCMs, was "very difficult to enforce." Sen. Bill No. 1446, 3d reading Mar. 28, 2016 (2015-2016 Reg. Sess.) (Cal. 2016)).

On November 8, 2016, California voters passed Proposition 63, the "Safety for All Act of 2016." Prop. 63, § 1, as approved by voters (Gen. Elec. Nov. 8, 2016)). The measure included several provisions—including amendments to Section 32310—intended to close "loopholes that leave communities throughout the state vulnerable to gun violence and mass shootings." Prop. 63, § 2, ¶ 5. The

amendments to Section 32310 largely mirror the same amendments made under SB 1446. Both provisions prohibit the possession of LCMs on or after July 1, 2017, and list options for the disposal of LCMs before that date. Prop. 63 also increased the potential consequence for violations of the possession ban, from an infraction to an infraction or a misdemeanor. Prop. 63, § 6.1. References to Section 32310 in this brief are to the statute as amended by Proposition 63.

B. The Potential Impact and Efficacy of California's Ban on Possession of LCMs

California's ban on possession was only recently passed, and I have not undertaken any study or analysis of this law. Nevertheless, it is my considered opinion that, based on the similarities of Section 32310 to the federal ban, the impacts of the federal ban and the ways in which Section 32310 address some of the weaknesses of the federal ban, Section 32310 is likely to advance California's interest in protecting public safety.[29]

[29] A few studies of state-level assault weapon and LCM bans have examined the effects of these laws on gun violence and other crimes. In those studies that have examined gun homicides and other shootings (the crimes that are logically most likely to be affected by LCM bans), evidence has been mixed. Although states with assault weapon and LCM laws tend to have lower gun murder rates, this association is not statistically significant when controlling for other social and policy factors. However, other evidence from these studies suggests these laws may produce statistically significant reductions in fatalities from public mass shootings. *See* Gius 2013 at 265-67; *see also* Gius 2014 at 281-84; Eric W. Fleegler et al., *Firearm legislation and firearm-related fatalities in the United States*, 173 JAMA Internal Med. 732, 732-40 (2013); Christopher S. Koper & Jeffrey A. Roth, *The Impact of the 1994 Federal Assault Weapon Ban on Gun Violence Outcomes: an Assessment of Multiple Outcome Measures and Some Lessons for Policy Evaluation*, 17 Journal of Quantitative Criminology 33-74 (2001); *see also Updated Assessment of the Federal Assault Weapons Ban* at 81 n.95. Nonetheless, it is difficult to draw definitive conclusions from these studies for several reasons including the following. For one, there is little evidence on how state LCM bans affect the availability and use of LCMs over time. Further, studies have not generally accounted for important differences in state assault weapons laws—most notably, whether they include LCM bans—and changes in these provisions over time. Perhaps most importantly, to the best of my knowledge, there have not been any studies examining the effects of LCM laws that ban LCMs without grandfathering, as done by the new California statute. Hence, these studies have limited value in assessing the potential effectiveness of California's new law.

California's LCM ban is more robust than the expired federal ban, and may be more effective more quickly due to its elimination of grandfathering for previously owned LCMs. While the LCM ban was arguably the most important feature of the 1994 federal ban (given that LCMs are the key feature contributing to an assault weapon's firepower, and that the reach of the LCM ban was much greater than the assault weapons ban as many semiautomatic guns that were not banned could still accept LCMs), my studies as to the effects of the federal ban indicated that the LCM ban was likely not as efficacious in reducing the use of these magazines in crime as it otherwise might have been because of the large number of pre-ban LCMs which were exempted from the ban. *The Washington Post*'s investigation of recovered guns with LCMs in Virginia, which showed an increasing decline in the number of recovered guns with LCMs the longer the ban was in effect, similarly suggests that the grandfathering of pre-ban LCMs delayed the full impact of the federal ban. See Fallis, *supra*, attached as Exhs. E & F. In my opinion, eliminating the grandfathering of pre-ban LCMs, as done by California's new law, would have improved the efficacy of the federal ban.

In my opinion, based on the data and information contained in this report and the sources referred to herein, a complete ban on the possession of LCMs has the potential to: (1) reduce the number of crimes committed with LCMs; (2) reduce the number of shots fired in gun crimes; (3) reduce the number of gunshot victims in such crimes; (4) reduce the number of wounds per gunshot victim; (5) reduce the lethality of gunshot injuries when they do occur; and (6) reduce the substantial societal costs that flow from shootings.

Through Section 32310 (c) and (d), California has enacted a ban on the possession of LCMs. Like federal restrictions on fully automatic weapons and armor piercing ammunition, I believe this measure has the potential to help prevent the use and spread of particularly dangerous weaponry, and is a reasonable and

well-constructed measure that is likely to advance California's interest in protecting its citizens and its police force.

Respectfully Submitted,

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IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF CALIFORNIA

VIRGINIA DUNCAN, et al.,

Plaintiffs,

v.

XAVIER BECERRA, in his official capacity as Attorney General of the State of California,

Defendant.

Case No: 17-cv-1017-BEN-JLB

EXHIBITS 6-9 TO THE DECLARATION OF ANNA M. BARVIR IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT OR, ALTERNATIVELY, PARTIAL SUMMARY JUDGMENT

Hearing Date: April 30, 2018
Hearing Time: 10:30 a.m.
Judge: Hon. Roger T. Benitez
Courtroom: 5A

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EXHIBIT 6

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IN THE UNITED STATES DISTRICT COURT

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17-cv-1017-BEN-JLB

EXPERT REBUTTAL REPORT OF JOHN J. DONOHUE

Judge: Hon. Roger T. Benitez
Action Filed: May 17, 2017

Expert Rebuttal Report of John J. Donohue

Duncan v. Becerra, United States District Court (S.D. Cal.),
Case No.: 17CV1017 BEN JLB
November 2, 2017

BACKGROUND AND QUALIFICATIONS

1. I, John J. Donohue, am the C. Wendell and Edith M. Carlsmith Professor of Law at Stanford Law School. After earning a law degree from Harvard and a Ph.D. in economics from Yale, I have been a member of the legal academy since 1986. I have previously held tenured positions as a chaired professor at both Yale Law School and Northwestern Law School. I have also been a visiting professor at a number of prominent law schools, including Harvard, Yale, the University of Chicago, Cornell, the University of Virginia, Oxford, Toin University (Tokyo), St. Gallen (Switzerland), and Renmin University (Beijing).

2. For a number of years, I have been teaching a course at Stanford on empirical law and economics issues involving crime and criminal justice, and I have previously taught similar courses at Yale Law School, Tel Aviv University Law School, the Gerzensee Study Center in Switzerland, and St. Gallen University School of Law in Switzerland. I have consistently taught courses on law and statistics for two decades.

3. I am a Research Associate of the National Bureau of Economic Research and a member of the American Academy of Arts and Sciences. I was a Fellow at the Center for Advanced Studies in Behavioral Sciences in 2000-01, and served as the co-editor (handling empirical articles) of the *American Law and Economics Review* for six years. I have also served as the President of the American Law and Economics Association and as Co-President of the Society of Empirical Legal Studies.

4. I am also a member of the Committee on Law and Justice of the National Research Council ("NRC"), which "reviews, synthesizes, and proposes research related to crime,

law enforcement, and the administration of justice, and provides an intellectual resource for federal agencies and private groups."[1]

5. My research and writing uses empirical analysis to determine the impact of law and public policy in a wide range of areas, and I have written extensively about the relationship between rates of violent crime and firearms regulation. My complete credentials and list of publications are stated in my curriculum vitae, a true and correct copy of which is attached as Exhibit A.

6. The following lists all of the cases in which I have testified as an expert in the past 4 years. I filed an expert declaration in each of two cases involving a National Rifle Association ("NRA") challenge to city restrictions on the possession of large-capacity magazines:

   Fyock v. City of Sunnyvale, United States District Court (N.D. Cal.), Case No. 4:13-cv-05807-PJH, January 2014.

   San Francisco Veteran Police Officers Association v. City and County of San Francisco, United States District Court (N.D. Cal.), Case No. C 13-05351 WHA, January 2014.

7. I also filed an expert declaration in a case involving a challenge by the NRA to Maryland's restrictions on assault weapons and large-capacity magazines:

   Tardy v. O'Malley (currently listed as *Kolbe v. Hogan*), United States District Court (District of Maryland), Case 1:13-cv-02841-CCB, February 2014.

   In all these cases, the relevant gun regulations have (ultimately) been sustained in the relevant federal appellate courts.

8. In addition to filing an earlier expert declaration in this case, I also filed (on June 1, 2017) an expert declaration in a case involving a challenge by the NRA to California's restrictions on carrying of weapons in public:

   Flanagan v. Becerra, United States District Court (C.D. Cal.), Case No. 2:16-cv-06164-JAK-AS.

9. I am being compensated at my government rate of $425 per hour.

[1] See http://www7.national-academies.org/claj/ online for more information about the NRC.

SUBSTANTIVE CONCLUSIONS

10. The events in Las Vegas on October 1, 2017, have underscored—yet again—the wisdom of the efforts of the California legislature, with the overwhelming support of the voters of the state, "to aid in the shaping and application of those wise restraints that make men free" by banning from our state the large-capacity magazines (LCMs)[2] that were a key element enabling the extent of the carnage in that horrific mass shooting.[3] It is my opinion that if, rather than allowing the federal ban on these devices to lapse in 2004, the country had moved to the more complete ban that California has finally adopted, tragedies like the one in Las Vegas would have been far less deadly and damaging to countless individuals who have been maimed and injured throughout the United States and perhaps the world.[4] It is also my opinion that Section 32310's ban on possession of LCMs would decrease the mayhem from at least some mass killings in California, by making it incrementally harder for those bent on mass destruction to implement their criminal designs.

Response to Curcuruto Report

11. In opposition to the ban on LCMs, plaintiffs offer two additional expert reports. The first report is from James Curcuruto of the National Shooting Sports Foundation.

12. Mr. Curcuruto provides irrelevant information, opining as his main conclusion that "There are at least one hundred million magazines of a capacity of more than ten rounds in possession of American citizens" (Curcuruto Report at 3), only to concede later that he really does not know but "it is safe to say whatever the actual number of such magazines

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[2] LCMs are defined as ammunition-feeding devices with the capacity to hold more than 10 rounds of ammunition.

[3] The quote is from John MacArthur Maguire and is enshrined at the Harvard Law School library. See https://asklib.law.harvard.edu/friendly.php?slug=faq/115309 (last visited Nov. 1, 2017).

[4] The horrendous mass killing in Norway by Anders Breivik, endangered by the restrictive gun laws of Europe, was salvaged by his ability to procure ten 30-round high-capacity magazines from the United States. Stephanie Condon, "Norway Massacre Spurs Call for New U.S. Gun Laws," CBS News, July 28, 2011, *available at* https://www.cbsnews.com/news/norway-massacre-spurs-calls-for-new-us-gun-laws/ (last visited Nov. 1, 2017).

in United States consumers' hands is, it is in the tens-of-millions." (Curcuruto Report at 4.)

13. While Mr. Curcuruto offers his wildly varying estimates of the number of high-capacity magazines in the United States, his undifferentiated national speculations offer no insight into how many of these magazines are possessed in rural areas throughout the United States. As a result, his figures would have little relevance to the appropriate regulatory regime for a state with large urban population centers like California. Mr. Curcuruto does not discuss the stock of high-capacity magazines in California, which of course will be far lower on a per capita basis because it has been unlawful to add to this stock for decades.

14. National surveys such as the General Social Survey (GSS) and research by the Pew Research Center and the National Behavioral Risk Factor Surveillance System consistently find a persistent decline in household gun ownership over the past several decades. A March 2013 report from the Pew Research Center states:

> The Pew Research Center has tracked gun ownership since 1993, and our surveys largely confirm the General Social Survey trend. In our December 1993 survey, 45% reported having a gun in their household; in early 1994, the GSS found 44% saying they had a gun in their home. A January 2013 Pew Research Center survey found 33% saying they had a gun, rifle or pistol in their home, as did 34% in the 2012 wave of the General Social Survey.[5]

15. Because this reliable social science data shows that the number of households that own guns has likely dropped in recent decades, and certainly has not grown, the robust gun sales in recent years cannot be attributed to increasingly broad gun ownership. Instead, these sales predominantly represent purchases of guns by members of households that previously owned guns, as well as purchases in anticipation that certain gun bans will be enacted with grandfather clauses that will generate profits from the higher prices that follow when the supply of certain weapons or LCMs is restricted.

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[5] Pew Research Center, *Why Own a Gun? Protection is Now Top Reason*, Section 3: Gun Ownership Trends and Demographics, March 12, 2013, *available at* http://www.people-press.org/2013/03/12/section-3-gun-ownership-trends-and-demographics (last visited on November 2, 2017).

16. I am not aware of any current social science research providing an estimate for the number of American households that own LCMs or for the number of LCMs in private hands in America. It is reasonable to assume, however, that consumer demand for LCMs is similar to demand for firearms generally.

17. If that is the case, then LCM ownership by household is also likely to be concentrated, with increased numbers of LCMs held by a declining share of households. This would be consistent with a January 2013 New York Times/CBS News nationwide poll of 1,110 adults showing that nearly two-thirds of Americans favored a ban on LCMs.[6] This is roughly the percentage of California voters who cast their ballots to rid the state of these devices.

18. Thus, Mr. Curcuruto's unsubstantiated claims about the number of LCMs in private hands should not be confused with broad possession across America, but merely proliferation in the hands of a stable or dwindling number of households. Indeed, plaintiff's other expert, Stephen Helsley, makes this point when he states: "My associates who have such pistols [that accept LCMs] also have a considerable number of spare magazines for them. In my case, I have one 19-round and eight 17-round magazines for my Glock." (Helsley Report at 5.)

19. Moreover, it is unclear what relevance the stock of high-capacity magazines could make to determinations about what can be lawfully banned. Had the federal ban on these magazines not been lifted in 2004, the stock would have been dramatically lower than it is today, and since the 1994 federal ban was lawful, efforts by the gun industry to flood the market with these magazines in its wake can hardly be thought to deprive state governments of the ability to regulate in ways that were available to them prior to 1994.

Response to Helsley Report

[6] Jennifer Steinhauer, *Pro-Gun Lawmakers Are Open to Limits on Size of Magazines*, N.Y. Times, Feb. 18, 2013, *available at* http://www.nytimes.com/2013/02/19/us/politics/lawmakers-look-at-ban-on-high-capacity-gun-magazines.html?_r=1& (last visited November 2, 2017).

20. The second expert report submitted for the plaintiffs is from Stephen Helsley. Noting that for the past 24 years, he was a state liaison for and then consultant to the National Rifle Association, Helsley states that soldiers during war and "on duty, uniformed police officers" often use guns equipped with high-capacity magazines. Without acknowledging that the risks faced by soldiers and police are vastly different from those faced by civilians, Helsley then states the following:

> The home-owner and the concealed weapon permit holder want a pistol that can hold significantly more cartridges than a revolver for the same reason a law enforcement office or soldier wants one—to increase his or her chances of staying alive. For virtuous citizens buy their guns to protect themselves from the same criminals that police carry guns to protect the citizens, the public, and themselves. (Helsley Report at 5).

21. But private individuals have completely different needs than police officers. The former only need to scare off criminals (or hold them off until the police arrive). The police need to effectuate arrests. Thus, while having the criminal run away is a desired outcome for the average citizen, this is a bad outcome for a police officer, which is why an extended gun battle is extremely rare for law-abiding citizens and far more common for the police. Accordingly, Helsley's effort to look to officer-involved shootings to make judgments about the needs of average citizens widely misses the mark. (Helsley Report at 7).

22. In opposing the ban on high-capacity magazines, Helsley's claims that "Gunfights frequently involve a lot of 'missing.'" (Helsley Report at 7.) He then combines that with the fact that the average citizen is not well-trained and is under stress when threatened to argue that more bullets should be sprayed by law-abiding citizens because some of their bullets will likely hit "barriers such as vehicles or walls." (Helsley Report at 7.) But all of these factors actually provide strong support for a ban on LCMs rather than an argument against such a ban. Helsley doesn't consider that bullets fired by a modern weapon with an LCM will easily penetrate walls, threatening family members or occupants in attached dwellings. This point was dramatically underscored when a hapless concealed carry permit holder attending a gun safety class inadvertently fired his weapon, which discharged a bullet that easily penetrated the classroom wall, striking and

killing the owner of the gun store who was working in the next room.[7] Encouraging untrained, stressed individuals to spray bullets from a high-capacity magazine is a recipe for generating similar unwelcome outcomes that will put family members and neighbors at considerable risk.

23. If high-capacity magazines had been completely barred from the civilian market, many lives would have been saved as the destructive capacity of mass shooters would have been appropriately restricted. The *New York Times* video of the recent Las Vegas shooting shows how the Las Vegas concert attendees would use the pauses in firing when the shooter's high-capacity magazines were spent to flee the deadly venue before more shots were fired.[8] If Stephen Paddock had been limited to using only 10-round magazines during his deadly rampage, potentially hundreds of victims at the concert could have been spared.

24. A prescient December 2016 editorial in the *Las Vegas Sun* noted the danger presented—and the lack of practical use for—LCMs:

> By overwhelmingly supporting universal background checks for firearms purchases, Clark County voters made it abundantly clear last month that they were concerned about gun violence.
>
> Now, it's time for Las Vegas-area lawmakers to go a step further to protect Nevadans and push to ban the sale of high-capacity magazines in the state.

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[7] Peter Holley, *Ohio gun store owner accidentally killed by student during firearm-safety class*, *Washington Post*, June 19, 2016, *available at* https://www.washingtonpost.com/news/morning-mix/wp/2016/06/19/ohio-gun-store-owner-accidentally-killed-by-student-during-firearm-safety-class/?utm_term=.ed4c232d20ad (last visited Nov. 1, 2017).

Another example of how doors and walls do not stop bullets from modern handguns occurred on September 13, 2015, when "39-year-old Mike Lee Dickey was babysitting an 8-year-old Casa Grande, Arizona boy. According to police, at about 2 a.m., Dickey was in the bathroom removing his .45-caliber handgun from the waistband of his pants when he unintentionally discharged the gun. The bullet passed through two doors and struck the 8-year-old in his arm while he lay sleeping in a nearby bedroom. The boy was flown to a hospital in Phoenix for treatment." *8-year-old boy unintentionally shot by babysitter*, Ohh Shoot, Sept. 13, 2016, *available at* http://ohhshoot.blogspot.com/2015/09/8-year-old-boy-unintentionally-shot-by.html (last visited Nov. 1, 2017).

[8] Malachy Browne, et al., *10 Minutes. 12 Gunfire Bursts. 30 Videos. Mapping the Las Vegas Massacre*, N.Y. TimesVideo, Oct. 21, 2017, *available at* https://www.nytimes.com/video/us/100000005473328/las-vegas-shooting-timeline-12-bursts.html (last visited Nov. 1, 2017).

> Eight states and the District of Columbia already have imposed such prohibitions, and with good reason. There's simply no legitimate civilian use for magazines that hold dozens upon dozens of rounds of ammunition.
>
> Don't believe us? Fine, then listen to Clark County Sheriff Joe Lombardo.
>
> "I'm a very avid hunter, I was in the military myself, and there's no need to have a high-capacity magazine for any practical reason," Lombardo said during a recent interview with the Sun.
>
> To the contrary, the dangers posed by such magazines are obvious. Lombardo says the time it takes for suspects to change magazines gives potential victims an opportunity to escape and law enforcement officials an opportunity to safely fire back. That being the case, the fewer times a shooter has to switch out magazines, the fewer the chances for people to get away and authorities to get a protected shot.[9]

25. Sheriff Lombardo's views were similarly endorsed in the testimony of United States Attorney (District of Colorado) John Walsh before the Senate Judiciary Committee on February 27, 2013, in which he noted:

> From the point of view of most law enforcement professionals, a perspective I share as a long-time federal prosecutor and sitting United States Attorney, shutting off the flow of military-style assault weapons and high-capacity magazines is a top public safety priority. [...]
>
> One of the most disturbing aspects of the recent mass shootings our Nation has endured is the ability of a shooter to inflict massive numbers of fatalities in a matter of minutes due to the use of high-capacity magazines. High-capacity magazines were defined in the 1994 ban as magazines capable of holding more than 10 rounds, and this is a definition the Department endorses. The devastating impact of such magazines is not limited to their use in military-style assault rifles; they have also been used with horrific results in recent mass shootings involving handguns. The 2007 mass shooting at Virginia Tech involved a shooter using handguns with high-capacity magazines. Similarly, recent mass shootings in Tucson, Arizona; Oak Creek, Wisconsin; and Fort Hood, Texas all involved handguns with magazines holding more than 10 rounds. As evidenced by these events, a high capacity magazine can turn any weapon into a tool of mass violence. Forcing an individual bent on inflicting large numbers of casualties to stop and reload creates the opportunity to reduce the possible death toll in two ways: first, by affording a chance for law enforcement or bystanders to intervene during a pause to reload; and second, by giving bystanders and potential victims an opportunity to seek cover or escape when there is an interruption in the firing.

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[9] *High-capacity magazine ban a must for Nevadans' safety*, Las Vegas Sun, Dec. 11, 2016, *available at* https://lasvegassun.com/news/2016/dec/11/high-capacity-magazine-ban-a-must-for-nevadans-saf/(last visited Nov. 1, 2017).

This is not just theoretical: In the mass shooting in Tucson, for example, 9-year old Christina-Taylor Green was killed by the 13th shot from a 30-round high-capacity magazine. The shooter was later subdued as he was trying to reload his handgun after those 30 shots. The outcome might have been different if the perpetrator had been forced to reload after firing only 10 times.

Furthermore, high-capacity magazines are not required for defending one's home or deterring further action by a criminal. The majority of shootings in self-defense occur at close range, within a distance of three yards. In such a scenario, and at such close ranges, a 10-round magazine is sufficient to subdue a criminal or potential assailant. Nor are high-capacity magazines required for hunting or sport shooting. Like military-style assault weapons, high-capacity magazines should be reserved for war, and for law enforcement officers protecting the public. The continued commercial sale of high-capacity magazines serves only to provide those determined to produce a high body count with the opportunity and the means to inflict maximum damage. Indeed, there is evidence suggesting that when the previous ban was in effect, it reduced the number of high-capacity magazines seized by the police, as well as the lethality of incidents.[10][The citation is from Walsh's statement.][11]

Respectfully submitted,

John J. Donohue III

[10] See, David S. Fallis and James V. Grimaldi, *In Virginia, high-yield clip seizures rise*, Washington Post, Jan. 23, 2011, *available at* http://www.washingtonpost.com/wp-dyn/content/article/2011/01/22/AR2011012204046.html (last visited Nov. 1, 2017).

[11] Statement of John F. Walsh before the United States Senate Committee on the Judiciary, https://www.judiciary.senate.gov/imo/media/doc/2-27-13WalshTestimony.pdf (last visited Nov. 1, 2017).

Exhibit A

JOHN J. DONOHUE III

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EMPLOYMENT

Full-time Positions

- Stanford Law School, C. Wendell and Edith M. Carlsmith Professor of Law, September 2010 to the present.
- Yale Law School, Leighton Homer Surbeck Professor of Law, July 2004 to August 2010.
- Stanford Law School, Professor of Law, September 1995 to June 2004.
  - William H. Neukom Professor of Law, February 2002 – June 2004.
  - John A. Wilson Distinguished Faculty Scholar, March 1997 – January 2002.
  - Academic Associate Dean for Research, since July 2001 – July 2003.
  - Stanford University Fellow, September 2001 – May 2003.
- Northwestern University School of Law:
  - Class of 1967 James B. Haddad Professor of Law, September 1994-August 1995
  - Harry B. Reese Teaching Professor, 1994-1995
  - Professor of Law, May 1991-September 1994
  - Associate Professor, May 1989-May 1991
  - Assistant Professor, September 1986-May 1989.
- Research Fellow, American Bar Foundation, September 1986-August 1995.
- Associate Attorney, Covington & Burling, Washington, D.C., October 1978-July 1981 (including last six months as Attorney, Neighborhood Legal Services)
- Law Clerk to Chief Justice T. Emmet Clarie, U.S. District Court, Hartford, Connecticut, September 1977-August 1978.

Temporary Appointments

- Visiting Professor, Bocconi University, Milan, Italy, October- November 2012, April 2014, and June 2015.
- 2011 Faculty Scholar in Residence, University of Denver Sturm College of Law, April 21-22, 2011.
- Visiting Fellow, The Milton Friedman Institute for Research in Economics, University of Chicago, October 2009
- Schmidheiny Visiting Professor of Law and Economics, St. Gallen University, November – December, 2007.
- Visiting Lecturer in Law and Economics, Gerzensee Study Center, Switzerland, June 2007.
- Visiting Professor, Tel Aviv University School of Law, May 2007.
- Herbert Smith Visitor to the Law Faculty, University of Cambridge, England, February 2006.
- Visiting Professor, Harvard Law School, January 2003.

- Fellow, Center for Advanced Studies in the Behavioral Sciences, Stanford, California, Academic year 2000-01.
- Visiting Professor, Yale Law School, Fall, 1999.
- Professor, Center for the Study of American Law in China, Renmin University Law School, Beijing, July 1998.
- Visiting Professor of Law and Economics, University of Virginia, January 1997.
- Lecturer, Toin University School of Law, Yokohama, Japan, May-June 1996.
- Cornell Law School, Distinguished Visiting Fellow in Law and Economics, April 8-12, 1996 and September 25-29, 2000
- Visiting Professor, University of Chicago Law School, January 1992-June 1992.
- Visiting Professor of Law and Economics, University of Virginia Law School, January 1990-May 1990.
- Fellow, Yale Law School Program in Civil Liability, July 1985-August 1986.
- Private Practice (part-time), New Haven, Connecticut, September 1981-August 1986.
- Instructor in Economics, Yale College, September 1983-August 1985.
- Summer Associate, Donovan Leisure Newton & Irvine, New York, Summer 1982.
- Summer Associate, Perkins, Coie, Stone, Olsen & Williams, Seattle, Washington, Summer 1976.
- Research Assistant, Prof. Laurence Lynn, Kennedy School of Government, Harvard University, Summer 1975.
- LSAT Tutor, Stanley Kaplan Education Center, Boston, Massachusetts; Research Assistant, Prof. Philip Heymann, Harvard Law School; Research Assistant, Prof. Gordon Chase, Harvard School of Public Health. (During Law School).

EDUCATION

Yale University, 1981-1986

- University Fellow in Economics; M.A. 1982, M. Phil. 1984, Ph.D. 1986.
  - Dissertation: "A Continuous-Time Stochastic Model of Job Mobility: A Comparison of Male-Female Hazard Rates of Young Workers." Awarded with Distinction by Yale.
  - Winner of the Michael E. Borus Award for best social science dissertation in the last three years making substantial use of the National Longitudinal Surveys--awarded by the Center for Human Research at Ohio State University on October 24, 1988.
- National Research Service Award, National Institute of Health.
- Member, Graduate Executive Committee; Graduate Affiliate, Jonathan Edwards College.

Harvard Law School, 1974-1977 (J.D.)

- Graduated Cum Laude.
- Activities: Law Clerk (Volunteer) for Judge John Forte, Appellate Division of the District Court of Central Middlesex; Civil Rights, Civil Liberties Law Review; Intra-mural Athletics; Clinical Placement (Third Year): (a) First Semester: Massachusetts Advocacy Center; (b) Second Semester: Massachusetts Attorney General's Office--Civil Rights and Consumer Protection Divisions. Drafted comments for the Massachusetts Attorney General on the proposed U.S. Department of Justice settlement of its case against Bechtel Corporation's adherence to the Arab Boycott of Israeli companies.

Hamilton College, 1970-1974 (B.A.)

- Departmental Honors in both Economics and Mathematics
  - Phi Beta Kappa (Junior Year)
- Graduated fourth in class with the following academic awards:
  - Brockway Prize
  - Edwin Huntington Memorial Mathematical Scholarship
  - Fayerweather Prize Scholarship
  - Oren Root Prize Scholarship in Mathematics
- President, Root-Jessup Public Affairs Council.

PUBLICATIONS

Books and Edited Volumes:

- Law and Economics of Discrimination, Edward Elgar Publishing, 2013.
- Employment Discrimination: Law and Theory, Foundation Press, 2005, 2009 (2d edition) (with George Rutherglen).
- Economics of Labor and Employment Law: Volumes I and II, Edward Elgar Publishing, 2007. http://www.e-elgar.co.uk/bookentry_main.lasso?id=4070
- Foundations of Employment Discrimination Law, Foundation Press, 2003 (2d edition).
- Foundations of Employment Discrimination Law, Oxford University Press, 1997 (Initial edition).

Book Chapters:

- "Drug Prohibitions and Its Alternatives." Chapter 2 in Cook, Philip J., Stephen Machin, Olivier Marie, and Giovanni Mastrobuoni, eds, *Lessons from the Economics of Crime: What Reduces Offending?* MIT Press. 45-66 (2013).
- "The Death Penalty," Chapter in Encyclopedia of Law and Economics, Spring (2013).
- "Rethinking America's Illegal Drug Policy," in Philip J. Cook, Jens Ludwig, and Justin McCrary, eds, Controlling Crime: Strategies and Tradeoffs (2011), pp.215-289 (with Benjamin Ewing and David Peloquin).
- "Assessing the Relative Benefits of Incarceration: The Overall Change Over the Previous Decades and the Benefits on the Margin," in Steven Raphael and Michael Stoll, eds., "Do Prisons Make Us Safer? The Benefits and Costs of the Prison Boom," pp. 269-341 (2009).
- "Does Greater Managerial Freedom to Sacrifice Profits Lead to Higher Social Welfare?" In Bruce Hay, Robert Stavins, and Richard Vietor, eds., Environmental Protection and the Social Responsibility of Firms: Perspectives from Law, Economics, and Business (2005).
- "The Evolution of Employment Discrimination Law in the 1990s: A Preliminary Empirical Evaluation" (with Peter Siegelman), in Laura Beth Nielsen and Robert L. Nelson, eds., Handbook of Employment Discrimination Research (2005).

- "Divining the Impact of Concealed Carry Laws," in Jens Ludwig and Philip Cook, Evaluating Gun Policy: Effects on Crime and Violence (Washington D.C.: Brookings, 2003).

Articles:

- "Right-to-Carry Laws and Violent Crime: A Comprehensive Assessment Using Panel Data and a State-Level Synthetic Controls Analysis" NBER Working Paper w23510, www.nber.org/papers/w23510, June 2017 (with Abhay Aneja, and Kyle Weber).

- "Comey, Trump, and the Puzzling Pattern of Crime in 2015 and Beyond," 117 Columbia Law Review 1297 (2017). http://columbialawreview.org/content/comey-trump-and-the-puzzling-pattern-of-crime-in-2015-and-beyond/.

- "Did Jeff Sessions forget wanting to execute pot dealers?" The Conversation, January 23, 2017 (with Max Schoening), https://theconversation.com/did-jeff-sessions-forget-wanting-to-execute-pot-dealers-71694
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- "Jeff Sessions, The Grim Reaper of Alabama," The New York Times, January 9, 2017 (with Max Schoening), http://www.nytimes.com/2017/01/08/opinion/jeff-sessions-the-grim-reaper-of-alabama.html

- "Testing the Immunity of the Firearm Industry to Tort Litigation," JAMA Intern Med. Published online November 14, 2016. http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2582991 (with David Studdert and Michelle Mello).

- "Empirical Analysis and the Fate of Capital Punishment," 11 Duke Journal of Constitutional Law and Public Policy 51-106 (2016). Available at: http://scholarship.law.duke.edu/djclpp/vol11/iss1/3

- "Firearms on College Campuses: Research Evidence and Policy Implications," Johns Hopkins Bloomberg School of Public Health, (October 15, 2016)(with Daniel Webster et al). http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-gun-policy-and-research/_pdfs/GunsOnCampus.pdf

- "Be skeptical about claims of benefits of concealed carry permits." Sacramento Bee, (October 6, 2016), http://www.sacbee.com/opinion/op-ed/soapbox/article106329677.html

- "The Death Penalty Does Not Add Up to Smart Justice," California State Treasurer Intersections (September 2016),http://treasurer.ca.gov/newsletter/2016/201609/conversation.asp

- "Reducing civilian firepower would boost police and community safety, Stanford expert says," Stanford News (July 2016), http://news.stanford.edu/2016/07/15/reducing-civilian-firepower-boost-police-community-safety/review/
- "Domestic Violence and Effectively Terminating the Gun Rights of the Dangerous," Legal Aggregate – Stanford Law School (June 2016), https://law.stanford.edu/2016/06/28/domestic-violence-and-effectively-terminating-the-gun-rights-of-the-dangerous/
- "4 Gun Control Steps U.S. Needs Now," CNN.com (June 2016), http://www.cnn.com/2016/06/23/opinions/gun-control-donohue/index.html
- "The Demise of the Death Penalty in Connecticut, " Legal Aggregate - Stanford Law School (June 2016), https://law.stanford.edu/2016/06/07/the-demise-of-the-death-penalty-in-connecticut/
- "Empirical Evaluation of Law: The Dream and the Nightmare," 17 American Law and Economics Review 313 2015.
- "Capital Punishment Does not Deter Homicides," Casetext, August 30, 2015, https://casetext.com/posts/capital-punishment-does-not-deter-homicides
- "There's no evidence that death penalty is a deterrent against crime," The Conversation, August 8, 2015. http://theconversation.com/theres-no-evidence-that-death-penalty-is-a-deterrent-against-crime-43227
- "Glossip v. Gross: Examining Death Penalty Data for Clarity," Stanford Lawyer, June 29, 2015. http://stanfordlawyer.law.stanford.edu/2015/06/glossip-v-gross-examining-death-penalty-data-for-clarity/
- "How US Gun Control Compares to the Rest of the World," The Conversation, June 24, 2015. http://theconversation.com/how-us-gun-control-compares-to-the-rest-of-the-world-43590
    - Reprinted in slightly modified form under the title "Ban guns, end shootings? How evidence stacks up around the world," in CNN.com on August 27, 2015 http://www.cnn.com/2015/08/27/opinions/us-guns-evidence/
- "The 10 day period is reasonable," San Francisco Daily Journal, September 3, 2014.
- "An Empirical Evaluation of the Connecticut Death Penalty System Since 1973: Are There Unlawful Racial, Gender, and Geographic Disparities?" 11 Journal of Empirical Legal Studies 637 (2014).
- "The Impact of Right to Carry Laws and the NRC Report: The Latest Lessons for the Empirical Evaluation of Law and Policy," NBER Working Paper 18294. Revised November 2014 (with Abhay Aneja and Alexandria Zhang), http://www.nber.org/papers/w18294
- "Do Police Reduce Crime? A Reexamination of a Natural Experiment," in Yun-Chien Chang, ed., Empirical Legal Analysis: Assessing the Performance of Legal Institutions, London: Routledge, Chapt. 5, pp. 125-143, 2014 (with Daniel E. Ho & Patrick Leahy)

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- "*Moore v. Texas* and the Pathologies that Still Mar Capital Punishment in the U.S.," March 29, 2017, https://law.stanford.edu/2017/03/29/moore-v-texas-and-the-pathologies-that-mar-capital-punishment-in-the-u-s/
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WORKSHOPS AND ADDRESSES

- Panelist, "Public Carry: Defending Against Efforts to Expand Carry Laws," **National Gun Violence Prevention Meeting**, Washington, D.C., October 18, 2017
- "Keynote Presentation: Right-to-Carry Laws and Violent Crime," Second Amendment Litigation & Jurisprudence Conference, **The Law Center to Prevent Gun Violence**, October 16, 2017.
- "The Latest Evidence on Abortion Legalization and Crime," Conference on Empirical Legal Studies, Cornell University, October 13, 2017.
- "Comey, Trump, and the Puzzling Pattern of Crime in 2015 and Beyond," **University of Texas School of Law and Economics Seminar,** April 24, 2017, Faculty Workshop, **UC Davis School of Law,** April 10, 2017; Law and Social Science Seminar, **Texas A&M University School of Law,** March 6, 2017; Quantlaw, **University of Arizona Law School,** February 17, 2017.
- Debate with Kent Scheidegger on Capital Punishment, Philosophy of Punishment Seminar, **JFK University School of Law,** March 18, 2017.
- "The Evidence on Guns and Gun Laws," **Federal Bar Council Program on Guns and Gun Laws** -- Rancho Mirage, California, February 23, 2017.
- "Guns, Crime and Race in America," Stanford's Center for Population Health Sciences, **Stanford Medical School,** October 17, 2016.
- "Evaluating the Death Penalty," Forum on California Propositions 62 and 66, **Stanford Law School,** September 14, 2016.
- "Empirical Analysis and the Fate of Capital Punishment," Colloquium, Presley Center for Crime and Justice Studies; **University of California, Riverside**, October 24, 2016.
- "Gun Violence and Mental Illness," Department of Psychiatry, **Stanford University**, August 25, 2016.
- "The Battle Over Gun Policy In America," Physicians and Social Responsibility" seminar; **Stanford Medical School**, October 3, 2016; **Bioethics Committee of the San Mateo County Medical Association**, April 27, 2016; **The League of Women Voters of Palo Alto**, April 19, 2016; Human Rights and Health Seminar, **Stanford**

University, April 12, 2016; Bechtel International Center, **Stanford University**, February 23, 2016; Stanford in Government Seminar, Haas Center, **Stanford University**, February 2, 2016.

- American Economic Association Continuing Education Course "The Economics of Crime" (with Jens Ludwig), **AEA Annual Meeting**, San Francisco, January 5-7, 2016.

- "Race and Arbitrariness in the Connecticut Death Penalty," **University of Connecticut School of Law**, Nov. 20, 2015.

- *"Connecticut v. Santiago* and the Demise of the Connecticut Death Penalty," Faculty Workshop, **Stanford Law School**, August 19, 2015.

- "Do Handguns Make Us Safer? A State-Level Synthetic Controls Analysis of Right-to-Carry Laws," Second Amendment Conference, **Covington and Burling, New York**, May 14, 2015; **NBER Summer Institute**, Cambridge, MA, July 23, 2015; Faculty Workshop, **Stanford Law School**, November 11, 2015.

- "U.S. Criminal Justice Under Siege : Will Becker or Beccaria Prevail?" Faculty Seminar, **Bocconi University School of Law, Milan, Italy**, June 18, 2015.

- "Can You Believe Econometric Evaluations of Law, Policy, and Medicine?" **Stanford Law School**, Legal Theory Workshop, March 1, 2007; Faculty Workshop, **Tel Aviv University School of Law**, May 14, 2007; Faculty Workshop, **University of Haifa Law School**, May 16, 2007; Law and Economics Workshop, **Georgetown Law School**, September 19, 2007; Law and Economics Workshop, **St. Gallen Law School**, Switzerland, November 29, 2007; and Yale Law School, February 25, 2008; Law and Economics Workshop, **Swiss Institute of Technology**, Zurich, Switzerland, May 21, 2008; Faculty Workshop, **University of Virginia Law School**, October 24, 2008; Plenary Session, Latin American and Caribbean Law and Economics Association, **Universitat Pompeu Fabra (Barcelona)**, June 15, 2009; **Google, Milan**, Italy, June 8, 2015.

- Commentator: ""Throw Away the Jail or Throw Away The Key? The Effect of Punishment on Recidivism and Social Cost,"" by Miguel F. P. de Figueiredo, American Law and Economics Association Meetings, **Columbia Law School**, May 15, 2015.

- "Broken Windows, Stop and Frisk, and Ferguson," 2015 Justice Collaboratory Conference: Policing Post-Ferguson, **Yale Law School**, April 17, 2015.

- "Assessing the Development and Future of Empirical Legal Studies," **Stanford Law School** course on Modern American Legal Thought, February 25, 2015.

- Commentator: "Payday Lending Restrictions and Crimes in the Neighborhood," by Yilan Xu, 9th Annual Conference on Empirical Legal Studies, **Boalt Hall**, Berkeley, CA, November 7, 2014.

- "An Empirical Evaluation of the Connecticut Death Penalty Since 1973: Are There Unconstitutional Race, Gender and Geographic Disparities?" Faculty Workshop, **Economics Department, Rice University**, Houston, TX, Feb. 18, 2014; Law and Economics Workshop, **University of Virginia Law School**, September 11, 2014; Faculty Colloquium, **University of San Diego School of Law**, October 3, 2014.

- "What's Happening to the Death Penalty? A Look at the Battle in Connecticut," **Hamilton College**, Clinton, New York, June 6, 2014.

- Panel Member, Research Methods Workshop, Conference for Junior Researchers on Law and Society, **Stanford Law School,** May 15, 2014.

- "Logit v. OLS: A Matter of Life and Death," Annual Meeting of the American Law and Economics Association, **University of Chicago,** May 9, 2014.

- "Guns: Law, Policy, Econometrics," Second Amendment Litigation and Jurisprudence Conference, **Jenner & Block,** Chicago, May 8, 2014.

- "The Impact of Antidiscrimination Law: The View 50 Years after the Civil Rights Act of 1964," **Renaissance Weekend,** Liguna Niguel, CA, Feb. 15, 2014.

- "Concealed Carry and Stand Your Ground Law," **Renaissance Weekend,** Liguna Niguel, CA, Feb. 15, 2014.

- "Reducing Gun Violence," Forum on Gun Violence Reduction, Mountainview City Hall, Mountainview, CA, Feb. 8, 2014.

- "Gun Policy Debate," C-SPAN. National Cable Satellite Corporation, Jan. 16, 2014. <http://www.c-span.org/video/?317256-1/GunPoli>.

- "Trial and Decision in the Connecticut Death Penalty Litigation," Faculty Workshop, **Stanford Law School,** November 20, 2013.
- "Rethinking America's Illegal Drug Policy," Law and Economics Workshop, **Harvard Law School,** April 20, 2010; NBER Conference, "Economical Crime Control," **Boalt Hall,** Berkeley, CA, January 16, 2010; **NBER Summer Institute** Pre-Conference "Economical Crime Control," July 23, 2009; **Whitney Center** Lecture Series, Hamden, CT, October 5, 2009; Law and Economics Workshop, **University of Chicago Law School,** October 13, 2009; Seminar for Spanish Law Professors, **Harvard Law School,** October 23, 2009; The Criminal Law Society, **Stanford Law School,** March 31, 2011, **University of Denver Sturm College of Law,** April 21, 2011; Law and Economics Workshop, **Boalt Hall,** Berkeley, CA, October 17, 2011; Shaking the Foundations Conference, **Stanford Law School,** November 2, 2013.

- "The Challenge to the Connecticut Death Penalty," **Yale Law School,** Death Penalty Clinic, November 5, 2007; Graduate Student Seminar, November 11, 2009; Stanford Program in International Legal Studies Seminar, **Stanford Law School,** Nov. 11, 2010; Faculty Workshop, **Stanford Law School,** June 8, 2011; Faculty workshop, **Duke Law School,** April 13, 2012; Program on Public Policy, **Stanford University,** May 2, 2012; Annual Meeting of the American Law and Economics Association, **Vanderbilt Law School,** Nashville, TN, May 18, 2013; Faculty Workshop, **University of Arizona Law School,** October 17, 2013; 8th Annual Conference on Empirical Legal Studies, **University of Pennsylvania Law School,** October 26, 2013.

- Commentator: "How to Lie with Rape Statistics" by Corey Rayburn Yung, 8th Annual Conference on Empirical Legal Studies, **University of Pennsylvania Law School,** October 2013.

- "An Empirical Look at Gun Violence in the U.S." **University of Arizona Law School,** October 17, 2013

- Discussant, "Sex Offender Registration and Plea Bargaining," **NBER Labor Summer Institute,** Cambridge, MA, July 25, 2013.

- "What Works in the War Against Crime?" **Renaissance Weekend,** Jackson Hole, Wyoming, July 5, 2013.

- Seminar Presentation, "Statistics and the Streets – Curbing Crime, Realities of the Death Penalty, and Successes in Public Safety," **Renaissance Weekend**, Jackson Hole, Wyoming, July 5, 2013.

- Flashes of Genius (Glimpses of Extra-ordinarily Novel Thinking) -- "Stemming Gun Violence," **Renaissance Weekend**, Jackson Hole, Wyoming, July 5, 2013.

- "Can Laws Reduce Crime?" Safe Oakland Speakers Series, Holy Names University, Oakland, CA, May 1, 2013, http://www.ustream.tv/channel/safe-oakland-speaker-series

- Presentation on "The Death Penalty in America" on a panel on "human rights and criminal justice systems in the world," Science for Peace conference at Bocconi University in Milan, Italy, November 15, 2012. http://www.fondazioneveronesi.it/scienceforpeace2012/

- Seminar Presentation, "America's Criminal Justice System," **Renaissance Weekend**, Santa Monica, CA., Feb. 19, 2012.

- "Statistical Inference, Regression Analysis and Common Mistakes in Empirical Research," SPILLS Fellow's Workshop, **Stanford Law School**, February 2, 2012.

- "New Evidence in the 'More Guns, Less Crime' Debate: A Synthetic Controls Approach," Conference on Empirical Legal Studies, **Northwestern Law School**, November 4, 2011.

- "Drug Legalization and its Alternatives," *Lessons from the Economics of Crime: What Works in Reducing Offending?* **CESifo Venice Summer Institute Workshop**, July 22 , 2011.

- "Incapacitating Addictions: Drug Policy and American Criminal Justice," in Rethinking the War on Drugs through the US-Mexico Prism," **Yale Center for the Study of Globalization**, May 12, 2011.

- Plenary Session: Flashes of Genius (Glimpses of Extra-ordinarily Novel Thinking) -- "Has Legalized Abortion Reduced Crime?" **Renaissance Weekend**, Liguna Niguel, CA., Feb. 18, 2011.

- "An Evidence-Based Look at the More Guns, Less Crime Theory (after Tucson)" The American Constitution Society for Law and Policy (ACS), **Stanford Law School**, January 25, 2011; **Renaissance Weekend**, Liguna Niguel, CA., Feb. 19, 2011; "Faculty Forum" at the External Relations Office, **Stanford Law School**, April 5, 2011.

- "Empirical Evaluation of Law: The Dream and the Nightmare," SPILS Fellows Lecture, **Stanford Law School**, January 15, 2015; Legal Studies Workshop, **Stanford Law School**, Feb. 7, 2011; **Renaissance Weekend**, Liguna Niguel, CA., Feb. 20, 2011; **University of Denver Sturm College of Law**, April 22, 2011; Presidential Address, Annual Meeting of the American Law and Economics Association, **Columbia University**, May 20, 2011.

- Death Sentencing in Connecticut," **American Society of Criminology Annual Meeting**, San Francisco, Nov. 17, 2010.

- "The Impact of Right to Carry Laws and the NRC Report: Lessons for the Empirical Evaluation of Law and Policy," Conference on Empirical Legal Studies, **Yale Law School**, Nov. 6, 2010.

- Comment on Bushway and Gelbach, "Testing for Racial Discrimination in Bail Setting Using Nonparametric Estimation of a Parametric Model," Conference on Empirical Legal Studies, **Yale Law School**, Nov. 6, 2010.

- Commentator, "A Test of Racial Bias in Capital Sentencing," **NBER Political Economy Program Meeting**, April 23, 2010.
- "The (Lack of a) Deterrent Effect of Capital Punishment," Faculty Workshop, **University of Chicago Economics Department**, October 21, 2009.
- Keynote Address, "The Evolution of Econometric Evaluation of Crime and Deterrence,"1st Paris& Bonn Workshop on Law and Economics: The Empirics of Crime and Deterrence, **University of Paris Ouest Nanterre,** September 24, 2009.
- Comment on Cook, Ludwig, and Samaha, "Gun Control after *Heller*: Litigating Against Regulation," NBER Regulation and Litigation Conference, **The Boulders**, Carefree, Arizona, September 11, 2009.
- "Impact of the Death Penalty on Murder in the US," Faculty Workshop, Law School, **Universitat Pompeu Fabra (Barcelona),** June 18, 2009.
- Comment on Joanna Shepherd's "The Politics of Judicial Opposition," Journal of Institutional and Theoretical Economics Conference, **Kloster Eberbach, Germany**, June 12, 2009.
- "The Great American Crime Drop of the '90s: Some Thoughts on Abortion Legalization, Guns, Prisons, and the Death Penalty," **Hamilton College**, Clinton, NY, June 5, 2009.
- "The Impact of the ADA on the Employment and Earnings of the Disabled," **American Law and Economics Association Meetings,** University of San Diego, May 15, 2009.
- "Crime and Punishment in the United States," **Eastern State Penitentiary, Yale Alumni Event,** Philadelphia, PA, April 26, 2009.
- "Measuring Culpability in Death Penalty Cases," Conference on Applications of Economic Analysis in Law, **Fuqua School of Business, Duke University,** April 18, 2009.
- "Autopsy of a Financial Crisis," Workshop on New International Rules and Bodies for Regulating Financial Markets, **State University of Milan**, March 23, 2009.
- "Yet Another Refutation of the More Guns, Less Crime Hypothesis -- With Some Help From Moody and Marvell, Law and Economics Workshop, **NYU Law School**, March 10, 2009.
- Intelligence-Squared Debate: "Guns Reduce Crime," **Rockefeller University**, New York, October 28, 2008.
- "The D.C. Handgun Controls: Did the Supreme Court's Decision Make the City Safer?" Debate, **The Contemporary Club of Albemarle**, Charlottesville, VA, October 23, 2008.
- "Evaluating the Empirical Claims of the Woman-Protective Anti-Abortion Movement," Panel on The Facts of the Matter: Science, Public Health, and Counseling, Yale Conference on the Future of Sexual and Reproductive Rights, **Yale Law School**, October 11, 2008.
- "Empirical Evaluation of Gun Policy," **Harvard Law School**, October 9, 2008.
- "Assessing the Relative Benefits of Incarceration: The Overall Change Over the Previous Decades and the Benefits on the Margin," **Russell Sage Foundation**, New York, May 3, 2007; Law and Economics Workshop, **Tel Aviv University School of Law**, May 28, 2008.
- Death Penalty Debate with Orin Kerr, Bloggingheads, April 11, 2008.

- "Evaluating Connecticut's Death Penalty Regime," Faculty Public Interest Conversation, **Yale Law School**, April 9, 2008.
- "The Death Penalty in Connecticut and the United States," **The Whitney Center**, Hamden, CT, November 5, 2007; Seminar on Advanced Criminal Law: Criminal Sentencing and the Death Penalty, **Fordham Law School**, April 8, 2008; Law and Economics Workshop, **Swiss Institute of Technology**, Zurich, Switzerland, May 20, 2008.
- Radio Interview, "The Death of Capital Punishment?" Morning Edition: Where We Live. WNPR. Connecticut, March 10, 2008.
- Comment on Thomas Dee's "Born to Be Mild: Motorcycle Helmets and Traffic Safety," **American Economics Association Meetings**, New Orleans, Louisiana, January 4, 2008.
- "The Empirical Revolution in Law and Policy: Jubilation and Tribulation," **Keynote Address, Conference on Empirical Legal Studies, NYU Law School**, Novermber 9, 2007.
- "The Optimal Rate of Incarceration," **Harvard Law School**, October 26, 2007.
- "Empirical Evaluation of Law: The Impact on U.S Crime Rates of Incarceration, the Death Penalty, Guns, and Abortion," Law and Economics Workshop, **St. Gallen Law School, Switzerland**, June 25, 2007.
- Comment on Eric Baumer's "A Comprehensive Assessment of the Contemporary Crime Trends Puzzle," Committee on Law and Justice Workshop on Understanding Crime Trends, **National Academy of Sciences**, Washington, D.C., April 25, 2007.
- Comment on Bernard Harcourt, Third Annual Criminal Justice Roundtable Conferemce, **Yale Law School**, "Rethinking the Incarceration Revolution Part II: State Level Analysis," April 14, 2006.
- "Corporate Governance in America: The Disney Case," **Catholic University Law School**, Milan, Italy, March 19, 2007.
- "The U.S Tort System," (Latin American) Linkages Program, **Yale Law School**, February 13, 2007.
- Panel Member, "Guns and Violence in the U.S.," **Yale University, International Center**, January 24, 2007.
- "Economic Models of Crime and Punishment," Punishment: The U.S. Record: A Social Research Conference at **The New School**, New York City, Nov. 30, 2006
- Comment on Baldus et al, "Equal Justice and the Death Penalty: The Experience fo the United States Armed Forces, Conference on Empirical Legal Studies, **University of Texas Law, School**, Austin, Texas, October 27, 2006.
- "Empirical Evaluation of Law: The Promise and the Peril," **Harvard Law School**, October 26, 2006.
- "Estimating the Impact of the Death Penalty on Murder," Law and Economics Workshop, **Harvard Law School**, September 12, 2006; Conference on Empirical Legal Studies, **University of Texas Law School**, October 28, 2006; Joint Workshop, Maryland Population Research Center and School of Public Policy, **University of Maryland**, March 9, 2007.
- "Why Are Auto Fatalities Dropping so Sharply?" **Faculty Workshop, Wharton**, Philadelphia, PA, April 19, 2006.
- "The Law of Racial Profiling," Law and Economic Perspectives on Profiling Workshop, **Northwestern University Department of Economics**, April 7, 2006.

- "Landmines and Goldmines: Why It's Hard to Find Truth and Easy To Peddle Falsehood in Empirical Evaluation of Law and Policy," **Rosenthal Lectures, Northwestern University School of Law**, April 4-6, 2006.
- "The Impact of Legalized Abortion on Crime," **American Enterprise Institute**, March 28, 2006.
- "The Impact of Damage Caps on Malpractice Claims: Randomization Inference with Difference-in-Differences,"**Conference on Medical Malpractice, The Rand Corporation**, March 11, 2006.
- "Powerful Evidence the Death Penalty Deters?" **Leighton Homer Surbeck Chair Lecture, Yale Law School**, March 7, 2006.
- "Uses and Abuses of Empirical Evidence in the Death Penalty Debate," Faculty Workshop, **University of Connecticut Law School**, October 18, 2005; Faculty Workshop, **UCLA Law School**, February 3, 2006; Law and Economics Workshop, **Stanford Law School**, February 16, 2006; ; Law Faculty, **University of Cambridge, Cambridge, England**, February 28, 2006; **University of Illinois College of Law,** Law and Economics Workshop, March 2, 2006; Faculty Workshop, **Florida State University Law School**, March 30, 2006; **ALEA**, Berkeley, CA May 6, 2006; **University of Chicago Law School,** Law and Economics Workshop, May 9, 2006.
- "Is Gun Control Illiberal?" Federalist Society Debate with Dan Kahan at Yale Law School, January 31, 2006.
- "Witness to Deception: An Insider's Look at the Disney Trial," **2005-2006 Distinguished Lecture, Boston University School of Law**, November 10, 2005; Center for the Study of Corporate Law, **Yale Law School**, November 3, 2005; **Law Offices of Herbert Smith, London, England**, February 23, 2006; Law Faculty, **University of Cambridge, Cambridge, England**, February 27, 2006.
- "Understanding the Surprising Fall in Crime in the 1990s," **Rotary Club**, Orange, CT, August 5, 2005; Faculty Workshop, **Yale School of Management**, September 21, 2005.
- Panel Member, "The Board's Role in Corporate Strategy," The Yale Global Governance Forum, **Yale School of Management**, September 8, 2005.
- "Crime and Abortion," **Museo de la Cuidad de Mexico**, Mexico City, October 20, 2003.
- "Allocating Resources towards Social Problems and Away From Incarceration as a Means of Reducing Crime," **MacArthur Foundation Research Network on Adolescent Development and Juvenile Justice**, San Francisco, CA, February 28, 2003.
- "Shooting Down the More Guns, Less Crime Hypothesis," **Stanford Law School**, Law and Economics Seminar, January 28, 2003; Faculty Workshop, Center for the Study of Law and Society, **Boalt Hall**, University of California, Berkeley, Feb. 24, 2003; Development Workshop, **Stanford Law School**, April 25, 2003; Faculty Workshop, **Stanford Law School**, July 2, 2003; Law and Public Affairs Program Workshop, **Princeton University,** September 29, 2003; Stanford Alumni Weekend, **Stanford University**, October 17, 2003; Faculty Workshop, **CIDE**, Mexico City, October 20, 2003.
- "The Impact of Legalized Abortion on Teen Childbearing," **NBER Labor Summer Institute**, Cambridge, MA, July 30, 2002.
- "Do Concealed Handgun Laws Reduce Crime?" Faculty Workshop, **Stanford Law School**, October 4, 2000; First-Year Orientation, **Stanford Law School**, September 5, 2001; Faculty Workshop, **Harvard Law School**, April 26, 2002; Faculty Workshop, **Columbia Law School**, April 29, 2002.
- "The Evolution of Employment Discrimination Law in the 1990s: An Empirical Investigation," Fellows Workshop, American Bar Foundation, February 11, 2002.

- "The Role of Discounting in Evaluating Social Programs Impacting on Future Generations: Comment on Arrow and Revesz," Colloquium on Distributive Justice, **Stanford Law School**, Oct. 18, 2001.
- "The Impact of Wrongful Discharge Laws," **NBER Labor Summer Institute**, Cambridge, MA, July 30, 2001; Labor and Employment Seminar, **NYU Law School**, October 16, 2001; Faculty Workshop, **Stanford Law School**, September 18, 2002; **Yale Law School**, January, 2004.
- "Racial Profiling: Defining the Problem, Understanding the Cause, Finding the Solution," **American Society of Criminology Conference**, San Francisco, CA, November 15, 2000.
- "Institutional Architecture for Building Private Markets," Conference on "Latin America and The New Economy" at **Diego Portales University** in Santiago, Chile, October 26, 2000.
- "The History and Current Status of Employment Discrimination Law in the United States," Unicapital School of Law, (Centro Universitario Capital), Sao Paulo, Brazil, March 10, 2000.
- "Corporate Governance in Developing Countries: Opportunities and Dangers," Conference on Neoliberal Policies for Development: Analysis and Criticism," University of Sao Paulo Law School, March 13, 2000
- "Legalized Abortion and Crime," Law and Economics Workshop, **University of Pennsylvania Law School**, September 21, 1999; Faculty Workshop, **Yale Law School**, September 27, 1999; **John Jay College of Criminal Justice**, October 7, 1999; Faculty Workshop, **Quinnipiac Law School**, October 13, 1999; Faculty Workshop, **University of Connecticut Law School**, October 19, 1999; **University of Virginia Law School**, October 25, 1999; Faculty Workshop, **Baruch College**, November 9, 1999; MacArthur Foundation Social Interactions and Economic Inequality Network Meeting, **Brookings Institution**, December 4, 1999; Faculty Workshop, **NYU Law School**, January 21, 2000; Faculty Workshop, **University of San Diego Law School**, February 18, 2000; Public Economics Workshop, Department of Economics, **Stanford University**, April 28, 2000; Law and Economics Workshop, **University of California at Berkeley Law School**, September 18, 2000; Faculty Workshop, **Cornell Law School**, September 26, 2000; OB-GYN Grand Rounds, **Stanford Medical School**, October 2, 2000; **Center for Advanced Studies in the Behavioral Sciences**, October 11, 2000; Faculty Workshop, **Graduate School of Business**, February 5, 2002.
- Panel member, Session on Executive Compensation, Director's College, **Stanford Law School**, March 23, 1999.
- "Exploring the Link Between Legalization of Abortion in the 1970s and Falling Crime in the 1990s," Law and Economics Workshop, **Harvard Law School**, March 16, 1999; Law and Economics Workshop, **University of Chicago Law School**, April 27, 1999; Faculty Workshop, **Stanford Law School**, June 30, 1999.
- "Is the Increasing Reliance on Incarceration a Cost-Effective Strategy of Fighting Crime?" Faculty Workshop, **University of Wisconsin School of Social Science**, February 19, 1999.
- "What Do We Know About Options Compensation?" Institutional Investors Forum, **Stanford Law School**, May 29, 1998.
- Commentator on Orlando Patterson's presentation on "The Ordeal of Integration," **Stanford Economics Department**, May 20, 1998.
- "Understanding The Time Path of Crime," Presentation at Conference on Why is Crime Decreasing? **Northwestern University School of Law**, March 28, 1998; Faculty Workshop, **Stanford Law School**, September 16, 1998; Faculty Workshop, **University of Michigan Law School**, February 18, 1999.
- Commentator, Conference on Public and Private Penalties, the **University of Chicago Law School**, Dec. 13-14, 1997.

- "Some Thoughts on Affirmative Action," Presentation at a conference on Rethinking Equality in the Global Society, **Washington University School of Law**, November 10, 1997.
- Commentator on Chris Jencks' Presentation on Welfare Policy, **Stanford Economics Department**, October 8, 1997.
- "The Impact of Race on Policing, Arrest Patterns, and Crime," Faculty Workshop, **Stanford Law School**, September 10, 1997; Law and Economics Workshop, **University of Southern California Law School**, October 23, 1997; Law and Economics Workshop, **Columbia University Law School**, November 24, 1997; Law and Economics Workshop, Haas School of Business, **University of California at Berkeley**, February 19, 1998; Annual Meeting of the American Law and Economics Association, **University of California at Berkeley**, May 8, 1998; Conference on the Economics of Law Enforcement, **Harvard Law School**, October 17, 1998.
- "Crime in America: Understanding Trends, Evaluating Policy," **Stanford Sierra Camp**, August 1997.
- "Executive Compensation: What Do We Know?" TIAA-CREF Committees on Corporate Governance and Social Responsibility, Center for Economic Policy Research, **Stanford University**, June 27, 1997; NASDAQ Director's Day, **Stanford University**, June 30, 1997.
- Panel Chair, Criminal Law (Theory), Criminal Law (Empirical), and Labor/Discrimination/Family Law, American Law and Economics Association, **University of Toronto Law School**, May 9-10, 1997.
- Commentator, "Diversity in Law School Hiring," **Stanford Law School**, February 25, 1997.
- Keynote Speaker, "The Optimal Rate of Crime," 11th Annual Conference, **The Oklahoma Academy for State Goals**, Tulsa, Oklahoma, May 7, 1996.
- Panel member, Session on Executive Compensation, Director's College, **Stanford Law School**, March 28-29, 1996.
- "The Power of Law: Can Law Make a Difference in Improving the Position of Women and Minorities in the Labor Market?" The Fellows of the **American Bar Foundation**, Baltimore, Maryland, February 3, 1996.
- "Public Action, Private Choice and Philanthropy: Understanding the Sources of Improvement in Black Schooling Quality in Georgia, 1911-1960," **Stanford Faculty Workshop**, January 24, 1996; Faculty Workshop, **University of Virginia Law School**, January 22, 1997; **National Bureau of Economic Research**, Cambridge, Massachusetts, Labor Studies Conference, April 3, 1998.
- Commentator, "The Effect of Increased Incarceration on Crime," Meetings of the **American Economics Association**, San Francisco, January 6, 1996.
- Commentator, Symposium on Labor Law, **University of Texas Law School**, November 10-11, 1995.
- Panel Member, Symposium on Criminal Justice, **Stanford Law School**, October 6-7, 1995.
- Commentator, "The Litigious Plaintiff Hypothesis," Industrial and Labor Relations Conference, **Cornell University**, May 19, 1995.
- Commentator on Keith Hylton's, "Fee Shifting and Predictability of Law," Faculty Workshop, **Northwestern University School of Law**, February 27, 1995.
- "The Selection of Employment Discrimination Disputes for Litigation: Using Business Cycle Effects to Test the Priest/Klein Hypothesis," **Stanford University**, Law and Economics Seminars, October 31, 1994.

- "Is the United States at the Optimal Rate of Crime?" Faculty Workshop, **Indiana University School of Law**, Indianapolis, November 18, 1993; Faculty Workshop, **Northwestern University School of Law**, April 18, 1994; Law and Economics Workshop, **Stanford Law School**, April 28, 1994; Meetings of the American Law and Economics Association, **Stanford Law School**, May 13, 1994; **American Bar Foundation**, September 7, 1994; Faculty Workshop, **DePaul Law School**, September 21, 1994; Law and Economics Workshop, **University of Chicago Law School**, October 11, 1994; Faculty Seminar, **Stanford Law School**, October 31, 1994; Law and Economics Luncheon, **Stanford Law School**, November 1, 1994; Faculty Seminar Workshop, **University of Illinois College of Law**, Champaign, November 22, 1994; Law and Economics Workshop, **Harvard Law School**, November 29, 1994; School Alumni Luncheon, Chicago Club, December 13, 1994; **Northwestern Law School**; Law and Economics Workshop, **Yale Law School**, February 1, 1996; Faculty Workshop, **Cornell Law School**, April 10, 1996; Faculty Workshop, **Tokyo University Law School**, June 4, 1996; Panel on "The Economics of Crime," **Western Economics Association** Meeting, San Francisco, July 1, 1996.
- "The Broad Path of Law and Economics," Chair Ceremony, **Northwestern University School of Law**, September 30, 1994.
- Commentator on Paul Robinson's "A Failure of Moral Conviction," **Northwestern University School of Law**, September 20, 1994.
- "The Do's of Diversity, The Don'ts of Discrimination," Kellogg School of Business, **Northwestern University**, May 17, 1994.
- "Does Law Matter in the Realm of Discrimination?" **Law and Society Summer Institute**, Pala Mesa Lodge, Fallbrook, California, June 25, 1993.
- Commentator, "The Double Minority: Race and Sex Interactions in the Job Market," Society for the Advancement of Socio-Economics, **New School for Social Research**, March 28, 1993.
- "The Effects of Joint and Several Liability on Settlement Rates: Mathematical Symmetries and Meta-Issues in the Analysis of Rational Litigant Behavior," Economic Analysis of Civil Procedure, **University of Virginia School of Law**, March 26, 1993.
- Debate with Richard Epstein on Employment Discrimination Law, **Chicago Federalist Society**, February 23, 1993.
- Panel Chair, "Optimal Sanctions and Legal Rules in Tort and Criminal Law," Meetings of Annual Association of Law and Economics, **Yale Law School**, May 15, 1992.
- Panel Member, "The Law and Economics of Employment at Will," **The Institute For Humane Studies**, Fairfax, Virginia, March 27, 1992.
- "The Efficacy of Title VII," Debate with Professor Richard Epstein, **University of Chicago Law School**, February 26, 1992.
- Moderator, "Using Testers to Demonstrate Racial Discrimination," **University of Chicago Law School**, February 13, 1992.
- "Law & Macroeconomics: The Effect of the Business Cycle on Employment Discrimination Litigation," Law and Society Workshop, **Indiana University**, November 6, 1991; Faculty Workshop, **University of North Carolina Law School**, Chapel Hill, November 8, 1991; Faculty Workshop, **Northwestern University School of Law**, December 11, 1991; Law and

- Economics Conference, **Duquesne Law School**, March 14, 1992; **University of Chicago Law School**, April 2, 1992.
- Panel Chair and Commentator, "New Perspectives on Law and Economics," **Society for the Advancement of Socioeconomics**, Stockholm, June 17, 1991; **Law and Society Meetings**, Amsterdam, June 29, 1991.
- Panel Chair, "Regulation of International Capital Markets," **Law and Society Meetings**, Amsterdam, June 27, 1991.
- Panel Chair, "The Law and Economics of Discrimination," American Association of Law and Economics, **University of Illinois Law School**, May 24, 1991.
- "The Economics of Employment Discrimination Law," **Industrial Relations Research Association**, Chicago, Illinois, March 4, 1991.
- "Does Current Employment Discrimination Law Help or Hinder Minority Economic Empowerment?" Debate with Professor Richard Epstein, The Federalist Society, **Northwestern Law School**, February 26, 1991.
- Panel Member, "The Law and Economics of Employment Discrimination," **AALS Annual Meeting**, Washington, D.C., January 6, 1991.
- "Re-Evaluating Federal Civil Rights Policy," Conference on the Law and Economics of Racial Discrimination in Employment, **Georgetown University Law Center**, November 30, 1990.
- "Opting for the British Rule," Faculty Seminar, **Northwestern Law School**, September 11, 1990; Faculty Seminar, **University of Virginia Law School**, September 14, 1990; Law and Economics Seminar, **University of Michigan Law School**, October 18, 1990; Faculty Workshop, **NYU Law School**, November 14, 1990; Faculty Workshop, **University of Florida Law School**, March 18, 1991.
- "The Effects of Fee Shifting on the Settlement Rate: Theoretical Observations on Costs, Conflicts, and Contingency Fees," at the **Yale Law School Conference** "Modern Civil Procedure: Issues in Controversy," June 16, 1990.
- "Studying the Iceberg From Its Tip?: An Analysis of the Differences Between Published and Unpublished Employment Discrimination Cases," **Law and Society Meetings**, Berkeley, California, May 31, 1990.
- Panel Discussion on Tort Reform, **University of Pennsylvania Law School**, April 27, 1990.
- Panel Discussion of "The Role of Government in Closing the Socio-Economic Gap for Minorities," at the Federalist Society National Symposium on "The Future of Civil Rights Law," **Stanford Law School**, March 16, 1990.
- "Continuous versus Episodic Change: The Impact of Affirmative Action and Civil Rights Policy on the Economic Status of Blacks," **University of Virginia Economics Department**, February 15, 1990; **Princeton University Department of Economics**, February 21, 1990 (with James Heckman); Law & Economics Workshop, **University of Toronto Law School**, October 8, 1991.
- "Sex Discrimination in the Workplace: An Economic Perspective," Fellows Seminar, **American Bar Foundation**, October 16, 1989.
- "The Changing Nature of Employment Discrimination Litigation," Law and Economics Workshop, **Columbia Law School**, March 23, 1989; Faculty Seminar, **University of Virginia Law School**, March 24, 1989; Law and Economics Workshop, **University of Chicago**, April 25, 1989; **Law & Society Meeting**; Madison, Wisconsin,

June 8, 1989; Labor Economics Workshop, **University of Illinois**, Chicago, November 1, 1989; Law & Economics Workshop, **University of Pennsylvania Law School**, November 9, 1989; Law and Economics Seminar, **University of California at Berkeley**, October 4, 1990; Law and Social Science Workshop, **Northwestern University**, February 3, 1991; Law and Economics Seminar, **Stanford Law School**, March 21, 1991; Faculty Workshop, **Cornell Law School**, April 3, 1991; Visiting Committee, **Northwestern Law School**, April 5, 1991.

- "Law & Economics: The Third Phase," The Association of General Counsel, **Northwestern University School of Law**, October 14, 1988.
- "Employment Discrimination Litigation," **Northwestern Law School** Alumni Monthly Loop Luncheon. **Chicago Bar Association**, May 31, 1988.
- "The Morality of the Death Penalty." A debate with Ernest Van Den Haag. **Northwestern University School of Law**, April 19, 1988.
- "Models of Deregulation of International Capital Markets." A presentation with David Van Zandt, Faculty Seminar, **Northwestern University School of Law**, April 1, 1988; Visiting Committee, May 5, 1988.
- "Is Title VII Efficient?" A debate with Judge Richard Posner, Faculty Seminar, **Northwestern University School of Law**, November 20, 1987.
- "The Senate's Role in Confirming Supreme Court Nominees: The Historical Record," **Northwestern University School of Law**, September 22, 1987.
- "Diverting the Coasean River: Incentive Schemes to Reduce Unemployment Spells," **Yale Law School** Civil Liability Workshop, March 30, 1987; Faculty Seminar, **Northwestern University School of Law**, March 18, 1987; **University of Southern California Law Center**, May 1, 1987; and Seminar in Law and Politics, Department of Political Science, **Northwestern University**, May 8, 1987; Labor Workshop, Department of Economics, **Northwestern University**, October 27, 1987; **AALS Annual Meeting**, New Orleans, January 7, 1989.
- "Women in the Labor Market--Are Things Getting Better or Worse?" **Hamilton College**, February 23, 1987.
- "The Changing Relative Quit Rates of Young Male and Female Workers," **Hamilton-Colgate Joint Faculty Economics Seminar**, February 23, 1987.
- "Living on Borrowed Money and Time--U.S. Fiscal Policy and the Prospect of Explosive Public Debt," **Orange Rotary Club**, February 22, 1985.
- "Capital Punishment in the Eighties," **Hamilton College**, April 6, 1981.
- "Terms and Conditions of Sale Under the Uniform Commercial Code," Executive Sales Conference, **National Machine Tool Builders' Association**, May 12, 1980.

PROFESSIONAL ACTIVITIES

- Member, Committee on Law and Justice, National Research Council, October 2011 – present.
- Fellow of the Society for Empirical Legal Studies, 2015 - present.
- Co-Editor (with Steven Shavell), American Law and Economics Review, May 2006 – August 2012.
- President, American Law and Economics Association, May 2011 – May 2012.

- Co-President, Society for Empirical Legal Studies, November 2011 - August 2012. Member, Board of Directors from November 2011 - November 2014.
- Testified before the Connecticut Legislature in Support of Senate Bill 1035 and House Bill 6425 (A Bill to Eliminate the Death Penalty), March 7, 2011; Testified again before the Connecticut Judiciary Committee on March 14, 2012.
- Member of the Special Committee on ALI Young Scholars Medal, October 2009 – February 2011.
- Vice-President/President Elect, American Law and Economics Association, June 2010 – May 2011.
- Secretary-Treasurer, American Law and Economics Association, June 2009 – May 2010.
- Board of Advisors, Yale Law School Center for the Study of Corporate Law, July 2004 – August 2010.
- Evaluated the Connecticut death penalty system: "Capital Punishment in Connecticut, 1973-2007: A Comprehensive Evaluation from 4600 murders to One Execution," http://works.bepress.com/john_donohue/137/
- Member, Panel on Methods for Assessing Discrimination, National Academy of Sciences, September 2001 – June 2004. Resulting Publication: National Research Council, Measuring Racial Discrimination (2004), http://www.nap.edu/catalog/10887.html
- Member, National Science Foundation Review Panel, Law and Social Sciences, September, 1999 – April 2001.
- Editorial Board, Journal of Empirical Legal Studies, July 2003 – present.
- Editorial Board, International Review of Law and Economics, October 1999 – present.
- Editorial Board, Law and Social Inquiry, February 2000 – present.
- Board of Editors, American Law and Economics Review, August 1998 – April 2013.
- Consultant, Planning Meeting on Measuring the Crime Control Effectiveness of Criminal Justice Sanctions, National Academy of Sciences, Washington, D.C., June 11,1998
- Member, Board of Directors, American Law and Economics Association, June 1994-May 1997. Member, ALEA Nominating Committee, July 1995-May 1996. Member, Program Committee, July 1996-May 1998 and July 2000 – May 2002.
- Statistical Consultant, 7th Circuit Court of Appeals Settlement Conference Project (December, 1994).
- Testified before U.S. Senate Labor Committee on evaluating the Job Corps, October 4, 1994.
- Assisted the American Bar Association Standing Committee on the Federal Judiciary in evaluating the qualifications of Ruth Bader Ginsburg (June 1993) and David Souter (June, 1990).
- Chair, AALS Section on Law and Economics, January 1990-January 1991.
- Economic Consultant to Federal Courts Study Committee. Analyzing the role of the federal courts and projected caseload for Judge Richard Posner's subcommittee. February 1989-March 1990.
- Member, 1990 AALS Scholarly Papers Committee.

- Member, Advisory Board, Corporate Counsel Center, Northwestern University School of Law. Since December 1987.
- Associate Editor, Law and Social Inquiry. Summer 1987-December 1989.
- Interviewed Administrative Law Judge candidates for U.S. Office of Personnel Management. Chicago, Illinois. May 23, 1988.
- Member, Congressman Bruce Morrison's Military Academy Selection Committee. Fall 1983.
- 1982 Candidate for Democratic Nomination, Connecticut State Senate, 14th District (Milford, Orange, West Haven).

PRO BONO LEGAL WORK

- Death Penalty case: Heath v. Alabama. Fall 1986-Fall 1989.
- Wrote brief opposing death sentence in Navy spy case. Court ruled in favor of defendant on September 13, 1985.
- Staff Attorney, Neighborhood Legal Services, January-July 1981.
- Appealed sentence of death for Georgia defendant to the United States Supreme Court. Sentence vacated on May 27, 1980. Baker v. Georgia.
- Court-appointed representation of indigent criminal defendant in District of Columbia Superior Court, February-July 1980.

RESEARCH GRANTS

- Stanford University Research Fund, January 1997 and January 1998.
- The National Science Foundation (project with James Heckman), December 1992; (project with Steve Levitt), July 1997.
- Fund for Labor Relations Studies, University of Michigan Law School, March 1988.

BAR ADMISSIONS

- Connecticut - October 1977; District of Columbia - March 1978 (Currently Inactive Status); United States Supreme Court - November 1980; U.S. District Court for the District of Connecticut – February 14, 1978.

PROFESSIONAL and HONORARY ASSOCIATIONS

- American Academy of Arts and Sciences (since April 2009).
- Research Associate, National Bureau of Economic Research (since October 1996) – in Law and Economics and Labor Studies.
- American Law Institute (since September 29, 2010).
- Member, Fellows of the Society for Empirical Legal Studies (since October 2015).
- American Bar Association
- American Economic Association

- American Law and Economics Association

PERSONAL

- Born: January 30, 1953.

DECLARATION OF SERVICE BY E-MAIL and U.S. Mail

Case Name: **Duncan, Virginia et al v. Xavier Becerra**

No.: **17-cv-1017-BEN-JLB**

I declare:

I am employed in the Office of the Attorney General, which is the office of a member of the California State Bar, at which member's direction this service is made. I am 18 years of age or older and not a party to this matter. I am familiar with the business practice at the Office of the Attorney General for collection and processing of correspondence for mailing with the United States Postal Service. In accordance with that practice, correspondence placed in the internal mail collection system at the Office of the Attorney General is deposited with the United States Postal Service with postage thereon fully prepaid that same day in the ordinary course of business.

On November 3, 2017, I served the attached **EXPERT REBUTTAL REPORT OF JOHN J. DONOHUE** by transmitting a true copy via electronic mail. In addition, I placed a true copy thereof enclosed in a sealed envelope, in the internal mail system of the Office of the Attorney General, addressed as follows:

C. D. Michel
Michel & Associates, P.C.
180 E. Ocean Boulevard, Suite 200
Long Beach, CA 90802
E-mail Address:
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Erin E. Murphy
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655 15th Street N.W.
Washington D.C. 20005
E-mail Address:
erin.murphy@kirkland.com

I declare under penalty of perjury under the laws of the State of California the foregoing is true and correct and that this declaration was executed on November 3, 2017, at Sacramento, California.

N. Newlin
Declarant

Signature

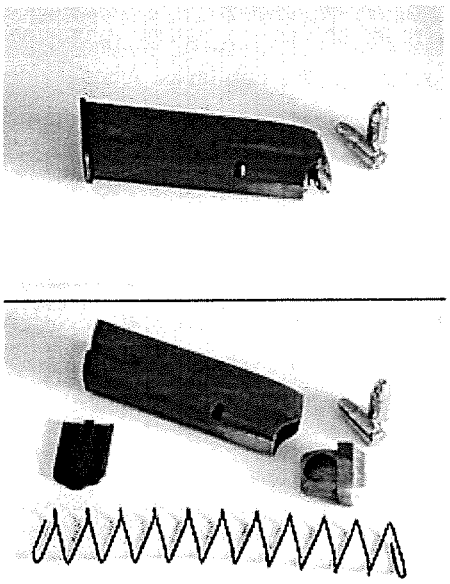
SA2017107272
POS.docx

EXHIBIT 7

Magazine (firearms)

A **magazine** is an ammunition storage and feeding device within or attached to a repeating firearm. Magazines can be removable (detachable) or integral (internal/fixed) to the firearm. The magazine functions by moving the cartridges stored within it into a position where they may be loaded into the barrel chamber by the action of the firearm. The detachable magazine is often colloquially referred to as a clip, although this is technically inaccurate.[1][2][3]

Magazines come in many shapes and sizes, from tubular magazines on lever-action rifles that hold only a few rounds, to detachable box and drum magazines for automatic rifles and machine guns that can hold more than one hundred rounds. Various jurisdictions ban what they define as "high-capacity magazines".



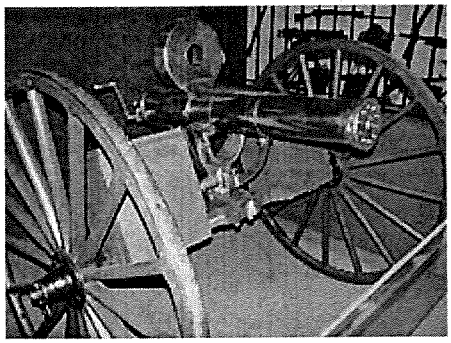
A staggered-column 9×19mm Browning Hi-Power pistol box magazine; the top image shows the magazine loaded and ready for use while the lower image shows it unloaded and disassembled

Contents

The new bolt-action rifles began to gain favor with militaries in the 1880s and were often equipped with tubular magazines. The Mauser Model 1871 was originally a single-shot action that added a tubular magazine in its 1884 update. The Norwegian Jarmann M1884 was adopted in 1884 and also used a tubular magazine. The French Lebel Model 1886 rifle also used 8-round tubular magazine.[12]

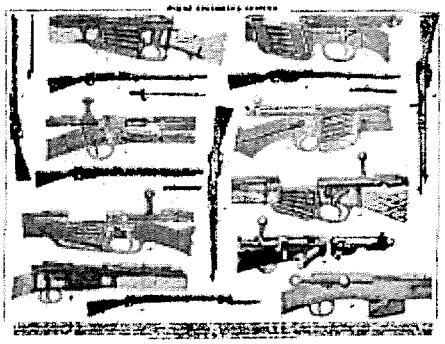
Integral box

The military cartridge was evolving as the magazine rifle evolved. Cartridges evolved from large-bore cartridges (.40 caliber/10 mm and larger) to smaller bores that fired lighter, higher-velocity bullets and incorporated new smokeless propellants. The Lebel Model 1886 rifle was the first rifle and cartridge to be designed for use with smokeless powder and used an 8 mm wadcutter-shaped bullet that was drawn from a tubular magazine. This would later become a problem when the Lebel's ammunition was updated to use a more aerodynamic pointed bullet. Modifications had to be made to the centerfire case to prevent the spitzer point from igniting the primer of the next cartridge inline in the magazine through recoil or simply rough handling.[13] This remains a concern with lever-action firearms today.



Gatling gun with Accles drum, an odd loading device resembling a pan magazine in that the rotary follower was operated by the gun's action rather than a spring

Two early box magazine patents were the ones by Rollin White in 1855 and William Harding in 1859.[14] A detachable box magazine was patented in 1864 by the American Robert Wilson. Unlike later box magazines this magazine fed into a tube magazine and was located in the stock of the gun.[15][16] Another box magazine, closer to the modern type, was patented in Britain (No. 483) by Mowbray Walker, George Henry Money and Francis Little in 1867.[17] James Paris Lee patented a box magazine which held rounds stacked vertically in 1879 and 1882 and it was first adopted by Austria in the form of an 11mm straight-pull bolt-action rifle, the Mannlicher M1886. It also used a cartridge clip which held 5 rounds ready to load into the magazine.[13][18]



1905 Military Rifles magazines.
1 & 2: Mosin–Nagant
3 & 4: Lebel
5 & 6: Gewehr 1888
7 & 8: Mannlicher M1888
9 & 10: Lee–Metford
11 & 12: Dutch-Mannlicher M1895
13 & 14: Mauser M1893
15: Krag–Jørgensen
16: Schmidt–Rubin M1889

The bolt-action Krag–Jørgensen rifle, designed in Norway in 1886, used a unique rotary magazine that was built into the receiver. Like Lee's box magazine, the rotary magazine held the rounds side-by-side, rather than end-to-end. Like most rotary magazines, it was loaded through a loading gate one round at a time, this one located on the side of the receiver. While reliable, the Krag–Jørgensen's magazine was expensive to produce and slow to reload. It was adopted by only three countries, Denmark in 1889, the United States in 1892,[19] and Norway in 1894.

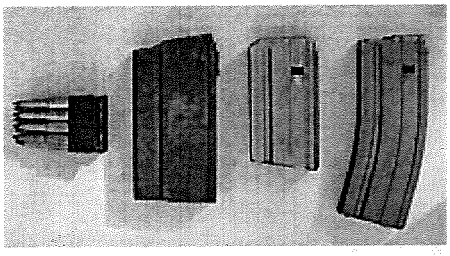
Clip-fed revolution

A clip (called *chargers* by the British) is a device that is used to store multiple rounds of ammunition together as a unit, ready for insertion into the magazine or cylinder of a firearm. This speeds up the process of loading and reloading the firearm as several rounds can be loaded at once, rather than one round being loaded at a time. Several different types of clips exist, most of which are made of inexpensive metal stampings that are designed to be disposable, though they are often re-used.

The Soviet SKS carbine, which entered service in 1945, was something of a stopgap between the semi-automatic service rifles being developed in the period leading up to World War II, and the new assault rifle developed by the Germans. The SKS used a fixed magazine, holding ten rounds and fed by a conventional stripper clip. It was a modification of the earlier AVS-36 rifle, shortened and chambered for the new reduced power 7.62×39mm cartridge. It was rendered obsolete for military use almost immediately by the 1947 introduction of the magazine-fed AK-47 assault rifle, though it remained in service for many years in Soviet Bloc nations alongside the AK-47. The detachable magazine quickly came to dominate post-war military rifle designs.[26]

Detachable box magazines

The Lee–Metford rifle, developed in 1888, was one of the first rifles to use a detachable box magazine.[27] However, the first completely modern removable box magazine was patented in 1908 by Arthur Savage for the Savage Model 99.[28] Other guns did not adopt all of its features until his patent expired in 1942: It has shoulders to retain cartridges when it is removed from the rifle. It operates reliably with cartridges of different lengths. It is insertable and removable at any time with any number of cartridges. These features allow the operator to reload the gun infrequently, carry magazines rather than loose cartridges, and to easily change the types of cartridges in the field. The magazine is assembled from inexpensive stamped sheet metal. It also includes a crucial safety feature for hunting dangerous game: when empty the follower[29] stops the bolt from engaging the chamber, informing the operator that the gun is empty before any attempt to fire.



(left to right)
M1 Garand 8-round en-bloc clip,
M14 20-round magazine,
M16 STANAG 20- and 30-round magazines

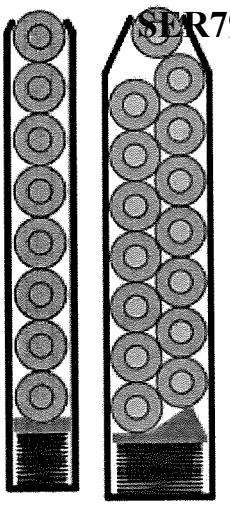
The first successful semi-automatic pistol was the Borchardt C-93 (1893) and incorporated detachable box magazines. Nearly all subsequent semiautomatic pistol designs adopted detachable box magazines.

The Swiss Army evaluated the Luger pistol using a detachable box magazine in 7.65×21mm Parabellum and adopted it in 1900 as its standard side arm. The Luger pistol was accepted by the Imperial German Navy in 1904. This version is known as Pistole 04. In 1908 the German Army adopted the Luger to replace the Reichsrevolver in front-line service. The Pistole 08 (or P.08) was chambered in 9×19mm Parabellum. The P.08 was the usual side arm for German Army personnel in both world wars.

The M1911 semi-automatic pistol set the standard for most modern handguns and likewise the mechanics of the handgun magazine. In most handguns the magazine follower engages a slide-stop to hold the slide back and keep the firearm out of battery when the magazine is empty and all rounds fired. Upon inserting a loaded magazine, the user depresses the slide stop, throwing the slide forward, stripping a round from the top of the magazine stack and chambering it. In single-action pistols this action keeps the hammer cocked back as the new round is chambered, keeping the gun ready to begin firing again.

During World War One, detachable box magazines found favor, being used in all manner of firearms; such as pistols, light-machine guns, submachine-guns, semi-automatic and automatic rifles. However, after the War to End All Wars, military planners failed to recognize the importance of automatic rifles and detachable box magazine concept, and instead maintained their traditional views and preference for clip-fed bolt-action rifles. As a result, many promising new automatic rifle designs that used detachable box magazines were abandoned.

The most popular type of magazine in modern rifles and handguns, a box magazine stores cartridges in a column, either one above the other or staggered zigzag fashion. This zigzag stack is often identified as a *double-column* or *double-stack* since a single staggered column is actually two side-by-side vertical columns offset by half of the diameter of a round. As the firearm cycles, cartridges are moved to the top of the magazine by a follower driven by spring compression to either a single feed position or side-by-side feed positions. Box magazines may be integral to the firearm or removable.



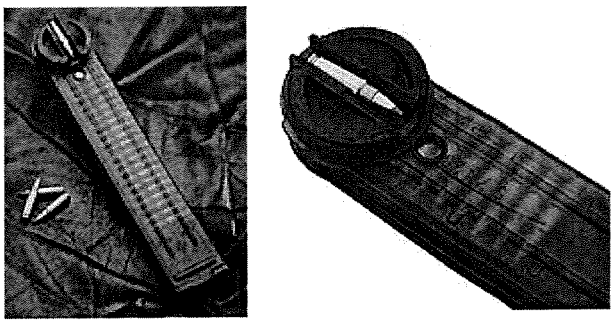
single column and staggered (aka *double-stack*) column detachable box magazines, both with single-feed lips.

- An **internal box**, **integral box** or *fixed* magazine (also known as a *blind* box magazine when lacking a floorplate) is built into the firearm and is not easily removable. This type of magazine is found most often on bolt-action rifles. An internal box magazine is usually charged through the action, one round at a time. Military rifles often use stripper clips, a.k.a. chargers, permitting multiple rounds, commonly 5 or 10 at a time, to be loaded in rapid sequence. Some internal box magazines use *en-bloc* clips that are loaded into the magazine with the ammunition and that are ejected from the firearm when empty.
- A **detachable box** magazine is a self-contained mechanism capable of being loaded or unloaded while detached from the host firearm. They are attached via a slot in the firearm receiver, usually below the action but occasionally to the side (Sten, FG 42, Johnson LMG) or on top (Madsen machine gun, Bren gun, FN P90). When necessary, the magazine can easily be detached from the firearm and replaced by another. This significantly speeds the process of reloading, allowing the operator quick access to ammunition. This type of magazine may be straight or curved, the curve being necessary if the rifle uses rimmed ammunition or ammunition with a tapered case. Detachable box magazines may be metal or plastic. The plastic magazines are sometimes partially transparent so the operator can easily check the remaining ammunition. Box magazines are often affixed to each other with clamps, clips, tape, straps, or built-in studs to facilitate faster reloading: see jungle style.

There are, however, exceptions to these rules. The Lee–Enfield rifle had a detachable box magazine only to facilitate cleaning. The Lee–Enfield magazine did open, permitting rapid unloading of the magazine without having to operate the bolt-action repeatedly to unload the magazine. Others, like the Breda Modello 30, had a fixed protruding magazine that resembled a conventional detachable box but was non-detachable.

Horizontal

The FN P90 personal defense weapon uses a horizontally mounted feeding system; the magazine sits parallel to the barrel, fitting flush with the top of the receiver, and the ammunition is rotated 90 degrees by a spiral feed ramp before being chambered. The AR-57, also known as the AR Five-seven, is an upper receiver for the AR-15/M16 rifle lower receiver, firing FN 5.7×28mm rounds from standard FN P90 magazines.



The P90's magazine has a capacity of 50 rounds, and it fits flush with the weapon's frame.[31]

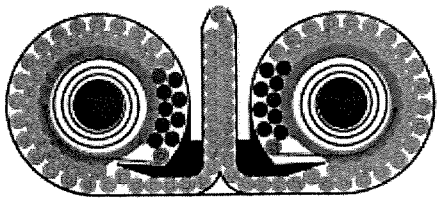
Casket

Another form of box magazine, sometimes referred to as a "quad-column", can hold a great amount of ammunition. It is wider than a standard magazine, but retains the same length. Casket magazines can be found on the Suomi KP/-31, Hafdasa C-4, Spectre M4, QCW-05 and on 5.45×39mm AK rifle derivatives. Magpul has been granted a patent[32] for a STANAG compatible casket magazine,[33] and such a magazine was also debuted by SureFire in December 2010, and is now sold as the MAG5-60 and MAG5-100 High Capacity Magazine (HCM) in 60- and 100-round capacities, respectively, in 5.56mm for AR-15 compatible with M4/M16/AR-15 variants and other firearms that accept STANAG 4179 magazines.[34] Izhmash has also developed a casket magazine for the AK-12.[33]

Media related to Drum magazines at Wikimedia Commons

Saddle-drum

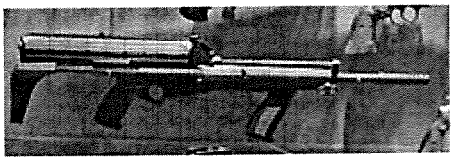
Before WWII the Germans developed 75-round saddle-drum magazines for use in their MG 13 and MG 15 machine guns. The MG 34 machine guns could also use saddle-drum magazine when fitted with a special feed cover. The 75 rounds of ammunition were evenly distributed in each side of the magazine with a central feed "tower" where the ammunition is fed to the bolt. The ammunition was fed by a spring force, with rounds alternating from each side of the double drum so that the gun would not become unbalanced.



Beta C-Mag double-drum magazine.

Helical

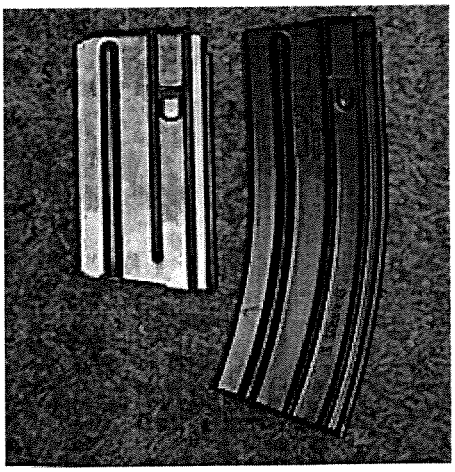
Helical magazines extend the drum magazine design so that rounds follow a spiral path around an auger-shaped rotating follower or *drive member*, allowing for large ammunition capacity in a magazine that can be adapted to increase ammo capacity with only a minor increase to the dimensions of an unloaded gun (compared to a regular box magazine of similar capacity). This type of magazine is used by the Calico M960, Bizon SMG, Long Wind CS/LS06 and KBP PP90M1.



Calico pioneered the helical magazine design. Pictured is the company's M960 carbine.

STANAG magazine

A **STANAG magazine**[39][40] or **NATO magazine** is a type of detachable magazine proposed by NATO in October 1980.[41] Shortly after NATO's acceptance of the 5.56×45mm NATO rifle cartridge, Draft **Stan**dardization **Ag**reement (STANAG) 4179 was proposed in order to allow NATO members to easily share rifle ammunition and magazines down to the individual soldier level. The U.S. M16 rifle magazine was proposed for standardization. Many NATO members, but not all, subsequently developed or purchased rifles with the ability to accept this type of magazine. However, the standard was never ratified and remains a 'Draft STANAG'.[42]



Two STANAG-compliant magazines: A 20-round Colt-manufactured magazine, and a 30-round Heckler & Koch "High Reliability" magazine.

The STANAG magazine concept is only an interface, dimensional, and control (magazine latch, bolt stop, etc.) requirement.[43][44] Therefore, it not only allows one type of magazine to interface with various weapon systems,[43][44] but also allows STANAG magazines to be made in various configurations and capacities.[43][44] The standard STANAG magazines are 20, 30, and 40 round box magazines,[44] but there are many other designs available with capacities ranging from 1 round[45] to 60 and 100 round casket magazines,[46][47] 90 round snail-drum magazines,[48] and 100 round[49] and 150 round double-drum magazines.[50]

High-capacity magazines

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EXHIBIT 8

NRA GUIDE TO THE BASICS OF PISTOL SHOOTING

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Single-action semi-automatics require the hammer to be cocked manually for the first shot; the reciprocating slide cocks the hammer for all subsequent shots. Single-action semi-automatics offer the same short, crisp and relatively light trigger pull for the first shot and for all subsequent shots.

An alternative to the single-action semi-automatic is the *traditional double-action* pistol, which may also be described as a *double/single action*. In this type of mechanism, the first shot is fired with the hammer down, in the double-action mode—i.e., a long, relatively heavy trigger pull both cocks and releases the hammer—and subsequent shots are fired in the single-action mode. This allows the gun to be carried safely with a cartridge in the chamber and the hammer lowered, giving a rapid first shot.

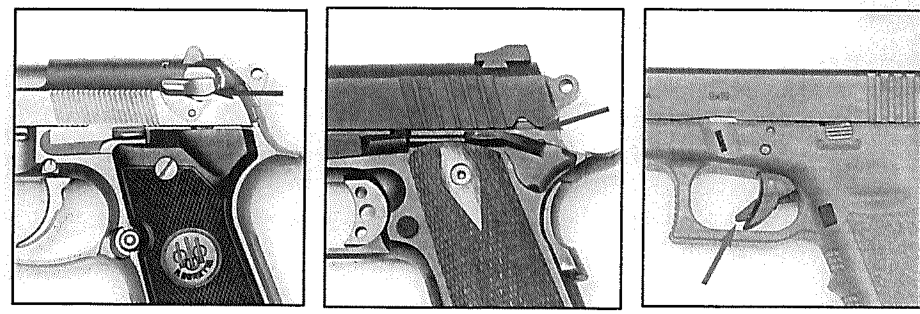
Some pistol users—particularly among law enforcement—wanted the rapid reloading and increased firepower of the semi-automatic, combined with the long, heavy pull of the double-action revolver. This pull was considered to be less conducive to an unintentional discharge than the short, light pull of the single-action or traditional double-action pistol. This led to the development of *double-action only (DAO)* semi-automatics, which, as their name implies, require a long double-action pull for every shot.

In addition to the broad categories above, a number of other pistol types incorporate novel designs, many of which seek to combine the fast and accurate first shot capability afforded by a single-action trigger pull with the safety of hammer-down carry. Some of these pre-cock a hammer or internal striker, giving a "semi-double-action" pull for the first shot. A few designs can be fired in the both the single-action and traditional double-action modes, affording the gun owner a choice of trigger types.

SEMI-AUTOMATIC SAFETY MECHANISMS

Semi-automatic pistol safety systems can assume a dizzying variety of forms. Probably the most familiar are the pivoting thumb levers located on the frame or slide. These are sometimes located on the left side only; however, on many recent designs, they are located bilaterally for ambidextrous use. While many thumb safeties are pivoted downward to disengage, some work in the opposite direction. Such safeties mounted on the frame typically block the sear, while those mounted on the slide usually prevent the hammer from contacting the firing pin.

A different type of safety system found on some traditional double-action pistols is the *hammer drop safety*, also known as a *decocker*. When this is engaged, the hammer falls harmlessly to its lowered position. With any



Semi-automatic pistols feature a variety of different safety mechanisms, including (l. to r.) slide-mounted decockers, frame-mounted safeties, and trigger safeties.

pistol of this type, firing a shot, or simply working the slide to feed a round into the chamber, leaves the hammer in the cocked position. Since such pistols are not designed to be safely carried with a round in the chamber and the hammer back, the hammer must be lowered before the pistol is holstered, placed in a pistol box, etc. The decocking mechanism safely accomplishes this. Double-action-only (DAO) semiautomatic pistols may have a thumb safety or, alternately, no active safety mechanism at all.

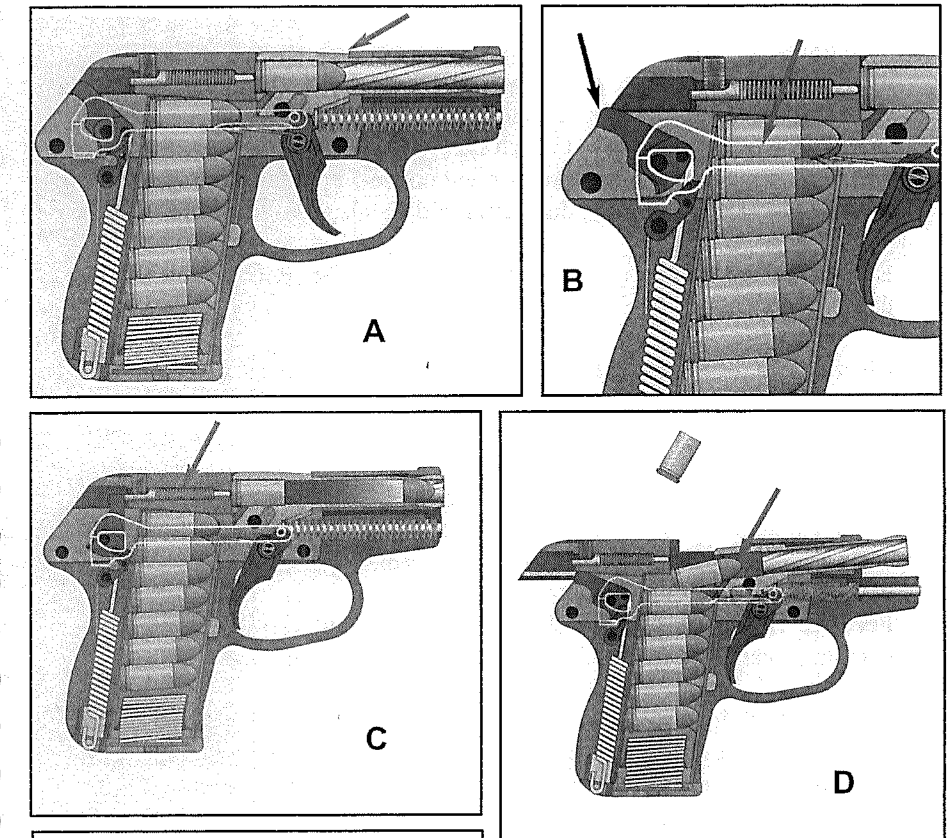
All semi-automatic pistols normally exhibit one or more *passive safety systems*, such as an inertia firing pin, a magazine disconnect (which prevents firing the round in the chamber if the magazine is removed), grip safety, or passive firing pin block that prevents forward firing pin travel unless the trigger is depressed.

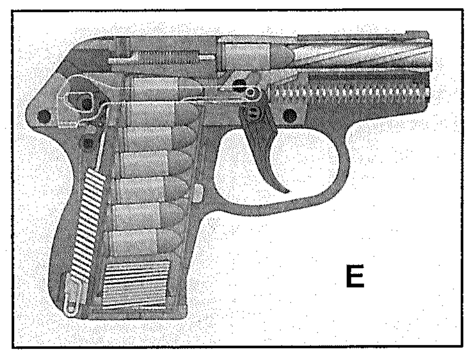
SEMI-AUTOMATIC CYCLE OF OPERATION

All semi-automatic pistols have essentially the same cycle of operation. However, some steps in the cycle may not apply to all action types. For example, double-action-only (DAO) semi-automatic pistols do not have a "cocking" step.

Firing. Pulling the trigger releases an internal or external hammer that strikes the firing pin and fires the cartridge, or it may release a cocked, spring-powered striker or firing pin in the slide.

Unlocking. The pattern of locking is determined by the nature of the semi-automatic mechanism. With recoil-operated actions, mechanical camming





Semi-automatic cycle of operation, shown here with double-action-only pistol with a cartridge in the chamber and the hammer down in its ready position.(A). The barrel and slide are locked together by way of shoulder on chamber end of barrel (arrow). Pulling the trigger (B) causes the trigger bar (white outline, right arrow) to cock the hammer (left arrow). When the trigger rotates the hammer through its full arc, it falls, hitting the firing pin (arrow), firing the gun (C). As the slide recoils to the rear (D), the rear of the barrel drops down and unlocks from the slide, and the empty case is extracted and ejected. The slide quickly returns forward, and the breechface engages the top cartridge in the magazine, feeding it into the chamber (arrow). Finally, the slide returns fully forward, the fresh cartridge feeds fully into the chamber, the barrel and slide lock together, and the trigger bar resets (E).

surfaces serve to unlock the barrel from the slide after the two components have traveled rearward together a short distance. Gas-operated actions utilize gas pressure tapped from the bore to impel the slide rearward and unlock the action. Blowback-operated systems are by definition unlocked, so no unlocking is necessary. In such systems, the action opens simply when the gas pressure in the chamber and bore overcomes the forward force of the recoil spring and the inertia of the slide or bolt.

Extraction. A claw extractor mounted on the slide face engages the rim of the cartridge case and pulls it from the chamber after the action unlocks.

Ejection. As the slide moves smartly to the rear carrying a spent cartridge case, an ejector—usually a standing blade mounted in the frame—contacts the case head, throwing the case out of the action through the ejection port.

Cocking. At or near the extreme rearward limit of its travel, the reciprocating slide cocks the hammer or striker, which is held rearward against spring tension by the trigger mechanism.

Feeding. The compressed recoil spring pushes the slide rapidly forward, stripping a cartridge from the magazine and feeding it into the chamber.

Locking. With locked-breech semi-automatic designs, locking of the action occurs during the last fraction of an inch of forward motion of the slide. In the vast majority of designs, the rear of the barrel is cammed upward as it moves forward so that its locking surfaces engage the slide or frame, locking the action. With blowback-operated designs, no locking occurs; the momentum of the forward-moving bolt or slide is sufficient to fully chamber a cartridge and close the action (at which point the action is said to be *in battery*). Only the force of the compressed recoil spring, combined with the inertia of the bolt or slide, keeps the action closed.

EXHIBIT 9

COMPLETE GUIDE TO GUNS & SHOOTING

by
John Malloy

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About Our Covers

The exciting world of guns and shooting is filled with a variety of firearms for different purposes and games. Our covers show just a few of the types of guns you'll likely encounter as you journey into this wonderful field.

At the top is Ruger's Red Label 12-gauge over/under chambered for 2 3/4-inch shells. It sports a rare blued receiver and fixed Modified and Improved Cylinder chokes. This shotgun is a very popular choice for hunters and competitive shooters alike.

The revolver is Colt's premier model, the Python. Chambered for 357 Magnum, this wheelgun has been a favorite of sport shooters, law enforcement personnel and hunters for many years, and is well known for its silky-smooth action. Shown here is the 6-inch barrel model with target stocks.

At left center is the famous Browning Hi-Power autoloading pistol in 9mm Parabellum. With the grip, feel and reliability by which others are judged, the Hi-Power is one of the most popular pistols in the world. This example is shown with target sights.

At bottom is the Ruger M77R Mark II bolt-action rifle in caliber 30-06. Since its introduction in the late 1960s, the M77 rifle has appeared in many forms, in myriad chamberings, and is the rifle of choice for many hunters because it represents excellent value. It's shown here with a Redfield 2 1/2-7x Tracker scope in Ruger mounts.

Photo by John Hanusin.

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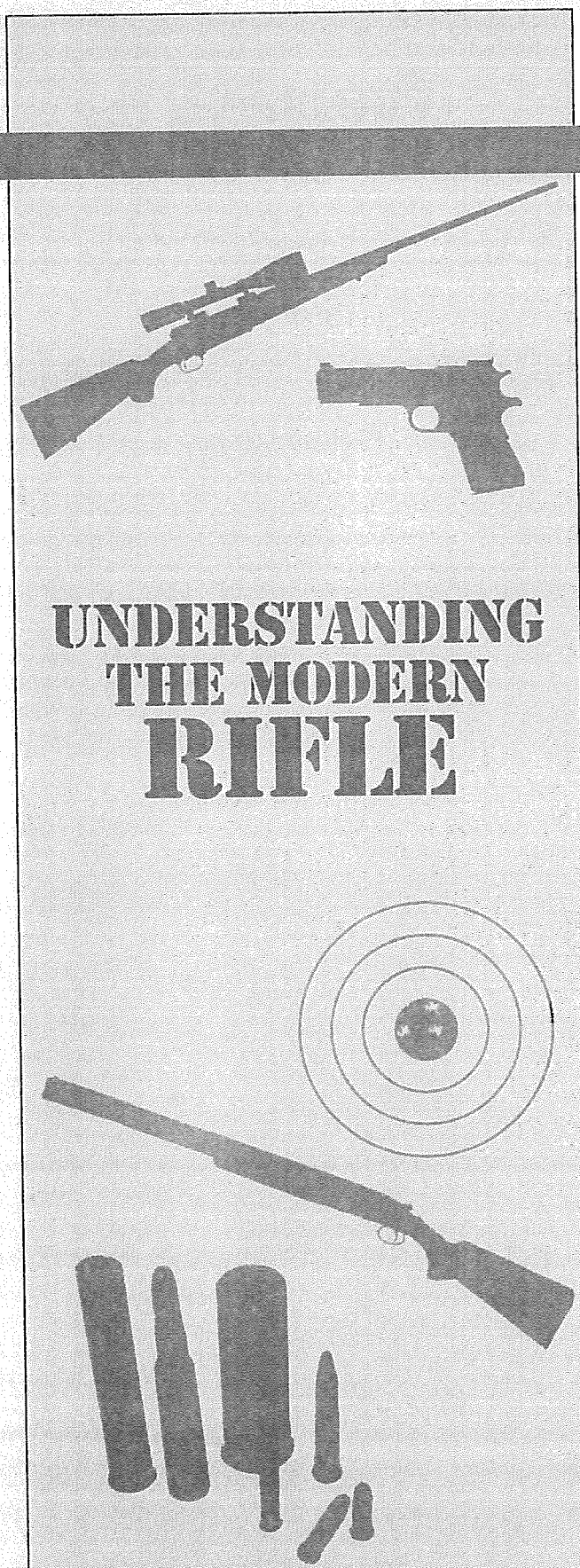


CHAPTER THREE

RIFLES HAVE A special place in American history. First used in Europe, probably before 1500, they were by 1700 fairly common in Germany and Switzerland, soon making their way to America with German gunsmiths settling in Pennsylvania. By 1735, rifles designed for American use—balanced for carrying, with small bores and long barrels—were becoming part of the American scene. With the expansion of the American frontier during Colonial days, the usefulness of the rifle became evident. A firearm that could deliver a small projectile with great accuracy was well suited for the wilderness. And, small bores required smaller amounts of lead and powder, hard items to acquire in the wilderness. This distinctly American style of rifle came to be called the "Kentucky" or "Pennsylvania" rifle.

Rifles played decisive roles in American history. They were instrumental during the American Revolution, accompanied Lewis and Clark on their expedition, and influenced both the War of 1812 and the Mexican War. The use of the rifle in the Civil War changed military tactics forever and helped expand the Western frontier. Rifles designed and used by Americans also influenced the outcomes of the two World Wars.

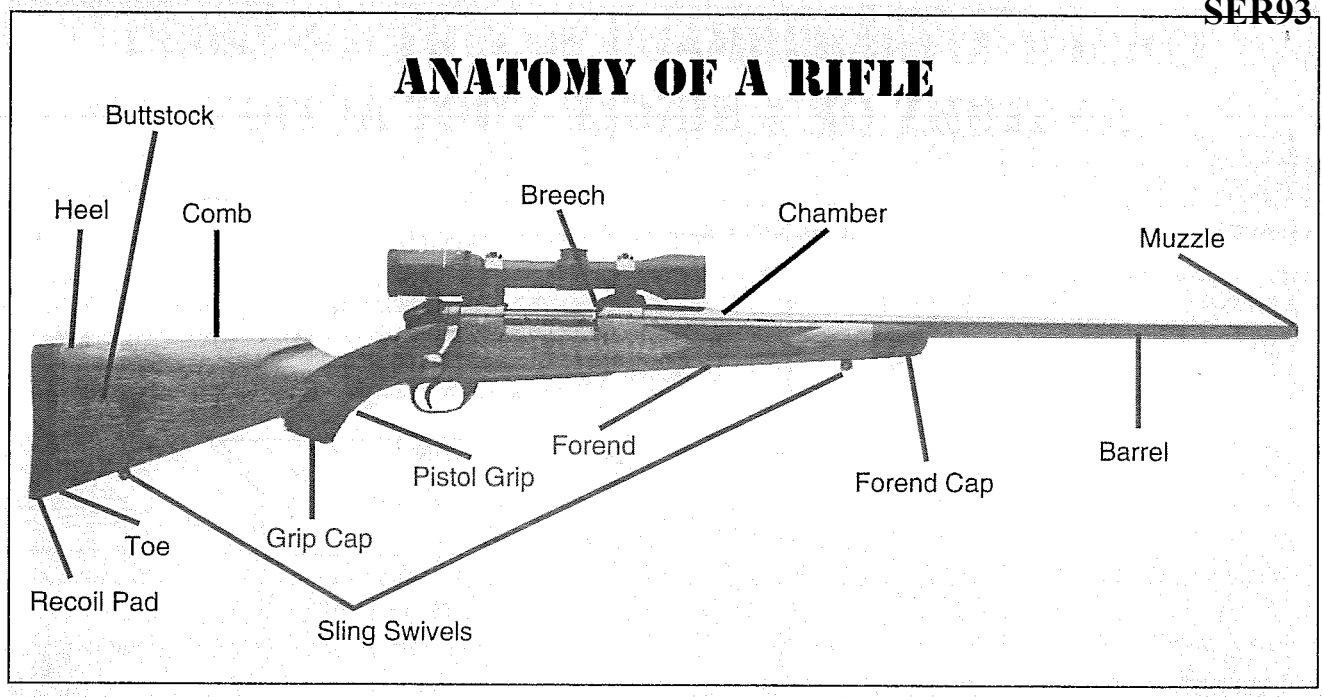
As special as rifles have been to our country on a historical level, they are special to many people on a personal level as well. For generations, a boy's first 22 was a rite of passage, a sign he was considered a responsible person by adults. That tradition has dwindled in our large metropolitan areas, but is still an American tradition nonetheless.

My first rifle was a Winchester Model 67, a manually cocked bolt-action single shot. I bought it with my lawn mowing money at age eleven, which was some time ago. To me, that little 22 seemed like an artillery piece. It seemed as if I were in control of more power than I had ever before imagined.

From that simple rifle, I learned a lot. Its few parts made me curious as to how a rifle worked, and knowing something about rifle parts is basic to understanding rifles. Since rifles are usually classified by action type, we must know something about the parts of a rifle in order to group them into categories of action types.

Rifles may also be classed according to the ammunition used—either rimfire or centerfire. Today's rimfires are all 22 caliber. The other classification, centerfire, consists of rifles that have greater power and range.

However, as we have already said, the usual way of classify-



ing rifles is by action type. Although they may differ in scale and details, rimfire and centerfire rifles use the same types of actions. Let us therefore define ***action:*** The breech mechanism that allows the shooter to load, shoot, and unload the rifle.

Parts of a Rifle

Since the parts of an action are critical to our classification, let's first go over all the parts of a rifle. The stock is the simplest part, so let's take that first.

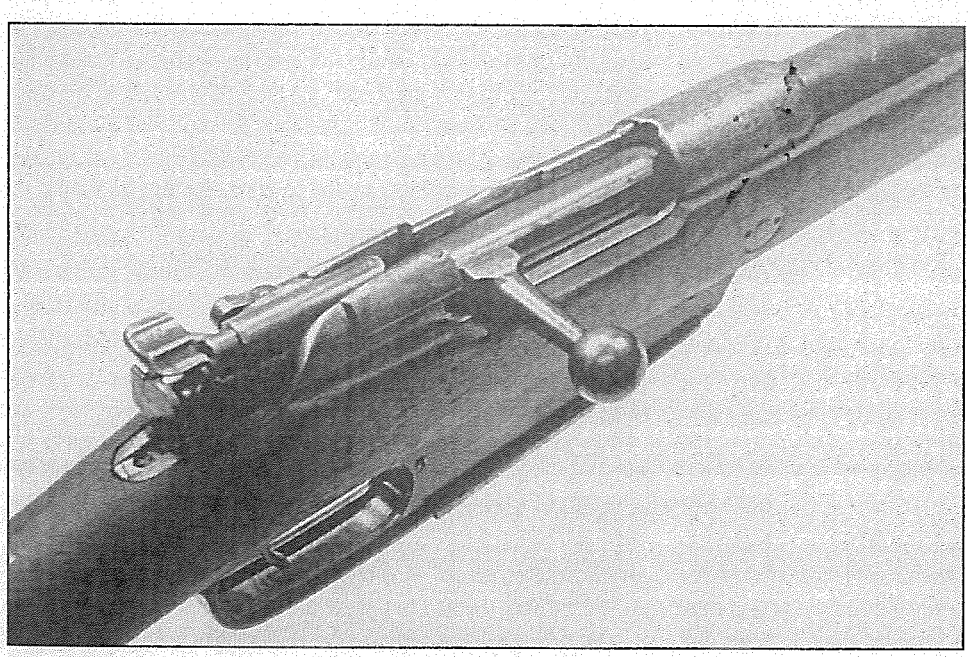
The Stock

For this discussion, we will assume the stock is made of wood. More and more stocks are being made of synthetic materials now, but most of the terminology still applies.

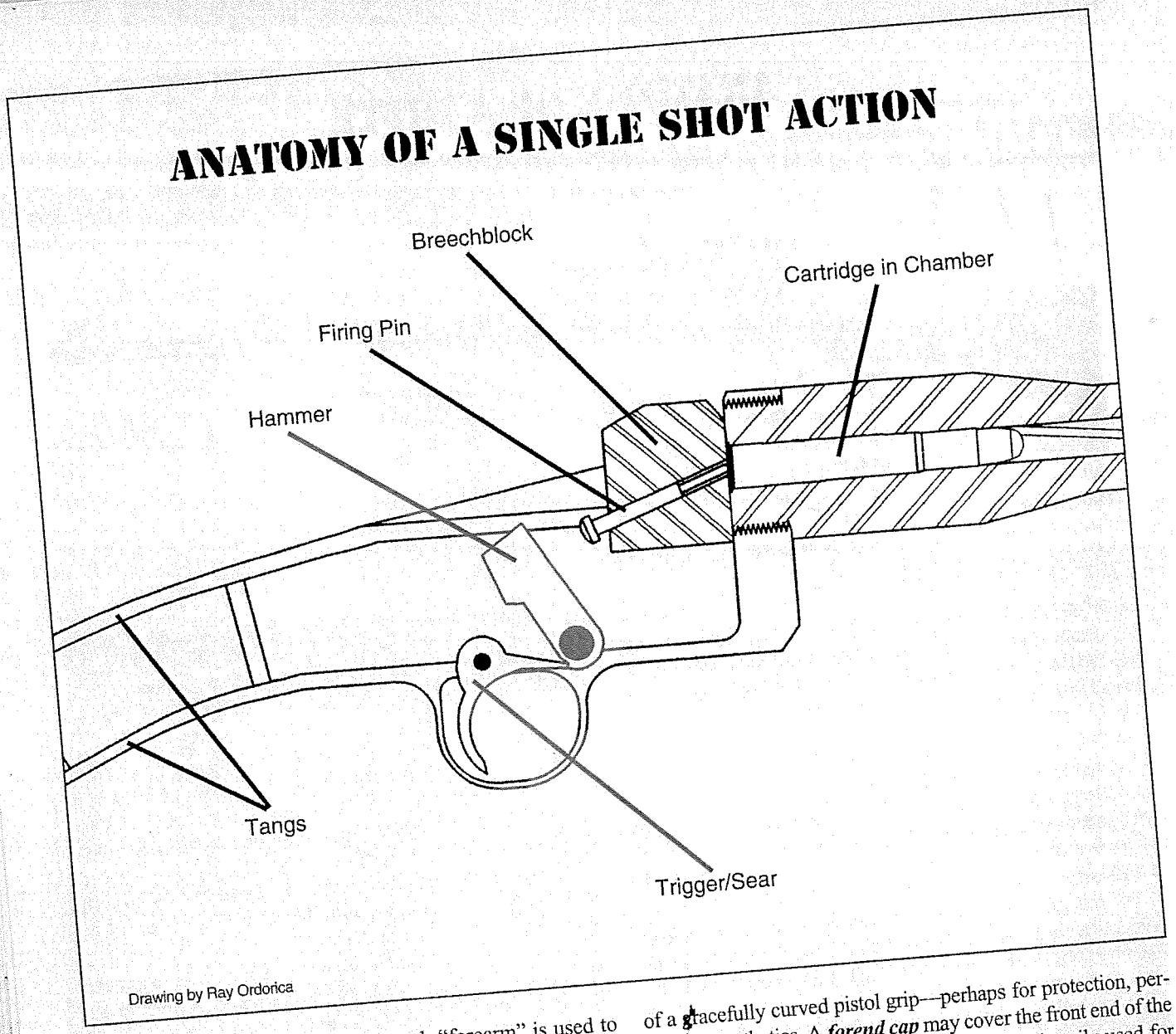
Beginning at the rear, the ***butt*** is the portion, generally flat or slightly curved, that fits against the shoulder. The top of the butt is the ***heel*** and the bottom is the ***toe***. Going forward, the shooter's cheek rests on the ***comb*** of the stock. Continuing forward, the stock becomes small. This is the ***small*** of the stock, or more commonly, the ***grip***. If the top and bottom lines are straight, it is called a ***straight grip***. If the bottom line curves like the grip of a pistol, it is called a ***pistol grip***.

Continuing forward, we come to the ***forend*** or ***forearm***. In some cases, it is a continuation of the same piece of wood. In others, it is a separate piece of wood.

Now we need to address a question that is not easy to answer. When is it correct to use "forend" and when is it correct to use "forearm?" The NRA basic handbooks use the term "forend"



This close-up shows the bolt and receiver of a German 1888 Commission bolt-action rifle.



when it is a continuous piece of wood; "forearm" is used to define the separate front piece of a two-piece stock. If you are taking an NRA course, by all means keep your instructor happy by using the terms in this fashion. Be aware, though, that some authorities use the two terms in exactly the opposite manner. Many use them interchangeably.

Until I began writing this, I really was not sure how I used these two terms. I found that, when speaking, I tended to use the terms interchangeably. When writing, I generally used "forearm" for all cases.

Some rifles based on modern military patterns may have features other than those we've discussed. They may have a completely separate pistol grip, or a buttstock that folds for compactness. Some hunters, including Florida Governor Lawton Chiles, use such rifles for hunting because of ease of transport. However, it is the traditional stock we will deal with in this book.

Attached to the stock may be a number of items. A ***buttplate*** generally covers the butt to protect the wood from cracking or splitting. Some centerfire rifles have substantial recoil and may have a rubber ***recoil pad*** attached. A ***grip cap*** may be at the end of a gracefully curved pistol grip—perhaps for protection, perhaps for aesthetics. A ***forend cap*** may cover the front end of the stock. In most cases, I think a forend cap is primarily used for looks, but many feel that covering the grain of the wood here deters moisture from entering and thus prevents the wood from warping.

Sling swivels may be installed to allow the use of a sling o carrying strap. On target rifles, an ***accessory rail*** or ***adapter*** i the forend allows the use of a hand stop or palm rest.

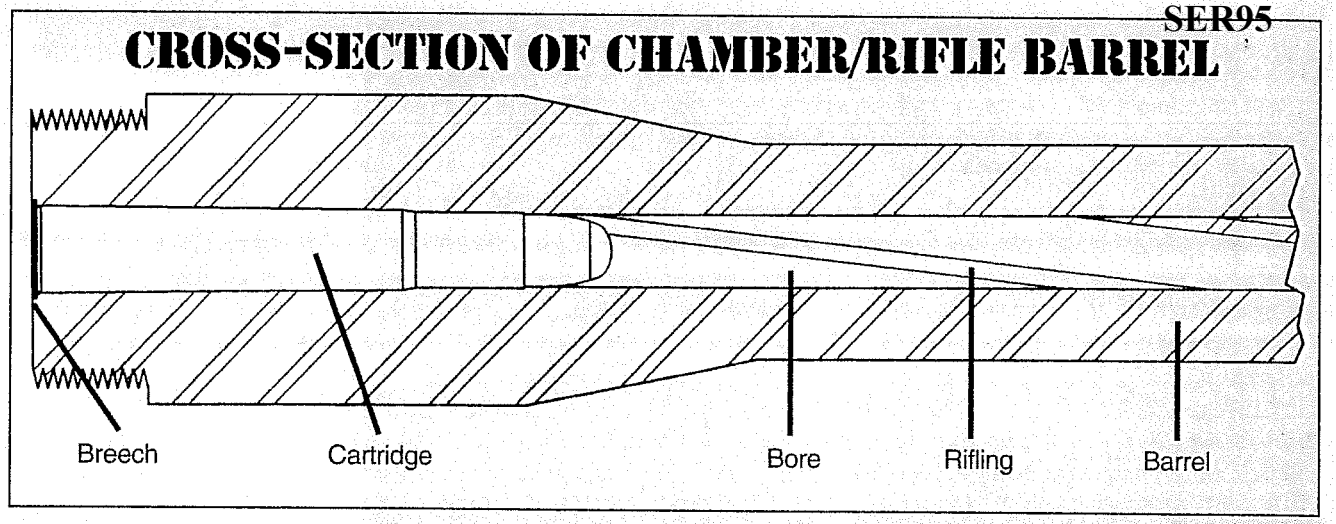
The Barrel

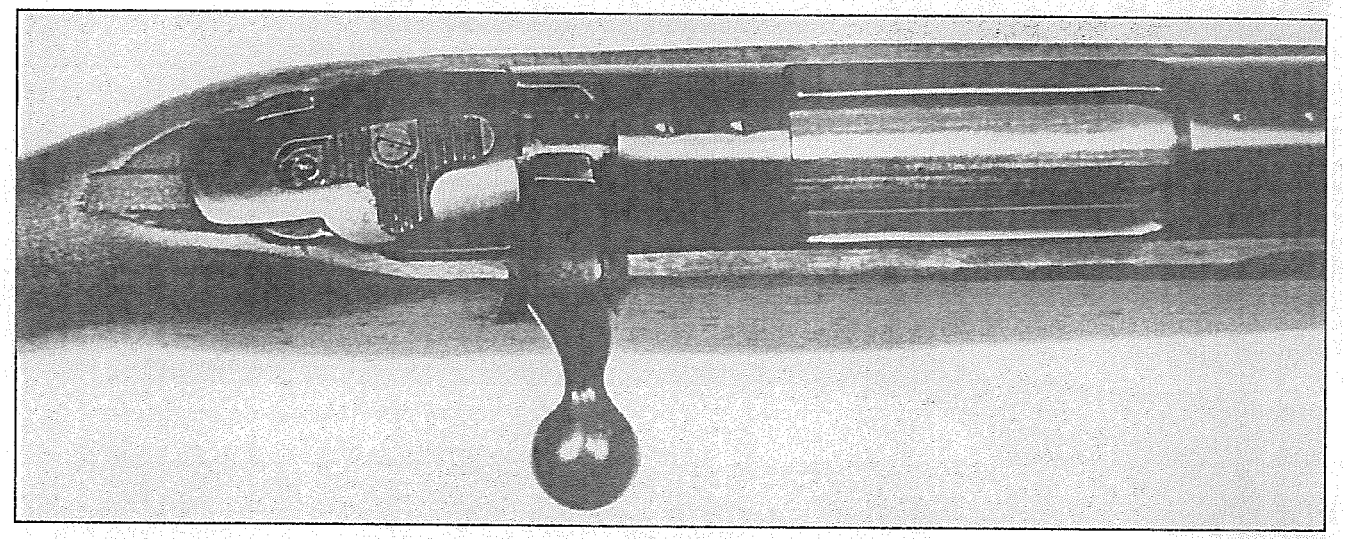
The barrel is the hollow steel tube into which the cartridge inserted and through which the bullet passes on its way to t outside world.

The hole through the center of the barrel is called the bo Spiral grooves are cut into the bore to impart a rotation or "sp to the bullet as it travels through the bore. The grooves are cal logically enough, ***grooves.*** The highs between the groove leys are called ***lands.*** This combination of lands and groov called "rifling," which of course gives a rifle its name.

The rifling curves either to the left or right going throug

SER95





Become familiar with your rifle's safety and how it works. This bolt-action 308-caliber Mossberg rifle has a sliding safety on the rear of the bolt.

bore. In almost all cases, this curve is constant. At some predetermined point in the bore, the rifling will make one full rotation. The distance at which this occurs is usually determined by the manufacturer, suited for the cartridge used, and is generally an even number of inches. Thus, we talk of the ***twist*** of the rifling. For example, a rifle may have a twist rate of one turn in 10 inches, or 1:10.

The rear of the barrel is the ***breech***. At the breech, the rifle's bore is enlarged to form a ***chamber*** which allows insertion of the cartridge for which the rifle is designed or chambered.

If a rifle barrel has the same outside diameter for its entire length (some target rifles do), it is said to be a straight, untapered barrel. Most barrels are smaller at the muzzle end than at the breech. This reduction is accomplished usually by tapering the barrel, sometimes by stepping it, and sometimes by a combination of steps and taper.

The front of the barrel is the ***muzzle***. The metal of the muzzle end of the barrel may be crowned, curved both toward the bore and the outside, or countersunk. This crowning protects the rifling and also has a positive effect on accuracy. Items such as sights or bands also may be installed on the barrel.

The Action

The action of a modern rifle is the combination of moving parts that allows a shooter to load, fire and unload the rifle. All rifles have a ***receiver***, a metal frame onto which all the other parts are attached. All rifles have this in common: A way to open the action, place a cartridge into the chamber and close the bolt or breechblock. When the rifle is thus loaded, a trigger mechanism can release the hammer or striker mechanism, causing the firing pin to strike the primer of the cartridge.

In addition, most rifles have a ***magazine***. This is a device that stores ammunition and allows individual cartridges to be fed automatically into the chamber. In addition, every rifle has some sort of mechanical safety device, which may be of a number of different types. If the design permits, the safety should be engaged whenever a rifle is loaded or unloaded.

Rifles are primarily classified by action type. The actions of modern rifles fall into six main categories: bolt action, slide (pump) action, lever action, semi-automatic, hinge (breakopen) action, falling block action.

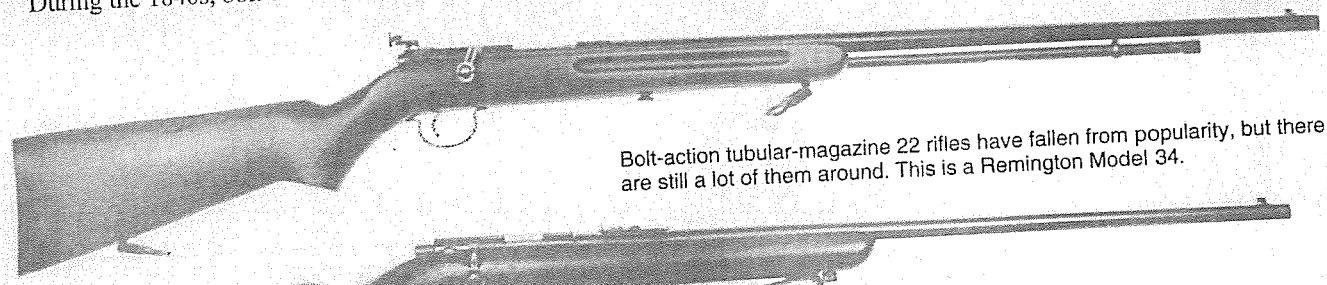
Bolt-action rifles are still seen in High Power Rifle matches. Here, the writer squeezes off a shot from a 1903A3 Springfield during the standing stage.

Bolt Action

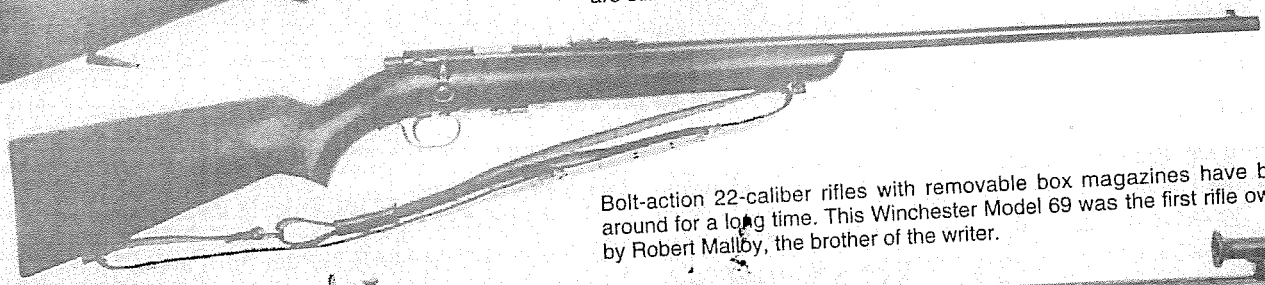
The bolt-action rifle is probably the most common type of rifle used in America. It is so named because the bolt resembles the common turning door bolt which was in use for some time before the concept was applied to firearms.

During the 1840s, bolt-action rifles were in common use in Europe in the form of the Prussian Needle Gun. This early form of bolt action used a paper cartridge and did not seal well at the breech. Thus, soldiers got a puff of powder gas coming back at them with each shot. Still, this inefficient breechloader was very successfully used against military muzzleloaders of the day.

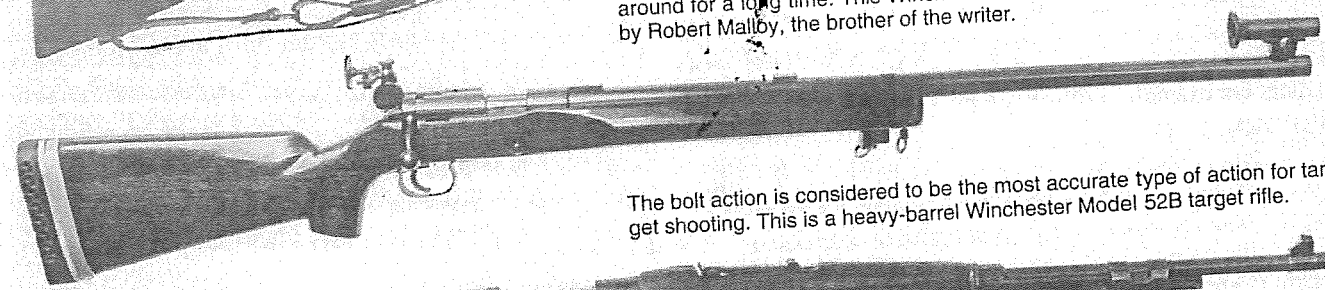
The prize for the first bolt action to use metallic cartridges



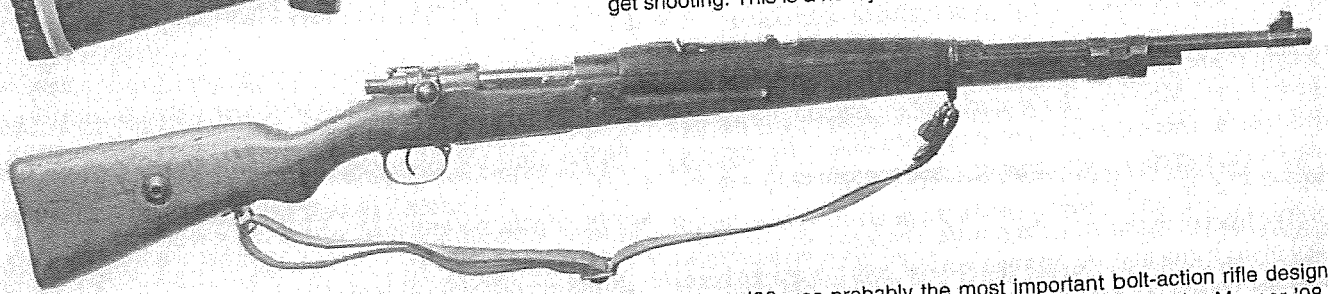
Bolt-action tubular-magazine 22 rifles have fallen from popularity, but there are still a lot of them around. This is a Remington Model 34.



Bolt-action 22-caliber rifles with removable box magazines have been around for a long time. This Winchester Model 69 was the first rifle owned by Robert Malloy, the brother of the writer.

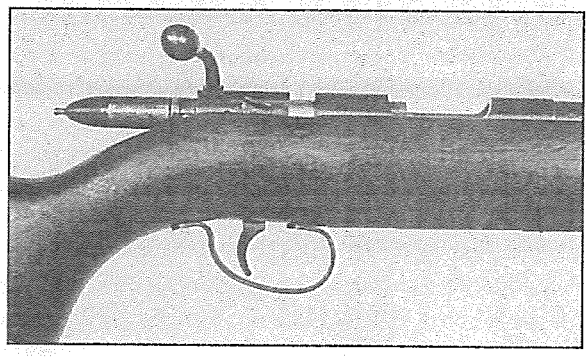


The bolt action is considered to be the most accurate type of action for target shooting. This is a heavy-barrel Winchester Model 52B target rifle.

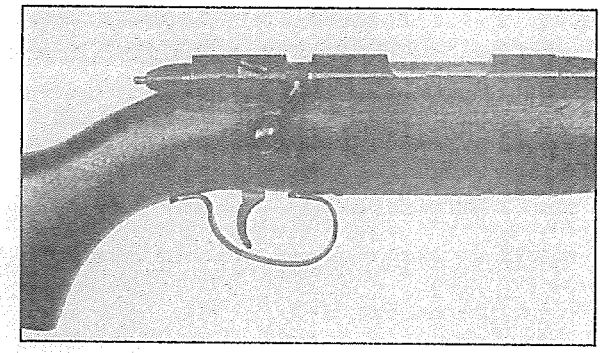


The Mauser '98 was probably the most important bolt-action rifle design ever produced. Many other designs are modifications of the Mauser '98. The basic design has a non-detachable magazine and can be loaded with single cartridges or from a stripper clip.

BOLT-ACTION SINGLE SHOT



A bolt-action rifle, action open.



A bolt-action rifle, action closed.

Bolt-action single shot rifles include two types: the least expensive beginner's rifles, usually 22s, and the most expensive expert's target rifles. The least expensive, because machining is simpler without a magazine cut in the receiver; target rifles, because the receiver is stiffer and flexes less without a magazine cut.

To load:
1. Open the bolt.
2. Insert a cartridge into the chamber.
3. Close the bolt.

Some very inexpensive rifles require manually pulling back the cocking piece at the end of the bolt, an additional step before shooting. If the rifle has an automatic safety, the safety will be on when the bolt is closed and must be taken off to fire. Recall, however, that in Chapter 2 we agreed the safety is only a mechanical device that supplements safe gun handling.

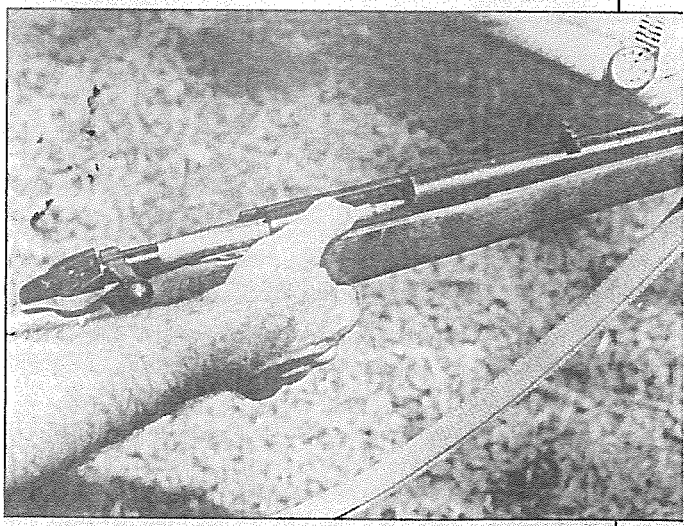
To unload:
1. Open the bolt. The cartridge or empty case will be ejected.
2. Visually inspect the chamber to make sure it is empty.

BOLT-ACTION REPEATER WITH NON-REMOVABLE MAGAZINE

Examples of this type include most centerfire hunting and military surplus rifles.

To load:
1. Open the bolt.
2. Place a cartridge into the open action and press downward into the magazine. Repeat to load additional cartridges.
3. Close the bolt.

To unload:
1. Open the bolt. The cartridge or empty case in the chamber will be ejected.
2. If the floorplate can be removed, release it and empty the remaining cartridges from the magazine. If the floorplate cannot be removed, open and close the bolt repeatedly until the magazine is empty.
3. Visually check the chamber and magazine.



Most bolt-action centerfire rifles, here a 308-caliber Mossberg, load by pushing cartridges down into the magazine.

BOLT-ACTION REPEATER WITH REMOVEABLE MAGAZINE

Examples of this type are most box-magazine 22 rifles and some centerfire rifles such as the Savage 340 and Remington 788.

To load:
1. Open the bolt.
2. Remove the magazine.
3. Load the magazine.
4. Insert the loaded magazine back into the rifle.
5. Close the bolt.

Some bolt-action rifles, such as this 30-30 Stevens Model 325, have a removable box magazine.

To unload:
1. Open the bolt. The chambered cartridge or empty case will be ejected.
2. Remove the magazine.
3. Remove the cartridges from the magazine.
4. Visually check the chamber and magazine.

BOLT-ACTION REPEATER WITH TUBE MAGAZINE

These rifles are almost exclusively 22-caliber, and for many decades, they were very popular plinking and small game rifles. Recently, their popularity has waned compared to bolt-action box-magazine repeaters. Lots of them were made, however, and many models made by Winchester, Remington, Mossberg, Marlin, Savage and Stevens are still in use.

To load:
1. Open the bolt.
2. Release the inner magazine tube and pull it out until the cartridge loading port in the outer tube is open.
3. Load cartridges into the magazine through the opening.
4. Push the tube into its original position and secure it.
5. Close the bolt to position the first cartridge, then open and close it to chamber the first cartridge.

To unload:
1. Open and close the action until all cartridges have been ejected from the rifle.
2. With the action open, visually check the chamber and magazine.

With all tubular magazine 22-caliber rifles, it is possible to unload most of the cartridges by withdrawing the inner magazine tube completely and pouring out the cartridges. There is a reason this method is *not recommended*. It is possible for a cartridge to hang up in the magazine or feed mechanism when the plunger force is removed. Working the cartridges through the action reduces this possibility.

goes to a little-known American rifle, the Palmer carbine, patented in 1863. About a thousand of these 44 rimfire carbines were used by Union troops during the Civil War. By 1867, the Swiss were starting production of the Vetterli rifle, a somewhat more powerful 10.4mm (41-caliber) rimfire rifle. The Vetterli was the first bolt-action repeater.

In 1871, the single shot German Mauser, a powerful 11mm rifle using a centerfire blackpowder cartridge, became the first really successful bolt-action military rifle. In 1886, France adopted the Lebel, the first smokeless-powder bolt-action rifle.

The race was on. By 1891, every major world power had adopted a bolt-action repeating military rifle using smokeless powder cartridges except the United States. We corrected this deficiency in 1892 with the adoption of the 30-40 Krag; then, a decade later, the 1903 Springfield.

Yet, the lever-action rifle was still the rifle of the American hunter. That situation did not change until after World War I. American "doughboys" had used bolt actions during that conflict and wanted similar rifles for hunting afterwards. Before too long, the bolt action became America's number one hunting rifle.

Bolt-action rifles are favored for their strength and their accuracy. All bolt-action rifles share the common "up-and-back, forward-and-down" operation of the bolt, but they come in many styles and types: bolt-action single shot; bolt-action repeater with removable or non-removable magazines; bolt-action with tube magazine.

Slide or Pump Action

The slide-action, or pump, rifle is operated by sliding (or pumping) the forearm of the stock back and forth. When doing so, rods connected to the forearm open and close the action. At the rear of the stroke, a cartridge case is ejected. At the forward stroke, a new round is chambered.

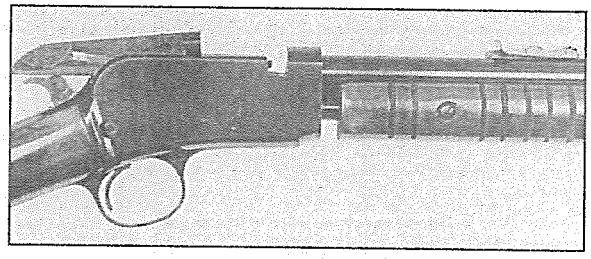
The slide-action rifle never attained the popularity of the bolt-action or lever-action types, but a lot of them have been made, most in 22-caliber. Because the hand that controls the trigger stays in place, leaving the other hand to operate the slide, the slide action is the fastest of all manually operated rifles. The forward movement of the forearm in closing the action also tends to help point the rifle toward the target. Thus, this type is favored by some for woods hunting, where a follow-up shot may be desired.

The slide action is moderately popular in America, but hardly anywhere else. Here, the Colt slide-action Lightning rifle was introduced about 1885. There were three frames: small, medium and Express. Calibers ranged from 22 to the big 50-95.

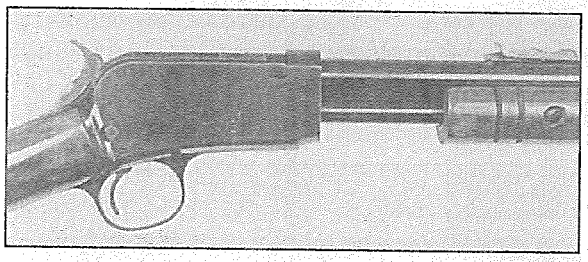
In 1890, Winchester brought out its handy little 22 pump rifle. The rifle went through several modifications, ending as the Model 62. In 1959, Winchester discontinued the rifle and subsequently sold the machinery to Rossi of Brazil; the basic design is still in production as the Rossi Gallery model. Other slide-action 22s have been made by Winchester, Remington, Marlin, Savage, Stevens, Noble, H&R, and High Standard. Centerfire pump hunting rifles have been made by Remington, Savage, Marlin and Action Arms.

As with bolt actions, it is important to understand how to load and unload slide-action rifles. There are three basic types: rimfire with tube magazine; centerfire with tube magazine; centerfire with removable box magazine.

RIMFIRE SLIDE-ACTION REPEATER WITH TUBE MAGAZINE



A slide-action rifle, action open.



A slide-action rifle, action closed.

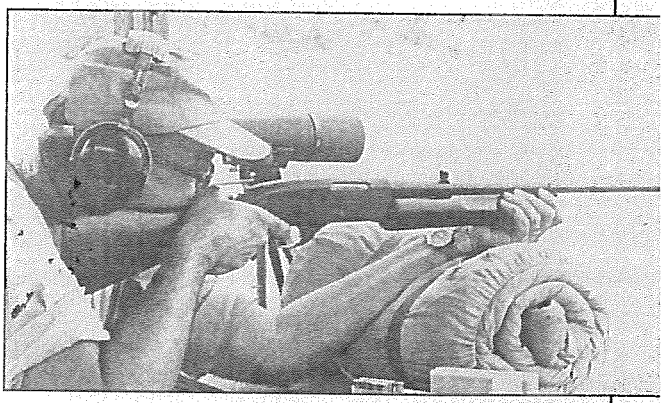
Most 22-caliber slide-action rifles have tubular magazines under the barrel. These magazines have a removable inner tube that contains a spring and plunger.

To load:

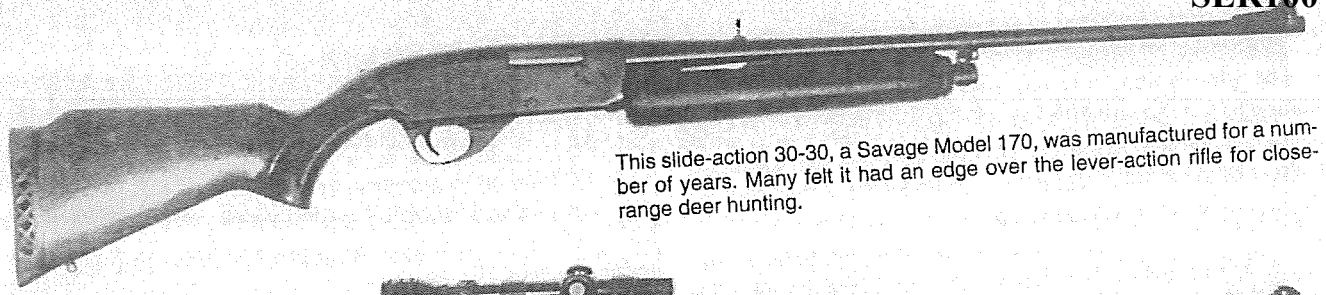
1. Open by pressing the action release and pulling the forearm to the rear.
2. Release the magazine and pull the plunger past the cartridge opening in the outer magazine tube.
3. Place cartridges in magazine opening.
4. Push inner magazine tube to original position and latch, then push the forearm forward to close it. A cartridge is now in the carrier mechanism.
5. Open and close the action to feed a cartridge into the chamber.

To unload:

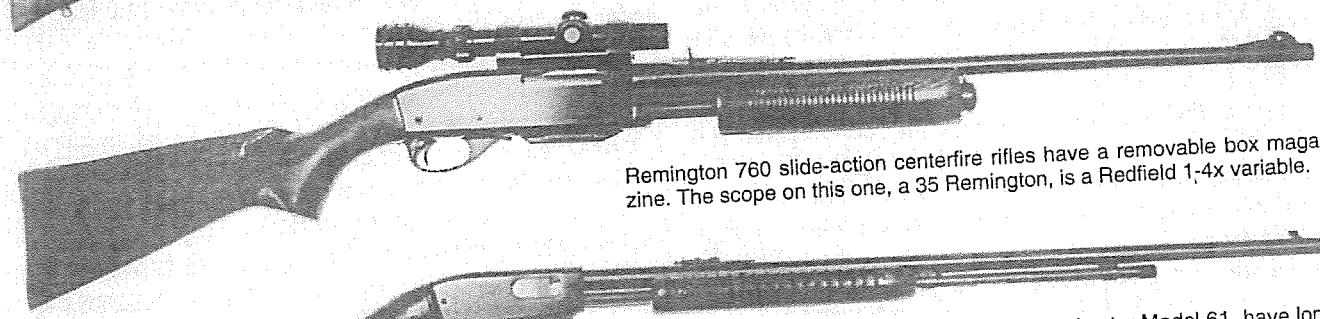
1. Press the action release.
2. Open and close the action until all cartridges have been ejected from the rifle. (Some old-timers slap the stock to jar the rifle, then work the action again at this point, to make sure a cartridge has not hung up in the magazine.)
3. With the action open, visually check the chamber and magazine to be sure the rifle is completely unloaded.



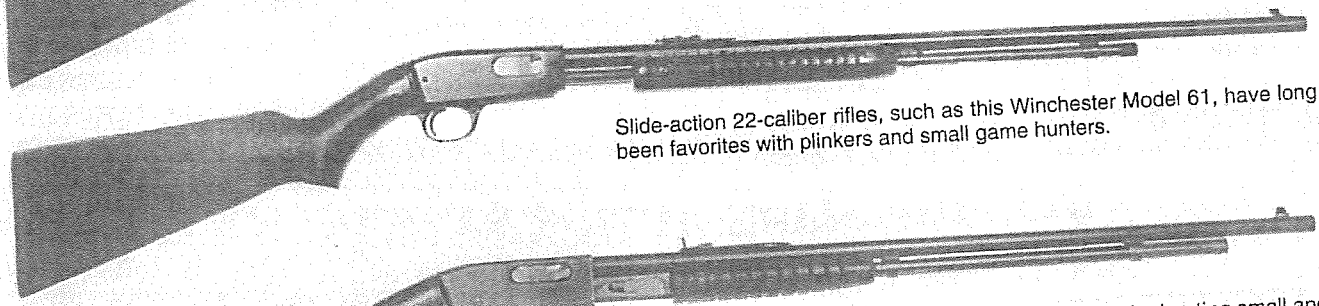
The slide-action rifle is almost always a hunting rifle. Here the writer sights in a Savage Model 170.



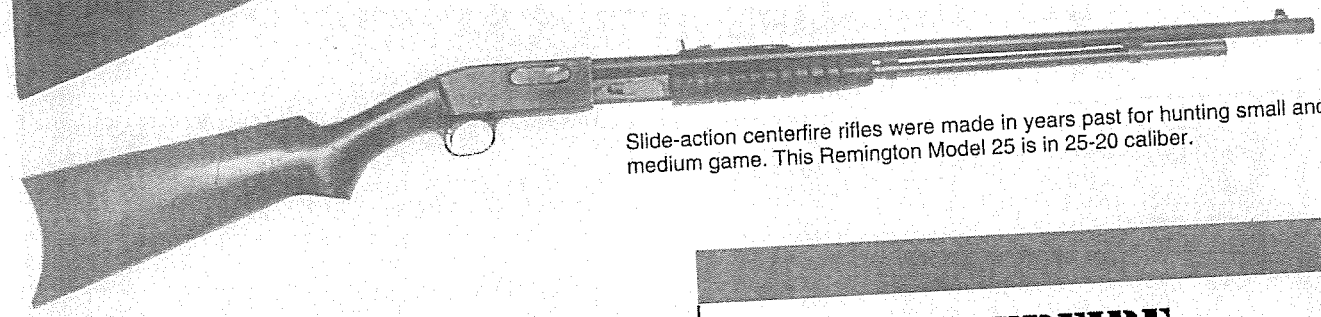
This slide-action 30-30, a Savage Model 170, was manufactured for a number of years. Many felt it had an edge over the lever-action rifle for close-range deer hunting.



Remington 760 slide-action centerfire rifles have a removable box magazine. The scope on this one, a 35 Remington, is a Redfield 1-4x variable.



Slide-action 22-caliber rifles, such as this Winchester Model 61, have long been favorites with plinkers and small game hunters.



Slide-action centerfire rifles were made in years past for hunting small and medium game. This Remington Model 25 is in 25-20 caliber.

CENTERFIRE SLIDE-ACTION REPEATER WITH REMOVABLE BOX MAGAZINE

The most common example in use today is the Remington Model 760.

To load:
1. Press the action release and open the action.
2. Remove the magazine and load cartridges into it.
3. Insert the magazine back into the rifle.
4. Move the forearm forward to close the action. This chambers the first cartridge.

To unload:
1. Press the action release and open the action.
2. Remove the magazine and take the cartridges out of it.
3. Visually inspect the chamber and magazine.

CENTERFIRE SLIDE-ACTION REPEATER WITH NON-REMOVABLE TUBE MAGAZINE

Examples still in fairly common use are the Savage 170 and the Remington 141.

To load:
1. Push cartridges into the magazine through the bottom of the receiver (M170) or the magazine tube opening forward of the receiver (M141).
2. Press the action release.
3. Open and close the action to feed a cartridge into the chamber. The magazine will now accept an extra cartridge.

To unload:
1. Press the action release.
2. Open and close the action until all cartridges have been ejected.
3. Visually check the chamber and magazine.

Lever Action

Although there are probably more bolt-action rifles in use in America than all other types combined, the lever action is still considered by many as the traditional American rifle.

The lever-action repeater was introduced to Americans during the Civil War in the form of the Henry and Spencer repeating rifles. After the Civil War, large numbers of these rifles went west and played a significant role in the westward expansion and settlement.

Oliver Winchester, a shirt manufacturer, headed up the company that manufactured the Henry. In 1866, he brought out an improved version under the name Winchester. When the Spencer company went bankrupt in 1868, Winchester bought the failed company in 1869 and discontinued the Spencer, leaving the Winchester without any serious competition for some years.

Before long, the Winchester design of an outside-hammer rifle with a tubular magazine under the barrel became the traditional lever-action rifle of America.

New Models 1873 and 1876 became popular, then were replaced by a later series of rifles designed by John M. Browning. These reached their peak of popularity in the Model 1894, which is still in production.

The Winchester lever action became the favored rifle of America not just because of availability, but because it worked well and suited the needs of the times. By the 1890s, other lever-action repeaters, such as the Marlin and the Savage, had entered the market.

One of the most famous lever-action rifles of all time is the Winchester '73. Here the writer shoots one in 32-20 caliber.

Even so, military use of the lever-action rifle has been limited, though the Henry and Spencer rifles were decisive in the American Civil War. The history books show us that in every major engagement where Union troops were equipped with Spencer rifles, they were victorious. (Except, for some reason, in Florida.)

However, after the Civil War, the repeaters were sold as sur-

RIMFIRE LEVER-ACTION REPEATER WITH REMOVABLE TUBE MAGAZINE

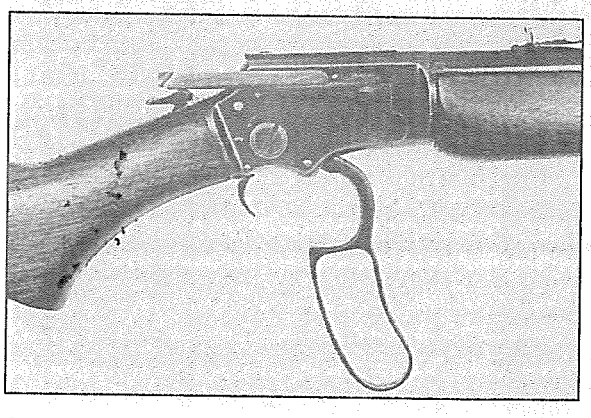
Common examples are the Marlin Model 39A and the Winchester 9422. Most lever-action 22-caliber rifles are of this type.

To load:

1. Open the action by pivoting the lever forward.
2. Remove the inner magazine tube enough so that the plunger clears the cartridge cutout in the outer tube.
3. Load cartridges into the cutout, then return the tube to its original position.
4. Close the action. A cartridge is now ready to be chambered.
5. Open and close the action. A cartridge is now in the chamber, and the rifle is ready to fire.

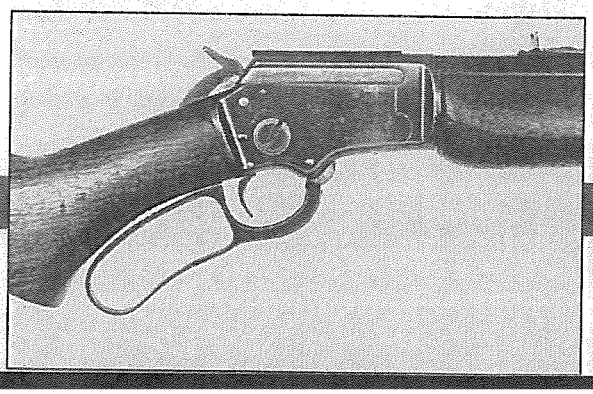
To unload:

1. Open and close the action until all cartridges have been ejected.
2. Visually inspect the chamber and magazine.



A lever-action rifle, action open.

A lever-action rifle, action closed.



plus, and United States troops were armed with a single shot rifle, the "trapdoor" Springfield. European military minds were equally slow to see the advantages of the repeating rifle. By 1877, most European countries were armed with single shot bolt-action rifles.

Despite this fact, an energetic Winchester salesman had sold the Turkish government 30,000 Winchester Model 1866 rifles. At the 1877 battle of Plevna, Turkish defenders faced a massed Russian army that was twice as large. The Turks issued 100 rounds with each Winchester. Also, before the battle, an extra box of 500 rounds was placed beside each defender. When it was over, the hail of bullets from the Winchesters had cut the Russian army to pieces. Over 30,000 Russian soldiers were killed during two mass assaults. The lesson was not lost. The battle marked the end of the single shot military rifle, but it was replaced by the bolt-action repeater, not the lever action.

In America, by the turn of the century, three basic centerfire lever-action types had appeared and were in common use—the Winchester 1894, Marlin 1893 and hammerless Savage 1899. Variants of these designs are still in production as the Winchester 94, Marlin 336 and Savage 99. For a time, Mossberg also made a lever-action centerfire rifle of traditional design.

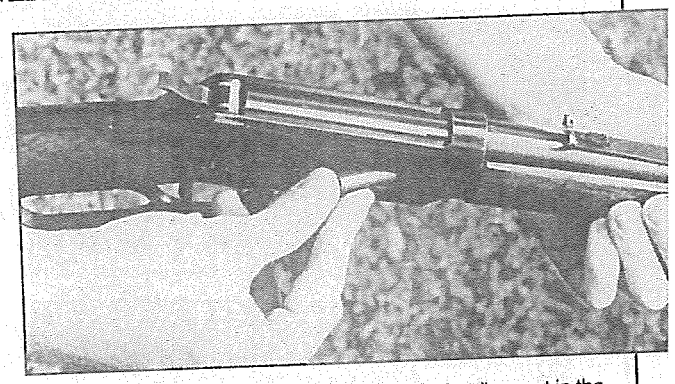
The Savage 99 with its rotary magazine has an advantage over the Winchester and Marlin designs. Because the tubular

CENTERFIRE LEVER-ACTION REPEATER WITH TUBE MAGAZINE

Most lever-action rifles such as the Winchester 94 and the Marlin 336, the common "30-30 deer rifles," are of this type, although they may be of calibers other than 30-30.

To load:
1. Load cartridges through the loading port.
2. Open the action.
3. Close the action.

To unload:
1. Open and close the action until all cartridges are out.
2. Visually inspect chamber and magazine.



Most centerfire lever-action rifles load through a loading port in the right side of the receiver. This is a 30-30 Winchester Model 94.

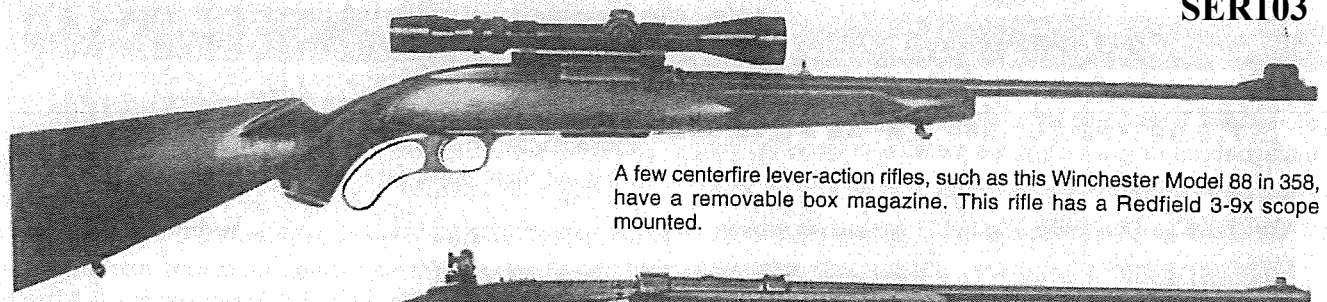
LEVER-ACTION REPEATER WITH REMOVABLE BOX MAGAZINE

Centerfire rifles such as the Winchester 88, late-version Savage 99 with removable magazine, and Browning Lever Rifle generally represent this type. For a short time, Marlin also made rifles of this type, in 22 rimfire as well as 30 Carbine and 256 Winchester.

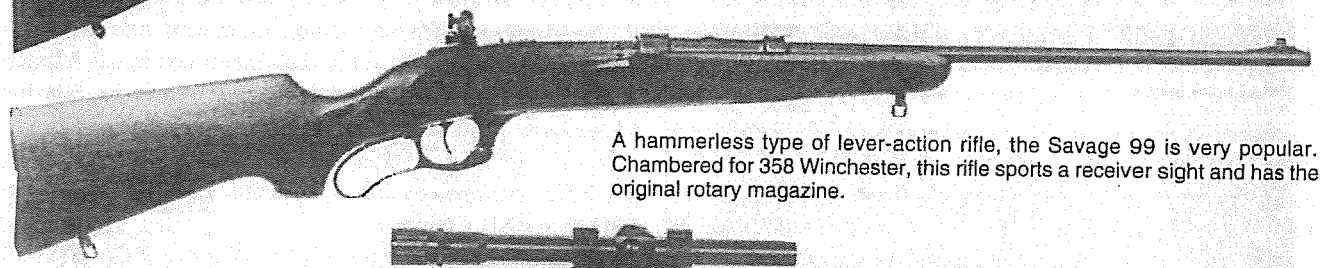
To load:
1. Open the action.
2. Remove the magazine and load cartridges into it.
3. Insert the magazine back into the rifle and close the action.

To unload:
1. Open the action.
2. Remove the magazine and unload the cartridges from it.

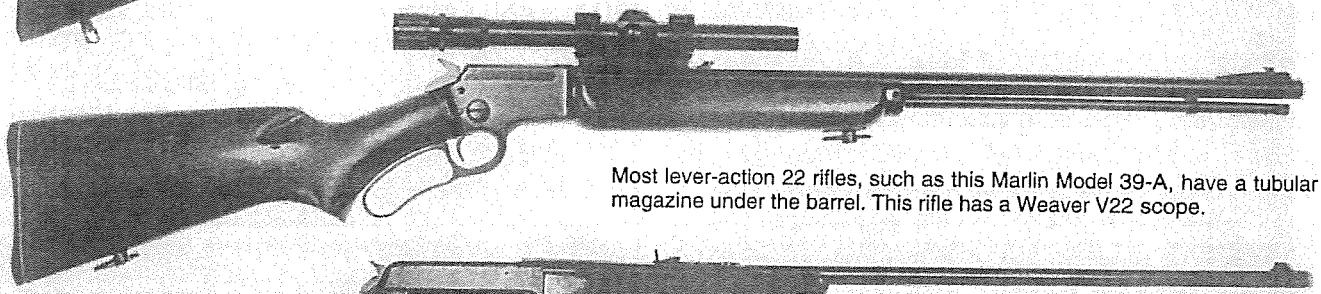
Only a few lever-action rifles load with a detachable box magazine. This is a 22-caliber Marlin Model 56.



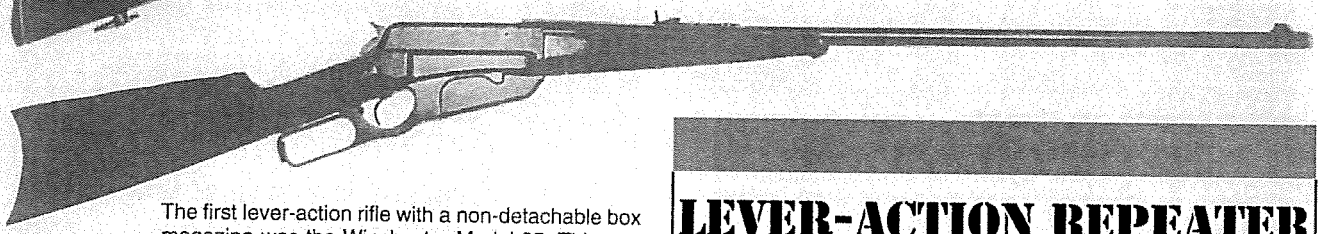
A few centerfire lever-action rifles, such as this Winchester Model 88 in 358, have a removable box magazine. This rifle has a Redfield 3-9x scope mounted.



A hammerless type of lever-action rifle, the Savage 99 is very popular. Chambered for 358 Winchester, this rifle sports a receiver sight and has the original rotary magazine.



Most lever-action 22 rifles, such as this Marlin Model 39-A, have a tubular magazine under the barrel. This rifle has a Weaver V22 scope.



The first lever-action rifle with a non-detachable box magazine was the Winchester Model 95. This one is chambered for 30-40 Krag.

magazine of the Winchester and Marlin put the nose of the cartridge's bullet against the primer of the one ahead, these designs are limited to the use of blunt-bullet ammunition. The Savage 99 can use pointed bullets, and its action is strong enough for high-pressure loads that the Winchester and Marlin can't handle.

The Winchester 88, introduced in 1955, was a hammerless box-magazine lever-action rifle capable of handling high-pressure cartridges and pointed bullets. It was dropped after twenty years, whereas the "traditional" Model 94 continued in production. In 1971, Browning tried a compromise—a modern lever-action box-magazine rifle with the traditional outside hammer. It found favor with many.

Because of their common use in Western movies, lever-action rifles are probably familiar even to those who have never shot one. They operate by forward and rearward rotation of an operating lever pivoted under the receiver. The operating lever under the grip is hinged in front of the trigger, and it forms the trigger guard of the rifle. When the lever is pivoted forward, the breech bolt is moved to the rear, opening the action. This opening action extracts the empty cartridge case from the chamber and positions the next cartridge. The rearward movement of the lever moves the bolt forward, chambers the cartridge, and closes and locks the action.

LEVER-ACTION REPEATER WITH NON-REMOVABLE BOX MAGAZINE

Rifles in this category are the Savage 99 with original rotary magazine and, to a lesser extent, the Winchester Model 95. Lots of 99s are still in the field, but most of the 95s rest in collections now. However, some of the Winchesters still see service, and Browning made a number in replica form not too long ago, so they are worth considering here also.

To load:

1. Open the action.
2. For the 99, lay a cartridge in the open action and push it into the magazine until it clicks into place. Continue until the magazine is loaded. For the 95, place the base of the cartridge under the lips at the rear of the magazine, then rock the cartridge forward into the magazine. Continue until the magazine is loaded.
3. Close the action.

To unload:

1. Open and close the action until all cartridges have been ejected.
2. Visually check the chamber and magazine.

Semi-Automatic Action

Semi-automatic rifles use the energy of one shot to operate the action, making the rifle ready for the next shot. Either through recoil or gas energy, the mechanism ejects the empty cartridge case, feeds the next one and closes the bolt. Because they eliminate the manual operations of the previous types, semi-automatics are often called self-loaders or autoloaders.

Semi-automatic rifles seem very modern, and many are. However, many designs are very old, and this method of operation is much older than many people believe.

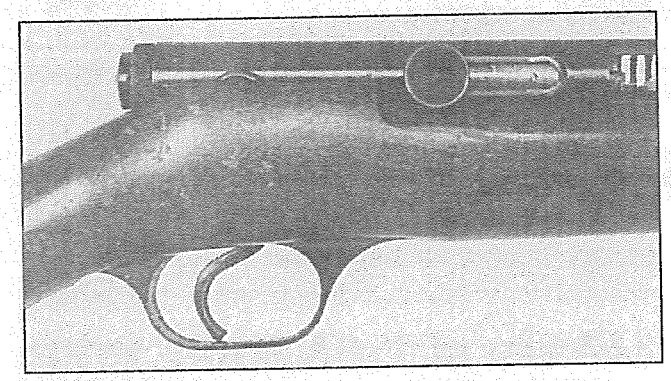
In the early 1880s, an American, Hiram Maxim, developed the first practical self-loading mechanism for firearms. By the early 1890s, both Maxim and another American, John M. Browning, had patented designs for gas- and recoil-operation machineguns. Semi-automatic pistols were already in commercial production by 1892.

In 1903, Winchester introduced a 22-caliber semi-automatic rifle for small-game hunting. Then in 1905, they brought out a centerfire version that was suitable for deer at short ranges. The following year, 1906, Remington introduced a more powerful semi-automatic rifle, their Model 8. This spurred Winchester to bring out more powerful versions of its design in 1907 and 1910. These early designs found favor with police as well as with hunters and saw limited service in WWI.

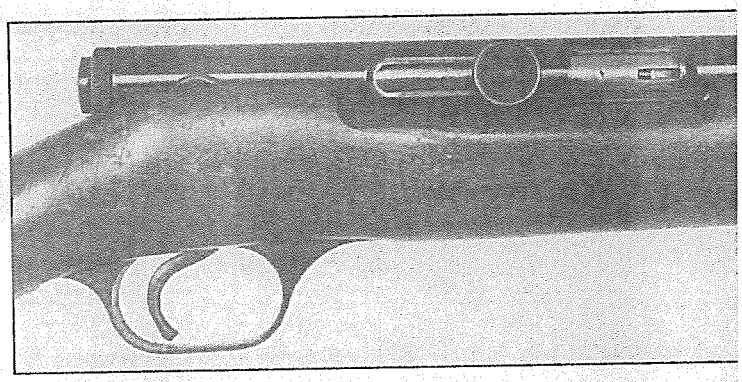
The advantages of the semi-automatic system were obvious to many military planners, and developments continued. Mexico officially adopted a semi-auto rifle for their military in 1908, the Mondragon. They were also used by German aviators in WWI.

In 1936, the United States adopted a semi-automatic rifle, the M1 Rifle developed by John C. Garand. This was followed in 1941 by the M1 Carbine.

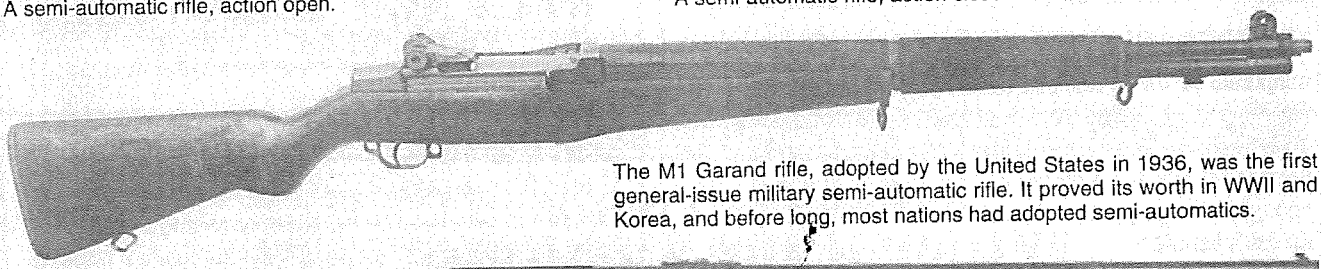
World War II and its aftermath saw tremendous development of semi-automatic military rifles. As had happened with the bolt



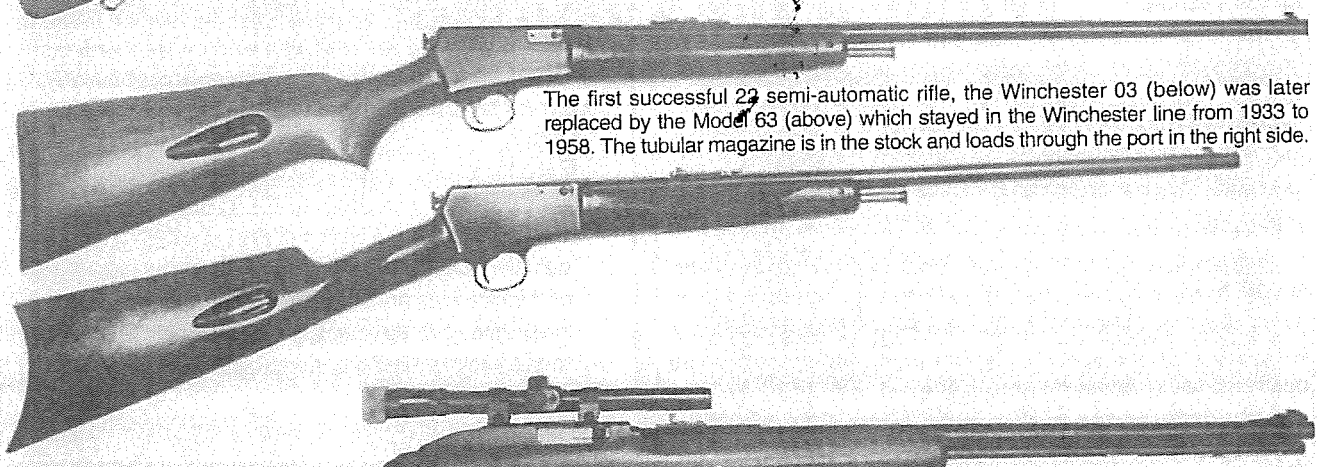
A semi-automatic rifle, action open.



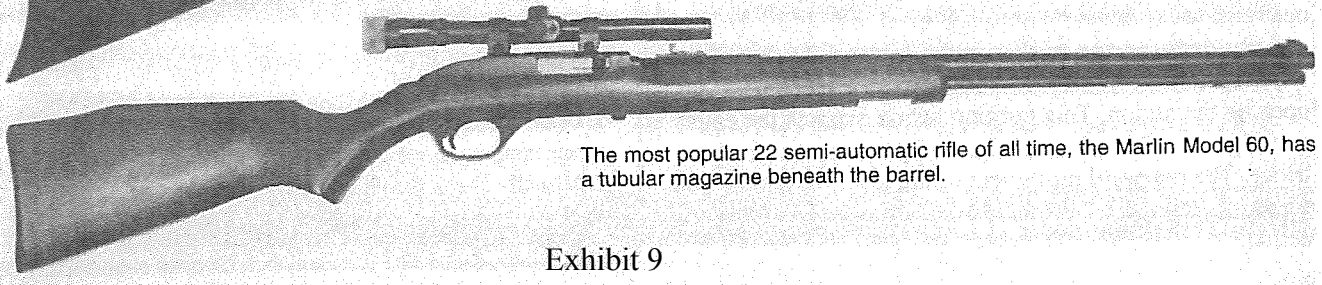
A semi-automatic rifle, action closed.



The M1 Garand rifle, adopted by the United States in 1936, was the first general-issue military semi-automatic rifle. It proved its worth in WWII and Korea, and before long, most nations had adopted semi-automatics.



The first successful 22 semi-automatic rifle, the Winchester 03 (below) was later replaced by the Model 63 (above) which stayed in the Winchester line from 1933 to 1958. The tubular magazine is in the stock and loads through the port in the right side.



The most popular 22 semi-automatic rifle of all time, the Marlin Model 60, has a tubular magazine beneath the barrel.

RIMFIRE SEMI-AUTOMATIC WITH TUBE MAGAZINE

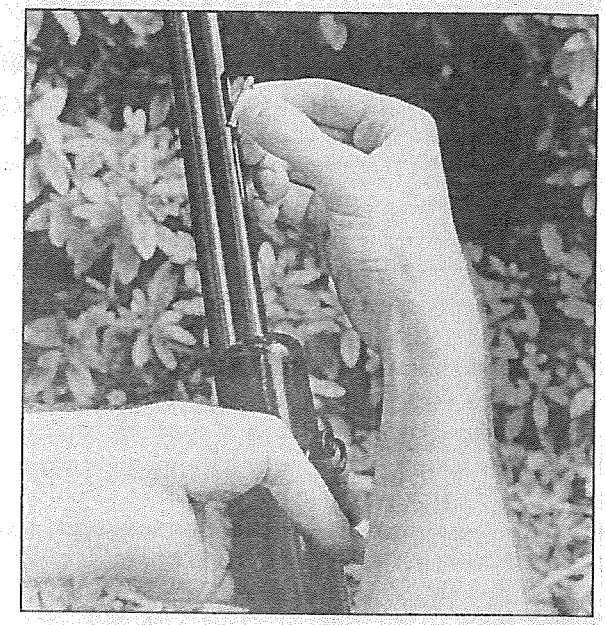
These rifles have a removable magazine tube with a spring and plunger. Location of the magazine may be under the barrel or inside the buttstock.

To load:

1. Open the action. In some early designs, the action will not stay open; such rifles must be loaded with the action closed, so extra care must be taken to make this operation safe.
2. Remove the magazine inner tube until the plunger has passed the cartridge cutout or loading port.
3. Load the cartridges through the loading port.
4. Push the inner tube of the magazine back into its original position and secure it.
5. Open the action and let it fly forward, feeding a cartridge into the chamber.

To unload:

1. Open and close the action until all cartridges have been ejected from the rifle.
2. Visually examine the chamber and magazine.



Many 22-caliber rifles with tubular magazines under the barrel have a loading port through which cartridges may be loaded.

SEMI-AUTOMATIC WITH REMOVABLE BOX MAGAZINE

Such rifles may be relatively simple 22-caliber arms, such as several Marlin models, Ruger's 10/22 or Survival Arms' AR-7. A number of centerfire arms have removable box magazines. Among those designed as sporting rifles, perhaps the most common now are the Browning BAR and Remington 7400. A number of rifles originally designed for military service are now used for hunting and target shooting, and are frequently encountered. Among them are the M1 Carbine, various semi-automatic offspring of the AK-47, Springfield M1A and Colt AR-15.

To load:

1. Open the action.
2. Remove the magazine and load it with cartridges.
3. Replace the magazine.
4. Close the action.

To unload:

1. Open the action.
2. Remove the magazine and unload the cartridges.
3. Visually inspect the chamber and magazine.

Early semi-automatic designs were very interesting and sometimes very strange. Military historian William Douglas explains the operation of a 30-06 Thompson Autorifle to the writer. This design was under development about the time of World War I.

action after World War I, American servicemen liked the semi-automatic rifles they had used and wanted similar rifles for hunting. New 22-caliber semi-automatic rifles were already on the market. Soon, Remington, Winchester, Ruger, Harrington & Richardson and Browning were supplying modern semi-automatic centerfire hunting rifles. Target shooters began to use rifles similar to military semi-automatics and, later, semi-automatic versions of selective-fire (semi- or full-automatic) military rifles.

The importation of large quantities of military surplus semi-automatic rifles during the 1980s and 1990s has spurred the interest in, and the use of, semi-automatic rifles.

There are a number of different types of semi-automatic rifles in common use: rimfire with tube magazine and centerfire with removable or non-removable magazine.

Clip vs. Detachable Magazine

Our remaining two types of rifles do not use magazines, so perhaps this is a good time to make a short side trip. Often times, removable or detachable box magazines are mistakenly called "clips." I have mentioned this not because I think it is a particularly good idea, but because it is common usage. Because the use of "clip" for "removable magazine" is so widespread, all shooters should be aware of it.

Actually, there are parts that can be correctly called clips, and I have mentioned them relative to the M1 and SKS rifles. Technically, clips are devices used to hold (or clip) cartridges together for inserting into a magazine, and there are two types.

Charger clip: The entire clip of cartridges goes into the magazine and actually becomes a part of the magazine as long as cartridges remain. The magazine will not function without the clip. Examples are the clips used to charge the magazine of the M1 Garand, a semi-automatic. Many early bolt-action military rifles—such as the German 1888 Commission rifle, Italian Carcano, Austrian 1895 straight-pull and French Berthier rifle—used charger clips. They are also called *en bloc* clips.

Stripper clip: These clips of cartridges are placed above the magazine into a slot which correctly positions them. Then the cartridges are pushed, or stripped, out of the clip into the magazine. Some examples are the 1903 Springfield rifle, German Mauser rifles, British SMLE and Russian SKS. The SMLE uses stripper clips to load a detachable magazine; however, most stripper clips are used to load a fixed magazine; the M14/M1A can be loaded from stripper clips directly into its (detachable) magazine.

Now you know the difference between clips and magazines, so let's continue with our discussion of action types.

SEMI-AUTOMATIC WITH NON-REMOVABLE MAGAZINE

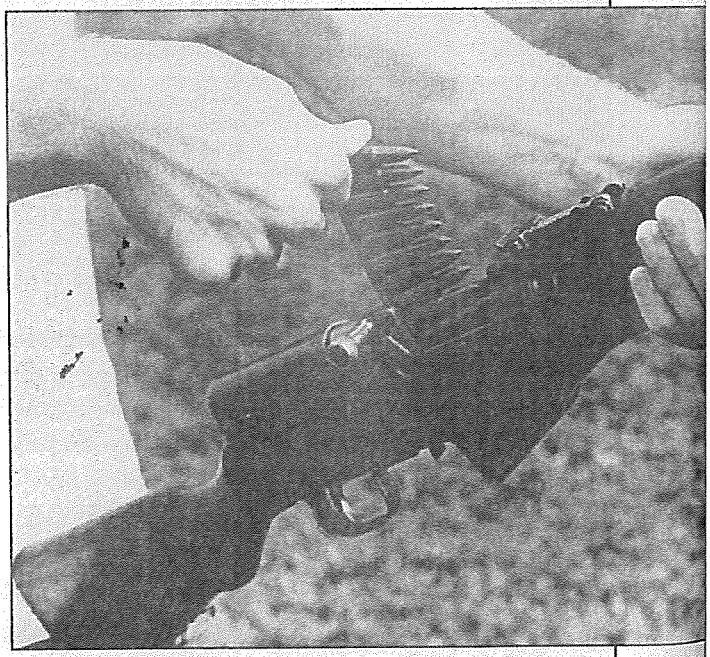
Common rifles in this category are the M1 Garand and the SKS rifles made in Russia and China.

To load:

1. Open the action by drawing back the operating handle until the bolt locks open.
2. For the M1, place a loaded clip of cartridges on the follower; press down until it latches. Release thumb pressure. Bolt will run forward, chambering a cartridge. For the SKS, push cartridges, one at a time or from a clip, into the magazine. Slightly pull back on the operating handle and release; the bolt will run forward, chambering a cartridge.

To unload:

1. For the M1, open the bolt to eject the chambered cartridge and firmly hold it back. Press the clip latch on the left side of the receiver to eject the clip and remaining cartridges. For the SKS, open the magazine box latch and empty cartridges from the bottom. Open the bolt to eject the round from the chamber.
2. Visually inspect the chamber and magazine.



A number of semi-automatic rifles have non-removable magazines. This 7.62x39mm SKS rifle can be loaded with single rounds or, as shown, from a stripper clip.

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IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF CALIFORNIA

VIRGINIA DUNCAN, et al.,

Plaintiffs,

v.

XAVIER BECERRA, in his official capacity as Attorney General of the State of California,

Defendant.

Case No: 17-cv-1017-BEN-JLB

EXHIBITS 10-19 TO THE DECLARATION OF ANNA M. BARVIR IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT OR, ALTERNATIVELY, PARTIAL SUMMARY JUDGMENT

Hearing Date: April 30, 2018
Hearing Time: 10:30 a.m.
Judge: Hon. Roger T. Benitez
Courtroom: 5A

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17	Pages 91-103 of Jim Garry, *Weapons of the Lewis and Clark Expedition* (2012)	00370-385
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EXHIBIT 10

COMPLETE GUIDE TO GUNS & SHOOTING

by
John Malloy

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About Our Covers

The exciting world of guns and shooting is filled with a variety of firearms for different purposes and games. Our covers show just a few of the types of guns you'll likely encounter as you journey into this wonderful field.

At the top is Ruger's Red Label 12-gauge over/under chambered for 2 3/4-inch shells. It sports a rare blued receiver and fixed Modified and Improved Cylinder chokes. This shotgun is a very popular choice for hunters and competitive shooters alike.

The revolver is Colt's premier model, the Python. Chambered for 357 Magnum, this wheelgun has been a favorite of sport shooters, law enforcement personnel and hunters for many years, and is well known for its silky-smooth action. Shown here is the 6-inch barrel model with target stocks.

At left center is the famous Browning Hi-Power autoloading pistol in 9mm Parabellum. With the grip, feel and reliability by which others are judged, the Hi-Power is one of the most popular pistols in the world. This example is shown with target sights.

At bottom is the Ruger M77R Mark II bolt-action rifle in caliber 30-06. Since its introduction in the late 1960s, the M77 rifle has appeared in many forms, in myriad chamberings, and is the rifle of choice for many hunters because it represents excellent value. It's shown here with a Redfield 2 1/2-7x Tracker scope in Ruger mounts.

Photo by John Hanusin.

ISBN 0-87349-166-1

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Semi-Automatic Pistols

A semi-automatic pistol is a handgun that uses the energy of one shot to get itself ready for the next shot. This energy is generally from recoil, but may come from the gas generated by the previous shot.

Semi-automatic pistols are sometimes called self-loaders or autoloaders. More commonly, they are just called automatics, although they do not fit the definition of a true automatic firearm.

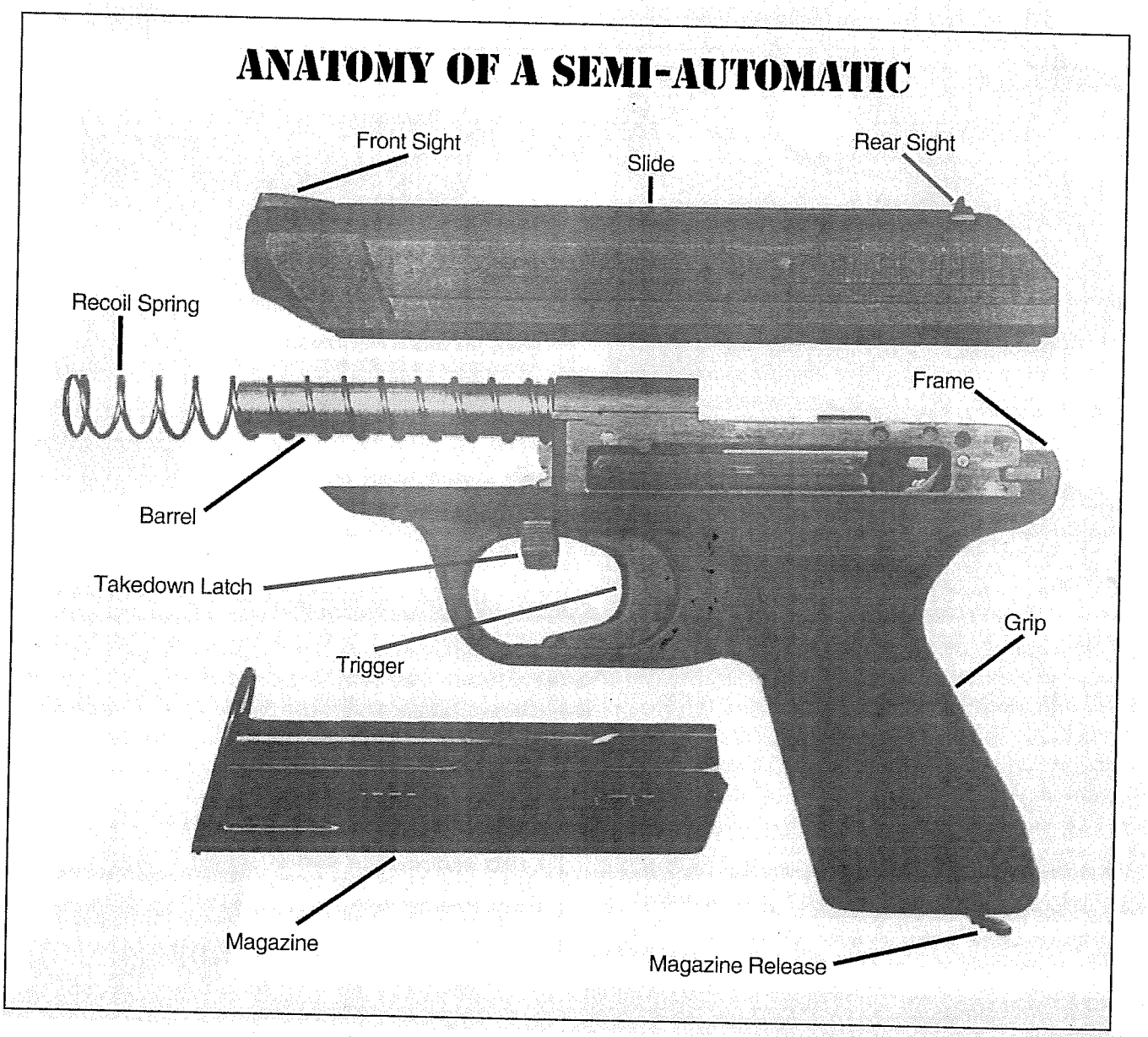
The semi-automatic pistol has the same three basic parts as the revolver: frame, barrel and action. However, the operation is very different.

In a revolver, the multiple cartridge chambers were in the cylinder. The barrel of a semi-automatic has a single chamber in the rear of the bore.

The frame of a semi-automatic generally has a hollow grip which contains the ***magazine***, a storage device to hold cartridges to be fed into the chamber. The frame may also contain a ***magazine release***, ***slide stop*** (also called a slide lock or slide release) to hold the action open, and ***safety***, a mechanical device to reduce the chance of accidental firing.

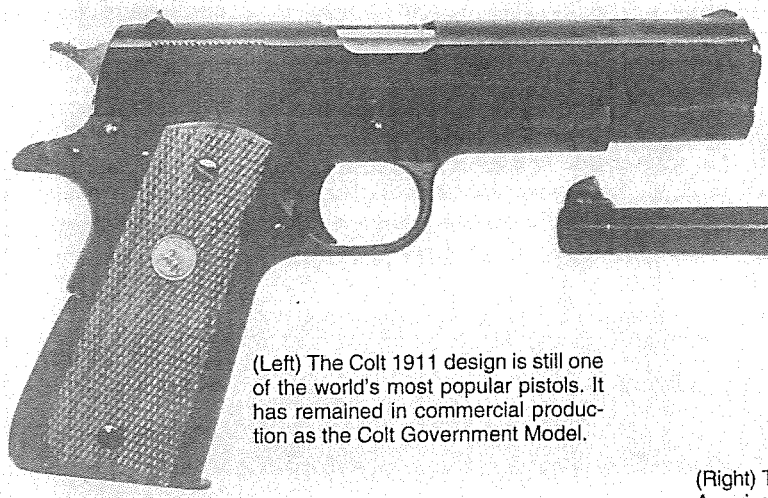
The details of semi-automatic pistol actions vary greatly. Some have a hammer (similar to that of revolvers) that strikes a firing pin. Some are striker-fired, that is, the firing pin is spring-loaded and released to strike the primer, firing the cartridge. Such pistols are often called hammerless. However, some "hammerless" guns have hammers that are not visible, but which are concealed in the mechanism of the pistol.

The earliest semi-automatics, such as the Borchardt, Mauser and Luger, had exposed barrels with a breechblock behind the chamber. In the late 1890s, John M. Browning came up with a marvelous invention, the ***slide***. It rode atop the frame and covered the barrel, recoil spring and other mechanisms, allowing a very compact pistol. You may hear the term "slide" used generically for any kind of semi-automatic pistol mechanism. When you hear the command "Slides Back" on a pistol range, you open the action of your semi-automatic pistol, no matter what the design.

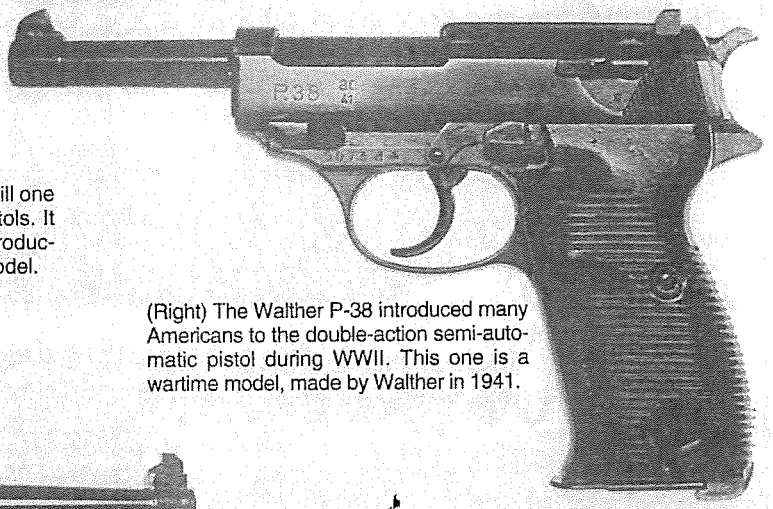


(Left) The 1911 Colt, a single-action pistol, is considered by many to be the best semi-automatic pistol ever designed. It was adopted by the U.S. Army in 1911 and is still in limited military service.

(Above) During WWII, Model 1911A1 pistols were made in large quantities by different manufacturers. This one was made by Ithaca. This specimen has the distinction of being the first semi-automatic pistol ever owned by the writer.



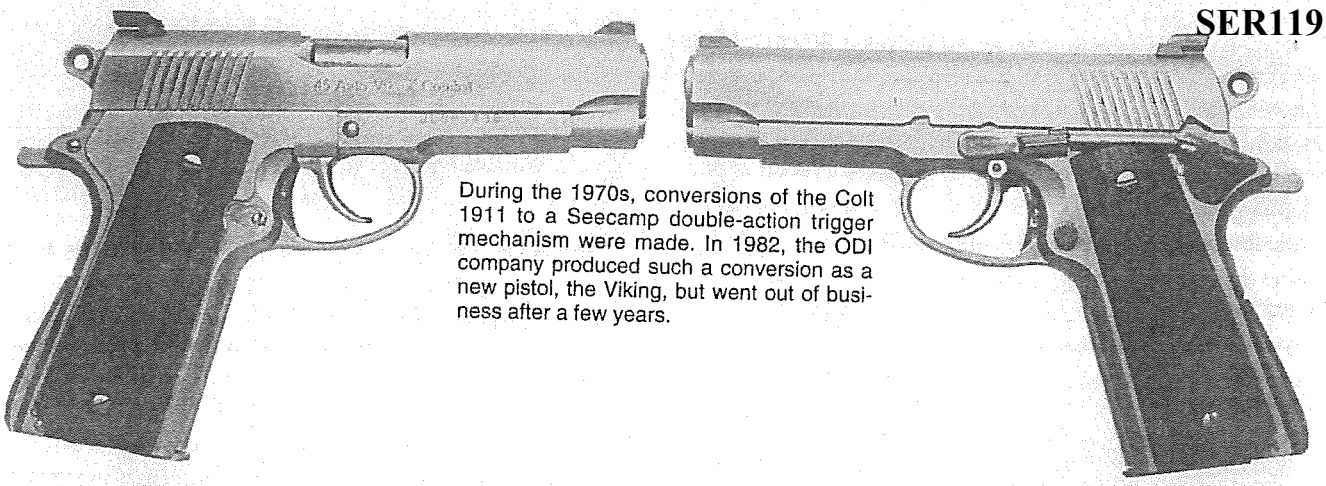
(Left) The Colt 1911 design is still one of the world's most popular pistols. It has remained in commercial production as the Colt Government Model.



(Right) The Walther P-38 introduced many Americans to the double-action semi-automatic pistol during WWII. This one is a wartime model, made by Walther in 1941.

The Ruger 22 semi-automatic pistol, introduced in America in 1949, became one of the most popular 22-caliber pistols of all time.

A DAO 9mm pistol, the Sardius was introduced in the late 1980s and imported from Israel.



During the 1970s, conversions of the Colt 1911 to a Seecamp double-action trigger mechanism were made. In 1982, the ODI company produced such a conversion as a new pistol, the Viking, but went out of business after a few years.

SEMI-AUTOMATIC PISTOL

Most of the semi-automatic pistols you will encounter will be be either single action (the most numerous type), conventional double action (next most), or double-action-only. You still need to know how the one in your hand works, but the basic procedures are the same.

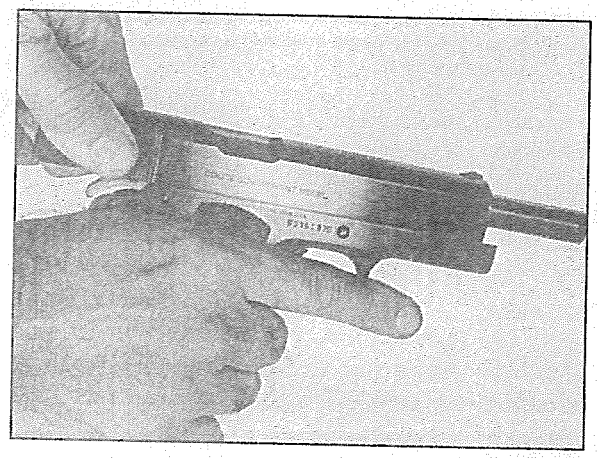
These steps are generally correct for all semi-automatic pistols. Keep in mind, though, that there are many different mechanical designs.

To load:

1. Remove the magazine.
2. Pull the slide to the rear and lock it open with the slide stop (if the pistol has one).
3. Visually inspect the chamber to make sure it is empty.
4. Lay the pistol down (pointing in a safe direction, of course).
5. Load the magazine. Push cartridges into it, down and to the rear.
6. Pick up the pistol and insert the loaded magazine.
7. Release the slide stop. The slide will move forward, stripping the top cartridge from the magazine and loading it into the chamber. For pistols that do not have a slide stop, pull the slide all the way back and release it so that it can move forward and chamber a cartridge.

To unload:

1. Remove the magazine.
2. Pull the slide all the way to the rear. This will eject the cartridge from the chamber.
3. Visually check the chamber to make sure it is empty.



When operating the slide on a semi-automatic pistol, keep your finger off the trigger. This Colt Government Model is a 45 ACP.

Open the Ruger pistol by pulling the internal "slide," or bolt, rearward.

Here is how a semi-automatic pistol works: When a shot is fired, the energy of that shot pushes the slide to the rear. The empty cartridge case is extracted from the chamber and ejected from the pistol at the end of the rearward movement of the slide. As the slide moves backward, it compresses a recoil spring. When the rearward travel is completed, the spring pushes the slide forward again. As the slide moves forward, it strips a cartridge from the magazine and pushes it into the chamber. The hammer or striker was recocked during the rearward movement, and the pistol is ready to fire another shot.

Early semi-automatic pistols were single action. From our discussion of revolvers, remember that the trigger thus performs the single action of releasing the hammer or striker.

Double-action semi-automatics were being tested as early as 1907, when the Knoble pistol was given a trial by the U.S. Army. The German Walther PP pistol was a commercially successful double-action design in the early 1930s. Then, during World War II, the double-action Walther P-38 became familiar to American GIs.

These pistols were double action for the first shot, then the recoiling slide cocked the hammer, and succeeding shots were single action.

Some of the early double-action designs had a decocking lever. If the pistol were cocked for single-action shooting, depressing the lever would safely lower the hammer without firing the cartridge. A decocking lever is featured on most traditional double-action semi-automatics made today.

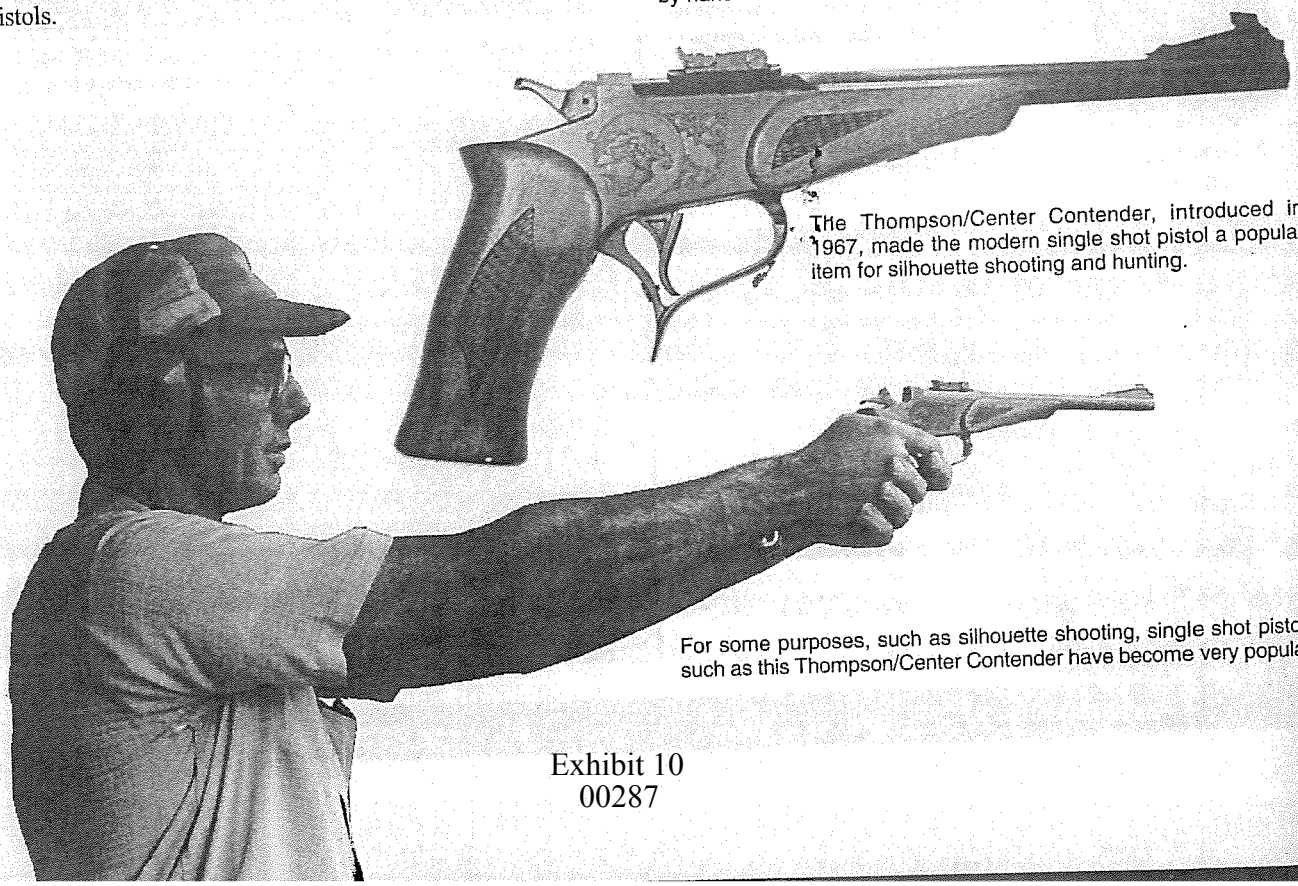
Other early designs were double-action-only. That is, every shot was fired by a long pull on the trigger which first cocks the hammer and then releases it. The slide chambers a new round for each shot, but does not cock the hammer or striker. Primarily, these early pistols were small pocket pistols carried for personal protection. Examples are the Little Tom and Le Francais pistols.

In recent times, as liability lawsuits became common, some law enforcement units required officers to carry pistols that could not be cocked. The thinking was that they could not be sued for a nervous officer's twitching off a shot from a cocked pistol if it couldn't be cocked.

Double-action-only (DAO) pistols have become more common because of this. Also, the popular Glock pistol, a modified form of DAO, is widely used. Glock, however, calls their design "Safe Action."

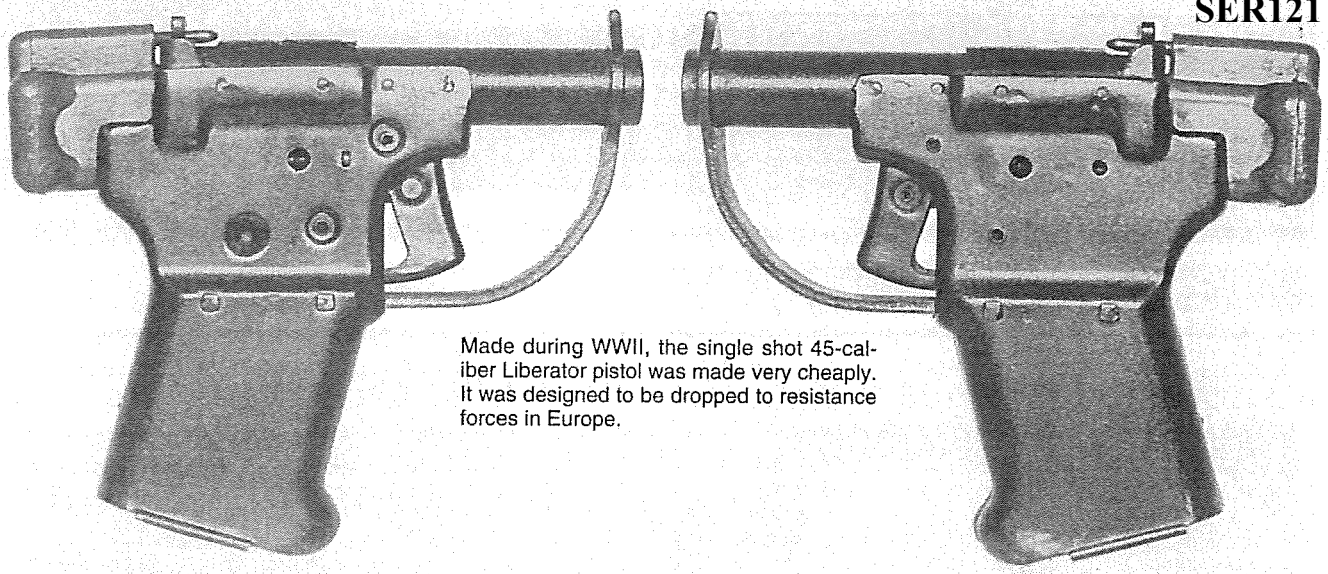
Because it might provide an advantage to be able to fire precise single-action shots, Browning introduced the BDM (Browning Double Mode) pistol. An external adjustment with a screwdriver can make the pistol operate in either of the two different manners.

This Semmerling LM4 is one of the few manually operated repeating pistols produced in recent times. It is in 45 ACP and must be cycled by hand for each shot.

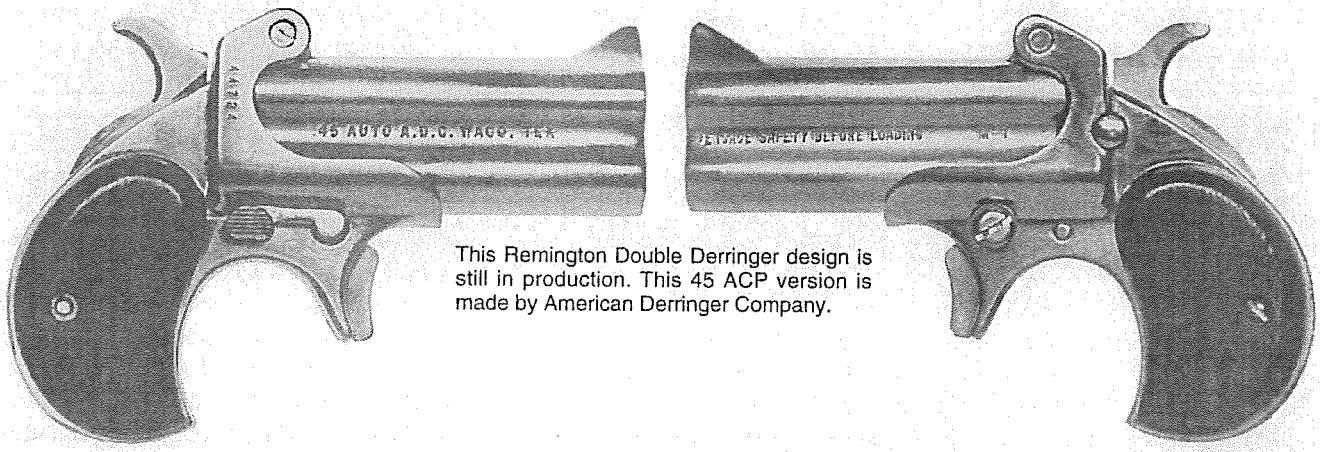


The Thompson/Center Contender, introduced in 1967, made the modern single shot pistol a popular item for silhouette shooting and hunting.

For some purposes, such as silhouette shooting, single shot pistols such as this Thompson/Center Contender have become very popular.



Made during WWII, the single shot 45-caliber Liberator pistol was made very cheaply. It was designed to be dropped to resistance forces in Europe.



This Remington Double Derringer design is still in production. This 45 ACP version is made by American Derringer Company.

If you are planning to try out a pistol, better be sure you have the instruction manual or knowledgeable advice handy. Instruction manuals may usually be obtained from the manufacturer for free.

Single Shot Handguns

At one time, long ago, all handguns were single shots. The revolver replaced the single shot as a military sidearm rather quickly, and eventually the single shot faded from the hunting and target shooting scenes, too.

Almost.

Only the 22-caliber single shot pistol continued in service in the highest echelons of target shooting, and a few diehards hunted with single shots of various kinds. There had been single shot derringers, cartridge equivalents of Henry Deringer's original muzzle-loading pocket pistol. During World War II, a single shot 45-caliber pistol, nicknamed the Liberator, was dropped to the French Underground behind enemy lines. A brief flurry of single shot pistols was seen after World War II, as Savage, Sheridan and Mendoza introduced inexpensive 22-caliber pistols suitable for the trail or tackle box.

However, if anything can claim to have reintroduced the single shot pistol to America, it is probably the silhouette shooting sport. Long-range pistol shooting at steel silhouettes favors accuracy and power, not cartridge capacity or rapidity of fire. Single shot handguns increased in popularity. Shooters soon learned that anything suitable for silhouettes also served as a pretty good hunting pistol, too.

Although the Thompson/Center Contender is likely to be the single shot pistol most commonly encountered today, others have been made in some quantities. In production at the time of this writing are pistols by Remington, Anschutz, Ithaca, Maximum, Merrill (now RPM), Wichita and others.

Other Handgun Types

There are also double-barrel derringers in production today. Most are copies or modifications of the old Remington Double Derringer. Their popularity today is really no surprise, as the original reportedly remained in production from 1866 to 1935. One manual repeating pistol, the compact 45-caliber Semmerling, remains in very limited production. Four-barrel pistols have been made, and sometimes copies or new designs have been put into production for a while.

Such handguns are generally small, usually bought for protection and fired only a few times for familiarity. We will not spend further time on them, but they are interesting arms, as are all handguns, in my opinion.

EXHIBIT 11

Magazine Disconnect

by Rick Hacker - Friday, September 11, 2015

Q: *I have just started reading* American Rifleman, *and I love the technical information in the magazine. But it seems like you guys sometimes assume every reader knows what every gun term you use means. What is a magazine disconnect? Is it the same thing as a safety?*

A: The answer is "yes" and "no." A common misconception—usually made by those not familiar with semi-automatic pistols—is to assume that when the magazine is withdrawn from the firearm, the gun is empty. There may still be, however, a live round in the chamber. If the slide is in battery with a cartridge chambered, the gun—whether a single-action like the M1911 or a double-action (first shot only) like the Beretta Model 92FS—can be fired, even with the magazine removed. A magazine disconnector, sometimes called a magazine disconnect safety, is designed to prevent this.

Thus, a handgun such as the Browning High Power, which has a magazine disconnect, cannot be fired if the magazine is even partially withdrawn, as the firing pin is mechanically blocked from striking the primer. With the magazine fully reinserted, the handgun becomes operational again.

For some, the presence of a magazine disconnect is a welcome feature and another layer of mechanical safety—of course, no mechanical device should take the place of common safety practices, including always keeping the muzzle pointed in a safe direction and assuming every gun is loaded.

Nonetheless, the inclusion of a magazine disconnect has some potentially serious drawbacks in a handgun intended for defensive use. For example, if the magazine has not been completely seated in the gun, which can happen, especially under stress, the pistol will not fire. Too, inadvertently depressing the magazine release while drawing the pistol has the same unwanted effect.

Also, while performing a tactical reload, in which a partially empty magazine is replaced with a fully loaded magazine in a situation where increased capacity might be needed, a magazine disconnect renders the gun useless during the reloading process. This puts the handgunner momentarily in a vulnerable situation with a partially loaded gun that will not operate.

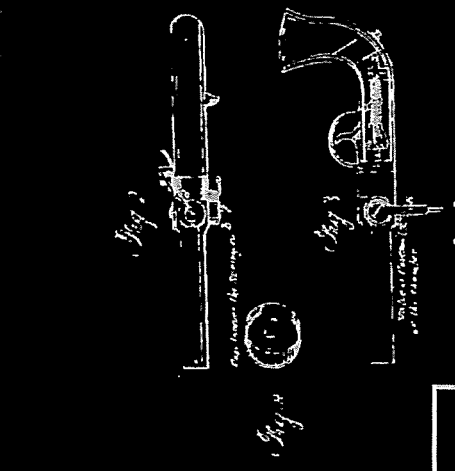
I experienced all of these situations while undergoing the strenuous but comprehensive 250 Pistol Class at Gunsite in Paulden, Ariz. Whether or not you opt for a pistol with a magazine disconnect, it is critical that you understand how your pistol operates (or when it doesn't) and train to become proficient with whatever handgun you choose.

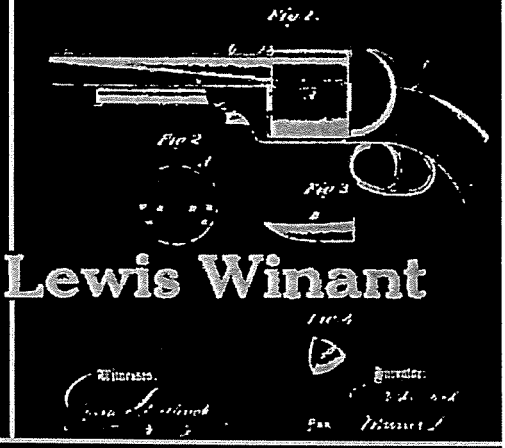
IN THIS ARTICLE

AMERICAN RIFLEMAN MAGAZINE MAGAZINE DISCONNECT Q&A RICK HACKER

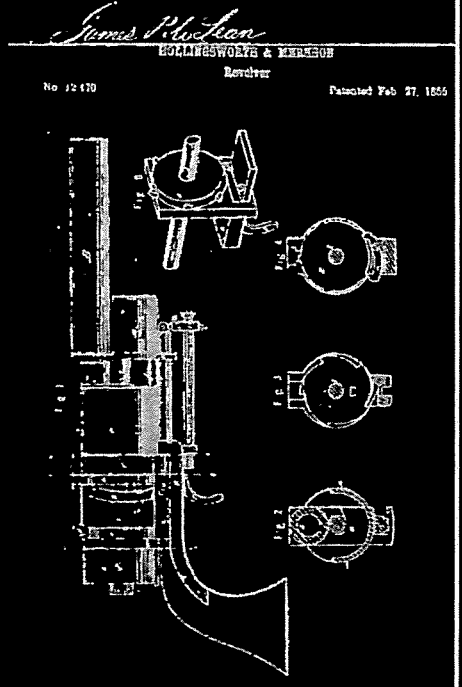
EXHIBIT 13

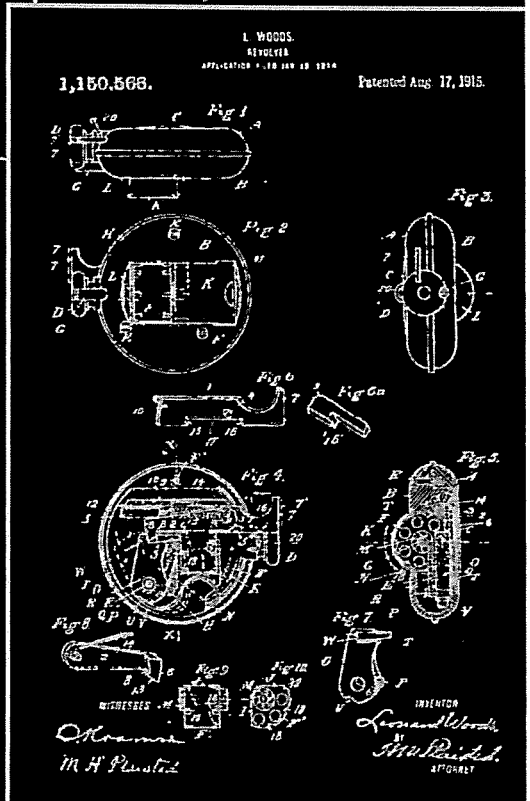
FIREARMS CURIOSA





Lewis Winant





SER128

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by
Lewis Winant

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solid rather than a perforated bullet somewhere in a series of superposed loads so as to stop the Roman candle effect and to permit resumption of firing by means of another lock.

A very rare and fine German piece is shown in figure 193. This most remarkable gun is capable of doing everything we assume Mr. Cardiff's double-lock gun may have been capable of doing, and it appears to antedate Mr. Cardiff's patent. No maker's name is on it, but the Nuremberg mark is clear.

As illustration 193 shows, there are two locks, the forward being a conventional wheel lock, and the rear an unusual combination wheel lock-matchlock. There is but one trigger.

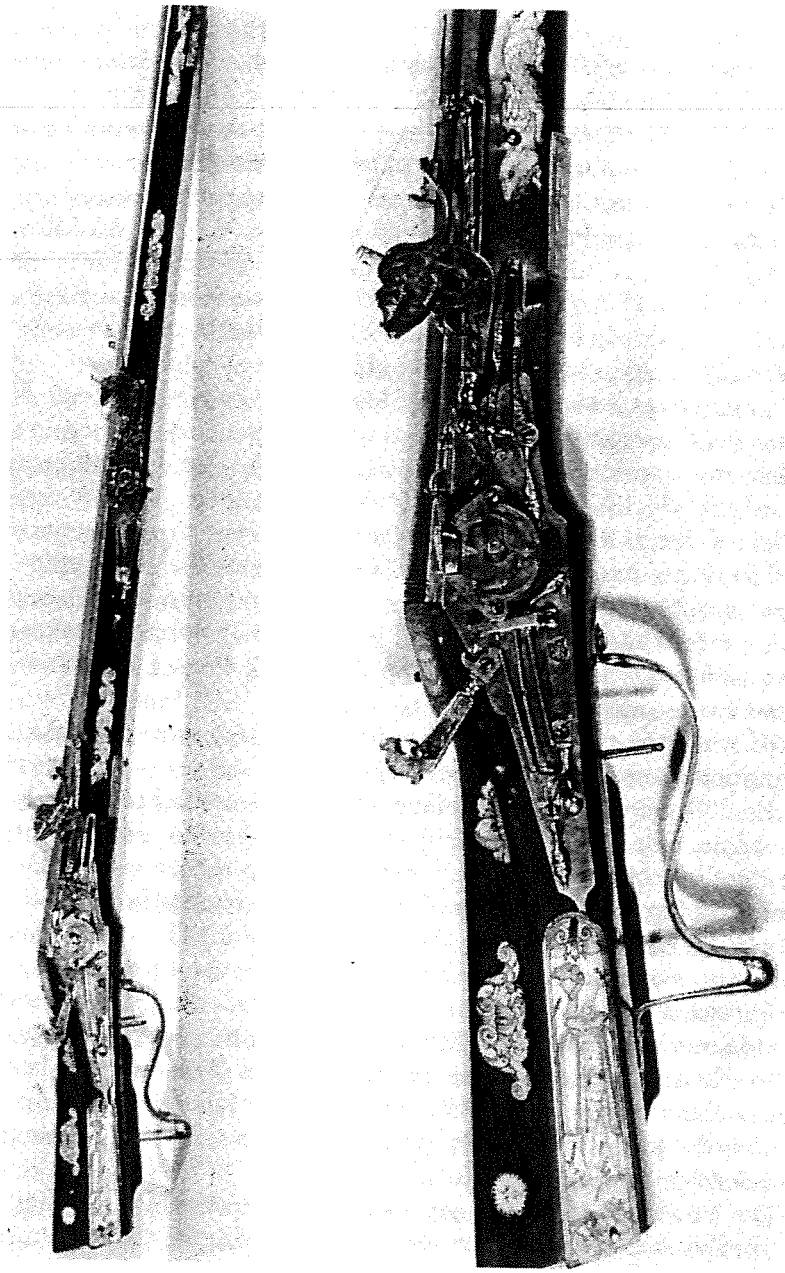
The gun may be used as a single-shot, employing the rear lock only, or it may be charged with sixteen superposed loads so that the first pull of the trigger will release the wheel on the forward lock and fire nine Roman candle charges, a second pull will release the wheel on the rear lock and set off six more such charges, and finally a third pull will fire the one remaining shot.

A safety catch which prevents movement of the wheel on the rear lock at the first trigger pull must be released, after the first series of nine shots, before the second series of six shots can be discharged. To fire the final shot by the third trigger pull it is necessary either again to span the wheel of the rear lock, or to use the match ignition.

The trigger is connected to the forward lock by a wire running through the frame. When the trigger is pulled the priming powder is ignited and fire goes from the pan directly through a touch hole to the foremost powder charge. If the gun be properly loaded the first shot will be followed by eight more self-acting and unpreventable discharges going off in quick succession.

The ignition of the first of the six shots in the second series requires that a train of priming powder be laid from the pan of the rear lock to a touch hole located some six or more inches frontward. A tube is provided that runs under the lockplate and along the barrel. This tube is detachable so it may be readily filled with the flash powder and is held to the barrel by a clip.

After the firing of both series of Roman candle shots the gun remains a loaded single-shot weapon. For the final shot the pan of the rear lock must be reprimed, and a sliding gate between the pan and a rearmost touch hole moved aside. The shot may



193. and 194. Wheel lock gun/ Frank E. Bivens, Jr. collection.

then be set off either by the matchlock or the wheel lock. Whether pressure on the trigger will send the spanned wheel spinning or move a lighted match into the pan, depends on how a lever on the side of the lock is set.

A close-up of the remarkable rear lock is shown in figure 194.

No original bullets for this gun exist, but charges such as were used in the Chambers gun, or even combustible cartridges such as were used in the Danish espingoles, could be successfully used in it. As in the Kesling gun (which along with the espingoles and the Chambers guns will be described shortly) the first bullet to be loaded would be solid. The seventh and sixteenth bullets, in order of loading, would also be solid.

It is perhaps well to depart at this time from a chronological order, so the espingole cartridges may be described. The espingoles were multiple barrel weapons used by Danish military forces, chiefly the Navy. An early report made in 1842 by the Chief of Naval Ordnance of Denmark reported that the guns could not be used freehand, and went on to say, ". . . the espingole must have a support and may thus be used only at places adapted for the purpose . . ." and ". . . when ignition has taken place the shooting cannot be stopped. The loading of the espingole can be performed only by trained people; it must be executed with the greatest care, requires a lot of appliances, takes up much time, and consequently cannot be done during a battle." Improvements were made, the early smooth bore barrels were later rifled, and the espingoles were kept in use in quantity for another thirty years. The novelty of these guns was in their combustible paper cartridges. Each cartridge had its bullet with a hole bored longitudinally through the center. This hole contained a slow burning fuse. When the fuse in the foremost cartridge was lighted by the operator, the charge would shortly explode and at the same time ignite the fuse in the next cartridge. From then on the explosions were automatic. The intervals between shots which gave the operator time to take aim were determined by the burning speed of the train of slow burning powder, or fuse.

The two important improvements in the espingole, the rifling of the barrels and the fully developed cartridges, came about 1850.

Figure 195 reproduces illustration #332 from Thierbach's

EXHIBIT 14

16-Shot Wheel Lock

Saturday, May 10, 2014

Photo credit: Michael Ives

Technologically ahead of its time, this highly decorated firearm achieved a multi-shot capability that would not be reached again until the American Civil War.

SER134

An unknown German gunsmith before 1600 crafted this oval-bore .67-caliber rifle that was designed to fire 16 stacked charges of powder and ball in a rapid "Roman candle" fashion. One mid-barrel wheel lock mechanism ignited a fuse to discharge the upper 10 charges, and another rearward wheel lock then fired the remaining six lower charges. In the event of a failure of either of the two wheel locks, a backup matchlock could be utilized to fire the charges. Elaborately embellished, this unusual shoulder arm has many bone and ivory inlays depicting period dress and even shows an individual loading a firearm. Numbers representing each charge are engraved in order along the side of the barrel.

On loan from Wanenmacher's Tulsa Arms Show, this unique rifle is just one of thousands of historic firearms on display in the extensive galleries at the NRA National Firearms Museum in Fairfax, Va.

Interested in engraved arms? Visit either of the two NRA museums—the NRA National Firearms Museum at NRA Headquarters in Fairfax, Va., or our new NRA National Sporting Arms Museum at Bass Pro Shops in Springfield, Mo. Both locations include exemplary handguns, rifles and shotguns available for viewing seven days a week. Admission is free (donations gratefully accepted). For more details, visit www.nramuseum.com or call (703) 267-1600.

EXHIBIT 15

44 Willamette L. Rev. 699

Willamette Law Review
Summer 2008

Article
Clayton E. Cramer [1] Joseph Edward Olson [2]

PISTOLS, CRIME, AND PUBLIC: SAFETY IN EARLY AMERICA

There is a vigorous debate under way about the scope of the Second Amendment. What are the limits of that right? What "arms" does it protect? Does it protect an individual right to possess and perhaps to carry firearms? The District of Columbia, in its attempt to defend its 1976 gun control law, has argued that the widespread possession of handguns ("pistols") represents an especially serious public safety hazard, and that even if arguendo, the Second Amendment protects an individual right, it would not extend to pistols, which the District of Columbia characterizes as "uniquely dangerous weapons" that present "unique dangers to innocent persons." [3]

This paper examines what was likely the Framer's original public meaning of the Bill of Rights provision that protects "the right of the people to keep and bear arms," with no apparent limitations concerning handguns. We do so by examining what the history of pistols in early America tells us about foreseeable technological developments.

I. Guns, Arms, Fire-Arms, Pistols: Some Definitions

A few definitions are appropriate because there have been a few subtle changes in the meaning of some of the terms over the last two centuries. "Gun" had a more restricted meaning in the eighteenth century than it does today, referring in some contexts to privately owned cannon, [4] but most often to what today we call long guns: ***700** weapons designed to be fired with two hands with either smoothbore or rifled barrels. The smoothbore weapons included fowling pieces,

blunderbusses, and muskets, all of which could--and often did-- fire either shot or lead balls. The only real distinction between a fowling piece and a musket was that muskets were of larger caliber and were intended for more powerful charges of gunpowder, thus being capable of firing a lead ball that would be deadly at a greater distance. Blunderbusses,[5] with their characteristic belled muzzles, were short-range antipersonnel weapons that put an enormous quantity of shot in a broad pattern--the "assault weapon" of their day in terms of lethality and the number of persons that they could kill or wound.

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

Eighteenth Century Blunderbuss[6]

That "gun" did not include "pistol"[7] is demonstrated by the number of statutes that include both "gun" and "pistol" on a list of arms. For example, Colonial statutes requiring churchgoers to be armed in South Carolina (1743)[8] and Georgia (1770)[9] distinguish between "a gun" and a pair of pistols. Perkin & Coutty of Philadelphia advertised in 1781 that they made firearms "in all its ***701** branches, where gentlemen may be supplied with Guns and Pistols of the neatest and best quality, on the shortest notice."[10] Even as late as 1828 this distinction between guns and pistols appeared in a proclamation from Washington, D.C. Mayor Joseph Gales:

> WHEREAS it has been too much the habit of idle and inconsiderate persons, on Christmas and New Year's Day and Eve to indulge in firing off guns, pistols, squibs, and crackers, and burning of gun-powder in divers other ways, to the great annoyance of the peaceable inhabitants of this city, and to the manifest danger of their persons and property . . . .[11]

The term "fire-arm" was also more restricted in meaning than today. Even though there are no examples in the Oxford English Dictionary, we know from contemporary documents that, as early as 1775 and as late as 1806, the term "fire-arm" was restricted to muskets.[12] It did not include pistols, rifles[13] or blunderbusses. At the start of the Revolution, General Gage ordered the people of Boston to turn in their arms. As an incentive, General Gage offered passes to leave Boston to all who turned in their weapons, because no weapons or ammunition

were allowed to leave Boston. On April 27th, "the people delivered to the selectman 1778 fire-arms, 634 pistols, 973 bayonets, and 38 blunderbusses." [14] Additionally an 1806 congressional committee report used the phrase "fire arms and rifles," suggesting that "fire arm" may have been used in the sense of "military musket," rather than the broader definition in use today. [15]

As is the case today, "arms" was not limited to firearms in the Colonial and Revolutionary periods, although most "arms" that appear in official documents from those periods are firearms (in the modern sense of the word--something that uses rapidly burning ***702** gunpowder to generate gas to discharge projectiles). For example, Massachusetts purchased 948 small arms in the first months of the Revolution for which we have both a count and a price. [16] Of these, some are explicitly identified as firearms, while others are simply referred to as "arms" or "small arms." Firearms (n = 341, standard deviation = 0.21841) had an average purchase price of 1.680 pounds sterling. Other arms (n = 607, standard deviation = 0.07642) had an average purchase price of 1.638 pounds sterling. At a ninety-five percent confidence interval, there is no overlap in pricing between the two groups. This suggests that while there might well have been some firearms in the "arms" or "small arms" category, it is unlikely that "arms" consisted entirely of firearms. [17]

While pistols were not included in the category of "guns," they were certainly "arms," along with a number of impact and edged weapons of the time. As Webster's A Dictionary of the American Language (1828) defined arms, "In law, arms are any thing which a man takes in his hand in anger, to strike or assault another." [18] The Oxford English Dictionary definitions for "arms" are more specific than Webster's: "Instruments of offence used in war; weapons. fire-arms: those for which gunpowder is used, such as guns and pistols, as opposed to swords, spears, or bows. small-arms: those not requiring carriages, as opposed to artillery." But all the examples cited in the Oxford English Dictionary of the usage of the word "arms," from 1300 to 1870, conform to the definition given by Webster--those which can be taken in the hand. [19]

*703 II. Pistol Regulations

There are almost no regulatory distinctions between pistols and long guns in statutes before 1791. [20] When Colonial statutes refer to pistols, it is usually as part of a list of other arms, with no indication that they were treated differently. As an example, in 1684 Virginia passed a law that sought to encourage private ownership

of guns by exempting privately owned guns from being impressed for public service. To encourage the inhabitants to be "well and compleatly furnished when commanded to musters," all "swords, muskets . . . pistolls, carbines, guns, and other armes and furniture, as the inhabitants of this country . . . shall provide and furnish themselves with, for their necessary use and service, shall from henceforth be free and exempted from being imprest or taken from him or them . . . ." [21] A statute adopted at the Massachusetts 1713-1714 legislative session complained, "Whereas by the indiscreet firing of guns laden with shot[t] and ball within the town and harbour of Boston, the lives and limbs of many persons have been lost, and others have been in great danger, as well as other damage [sic] has been sustained . . . ." [22] The legislature prohibited firing of any "gun or pistol" in Boston ("the islands thereto belonging excepted"). [23]

Measures that sought to disarm African-Americans also made no distinctions between categories of arms. Pennsylvania's 1700 "Act for the Trial of Negroes" provided that "if any Negro shall presume to carry any guns, swords, pistols, fowling-pieces, clubs or other arms or weapons whatsoever, without his master's special license for the same," he would receive twenty-one lashes on his bare back. [24]

A 1743 South Carolina statute required "every white male inhabitant of this Province" under sixty years old, "who is or shall be liable to bear arms in the militia of this Province" and who attended "church or any other public place of divine worship," to "carry with ***704** him a gun or a pair of horse-pistols . . . with at least six charges of gun-powder and ball." Those who failed to do so would be fined twenty shillings--a week's wages for many colonists. [25] (Georgia adopted a very similar statute in 1770.) [26]

The only examples of laws that treat pistols differently from other arms suggest that pistols were regarded as either less dangerous than long guns, or perhaps, that they enjoyed some protected status as weapons of self-defense. In January of 1776, the Maryland Revolutionary government ordered those not prepared to associate with the Revolutionary cause to turn over their firearms for the use of the militia--with one notable exception. The counties were told to order all freemen to "deliver up to the committee of observation for this county, all fire-arms, if he hath any, except pistols." [27] Even with all the concerns about Loyalists who might take advantage of the arrival of British troops to cause mischief, there was apparently no need to disarm them of their pistols. [28] A similar exception--allowing those not entirely

trusted with long guns to nevertheless possess pistols--occurred in Maryland as late as 1781.[29]

Arlan K. Gilbert's examination of post-Revolutionary gunpowder manufacturing mentions an incident that suggests that the carrying of handguns was not particularly restricted in Maryland.

> An earlier explosion occurred on October 17, 1783, in the yard of a Mrs. Clement in Baltimore, where some gunpowder had been placed to dry. Three boys, two of them Negroes, went into the yard to clean their pistols. One of them carelessly fired his pistol near the powder, causing it to blow up. One boy was killed and the other two seriously injured.[30]

A Boston ordinance from 1786 that prohibited storing a variety of loaded weapons in buildings makes no apparent distinctions between different categories of weapons. The ordinance prohibited ***705** keeping loaded "fire-arms, or any bomb, granade, or other shell . . . in any house, outhouse, barn, stable, store, ware-house, shop, or other building."[31] Other sections apply this prohibition to "cannon, swivels, mortars" and other military ordnance.[32]

Saul Cornell has pointed to this law as evidence that there was no individual right to keep and bear arms at the time:

> This is a law that effectively makes it illegal in the city of Boston to have a loaded firearm. To have a loaded firearm in the city of Boston in the 1780s is against the law. The founding fathers were willing to ban loaded guns in the city of Boston.[33]

One would think that if there were other laws or ordinances regulating the possession of loaded firearms, Cornell would not have been silent about it. The absence of other examples suggests that Boston's ordinance was somewhat remarkable.

A careful reading of the ordinance, however, reveals that its purpose was not Cornell's general ban on guns in Boston, but on the act of leaving them loaded and unattended: "[w]hereas the depositing of loaded arms in the houses of the town

of Boston, is dangerous to the lives of those who are disposed to exert themselves when a fire happens to break out in the said town . . . ." [34]

The ordinance did not prohibit carrying loaded firearms within the city of Boston--only leaving them unattended in a building--and as the preamble makes clear, this law was for the protection of those fighting fires. These were all black powder arms that are susceptible to explosive ignition from external heat sources as well as prone to accidental discharge because of their exposed firing mechanisms. Unloading a flintlock firearm (except by firing it) was a tedious task, and it is easy to see why the city felt that it was appropriate to require guns not be kept loaded and unattended. That Boston felt the need for such a law, however, suggests that gun ownership was also common, as was having loaded firearms in one's home or business. Further, fires were more common at that time than today. But if only ten ***706** percent of homes had a gun, and only ten percent of those homes had a loaded gun, the intersection of houses on fire and houses with loaded guns in them would have been very small indeed. The law also clearly considered the possession of firearms, cannon, and grenades to be unremarkable, and the carrying of loaded firearms a sufficiently common practice as to need no separate regulation--and no prohibition while walking the streets of Boston. [35]

There also remains the question of whether pistols were included among "fire-arms" in this Boston ordinance. They certainly were not explicitly listed, and previous usage (such as the inventory of weapons turned over to General Gage) would arguably suggest that pistols were not included.

III. Why Were Pistols Treated So Cavalierly?

There are a number of possible explanations for why the Colonial and Revolutionary periods treated pistols like other firearms. One possibility is that pistols were relatively scarce and therefore might not have attracted particular regulatory attention. The evidence is very clear, however, that pistols were not scarce in the Colonial period, during the Revolution, or into the early Republic. Seventeenth century Colonial probate inventories reveal that while pistols were not as commonly owned as long guns, they were also not particularly rare. One analysis of all Plymouth Colony probate inventories through the 1670s found that, of 339 listed firearms, 13% [36] were pistols, and 54.5% of lead projectiles recovered from Plymouth Colony digs were pistol ammunition. [37]

Ads offering pistols for sale appear throughout the Colonial period, although less commonly than ads for long guns. At least one ad offering guns for sale, including pistols, appears among the surviving issues of the Boston Gazette published in 1720.[38] Sampling Boston Gazette ads from the 1741-1742 period reveals at least two different merchants offering pistols for sale. One of the merchants, Samuel Miller, identified himself as a gunsmith.[39]

***707** Similarly, merchants offered pistols for sale in the South Carolina Gazette on occasion.[40] Ads specifically for pistol-powder (finer grained so that it would burn more rapidly in a shorter barrel) appeared as well.[41] Also, at least one gunsmith, who identified himself as working on pistols, advertised in the South Carolina Gazette: "John Scott Gun Maker from London who performs all sorts of Gun or Pistol Work for ready Money only."[42]

The Pennsylvania Gazette showed a number of pistols for sale in the eighteenth century. Philadelphia merchants advertised pistols for sale repeatedly from 1744 onward.[43] Robert Towers offered, as part of his selection, "rifle double barrel and smooth bore guns, pistols, flints, bullet and shot molds."[44] Specifically, pocket pistols were offered for sale as well in 1750, showing that concealable handguns were known, lawful, and likely carried concealed.[45] In 1772 and 1773, Heinrich Diebenberger advertised in Pennsylvania newspapers that he sold pistols,[46] as did Henry Deabarear, who sold "pistols for holsters and the pocket."[47] Ads offering gunpowder specifically for pistols also appear in the Pennsylvania Gazette.[48] In 1748 in New York City, Edward Annely advertised his services as a gunsmith and dealer in ***708** imported guns. "He likewise makes guns and pistols as any gentleman shall like . . . ."[49]

Pocket pistols also appear to have been carried by those out exploring the natural wonders of America. A 1772 account of a natural bridge in Virginia includes the following description of the echo characteristics of the area: "after this I fired a Pocket Pistol under the Arch, the Report of which was louder than a Swivel [a type of small mounted artillery used on ships]."[50]

Although pistols were usually imported before the Revolution (typically from Britain), they were also made in America. Medad Hills made a pair of pistols for William Smith in 1771.[51] Surviving pistols that were apparently made in Colonial America also include a pistol owned by Peter Grubb, who made gun

barrels for the Lancaster Committee of Safety during the Revolution. The lock is apparently English-made, but the rest of the pistol appears to have been made in Pennsylvania--perhaps by I. Perkins of Philadelphia or by Grubb himself. [52] While the makers of other pistols are uncertain, William Antes is clearly the maker of one surviving Colonial period American-made pistol. Antes signed both the barrel and the lock, suggesting that he made the entire pistol. [53] Another surviving signed pistol of the Colonial period was made by Matthew Sadd of Hartford, Connecticut "in the middle 1700s." [54] Other surviving examples include a pistol made by Cornelius Atherton in New England; surviving pistols by Henry Mauger of Berks County, Pennsylvania and by William Shenner of Reading, Pennsylvania; [55] and pistols by Nathan Bailey (made for Connecticut). [56]

The previously mentioned count of firearms surrendered to General Gage by the citizens of Boston also indicates that pistols ***709** were fairly common. They comprised nearly one-fifth (18.5%) of the 3,423 firearms surrendered. [57]

On May 30, 1775, the New York Provincial Congress recommended "to the Inhabitants of this Colony in general, immediately to furnish themselves with necessary Arms & Ammunition." [58] On August 22, 1775, it ordered cavalrymen to provide themselves with a horse, saddle, "a case of pistols . . . one pound of gunpowder and 3 lbs. of sizeable bullets, . . . and a carabine." Like the infantry, cavalrymen were to "be provided . . . with 1 lb of pow[d]er and 3 lbs of bullets." While not explicit as to who would provide the gunpowder and bullets, it is clear that every man aged sixteen to fifty was to "furnish himself" with either a long gun or "a case of pistols." [59]

On May 2, 1787, the Continental Congress ordered the public auction of a collection of military odds and ends: "413 old militia Arms . . . 365 old militia gun barrels . . . 985 old gun locks . . . 2000 damaged muskets . . .700 pistols . . . 1194 damaged muskets . . . 1066 damaged carbines . . . 4446 damaged musket barrels," and a bit more than thirteen tons of damaged powder. [60] Pretty clearly, the government believed that there was a market for pistols, and it did not suffer from modern fears of selling surplus handguns to the population.

John Nicholson, a gunsmith, offered a variety of firearms for sale in November of 1781, including "Pistols . . . upon the most reasonable terms." [61] Edward Pole advertised his "Military Laboratory" where "Owners and Commanders of Armed Vessels may be supplied, for either the use of Small Arms or Cannon, at the shortest

notice, with ever species of Military Stores." Among the items for sale included "Musket's [sic] and pistol's [sic]." That Pole's ***710** customers included civilians is suggested by the offering of "Musket cartridges in blank, for the exercise of the militia." [62]

In 1785, Anthony Desverneys, Jr. of South Carolina advertised that he "continues to make and repair all sorts of guns, Pistols and generally everything that belongs to the Gunsmith's Business." [63] Francis Brooks in 1791 Philadelphia advertised himself as a "Pistol Maker." [64] John Miles's 1798 advertisement in the Pennsylvania Packet made it clear that there was a civilian market for pistols: "Gun and Pistol Manufactory . . . Where Merchants, Captains of vessels, and others may be supplied with all sorts of small arms, on the lowest terms and shortest notice." [65]

Ads for lost pistols from the Revolutionary period also suggest that pistols were not particularly rare. An October 24, 1781 Pennsylvania Gazette ad offers a reward: "Was LOST on the Commons, A Silver mounted Pistol. Whoever has found the same, and will bring it to the Sheriff Office, shall receive ONE GUINEA REWARD." [66] Other ads throughout the period for lost pistols suggest that people must have been carrying them often, both to have them fall out of a belt or pocket and to have them be sufficiently concealable so that there was no loud "thunk" as the pistol hit the ground: "LOST, on Saturday, the 5th instant, A Silver mounted PISTOL, with a brass barrel, on the road between Chester and this city . . . ." [67] or "WAS lost, on the evening of the 25th of January last, on the road leading from Philadelphia to the Lower Ferry, a very neat Pocket Pistol . . . ." [68]

Various accounts in the first few years of the early Republic suggest that the possession and carrying of pistols remained common. Isaac Weld's account of his travels in North America between 1795 ***711** and 1797 described how in the back country, "[t]he people all travel on horseback, with pistols and swords." [69]

When Aaron Burr was tried for his criminal conspiracy to detach the Southwest into its own country, one of the pieces of evidence used against him was a meeting between a Mr. Blannerhassett and a number of other conspirators--all of them armed. Burr's defense attorney argued that gun ownership was the norm in the early Republic:

> If there were evidence of a merely friendly meeting, it would be the same as if there were no assemblage. If they were to give evidence that Blannerhassett and some of those with him were in possession of arms,

> as people in this country usually are, it would not be sufficient of itself, to prove that the meeting was military.
>
> Arms are not necessarily military weapons. Rifles, shot guns and fowling pieces are used commonly by the people of this country in hunting and for domestic purposes; they are generally in the habit of pursuing game. In the upper country every man has a gun; a majority of the people have guns everywhere, for peaceful purposes. Rifles and shot guns are no more evidence of military weapons than pistols or dirks used for personal defence, or common fowling pieces kept for the amusement of taking game. It is lawful for every man in this country to keep such weapons. [70]

Given this body of evidence, it is difficult to argue that pistols were loosely regulated because of their scarcity.

IV. Were Pistols Less Misused in the Eighteenth Century?

Were pistols less misused in the Colonial and Revolutionary periods? It is conceivable that if pistols were rarely misused, the Framers might have neglected to exclude pistols from the "arms" that "the people" had a right to keep and bear. However, references to criminal and violent uses of pistols occur occasionally in the Colonial and Revolutionary era, and these occurrences are never treated as unusual or surprising because of the type of weapon. Along with misuse by professional criminals, pistols also appear to be commonly used in crimes of passion and suicides of the period.

***712** John Winthrop makes several references to pistols in New England in the nineteen years that his journal covers. A theological dispute at Pascataquack (now Dover, New Hampshire) in 1641 soon led the factions to arm themselves and march--at least one member is identified as armed with a pistol. There were murders with pistols at Stamford, Connecticut and at Penobscott in 1644 and an attempted murder with a pistol at Cape Sable in 1646. [71] Winthrop never expressed any surprise or disgust over the presence of pistols-- and he was not a man inclined to withhold his moral revulsion at the actions of his fellow Englishmen.

Eighteenth century accounts also mention pistols, and their presence is never surprising. Eliza Lucas Pinckney describes the suicide of Anne LeBrasseur with a pistol as "melancholy and shocking;" however, newspaper accounts suggest that what was shocking about LeBrasseur's suicide was not the weapon, but that she was "a Disciple of Mr. Whitefield's" (the noted Anglican evangelist). [72] There are other examples of suicides in this period by pistol, and apparently, they were never surprising for the choice of method. [73] A similar account of a planned suicide involving pistols also appears as a result of a fatal hunting accident. [74] Further, accidental deaths involving pistols occasionally appear, but never with any note of surprise. [75]

The September 7, 1749 Pennsylvania Gazette reported that, "Sunday night last, about eight a Clock, Richard Green, coming to Town from Kensington, was stopt on the Road, and his Money demanded, by two Men with Pistols . . . ." [76] There are other examples available in the Pennsylvania Gazette that illustrate how criminal misuse of and accidental deaths from pistols was never expressed as surprising. [77] A gang of robbers, having terrorized New York City, moved on to Philadelphia in 1749. A newspaper account of their ***713** crimes reported that, "two Men, unknown, were lately at Mr. Rush's, a Gun smith, enquiring for six Pair of Pocket Pistols, to make up twelve Pair, having as they said, got the six Pair at some other Place." [78]

An account from the Pennsylvania Gazette in 1765 reprints a report from Boston:

> Last Wednesday Evening, just after seven o'Clock, as a Man was going over Boston neck, he was stopped by a Fellow, who presenting a Pistol to his Breast, bid him deliver, swearing he would send a Brace of Balls thro'him instantly if he refused; but the Man replying he had but 3 Pistareens about him, he ordered him to go about his Business, and then ran of--doubtless apprehending a Pursuit, as there were a Number of People hastening towards them. He was a little Fellow, had on a surtout Coat, wore his Hat slapped before, and had a Pair of Pistols. [79]

Other examples are available in which robbers were described as using pistols or as being taken into custody while armed with pistols. [80] Much like today, pistols also appeared in offenses that might be categorized as crimes of passion. [81]

As noted above, accidental deaths appear as well and are expressed as tragic--but not shocking--occurrences:

> Monday Evening last a very melancholy Accident happen'd in this City, when a young Gentleman having been on board the Clinton Privateer, then going out, had a Pair of Pistols given him; which on his coming on Shore he carried into a Publick House, among some of his Acquaintance, where one of them was found to be loaded; upon which several Attempts were made to discharge it; but it missing Fire, he sat down in order to amend the Flint; in doing of which, the Pistol unhappily went off, and shot Mr. Thomas Cox, Butcher, through the Head, in such a Manner that some of his Brains came out, and he fell down dead without speaking a Word. [82]

Pistols appear repeatedly among the South Carolina Regulators and the criminals to whom they administered frontier justice in the 1760s. [83] Foolish persons engaged in duels appear in newspaper ***714** accounts, and the presence of pistols was not cause for surprise. [84] Nor was there any surprise when pistols appear in the hands of the law-abiding citizenry. For example, Rev. Whitfield is described as preaching in Massachusetts where "he was attended by many Friends with Muskets and Pistols on Account of the Indians." [85]

Pistols also appear in the hands of non-militia members who engage in guerilla warfare against the British at the start of the Revolution. "Samuel Whittemore, aged eighty years," upon seeing British soldiers marching towards Concord, prepared himself by oiling "his musket and pistols and sharpening his sword." When the soldiers returned,

> Whittemore had posted himself behind a stone wall, down Mystic Street about four hundred and fifty feet . . . . The distance seemed an easy range for him, and he opened fire, killing the soldier he aimed at. They must have discovered his hiding place from the smoke-puff, and hastened to close in on him. With one pistol he killed the second Briton, and with his other fatally wounded a third one. In the meantime, the ever vigilant flank guard were attracted to the contest, and a ball from one of their muskets struck his head and rendered him unconscious. They rushed to the spot, and clubbed him with their muskets and pierced him with their

bayonets until they felt sure he was dead . . . . Whittemore lived eighteen more years, dying in 1793 at the age of ninety-eight. [86]

Enough pistols were present in private hands in Pennsylvania in 1774 for the legislature to include handguns in a law regulating New Year's Day festivities. This statute made it illegal for:

> [A]ny person or persons shall, on any thirty-first day of December, or first or second day of January, in every year, wantonly, and without reasonable occasion, discharge and fire off any handgun, pistol, or other firearms, or shall cast, throw or fire any squibs, rockets or other fireworks, within the inhabited parts of this province . . . . [87] ***715** Could the small town nature of Colonial and Revolutionary America have played a part in framing a Second Amendment lacking a negative reference to handguns? America really only had three cities of any notable size in 1791: Philadelphia, New York, and Boston--none of which would even be a large town by current standards. Could the Framers simply not have envisioned the dangers that handguns might create in a city of several hundred thousand inhabitants? No. Many of the Framers had spent time in London and were certainly aware of that city's burgeoning crime problem and the recent growth in gun-facilitated violence. Given the leading colonists abiding interest in all dimensions of London society, it seems likely that many of those who had not traveled there were nevertheless well aware of the problems of crime in England's urban area.

A sampling of the criminal cases of the Old Bailey covering the period 1674-1789 demonstrates that pistols appear commonly in these records especially in the period just before the adoption of the Bill of Rights. [88]

Table 1. Old Bailey Case Data

Decade	Pistol or Pistols cases	Sampled	Criminal Misuse	Stolen	Accidental Death	Lawful Use
1670s	16	16	12	1	1	0
1680s	38	5	4	0	0	0
1690s	80	8	3	1	2	0
1700s	11	11	9	0	0	1

1710s	58	6	5	1	0	0
1720s	113	12	7	3	0	1
1730s	185	10	6	1	0	0
1740s	135	10	7	1	0	0
1750s	139	10	8	1	0	1
1760s	128	10	6	2	0	0
1770s	286	10	7	3	0	0
1780s	336	10	5	3	0	1
Totals	1525	118	79	17	3	4
%		7.74%	66.95%	14.41%	2.54%	3.39%
Projected			1020.97	219.7	38.77	51.69
std. dev.			2.39	1.08	0.62	0.49
Years covered 116						
Incidents/Year			8.8	1.89	0.33	0.45

*716 V. Technology Marches Onward

One argument for treating the Second Amendment's protection as obsolete is that the technology of firearms has advanced so dramatically since 1791--a modern pistol provides so much destructive potential--that the Framers, were they present today, would recognize the absurdity of allowing ordinary law-abiding persons to possess or carry such a weapon. Alternatively, those with a mirthful spirit suggest that the Second Amendment should protect only the type of weapons available in 1791 when the states ratified the Second Amendment.

It is certainly true that firearms technology has advanced since 1791--but not as much as some would like to think. Repeating, magazine-fed firearms date back to at least the 1600s;[89] concealable "pepperbox" handguns capable of firing five to seven shots without reloading were in use by the end of the eighteenth century;[90] and there are some indications that multibarrel handguns were in development as early as the seventeenth century.[91] Several multibarrel repeating firearms survive from the late seventeenth century, and at least one six shot flint-lock pistol survives from the first half of the eighteenth century.[92] Additionally, some British soldiers were issued magazine-fed repeating guns as early as 1658.[93]

For example, in 1718 (seventy-one years before the drafting of the American Bill of Rights) the "Puckle Gun" was patented in England.[94] It was a repeating firearm from which multiple individual *717 shots could be discharged without physically reloading the gun. The tripod-mounted flintlock revolver had a barrel 2 feet, 9 inches long and a bore of 1.2 inches.[95] It was fitted with a removable "pre-loaded" cylinder that held eleven charges and was rotated by hand. Each shot required an independent decision to fire and a separate pull of the trigger. Several examples were manufactured and, in a demonstration at the Royal Woolrich Armory, the

gun fired sixty-three shots in seven minutes in a rainfall.[96] This rate of nine shots per minute was three times quicker than the fastest musket of the time, which also could not fire reliably in the rain. Further increasing its firepower, the gun could be loaded to throw either one large or sixteen small Musquet Balls at every discharge.

In March 1722, the Daily Courant carried an advertisement for "Several sizes in Brass and Iron of Mr. Puckle's Gun, called a Defence. . . . at the Workshop thereof, in White-Cross-Alley, Middle Moorfields."[97] Although Puckle made strenuous efforts to market the gun, raising a company for this purpose in 1721, he was unable to acquire sufficient investors or a military contract. He did, however, prove that a repeating firearm was within the reach of inventors.

In 1776, Captain Patrick Ferguson was more successful than Puckle, gaining both a British patent and a military contract for his breech-loading rifle. Ferguson's design built on the 1704 work of Isaac de la Chaumette and the 1720 designs of John Warsop.[98] The goal was in sight seventy years before the hardware was produced. The Ferguson rifle saw its first action in the Revolutionary War. Ferguson, now a Major, lead a small corps of riflemen armed with his invention. The rifles were use with great success until the Battle of Brandywine in 1778, during which Ferguson was seriously wounded. Without the inventor in command, the test ended and the unit was ***718** soon merged into the regular infantry.[99] Thus, breech-loading, repeating rifles were more than just imaginable in 1791.

The next development in repeating firearms would take place in pistols.

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

An Allen & Thurber Pepperbox, Early Nineteenth Century[100]

The development of the percussion ignition system in 1816 encouraged further development of the pepperbox by making revolving handguns more practical--the concept of a repeating handgun was certainly known in 1791, if still unrefined. Even the development of the modern revolver by Samuel Colt did not suddenly render the pepperbox obsolete; Americans continued to use pepperboxes for self-defense for several decades after Colt's invention,[101] and there are indications from medico-legal texts published as late as 1895 that pepperboxes were not just curiosities.[102]

***719** Even with respect to single shot pistols, the technological advance is less dramatic than it first appears. Pocket pistols of the Revolutionary-era were often surprisingly compact, such as this example owned by Paul Revere.

TABULAR OR GRAPHIC MATERIAL SET FORTH AT THIS POINT IS NOT DISPLAYABLE

Paul Revere's Pocket Pistol [103]

Being so compact, those who were expecting trouble might carry two, four, or even six single shot pistols on their belt. This was such a sufficiently common practice that pistols were often sold (or stolen) in pairs [104] -- sometimes as a "case of pistols" or a "brace of pistols." [105] ***720** The phrase "brace of pistols" frequently appears in eighteenth century documents to describe this solution to the single shot problem. [106]

A criminal carrying six single-shot pistols in his pockets and on his belt in 1791 would admittedly not be as quick to fire those six shots as his 2008 counterpart using a modern revolver or semiautomatic pistol. However, most often, pistols induce compliance or deter attack without being discharged, and when fired, three shots are usually sufficient even with a modern handgun. [107] A modern pistol shooter can discharge three accurate shots in about three seconds. His 1791 equivalent might accurately fire three bullets in about ten seconds (with the extra time coming from the need to draw three times). As a practical matter, the often decisive first shot can be discharged in virtually equal time. [108] This is hardly an order of magnitude enhancement in the ability of handguns to discharge bullets and cause damage.

On the other side of the equation, advances in medical, communication, and protective technology have more than kept pace with the improvement in handgun technology. Any abdominal wound in 1791 was nearly a guarantee of death from peritonitis. Improvements in surgical technique and the ability to rapidly move a ***721** victim to a hospital have also dramatically improved the chances of surviving gunshots. [109]

It is clear that the goal of multi-shot firearms was on the mind of gunsmiths, inventors, and shooters in 1791. Rudimentary repeating firearms existed, as did magazine-fed firearms. Faster, more secure and weather-resistant ignition technology was being pursued at the time of the drafting of the federal Bill of

Rights. Firing mechanisms had advanced from the cumbersome matchlock to the relatively compact, more reliable and durable flintlock. Guns were in hand and getting better with every generation. Inventors knew where they wanted to be, and they were proving the truth of the familiar saying that "What man can imagine, he can invent."

Compare this with the new mediums through which the First Amendment is exercised today. There was no rudimentary radio in 1791, although the concept of long range communication had existed for centuries using fire, mirror flashes and signal flags. Benjamin Franklin had just received his shock of electricity, but there was no wave theory and certainly no thought of amplitude or frequency modulation (AM or FM). The technological jump (actually a series of jumps) to radio and television was beyond imagination at that time.

Perhaps a more meaningful question than whether the improvement in weapons technology obsoletes the Second Amendment is whether any provision of the Bill of Rights could survive such a test. The technology of mass communications in 1791 limited a publisher to printing a few hundred "dangerous opinions" an hour; modern radio and television broadcasting and the Internet make it possible for NBC to repeatedly fire off a particular viewpoint into the sight and hearing of tens of millions of people in a few minutes. Would this dramatic technological advance justify a more restrictive view of the First Amendment's freedom of the press?

Similarly, should we use the dramatic improvements in the technology of travel as an excuse to declare obsolete the Eighth Amendment's guarantee of bail in non-capital cases? Does the increased risk of terrorism in an age of biological and radiological weapons justify excluding telecommunications from the Fourth Amendment's protections against warrantless search and seizure? There are legitimate questions that might be asked about how ***722** technological change may render certain applications of 1791 concepts out of date--but if this is true, then the courts should treat the entire Bill of Rights in a consistent way.

Footnotes

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3 Petition for Writ of Certiorari at 22-23, District of Columbia v. Heller, No. 07-290 (U.S. Sept. 4, 2007).

4 See J. Hammond Trumbull, Public Records of the Colony of Connecticut 497 (Hartford, Conn., Brown & Parsons 1850) (describing "two great gunns" documented in "An Inventory of the Estate of Mr. William Whiting, deceased").

5 An eighteenth century "blunderbuss" is the equivalent of a twentieth century shotgun but often of very large bore diameter.

6 Photograph courtesy of the Idaho Historical Museum and the J. Earl Curtis Exhibition at the Old Idaho Penitentiary.

7 An eighteenth century "pistol" is the equivalent of a twentieth century handgun.

8 7 David J. McCord, Statutes at Large of South Carolina 417-19 (A. S. Johnson 1840), available at http:// www.claytoncramer.com/primary/militia/SCStatAtLarge7-417.jpg; http:// www.claytoncramer.com/primary/militia/SCStatAtLarge7-418.jpg; http:// www.claytoncramer.com/primary/militia/SCStatAtLarge7-419.jpg.

9 19 Allen D. Candler, The Colonial Records of the State of Georgia 137-40, (Chas. P. Byrd 1911), available at http:// www.claytoncramer.com/primary/militia/GA1770BringGunsToChurch.pdf.

10 PA. Gazette May 2, 1781 (emphasis added).

11 Joseph Gales, Jr., A Proclamation (Dec. 23, 1828), reprinted in An American Time Capsule: Three Centuries of Broadsides and Other Printed Ephemera (Library of Congress, Rare Book & Special Collections Div.), http:// hdl.loc.gov/loc.rbc/rbpe.19301000 (last visited May 5, 2008) (emphasis added).

12 An eighteenth century "musket" is a long gun with a smoothbore barrel capable of discharging a single lead ball of about three-quarter inch diameter with accuracy at moderate distances.

13 An eighteenth century "rifle" is a long gun with a rifled barrel capable of discharging a single lead ball of about one-half inch diameter with accuracy at longer distances

14 Richard Frothingham, History of the Siege of Boston, and of the Battles of Lexington, Concord, and Bunker Hill 94-95 (Little, Brown, & Co. 6th ed. 1903) (1849) (emphasis added).

15 1 American State Papers: Military Affairs No. 62 (William S. Hein & Co., Inc. 1998) (1832), available at http:// memory.loc.gov/ll/llsp/016/0200/02040198.tif (emphasis added).

16 See American Archives: Fourth Series, containing a Documentary History of the English Colonies in North America from the King's Message to Parliament of March 7, 1774 to The Declaration of Independence of the United States 1347, 1349, 1353, 1357-62, 1367 (Washington, M. St. Clair Clarke & Peter Force 1837) [hereinafter American Archives]; Provincial Congress of Mass., The Journals of Each Provincial Congress of Massachusetts in 1774 and 1775, at 536-37, 584-93 (Boston, Dutton & Wentworth 1838).

17 See John Winthrop, Winthrop's Journal: History of New England 1630-1649, at 191 (James Kendall Hosmer ed., Charles Scribner's Sons 1908). In at least one early Colonial source, "armed" means "with armor," because the soldiers under Indian attack are described as "some ten only (who had pieces which could reach them) shot" and yet later, "they shot only one of ours, and he was armed, all the rest being without arms." Id. That some soldiers fired guns, while one was described as "armed" and rest were not, shows that "armed" meant "with armor." This indicates that "arms" could include body armor as well as a variety of weapons.

18 Noah Webster, An American Dictionary of the English Language (New York, S. Converse 1828) (emphasis added).

19 Oxford English Dictionary 634 (J.A. Simpson & E.S.C. Weiner, eds., Clarendon Press 1989).

20 See generally Clayton E. Cramer, Armed America: The Remarkable Story of How and Why Guns Became as American as Apple Pie (2006).

21 3 The Statutes at Large: Being a Collection of all the Laws of Virginia, from the First Session of the Legislature, in the Year 1619, at 13 (William Waller Hening, ed., R. & W. & G. Bartow) (1823) (emphasis added).

22 3 Acts and Resolves, Public and Private, of the Province of the Massachusetts Bay: To Which Are Prefixed the Charters of the Province with Historical and Explanatory Notes 305 (Boston, Albert J. Wright 1878).

23 Id. (emphasis added).

24 2 Statutes at Large of Pennsylvania from 1682 to 1801, at 77-79 (Pennsylvania, Clarence M. Busch 1896) (emphasis added).

25 McCord, supra note 8, at 417-19 (emphasis added).

26 Candler, supra note 9, at 137-40.

27 78 Archives of Maryland 75, 110 (Baltimore, James Lucas & E. K. Deaver and Annapolis, Jonas Green), available at http:// aomol.net/megafile/msa/speccol/sc2900/sc2908/000001/000078/pdf/am78--75.pdf; http://aomol.net/megafile/msa/speccol/sc2900/sc2908/000001/000078/pdf/am78-- 110.pdf.

28 Id.

29 203 Archives of Maryland 278 (Baltimore, James Lucas & E. K. Deaver and Annapolis, Jonas Green), available at http:// aomol.net/megafile/msa/speccol/sc2900/sc2908/000001/000203/pdf/am203--278.pdf.

30 Arlan K. Gilbert, Gunpowder Production in Post-Revolutionary Maryland, Md. Historical Magazine, Sept. 1957, at 188 n. 7.

31 An Act in Addition to the Several Acts Already Made for the Prudent Storage of Gun-Powder Within the Town of Boston, Massachusetts Session Laws (1786) (on file with author) [hereinafter 'Boston Law'].

32 Id.

33 Saul Cornell, Assoc. Professor, Ohio State Univ., Address at the Center to Prevent Handgun Violence Second Amendment Symposium: After the Emerson Decision, Setting the Record Straight on the Second Amendment 64 (Feb. 16, 2000) (transcript available at http:// www.gunlawsuits.org/pdf/defend/second/symposium.pdf).

34 Boston Law, supra note 31.

35 Id.

36 44 pistols out of 339 firearms.

37 Plymouth Archaeological Rediscovery Project, Firearms in Plymouth Colony, Tbls. 2 & 4 (2002), http:// plymoutharch.tripod.com/id73.html.

38 Boston Gazette, May 30, 1720.

39 See Boston Gazette, Nov. 17, 1741; Boston Gazette, Dec. 8, 1741; Boston Gazette, Feb. 2, 1742; Boston Gazette, May 11, 1742; Boston Gazette, May 18, 1742; Boston Gazette, May 25, 1742; Boston Gazette, July 13, 1742; Boston Gazette, Aug. 10, 1742; Boston Gazette, Aug. 24, 1742; Boston Gazette, Aug. 31, 1742.

40 See S.C. Gazette, Oct. 25, 1735, S.C. Gazette, Sept. 18, 1736; S.C. Gazette, Feb. 26, 1741; S.C. Gazette, Mar. 5, 1741, S.C. Gazette, Sept. 5, 1741; S.C. Gazette, Sept. 12, 1741, S.C. Gazette, Oct. 10, 1741; S.C. Gazette, Dec. 19, 1741.

41 See S.C. Gazette, Jan. 13, 1733; S.C. Gazette, Sept. 14, 1734; S.C. Gazette, July 28, 1733; S.C. Gazette, May 24, 1735; S.C. Gazette, Mar. 8, 1740.

42 S.C. Gazette, Mar. 8, 1740.

43 See Pa. Gazette, Nov. 1, 1744; Pa. Gazette, Sept. 26, 1745; Pa. Gazette, Oct. 3, 1745; Pa. Gazette, Oct. 17, 1745; Pa. Gazette, Feb. 11, 1746; Pa. Gazette, July 17, 1746; Pa. Gazette, July 30, 1747; Pa. Gazette, May 5, 1748; Pa. Gazette, May 12, 1748; Pa. Gazette, Sept. 15, 1748; Pa. Gazette, Oct. 25, 1750; Pa. Gazette, Nov. 27, 1755; Pa. Gazette, Aug. 2, 1759; Pa. Gazette, Feb. 11, 1762; Pa. Gazette, Apr. 14, 1763; Pa. Gazette, May 19, 1763; Pa. Gazette, Apr. 12, 1764; Pa. Gazette, Apr. 19, 1764; Pa. Gazette, May 28, 1772; Pa. Gazette, Feb. 17, 1773.

44 Pa. Gazette, Sept. 6, 1764 (emphasis added).

45 See Pa. Gazette, June 21, 1750; Pa. Gazette, Sept. 27, 1750.

46 Wochtenlichter Pennsylvanische Staatsbote, Sept. 4, 1772 and Sept. 14, 1773, translated and quoted in James Whisker, The Gunsmith's Trade 159-60 (1992).

47 Pa. Gazette, Aug. 16, 1770; Pa. Gazette, Sept. 15, 1773; Pa. Gazette, Dec. 24, 1778.

48 See Pa. Gazette, Aug. 25, 1748; Pa. Gazette, May 5, 1748; Pa. Gazette, Nov. 10, 1748; Pa. Gazette, Nov. 16, 1749; Pa. Gazette, Mar. 6, 1750; Pa. Gazette, May 24, 1750; Pa. gazette, June 14, 1750; Pa. gazette, Nov. 1, 1750.

49 Henry J. Kauffman, Early American Gunsmiths: 1650-1850, at 4 (1952) (quoting New-York Gazette Revived in the Weekly Post-Boy, Aug. 1, 1748) (emphasis added).

50 Pa. Gazette, Nov. 25, 1772 (emphasis added).

51 George A. Stickels, The William Smith Pistols Made by Medad Hills, The Gun Report, Sept. 1979, at 10-12.

52 Frank Klay, The Samuel E. Dyke Collection of Kentucky Pistols 4-9 (1972).

53 Id.

54 Merrill Lindsay, The New England Gun: The First Two Hundred Years 64 (1975).

55 See Klay, supra note 52, at 10-15; Michael H. Lewis, The Gunsmiths of Manhattan 1625-1900: A Checklist of Tradesmen 6 (1991).

56 Lindsay, supra note 54, at 52, 54, 56, 61, 64.

57 Frothingham, supra note 14, at 94-95.

58 15 Berthold Fernow, Documents Relating to the Colonial History of the State of New York 5 (AMS Press, Inc. 1969) (1887).

59 Id. at 42-43. A "case" of pistols ordinarily contained two handguns. A letter dated May 21, 1775 from a committee in Tryon County, complaining of a shortage of ammunition--but saying nothing about a shortage of firearms--has a similar implication. See American Archives, supra note 16, at 665-66.

60 32 Journals of the Continental Congress, 1774-1789, at 244-46 (Roscoe R. Hill, ed., 1936) (emphasis added).

61 Kauffman, supra note 49, at 71 (quoting Pa. Journal, Nov. 24, 1781) (emphasis added).

62 Edward Pole, Military Laboratory, at No. 34, Dock Street, Near the Drawbridge, Philadelphia (Philadelphia, R. Aitken 1789), reprinted in An American Time Capsule: Three Centuries of Broadsides and Other Printed Ephemera (Library of Congress, Rare Book & Special Collections Div.), http:// hdl.loc.gov/loc.rbc/rbpe.1470090a (last visited May 5, 2008) (emphasis added). See also PA. Packet, Nov. 28, 1778 (displaying a similar ad for Pole).

63 Kauffman, supra note 49, at 23 (quoting S.C. Gazette & Public Advertiser, Oct. 13, 1785) (emphasis added).

64 Id. at 14 (quoting Federal Gazette, Sept. 21, 1791) (emphasis added).

65 Id. at 66 (quoting Pa. Packet (Claypoole's American Daily Advertiser), Apr. 26, 1798) (emphasis added).

66 Pa. Gazette, Oct. 24, 1781 (emphasis added).

67 Pa. Gazette, June 9, 1784 (emphasis added).

68 Pa. Gazette, Apr. 6, 1774 (emphasis added).

69 Isaac Weld, Travels Through the States of North America, and the Provinces of Upper and Lower Canada, During the Years 1795, 1796, and 1797, at 234 (London, John Stockdale 1807) (emphasis added).

70 David Robertson, Reports of the Trials of Colonel Aaron Burr, (Late Vice President of the United States,) for Treason, and for a Misdemeanor 582 (Philadelphia, Hopkins & Earle 1808).

71 Winthrop, supra note 17, at 27, 153, 180, 275.

72 Eliza Lucas Pinckney, The Letterbook of Eliza Lucas Pinckney 42 & n.55 (Elise Pinckney, ed., Univ. of S.C. Press 1997).

73 See Pa. Gazette, Dec. 27, 1759; Pa. Gazette Aug. 22, 1765.

74 S.C. Gazette, May 29, 1736.

75 S.C. Gazette, Nov. 27, 1740.

76 Pa. Gazette, Sept. 7, 1749.

77 Pa. Gazette, Oct. 31, 1745 (accidental discharge of a pistol causes death); Pa. Gazette, Apr. 20, 1749 (criminal shooting from inside a barricaded home); Pa. Gazette, Oct. 27, 1763 (attempted robbery in Lancaster County, Pennsylvania); Pa. Gazette, June 27, 1787 (attempted robbery in Bush Hill, Virginia with a pistol and blunderbuss).

78 Pa. Gazette, Aug. 31, 1749.

79 Pa. Gazette, Feb. 7, 1765 (emphasis added).

80 Pa. Gazette, Dec. 10, 1751; Pa. Gazette, Mar. 5, 1783; Pa. Gazette, July 2, 1783.

81 S.C. Gazette, July 24, 1736.

82 Pa.Gazette, Oct. 31, 1745 (emphasis added).

83 See Richard Maxwell Brown, The South Carolina Regulators 25, 40, 54 (1963).

84 S.C. Gazette, Sept. 6, 1735.

85 Pa. Gazette, Aug. 15, 1745.

86 Frank Warren Coburn, The Battle of April 19, 1775, at 141-42 (Kennikat Press, 2d ed. 1970) (1922). See also Abram English Brown, Beneath Old Roof Trees 262-63 (Boston, Lee & Shepard 1896) (recounting the same story and also quoting Whittemore's obituary in the Feb. 6, 1793 Columbia Sentinel, which reports very nearly the same facts as Coburn).

87 Pa. Gazette, Dec. 28, 1774 (emphasis added). New Year's revelry is still a problem in American cities. Minnesota did not get around to dealing with it until 1993. See Minn. Stat. §609.66, subd. 1a (a)(3) (2007).

88 See Proceedings of the Old Bailey, 1674-1834, http:// www.oldbaileyonline.org/search/ (last visited Jan. 16, 2008). The term "pistol" appears occasionally to refer to a Spanish or French coin, and more rarely, used an adjective to describe something small or short.

89 See Claude Blair, Pollard's History of Firearms 207, 214 (1983); William Wellington Greener, The Gun and Its Development 80-81 (Cassell & Co., 8th ed. 1907) (1881).

90 Blair, supra note 89, at 207, 214. While most surviving pepperbox handguns are percussion system, and therefore nineteenth century, there are occasional references to flintlock pepperbox handguns. $150 Paid for Flintlock, N.Y. Times, Nov. 19, 1919, at 11.

91 Charles Edward Chapel, Guns of the Old West: An Illustrated Guide 84 (2002); Greener, supra note 89, at 509.

92 Greener, supra note 89, at 82-83.

93 A. V. B. Norman & Don Pottinger, English Weapons & Warfare: 449-1660, at 206-07 (1979).

94 A copy of the James Puckle Portable Gun patent is available at http://www.wedmore.org.uk/puckle/James.htm (last visited May 20, 2008).

95 An essay on the Puckle Gun by a historian from De Montfort University, Leicester, UK, is available at http://ccrkba.org/pub/rkba/news/Quick-firingGun.htm (last visited on May 20, 2008) [hereinafter Puckle Gun Essay].

96 A surviving example of the "Puckle Gun" was observed by the author, Professor Olson, at the Tower of London Armory. See also James H. Willbanks, Machine Guns: An Illustrated History of Their Impact 23 (2004).

97 Puckle Gun Essay, supra note 95.

98 See generally Ferguson Rifle and Military Innovation in the 18th Century, http://johnsmilitaryhistory.com/fergusonrifle.html (last visited May 20, 2008).

99 Lance Klein, This Barbarous Weapon, http:// www.11thpa.org/ferguson.html (originally posted on http://www.nmlra.org/) (last visited on May 20, 2008).

100 Photograph courtesy C.W. Slagle of Scottsdale, Arizona. There were dozens of similar early pepperboxes at the gun show where the author photographed this one.

101 See William Elsey Connelley, Quantrill and the Border Wars 399 (Torch Press 1910); Anson Uriel Hancock, Silhouettes from Life on the Prairie, in the Backwoods 155 (Chicago, C.H. Kerr 1893); Frank Hickenlooper, An Illustrated History of Monroe County, Iowa 257 (1896); John A. Joyce, A Checkered Life 135 (Chicago, S.P. Rounds, Jr. 1883); John S. Mosby, The Memoirs of Colonel John S. Mosby 8 (Charles Wells Russell, ed., Little, Brown, & Co. 1917).

102 Medico-Legal Society of New York, Bulletin of the Medico-Legal Congress, Held at the Federal Building in the City of New York, September 4th, 5th and 6th, 1895, at 168 (New York, Medico-Legal Journal 1898).

103 Photograph courtesy of the Massachusetts Historical Society.

104 See 78 Archives of Maryland, supra note 27, at 63; William P. Palmer, Calendar of Virginia State Papers and Other Manuscripts, 1652-1781, Preserved in the Capitol at Richmond 81 (Richmond, VI, R. F. Walker, ed. 1875). Advertisements for stolen pairs of pistols listed in runaway ads can be found in: Thomas Costa, Virginia Runaways: Runaway Slave Advertisements from 18th-century Virginia Newspapers, http://etext.lib.virginia.edu/subjects/runaways/search.html (last visited May 5, 2008). Advertisements for pairs of pistols for sale can be found in: Pa. Gazette, Apr. 2, 1752; Pa. Gazette, Oct. 25, 1753; Pa. Gazette, Dec. 5, 1754; Pa. Gazette, Aug. 10, 1774; Pa. Gazette, May 10, 1775; Pa. Gazette, Jan. 8, 1767; Pa. Gazette, March 29, 1780; Pa. Gazette, Dec. 5, 1781; Pa. Gazette, May 19, 1784; Pa. Gazette, June 27, 1787; Pa. Gazette, Aug. 31, 1749; Pa. Gazette, Sept. 19, 1751; Pa. Gazette, Oct. 1, 1761; Pa. Gazette, Oct. 21, 1762; Pa. Gazette, Dec. 14, 1774; Pa. Gazette, April 15, 1776; Pa. Gazette, Jan. 24, 1778; S.C. Gazette, Mar. 8, 1740.

105 See Pa. Gazette, Oct. 1, 1761; Pa. Gazette, Sept. 1, 1779.

106 See Pa. Gazette, May 20, 1756; Some Account of the Loss of the Hartwell East-Indiaman, The Annual Register, or a View of the History, Politics, and Literature, for the Year 1787, at 253 (London, J. Dodsley 1789); Account of the Disaster that befell his Majesty's Ship Guardian, Lieutenant Riou, Commander, The Annual Register, or a View of the History, Politics, and Literature, for the Year 1790, at 260 (London, J. Dodsley 1793); Matthew Gregory Lewis, The Monk: A Romance 203 (J. Bell 1796); Jasper Sprange, The Tunbridge Wells Guide 247 (London, n. pub. 1797); Robert Bisset, Douglas; or, The Highlander 189 (London, T. Crowder 1800).

107 A multi-year study by the New York City Police Department reported that:
[In actual gunfights,] the average number of shots fired by individual officers in an armed confrontation is between two and three rounds, less than half the capacity of the service revolver. The two to three rounds per incident has remained constant over the years covered by the report. It also substantiates an earlier study by the L.A.P.D. (1967) which found that 2.6 rounds per encounter were discharged. The necessity for rapid reloading to prevent death or serious injury was not a factor in any of the cases examined. In close range encounters, under 15 feet, it was never reported as necessary to continue the action ....
New York City Police Department Analysis of Police Combat Situations, at Rapid Reloading, http://www.theppsc.org/Grossman/SOP9/1981.htm (last visited May 20, 2008).

108 These observations are based on the experience of the author, Professor Olson, an accomplished NRA pistol instructor, a state CCW instructor, and a thirty year competitor in combat pistol competitions.

109 See 2 Samuel David Gross, A System of Surgery: Pathological, Diagnostic, Therapeutic, and Operative 615 (6th ed. Philadelphia, Henry C. Lea's Son & Co. 1882).

44 WMTLR 699

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EXHIBIT 16

"DEFENCE" RAPID-FIRE GUN PATENTED

15 MAY 1718

On this day in 1718, London lawyer James Puckle patented the "Defence Gun." The first well-documented rapid-fire gun in the world, the Defence Gun is considered a precursor of the machine gun.

Since the 14th century, inventors had been attempting to create small caliber, rapid-fire artillery. In the scientific formula of arms warfare, small caliber (which meant controllable recoil) + rapid projection of projectiles = maximum casualties to the enemy. Though many devices were devised, created, and tested—including one from Leonardo da Vinci, which never left the drawing board—few amounted to much on the battlefield.

Until 1718, when Puckle, a noted British lawyer, inventor, and writer, invented and patented the first well-documented rapid-fire gun and what many call the precursor to the modern machine gun. The Defence, or Puckle, gun was a tripod-mounted single-barreled flintlock weapon. Its barrel was about a metre long with a bore of about three centimetres. The preloaded revolving cylinder held 11 charges and could fire 63 shots in seven minutes, or 9 shots per minute—three times faster than the fastest loading time of any infantryman at the time. Puckle's patent describes it as "A portable gun or machine called a Defence, that discharges so often and so many bullets, and can be so quickly loaded as renders it next to impossible to carry any ship by boarding." In other words, the weapon was initially designed for shipboard use, to discourage enemies from boarding British vessels.

In fact, Puckle even demonstrated two versions of his basic Defence Gun design. The first, designed to be used against Christian enemies, fired conventional round bullets. The second, intended for use against Muslim Turks, fired square bullets. The square bullets were supposed to inflict more damage and according to Puckle's patent, would convince the Turks of the "benefits of Christian civilisation."

Unfortunately for Puckle and his efforts, the square bullets convinced no one: their odd shape resulted in such unpredictable flight patterns that the square bullets were eventually discontinued. What's more, the Puckle gun failed to attract investors, mass production, or introduction to the British armed forces—partly because British gunsmiths could not produce the gun's complicated components. As such, a British newspaper once reportedly observed that the Defence Gun "only wounded those who hold shares therein."

Nonetheless, the Puckle's rapid-fire weapon laid the groundwork for the machine gun, a weapon that changed the way war is waged.

EXHIBIT 17

WEAPONS *of the* LEWIS & CLARK EXPEDITION

JIM GARRY

Also by Jim Garry

This Ol' Drought Ain't Broke Us Yet (But We're All Bent Pretty Bad): Stories of the American West (New York, 1992)

The First Liar Never Has a Chance: Curly, Jack, and Bill (and Other Characters of the Hills, Brush, and Plains) (New York, 1994)

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CHAPTER 6

Air Rifle

The image that leaps to mind for most people when they hear the term "air rifle" is a Daisy BB gun, which leads to thinking that Meriwether Lewis had brought a toy along to impress the Indians. It did impress the Indians, but not as a toy. At the beginning of the nineteenth century there were many people who were not happy with gunpowder and the firearms it produced. These were not antigun people. They were gun designers and manufacturers who were displeased with many of the characteristics of gunpowder, such as cost, the fouling problems associated with dirty burning, the fact that powder often varied from batch to batch, and the fact that it might not work at all in wet or even damp weather. Then there was the fact that gunpowder produced so much smoke when a weapon was fired that the shooter's vision was often obscured too much to see whether he had hit his mark. Some of these people thought compressed air offered a viable alternative.

As the eighteenth century gave way to the nineteenth, there were many gunsmiths in Europe producing compressed air weapons powerful enough to use for big game hunting or as military weapons. Air rifles had a number of advantages. Though not silent, they were much quieter than firearms. The noise they produced was a low-frequency pop that was hard to recognize or to pinpoint if one couldn't see the shooter. And compressed air doesn't smoke when an air gun is fired. Armies of the day fought at close range with massed troops. After the first couple of volleys the field was so obscured that aiming was difficult at best.

A musket had to be reloaded—powder, ball, and priming—for each shot. That added up to about four shots a minute. An air rifle with 750 pounds-per-square-inch of air pressure in its air cylinder could be discharged twenty to forty times before losing power.

It did take some time and effort to pump up a cylinder. With a hand pump, up to 1,500 strokes might be required to fully charge a cylinder; not a problem for a hunter, but potentially a problem for a soldier. Armies solved this problem by using larger multicylinder cart pumps and by supplying air riflemen with several air cylinders. The Austrian army equipped its air rifle companies with enough air cylinders and balls for four to five hundred shots per soldier, this at a time when most armies issued twenty to a hundred rounds per man.[1]

Why didn't armies convert from firearms to air rifles? Some accounts point to the Napoleonic Wars between 1796 and 1815. The French, so the stories go, didn't have the manufacturing technology to produce air rifles. Napoleon, on the other hand, was facing Austrian troops armed with high-quality repeating air rifles. These troops had a much higher rate of fire, and sans smoke it was more accurate. There are stories that Napoleon had captured air riflemen shot as terrorists, making it hard to recruit men for the air rifle companies. Research and development therefore slowed, and the weapons became very exclusive, expensive, and therefore limited in manufacture and in use. In the meantime, firearm technology improved throughout the nineteenth century, ending with the metallic cartridge and smokeless powder. So the firearm won the competition.

There is some evidence to support the above-mentioned stories. In 1802, during a lull in the Napoleonic Wars, Col. Thomas Thornton traveled in France and spent some time with Gen. Edouard Mortier, the future *maréchal* of France. Thornton wrote:

> One day in particular, General Mortier, in speaking of air guns, recalled to the recollection of some officers in the company a circumstance which happened after the retreat of the enemy, but where I cannot precisely call to mind. He said, "do you remember when I

[1]Wolff, *Air Guns*, 29.

had ordered the cannon to cease firing that an orderly sergeant who was standing close to us leaped up very high into the air and then fell down? We supposed, at first, that he was in a fit, and we were greatly astonished to find him dead, as nothing had been heard to injure him. On his being undressed, however, a ball was found to have struck him, which must have been shot from an air-gun in the adjoining field and aimed at us." "Yes," replied one of the officers, "I remember it well, and I think we had a fortunate escape." They then stated, that on account of this treachery they hung all of that corps that fell into their hands, considering them not as soldiers but as assassins, and never after gave any quarter. They acknowledged, at the same time, that they lost many fine men by that corps of Austrians, which they stated consist of about five hundred men.[2]

Thornton's book may well be the origin of the tales of the Austrians' inability to recruit or keep men in air rifle companies, resulting in the guns going out of service. Some other sources, in particular Fred Baer, point to the delicacy of air rifle mechanisms and the difficulty of building air cylinders that could stand up to the high pressures needed as more likely reasons for most armies not using them. The Austrians did use repeating air rifles against both the Turks and the French, but Baer indicates only the numbers used, the trouble the army had acquiring enough air cylinders, apparently due to the difficulty of constructing reliable ones, and their final resting places in magazines and arsenals as troops were equipped with flintlocks.[3]

W. H. B. Smith, who quotes Thornton extensively, goes on to state that a Hauptman Halla wrote in 1890:

> The fact that this remarkable weapon nevertheless did not remain in use and was removed as expendable supply to the fortress of Olmutz in 1815 was due not only to the changed tactical principles, but chiefly to the circumstance that there were no adequately trained riflesmiths available to take care of the delicate component parts of the locks and valves, and therefore the percentage of unusable air rifles shown in the reports was frighteningly high.[4]

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[2] From Thomas Thornton, *A Sporting Tour Through France in the Year 1802*, 2:59. Quoted in Smith's *Gas, Air and Spring Guns of the World*, 25.

[3] Fred Barer, "Napoleon Was Not Afraid of It," in Held, *Arms and Armor Annual*, 1:250.

[4] [first name not given] Halla, *Bulletins of the Military Archives for the Year 1890*. Quoted in Smith, *Gas, Air and Spring Guns of the World*, 30.

This would suggest that the air rifles were considered good and viable weapons and not retired from service until they had been in use for twenty-five years. There is the added fact that in 1815 the Napoleonic Wars ended at Waterloo and the Austrian army was in a position to give up some of its arms as part of the army was discharged. Smith goes on to write:

> The Austrians treated the development as a real secret weapon. A special shop was set up for Girandoni and workers were specially selected and sworn to secrecy about equivalent to that required for an H-Bomb "Q" clearance today.
>
> It should be mentioned in passing that the Girandoni pattern was produced by other makers on contract. Then, even as now, Austria was a hotbed of small gunmakers who were good at duplication.[5]

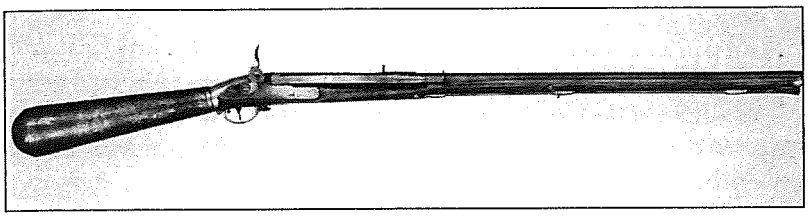
Smith seems to contradict himself in the above paragraphs. Austria wasn't going to keep a weapon secret by giving the design to a number of different manufacturing firms, most of which were in foreign countries. The Girandoni design was consciously spread to various German principalities and to Switzerland and England by the Austrian government. That strongly suggests that there was no attempt to keep the weapon secret. From any of those countries the design and quite possibly a weapon itself could easily have found its way to the United States.

The Girandoni air rifles represented a technology that teased generals and sportsmen alike. Lewis was one of the teased. For an expedition such as the one on which he was embarking, an air rifle such as a Girandoni would serve well as a way to impress the various tribes with the power of the United States. A rifle that needed no gunpowder was likely to impress tribes who had to trade for expensive and scarce gunpowder. And the weapon could serve as a backup if the Corps lost its gunpowder. So Meriwether Lewis, somehow, somewhere, acquired one.

Lewis's air rifle enters the Expedition journals on the day Lewis began recording the journey.

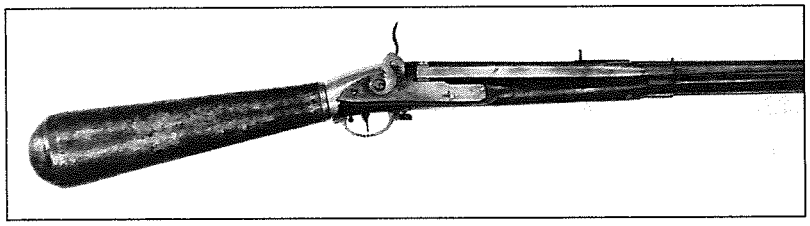
> went on shore and being invited on by some of the gentlemen present to try my *airgun* which I purchased brought it on shore charged it

[5]Smith, *Gas, Air and Spring Guns of the World*, 30.



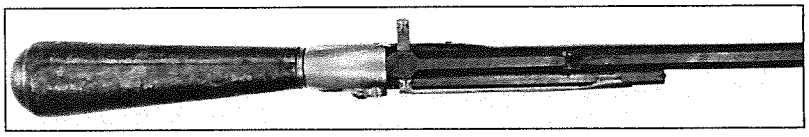
GIRANDONI AIR RIFLE (RIGHT SIDE VIEW)

Notice that there is no frizzen and pan in front of the hammer. The hammer sets the air charge for the trigger to release; there is no need for spark of fire. Also note that the butt stock is metal; it is the air cylinder for the weapon, holding air compressed to about 750 psi. *Courtesy Michael F. Carrick.*



GIRANDONI AIR RIFLE (RIGHT SIDE CLOSE-UP)

This view shows the metal butt stock and the tubal magazine in front of the hammer more clearly. *Courtesy Michael F. Carrick.*



GIRANDONI AIR RIFLE (TOP VIEW)

In this view one can see the magazine tube on the right, in front of the hammer. The breech block sticks out on the left. *Courtesy Michael F. Carrick.*

> and fired myself seven times fifty five yards with pretty good success; after which a Mr. Blaze Cenas being unacquainted with the management of the gun suffered her to discharge herself accidently the ball passed through the hat of a woman about 40 yards distanc cuting her temple about the fourth of the diameter of the ball; shee feel instantly and the blood gusing from her temple we were all in the greatest consternation supposed she was dead by [but] in a minute she revived to our enespressable satisfaction, and by examination we found the wound by no means mortal or even dangerous.
>
> *Lewis, August 30, 1803*[6]

There is an obvious question. How did Lewis find a man west of Pittsburgh who was "unacquainted with the management of the gun?" In 1803, guns were a part of life that far west. One possible answer is that Lewis's air gun was somehow different from the guns to which men along the Ohio River were accustomed. The Corps of Discovery's journals aren't much help. The next time the air gun is mentioned is almost a year later, when, on August 3, 1804, an entry makes a typical allusion to the air gun, saying simply that Lewis had fired it "a few times" for the Otos with whom they were visiting.

On his way down the Ohio, Lewis wrote that he spent some time with Col. Thomas Rodney, on his way from Delaware to the lower Mississippi. On September 8, 1803, Rodney wrote a bit more about the meeting:

> Visited Captain Lewess barge. He shewed us his air gun which fired 22 times at one charge. He shewed us the mode of charging her and then loaded with 12 balls which he intended to fire one at a time; but she by some means lost the whole charge of air at the first fire. He charged her again and then she fired twice. He then found the cause and in some measure prevented the airs escaping, and then she fired seven times; but when in perfect order she fires 22 times in a minute. All the balls are put at once into a short side barrel and are then droped into the chamber of the gun one at a time by moving a spring; and when the triger is pulled just so much air escapes out of the bag which forms the britch [breech] of the gun serves for one ball. It is a curious piece of workmanship not easily discribed and therefore I omit attempting it.[7]

[6]Moulton, *Journals of the Lewis and Clark Expedition*, 2:65.
[7]Rodney, *A Journey through the West*, 50, 62.

This helps to visualize Lewis's air rifle but also presents a problem. It contradicts all we knew about that particular air gun before Michael Carrick published the above passage in "Meriwether Lewis's Air Gun," his paper on Rodney's description of Lewis's air gun, in 2002. Will Rogers once said that it wasn't what we don't know that gets us in trouble, "it's all the things we know that just ain't so." For the last quarter century, historians looking into Lewis's air gun have all fallen into the trap of circular reasoning.[8]

The loop of misunderstanding began in 1977, when Henry M. Stewart, Jr., published a paper revealing that he'd found, in Isaiah Lukens's estate papers, evidence of the disposition of Lewis's air rifle. Lukens, a Philadelphia clockmaker and gunsmith, died in 1846. In January of 1847 his estate was auctioned off. Item 95 in the auction catalogue states: "1 large do [air gun] made for and used by Messrs Lewis & Clark in their exploring expedition. A *great curiosity*."[9]

There is no record of who purchased item 95, so the trail turns cold from there and the circular reasoning begins.

Lukens, perhaps best known in his own day as a clock maker (he made the clock for the tower of Independence Hall), was also a maker of air guns. He had perfected a valve for air guns that solved their greatest problem, decreased air pressure after each shot. His guns were considered some of the finest of the period. And he moved in the same Philadelphia circles Lewis was moving in during the spring and summer of 1803. So, the logic said, since Lukens had the air gun in 1846 and since the estate sale said it was "made for" Lewis and Clark, it must have been one of his that Lewis had bought and either returned to him after the expedition or that Lukens reacquired after Lewis's death. Suddenly, the older question of what the air gun was seemed to be solved. The logic worked; everyone was satisfied. The gun must have been made by Lukens.

---

[8] The author pleads guilty to this as well. The original of this chapter, written before Carrick's article, is currently in the circular file.

[9] "A Great Curiosity," Discovering Lewis and Clark, http://lewis-clark.org/content/content-article.asp?ArticleID=1826.

Various researchers have suggested that Lukens made eight air guns during the period leading up to Lewis's time in Philadelphia. Four, perhaps five, of them are still extant. So, after Stewart found that Lewis's air gun still existed in 1846, and everyone interested settled on the gun being a Lukens, experts began to examine the possible guns. And there the journals enter the story again. On June 10, 1805 Lewis wrote, "The day being fair and fine we dryed all our baggage and merchandize. Shields renewed the main Spring of my air gun."[10] Experts examined the surviving Lukens air guns, looking for nonoriginal parts. And they found them.

The Virginia Military Institute (VMI) has a good collection of air guns, two of which are Lukens air guns from the late eighteenth or early nineteenth century. All of the known Lukens air guns are, as one would expect from a maker of fine clocks, elegant and refined, inside and out. They look like Pennsylvania rifles except that they have no pans and frizzens. The hammers are the beautiful serpentine design we associate with the Pennsylvania Rifles. All but one. That one, in the VMI collection, has a more robust, double-neck hammer of the type associated with military weapons. The mainspring too is crude, the kind of work a good blacksmith might do if he was working without a decent shop. Lewis had brought along a number of spare locks and parts from Harper's Ferry. Within a few months of Lewis's leaving there, the Harper's Ferry Arsenal was producing the Model 1803 Rifle with double-neck hammers. All the pieces fit. The VMI gun, it was assumed, must be the one Lewis took to the Pacific and back.

The puzzle was seemingly solved on the eve of the expedition's bicentennial. Then Michael Carrick published his paper on the Thomas Rodney description of Lewis's air rifle. The flaw in the train of logic was suddenly clear. Everyone had assumed that because Lukens ended up with the gun, he had made it. But if Lukens made the gun Thomas Rodney described, not only is it lost to us, it is radically different from any of the surviving Lukens air

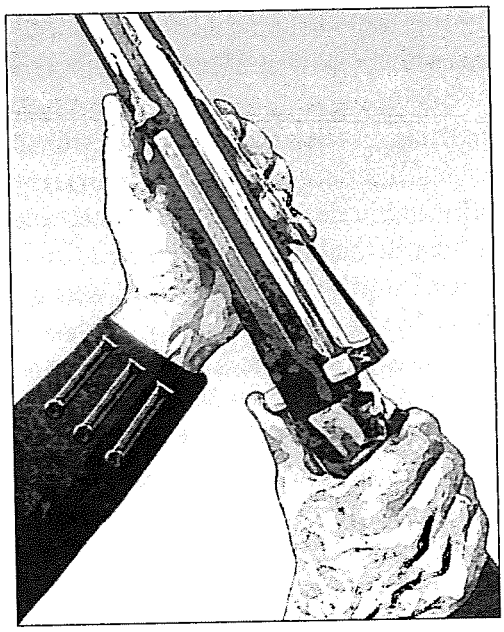
[10]Moulton, *Journals of the Lewis and Clark Expedition*, 4:275.

guns. All of his that remain are single-shot muzzle loaders. Rodney describes a repeating weapon. There were a number of designs for repeating air guns at the beginning of the nineteenth century. But Rodney's account strongly suggests the type designed by G.C. Girandoni (a.k.a. Girardoni or Girardony) for the Austrian army.

Europe was not politically stable during the eighteenth and early nineteenth centuries. Austria fought wars against the Ottoman Empire, the Holy Roman Empire (and following its demise, Prussia), various powers in Italy and the Low Countries, and a whole series with France following the French Revolution and the rise of Napoleon. One result of all those wars was a large and well-financed military. Girandoni designed weapons for the Austrian military during the last quarter of the eighteenth century. His experiments with a repeating flintlock resulted in the loss of his left hand when a malfunction caused a test weapon to explode while he was firing it. He had better luck when he adapted the system to a repeating air rifle in the late 1770s. The result was the Model 1780. That weapon was improved, and the Model 1799 was the weapon that supposedly so upset Napoleon. It is unclear whether Girandoni was the lead manufacturer once he finished the design work. The fact that there were clearly many makers in Austria, Russia, Switzerland, England, and various German principalities using his design points to him as primarily an innovator that others then manufactured.[11]

A few of Girandoni's repeating air rifles have survived, and they are striking-looking weapons, with full-length forearms, very high, prominent hammers, and leather-covered metal stocks. On a Girandoni, as on many air guns of the time, the stock is the gun's air reservoir and detaches from the breech so it can be pumped up. It took five hundred to a thousand strokes of a hand pump to fill the air chamber to about 750 psi, but the gun can then be fired twenty to forty times. (The Austrian army supplied a larger pump mounted on a cart to facilitate refilling the air reservoirs.) Along the right side of the gun barrel, immediately

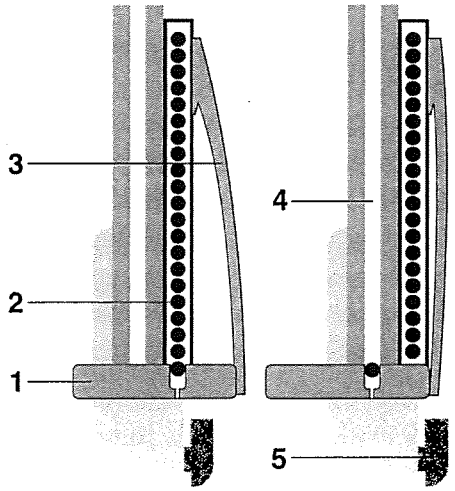
[11] Smith, *Gas, Air and Spring Guns of the World*, 28–30.



LOADING THE GIRANDONI AIR RIFLE
This shows a soldier loading the rifle by pushing the breech block to the right with his thumb. This must be done while holding the rifle vertically, as the balls feed down the magazine by gravity. *Courtesy Michael F. Carrick.*

in front of the hammer, is a tube about a foot long and about a half inch in diameter, capable of holding about twenty rifle balls. The front of the tube is gated, and a leaf spring, attached just behind the gate, runs slightly more than the length of the tube along its right side. There is a sliding breech block that sticks out on both sides of the weapon. The right side of the block closes the back of the tube magazine, its right edge in contact with the magazine's leaf spring. The left side projects from the weapon roughly an inch and a half to two inches.

When the rifleman pushes that block to the right, it moves against the spring and places a funnel-shaped hole in the block over the end of the magazine. The hole is large enough in the front for a ball to enter and too small in the back for the ball to fall through—but large enough for air to pass. By holding the rifle muzzle up the shooter allows gravity to drop a ball into the breechblock's hole. When the block is then released from the



SCHEMATIC OF THE GIRANDONI AIR RIFLE
(1) breech block; (2) magazine (filled with balls); (3) leaf spring; (4) barrel; (5) hammer. By pushing the breech block to the right while holding the rifle in a barrel-up position, the leaf spring is displaced to the right and a ball falls into the breechblock. Releasing the block, the leaf spring pushes the block back, positioning the ball in line with the barrel and the air cylinder to the rear. *Courtesy Michael F. Carrick.*

left, the leaf spring forces the block back to the left and the hole containing the ball is moved back in line with the rifle barrel. The shooter then cocks the hammer and air is released from the reservoir into a chamber between the stock and the breech block until the pressure in the two chambers is equalized. Then the reservoir valve closes. (The failure of this valve from something as insignificant as a bit of dirt could easily explain the problem of the weapon when Lewis was demonstrating it to Thomas Rodney.) Pulling the trigger then opens the valve at the front of the forward air chamber, and the air pressure sends the ball down the barrel at a speed of several hundred feet per second.

Lewis's first journal entry does state that he had purchased the air gun, but neither that or any evidence has surfaced to explain exactly where or when he acquired it. There is no other good evidence for Girandoni-style air rifles having made it to the United States by the beginning of the nineteenth century. Since so many different manufacturers in so many different countries were producing the weapons, it is easy to imagine them being

traded widely and without great comment during the more than twenty years from the weapon's introduction in 1780 until Lewis headed west. Interestingly enough, Lewis's penultimate journal entry also mentions the air rifle and another shooting accident as well. On that day, after being shot by Cruzatte, Lewis assumed that he and Cruzatte had been attacked by a party of Indians, and he called out to Cruzatte, who failed to respond. He made his way back to the river and called to his men to aid him in his attempt to save Cruzatte from the supposed Indian attack. The ball that wounded Lewis had passed through both cheeks of his buttocks, and Lewis found:

> my wounds became so painfull and my thye so stiff that I could scarcely get on; in short I was compelled to halt and ordered the men to proceed and if they found themselves overpowered by numbers to retreat in order keeping up a fire. I now got back to the perogue as well as I could and prepared myself with a pistol my rifle and air-gun being determined as retreat was impracticable to sell my life as deerly as possible.
>
> *Lewis, August 11, 1806*[12]

If Lewis's air gun was capable of firing twenty shots in a minute, his defense would likely have been as effective as it was heroic. As events unfolded, the men returned with Cruzatte, who at least pretended bafflement, claiming he had never fired his rifle. Lewis had the ball that wounded him, one of the same caliber as the short rifle Cruzatte carried. Lewis was sure he had been shot accidentally by his one-eyed, nearsighted companion, but, somewhat uncharacteristically, he dropped the matter.

In between those incidents of April 1803 and August 1806, the air rifle is mentioned twenty times. In sixteen of those instances the air rifle was shot as a demonstration to impress various tribes. Since not every journalist mentions these performances on the same days, it seems reasonable to assume the weapon might have been fired more often than that. It may be that it became such a routine piece of equipment to the Corps that the writers didn't

[12]Moulton, *Journals of the Lewis and Clark Expedition*, 8:155.

deem it necessary to note its every use. For instance, neither Sergeant Gass nor Private Whitehouse ever mentions it. The various tribes all seem to have had the same reaction to the air rifle. Most of the journals describe the tribes as astonished or surprised. On January 24, 1806, Lewis wrote his longest report on the Indians' reaction to the air gun. "My Air-gun also astonishes them very much, they cannot comprehend it's shooting so often and without powder; and think that it is *great medicine* which comprehends every thing that is to them incomprehensible."[13] The line "shooting so often" seems to support the idea that Lewis had a repeating air rifle such as a Girandoni type.

The final mention of the air rifle in the journals is undated. After returning to St. Louis, some of Clark's notes refer to the air rifle being boxed for shipment back East.[14] Then, as the trackers say, the trail goes cold. But rather than turn away, it is useful to look at one last piece of evidence. Isaiah Lukens's estate papers say that the air gun was not only carried by Lewis but made for him as well. By whom? Based on whose design? Did Lewis acquire the designs for a Girandoni and take them to Pennsylvania and have one made for the trip? Did Lukens, after all, make Lewis's air gun, but not from his standard model? Or did the writer of the estate sale brochure make a small literary error and add "made for" to "used"? Had Lukens only acquired it after Lewis's death? Did he want it because of where it had been or because he wanted to study the unusual design? Or . . . ?

The Corps of Discovery's expedition was one of the best documented of the period, but there are many questions about it that are probably unanswerable two hundred years later. What exactly Lewis's air gun was may well be one of those questions. But historians should be wary of the word "never."

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[13]Ibid., 6:233.
[14]Ibid., 8:419.

EXHIBIT 18

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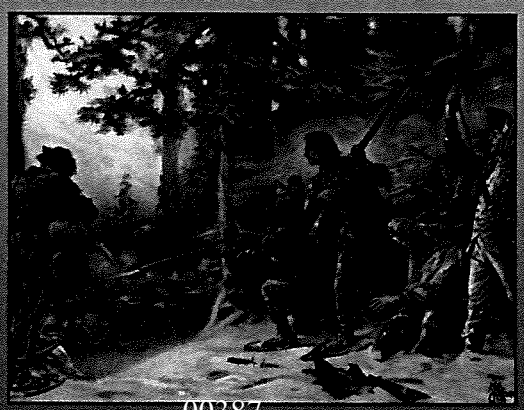
THE HISTORY OF SNIPING AND SHARPSHOOTING



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Air Rifle Sharpshooters

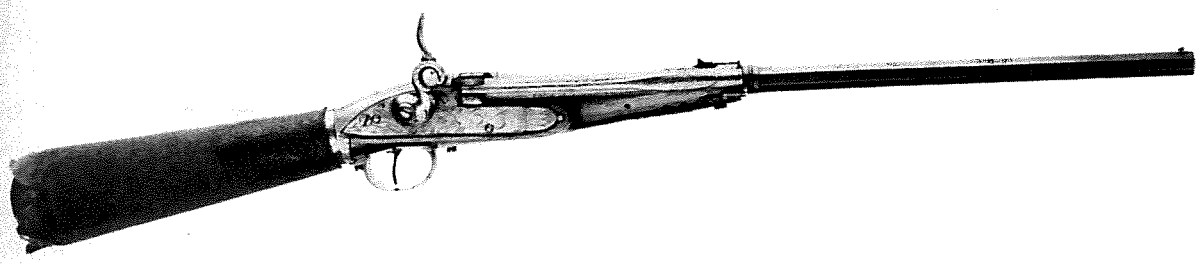
When French General Edouard-Adolphe-Casimir-Joseph Mortier paused during an 1800 battle in Austria, he was surprised to see "an orderly sergeant who was standing close to us leap up very high into the air and then fall down. We supposed, at first," he recalled, "that he was in a fit, and we were greatly astonished to find him dead, as nothing had been heard or seen to injure him. On his being undressed, however, a ball was found to have struck him, which must have been shot from an air-gun in the adjoining field. . . . [We] lost many fine men by that corps of Austrians."

"That corps of Austrians" Mortier cited were specially trained Tyrolean sharpshooters, armed with the most novel secret weapon of the 18th century, the Austrian Model 1779 *Repetierwindbuchse* (repeater wind rifle). Think of it—*smokeless, almost silent, yet lethal at 100 yards.* "On account of this treachery," reported General Mortier, his troops "hung all that corps that fell into their hands, considering them not as soldiers but assassins, and never gave them any quarter."

This amazing sharpshooter's air rifle had come to the attention of Austrian Emperor Joseph II in 1779, who had it tested by Field Marshal Franz Moritz. Convinced of the air rifle's superiority, the emperor summoned its inventor, Italian gunmaker Bartholomeo Girandoni, to Vienna to produce it under the utmost secrecy.

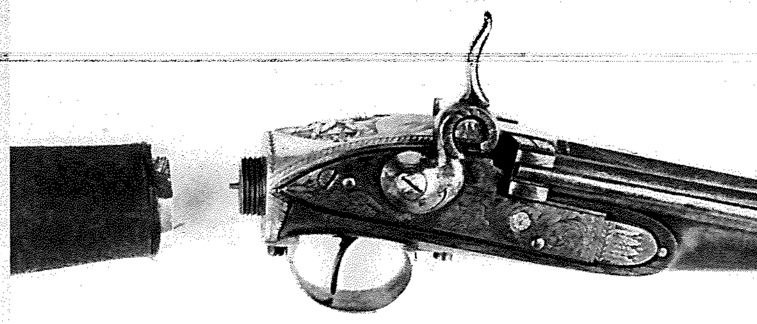
Instead of a tiny pellet, Girandoni's air rifle fired an 11.5mm ball, approximately .45 caliber, with sufficient power to penetrate a 1-inch board at 100 yards. At a time when the only repeating firearms were double-barrels, and even smoothbores fired just two to three rounds per minute, the Girandoni rifle could get off 20 shots in a half minute without reloading. Some 49 inches long and weighing nearly 10 pounds, it was similar in size and weight to a conventional musket. Its 32-inch wrought-iron barrel's rifling rotated the ball once in 26.25 inches.

The rifle's compressed air was contained in its detachable stock, actually a leather-covered metal reservoir or flask, which held air sufficient for about 30 shots. Using a small hand pump, the sharpshooter could refill his flask, with 600 pumps achieving a pressure of 60 atmospheres and projectile velocity of perhaps 500 feet per second. Considerably more pressure was yielded from a wagon-mounted compressor, capable of 150 atmospheres and generating a more lethal 900 feet per second. (At this higher pressure, however, the flasks occasionally burst, sometimes causing serious injuries.) Under ideal conditions,



The remarkable Girandoni air rifle, an Austrian sharpshooter's weapon and an arm for the Lewis and Clark Expedition. (Courtesy of the West Point Museum.)

each air rifle sharpshooter had two or three flasks, with runners bringing him reloads from the nearby wagon, which held 2,000 preloaded flasks. The sharpshooter carried reload lead balls in 20-round tubular speedloaders.



The Girandoni's leather-covered butt contained a detachable flask filled with compressed air. (Courtesy of the West Point Museum.)

A few years ago, the dean of American airguns, Dr. Robert D. Beeman, fired tests with a custom replica Girandoni air rifle and found that its 210-grain ball attained a muzzle velocity of 750 feet per second. Ballistically, this is comparable to a modern .38 Special or .45 Colt Auto pistol projectile—which is, indeed, potentially lethal at 100 yards. An 18th-century test of a similar air rifle firing 120-grain balls yielded an even faster 900 feet per second. Running this data through my Sierra Exterior Ballistics software, I found that the bullet drop at 100 yards exceeded 2 feet—meaning, as Beeman had concluded and 18th-century literature suggested, the maximum range was no more than perhaps 100 yards.

Despite its limited range, the Girandoni air rifle was originally issued only to select riflemen from Austria's fusilier regiment, but rough handling and improper maintenance caused frequent malfunctions. Thus, Emperor Joseph had his secret weapons redistributed to specially trained Tyrolean sharpshooters who better understood how to care for these rather delicate instruments.

During Austria's 1788–89 War against Turkey and a 1790 fight with Prussia, the Girandoni air rifle was used extensively and proved itself in combat, offering a high rate of fire, reasonable accuracy, and lethality, without generating gun smoke or muzzle blast. One Tyrolean sharpshooter report noted, "These weapons were really accurate and effective."

Despite these benefits, however, the air rifles could not stand up to field use, with the repeater feed breaking down and leather seals failing. In 1801, the Tyrolean sharpshooters' commander complained that of his 500 air rifles, only 101 were usable. Soon afterward, the worn-out airguns were withdrawn and replaced by conventional rifles.

A few Girandoni air rifles made their way to America, where one ended up in the hands of Captain Meriwether Lewis. He carried it westward with his Corps of Discovery in 1803–05 and fired a number of demonstrations for Indians along the way, never failing to amaze them when he pumped off 20 lethal lead balls in just 30 seconds.

Captain William Clark wrote in his *Field Notes* that the Girandoni demonstrations "astonished [the Sioux Indians] very much," while the Snake Indians were "surprised and astonished." Perhaps, as Dr. Beeman has suggested, these firepower demonstrations deterred the Indians from attacking the Lewis and Clark Expedition. Dr. Beeman today owns an authentic Girandoni air rifle tentatively identified as being the very one Captain Lewis fired those many years ago.

EXHIBIT 19

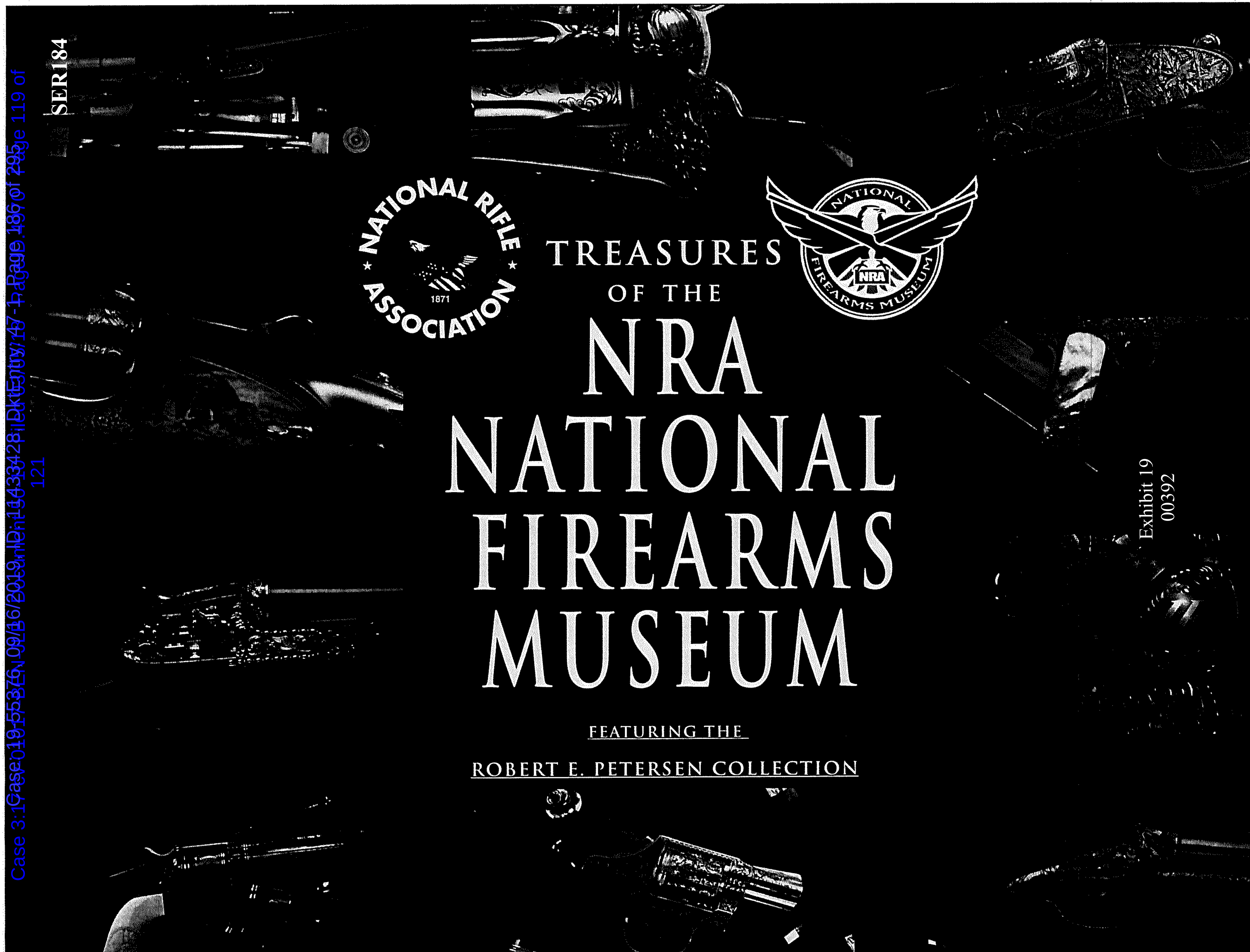


Exhibit 19
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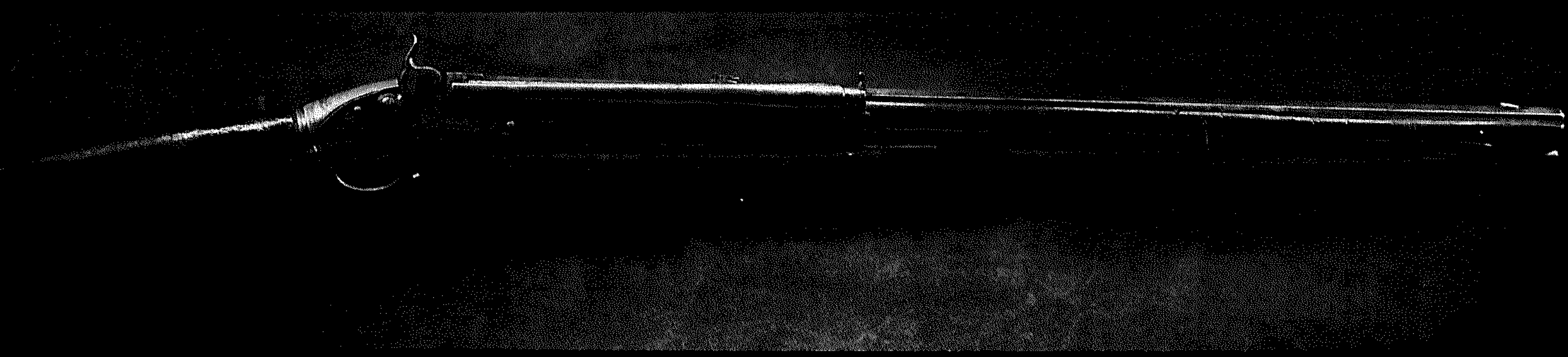

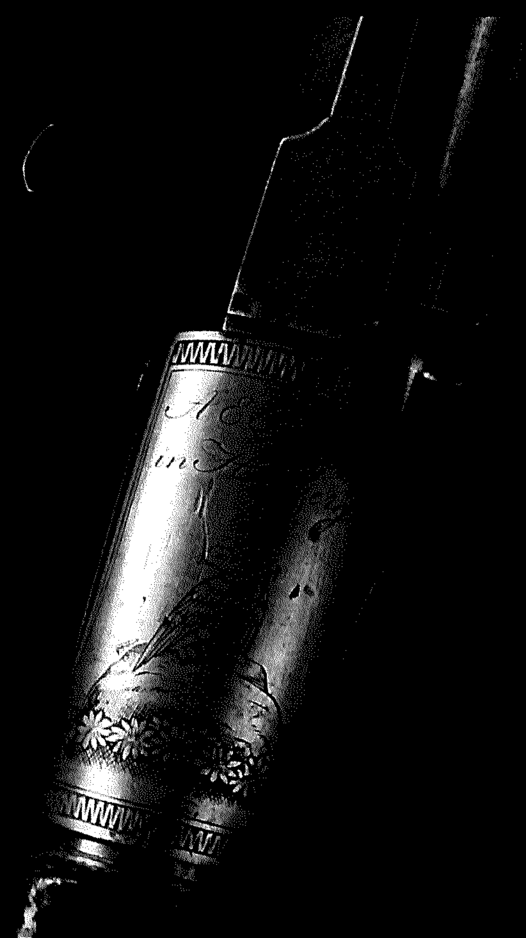

Girandoni Repeating Air Rifle, as carried by Lewis and Clark - .49 caliber - circa 1795 - 22-shot repeating air rifle, built by Bartolomeo Girandoni, who originally supplied similar air rifles to the Austrian army around 1790. As originally issued, each Girandoni air rifle had three detachable air reservoirs, each requiring about 1,500 strokes of a separate pump to completely pressurize the reservoir. Once filled to operating pressure (about 800 psi), the air rifle could fire up to 70 shots before the reservoir needed to be replaced. A hollow metal tube on the side of the barrel held up to 22 lead balls that could be fed one at a time to the firing chamber by a simple sideways push of a plunger. At a distance of 50 feet, this rifle is capable of placing 10 shots into a group the size of a quarter, and could penetrate a 1-inch wood plank or bring down an elk. *Donated by Michael Carrick*

Painting: ***Lewis and Clark on the Lower Columbia*** (28 × 24 in (71.1 × 61 cm)) by Charles Marion Russell 1905.

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IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF CALIFORNIA

VIRGINIA DUNCAN, et al.,

Plaintiffs,

v.

XAVIER BECERRA, in his official capacity as Attorney General of the State of California,

Defendant.

Case No: 17-cv-1017-BEN-JLB

EXHIBITS 20-26 TO THE DECLARATION OF ANNA M. BARVIR IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT OR, ALTERNATIVELY, PARTIAL SUMMARY JUDGMENT

Hearing Date: April 30, 2018
Hearing Time: 10:30 a.m.
Judge: Hon. Roger T. Benitez
Courtroom: 5A

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27	Pages 9-17, 19-44 of Harold F. Williamson, *Winchester: The Gun That Won the West* (1952)	00442-479
28	Pages 303-06 of Norm Flayderman, *Flayderman's Guide to Antique American Firearms and Their Values* (9th ed. 2007)	00480-486
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Exhibit	Description	Page(s)
50	Page 121 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00678-681
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52	Pages 369-74, 377-78, 380-87, 391, 395-96, 398-99, 401-07, 409-11, 413-14, 438-47, and 454 from *Gun Digest* 2017 (Jerry Lee ed., 71st ed. 2016)	00693-736, 00744-747
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Exhibit	Description	Page(s)
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66	*Gun Shop Owner Shoots, Kills Man During Attempted Robbery*, WIS TV (Aug. 9, 2012)	00950-952
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EXHIBIT 20

Girandoni air rifle

The **Girandoni air rifle** was an airgun designed by Tyrolian inventor Bartholomäus Girandoni circa 1779. The weapon was also known as the *Windbüchse* ("wind rifle" in German). One of the rifle's more famous associations is its use on the Lewis and Clark Expedition to explore and map the western part of North America in the early 1800s.

Contents

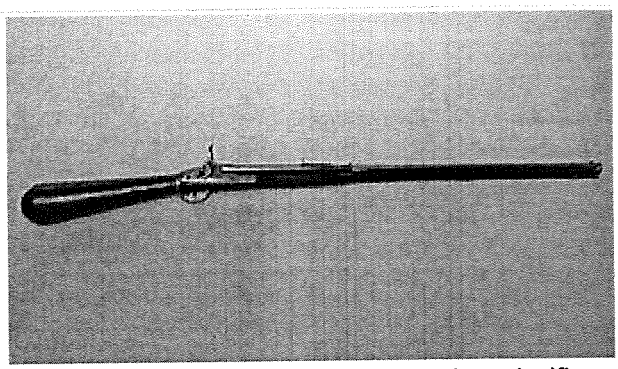
History and use

The Girandoni air rifle was in service with the Austrian army from 1780 to around 1815. The advantages of a high rate of fire, no smoke from propellants, and low muzzle report granted it acceptance. It did have problems and was eventually removed from service for several reasons decades after introduction. While the detachable air reservoir was capable of around 30 shots it took nearly 1,500 strokes of a hand pump to fill those reservoirs. Later, a wagon-mounted pump was provided. The reservoirs, made from hammered sheet iron held together with rivets and sealed by brazing, proved very difficult to manufacture using the techniques of the period and were always in short supply.

In addition, the weapon was very delicate and a small break in the reservoir could make it inoperable. Finally, it was very different from any other weapon of the time and any soldier using it needed to be highly trained.

The Lewis and Clark Expedition used the rifle in the demonstrations that they performed for nearly every Native American tribe they encountered on the expedition.[1][2]

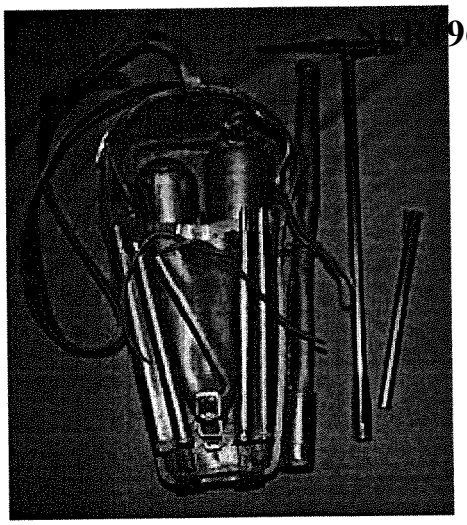
Girandoni air rifle



Girandoni system Austrian repeating air rifle, circa 1795, believed to have been taken on the Lewis and Clark Expedition

Type	Air rifle
Place of origin	Holy Roman Empire
Service history	
In service	1780–1815
Used by	Austrian Empire United States (Lewis and Clark)
Production history	
Designer	Bartholomäus Girandoni
Designed	1779 or 1780
Specifications	
Weight	4.5 kg (9.9 lb)
Length	120 cm (3.9 ft)
Cartridge	spherical balls
Caliber	.46, 210 grains (13.6 g)
Muzzle velocity	about 500 fps (152 m/s), 117 ft lbs (159 J)
Feed system	20/21 round vertical hopper
Sights	Iron

Design and capabilities



Recreation of an Austrian Girardoni system Accoutrements Bag, including spare air flasks, air pump, wrenches, bullet mold and ladle

The rifle was 4 ft (1.2 m) long and weighed 10 lb (4.5 kg), about the same basic size and weight as other muskets of the time. It fired a .46 caliber ball[3] (caliber is contested, original sources such as Dolleczek[4] describe the caliber as 13mm (.51cal)) and it had a tubular, gravity-fed magazine with a capacity of 20 balls. This gravity operated design was such that the rifle had to be pointed upwards in order to drop each ball into the breech block. Unlike its contemporary, muzzle-loading muskets, which required the rifleman to stand up to reload with powder and ball, the shooter could reload a ball from the magazine by holding the rifle vertically while lying on his back and operating the ball delivery mechanism. The rifleman then could roll back into position to fire, allowing the rifleman to keep a "low profile". Contemporary regulations of 1788 required that each rifleman, in addition to the rifle itself, be equipped with three compressed air reservoirs (two spare and one attached to the rifle), cleaning stick, hand pump, lead ladle, and 100 lead balls, 1 in the chamber, 19 in the magazine built into the rifle and the remaining 80 in four tin tubes. Equipment not carried attached to the rifle was held in a special leather knapsack. It was also necessary to keep the leather gaskets of the reservoir moist in order to maintain a good seal and prevent leakage.[5]

The air reservoir was in the club-shaped butt. With a full air reservoir, the Girandoni air rifle had the capacity to shoot 30 shots at useful pressure. These balls were effective to approximately 125 yd (114 m) on a full air reservoir. The power declined as the air reservoir was emptied.[6]

Importance

The Girandoni air rifle was an important first. It was the first repeating rifle of any kind to see military service. It was one of the first uses of a tubular magazine.

See also

- Weapons of the Austro-Hungarian Empire

Footnotes

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4. Die Entwicklung der Handfeuerwaffen im österreichischen Heere, 1896, Anton Dolleczek
5. A letter detailing regulations, "Signed, Vienna, 24th January 1788"; reproduced in Baker, G; Currie, C. *The Austrian Army Repeating Air Rifle* 2nd Ed., 2007.

6. Military writer August Haller claimed in an 1891 treatise *Die österreichische Militär-Repetier-Windbüchse* that the first ten shots would be effective to about 150 paces, the next ten shots up to 120-125 paces, the next ten out to 100 paces, and then the remaining air pressure in the reservoir would be too low. **SER197**

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- Die Windbüchse (http://www.braunschweiger-feldkorps.de/windbuechse.htm)
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EXHIBIT 21

SER199

The Leading Reference for Antique American Arms

FLAYDERMAN'S GUIDE TO ANTIQUE AMERICAN FIREARMS

...and their values

Norm Flayderman

• 4,000 Individually Priced Firearms • 1,800 Photos for Quick Reference • Coverage From Early 1700s to Early 1900s

ABOUT THE COVER

SER200

Representing the newer end of the contents spectrum, the Colt Model 1911 pistol has become a sought-after collectible, and continues in use by military units, law enforcement personnel and private citizens.

The Model 1911 autoloading 45-caliber pistol was adopted in 1911, and Colt's first deliveries were made to Springfield Armory in early January 1912. Subsequently the Model 1911, with numerous modifications, has compiled an enviable service record with total production (to 1970) of over three million units, with most going to military contracts.

Author Norm Flayderman acquired the illustrated M-1911, frames and drawing from the Winchester Gun Museum in the mid-1970s when the museum contents were moved to the Buffalo Bill Museum in Cody, Wyoming. The Flayderman letter documenting the details of the acquisitions appears in the background, as does a letter from the Winchester Gun Museum, and is the sort of provenance that collectors value greatly. *(Courtesy Little John's Auction Service)*

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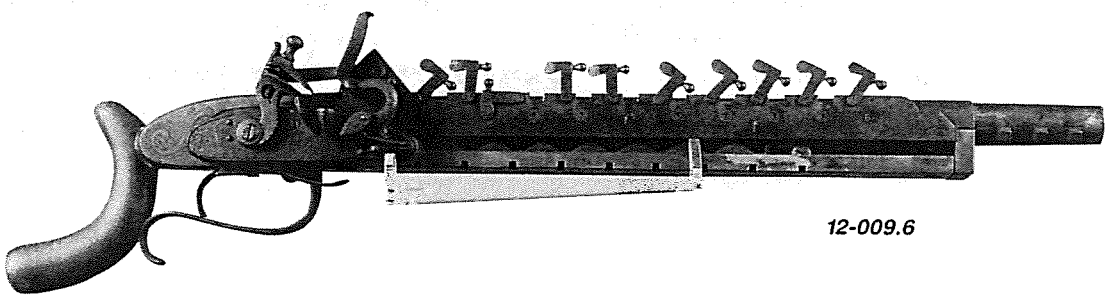
Designed by Patsy Howell and Donna Mummery
Edited by Ken Ramage

Printed in the United States of America

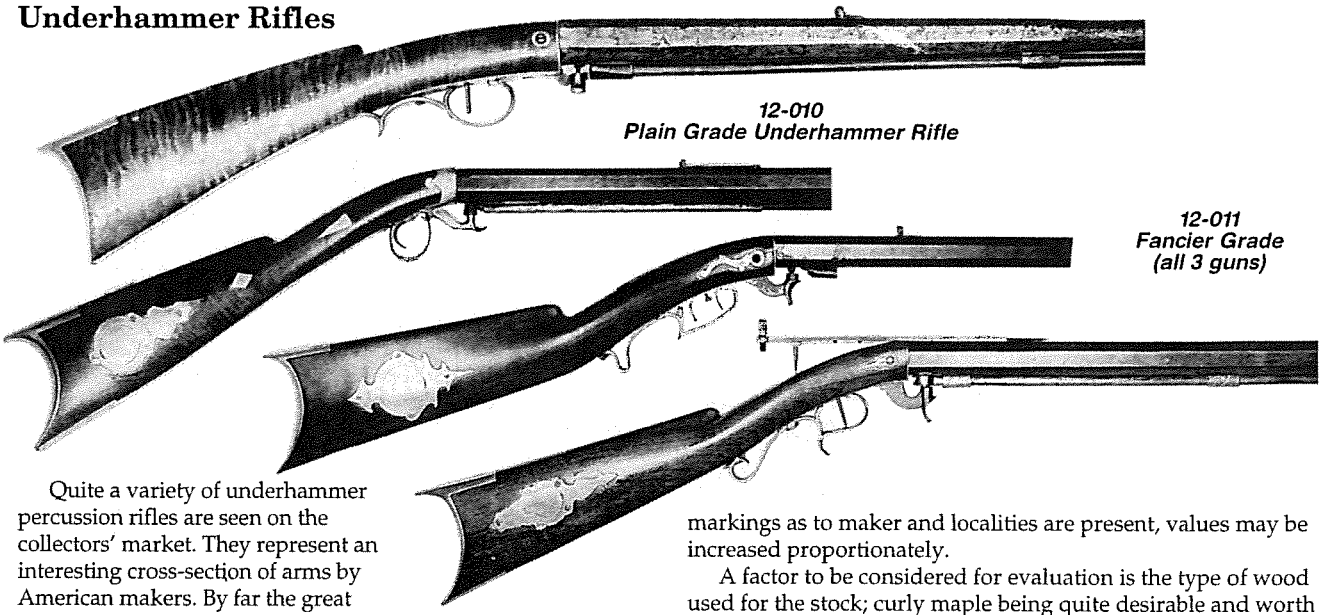
Jennings All-Metal, Muzzleloading Multi-Shot Flintlock Rifle



12-009.6

Isaiah Jennings All-Metal Muzzleloading Flintlock Repeating Rifle. Invented and patented by Isaiah Jennings of New York City, 1821. Quantity unknown; extremely rare. Illustrated here is a twelve-shot specimen; a three-shot variant similar in appearance is illustrated and described in C.W. Sawyer's *Our Rifles, 1800-1920*. All brass construction, skeleton-type shoulder stock (identical to above) that is easily removable; the 21-inch octagon barrel is also quickly removable by merely loosening the thumbscrew at the breech and twisting. Lock marked I.JENNINGS. The multi-shot rifle illustrated takes twelve individual, superposed loads of powder and ball, one on top of the other, and is fitted with twelve individual touchholes, each with a swivel cover which also act to position and align the lock as it slides from its forward position towards the rear to align the shots in reverse order. 21-inch octagon brass barrel; rifled 44 caliber bore. (See also Ellis-Jennings Repeating Flintlock Military Rifles 9B-009/010 purchased under contract by U.S. Government, 1829.) Value for these rarities indeterminate; estimates in mid- to high five-figure range would not be inordinate.
12-009.6

Underhammer Rifles



12-010
Plain Grade Underhammer Rifle

12-011
Fancier Grade
(all 3 guns)

Quite a variety of underhammer percussion rifles are seen on the collectors' market. They represent an interesting cross-section of arms by American makers. By far the great majority of underhammers were made in New England, although certainly all Eastern states are well represented as is California; these latter worth a premium. Underhammers are found in a wider range of sizes than almost any other American rifle. Quite a few are seen in lightweight "boys" or "buggy" sizes with correspondingly smaller proportions and dimensions while others increase to massive 20-pound and 25-pound bench rest match target rifles made by some of the era's most noted riflesmiths, e.g., Billinghurst and Brockway. Specimens illustrated here are the most typical of those encountered. Underhammers run the gamut in quality from primitive, awkward, unmarked specimens to those displaying the very highest quality of workmanship and possessing pleasing, artistic qualities.

As the underhammer mechanism was more simply fashioned than the full side lock type, their manufacture was obviously attempted by not a few unskilled craftsmen and gunsmiths—or more likely, blacksmiths! Thus, quite a few primitive appearing specimens are to be seen. If identifiable markings as to maker and localities are present, values may be increased proportionately.

A factor to be considered for evaluation is the type of wood used for the stock; curly maple being quite desirable and worth a premium and is in equally stronger demand.

Undoubtedly one of the most prolific makers was Nicanor Kendall of Windsor, Vermont. Judging by the specimens seen over the years, he turned out a notable number of underhammers in varying degrees of quality circa 1830s to 1840s. Another well-known maker of this type was David H. Hilliard of Cornish, New Hampshire. The reader is referred to Chapter VII, American Percussion Pistols (Section E) for further information about the principle and use of the underhammer, and to the classic work on the subject, *Underhammer Guns*, by Herschel C. Logan.

The specimens illustrated here are all of the off-hand size and weight. Heavy bench rest match type underhammer rifles are classed and evaluated in the "Bench Rest Rifles" section of this chapter.

Plain grade underhammer rifle usually brass mounted; made without patchbox, plain walnut or maple stock (curly maple worth 10 percent to 20 percent premium on this type):
12-010 Values—Good **$300-600** Fine **$500-900**

EXHIBIT 22

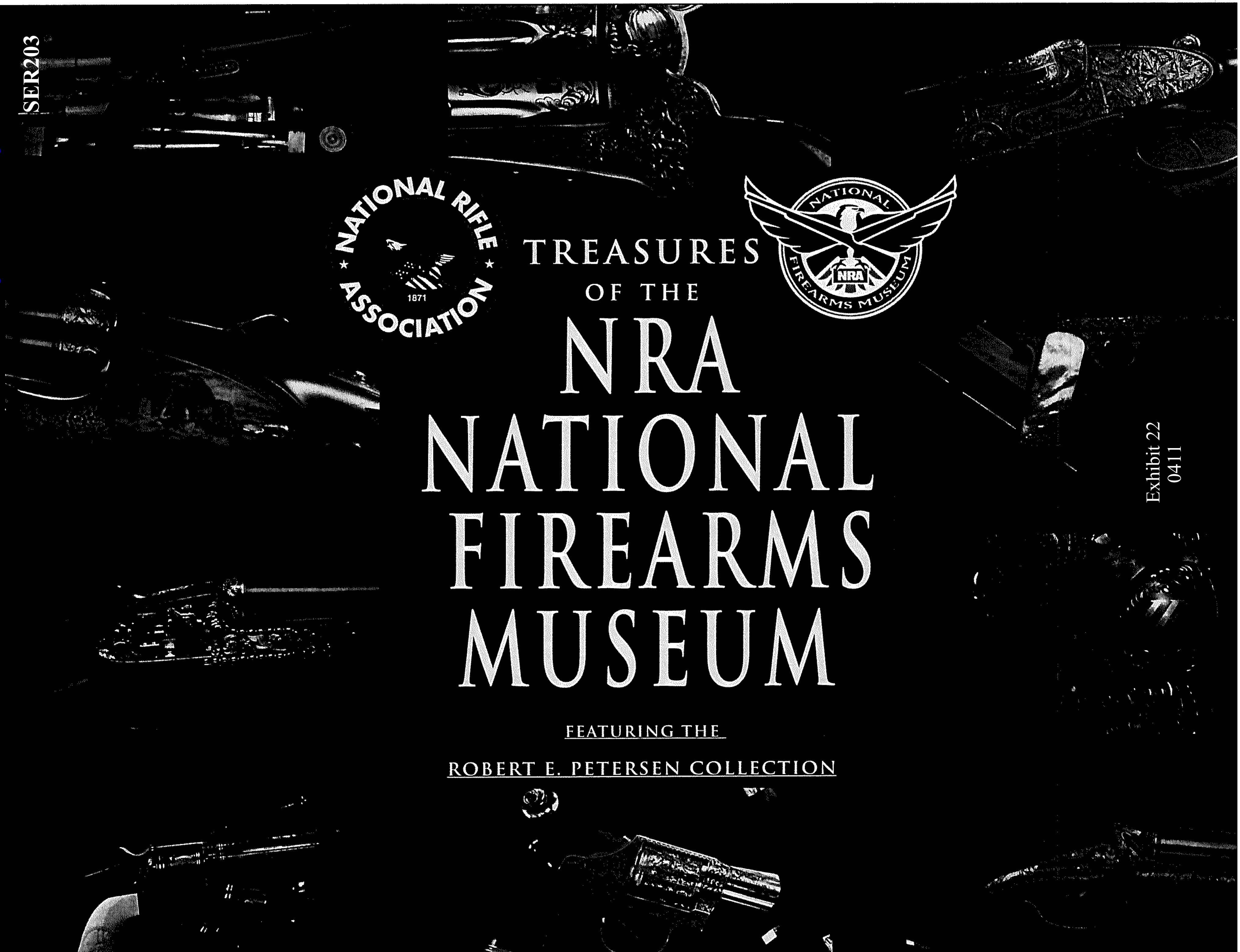


Exhibit 22
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SER205

Four barrel flintlock pistol – This European pistol, ca. 1810-30, took 9mm lead balls. After the first two barrels were fired, the barrel cluster could swivel to bring two more shots into battery. *Petersen Gallery*

Delexhe Apache Knuckleduster – This triple threat weapon combined a 7mm pinfire revolver and a folding blade with a grip that served as brass knuckles. Made in Europe in the late 19th century, it is named after the Parisian Apache street gangs of that era rather than the American tribe. This one varies from usual configuration with longer fixed knucks rather than folding, and in the position of the bayonet. *Petersen Gallery*

Jarre harmonica pistol – A European alternative to the revolver, this ten-shot 9mm percussion handgun, ca. 1860-70, advanced a fresh shot under the hammer by sliding the charge bar. *Petersen Gallery*

Mariette 18 shot pepperbox – The pepperbox repeater was a contemporary of the Colt revolver, and its major competitor in the 1840s and 1850s. Made in both America and Europe, most pepperboxes held four to six shots in a cluster of rotating barrels that advanced to a fresh charge with each pull of the trigger. This is a rare high capacity 18 shot .32 caliber model. *Petersen Gallery*

Exhibit 22

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EXHIBIT 23

AMERICAN BRITISH & CONTINENTAL

PEPPERBOX FIREARMS

JACK DUNLAP

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CHAPTER 3
The Darling Pepperbox

THE brothers Barton and Benjamin M. Darling were granted a patent for the first American pepperbox, and the Darling patent was dated April 13, 1836. Mr. Benjamin Darling maintained until his death that he invented the first American revolver. (The word "Pepperbox" was not in vogue at the time of his invention.) The Darling patent claimed the rotation of the cylinder by cocking the hammer, but the Colt patent—dated February 25, 1836, some seven weeks earlier—also claimed this mechanical feature. Conflict with the Colt patent may have been the determining factor in causing the Darling brothers to cease manufacturing their Patent Rotary Pistol.

The great fire at the Patent Office in December 1836 destroyed nearly all records. There is almost no information existing either about the contents of early patents or about the routine of filing and recording applications and caveats. Obvious discrepancies are not susceptible to explanation. As an instance, it has not been possible to ascertain why Re-issue #124 obtained by Samuel Colt on September 24, 1848, reads: "Specification forming part of Letters Patent No. 138, dated February 25, 1836." That the original Colt patent is frequently referred to by collectors as Patent #138 brought the response that no Colt patent bears the number 138 and that patent #138 was granted to B. S. Gillespie and covered a machine for breaking ice. The Patent Office states that the 138 considered by collectors as the number of the original Colt patent "may refer to the annual number which might have been used at that time." For a few years patents were numbered throughout the year, with the No. 1 repeated at the beginning of each year. The present system of numbering dates from July 4, 1836. Whether the annual numbers which antedated the present series were based on the British system of patent application numbers and were given at the time the applications were filed or whether the numbers were assigned when the patents were granted is not known.

The history of the operations of the Darling brothers is obscure, but it is known that not many of their patented pepperboxes were made. The Darlings were established gunsmiths in Bellingham, Massachusetts, when their invention was patented. Their first pepperbox was undoubtedly made there. A few more — perhaps twenty-five — were reported made in Shrewsbury, Massachusetts. Then the Darlings settled in Woonsocket, Rhode Island, and for a short time continued to manufacture the pepperboxes they had patented. Of the original iron frame Darling pepperbox, probably less than a dozen survive including those marked with the name of a dealer.

The first model Darling pepperbox is marked "B. & B. M. Darling" with a number following the word "patent." The gun pictured in Figure 1 bears the number "113" and is the highest number encountered, assuming that these are serial numbers—and most collectors agree on this assumption—the indication is that slightly more than 100 pieces were made. There is a possibility, however, that guns other than their patented pepperbox were included in this series of

CHAPTER 11
Pepperboxes of Continental Europe

THE PEPPERBOXES of Continental Europe range from very ordinary to very elaborate and beautifully made pieces. Some were cheaply made to be sold at a low price. Others, especially those made by the top makers of France and Belgium, were works of art that sold at high prices. These sometimes have gold inlaid frames and barrels and may even have gold inlaid screw heads. Belgium has produced many of the poorest and cheapest guns ever made, but Belgium has also produced some of the finest weapons — including pepperboxes — ever manufactured.

Of all the Continental pepperboxes those marked "Mariette Brevete" are probably the most common. These were forerunners of the ring-trigger under-hammer pepperboxes to which J. R. Cooper of England claimed patent rights and produced in equal profusion.

Judging from the numbers that have survived, the pepperbox marked "Mariette Brevete" were obviously produced in great quantity. In fact, they were produced in such quantity that the maker should have attained fame in their making. Yet there is very little known about Mariette and his activities as a gunsmith. The definition of the French word "Brevete" in its noun form is: Patentee or patent; the verb form is: to patent or to license. A likely theory is, therefore, that Mariette licensed many makers to produce his patented pepperbox. That Mariette was not a gunsmith but merely the patentee is also a plausable answer.

The many forms in which the Mariette pepperbox is found leads to the conclusion that various makers participated in their production.

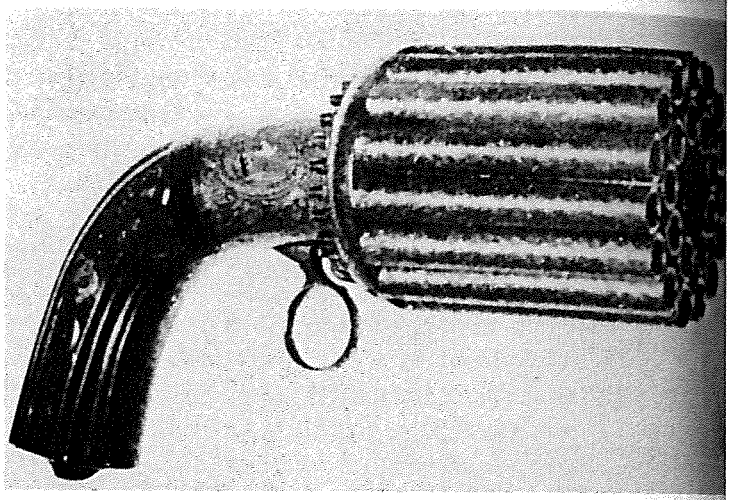


FIG. 1 – (Paul Mitchell Collection.)

These various shapes and forms, although basically similar, tend to make up a very colorful collection. Like the British bar hammer pepperbox, the exceptionally large and the very small size are the least common. The six-shot, ranging in overall length of from 7 to 8 inches, is the type most frequently encountered. The 4-shot, although not as common as the 6-shot, appears much more often than does the 5 or the 8-shot. A Mariette pepperbox with a barrel group in excess of eight is extremely scarce.

The 24-shot Mariette pictured in Figure 1 is from the material gathered by Mr. Winant before his death. The only information available is that it was, at the time the photo was taken, in the Paul Mitchell collection.

The barrels of the 18-shot pepperbox pictured in Figure 2 are arranged in a circle, the vents leading straight to the outer barrels and curving to the inner barrels. Successive trigger pulls

will fire two outer barrels and then one inner barrel.

The three Mariettes pictured in Figure 3 are of exceptionally fine quality. The bottom gun is of an unusual size for a Mariette. Top gun is 7⅞ inches overall, 2⅞ inch barrels, 8-shot .31 caliber. The middle gun is a piece of outstanding quality; 7 inches overall, 2½ inch barrels, 4-shot of .36 caliber. Bottom gun: 5 inches overall, 2⅜ inch barrels, 4-shot .22 caliber.

FIG. 2 – (Frank Horner Collection)

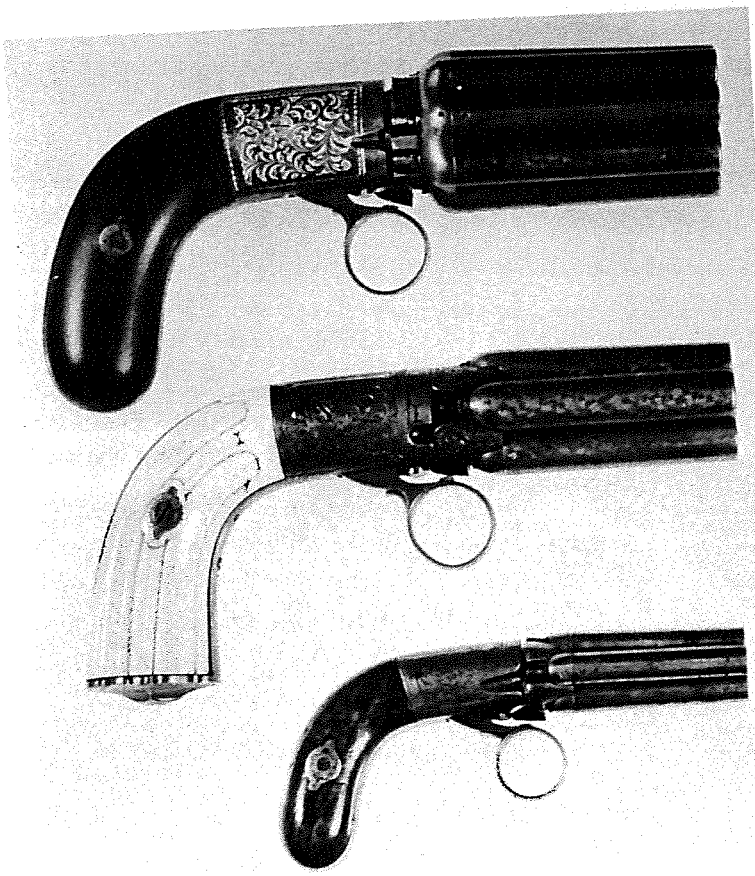


FIG. 3 – (Harry Mann Collection.)

The pepperbox pictured in Figure 4 has a Mariette type mechanism, but is unlike a Mariette in that the barrel group is bored and milled from a single piece of metal. In addition, it has a simple, but very effective method of feeding caps to the nipples. A tube, removable for reloading, is mounted at the inside of the butt plate and runs up through the inside of the side plate and connects with an opening in the breech block. A spring controlled lever, mounted on the left side of the breech-block and manually operated, opens and closes this opening to allow caps to be fed to the nipples. With the exception of Belgian proof marks, this piece is unmarked. 6¾ inches overall, 3 inch barrel group, 6-shot of about .28 caliber.

The pepperbox pictured in Figure 5 is of the ring-trigger under-hammer type but is not marked Mariette Brevete. Marked "EONTAINE & LORON BTES. i VERSAILLES" on top of the frame, and "LORON" on two of the nipple partitions. This piece was probably produced before the filing of the Mariette patent, for Loron is known to have operated prior to 1836, the usually accepted date of the Mariette patent. The grips are of ebony carved in high relief. The

FIG. 4 – Mariette with capping device. (Frank Horner Collection)

a one-sixth turn of the cylinder, the opposite button rises and the pin indexes the barrel group at the proper position for firing. After the barrel group has completed a full rotation, it must be turned in the opposite direction for the next six shots. The overall length is 7⅞ inches with a 3¾ inch barrel group of about .40 caliber.

Figure 63 shows a double-action German Reform Pistol chambered for the .25 ACP cartridge. The four barrels are in a vertical block. After the top barrel is fired, another pull on the trigger lifts the block and fires the cartridge in the second barrel. As the second barrel is fired, gas escapes from it through a small hole in the first barrel and ejects the shell from that barrel. The empty case from barrel two is ejected when barrel three is fired, and barrel three is cleared when the lowest barrel is fired. It is necessary to remove the case from the lowest barrel with a rod when the barrel block is removed for reloading. There is a safety lock on the left of the frame. The Reform is extremely thin and flat and has been a popular weapon on the Continent to carry in evening clothes.

RECEIVED TOO LATE TO INCLUDE IN TEXT.

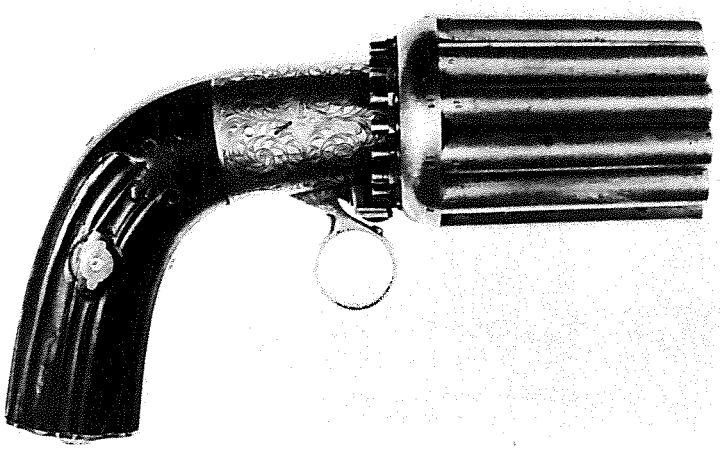


FIG.64 – Marked "Herman Brevete" on top tang. 18-shot, 12 barrels in outer circle–6 in inner circle. Successive trigger pulls fire two outer barrels and one inner barrel. 9⅜ inches overall, .31 caliber weight approximately 4 pounds.
(Dr. J. Otto Lottes Collection.)

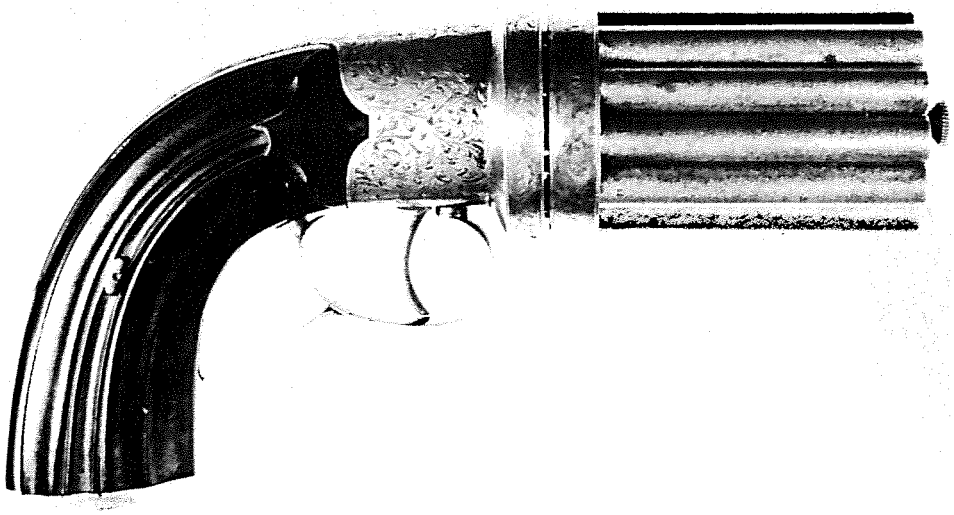
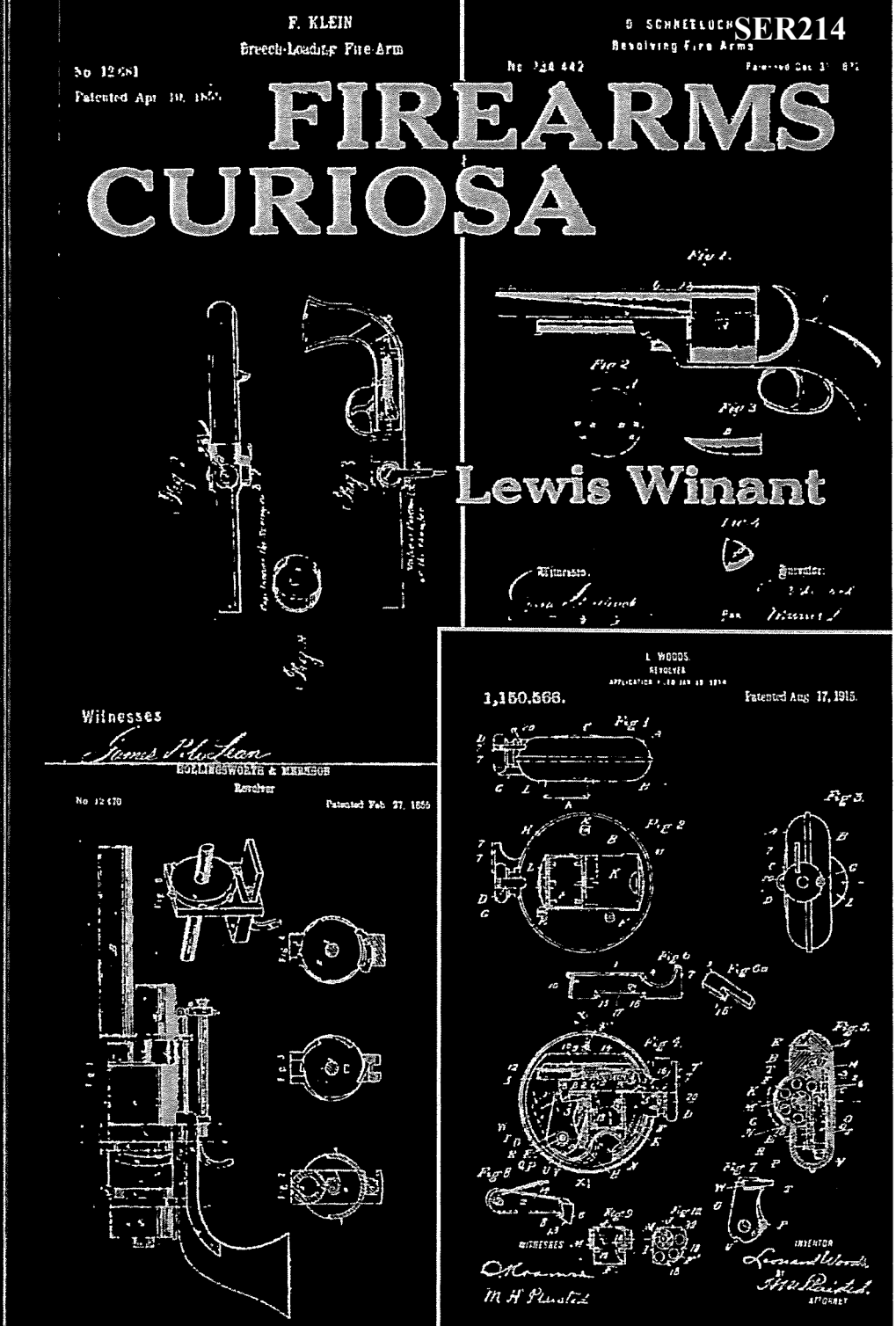


FIG.65 – Another 18-shot Mariette but considerably smaller than Figure 64. 7¾ inches overall. 3¼ inch barrels of .31 caliber. (Dr. J. Otto Lottes Collection.)

EXHIBIT 24

SER214

FIREARMS CURIOSA



SER215

Firearms Curiosa
by
Lewis Winant

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Published several times since

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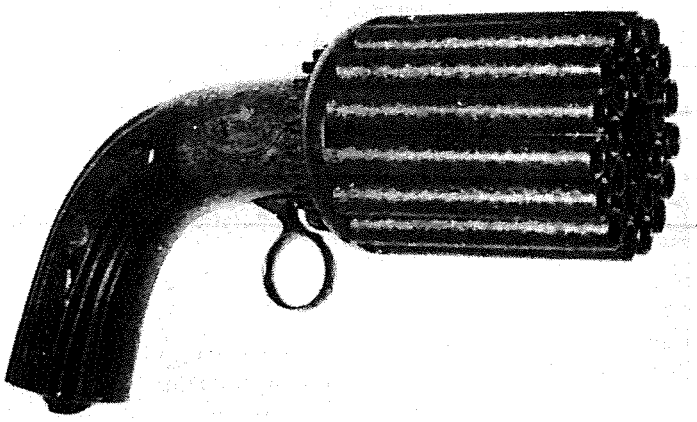
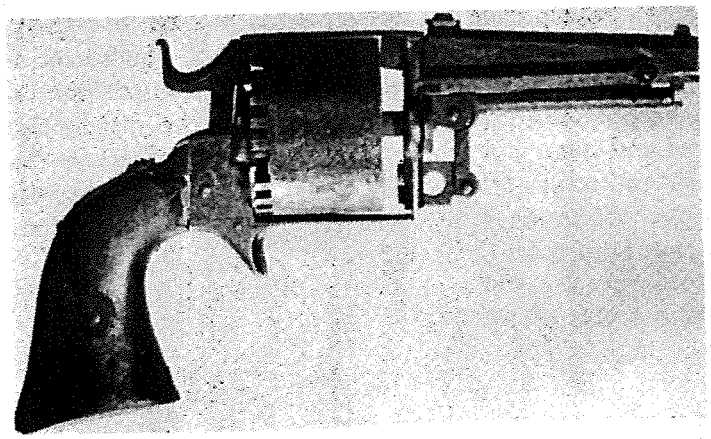
we find one with eight barrels, but rarely with more than eight. One with twenty-four barrels is a curiosity. Of the few in existence, a fine example is shown in figure 288. This is a European ring trigger percussion cap Mariette with the barrels in two concentric rows, fifteen in the outer row and nine in the inner.

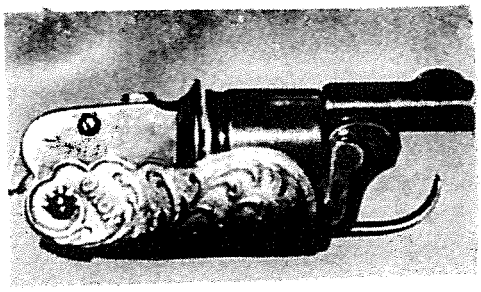
An American revolver with twenty-four chambers is shown in illustration 289. This piece was formerly in the Philo Remington collection and was designed by Fordyce Beals. I do not know of the existence of another example of this gun, or in fact of any other 24-shot American revolver. Revolvers having two barrels and with from fourteen to twenty chambers were described in an earlier chapter. This gun has twelve chambers in each of two rows, but it has only one barrel. The barrel, shown in position to guide bullets from the outer row, is pivoted near the muzzle and has a rotating lock at the breech end. The barrel may be depressed against spring pressure and locked in position to direct bullets from the inner row of chambers. The nipples are staggered and there is a rotating lock back of the hammer that may be set to limit the motion of the hand so the hammer will strike nipples in the inner row. The rammer has a double head that reaches both rows of chambers.

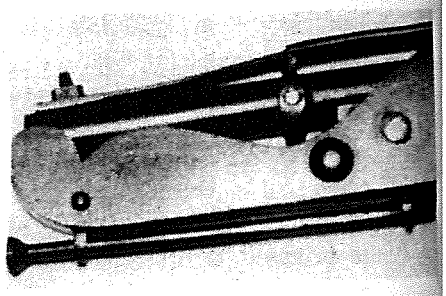
In illustration 290 is shown an all-metal folding revolver and in illustration 291 an all-metal folding pistol. Both guns are small and designed to be carried inconspicuously. The 5-shot revolver is Belgian and marked NOVO. It is double-action, hammerless and fires small low power cartridges. The thin curved metal grip may be put in the folded position shown when a stud is pressed. The folding pistol, figure 291, fires a single small caliber pin-fire cartridge and has several unusual features. It may be loaded by drawing back a pivoted breech section of the barrel when the gun is folded. After pulling up on the barrel muzzle until the barrel locks at a right angle to the frame, the gun may be cocked by pulling up the rear end of a heavy spring. This spring, which is screwed tight to the muzzle end of the barrel, acts as the striker to drive in the detonating pin of the cartridge. When the spring hammer is cocked, the gun may be fired by pressing a folding trigger which is attached to the barrel. The gun may be unlocked for folding when a button on the side of the frame is pressed. An ejecting rod is carried under the frame.

Perhaps as a result of the fact that some early American per-









288. 24-shot pepperbox/ Paul Mitchell collection.
289. 24-shot revolver/ Henry M. Stewart collection.
290. Novo revolver/ Eddie Reider collection.
291. Folding pistol/ Dr. W. R. Funderburg collection.

EXHIBIT 25

Catalogue of Contents

Doe Run Lead Company's

MUSEUM

DOE RUN, MISSOURI

JULY 1, 1912

Articles	Price	
3 Confederate carbines and cavalry guns		
14 Unoin carbines, Cavalry guns		
4 Union muskets, Spriagfield, etc		
3 Old style, 1st. breechloading, etc		
1 Short, made over, Geurilla Bushwhackers rifle, found near Gen. Lyons battlefield		
1 Old musket, flint lock, "Harpers Ferry"		
2 Old muskets, flint lock, "Harpers Frrry"		
1 Old Indian flint lock rifle		
1 Old rifle		
1 Old rifle and shot barrel combined		
18 Old swords and sabers, scabbards, bayonets, etc., from Union aud Confederate soldiers quarters		
1 Bayonet, flat trowel shape		
3 U. S. belts and cartridge boxes, etc		
1 Muzzle load, flint lock pistol		
2 Muzzle load, flint lock pistols, large		
1 Muzzle load, single barrel, cap and ball		
1 Muzzle load, double borrel, cap and ball		
1 Muzzle load, single, dueling pistol		
1 Muzzle load, double barrel, changeable		
1 Revolver, 5 shot, small		
1 Revolver, 5 shot, large		
3 Revolvers, 5 shot, Army size		
1 Revolver, 6 shot, French style		
1 Revolver, 6 shot, Phillipines		
1 Large muzzle loader Horse pistol		
5 Large Navy revolvers, 38-44		
1 Large revolver, 6 shot, Starr		
1 Large revolver, 6 shot, Rogers Spencer		
1 Large old muzzle loader, flnt lock, said to have belonged to President Wm. McKinley's father, initials cut F. McK		
1 Very large revolver, found on "Ousters" Battle field		
1 Revolver, Pepper Box, 4 barrel		
1 Revolver, Pepper Box, 6 barrel		
1 Revolver, Pepper Box, 6 barrel		
1 Revolver Pepper Box, 12 barrel		
1 Colts small revolver in box G. W. C		
1 Very old Spanish piece, brass barrel, pistol and knife combined		
1 Flint lock pistol, very fine finish, single and safety slide		
1 Double barrel pistol, patent safety slide		
1 Single barrel pistol, hammer and trigger underneath		
1 Small brass sash pistol, burglar proof, J. P. Wilson patent 1859		
1 Gun. Cut off and made to pistol		
1 Old Rifle stock, was found at Hildebrand's Cave and given me by Willis Perryman, 1878		
1 Very heavy rifle "Sharp" and said to have been used by Life Saving Crew, and can shoot a rod carrying line about two miles out to sea		
1 Large Shrapnel projectile for a Cannon 8 inch bore, it is now filled with nine cannon balls of 3 inches in diameter		
1 Large shell, exploded		
1 Large shell, unloaded, whole		
1 Large conical shell, unexploded, found Battle Pilot Knob		
1 Cannon Ball, from J. Shelby Co		
1 Large cannon ball		
1 Small cannon ball		
1 Time set explosive shell, round		
1 Time set explosive shell, round		
2 Time set explosive shells, oblong shape		
1 Time set explosive shell, upright		
1 Piece shell found Fort Sumpter, 1863		

Exhibit 25
00428

EXHIBIT 26

SER222

The Leading Reference for Antique American Arms

FLAYDERMAN'S GUIDE TO ANTIQUE AMERICAN FIREARMS

... and their values

Norm Flayderman

• 4,000 Individually Priced Firearms • 1,800 Photos for Quick Reference • Coverage From Early 1700s to Early 1900s

ABOUT THE COVER

Representing the newer end of the contents spectrum, the Colt Model 1911 pistol has become a sought-after collectible, and continues in use by military units, law enforcement personnel and private citizens.

The Model 1911 autoloading 45-caliber pistol was adopted in 1911, and Colt's first deliveries were made to Springfield Armory in early January 1912. Subsequently the Model 1911, with numerous modifications, has compiled an enviable service record with total production (to 1970) of over three million units, with most going to military contracts.

Author Norm Flayderman acquired the illustrated M-1911, frames and drawing from the Winchester Gun Museum in the mid-1970s when the museum contents were moved to the Buffalo Bill Museum in Cody, Wyoming. The Flayderman letter documenting the details of the acquisitions appears in the background, as does a letter from the Winchester Gun Museum, and is the sort of provenance that collectors value greatly. *(Courtesy Little John's Auction Service)*

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Designed by Patsy Howell and Donna Mummery
Edited by Ken Ramage

Printed in the United States of America

configurations of the guns on which they appear are correspondingly altered.

The field of revolving rifle collecting is noticeably less condition-conscious than most other American arms specialties. The usually low production figures of various makers and their relative scarcity on the collectors' market, combined with a certain erudition on the part of collectors who fancy these types, has placed emphasis (and consequently values) on their rarity factor with condition decidedly taking a back seat. Many of these types may be considered in great demand and eagerly sought after in almost any degree of condition. The foregoing, however, should certainly be modified and tempered by the fact that condition still plays a role in determining value.

BIBLIOGRAPHY

(Note: There is a decided lack of published definitive information about American revolving rifles. Some material about them may be found in several books having general coverage of American firearms and appearing in complete bibliographic listings elsewhere in this book. Most notable and valuable for the collector is *American Percussion Revolvers* by Frank Sellers and Samuel Smith. Others are *The Collecting Of Guns* edited by James E. Serven, *Spencer Repeating Firearms* by R. Marcot (best details on Ropers) and the numerous works covering Colt Firearms [the revolving rifles of this maker only have been adequately and completely covered].)

James, Edsall. *The Revolver Rifles*. Nashville, Tenn. Pioneer Press, 1974. Short monograph well illustrated on general history of revolving rifles.

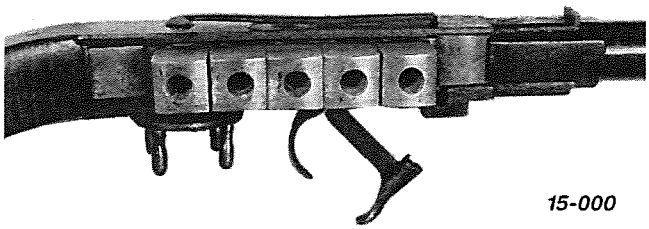
(Author unknown.) *The J. C. Lowe Collection Of Cylinder Guns.* Issue No. 35 (February, 1951) *The Gun Collector* Magazine, Published Whitewater, Wisconsin. For many years a major source of reference on revolving longarms of all types. The entire issue devoted to a study of those in the collection of J. Churchill Lowe of St. Louis.

(*) Preceding a title indicates the book is currently in print.

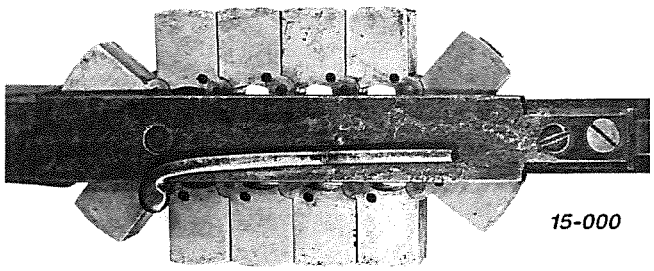
Allen & Wheelock Revolving Lip Fire and Percussion Rifles and Carbines

See E. Allen Arms, Chapter V-A.

Bennett & Haviland Many Chambered Revolving Rifle



15-000



15-000

Epenetus A. Bennett and Frederick P. Haviland, Waterville, Maine, Many Chambered Revolving Rifle. Made c. 1838-40. U.S. Patent No. 603, Feb. 15, 1838. Quantity unknown; likely less than ten.

Twelve-shot. 40 caliber. 29" octagon barrel (dimensions, caliber likely will vary on all specimens).

Rectangular brass chambers horizontally mounted in linked belt fashion. Manually revolved by rotating disc at rear of chambers. Locking latch for chambers on topstrap. Marking of well-known gunsmith N. KENDALL, WINDSOR, VT. observed on barrel of one specimen with BENNETT'S PATENT on frame. Markings likely will vary on each. Very rare. Unique system:

15-000 Values—Good **$9,500** Fine **$20,000**

Billinghurst Revolving Pill Lock Rifles

See J. & J. Miller

Cochran Underhammer Revolving Turret Rifle

John W. Cochran, New York City, Underhammer Revolving Turret Rifle. Made by C. B. Allen, Springfield, Massachusetts c. mid-late 1830s. Total quantity estimated at slightly over 200.

36 and 40 caliber horizontally mounted turret or radial cylinder. First and Second Types nine-shot; Third Type seven-shot. Manually revolved. Single action; underhammer. Octagon barrels of varying length; 31" to 32" average.

Finish: Frames and turrets casehardened; barrels blued or browned. Walnut stock.

Topstrap over turret marked on forward section: COCHRAN/MANY/CHAMBERD/ & /NON RECOIL/RIFLE Marked on rear of topstrap: C. B. ALLEN/SPRINGFIELD/MASS, and often, but not always, accompanied by an eagle motif.

Serial numbered from 1 to slightly over 200. Key to understanding variations of these arms as well as spotting occasional skullduggery with serial numbers, is the sequence in which patents were granted. The initial patent claim filed by Cochran was followed closely by a claim for an improvement. Surprisingly, the improvement patent (which was the hinged top plate) was granted first (Patent No. 183) on April 29, 1837, while the original patent claim followed after as Patent No. 188, and granted on the same date. The Second Type bearing very low serial numbers would therefore be quite inconsistent.

(a) First Type: Topstrap completely circular in center with short vertical projection of narrow width at either end and bolted securely down over the turret by two screws; turret is not easily removable for loading. The underhammer is gracefully curved and entirely encircles the trigger acting in a dual capacity as trigger guard. Estimated quantity made approximately 30; serial numbers in the range of 1 to 30:

15-001 Values—Good **$5,000** Fine **$12,500**

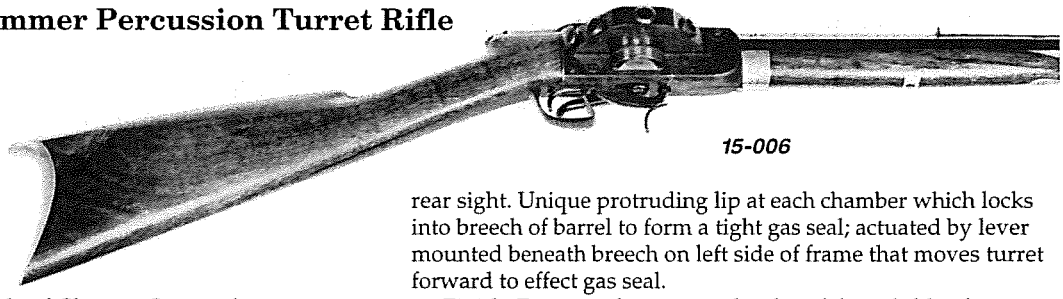
latter, although far more rare than original flintlock, normally do not bring as much. The entire Collier story is yet to be told. Important data about them may be found in *English Guns And Rifles* by J. N. George (Small-Arms Technical Publishing Company, Plantersville, South Carolina, 1947 and more recent reprint editions):

15-005 Values—Good **$12,500** Fine **$35,000**

Colt Revolving Percussion Rifles and Shotguns

See Colt Firearms, Chapter V-B.

Daniels Underhammer Percussion Turret Rifle



15-006

Henry and Charles Daniels of Chester, Connecticut, Underhammer Percussion Turret Rifle. Made by C. B. Allen, Springfield, Massachusetts c. late 1830s. Patent No. 610, February 15, 1838 and Patent No. 677, April 3, 1838. Quantity made unknown, estimated at less than 50. Rare.

Calibers and dimensions vary; average approximately 40 caliber with 34" octagon barrel. Eight-shot horizontal turret or radial cylinder of octagon shape. Manually revolved. Turret removed for loading by raising the hinged topstrap (as on the Second and Third Type Cochran) with the latch also acting as rear sight. Unique protruding lip at each chamber which locks into breech of barrel to form a tight gas seal; actuated by lever mounted beneath breech on left side of frame that moves turret forward to effect gas seal.

Finish: Frame and turret casehardened; barrels blued or browned.

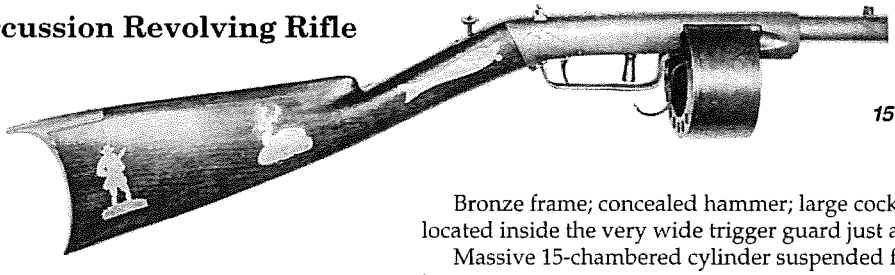
Marked on forward section of topstrap: H & C DANIELS/PATENT/CHESTER, CONN. Marked at rear of topstrap: C. B. ALLEN/SPRINGFIELD/MASS. accompanied with an eagle motif.

Walnut stock and forend; German silver furniture.

It is quite apparent that C. B. Allen made this shortly after his manufacture of the Third Type Cochran (*q.v.*). Note the similarities in design with the hammer mounted ahead of trigger:

15-006 Values—Good **$7,000** Fine **$12,500**

Hall 15-Shot Percussion Revolving Rifle



15-007

Alexander Hall of New York City, New York, 15-Shot Percussion Revolving Rifle. Made c. mid-1850s. Quantity unknown. Very rare.

Calibers and dimensions will undoubtedly vary; specimen viewed was 38 caliber.

Bronze frame; concealed hammer; large cocking lever/spur located inside the very wide trigger guard just ahead of trigger.

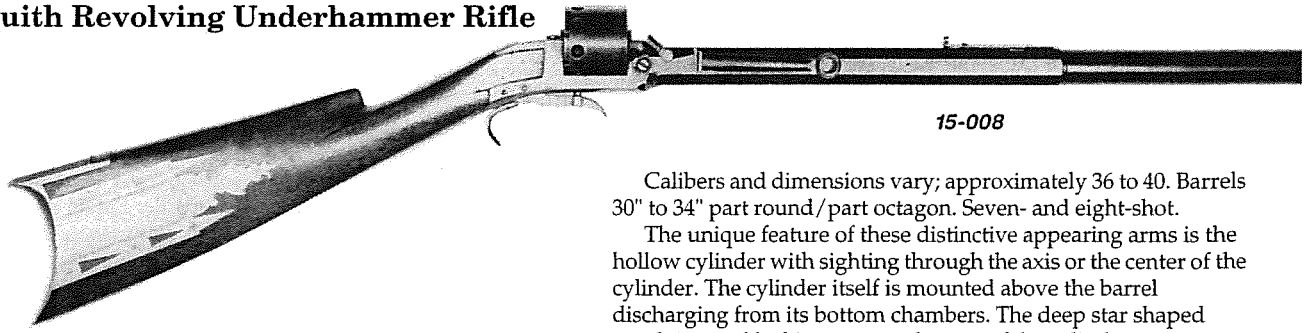
Massive 15-chambered cylinder suspended from frame by a hinge.

Marked in script on cylinder *HALL'S/REPEATING RIFLE/PATENTED JUNE 10/1856.*

Value estimated only with no known recorded recent sales:

15-007 Values—Good **$9,500** Fine **$20,000**

Jaquith Revolving Underhammer Rifle



15-008

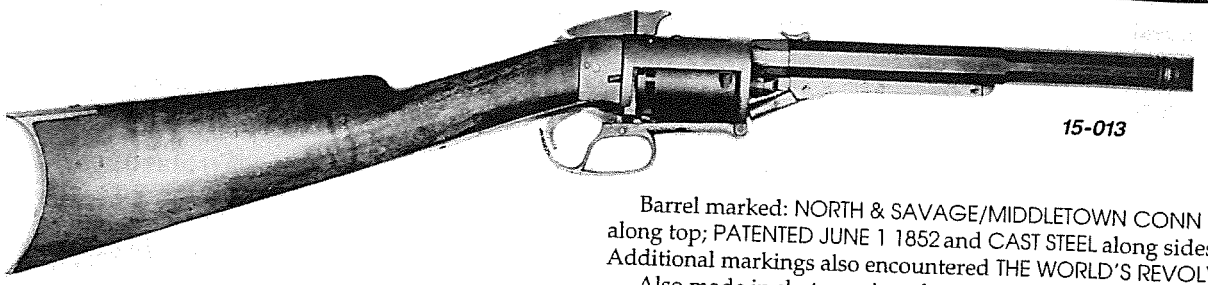
Elijah Jaquith of Brattleboro, Vermont, Revolving Percussion Underhammer Rifle. Made c. late 1830s; manufacturer unknown, but believed same as for Nichols and Childs (*q.v.*). Patent No. 832 of July 12, 1838. Quantity made unknown; extremely limited, estimated at approximately 25.

Calibers and dimensions vary; approximately 36 to 40. Barrels 30" to 34" part round/part octagon. Seven- and eight-shot.

The unique feature of these distinctive appearing arms is the hollow cylinder with sighting through the axis or the center of the cylinder. The cylinder itself is mounted above the barrel discharging from its bottom chambers. The deep star shaped revolving and locking cuts on the rear of the cylinder were utilized in the Jaquith pistol made by Springfield Arms Company to avoid infringement on the Colt's Patent at later date.

Finish: Frame and cylinder casehardened; barrel browned.

Barrel markings: E. JAQUITH BRATTLEBORO. VT. (with small design of hand and pointing finger) and PATENT.



15-013

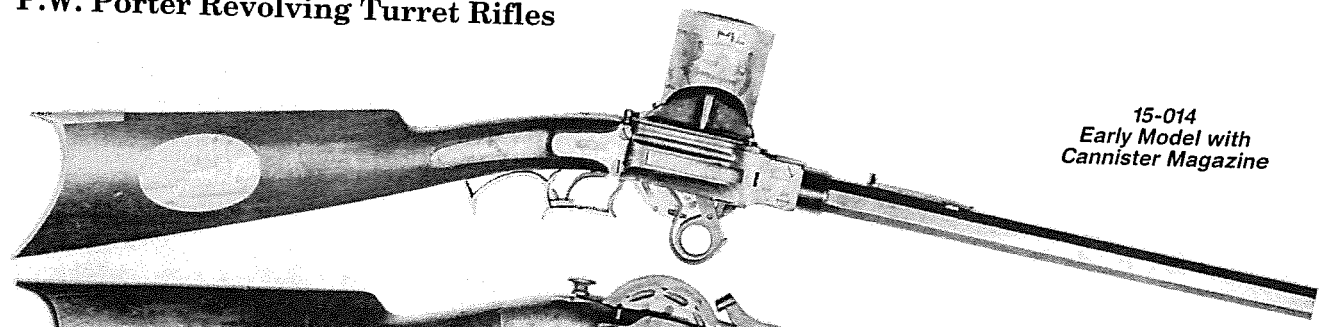
Average caliber 44, but could vary. Six-shot cylinder revolved, locked into position and hammer cocked by a downward motion of combination trigger guard and cocking lever. Round or part round/part octagonal barrels varying lengths; 23-1/2" average. Finish blued. Walnut stock.

Barrel marked: NORTH & SAVAGE/MIDDLETOWN CONN along top; PATENTED JUNE 1 1852 and CAST STEEL along sides. Additional markings also encountered THE WORLD'S REVOLVER

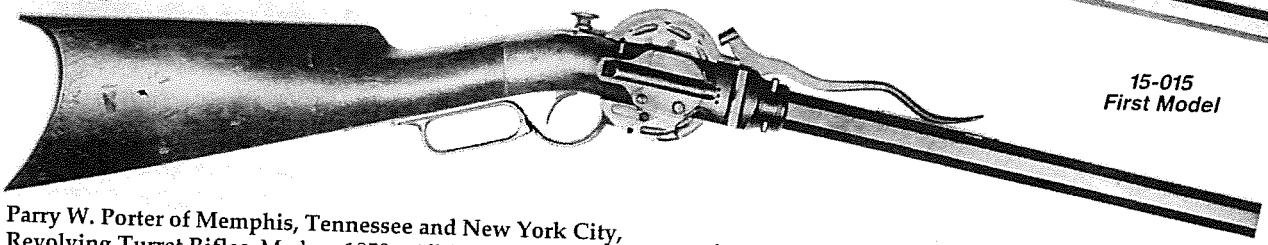
Also made in shotgun size of approximately 60 caliber with average 27" part octagonal/part round barrel, slightly longer frame and a full shield in front of cylinder. In place of the loading lever of the rifle there is a shotgun tamping rod/loading tool mounted below the barrel. Although fewer made, values either the same as rifle or slightly less as demand is not quite as strong:

15-013 Values—Good **$3,500** Fine **$7,500**

P.W. Porter Revolving Turret Rifles



15-014
Early Model with
Cannister Magazine



15-015
First Model

Parry W. Porter of Memphis, Tennessee and New York City, Revolving Turret Rifles. Made c. 1850s. All (except for earliest model with cannister magazine) made by G. P. Foster of Taunton, Massachusetts. Total quantity estimated about 1,250. U.S. Patent No. 8,210 of July 18, 1851.

Calibers and dimensions as below. The vertically mounted radial cylinder or turret is rotated and locked by movement of the under-lever which simultaneously cocks hammer.

Markings on the barrels of all New York era types: ADDRESS/ P. W. PORTER/NEW YORKand P. W. PORTER'S/PATENT 1851

An intriguing, though fictitious, legend has grown around Porter and his turret rifles stating that the inventor was killed while giving a demonstration of his arm to Colonel Samuel Colt, implying that but a few were made. Research has proven this story untrue and it seems likely that it was fabricated in the pre-World War II era to give color to an arms auction catalog! The wonderment is that so many specimens were produced since the arm had the same basic failing as the Cochran—at least one chamber aiming in the direction of the shooter at all times.

Early Porter With Cannister Magazine. Believed made in Tennessee prior to Porter's move to New York to seek financial assistance for mass production. Quantity unknown; estimated at approximately 25. Very rare. It is a matter of record that this type was given government trials at the Washington, D. C. arsenal in February of 1853.

Automatic loading and priming; with a distinctive large round German silver cannister magazine mounted above the turret holding balls (on ramp around outer periphery), black powder (in mid section of cannister) and fulminate (in the tube mounted over center). 30 shots are held in the magazine; that combined with the 8 loaded chambers gave the shooter a total of 38 shots providing all worked according to principle. Caliber average approximately 40; octagon barrels of varying lengths. All known specimens quite fancy with engraved symbolistic designs on the frame as well as the magazines and plaques inlaid in stocks (motifs such as clasped hands, sheaves of wheat, Masonic eye, town views and even an engraving of the capitol building at Washington, D.C.).

Most of those known specimens are without the magazine intact. Thus, prices reflected are for specimens without the cannister magazine. A premium of approximately 50 percent may be added to the price if complete with original magazine:

15-014 Values—Good **$9,500** Fine **$27,500**

New York Types (Made by Foster in Massachusetts). Total quantity made estimated about 1,225 for all three models.

In debunking another arms collecting myth, it should be specifically noted that the First and Second Model Porters *are not pill lock ignition as invariably described,* but rather, are all percussion ignition, accepting the standard type percussion caps of the era and not pills. Caps are spring forced into alignment with the hammer as the gun is used. When the hammer struck, the cap was smashed flat against the outer wall of the turret (over the tiny flash hole which is often confused as a receptacle for pills) and the residue of the exploded cap fell clear through the slot provided underneath the magazine.

In the First and Second Models occasionally nipples may be found screwed into the frame (with magazines often removed or partly missing). Such alterations are usually performed by parties unfamiliar with the Porter system; thereby making it

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Attorneys for Plaintiffs

IN THE UNITED STATES DISTRICT COURT

FOR THE SOUTHERN DISTRICT OF CALIFORNIA

VIRGINIA DUNCAN, et al.,

Plaintiffs,

v.

XAVIER BECERRA, in his official capacity as Attorney General of the State of California,

Defendant.

Case No: 17-cv-1017-BEN-JLB

EXHIBITS 27-30 TO THE DECLARATION OF ANNA M. BARVIR IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT OR, ALTERNATIVELY, PARTIAL SUMMARY JUDGMENT

Hearing Date: April 30, 2018
Hearing Time: 10:30 a.m.
Judge: Hon. Roger T. Benitez
Courtroom: 5A

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17	Pages 91-103 of Jim Garry, *Weapons of the Lewis and Clark Expedition* (2012)	00370-385
18	Pages 69-70 of John Plaster, *The History of Sniping and Sharpshooting* (2008)	00386-390
19	Page 31 of Jim Supica, Doug Wicklund & Philip Shreier, *Treasures of the NRA National Firearms Museum* (2013)	00391-394
20	Wikipedia page for "Girandoni Air Rifle", https://en.wikipedia.org/wiki/Girandoni_air_rifle	00402-405
21	Page 683 of Norm Flayderman, *Flayderman's Guide to Antique American Firearms and Their Values* (9th ed. 2007)	00406-409
22	Page 33 of Jim Supica, Doug Wicklund & Philip Shreier, *Treasures of the NRA National Firearms Museum* (2013)	00410-413
23	Pages 16, 148-49 and 167 of Jack Dunlap, *American British and Continental Pepperbox Firearms* (1964)	00414-420
24	Pages 249-50 of Lewis Winant, *Firearms Curiosa* (2009) (1st pub. 1954)	00421-425
25	Page 66 of *Catalogue of Contents: Doe Run Lead Company's Museum* (July 1, 1912)	00426-428
26	Pages 711, 713, and 716 of Norm Flayderman, *Flayderman's Guide to Antique American Firearms and Their Values* (9th ed. 2007)	00429-434

Exhibit	Description	Page(s)
27	Pages 9-17, 19-44 of Harold F. Williamson, *Winchester: The Gun That Won the West* (1952)	00442-479
28	Pages 303-06 of Norm Flayderman, *Flayderman's Guide to Antique American Firearms and Their Values* (9th ed. 2007)	00480-486
29	Joseph Bilby, *The Guns of 1864*, in Am. Rifleman (May 5, 2014)	00487-497
30	Page 49 of Harold F. Williamson, *Winchester: The Gun That Won the West* (1952)	00498-501
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32	Pages 116-29 of Louis A. Garavaglia & Charles G. Worman, *Firearms of the American West* (1985)	00527-543
33	Pages 307-12 of Norm Flayderman, *Flayderman's Guide to Antique American Firearms and Their Values* (9th ed. 2007)	00551-559
34	Pages 137, 1240-41 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00560-565
35	Pages 108-09 of Jim Supica, Doug Wicklund & Philip Shreier, *Treasures of the NRA National Firearms Museum* (2013)	00566-570
36	Pages 122-23 of Norm Flayderman, *Flayderman's Guide to Antique American Firearms and Their Values* (9th ed. 2007)	00571-575
37	Pages 60-63, 67-71, 204-208, 244-45 Lewis Winant, *Firearms Curiosa* (2009) (1st pub. 1954)	00576-594

Exhibit	Description	Page(s)
38	Pages 708-09 of the *2014 Standard Catalog of Firearms*	00595-599
39	Pages 23, 30-32, 38-39, 54-55, and 272 of John W. Breathed, Jr. & Joseph J. Schroeder, Jr., *System Mauser: A Pictorial History of the Model 1896 Self-Loading Pistol* (1967)	00600-611
40	John Elliot, *A Sweeping History of the Mauser C96 Broomhandle Pistol*, Guns.com (Jan. 26, 2012)	00612-624
41	Pages 191-92 of Jim Perkins, *American Boys Rifles* 1890-1945 (1976)	00625-629
42	Page 84 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00630-633
43	Page 104 of Patrick Sweeney, *Gun Digest Book of the AR-15* (2005)	00641-644
44	Page 294 of *Gun Digest 24th Anniversary Deluxe Edition* (John T. Amber ed. 1969)	00645-648
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46	Page 1173 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00653-656
47	Pages 182-83, 432-33 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00657-663
48	Pages 464-65 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00664-668
49	Pages 72-73 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013) and pages 216-17 of Joseph J. Schroeder, Jr., *System Mauser: A Pictorial History of the Model 1896 Self-Loading Pistol* (1967)	00669-677

Exhibit	Description	Page(s)
50	Page 121 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00678-681
51	Page 184 of the *2014 Standard Catalogue of Firearms* (Jerry Lee ed. 2013)	00682-685
52	Pages 369-74, 377-78, 380-87, 391, 395-96, 398-99, 401-07, 409-11, 413-14, 438-47, and 454 from *Gun Digest* 2017 (Jerry Lee ed., 71st ed. 2016)	00693-736, 00744-747
53	Pages from websites of firearm manufacturers advertising firearms	00748-774
54	Pages 73-97 of *The Complete Book of Autopistols: 2013 Buyer's Guide* (2013)	00775-800
55	Robert A. Sadowski, *The Evolution of Glock Pistols*, *Pistols*, Handguns Buyer's Guide Mag. (Nov. 25, 2015)	00801-811
56	Pages 87 and 89-90 of Massad Ayoob, *The Complete Book of Handguns* (2013)	00819-823
57	Pages 183-87 *NRA Guide to the Basics of Personal Protection in the Home* (1st ed. 2000)	00824-829
58	Christopher S. Koper, Daniel J. Woods & Jeffrey A. Roth, *An Updated Assessment of the Federal Assault Weapons Ban: Impacts on Gun Markets and Gun Violence, 1994-2003* (Nat'l Instit. J. 2004)	00830-866
59	*What Should America Do About Gun Violence?* Full Comm. Hr'g Before U.S. Sen. Jud. Comm., 113th Cong. At 11 (2013)	00867-903
60	Gary Kleck, *Large-Capacity Magazines and the Casualty Counts in Mass Shootings: The Plausibility of Linkage*, 17 J. Research & Pol'y 28 (2016)	00904-924

Exhibit	Description	Page(s)
61	U.S. Dept. of Justice, Bureau of Justice Statistics, National Crime Victimization Survey, *Criminal Victimization in the United States, 2008 Statistical Tables*, Table 37 (Mar. 2009)	00925-928
62	Massad Ayoob, *Five Gunfighting Myths Debunked by Massad Ayoob*, Personal Defense World (Oct. 14, 2014)	00929-938
63	Jacob Sullum, *The Threat Posed by Gun Magazine Limits* (Jan. 13, 2016)	00939-941
64	Charles Remsberg, *Why One Cop Carries 145 Rounds of Ammo on the Job*, PoliceOne (Apr. 17, 2013)	00942-946
65	Gus G. Sentementes & Julie Bykowicz, *Documents Detail Cross Keys Shooting*, Balt. Sun (Mar. 21, 2006)	00947-949
66	*Gun Shop Owner Shoots, Kills Man During Attempted Robbery*, WIS TV (Aug. 9, 2012)	00950-952
67	Nieson Himmel, *Police Say Watch Shop Owner Kills 4th, 5th Suspects*, L.A. Times (Feb. 21, 1992)	00953-955
68	*Jewelry Store Burglarized, Scene of Deadly 1994 Robbery Attempt*, nbc12.com (2012)	00956-958

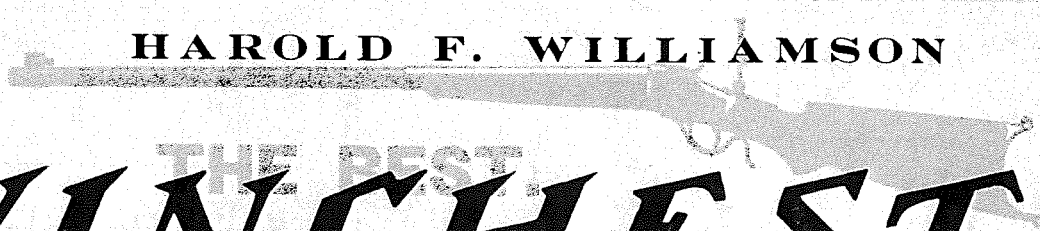
EXHIBIT 27

SER235

WINCHESTER

SINGLE SHOT RIFLE.

HAROLD F. WILLIAMSON



THE BEST

WINCHESTER

Send for 76 Page Illustrated Catalogue of Arms and Ammunition.

THE GUN THAT WON THE WEST

Winchester Repeating Arms Co.,

Stores, 312 BROADWAY, NEW YORK
418 and 420 MARKET STREET, SAN FRANCISCO, CAL.

NEW HAVEN, CONN.

WINCHESTER - Model

1886

.50-100-450.

A New Cartri

.50 Caliber,
100 Grains Powder.

d Bullet.

LIST PRIC[illegible]

To meet the demands of our friends for a .50 caliber carrying a heavy bullet, we are [illegible] above. The bullet has a penetration of about 16 pine boards ⅞ inch thick, and a trajectory of about [illegible] The [illegible] can be fired with good results out of the .50-100-300 rifle, but requires a barrel especially rifled [illegible]

Winchester Repeating Arms Company,

(The Winchester trade mark is used with permission of the Winchester Repeating Arms Company)

MANUFACTURED IN THE UNITED STATES OF AMERICA

Library of Congress Catalog No. 52-11409

SBN: 498 08315 2

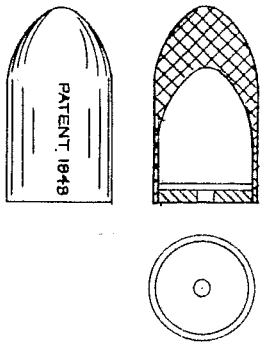
CHAPTER TWO

AN EXPERIMENT IN REPEATING FIREARMS

The Development of a Repeating Firearm

Among the many individuals who contributed to the mechanism that was eventually incorporated in the early Winchester repeating rifles was Walter Hunt. Born in 1796, Hunt learned the machinist's trade in his home town of Martinsburg, New York. In 1826 he moved to New York City where he set himself up as an inventor and mechanic. From that date until his death in 1859, Hunt turned out a remarkable number of inventions, including such diverse items as a flax-spinning machine, a heating stove, an iceboat, a nail-making machine, a fountain pen, and the safety pin. Despite his originality Hunt seems to have had no mind for business and was never able to capitalize on his inventions. This is illustrated in the case of the lock-stitch needle which he perfected between 1832 and 1834, but which he failed to patent. Some twelve years later Elias Howe received a patent for a similar needle and Hunt lost his chance at a fortune and general recognition as the inventor of the sewing machine.[1]

It is not astonishing that such a prolific inventor should turn his attention to firearms. His first move was to devise a loaded bullet for which he received a patent in August 1848 (US 5701) and which he described as a hollow-based, conical projectile, filled with powder and with the base closed by a cork wad having a hole in its center to admit the flame from an independent priming unit.[2]

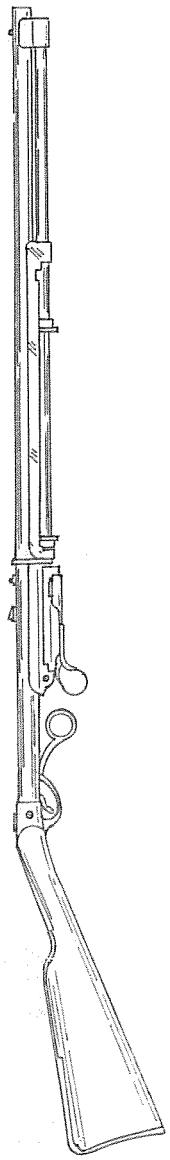


Hunt Cartridge Patented 1848

Hunt's next step was to design a gun that would utilize his ammunition, and in August 1849 he was granted a patent (US 6663) for a repeating firearm with a tubular magazine under the barrel, which he called the "Volitional Repeater." In many respects this gun was a brilliant achievement. It had a straight drive, spiral-spring-driven firing pin that was well ahead of the time, and the tubular magazine under the barrel was to become an integral part of the Winchester repeaters. But the repeating mechanism was far too complicated for practical use.

Not having sufficient funds to promote his inventions, Hunt assigned his patents to a fellow New Yorker, George A. Arrowsmith. Arrowsmith was a model-maker and machinist, who had in his employ Lewis Jennings, a skilled inventor and mechanic in his own right. Jennings was put to work on the problem of improving Hunt's rifle, and within a few months had succeeded in simplifying the lock and repeating mechanism which was patented in December 1849 (US 6973).

At this point Arrowsmith interested a New York capitalist, Courtlandt C. Palmer, in the possibilities of the new firearm. Palmer, one-time president of the Stonington & Providence Railroad, and a leading hardware merchant in New



Hunt Rifle Patented 1849

York, bought the Hunt and Jennings patents from Arrowsmith with the idea of manufacturing the gun. In 1850 he contracted with the already famous firm of Robbins & Lawrence, of Windsor, Vermont, to have 5,000 Jennings Patent Rifles produced. It was in connection with this contract that Palmer became associated with Horace Smith and Daniel B. Wesson, who were later to found the well-known firm that bears their names.

While Smith and Wesson made their lasting reputation as revolver producers, they played an important role in the development of the repeating rifle that, had circumstances worked out a little differently, might have carried their names instead of Winchester's.

Daniel B. Wesson, who in 1850 was working at Robbins & Lawrence, was already an experienced gunsmith, having learned his trade in the shop of his older brother, Frank Wesson, of Worcester, Massachusetts. He became interested in the Jennings gun and began some experimental work on the mechanism for Palmer. About the same time, Palmer engaged Horace Smith to make further experiments with the gun. Smith was also an experienced gunsmith. After working for various arms producers, he set up shop for himself in 1846 at Norwich, Connecticut. For the next eight years he experimented with and produced various types of firearms. Of special interest is the fact that during 1851 and 1852 he was manufacturing the small-caliber .22 Flobert pistol which had been developed in France a few years before.[3]

While this pistol was practically a toy and could be used safely for target practice within the confines of the drawing room, it was a breech-loading firearm and used a metallic cartridge, called a BB cap, containing a charge of fulminate in the head which was the only propellant of the lead ball. Smith's early acquaintance with this type of ammunition was an important link in the development of metallic cartridges in the United States.

In 1851 Smith took out a patent (US 8317) for an improvement of the Jennings rifle and Palmer had hopes that the weapon would be successful. Despite improvements, the gun remained too complicated and not powerful enough for a practical firearm and its production was abandoned in 1852.

The association of the three men continued, however, with Palmer apparently furnishing funds for further developmental work. Out of this experimentation came a new patent (US 10,535) granted to Smith & Wesson in February 1854. The most important feature of this rifle was the mechanism that moved the bolt and locked it in position with its head supporting the cartridge. It was a simple mechanism and, for cartridges of medium power, a highly satisfactory method of obtaining reciprocal movement in the carrier and locking the block in its forward position. This improvement, added to the tubular magazine and the rising breech block of earlier models, completed the essential mechanical features that were subsequently incorporated in the early Winchester rifles.

The Smith & Wesson Partnership

Encouraged by the possibilities of the improved repeating action, Smith, Wesson, and Palmer formed a limited partnership on June 20, 1854, under the partnership name of Smith & Wesson. Manufacturing was carried on in Norwich, Connecticut, apparently at the same location previously owned by Smith. The firm's principal assets included the Hunt, Jennings, Smith, and Smith & Wesson patents already described. In addition, the partners signed an agreement that the

partnership was to receive the benefit of any improvements in firearms or ammunition that Palmer or his representatives or Smith & Wesson might patent or acquire.

Production was concentrated primarily on pistols, using the mechanism patented by Smith & Wesson in February 1854.[4] The ammunition used in these arms, which was also produced by the firm, consisted of a cylindro-conical bullet weighing about 115 grains with a deep cavity in the back, filled with a priming mixture. It was sealed off with a copper washer having a cork disk in the center and was discharged by the impact of the hammer on the breech or firing pin. Except for the substitution of priming mixture for compressed powder, this ammunition was almost identical in form with that described by Hunt in his patent taken out in 1848.

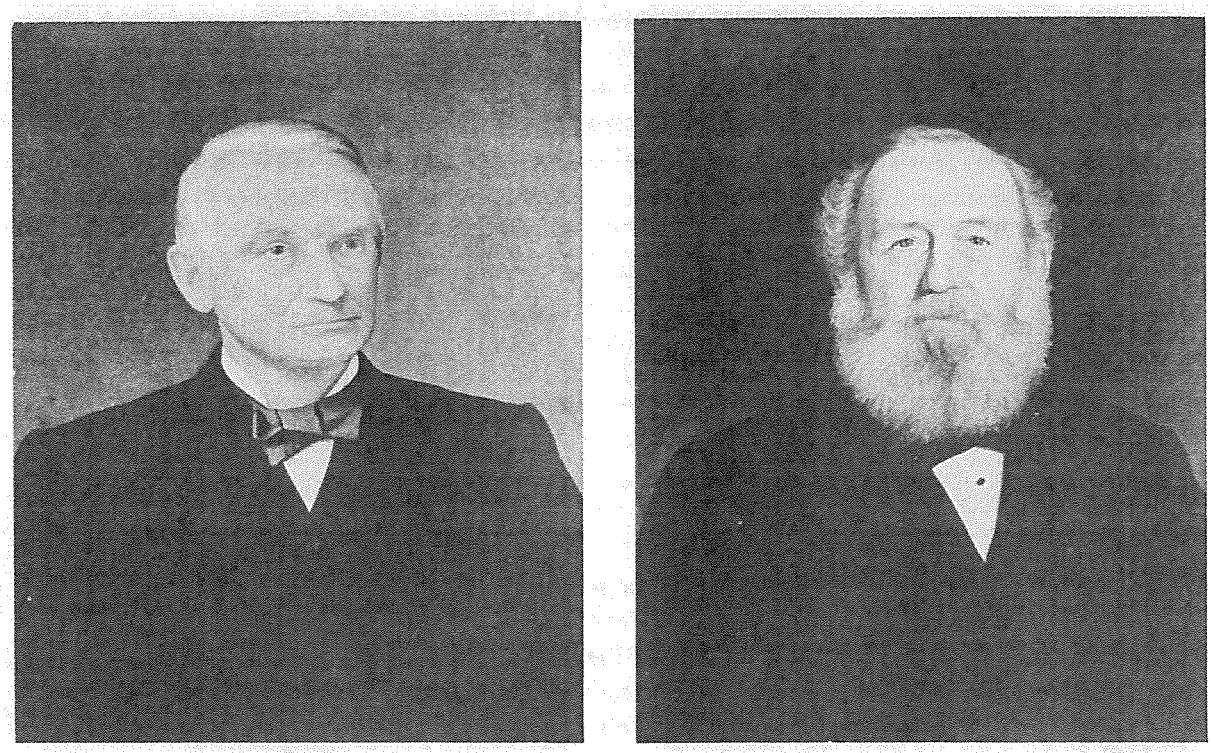
For reasons to be noted presently, this type of ammunition was not very effective. Wesson, in particular, appears to have been dissatisfied with its performance, for in August 1854 he was granted a patent (US 11,496) which was assigned to the firm for an inside-primed, centerfire, metallic cartridge, apparently to be used in the arms being produced by the firm. For some inexplicable reason, this ammunition was not utilized or developed further at this time, even though it held the key to the satisfactory operation of the type of firearms under production.

The partnership had been in operation about a year when it was decided to change the nature of the organization. Just why this change was decided upon is not clear. In any event, when a group of New Haven and New York capitalists made a propostion to form a corporation to take over the business, the partners agreed to sell to the new concern.

The Volcanic Repeating Arms Company

With some imagination the sponsors of the newly formed corporation called it the Volcanic Repeating Arms Company. Incorporated in Connecticut in June 1855, the organization was capitalized at $150,000 (6,000 shares of common stock at $25 par value per share). The backers, numbering forty in all, were chiefly from New Haven and nearby towns, although four lived or had their businesses in New York City. Their occupations give an interesting sample of the kinds of business enterprises that were capable of supplying venture capital to new undertakings. Included were seven clock-makers, three carriage-makers, two bakers, two grocers, as well as representatives of shipping, merchandising, shoe manufacture and similar types of business. Of particular interest is the fact that Oliver F. Winchester, then engaged in the manufacture of shirts in New Haven, subscribed to 80 shares of stock. (The list of stockholders is shown in Appendix E.)

In July 1855, Smith, Wesson and Palmer sold, transferred or assigned their various assets to the new corporation, including an agreement made by Smith and Wesson that ". . . it shall have the exclusive use and control of all patents and patent rights which the said Smith and the said Wesson or either of them can or may hereafter obtain or acquire for inventions or improvements in firearms or ammunition or upon the matters already patented as aforesaid, including all power of granting licenses, conveying shares and rights, receiving rents and royalties, and recovering and collecting damages for infringements."[5] The partners received $65,000 in cash paid in three instalments, plus 2,800 shares of stock, for their assets. In addition, Smith and Wesson were given an undisclosed sum for machinery at the Norwich plant.



Horace Smith and Daniel B. Wesson

With the formation of the Volcanic corporation the former partners withdrew from active participation. Smith and Wesson went on to form their famous pistol company while Palmer appears to have withdrawn entirely from the firearms business. Although Palmer, at least, held a substantial block of stock, neither he, Wesson, nor Smith appears to have served as an officer or a member of the board of directors.[6] Smith did act as plant manager for a short time during the latter part of 1855, but when the factory was moved to New Haven, early in 1856, he left the company's employment.

Initially the leading personality in the new management seems to have been Nelson B. Gaston of New Haven. Gaston had for a number of years been engaged in mining and processing barytes, a mineral used in paint. Around 1854 he shifted his principal business interests to shipping, and in 1855 became one of the largest stockholders and president of the Volcanic Company.[7] Oliver F. Winchester, although holding only a few shares of stock, apparently became more active in the management during the latter part of the concern's short existence and, when Gaston died, in December 1856, succeeded him as president.

The withdrawal of Smith and Wesson had left no one in the organization with any experience in the manufacture and improvement of firearms. William C. Hicks was picked to succeed Wesson as plant manager. Little is known of Hicks's early life and training, but he appears to have been an experienced mechanic.[8] There is nothing, however, to indicate that he knew very much about guns.

Manufacturing was started in New Haven under Hicks's direction in Feb-

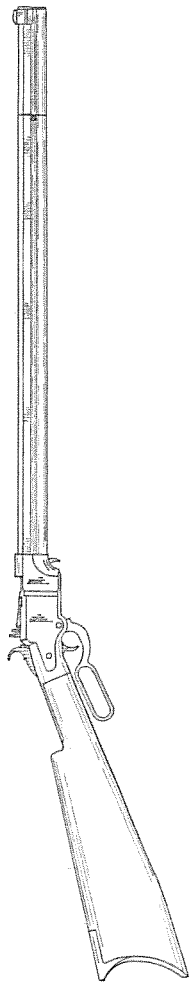
ruary 1856, in a small building located near the corner of Orange and Grove Streets. Compared with the Colt and the Robbins & Lawrence establishments at Hartford, operations were on a relatively modest scale. At the same time the labor force which numbered some fifty employees, including four girls making ammunition, and the amount of machinery used, made this plant well above the average size for the industry.

No description of the factory's operations at this time is available, but an inventory made when the Volcanic Company was liquidated gives some indication of the processes used. Included in the inventory were such standard types of machine tools as lathes, millers, drills, reamers, broachers, screw cutters, and the like. More specialized equipment was used in barrel-making and rifling. All of the machinery was apparently purchased from contemporary tool builders.

The machinery on hand was sufficient to permit the fabrication of parts that were reasonably interchangeable. Samples of the pistols and carbines show a considerable amount of file work, but this process was carried only to the point necessary to smooth off machined surfaces so that a more accurate fit was possible. The Company depended upon outside suppliers for frames and receivers, made of brass castings, drilled gun barrels of mild steel, and rough gun stocks.[9] Otherwise the quantity and variety of machinery on hand was extensive enough to have produced practically all of the parts that went into the finished products, plus the making of gauges, jigs, and fixtures.

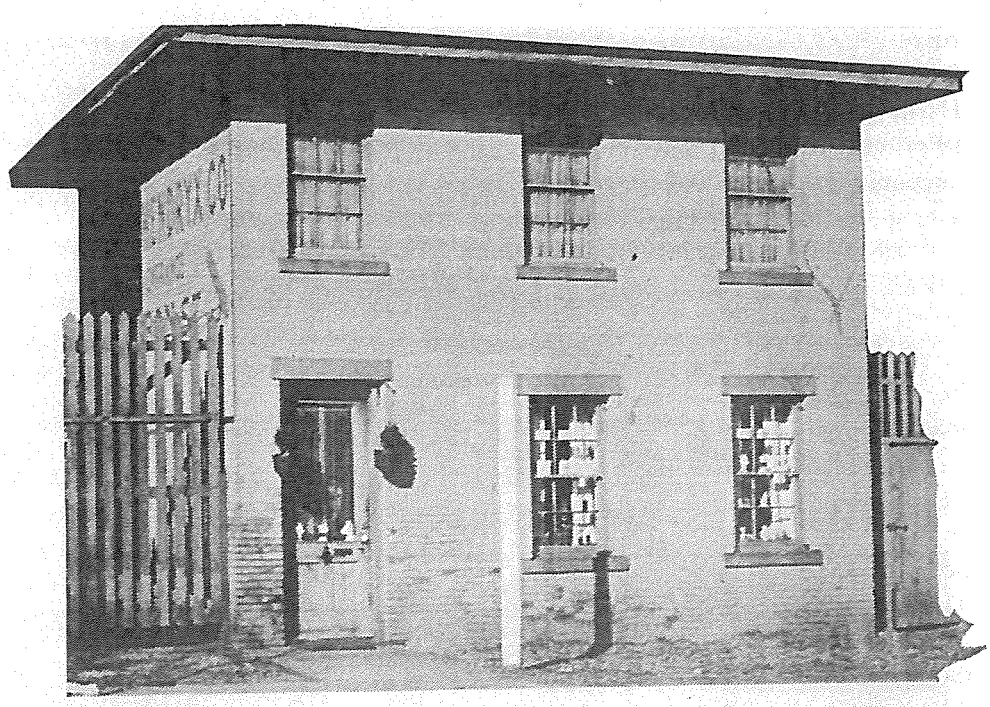
An examination of the names that appear on the payrolls of the Company indicates that almost all of the labor force was of English or Scottish background. The work-day and the work-week were probably typical for the period in the arms industry; that is, six days per week and ten hours per day. There is evidence of the beginnings of the contract system being utilized in the organization, under which agreements were made with individuals to assume responsibility for the production of specific items within the plant of the Volcanic Company. These early contractors were drawn from the more highly paid men already employed, or from outside the firm. Different individuals assumed contractual obligations from time to time, resuming their status as regular employees after the contract had been filled. It was not uncommon for a man to take on such an obligation in addition to his regular employment.[10] As will be noted subsequently, the contract system became a very important feature of the organization of manufacturing under the Winchester Repeating Arms Company.

The Volcanic Company continued to produce the same types of firearms and ammunition begun by the Smith & Wesson partnership. The principal change was the addition of carbines to the line which used the same repeating action as the pistols. An advertisement in the form of a circular, issued in 1856, lists the following models, all of which were caliber .36:



Volcanic Rifle

Type	*Length of Barrel*	*Load*
Navy Pistol	6 inches	8 balls
Navy Pistol	8 inches	10 balls
Carbine	16 inches	20 balls
Carbine	20 inches	25 balls
Carbine	24 inches	30 balls



Office of the Volcanic Repeating Arms Company, New Haven

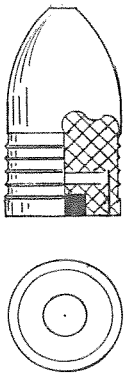
The Volcanic Company's products received favorable comments from several sources. The New Haven *Journal-Courier* reported on February 9, 1856: "We find in the N.Y. Tribune's notices of new inventions, the following account of two articles manufactured in this city. The Volcanic pistol and rifle seem to be the very perfection of firearms, and must be favorites with the public when they are fully known. We understand that orders crowd in upon the Company from all quarters." There followed a lengthy description of both the firearms and ammunition, and a statement that "about 70 men are now employed in the manufactory."

On November 17, 1856, the same paper, under the headline "Tall Pistol Shooting," noted: "The N.Y. Tribune gives the following account of practice with the Volcanic pistols made by the Volcanic Repeating Arms Co. of New Haven. It shows that they are a wonderful weapon, and that the shooter is an accomplished marksman. Col. Hay of the British Army, tried his hand with the Volcanic Repeating Pistol, a Yankee invention made at New Haven. The pistol used on the occasion was an 8 inch barrel, which discharged 9 balls in rapid succession. The Colonel fired shots which would do credit to a rifleman. He first fired at an 8 inch diameter target at 100 yards, putting 9 balls inside the ring. He then moved back to a distance of 200 yards and fired 9 balls more, hitting the target seven times. He then moved back 100 yards further, a distance of 300 yards from the mark, and placed 5 of the 9 balls inside the ring, and hitting the bull's eye twice. The man who beats that may brag."

This was indeed Tall Pistol Shooting, so tall in fact that there is a strong suspicion that the reporter drew heavily on his imagination and not on fact. An analysis of the accuracy and velocity of the Volcanic ammunition made by the ballistic department of the Winchester Repeating Arms Company shows that Colo-

nel Hay's chances against putting nine out of nine balls into an eight-inch target at 100 yards were about eleven to one. The odds against his score at 200 yards were on the order of seventy to one; while he had about one chance out of 7,140 of making his score at 300 yards.[11]

In fact, the Volcanic firearms were subject to the limitations, previously noted, that affected all breech-loading arms before the perfection of metallic ammunition: the impossibility of sealing off the breech sufficiently to prevent the escape of gas at the moment of firing. Furthermore, the Volcanic ammunition itself was seriously deficient. As one authority has noted: "The self-propelling bullet had many defects. The hollow base could not possibly hold a charge of powder adequate to produce effective velocities and energies. Proper obturation was impossible, and the projectiles [with their heavy charges of fulminate] had the unfortunate tendency to go off, a whole magazine load at a time, at moments most unpropitious. A fine mechanism had been evolved [in the Volcanic arm] but faulty ammunition caused it to fall dismally short of developing its potentialities to the fullest." [12]



Volcanic Cartridge

Subsequent events showed that the poor performance of the ammunition made it almost impossible to market the Volcanic products in competition with other firearms. This technical limitation appears to have been obscured by the immediate financial and management difficulties that were affecting the concern. The chief basis for this conclusion is that Oliver F. Winchester and a number of the Volcanic stockholders were willing to furnish additional capital to form a new organization to manufacture the same type of firearms and ammunition.

Failure of Volcanic Repeating Arms Company

The proximate causes for the failure of the Volcanic Repeating Arms Company seem to have come from difficulties in connection with manufacturing and from a lack of working capital. The exact nature of the production problem is not known, but a letter written May 18, 1857, stated: "The settlement of the affairs of the Volcanic Repeating Arms Co. is now being delayed by claims at law . . . occasioned by the inferior quality of the workmanship of the arms sent Messrs. Post and Wheeler during the last summer and autumn." Something over $11,000 was involved in this controversy, which must have represented a fairly large percentage of the organization's total sales for the period of operation.

The difficulty in collecting this account undoubtedly added to the financial stringency felt by the management during the latter part of 1856. At best the Volcanic Company could not have had any very large amount of working capital, especially after the last instalment of the total $65,000 cash was paid to Smith, Wesson and Palmer in April of the same year. Of the original 6,000 shares, 2,800 had been turned over to the three partners. On the assumption that the remaining 3,200 shares were fully paid in at their par value of $25, the total subscribed capital would have been $80,000. After deducting the $65,000 already noted, plus an undisclosed amount to Smith and Wesson for machinery, the organization would have left only a small balance.

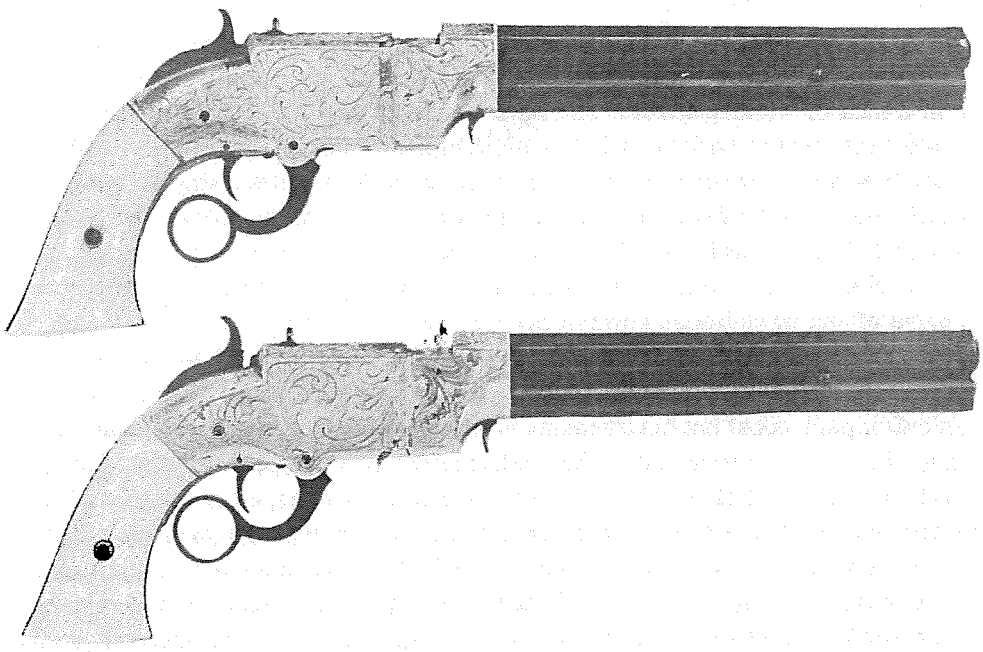
Whatever the amount, it seems to have been insufficient to carry the organization for more than a short time after April 1, 1856. Additional funds were borrowed from banks and by discounting notes, but the chief suppliers of capital were Gaston and Winchester, whose advances to the Company had amounted to something over $25,000 by August 1856. On the 26th of that month the Company

issued a mortgage to Winchester and Gaston for the amount of their loans, pledging the principal assets of the organization as security. Another $10,000 was borrowed from the Tradesman's Bank of New Haven, the payment of which seems to have been guaranteed by Winchester and Gaston.

Even with these funds, the Company experienced increasing financial difficulties and in early February 1857 was unable to pay several notes which fell due at that time. Upon petition of the Tradesman's Bank of New Haven, the Volcanic Repeating Arms Company was declared insolvent on February 18, 1857, and Samuel Talcott and R. B. Bennett were made trustees. Eli Whitney, Jr., Henry Newson, and Charles Ball were appointed by the probate court to make an inventory and an appraisal of the assets of the Company.

Sometime within the succeeding few weeks Winchester made arrangements with the heirs of Gaston, who had died during the preceding December, and the Tradesman's Bank, to take over their claims. On March 15, 1857, by order of the court, the entire assets of the Volcanic Company were assigned to him for a figure slightly in excess of $39,000, which was just about sufficient to cover the secured claims against the organization, now held by Winchester. As a result the stockholders received nothing from their investment.

Thus the pioneer attempt to manufacture repeating firearms utilizing the action developed by Hunt, Jennings, Smith, and Wesson, failed because of immediate financial and managerial difficulties and because of the more basic problem of getting a satisfactory ammunition.



Pair of Ivory-Handled Engraved Volcanics Made for Oliver F. Winchester

PART 2

GAINING A FOOTHOLD

CHAPTER THREE

CRISIS AND TRIAL

Oliver Fisher Winchester

It is doubtful whether Oliver F. Winchester had any intention of becoming an active gun and ammunition manufacturer at the time he purchased his eighty shares of Volcanic stock in 1855. As a partner in a flourishing business he was well known at the time as a capitalist and this investment was apparently only one of several that gave promise of financial success. The fact that he subsequently lent considerable money to the concern and took over as president, suggests that he soon became very much interested in firearms. Even before he had completed arrangements to acquire the assets of the defunct Volcanic concern, he had organized a new corporation, the New Haven Arms Company of New Haven, to carry on production under his general management.

Forty-six years old at the time he took over the management of the New Haven Arms Company, Winchester had already achieved a substantial business success. This he had accomplished largely through his own efforts, as he began life with few material advantages. He and his twin brother, Samuel C. Winchester, were born on November 10, 1810, in Boston, Massachusetts, the youngest in a family of five children. Oliver's mother was the third wife of his father, Samuel, who had ten children by his previous two marriages.

This branch of the Winchester family had long resided in Massachusetts, being directly descended from John Winchester, who had migrated from England at the age of nineteen and settled in the Boston area in 1635. The family genealogist has noted of the Winchesters: "Looking back . . . I do not find that they were men of note or known for their great deeds to mankind, but I do realize that they were men of strong character, earnest purpose, and deep religious convictions, upright and useful citizens, holding many offices of trust in the communities of which they were members, and helpful in building up the towns they selected for their homes, showing both ability and public spirit." [1]

There is no information about the occupation of Samuel Winchester, Senior, but it appears that most likely he was engaged in farming near Boston. In any case, when he died a year after Oliver and his brother were born, his wife was left with very little with which to raise and educate her children. The limited resources of the family made it necessary for young Oliver, at the age of seven, to go to work on a farm. During the winter months, when the work was slack, he attended school. When he was fourteen he was apprenticed to a carpenter and six years later became a master builder.

Having completed his apprenticeship in 1830, he moved to Baltimore, where, in spite of his youth, he became a building contractor for the succeeding three

years. He is credited, among other projects, with having constructed a church in that city. In 1833 he decided to change his vocation and went to work in a local commission store which handled dry goods and men's furnishings. The following year he married Jane Ellen Hope, originally of Portland, Maine, and at that time went into business for himself, opening a small retail store selling men's furnishings in Baltimore.

Three years later he decided to expand operations and opened a downtown store in Baltimore, handling the same type of merchandise. Although this new venture began in the panic year of 1837, it was successful, and for the next ten years he continued in this line of business. It was while Winchester was living in Baltimore that his three children were born: Ann Rebecca, William Wirt, and Hannah Jane.

Some time before the end of 1847, Winchester became interested in improving the construction of men's dress shirts. During the latter part of that year he applied for a patent on his ideas. In his application he pointed out, "The methods of cutting shirts heretofore and at present practiced are accompanied with a disadvantage which all have more or less experienced, *viz*: that of the pull on the neckband."

After reviewing the attempts that others had made to correct this fault, he continued: "The object of my invention is to remedy this evil, and this I effect by making a curved seam on top of and corresponding with the curve of that part of the shoulder which extends from the arm to the neck so that the shirt shall be supported on the shoulder and thereby avoid a pull on the neckband. The bosom is also curved out on each side which aids the effect produced by so cutting the shirt and also serves to make it fit better." [2]

It is interesting to speculate whether Winchester himself had suffered from ill-fitting shirts or whether he was struck by the complaints of the customers who patronized his store. In any case, he was sufficiently impressed by the possibilities of producing and marketing an improved product to sell his business in Baltimore and move to New Haven, where he began the production of shirts in a small building on State Street, a few months before his patent (US 5421) was granted in February 1848.

In placing his product on the market, Winchester had made the acquaintance of John M. Davies, a leading importer and jobber of men's furnishings in New York City, and in 1849 the two men formed a partnership known as Winchester & Davies. The following year the manufacture was moved into a new building which the partners had built on nearby Court Street. Winchester seems to have supervised the production end of the business while Davies handled the marketing and distribution with headquarters in New York.

Initially the manufacture was conducted on what is known as the "putting-out system." The various parts of the shirt were cut out in the New Haven plant and distributed to the homes of workers for hand sewing. At one time the firm is said to have had eight hundred employees in the New Haven plant and another five thousand scattered throughout western Massachusetts, Connecticut, and Long Island.[3]

The advent of the sewing machine made it possible to eliminate much of the hand sewing and to change the production system to the factory form.[4] Some time around 1853 the partners enlarged their plant, installed a number of sewing

machines, and increased the number of workers in the factory. The firm's operations were conducted on an impressive scale. According to the Census of 1860, the firm of Winchester & Davies had an invested capital of $400,000 and used 1,500,000 yards of cotton cloth, 400,000 yards of linen cloth, 25,000 spools of thread, 25,000 gross of buttons, 50,000 pounds of starch, and 18,00 pounds of soap. Some 500 foot-pedal sewing machines were utilized, and the average monthly employment included 40 male and 1,500 female workers. The payroll was reported to have been $17,000 per month—$2,000 for the men and $15,000 for the women. The annual output came to around 40,000 dozen shirts, valued at $600,000.[5]

The shirt business was undoubtedly profitable, and by 1855, when he invested in the stock of the Volcanic Arms Company, Winchester was already well-to-do, if not a wealthy man.[6] With the formation of the New Haven Arms Company he divided his attention between the gun and ammunition business and shirt manufacture. He continued his interest with Davies until 1866, at which time he sold out to his partner and devoted full time and energies to firearms.

Winchester represented a new type of *entrepreneur* in the firearms industry. Up to this time the prominent figures, such as Eli Whitney, Eliphalet Remington, and Samuel Colt, had typically been inventors and skilled machinists, who also had a flair for business. Smith and Wesson carried on this tradition, but Winchester's background and experience had been completely foreign to his new interest. His promotion and early administration of the New Haven Arms Company show he knew rather little about the mechanics of firearms and ammunition. His ability lay in his skill as a salesman, his grasp of financial matters, and his choice of subordinates who could advise him on technical matters. In spite of his ability, the New Haven Arms Company barely managed to survive the first four years of its existence. Winchester learned by experience, and after an uncertain start his administration of the Company began to show increasingly favorable results.

Organization and Control of the New Haven Arms Company

The new company was formally organized under the Articles of Association which were signed April 3, 1857. The authorized capital was fixed at $50,000, divided into 2,000 shares with a par value of $25 per share. It is a tribute to Winchester's reputation as a business man and his powers of persuasion that eleven individuals joined him in investing in the new company, seven of whom had been shareholders in the Volcanic Repeating Arms Company. Winchester himself was the largest single stockholder, holding 800 shares, and he became president and treasurer and active head of the organization.

The New Haven Arms Company officially began on May 1, 1857, with the purchase from Winchester of the assets he had acquired from the trustees of Volcanic. He was paid $25,000 for the tools, equipment and fixtures and an additional $15,000 for the right to manufacture firearms and ammunition, under the patents which had been assigned to him and the ownership of which he appears to have retained.[7] This sum, it may be noted, was the approximate value of the claims Winchester had held against the Volcanic Repeating Arms Company. His 800 shares in the new company took half this amount, leaving him $20,000 in cash plus the ownership of the patents.

Besides these patents, Winchester held the beneficial interest in the covenant

signed by Smith and Wesson in 1855. It was not until ten years later that he turned over these rights to the newly formed Winchester Repeating Arms Company in return for a substantial block of stock.

The following letter, written on the first day of business, reports the progress that had been made in collecting the subscriptions to the capital stock and the optimism of the management for the future success of the venture.

New Haven, Conn.
May 1, 1857

CHARLES J. HARRIS, ESQ.
NEW YORK

Dear Sir:

Your valued favor of the 29th inst. came directly to hand last evening. In reference to your question concerning the installments called for and payable this day, I would say that already over $33,000 has been paid *in full*; and that by Monday hope for quite a large portion of the balance. It is proposed, in order to accommodate and suit the convenience of all, that such as may prefer can pay 20% cash and balance by note at not to exceed in all ninety days (interest added), from this date.

It is not the purpose of the Treasurer to use the credits of the Company at all in bank at present. The Directors aim to start the wheels cautiously and, believing most confidently that in the present company there are unmistakable elements of success, they hope for satisfactory results.

S. L. TALCOTT
Secretary

Benjamin Tyler Henry

Winchester demonstrated his ability to choose personnel by selecting Benjamin Tyler Henry to succeed Hicks as plant manager. Henry, a somewhat neglected figure in the history of firearms, was the grandson of Benjamin Tyler, a pioneer ironmaster and mechanical engineer who lived in the Windsor section of Vermont.[8] B. Tyler Henry, as he invariably signed his name, was born in Claremont, New Hampshire, on March 22, 1821. After attending school until he was sixteen, he became an apprentice in the gunshop of J. B. Ripley & Company, in the same town.

During his apprenticeship he worked on various firearms and gun models, including the so-called "Waterproof Rifle," an early magazine gun patented in 1839 (US 1084), by R. B. Ripley, Lebbeus Baily, and William B. Smith. While this gun never became popular, it represented an intermediate development between Hall's breech-loader rifle and the Spencer repeating rifle, which came out in 1860, and served to familiarize Henry with the problems connected with breech-loading repeating firearms.

Leaving J. B. Ripley & Company, Henry worked in various gunshops, including Springfield Armory, until some time around 1842 when he was employed by N. Kendall & Company, of Windsor, Vermont. When that organization merged the following year to form the Robbins, Kendall & Lawrence Armory, he continued as their expert on guns. In 1850 when Courtlandt C. Palmer made arrangements with the company (now Robbins & Lawrence) to produce the Jennings rifle, Henry was among those who worked on the improvement of the mechanism. It was in connection with this contract that he met Daniel Wesson, and when the

latter joined with Horace Smith and Palmer to form the Smith & Wesson partnership, Henry went with them to Norwich.

Henry's name does not appear on the payrolls of the Volcanic Repeating Arms Company, and he apparently returned to Windsor during the period of that concern's operation, because he came directly from Windsor to the New Haven Arms Company. There is no record of how he came to the attention of Winchester. It is said that the two first met when Winchester employed him as an expert mechanic to repair a number of sewing machines used in the shirt factory. It is quite possible that he was also recommended by Smith or Wesson, as their relations with the New Haven Arms Company were friendly. In any event, the choice of B. Tyler Henry was a happy one. He brought to the organization his experience with the improvement and manufacture of repeating firearms and made a major contribution by effecting changes in the Volcanic firearm and ammunition.

Early Operations of the New Haven Arms Company

Under Henry's supervision, the New Haven Arms Company continued the production of essentially the same firearms and ammunition that had been manufactured by the Volcanic Company. Two small-caliber .30 pistols, one a four-inch and the other a six-inch model, were added to the line, along with the ammunition to fit them. The ammunition itself was unchanged except for substituting black powder for part of the fulminate in the charge.

By the end of 1857, the full line and list prices of the Company's production were as follows:

No. 1	4-inch pistol	$15.00
No. 2	6-inch Navy pistol	21.00
No. 2	16¼-inch carbine	30.00
No. 2	20-inch carbine	35.00
No. 2	24-inch carbine	40.00
No. 1	balls	11.50 per 1,000
No. 2	balls	12.00 per 1,000

The bore of the No. 1 arm was approximately caliber .30 while the No. 2 was caliber .36.

Manufacturing was carried on in the same rented building that had been used by the Volcanic Company until June 1859, when the New Haven Arms Company moved into newly leased quarters at 9 Artizan Street, a short distance away. There is no information about the size of the plant before 1860, but in the census returns for that year, the Company reported the average number of employees at sixty-eight, forty of whom were men and the rest women. The monthly payroll came to $1,000, and the annual value of products was stated to be $25,000.[9]

Winchester's personal efforts appear to have been directed toward building up a market for the Company's products. Contacts with dealers were made by letter and through personal calls by himself and W. C. Stanton, who was employed as a traveling salesman about the middle of 1857. The Company was interested in opening an office in New York and on March 4, 1858, Winchester wrote Smith & Wesson: "We have in contemplation to open an office on Broadway, N. Y. for the sale of our arms and should perhaps like to make an arrangement with you to sell yours if we can do so in a manner mutually satisfactory. What do you think

of it?" Nothing appears to have come from this proposal, but the Company did make an arrangement with J. W. Storrs of New York to act as its agent.

Dealers were given discounts from list prices which varied according to the volume of orders. On firearms they ranged from 20 per cent on amounts over $100, 25 per cent on sums above $1,000, and 30 per cent on $5,000 or more. The discount on ammunition was 20 per cent on any orders above $100. These discounts applied to settlement by "approved paper" of four months' duration or less, while a cash settlement gave the payer an extra 5 per cent discount. To any interested, responsible party, the Company sold a sample set of its products at regular dealer discounts and stood ready to fill additional orders as they were received. No merchandise was sold on consignment, and Winchester refused several requests of this nature. He was willing and eager to grant exclusive privileges to wholesalers or jobbers and occasionally to large dealers. Even during this early period he was interested in maintaining prices, cautioning one prospect who was interested in becoming a wholesaler, "... in selling to dealers you will please adhere to these prices and in retailing them do so at list price and in all cases for net cash."

In advertising the Company's arms Winchester made an early use of testimonials, which was the common practice of the period. In Winchester's case there was an added reason. Machine-made firearms were still a novelty and it was necessary to overcome the prejudice of users who preferred the products of the gunshops. Testimonials could be effective in breaking down their prejudice. A circular printed in 1859 reproduced the following letters from "among the numerous testimonials" received:

New York, March 10, 1855

Gent:—I consider the Volcanic Repeating pistol the *ne plus ultra* of Repeating or Revolving Arms, and far superior in many respects to Colt's much extolled Revolver. I have fired, myself, over 200 shots from it without even wiping the barrel—this is an advantage which no other arm I know of possesses. I have had the pistol with me at sea for more than eighteen months, on a voyage around the world, and find that, with the most common care, it will keep free from rust far more so than Colt's. I find the Balls as good now as when I left New York. I have shown the pistol to my friends in San Francisco, Hong Kong, Manila, Canton, and Shanghai, and they were much pleased with it.

C. F. W. BEHM, late of Clipper Ship *Stag Hound*

New York, 23rd November, 1856

Gent:—I have used a Volcanic Repeating Pistol for some months, on my last voyage to San Francisco, and in all that constitutes a good Pistol or Firearm, it has no equal and excels all others I have ever seen in rapidity, efficiency and certainly of execution. Its peculiar merit for sea service is the nature of the Ball, which contains the Ammunition, is water-proof and cannot be damaged by any change of climate, but is sure fire even after having been loaded for months.

FRED K. A. STALL, Commander Ship *Star of the Union*

In spite of the enthusiasm with which the New Haven Arms Company was begun and the efforts to make it successful, sales remained small. The financial position of the organization steadily deteriorated after 1857, and by 1861 the Company was virtually bankrupt.[10] The basic difficulty with the Volcanic firearms has already been described; it arose from the use of the self-propelled bullet. It is

VOLCANIC
REPEATING FIRE ARMS,

MANUFACTURED BY THE

NEW HAVEN ARMS COMPANY,

NEW HAVEN, CONN.

(PATENTED, 1854.)

The above named Company having purchased all the Patent rights on this Arm and its ammunition, (some eight or ten in number,) the inventions of as many of the most ingenious mechanics of the country, who have spent years in bringing this wonderful triumph of genius to perfection, are now prepared to manufacture them in a perfect manner, and offer them for sale as the most powerful and effective weapon of defense ever invented. They are made of all sizes, from a four inch Pocket Pistol, carrying six balls, to a twenty-four inch Rifle, carrying thirty balls.

The rapidity of execution of this Arm places it beyond all competition. The thirty shooter can be loaded and fired in less than one minute—a quickness and force of execution which is as much superior to the best revolvers, as they are to the old muzzle loading single shooters.

The Ammunition is water-proof, hence it can be used in any weather, or loaded and hung up for months, or laid under water, and then fired with certainty.

Its safety from accidental discharge is a great consideration in its favor; for while the magazine (a tube running the whole length of the barrel) may be filled with balls, and thus the gun, in fact, be loaded from breech to muzzle, it is yet impossible, from any carelessness in handling, to discharge it. *Its construction* is simple and its workmanship most perfect, hence it is not easily got out of repair.

Its proportions are light, elegant and compact, and the barrels are all rifled with great exactness. It requires no cap nor priming, no bullet mould nor powder flask. The powder and cap is contained in a loaded "minnie" ball of the best form and proportions, and is as sure as the best percussion caps.

It shoots with accuracy and *greater force* than any other Arm can with double the powder used in this. Directions for use accompany each Arm. Balls are packed in tin cases, 200 each.

LIST OF MANUFACTURERS' PRICES.

No. 1.	4 inch	Pocket Pistol,	$12.00,	Plated and Engraved,	$13.50,	Carrying	6	Balls.
" 1.	6 "	for Target Practice,	13.50,	"	15.00,	"	10	"
" 2.	6 "	Navy Pistol,	18.00,	"	20.00,	"	8	"
" 2.	8 "	" "	18.00,	"	20.00,	"	10	"
" 2,	16 "	Carbine,	30.00,	"	33.00,	"	20	"
" 2,	20 "	"	35.00,	"	38.00,	"	25	"
" 2,	24 "	"	40.00,	"	43.00,	"	30	"

Plating and Engraving, from $2.50 to $5.00 extra, per Arm.

AMMUNITION.

No. 1 Balls, 130 to the Pound, $10 per M. No. 2 Balls, 66 to the Pound, $12 per M. (No. 1 Arms, require No. 1 Balls. No. 2 Arms, require No. 2 Balls.)

The numbers 1 and 2 designate the size of the bore, and the Balls are numbered to correspond.

A liberal discount to the trade.

We select the following from numerous testimonials, as the service to which the Arms were subjected was most severe, from the rapid action of salt water upon all metals.

New York, March 10th, 1855.

Gent:—I consider the Volcanic Repeating Pistol the *ne plus ultra* of Repeating or Revolving Arms, and far superior in many respects to Colt's much extolled Revolver. I have fired, myself, over 200 shots from it without even wiping the barrel—this is an advantage which no other Arm I know of possesses. I have had the Pistol with me at sea for more than eighteen months, on a voyage around the world, and find that, with the most common care, it will keep free from rust, far more so than Colt's. I find the Balls as good now as when I left New York. I have shown the Pistol to my friends in San Francisco, Hong Kong, Manilla, Canton and Shanghai, and they were highly pleased with it.

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Gent:—I have used a Volcanic Repeating Pistol for some months, on my last voyage to San Francisco, and in all that constitutes a good Pistol or Fire Arm, it has no equal, and excels all others I have ever seen in rapidity, efficiency and certainty of execution. Its peculiar merit for sea service is in the nature of the Ball, which containing the Ammunition, is water-proof, and cannot be damaged by any change of climate, as it was fired even after having been loaded for months.

Signed, FRED'K A. STALL, Commander Ship Star of the Union.

All orders may be addressed to

NEW HAVEN ARMS COMPANY,

October, 1859. **New Haven, Conn.**

Broadside Advertising Volcanic Repeating Arms

somewhat ironic that the Company should have continued to use this type of ammunition, when Winchester owned the Smith and Wesson patent covering a metallic cartridge which was the key to the solution of the problem. The failure, initially, to recognize the faults of the Volcanic products is a reflection of Winchester's limited knowledge of firearms in 1857.

As soon as this fault was recognized in 1858, Winchester put B. Tyler Henry to work to correct the difficulty, but nearly three years passed before his efforts began to show favorable results.

It was only the possibility of getting more satisfactory types of ammunition and adapting the Volcanic mechanism to handle them that kept the concern from being liquidated. Winchester's personal confidence in the future of the Company is revealed by the amount of funds he advanced to the business and his acceptance of responsibility as co-signer, along with the other directors, for the concern's notes payable.

Metallic Ammunition and the Rimfire Cartridge

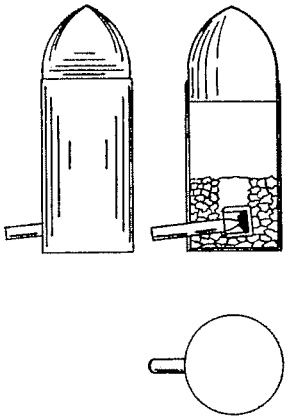
It is impossible to credit any single individual with the invention of the metallic cartridge. Ammunition development has always proceeded in a series of small steps. It has involved a delicate balance among several variables, including the form and construction of the projectile, the relationships between the amount of propellant and the weight of the bullet, the strength of the cartridge case, and the kind of priming mixture used. The continuing problem of getting satisfactory performance from the ammunition has prompted changes in allied fields; for example, better control of powders, priming materials, and improvements in metallurgy. In some instances an impetus that has come from the outside has in turn affected ammunition production.

The idea of making metallic ammunition was not new in the decade of the 1850s, but interest tended to lag as long as muzzle-loading weapons were predominant. A few Englishmen and Americans took part in the early development, but French inventors showed the greatest initiative. As early as 1812, Pauley, encouraged by Napoleon, patented a cartridge with a priming base and a charge of powder contained in a metal cylinder that was screwed onto a bullet.[11] Between that date and 1860 a number of French patents covering various types of metallic ammunition were granted, including a pinfire cartridge which enjoyed a measure of popularity. This was perfected by Houiller in 1847, who at the same time took a patent for a rimfire cartridge.[12]

With the growing number of breech-loading firearms, more and more attention was given to the development of metallic ammunition. By the late 1850s enough progress had been made to assure its early substitution for the kinds of cartridges currently being used in breech-loading arms. The significance of this development for the history of the industry has been pointed out by W. W. Greener, the famous British authority: "Probably no other invention connected with firearms has wrought such changes in the principle of gun construction as the invention of the expansive cartridge case. It has been used for every description of small firearms, and has been applied with success even to cannon. It has completely revolutionized the art of gun-making and has called into being a new and important industry—that of cartridge manufacture." [13]

The immediate credit for perfecting the rimfire cartridge which brought success to the New Haven Arms Company's weapons, should probably go to Daniel

B. Wesson of the Smith & Wesson Company. Wesson's interest in metallic cartridges dated back at least to 1854 when, during the original Smith and Wesson partnership, he took out his patent on the construction of a centerfire cartridge. Soon after Smith and Wesson established their pistol business in Springfield, Massachusetts, they acquired a basic revolver patent from Rollin White which covered a revolving cylinder with the chambers bored clear through the cylinder. (The chambers in Colt's revolvers at this time did not extend through the cylinder and were loaded from the fore part of the chambers, usually with loose powder from a flask designed to "throw" the proper charge, and a separate bullet. There was a limited use of paper cartridges with the bullet attached, but these were fragile and hard to get for most persons.)



Pinfire Cartridge

The White repeating action presented the same problem of checking the escape of gas and fire at the breech that was plaguing the New Haven Arms Company's firearms. Wesson, accordingly, began experimenting with metallic cartridges in the hope of overcoming this difficulty. It will be recalled that Smith, his partner, had manufactured the caliber .22 Flobert pistol which used a metallic cartridge (more accurately a BB cap) containing no powder but propelled by a charge of fulminate in the head. Wesson's initial attempt was to use this type cartridge in the first Smith & Wesson revolver, a caliber .22 model, which was brought out in 1857.[14]

The low velocity of this ammunition, plus the tendency of the head to bulge when fired, made the empty shells difficult to extract and led Wesson to further experimentation. By early 1858 he had worked out a cartridge with the priming mixture in the rim of the head and a powder charge as a propellant which worked satisfactorily in the Smith & Wesson pistols. The following extracts from his patent application, made two years later, show something of other attempts that had been made up to that time:

> We are aware that a metal cartridge for breech-loading pistols . . . has been made, in which the fulminate is spread in a thin layer over the interior of the base of the cartridge and is held in place by a washer of thin metal or other material.
>
> The explosion of the cartridge [in our type of revolver] from the hammer causes the base to bulge out—by which the cylinder is jammed and prevented from revolving freely.
>
> Metallic cartridges have also been constructed with a milled washer inserted in their base and the fulminate contained between the projection and depression around the edge of the washer and the interior surface of the cartridge at its base; but these cartridges are not adapted to the cylinder used in our arm.
>
> Metallic cartridges have also been constructed with a hollow flanged annular base and the fulminate contained in a hollow ring which is inserted in the hollow annular base . . . but this description of cartridge is expensive and the construction dangerous from the difficulty of closing and turning the ring after the fulminate is introduced, without explosion.[15]

Wesson proposed to avoid these various difficulties by making a rimfire cartridge with a projecting flange around its base with an annular recess in which the fulminating powder is placed, the fulminate from the central portion of the head being removed.

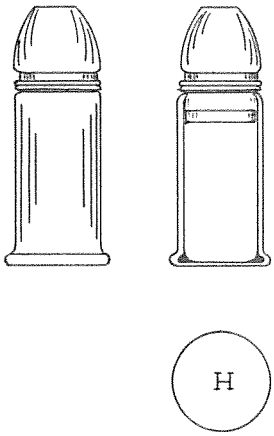
An important part of Wesson's invention was a loading tool which consisted of a small arm that spun the fulminate into the recess in the flange of the cartridge

head. After the fulminate was in place, a wad was inserted in the head of the cartridge and the case filled with gunpowder. A ball of an "elongated conical form" grooved at the rear was in turn put into the mouth of the case and pressed into place. The final step was to put a light pressure on the head to bring the metal into close contact with the fulminate.

Wesson, it may be noted, made no claim to have invented the rimfire metallic cartridge, but he did claim priority in making it in the form and manner described. Actually, he made the first cartridges of this type in January 1858, and they were used in the caliber .22 revolver that his company had introduced the year before.

The Henry Rimfire Cartridge

In testimony given some years later, B. Tyler Henry stated that he began experimenting with metallic ammunition in the fall of 1858.[16] By the end of the year he could produce flanged rimfire cartridges almost identical with those of Wesson's except that they were larger in size. It is possible that he developed this type of ammunition independently, but it seems more likely that he had seen some of Wesson's products and realized their applicability to the problem of the Volcanic firearms. The fact that Henry did not take out a patent on ammunition might be taken as evidence that he recognized Smith & Wesson's prior claim. It appears much more probable that he and Winchester did not believe such a cartridge was patentable, for on April 20, 1863, the latter wrote Smith & Wesson:



44 Flat Rimfire Cartridge

Gentlemen:

After I saw you on Friday last, I saw Mr. Leete and, in course of the conversation, he asked me if you had said anything to me about your patent on cartridges. I replied that you had not, that I was not aware that you had one, and if you had I presumed you would not say anything to me about it for the reason that by virtue of certain agreements with the Volcanic Arms Company to which I fell heir, you would doubtless consider me entitled to make them. On this subject, however, it is best we should have a fair understanding, to this end please give me the facts and your views.

Yours Respectfully,
O. F. WINCHESTER

In any event, at the time the letter to Smith & Wesson was written, the New Haven Arms Company had been turning out caliber .44 rimfire cartridges in some quantity for well over a year and a half. Stamped on the head with the letter H, in honor of Henry, these cartridges carried a pointed, conical, spherical bullet weighing 216 grains and a powder charge of about 26 grains. About a year later the Company brought out a cartridge with a flat-nosed bullet, designed to lessen the danger of explosion in the magazine. These cartridges became known as the Henry .44 Flat. Some measure of their superiority over the Volcanic ammunition is indicated by the fact that they developed a muzzle velocity of about 1,200 feet per second compared with the maximum of 500 feet per second for the former.

The Henry Rifle

As soon as he had produced a satisfactory cartridge, Henry turned his attention to adapting the Volcanic repeating mechanism to the use of the new ammunition. Specifically, his improvements consisted in adapting the bolt and firing pin to loading, firing, and extracting the rimfire cartridge. A special feature was the design of the firing pin, which was divided at the fore end so that it indented both sides of the rim of the cartridge head and reduced the possibility of misfires. There was no question as to the patentability of these improvements, and in Octo-

ber 1860 Henry was granted US Patent 3446, which he assigned to the New Haven Arms Company.

These changes were incorporated in a new model rifle, bearing Henry's name, which in external appearance showed its relationship to the Volcanic. The magazine was the same, consisting of a slotted metal tube under the barrel, parallel with it, and holding fifteen cartridges. A section of the magazine, near the muzzle, which swung to one side to permit loading, contained a spiral spring that forced the ammunition to the rear against the carrier block. The barrel was twenty-four inches long with a bore of caliber .44. Complete, the gun weighed about ten pounds.

The choice of the caliber .44 bore for the new rifle raises an interesting question. While not an uncommon size, this bore was smaller than the standard military arms which were all above caliber .50. At the same time, it was larger than the Volcanic caliber .36 rifle and, therefore, its manufacture required the use of new equipment. It seems most probable that the Company adopted the larger bore in an attempt to tap the military market, but could not go beyond the caliber .44 without redesigning the repeating action to handle the longer ammunition. Even if this had been possible or practicable in 1861, it would have made the arm heavier and would have cut down on the amount of ammunition that could be carried in the magazine.[17]

Importance of Henry's Contribution

Some evidence of the significance of Henry's contributions to the New Haven Arms Company is contained in a brief submitted for an extension of his patent to the Patent Office in September 1874. According to this document

> In 1860 the Volcanic arm as fully shown by all the witnesses for applicant, had become a failure, and the company insolvent, which state of affairs led applicant to make the improvements in the arm.
>
> That the invention was of great value and importance is clearly shown by each and all of the witnesses on the part of the applicant.
>
> It is impossible to estimate the real value of the invention made by the applicant.
>
> The Mechanism of the arm remains the same as the original arm, the patents for that mechanism are the foundation of all subsequent improvements, and to those patents, in this arm, applicant's patent was and still is subservient. The arm was a failure till the applicant's improvements, but it would be folly to say that the value of the arm made successful by such improvements is the real value or ascertained value of the invention of the applicant.
>
> The witness, Winchester, fully explains the difficulties of estimating the real value of the invention . . . and fixes one dollar per gun as the money value of an improvement of that kind, and he stated that one hundred forty thousand arms have been made and sold to 1874, hence one hundred and forty thousand dollars is a reasonable estimate of the real value of the invention to the manufacturer, some portion of which should properly be credited to the inventor.
>
> The Winchester Repeating Arms Company have agreed to pay the applicant for the patent for the extended term, the sum of twelve thousand five hundred dollars.[18]

The same document gives the details of the way in which Henry was compensated for his improvements:

> Applicant's salary as superintendent was fifteen hundred dollars per year, and as in all manufactures, his ingenuity and talent were expected to be exercised for the good of

his employer without special agreement to that effect, leaving the question of the right of any patentable invention that he may make open, to be settled between the inventor and Company that employed him as they can agree.

Rather than pay Henry a cash settlement or royalty, Winchester, on behalf of the New Haven Arms Company, gave him a contract to manufacture five thousand arms "but in this contract no extra price was allowed applicant, above what other parties would have received from the same." (This is an example of the inside contract system, which will be discussed in some detail in Chapters Seven and Twelve. In brief, under this arrangement Henry was to produce the guns in the New Haven Company's factory, using the fixed plant and equipment and raw materials supplied by the Company. He was to employ, supervise and pay the workers himself. The difference between his costs and the contract price to the New Haven Arms Company was his income.) Furthermore, under this contract, although Henry continued to act as superintendent, his pay was discontinued. The arrangement ran for five years during which time Henry made some $15,000, or more by $7,500 than he would have received from his salary as superintendent.

In view of the importance attached to Henry's improvements, that amount does not appear to be overly generous. As the brief relates, if a deduction is made from Henry's income of a reasonable allowance for his attention and services under the contract, little or nothing remains as compensation for his invention which made a complete success of the arm and which, but for his improvement, was a failure.

This statement was made in an attempt to get a renewal of the patent and after the new gun had proved itself. In 1861, when the future of the rifle was still uncertain, Winchester's unwillingness to make a cash payment to Henry is understandable. Evidence is lacking as to whether the question of a royalty payment was raised, but it is significant to note that Winchester and his successors in general followed a rule of never granting royalties on inventions they acquired.

"Gentlemen's Agreement"

With the introduction of the Henry improvements, the New Haven Arms Company dropped the production of pistols and concentrated on the manufacture of rifles. The fact that the New Haven Arms Company and its successor, the Winchester Repeating Arms Company, never again manufactured pistols or revolvers, has given rise to an interesting speculation about an agreement between Winchester and Smith & Wesson. Chinn and Hardin, in their book on American hand arms, state, without documentation, that when Winchester and Smith & Wesson came to terms about the patents, they entered a gentlemen's agreement

> . . . that was verbal, but has never been violated by either company in their many years of active existence. Oliver Winchester pledged that his company would never compete in the revolver business by manufacturing them; likewise the Smith and Wesson Company agreed never to produce rifles. And this agreement has been recognized by each succeeding generation having proved more binding than lots of contracts have that were legally perfect and elaborately drawn.[19]

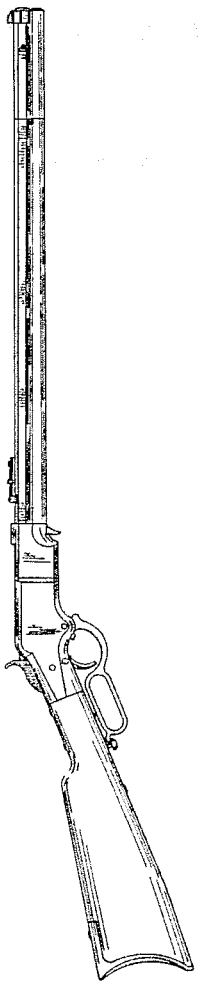
Such an agreement may have been entered into, and, being a "gentlemen's agreement," might not have been made a matter of record. There is, however, no mention of such an arrangement in the existing documents of either Smith & Wes-

son or the Winchester Repeating Arms Company, although the latter company did make a similar agreement with another concern.

Furthermore, the timing of the alleged agreement is wrong, because the patents were transferred to the Volcanic Company in 1855 and that company continued to produce pistols until almost 1860, several years after Smith & Wesson had started operations. In any case, the decision to specialize after 1860 can be accounted for largely on other grounds. If Smith & Wesson had wished to produce repeating rifles, it would have been necessary for them to develop an action not covered by the patents turned over to the Volcanic Repeating Arms Company and now held by Winchester. Moreover, any such invention would have reverted to Winchester under the covenant signed by the two at the same time. The Rollin White patent acquired by Smith & Wesson did not fall within the covenant although Winchester seems to have had his lawyers explore the possibility.

Of course, Winchester could have continued the manufacture of pistols using the toggle-link action. But at this time the revolving action popularized by Colt was well known and liked by shooters. This was largely because the revolver was easier to manipulate than the finger-lever action of the Volcanic which required both hands. As the Rollin White patent covered the revolving mechanism with the chambers bored through, in which metallic ammunition could be used, it would have been extremely difficult for the New Haven Arms Company to develop a patentable revolving action during the life of the Rollin White patents.

Whatever may have been Winchester's inclination toward the production of pistols, there is no doubt that by the middle of 1862 the prospects for the future of the New Haven Arms Company looked promising. The improvements in the rifle had been completed and the organization was tooled up and ready for production. The Civil War had begun the year before, and the tremendous demand for military supplies of all kinds offered the prospect of a substantial market for the New Haven Arms Company's new rifle.



Henry Rifle

CHAPTER FOUR

LAYING THE FOUNDATION

Attempt at Military Adoption

The Henry improvements marked a turning point in the history of the New Haven Arms Company and in the career of Winchester himself as a gun and ammunition producer. The latter had stated in a communication of October 17, 1862, that the new rifle would "if pressed with vigor retrieve [the Company's] past losses." Actually, this claim was too modest. Production of the new firearm not only enabled the New Haven Arms Company to recover its previous losses, but to develop into a profitable organization during the succeeding four years. In this accomplishment, the management was considerably aided by external conditions, but even so, no small amount of energy had to be expended before success was achieved. It was to this task that Winchester devoted an increasing amount of his attention after 1861.

Trade Card of New Haven Arms Company

Like every other gun and ammunition manufacturer at the time, Winchester was interested in supplying the military demand. With the firing on Fort Sumter in April 1861, the Nation had plunged into its grim civil conflict. At the outset neither side was adequately prepared to supply its armed forces with military equipment. This was especially true in regard to small firearms. So great was the need that all types, ancient and modern, foreign and domestic, were pressed into service. This demand for firearms, coupled with the fact that the arms and ammunition themselves were undergoing extensive modification, resulted in the use of a

greater variety of guns during the Civil War than in any other major conflict in history.

In the new gun the New Haven Arms Company had a product that might be expected to sell readily, and Winchester made early arrangements to have the Henry rifle tested by the military authorities. The results of one such trial made by an officer of the United States Navy, in May 1862, give a good impression of the gun's performance. During the test, 187 shots were fired in 216 seconds, which did not, however, include the time spent in reloading the magazine. For comparison with the rapidity of fire of other rifles, 120 rounds were fired in an elapsed time of 340 seconds, including reloading, or an average of 1 shot every 2.9 seconds. Compared with the best performance of the muzzle-loader of around 20 seconds per shot, and the single-shot breech-loader, which could be fired once every 10 or 12 seconds, this was a substantial improvement. The Henry was shot for accuracy and range, and in the hands of a relatively inexperienced shooter placed 14 out of 15 shots in a target 18 inches square at a distance of 348 feet. The rifle was also tested for endurance, and after being fired 1,040 times without cleaning, developed no mechanical difficulties, although the barrel was considerably leaded and very foul.[1]

In spite of the need for firearms, the reaction of the United States military authorities to the use of a repeating firearm was not enthusiastic. The following extract from a letter written by Brigadier General James W. Ripley, Chief of Ordnance, to Secretary of War Simon Cameron on December 9, 1861, illustrates the official attitude. Referring to tests that had been made of the Henry and the Spencer rifles, he admitted that both guns had performed well, but continued: "... it is impossible, except when arms are defective in principle, to decide with confidence, in advance of practical trials, on their value, or otherwise, as military weapons. I regard the weight of the arms with the loaded magazine as objectionable, and also the requirement of special ammunition, rendering it impossible to use the arms with ordinary cartridges or with powder and ball. It remains to be shown by practical trial what will be the effect on the cartridges in the magazine of carrying them on horseback, when they will be exposed to being crushed or marred possibly to such an extent as to interfere with their passage into the barrel, and whether they will be safe for transportation with the fulminate in the cartridge; also, what will be the effect on the spiral spring of long use and exposure in the field. I do not discover any important advantage of these arms over several other breech loaders, as the rapidity of fire with these latter is sufficiently great for useful purposes without the objection to increased weight from the charges in the arm itself, while the multiplication of arms and ammunition of different kinds and patterns, and working on different principles, is decidedly objectionable, and should, in my opinion, be stopped by the refusal to introduce any more unless upon the most full and complete evidence of their great superiority. In view of the foregoing, of the very high prices asked for these arms, and of the fact that the government is already pledged on orders and contracts for nearly 73,000 breech-loading rifles and carbines, to the amount of $2,250,000, I do not consider it advisable to entertain either of the propositions for purchasing these arms." [2]

Apparently General Ripley's attitude remained unchanged until sometime in June 1863, when he authorized a Government order for some 250 Henry rifles.

In a letter to General Ripley dated June 24, 1863, Winchester took the occasion to point out the virtues of the Henry rifle and to bring a little pressure on the Ordnance Department by concluding: "If these arms are used as efficiently by the men who are to receive them as they have been by our Union friends in Kentucky the country will have no cause to regret the expenditure. We are having many more orders than we can fill, those from Europe are the most profitable owing to the Exchange, but prefer and anxiously desire that they may be used against the Rebellion, but cannot afford to refuse other orders upon an uncertainty. We trust, therefore, that the Government may find its interest in using them and place orders with us early that we may be able to meet them in time."

At this point Winchester determined to make a strong bid for the Government orders. He wrote Messrs. W. G. Woodman, of New York City, in 1863: "We are preparing to make Rifles and Carbines on the principle adapted especially to Infantry and Cavalry using the same size cartridges and one with a barrel 30 inches long and the other 20 or 22 inches carrying a ball nearly twice the weight of the one sent, the bore to be 50/100. Many experiments have been recently made by gun men in this country and by the English Government all which result in establishing the fact that a rifle with a small bore of 46/ to 50/100 of an inch carries with more accuracy and greater effect than the larger ones heretofore in use of 56/ to 60/100 inches or more in the bore. Other incidental advantages also arise from the use of the smallest practicable size bore in the diminished cost and weight of the ammunition both of which increase in a rapid ratio with the increase of size."

Sometime within the next few months he opened negotiations directly with Assistant Secretary of War R. C. Watson, suggesting that the New Haven Arms Company be given a contract. Winchester's hopes were temporarily dashed when he learned that the armory he proposed to rent from Wheeler & Wilson, in Bridgeport, was already spoken for. He wrote Watson that it would take longer to make sizable deliveries than he had anticipated because at least eighteen months would be needed to construct a new building and get production under way. A further investigation, however, revealed that Colt's Patent Firearms Company at Hartford had sufficient idle capacity to take care of his needs. At the same time the Wheeler & Wilson armory was also offered to him. With these plants available Winchester reopened negotiations with Assistant Secretary Watson and offered to deliver as many as forty thousand Henry carbines in about eight months at $26 each.[3]

But Winchester was doomed to disappointment. Assistant Secretary Watson apparently presented his proposals to the Ordnance Department. While the new head, Brigadier General George D. Ramsay, was more favorably inclined to the repeating rifle than his predecessor, General Ripley, had been, he was not impressed with the Henry rifle. In a report to Assistant Secretary Watson, dated April 5, 1864, he stated: "Repeating arms are the greatest favorite with the Army, and could they be supplied in quantities to meet all requisitions, I am sure that no other arm would be used. Colt's and Henry's rifles and the Spencer carbines and rifles are the only arms of this class in the service. Colt's is both expensive and a dangerous weapon to the user. Henry's expensive and too delicate for service in its present form, while Spencer's is at the same time the cheapest, most durable, and most efficient of any of these arms."[4]

General Ramsay's report apparently caused Assistant Secretary Watson to limit severely the orders for the Henry rifle. Ordnance Department records show a contract for eight hundred was made with the Company on December 30, 1863.[5] This order was followed over a year later by a second contract for eight hundred Henrys on April 7, 1865, and by a third for an additional 127 rifles on May 18 the same year.[6] These contracts, plus sales made earlier, made the total number of Henry rifles supplied to the U.S. Government during the war come to 1,731. The total amount collected from the Government for these arms came to $63,953.26, or an average of a little less than $37 per rifle.[7]

Government purchases of Henry ammunition amounted to 4,610,400 cartridges and cost $107,352.05, or an average of something over $23 per thousand.[8] This amount was much larger than the Government orders of Henry rifles would warrant. It is accounted for chiefly by the fact that so many of the Henry rifles were bought by individuals in the services, who were supplied with ammunition by the Ordnance Department.

His failure to obtain a Government contract forced Winchester to seek other outlets for the Company's products. While he was successful in selling the Company's guns and ammunition to customers outside the U.S. Government, directly and indirectly the demand was closely related to the war. A number of sales were made directly to individual officers and men of the Volunteer and State Militia forces which made up such an important part of the Union armies. Some rifles were purchased by officers attached to the Regular Army and Navy, but the bulk went to civilians living principally in Kentucky and the neighboring states of Ohio, Indiana, Illinois, and Missouri. On one occasion Winchester wrote, "There are few in this neighborhood who have tested the rifle or know of its existence. Yet the border states give us more than we can do."

The Company depended chiefly on dealers for distribution. In general, the arrangements were similar to those developed prior to 1861. Discounts were scaled according to the amount of the orders and an extra commission was given to wholesalers. The list price of the rifle in October 1862 was $42, and ammunition was quoted at $10 per thousand. The discounts on the rifle were set so as to return the Company a minimum of $34, while the ammunition returned $8. In spite of rising costs, the list price of the rifle did not change, and discounts remained practically the same. On ammunition, however, there were several price increases, and by the latter part of 1863 the figure quoted was $17.50 per thousand, although it should be noted that this was the improved ammunition using compressed powder.

Contacts with dealers came from inquiries directed to the Company and from the personal efforts of Winchester, who wrote to likely prospects and made frequent trips into the Kentucky area as did Stanton, who continued as the organization's travelling representative.

In general, Winchester took care to give his dealers equal terms and to protect them against price cuts and unfair competition. This was not always easy. There was the case of George D. Prentice, of Louisville, Kentucky, who ordered some $10,000 worth of rifles and ammunition in September 1862. Soon after this shipment arrived a sudden scare that the city might be attacked caused Prentice to sell his order to individuals at prices less than what it had cost him. This action produced a strong protest from the other dealers in the region, which caused Winchester considerable embarrassment. Under the extenuating circumstances he kept

SIXTY SHOTS PER MINUTE

HENRY'S PATENT

REPEATING

RIFLE

The Most Effective Weapon in the World.

This Rifle can be discharged 16 times without loading or taking down from the shoulder, or even loosing aim. It is also slung in such a manner, that either on horse or on foot, it can be **Instantly Used**, without taking the strap from the shoulder.

For a House or Sporting Arm, it has no Equal;

IT IS ALWAYS LOADED AND ALWAYS READY.

The size now made is 44-100 inch bore, 24 inch barrel, and carries a conical ball 32 to the pound. The penetration at 100 yards is 8 inches; at 400 yards 5 inches; and it carries with force sufficient to kill at 1,000 yards.

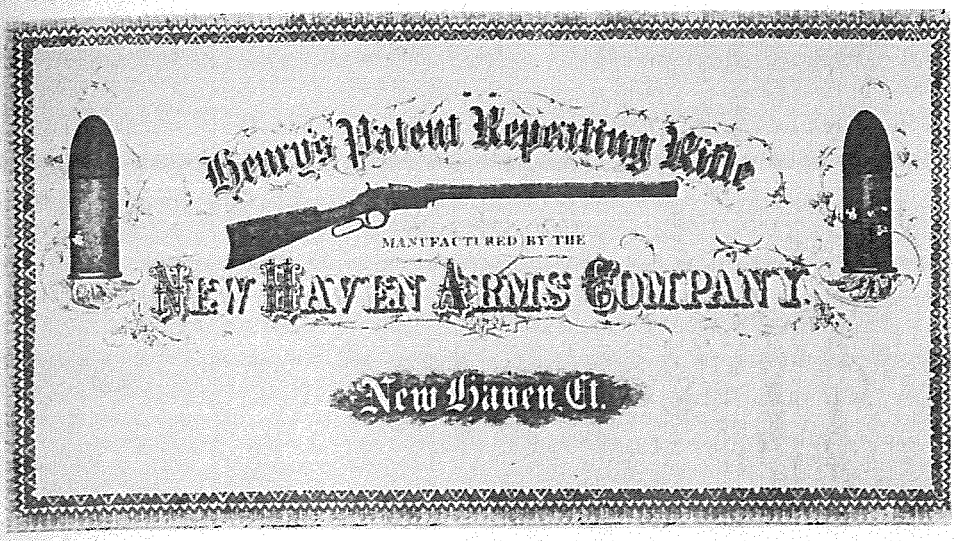
A resolute man, armed with one of these Rifles, particularly if on horseback, CANNOT BE CAPTURED.

"We particularly commend it for ARMY USES, as the most effective arm for picket and vidette duty, and to all our citizens in secluded places, as a protection against guerilla attacks and robberies. A man armed with one of these Rifles, can load and discharge one shot every second, so that he is equal to a company every minute, a regiment every ten minutes, a brigade every half hour, and a division every hour."—*Louisville Journal.*

Address **JNO. W. BROWN,**
Gen'l Ag't., Columbus, Ohio,
At Rail Road Building, near the Depot.

R. NEVINS' Steam Printing Establishment, No.'s 36, 38 and 40 North High Street, Columbus, Ohio.

Advertisement for Henry Rifles



Cover of 1863 New Haven Arms Company Catalogue

Prentice on as a dealer, but in the letters written subsequently, Winchester was careful to admonish Prentice not to sell below the established price.

In another instance rifles were sold to Messrs. B. Kittredge & Company of Cincinnati, Ohio, who, according to reports received by the New Haven Arms Company, not only resold the guns below the established prices, but made disparaging remarks about their performance as well. Winchester attempted to stop this practice by refusing to sell to Kittredge & Company. He was not immediately successful and a few months later he asked one of his dealers to go around to the latter's place of business, buy up the stock of Henry rifles, and find who was supplying them. Kittredge & Company was pushing the Frank Wesson rifle at this time, and during the course of correspondence insisted that it was a better gun than the Henry. Winchester offered to wager "not less than $5,000 nor more than $10,000" that in a competition between the two guns, the Henry would prove the better performer, a challenge that seems to have ended this episode.

Winchester aided his dealers by doing a certain amount of advertising in newspapers in the chief marketing areas.[9] Early in 1863 he began gathering material for the first catalog to be published by the company. He asked A. A. Vanwormer, a dealer in St. Louis, to make tests of the accuracy of the Henry rifle at various distances from the target, explaining: "We have no expert nor anyone in this vicinity who has tested the rifle as you have. In fact few in this vicinity know even of the existence of the weapon. While the demands from the border states have been and still are beyond our means to supply and used so far away from us that we have no means of getting exact results, as we desire to publish."

He also solicited personal accounts of combat performances of the rifle, explaining that the "Romance of War as a matter of history should be preserved."

Late in 1863 the Company issued a small catalog which included a number of testimonials concerning the effectiveness of the Henry rifle as a combat weapon, in addition to a description of the gun and ammunition. This catalog appears to have been distributed quite widely. It was translated and sent to prospective

dealers in France and Germany. Shortly thereafter some orders began to come in from Prussia, which were especially welcome because exchange rates happened to be favorable.

One of the most exciting of the personal experiences published in the 1863 catalog concerned James M. Wilson, later to become a captain in the Kentucky Cavalry. The account of his adventure, which was reproduced in Cleveland's well known book, *Hints to Riflemen,* tells how Wilson, "an unconditional Union man, living in a strongly disloyal section of Kentucky," had been threatened by his neighbors.

> In consequence of this, Capt. Wilson had fitted up a log crib across the road from his front door as a sort of arsenal, where he had his Henry Rifle, Colt's Revolver, etc. One day, while at home dining with his family, seven mounted guerillas rode up, dismounted and burst into his dining room and commenced firing upon him with revolvers. The attack was so sudden that the first shot struck a glass of water his wife was raising to her lips, breaking the glass. Several other shots were fired without effect, when Capt. Wilson sprang to his feet, exclaiming, "For God's sake, gentlemen, if you wish to murder me, do not do it at my own table in the presence of my family."
>
> This caused a parley, resulting in their consent that he might go out doors to be shot. The moment he reached his front door he sprang for his cover, and his assailants commenced firing at him. Several shots passed through his hat, and more through his clothing, but none took effect upon his person. He thus reached his cover and seized his Henry Rifle, turned upon his foes, and in five shots killed five of them; the other two sprung for their horses. As the sixth man threw his hand over the pommel of his saddle, the sixth shot took off four of his fingers; notwithstanding this he got into his saddle, but the seventh shot killed him; then starting out, Capt. Wilson killed the seventh man with the eighth shot.
>
> In consequence of this feat the State of Kentucky armed his Company with the Henry Rifle.

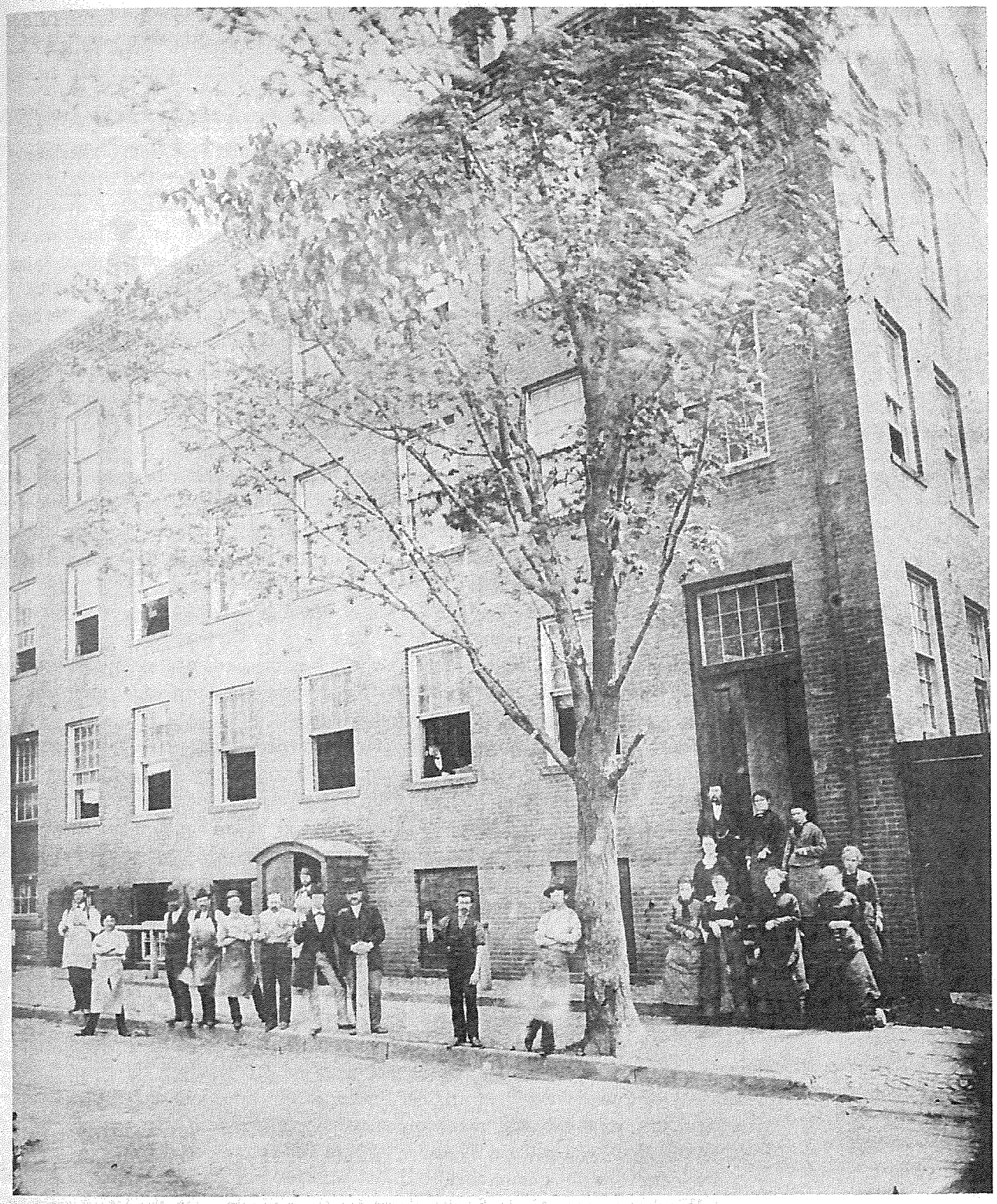
One of the most colorful tributes to the effectiveness of the Henry rifle came from the Southern soldiers themselves. Sawyer tells how "Major Claudman of the 1st D.C. Cavalry, in a letter to Mr. Winchester, said that when he was held in Libby Prison he often heard the enemy discuss the merits of the Henry rifles and he heard one of them say, 'Give us anything but that damned Yankee rifle that can be loaded on Sunday and fired all the week.' " [10]

In *Letters from Lee's Army* there is the sober comment: "We never did secure the Winchester [Henry] whose repeating qualities made the enemy's cavalry so formidable towards the end of the war." [11]

Operations during the War Period

In the absence of large Government contracts, Winchester was unable or unwilling to take the risk of expanding the Company's facilities beyond the physical limit imposed by the location of the plant, which remained at 9 Artizan Street, until after 1865.[12] To John W. Brown, of Columbus, Ohio, who had suggested that the organization might move into larger quarters, Winchester replied on May 4, 1863: "We shall go into an Armory, as you have in your eye, but we must creep a little longer. By and by we hope to walk and then we shall soon be in a position to drive." Eventually he was able to make good his prediction, but not until after the war was over.

Operations as a result remained on a relatively small scale. The average



Plant of New Haven Arms Company in 1859

number of 53 employees during the last half of 1863 was below the figure of 68 reported to the Census of 1860. Employment reached a peak of 72 during the third quarter of 1864, but after the end of the war, which came in April 1865, employment declined abruptly to around 25 workers.

It is possible to make a fairly accurate estimate of the output of rifles during the period. By January 31, 1863, seven months after the first Henry rifles were ready for delivery, about 1,500 had been made and sold. After 1863 production was stepped up approximately twenty-five per cent. Output figures are not available for 1864, but in 1865 some 3,011 rifles were produced and sold. This rate of around 250 per month is consistent with the fact that the Company's total sales between 1862 and the end of 1865 amounted to a little over ten thousand rifles.[13]

Information on ammunition capacity is more scanty. In September 1863 there is a notation in a letter to Messrs. Potter, Gay & Tollman that the Company was using forty to fifty pounds of powder per day. On the assumption that these were avoirdupois pounds, containing 7,000 grains, the 25-grain load in the Henry cartridge would have given a daily output of between 11,000 and 14,000.

Some months before, Winchester had already begun laying plans for expanding the Company's ammunition production. On April 20, 1863, he wrote Smith & Wesson: "Mr. Leete has been here and hired the man we employed to make tools for our cartridges and I am desirous of securing a competent man to take entire charge of that department, which I propose to perfect and extend to a scale sufficient to meet all demands, for all sizes, and if we succeed in making a perfect article we should be pleased to furnish you at about cost. My purpose is to inquire of you if you know such a man. If Mr. Warner or Mr. Wade are either or both of them calculated to fill this position, if so which is the best, and is he so situated as to make an engagement desirable. By giving these questions your careful consideration and an early reply you will much oblige [me]."

The following October, there is mention made of an order for cartridge machinery that would enable the Company to make twenty thousand cartridges per day.

A few production problems were encountered in ammunition manufacture. One correspondent wrote in complaining about misfires and suggesting the difficulties came from overheating. Winchester's response gives a good example of his interest in suggestions of this sort and the empirical approach that was used to analyze this sort of problem. He reported: "We took fresh made ammunition, 15 cartridges, and set them on end in a hot place for two hours, until all the grease had melted down onto the powder. Of these three misfired and the penetration (of the rest) was less by about one inch than that of 15 others taken from the same box but not warmed. None of the last misfired. This, of course, would indicate some force in your suggestion that the melting of the tallow affects the powder and certainty of firing. We will experiment further in this direction; and if the results confirm this view, we will make the necessary alterations." He concluded by requesting that "you will aid by so far as is in your power, to discover the cause of any defects in the ammunition."

Winchester was able to fix the blame for the difficulty with the lot of ammunition about which the complaint was originally made. "It is due," he wrote, "to the faithlessness of our man employed to put the cartridges together, as he must have put the grease in hot, instead of cold, to save time."

The Company made other experiments with ammunition, and in January 1863 reported "an improved cartridge with the powder compressed, by which the power is much increased."

Rising costs of labor and materials also contributed to management problems. As early as October 1862, Winchester explained an increase in prices: "Lead, copper, and steel have advanced 50% within a short time. Our ammunition *costs* us $12 per 1,000. We shall stand this for awhile in hopes of a decline; but if costs advance more, or continue on at the present high prices for any considerable length of time, we shall have to advance the price of ammunition. It is very annoying to us, as it must be to others, to be constantly changing prices; but with the state of the market we have no choice, as we are not safe in guaranteeing the price today to be the price tomorrow." The following month he noted "... the immense increase in the costs (gunsmiths to whom we used to pay $2 per day, are now getting $4.50), has made it imperative on us to sustain our prices firmly to save us from loss, if not ruin."

Winchester was especially interested in the performance of the Company's products and in correcting any faults that users experienced. The Henry rifle did, in fact, develop two weaknesses. One was a tendency for the firing pin to break, attributed by Winchester to pulling the trigger without ammunition in the chamber; the other defect arose when the magazine became dented. To one captain he wrote: "I regret that the metal in the breech pin should have failed in so many of the guns furnished your company. We have used the greatest care to have them perfect and of the best material. It is the weak point in the rifle, the most important we have yet discovered, but it is easily [corrected] and shall be remedied in the next lot, which we are now commencing." In the same letter he cautioned against pushing up the plunger in the magazine and letting it fly back against the cartridges, as this damaged the magazine and prevented the ammunition from feeding back into the breech.

While Winchester was receptive to suggestions about improving the Company's products, there were limits to the amount of changes that could be undertaken. As he noted to one correspondent, all the improvements the latter had suggested could be made, for example: ". . . increasing the length of the barrel and breech, and adding globe, telescopic or other sights; but all or any of these alterations would require time and expense, which, in the present scarcity of hands, and the hurried demand for our rifle, we can not possibly give in to at present."

Position of the Company in 1866

In spite of being forced to sell largely to non-Government markets, the New Haven Arms Company emerged from the war period with a greatly improved financial position and prepared to adapt its operations to meet the contingencies of postwar adjustments. Virtually bankrupt in 1860, the net worth of the concern was approximately $354,000 at the end of 1866 (*see Appendix G-1*). The dealer contacts made during these years gave the Company the nucleus of an established marketing organization to carry on its postwar commercial business. Furthermore, certain of the features of the rifle, such as the smaller caliber and the rapid fire, which had only limited attractions for the military authorities, became increasingly popular among hunters and frontiersmen.

These were important considerations for an arms and ammunition manufac-

turer during the postwar years. With the end of hostilities, the industry as a whole was greatly overexpanded. Foreign purchases took up some of the slack in military demand for a few years, until those countries built up their own small-arms production facilities. But this demand was not sufficient to support the entire industry and a large number of firms went into receivership. Those that survived did so by adapting and diversifying their production.[14]

The New Haven Arms Company was not immune to the sudden slackening of business that followed the end of the Civil War. Partial sales figures indicate that only 470 guns were sold during the last quarter of 1865 and the first half of 1866. During the same period only 672,000 cartridges were marketed. A continuation of these conditions could have been embarrassing to the Company, for the balance sheet indicates that a considerable portion of the assets was made up of inventory and the cash position was low.

Winchester, however, was not discouraged by the outlook for the future. Over the preceding nine years he had learned a great deal about guns and ammunition and their manufacture. Early in 1865 he began laying plans for expanding operations by applying to the Connecticut Legislature for a new corporate charter. In July of that year the State Assembly granted a charter for the Henry Repeating Arms Company with permission to carry on business either in New Haven or Bridgeport. Capital stock was set at $500,000 (par value $100 per share) with a provision that this figure might be increased to $1,000,000. No attempt was made during 1865 to re-form the organization under the new charter, but in 1866 Winchester sold his share of the shirt business to his partner, John M. Davies, which freed him to devote full attention to firearms production.[15] He also moved to identify the organization with his own name, by getting the Legislature in 1866 to change the title of the new corporation to the Winchester Repeating Arms Company.[16]

Meanwhile Winchester's growing stature in the community was reflected in the fact that he served as Lieutenant Governor of Connecticut for the term 1866-1867. Thereafter he was commonly addressed as "Governor Winchester" by his friends and business associates.

The Henry Rifle in the West

Two incidents, involving the use of the Henry rifle in 1865 and 1866, offer a prologue to the subsequent tremendous popularity of the Winchester repeaters in the West.

The first of these came late in 1865 and marked one of the earliest experiences of the Indians of the Rocky Mountains area with the deadly effect of a repeating firearm. For nearly two hundred and fifty years there had been more or less continuous conflict between red and white men armed with single-shot guns. The chief and most effective tactic of the Indians was to maneuver within charging distance of an opponent and tempt him to fire by offering one of their number as a target. The brave involved, unless he was disabled, and his companions would then rush in and overwhelm their white adversary before he could reload his firearm.

How the Blackfoot Indians of Montana tried this same maneuver against two prospectors armed with Henry rifles was told by one of the white participants to Paul B. Jenkins many years later. The two white men were former Union soldiers who had kept the Henry rifles issued to them just before being mustered out. They began mining borax in the heart of the Blackfoot Indian country, knowing

it was only a matter of time before the Indians would attempt to wipe them out. As retold by Jenkins,

> One morning the two young ex-soldiers had hardly begun the day's operations when they saw the enemy approaching in force and knew that they were in for it. Some forty warriors dismounted at a distance, approached to nearly gun range, lay down in the grass and began deliberately to creep in, spreading out to surround their supposedly doomed victims. Once in range, some began to expose themselves for an instant, bobbing up in the hope of drawing a desperate bullet, but always doing so two at a time in the hope of getting the guns of both whites empty simultaneously. One of the youths caught the idea from the fact that two Indians always showed themselves at the same instant, and said to his companion: "As soon as they get near enough, we'll fire together. They'll rush us the moment we both fire; and then'll be the time for you and me to do some shooting!"
>
> It happened precisely as he foresaw. With full magazines they agreed to bring on the decisive charge. At the word of one, both fired as two warriors showed themselves above the grass for an instant; and the moment that the two flashes and puffs of smoke were seen simultaneously the whole band of Blackfeet sprang to their feet and dashed yelling in on their supposed temporarily unarmed and helpless victims. But those two guns kept on firing! Shot after shot kept pouring from the guns over the low log breastwork, and to the indescribable horror of the warriors who considered themselves already victorious, man after man of their number fell shrieking or silent in the prairie grass as the deadly and unheard-of continuous firing blazed steadily at them; and that at a range so short, chosen for the final dash to close quarters, that few if any of the young riflemen's bullets missed. To halt, to wheel and dash madly away in any direction to escape the ceaseless fire, were moves of but an instant; but as they fled the guns kept at them, and only a few escaped unhit. Reloading their magazines the youths sprang from their rude barbette and ended the desperate work by leaving alive no wounded victims. Indeed, for the effect of the thing, they riddled every corpse with innumerable bullets and dragged the whole number to a heap at a distance beyond rifle range of their fort, that the survivors might return and contemplate the fatal results of their terrible encounter with weapons that obviously appeared never to need to be reloaded at all.
>
> From that day no other attack was ever made upon that pair. Not only were they thereafter immune, but the one of them I later knew told me that passing Indian bands would make wide detours to avoid even the neighborhood of their cabin; or, on meeting one of them, would rush off to a distance for fear of coming into any proximity with the awful magic of death that they had so terribly exhibited. Once, he told me, meeting an Indian whom he had reason to believe to have been one of the survivors of the fight, the brave, with a face of horror exclaimed, "Spirit guns! Spirit guns!" and was off as fast as his pony could gallop.[17]

The second incident involved a brush between "the law" and some stagecoach robbers. Neill C. Wilson, in his book, *Treasure Express: Epic Days of the Wells Fargo,* tells how the stagecoach carrying a large shipment of cash was held up and robbed by three armed bandits near Nevada City one May day in 1866. Steve Venard, the former town marshal of Nevada City, did not join the posse that set out after the robbers but, armed with his Henry rifle, picked up the trail at the point of the robbery and followed it into a steep and rocky canyon to a point where his way was barred by a waterfall. To let Wilson continue the story:

> Climbing doggedly with feet, knees, and one hand, Steve Venard reached the top of this fall. A half-shattered log led to the base of the islet. The man-tracker advanced over

the bridge, stepped ashore around a granite block, and came full on Jack Williams' ghost. The ghost was cocking and leveling a long .44 revolver.

Williams and Venard sighted each other at the same instant. And at the instant, Venard's rifle leaped to his shoulder. Also, at the instant, Venard saw Finn, alias Kerrigan, drawing bead on him from the summit of the islet.

No time to change targets. Venard drilled Jack Williams' ghost directly and speedily through the heart. A flip of trigger-guard and another half-ounce cone of lead was in firing position, just where Tyler Henry had once pledged Mr. Winchester it would be. The second shot, dispatched before echo of the first had caromed off the cliffs, sped upward and spattered on the canyon wall, having entered Finn's skull below the right eye and toured his skull en route. A scramble for the top of the islet proved the third bandit vanished. Venard kicked leaves over the Wells Fargo buckskin bag which lay beside Finn's body, took new bearings on the ravine that still mounted by big, wet terraces in front of him, and set up its eastern face.

Bandit Number Three was doubling and twisting like a hare along the steep brush-covered hillside. Venard's rapid shot all but nipped him. The quarry turned at bay, full of fight, as its dust spurted in his face. The next shot out of the pursuing Henry explored his heart, sent his spirit winging and his person crashing downhill into the canyon.

The rest of the posse found Venard sitting on the buckskin bag, communing with his plain old, well oiled rifle. The odds had been three to one and the three had been under cover while he had advanced in the open; each adversary in that one high-blazing instant had held fair bead on him; yet here they were. Three dead men, two of them still clutching cocked revolvers, and one live deputy. But—four expended bullets. The Henry must be getting old. Steve Venard was regretful.

The stage had been robbed at 4:30 a.m. It now was noon. The treasure was back in express company keeping by two p.m.

The governor of California commissioned Venard a lieutenant colonel of militia "for meritorious services in the field," and the express company made over to him its $3,000 reward money and, with considerable celerity, a brand new, suitably inscribed sixteen-shot Henry. It had become fixed policy with the express management, when a man showed himself adept at gunning bandits, to present him with a fine rifle and its hearty compliments.[18]

EXHIBIT 28

SER273

The Leading Reference for Antique American Arms

FLAYDERMAN'S GUIDE TO ANTIQUE AMERICAN FIREARMS

...and their values

9th EDITION

Exhibit 28
00481

Norm Flayderman

• 4,000 Individually Priced Firearms • 1,800 Photos for Quick Reference • Coverage From Early 1700s to Early 1900s

ABOUT THE COVER

Representing the newer end of the contents spectrum, the Colt Model 1911 pistol has become a sought-after collectible, and continues in use by military units, law enforcement personnel and private citizens.

The Model 1911 autoloading 45-caliber pistol was adopted in 1911, and Colt's first deliveries were made to Springfield Armory in early January 1912. Subsequently the Model 1911, with numerous modifications, has compiled an enviable service record with total production (to 1970) of over three million units, with most going to military contracts.

Author Norm Flayderman acquired the illustrated M-1911, frames and drawing from the Winchester Gun Museum in the mid-1970s when the museum contents were moved to the Buffalo Bill Museum in Cody, Wyoming. The Flayderman letter documenting the details of the acquisitions appears in the background, as does a letter from the Winchester Gun Museum, and is the sort of provenance that collectors value greatly. *(Courtesy Little John's Auction Service)*

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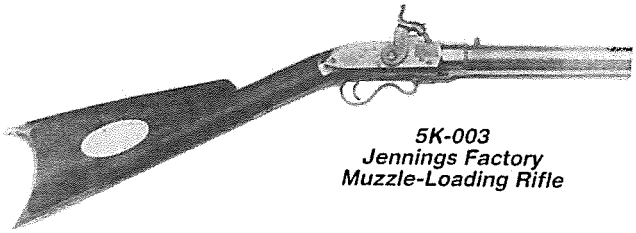
Designed by Patsy Howell and Donna Mummery
Edited by Ken Ramage

Printed in the United States of America

Jennings Factory Muzzle-Loading Rifle. Made c. 1852 only. New smaller frame using remaining parts from unsuccessful breechloading models. Ring trigger cut and altered to spur trigger; trigger guard re-formed with an indented bow. Breech of barrel plugged, striker pin on hammer ground flush, percussion nipple fitted on top of frame. Listed in previous editions of this Guide as number 5K-004:

5K-003 Values—Good **$950** Fine **$1,750**

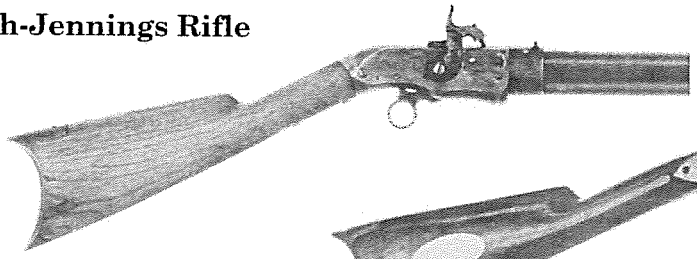


5K-003
Jennings Factory
Muzzle-Loading Rifle

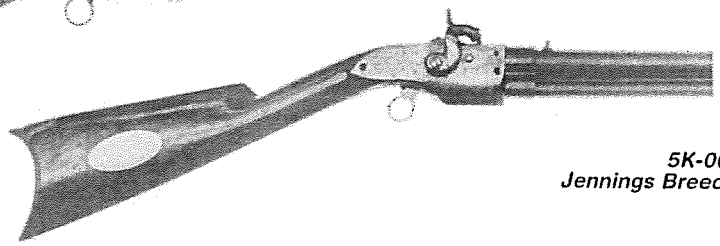
Non-Factory Converted Jennings to Muzzle-Loading Rifle. (Not illus.) Made c. 1850s. Encountered usually on the Second Model Jennings (above). Quality of workmanship varies greatly; unlikely any two of these are identical. Barrels plugged in usual manner with trigger guards, triggers, hammers altered, modified or replaced:

5K-003.5 Values—Good **$500** Fine **$900**

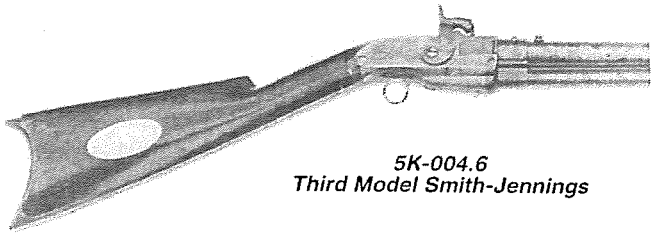
Smith-Jennings Rifle



5K-004
Jennings Repeating Rifle



5K-004.5
Jennings Breechloading Rifle



5K-004.6
Third Model Smith-Jennings

The Smith-Jennings Rifle. Horace Smith, an experienced gunsmith (and soon after of Smith & Wesson fame) was engaged to improve the Jennings Rifle c. 1851. He was issued a patent August, 1851 for an improved action and Robbins and Lawrence commenced manufacture of the repeater. All took the "Rocket Ball" cartridge and were pill primed. *All three models are repeating rifles;* all caliber 54. Markings are the same as on the Jennings (see above) retaining the *1849* patent date.

In earlier editions of the Guide, this rifle was termed "Second Model Smith-Jennings" number 5K-003. It is now more correctly listed as follows:

First Model Smith-Jennings; made 1851. Quantity approximately 500. Ring type lever-trigger without trigger guard. Front loading tubular cartridge magazine under barrel. Automatic pill magazine for priming the "Rocket Ball" ammunition. Flat sided (usually engraved) frame with evenly rounded forward undersection. Most often encountered of the three models:

5K-004 Values—Good **$3,500** Fine **$7,000**

Second Model Smith-Jennings; made c. 1851-52. Quantity less than 400. Very similar to First Model with improved pill priming system and cartridge carrier position spring. Frame has pronounced bulge on undersection resulting in nickname "pregnant frame Jennings":

5K-004.5 Values—Good **$4,000** Fine **$8,500**

Third Model Smith-Jennings; made 1852. Quantity less than 200. Long slender frame with escalloped (hollowed-out or fluted) lower sides of frame. Pill priming system further improved; side loading port changed from a simple swinging plate to one which slid open/closed within two channels:

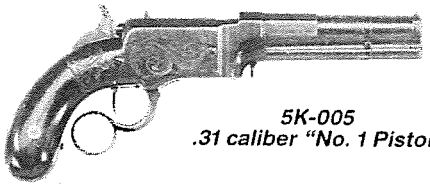
5K-004.6 Values—Good **$4,500** Fine **$9,500**

S&W Lever Action Repeating Pistols

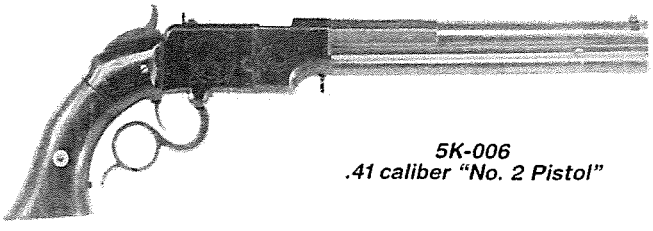
Smith & Wesson Lever Action Repeating Pistols. The next Winchester predecessor arms made after the Jennings were the Smith & Wesson repeaters. These were based on a Horace Smith and Daniel B. Wesson patent of 1854, and are historically intriguing due to the fact that the S&W firm today is famous for its success with revolvers.

The S&W Lever Action pistols were made in Norwich, Connecticut, c. 1854-55. The estimated total production was only about 1,700. Featuring the lever action mechanism, they have integral, front loading magazines located beneath the barrel. The self-contained cartridge was a special type, the hollowed out conical bullet containing the powder, and backed by the primer.

An important pioneer arm to both Smith & Wesson and Winchester collectors, the quite limited production total makes these pistols highly prized and difficult to obtain.



5K-005
.31 caliber "No. 1 Pistol"



5K-006
.41 caliber "No. 2 Pistol"

The basic models are:

31 Caliber No. 1 Pistol; 4" barrel, bag shaped varnished wooden grip, all steel construction with engraved frame. The lever with a round finger hole. Blued finish with browned barrels. Serial number usually found beneath the grips. Standard marking on barrel flats: SMITH & WESSON, NORWICH, CT. and PATENTED FEBRUARY 14, 1854 and CAST STEEL. Quantity made approximately 1,200:

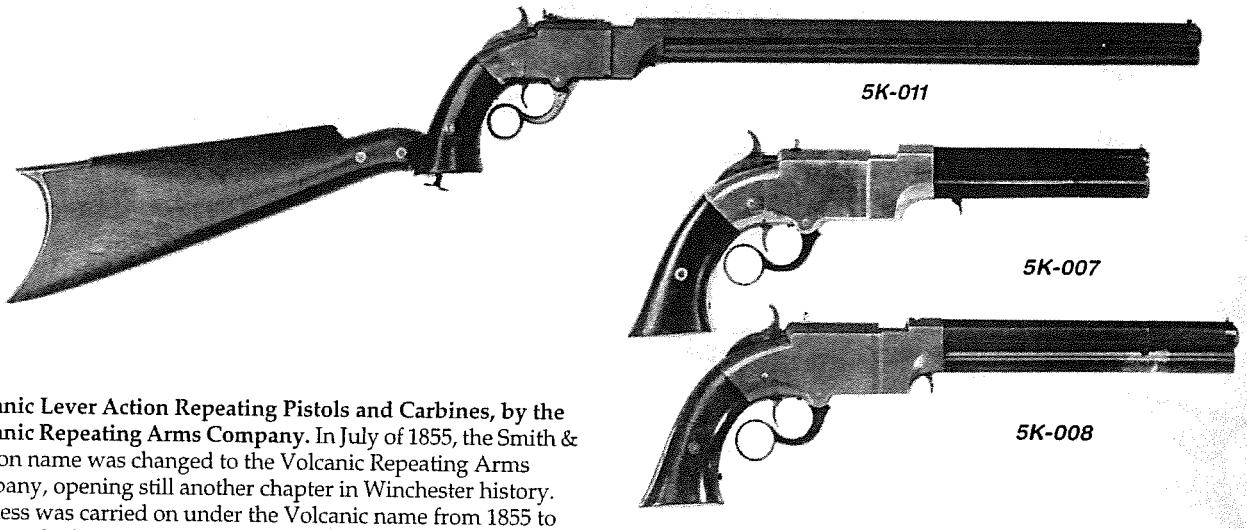
5K-005 Values—Good **$3,250** Fine **$12,500**

41 Caliber No. 2 Pistol; 8" barrel, flat bottomed varnished wooden grip, all steel construction with engraved frame. Note spur on bottom of the round finger hole of the lever. Blued finish with browned barrels. Serial number usually beneath grips. Generally marked on barrel top flat: SMITH & WESSON NORWICH, CT./CAST-STEEL PATENT. Also made with 6" bbl. and worth premium. Quantity made under 500:

5K-006 Values—Good **$5,500** Fine **$15,000**

NOTE: Calibers for S&W and Volcanic Arms have been variously listed as 30 and 38 cal. Correct sizes are 31 cal. and 41 cal. as shown.

Volcanic Lever Action Pistols and Carbines



5K-011

5K-007

5K-008

Volcanic Lever Action Repeating Pistols and Carbines, by the Volcanic Repeating Arms Company. In July of 1855, the Smith & Wesson name was changed to the Volcanic Repeating Arms Company, opening still another chapter in Winchester history. Business was carried on under the Volcanic name from 1855 to 1857, at which time it was reorganized as the New Haven Arms Company. Oliver F. Winchester, a successful manufacturer of clothing, became an increasingly active investor in the lever action arms, having first purchased stock in the Volcanic firm c. 1855. Smith and Wesson both dropped out of the enterprise c. 1855-56.

The breakdown of Volcanic arms is presented in the following model listings. All guns were of the same caliber, 41, and fired the patented, specially designed cartridges (though improved) of the Smith & Wesson type; magazines of integral structure, located beneath the barrel. The Volcanics began with serial 1, and have been observed marked in excess of the number 3000. Standard markings of all models, on the barrels: THE VOLCANIC/REPEATING ARMS CO./PATENT NEW HAVEN CONN/FEB 14, 1854. Marking variations are noted in these. Finish: Unfinished brass frames; the barrels blued. (Note: Engraved specimens, cut in a large, open scroll pattern, are often encountered. These arms command an added premium.)

Lever Action Navy Pistol; 6" barrel, 41 caliber, brass frame, flat-bottomed varnished walnut grip, rounded finger hole in the lever. VOLCANIC barrel markings as noted above. Quantity estimated 1,200:

5K-007 Values—Good **$3,500** Fine **$8,000**

Lever Action Navy Pistol; same as above but with 8" barrel. Quantity estimated 1,500:

5K-008 Values—Good **$3,500** Fine **$8,000**

(Note: Pistols as above fitted with shoulder stocks demand a premium.)

Lever Action Navy Pistol; as above but with 16" barrel, and attachable shoulder stock. Quantity estimated 300. Rare.

Pistol:

5K-009 Values—Good **$5,000** Fine **$16,000**

Pistol with Stock:

5K-010 Values—Good **$8,500** Fine **$22,500**

Lever Action Carbine; 41 caliber, barrel length of 16-1/2" utilizing left-over barrels from Navy Pistol. Long and straight, varnished walnut, buttstocks, with crescent type brass buttplate. VOLCANIC markings as noted above:

16-1/2" barrel:

5K-011 Values—Good **$7,000** Fine **$17,500**

21" barrel made only by New Haven Arms Co. (*q.v.*):

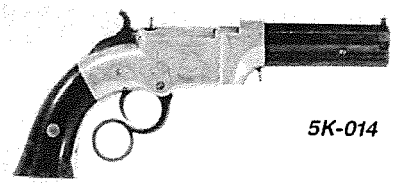
5K-012

25" barrel made only by New Haven Arms Co. (*q.v.*):

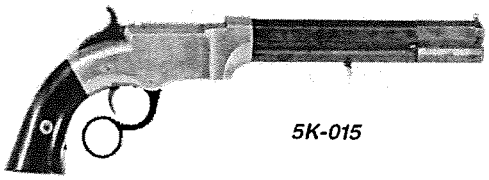
5K-013

Volcanic Lever Action Pistols and Carbines by New Haven Arms Co.

Volcanic Lever Action Repeating Pistols and Carbines, by the New Haven Arms Company. Due to increasing financial pressures, the Volcanic firm was reorganized into the New Haven Arms Company, in April of 1857. However, Volcanic remained as the trade name for the lever action pistols and carbines. A key means of telling the "Volcanic Volcanics" from the "New Haven Arms Company Volcanics" is the omission of VOLCANIC marks and change to PATENT FEB. 14, 1854/NEW HAVEN,CONN. Marking variations are also noted in these.



5K-014



5K-015

The New Haven Arms Company's Volcanic production lasted from 1857 to 1860, and the breakdown of models is presented below. The cartridge type, magazine, and other basic features remained as on the "Volcanic Volcanics." Total manufactured of the New Haven Volcanics is estimated at about 3,300; serial numbering began with 1. Finish: Unfinished brass frames; the barrels blued. (Note: Engraved specimens, cut in a large, open scroll pattern, are often encountered. These arms command an added premium.)

Lever Action No. 1 Pocket Pistol; 3-1/2" and 6" (Target type) barrels (scarce and will bring a premium), 31 caliber, small size brass frame, flat-bottomed varnished walnut grip, round finger hole in the lever. VOLCANIC barrel markings as on Volcanic Arms Company pistols, but including 1854 patent date and New Haven address:

3-1/2" barrel. Quantity estimated 850:
5K-014 Values—Good **$2,750** Fine **$5,000**

6" barrel. Quantity estimated 225:
5K-015 Values—Good **$3,250** Fine **$6,750**

Lever Action No. 2 Navy Pistol; 8" barrel, 41 caliber large size brass frame, flat-bottomed varnished walnut grip, round finger hole in lever. VOLCANIC barrel markings as above, including 1854 patent date and New Haven address. Quantity estimated 1,000:
5K-016 Values—Good **$3,750** Fine **$8,000**

No. 2 Navy Pistol identical above with 6" barrel. Quantity estimated 300:
5K-016.5 Values—Good **$4,250** Fine **$9,500**

Lever Action Navy Pistol; large frame model as above, but with 16" barrel, and attachable shoulder stock. Quantity unknown; extremely limited; very rare. Great caution should be exercised in acquiring this variant:

Pistol:
5K-017 Values—Good **$5,000** Fine **$15,000**

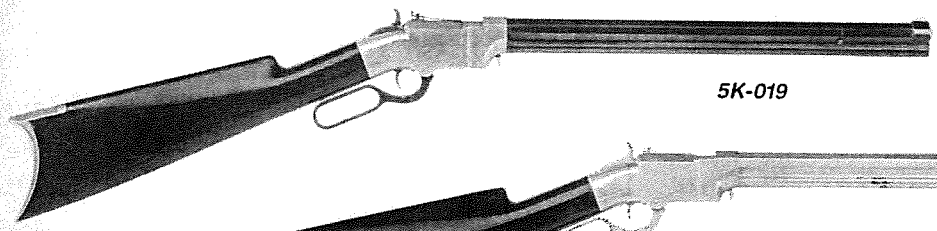
Pistol with Stock:
5K-018 Values—Good **$7,500** Fine **$22,500**

Lever Action Carbine; 41 caliber, barrel lengths of 16-1/2", 21", and 25". Large brass frame. Long and straight, varnished walnut, buttstocks with crescent type brass buttplate. Barrel markings as above, including 1854 patent date and New Haven address. Quantity estimated 1,000 for all three lengths:

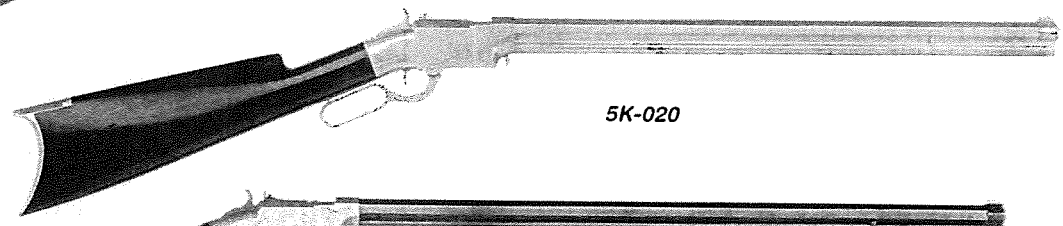
16-1/2" barrel:
5K-019 Values—Good **$7,000** Fine **$17,500**

21" barrel:
5K-020 Values—Good **$8,000** Fine **$24,000**

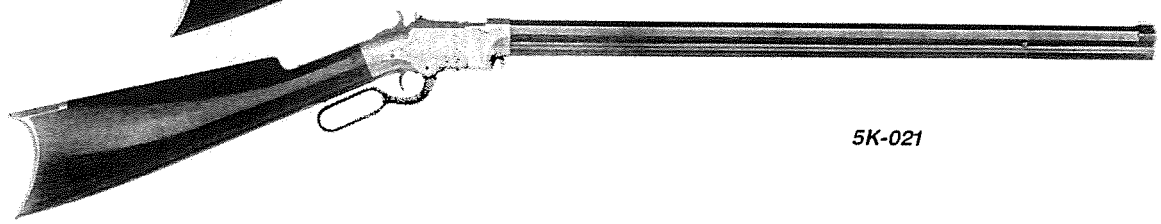
25" Barrel:
5K-021 Values—Good **$9,000** Fine **$27,500**



5K-019



5K-020



5K-021

See also Walch Revolver 7A-117

Henry Rifle

Henry Rifle. Made 1860-66; total quantity approximately 14,000. (overlap with model 1866).

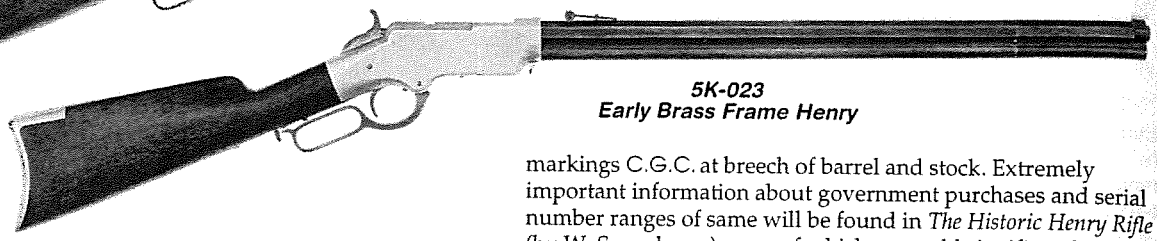
44 rimfire caliber. Tubular magazine integral with the barrel, and located beneath it. 15 shots. 24" barrel length standard.

Oil stained walnut stocks. Blued finish; brass frames usually left plain.

Serial numbers overlap the Model 1866. Highest Henry range is about 14000. Major serial number location on the top of breech end of barrel; marked: HENRY'S PATENT. OCT. 16. 1860/ MANUFACT'D BY THE NEW HAVEN ARMS. CO. NEW HAVEN. CT.

The Henry Rifle was developed from the Volcanic, and was built around the new 44 rimfire cartridge. Both the new rifle and the cartridge were designed by B. Tyler Henry. A basic feature of the 44 rimfire was the use of a metallic casing, rather than the undependable self-contained powder, ball and primer bullet of the Volcanic. Loading continued to be from the muzzle end of

5K-022
Iron Frame Henry



5K-023
Early Brass Frame Henry

the magazine. A distinctive identifying feature of the Henry is the lack of a forend, and the absence of a loading gate on either side of the frame. Made in relatively limited quantities, and a revolutionary weapon in Civil War service, the Henry is one of the major collector's items in the entire Winchester field. The model is difficult to obtain in fine condition and commands premium prices in all its variations. Quite a few company-size Union outfits, especially those from Kentucky, Illinois, Indiana and Missouri purchased at their own expense, and carried, Henry rifles. Much significant information on the development and history of this important rifle, its production, sale and usage by the military during the Civil War is found in *The Historic Henry Rifle* by W. Sword (q.v.).

Iron Frame Model. The most desirable Henry variation, featuring the frame of iron, rather than the standard brass. Rounded type iron buttplate at its heel; no lever latch; sporting style adjustable leaf rear sights. Quantity estimated 275. Serial number range 1 to 400:

5K-022 Values—Good **$30,000** Fine **$100,000**

Early Brass Frame Model. As above, but the frame and buttplate of brass. With or without lever latch. Serial numbers overlap iron frames. Total made about 1,500:

5K-023 Values—Good **$11,500** Fine **$35,000**

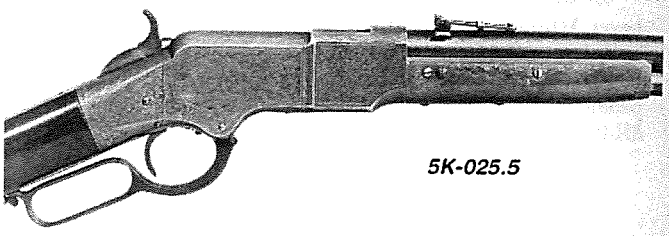
Late Brass Frame Model. As above, but the heel of the **brass** buttplate (**adopted approx. serial range no. 4,000**) has a pointed profile. Lever latch standard. Serial range primarily above about 2500 (overlap with early M1866 brass frame rifles):

5K-024 Values—Good **$10,000** Fine **$30,000**

U.S. Government Purchased and Issued Henry Rifles. Total quantity 1,731 acquired between 1862 and 1865. Most in serial range 3000 to 4200. Known issued to 1st Maine and 1st District of Columbia Cavalry Regiments, (more than 200 were captured Sept. 1864 from the 1st D.C. Regiment and issued to the 7th, 11th and 35th Virginia (Confederate) Cavalry); small quantity trial issues to other units. Believed brass frames only. Inspector markings C.G.C. at breech of barrel and stock. Extremely important information about government purchases and serial number ranges of same will be found in *The Historic Henry Rifle* (by W. Sword, q.v.) some of which may add significantly to historic significance and premium values.

5K-025 Values—Good **$20,000** Fine **$70,000**

Cleaning or wiping rods issued with all Henry rifles. Earliest types were jointed, four-piece hickory wood rods with small iron fittings for assembly. The four sections were stowed in the butt stock through a hinged brass door in buttplate. Later rods were four pieces of steel with brass tip stowed in butt in same manner. However, the aperture and the loading port was narrower in diameter, hence the earlier wooden rod will not fit into that later style! Reported that some earlier wooden rods may bear "CGC" inspector markings to accompany government contract rifles.



5K-025.5

Briggs Patent Henry Rifle. Although the King's Patent (May 22, 1866) hinged loading gate adapted to a Henry rifle became the device used to facilitate loading cartridges from the receiver in the M.1866, other methods were experimented with. Best known and most practical is the Briggs Patent of Oct. 16, 1866 which allowed for loading the magazine tube immediately in front of the receiver. Made only experimently, there are a handful of known examples that have come on the market. One method, made without a forearm, had the entire magazine tube slide forward; the other (illus. here) is fitted with a uniquely designed brass forend which slides forward to expose the bottom end of the magazine for ease in loading. Few recorded sales; values minimum in low five figures; upward considerably dependant on condition.

5K-025.5

Winchester Model 1866 Rifle

Model 1866 Rifle. Manufactured c. 1866-98; total produced approximately 170,101.

44 rimfire caliber. Tubular magazine located beneath the barrel. Distinctive brass frame.

Oil stained walnut stocks. Metal parts finished as follows: Lever and hammer casehardened; barrel browned or blued, magazine tube blued, the brass furniture left a natural finish.

Serial numbering overlaps that of the Henry Rifle, and began at about 12476. Until about the 20000 serial range the number was marked beneath the buttstock on the left side of the upper tang. Thereafter the number could be found on the lower tang and was visible without removing the buttstock.

These arms are not marked "Model 1866," and are easily distinguished by their brass frames with loading gates, and the presence of forestocks. Winchester Museum serial records are only partially complete on the 1866 production. Popularly known on the frontier as the "Yellow Boy", the Indian also called it "many shots" along with "heap firing" guns. The '66 is the repeating rifle most deserving of the name "The Gun That Won The West."

Rifles: Standard with 24" barrel, octagonal through about the serial range 100000, at which time round barrels became common. Brass frame, buttplate, and forend cap (steel cap became standard after serial range 135000). The buttplate of the crescent type.

Carbines: Standard with 20" round barrel and two barrel bands. Brass frame and buttplate, the latter of the distinctive curved profile. Saddle ring mounted on the left side of the frame.

Muskets: Standard with 27" round barrel, 24" magazine, and

EXHIBIT 29

The Guns of 1864

by Joseph Bilby - Monday, May 5, 2014

By mid-July 1864, after two and a half months of desperate fighting, the Confederate Army of Tennessee had been pushed from northern Georgia to the outskirts of Atlanta by Maj. Gen. William T. Sherman's Union forces. In a risky attempt to break the developing siege of the city, Confederate Lt. Gen. John B. Hood withdrew men from Atlanta's defensive lines and launched a series of assaults on Sherman's enveloping army. Hood's July 20 attack at Peach Tree Creek failed, but two days later his gambit seemed on the verge of success, as the Rebels broke through Yankee lines and, in the process, killed Maj. Gen. James B. McPherson.

When victorious Confederates surged into the Federal rear, however, they encountered stiffening resistance from Union units, including the 66th Illinois Infantry, a regiment with a large number of Henry .44-cal. repeating rifles in its ranks. Private Prosper Bowe of the 66th recalled that: "We started our [Henry] sixteen-shooters to work. The first column in front of us nearly all fell at two or three volleys." The "sixteen shooters" helped win the day, driving the Confederates from the field. The Rebel retreat proved timely for the rapid-firing Yankees, however, since they had begun to run out of ammunition. General Hood ultimately failed in his attempt to lift the siege of Atlanta, arguably at least partially due to the "sixteen shooters." The city was doomed, and with it, the Confederacy.

On Sept. 19, 1864, at Winchester, Va., Union Maj. Gen. Philip Sheridan launched his campaign to drive Confederate Gen. Jubal Early out of the Shenandoah Valley. As Sheridan's army advanced, Brig. Gen. Cullen A. Battle's Alabama brigade counterattacked and, exploiting a gap between two corps, precipitated a retreat all along the Sixth Army Corps front. The First New Jersey Brigade's fighting withdrawal held off the Rebels and then the Jerseymen were relieved by the 37th Massachusetts Infantry, a regiment recently re-armed with seven-shot Spencer repeating rifles, and the Bay State boys let loose a blizzard of bullets, slowing the Confederate advance. This, coupled with confusion caused by the death of Confederate Maj. Gen. Robert Rodes and a flank attack conducted by Brig. Gen. Emory Upton, halted the Rebels. The Massachusetts men, like their Illinois brothers in arms to the west, ran low on ammunition. They took to ground under a heavy fire of Confederate musketry until soldiers from the 2nd Rhode Island Infantry filled their pockets with Spencer .56-56-cal. cartridges and ran the ammunition up to the 37th. The Yankees went on to win the day, and Col. Elisha Hunt Rhodes of the 2nd was so impressed that he carried a Spencer carbine as his personal arm for the rest of the war.

If 1863 was the year of the rifle-musket, when the major armies of North and South were finally completely armed with the standard "modern" infantry arms of the day, 1864 could be called the year of the repeating rifle, as increasing numbers of Spencer and, to a more limited extent, Henry repeaters drew notice in the field. These revolutionary breech-loading arms fired self-contained copper rimfire cartridges, with primer, powder and bullet all in one sturdy water-resistant package. The South did not have the industrial capacity to make its own repeaters or ammunition for them, and, although captured Spencers and Henrys began to appear in Rebel ranks as the year wore on, Confederate combat use of captured repeating rifles, unlike rifle-muskets or even Sharps carbines, was dependant on a supply of captured cartridges.

The heavy fighting on all fronts that brought the repeating rifle to the foreground in the summer of 1864 originated in President Abraham Lincoln's promotion of Ulysses S. Grant, the victor at Vicksburg and Chattanooga, to lieutenant general and command of all Union ground forces. Leaders of the North and South realized that 1864 would be a crucial year, as the hopes of the Confederacy were largely pinned on a war-weary Union replacing Lincoln with a president amenable to a negotiated settlement. Such an election outcome would likely depend on the success or failure of federal armies in the field.

That spring Grant ordered a multi-pronged offensive and personally accompanied Maj. Gen. George G. Meade's Army of the Potomac in its drive south on Richmond, while his ablest lieutenant, "Uncle Billy" Sherman, marched on Atlanta and smaller armies advanced on other fronts. Grant realized that the Confederate ability to transfer forces from Virginia to Georgia was responsible for Gen. Braxton Bragg's victory at Chickamauga the previous September, and he hoped to avoid a repetition by applying pressure at as many points as possible.

In the event, the lesser campaigns did not accomplish much, but the main Union armies were quickly locked in combat with Gen. Robert E. Lee's Army of Northern Virginia and Gen. Joseph E. Johnston's Army of Tennessee. Sherman's task proved somewhat easier as he had more maneuver room in the west than Grant and Meade did in the east, hemmed in between the Blue Ridge Mountains and the sea in the advance on Richmond.

The Union armies of 1864, as well as their Confederate opponents, were better armed than they had been since the beginning of the conflict. Almost all of the infantrymen of the opposing Army of Northern Virginia and Army of the Potomac were equipped with rifled arms, mostly in caliber .58 Springfield or .577 Enfield patterns, although an April ordnance report from Battles' Brigade reveals a number of .54-cal. arms, either Austrian Lorenz imports or older U.S. Model 1841 rifles still in service. There were a few smoothbore muskets in the hands of Union troops, such as the New York regiments of the Irish Brigade and the 12th New Jersey Infantry, but because of preference, not because of a lack of available rifle-muskets.

Sherman's infantry was also well-armed with rifle-muskets and shouldered more repeating arms, including government-issued Spencer rifles and privately purchased Henrys, than the Army of the Potomac's foot soldiers. Although the eastern Confederate infantry had largely re-armed with rifle-muskets by mid-1863, in January 1864 their western counterparts were still shouldering a disproportionate number of smoothbores, despite capturing around 8,000 rifled arms (including 70 Spencers) at Chickamauga. As spring approached, however, the Army of Tennessee was issued enough imported Austrian Lorenz .54-cal. rifles to re-arm a third of its troops, and the vast majority began the campaign with rifled arms.

More attention appears to have been paid to marksmanship training in the Union army in the spring of 1864 than in previous years, but that instruction continued to be erratic and often lacking in fundamentals. In April, Army of the Potomac Provost Marshal Gen. Marsena Patrick authorized the issue of 10 rounds per man for target practice and ordered all enlisted men to load and fire their arms in the presence of an officer, because "there are men in this army who have been in numerous actions without ever firing their guns, and it is known that muskets taken on the battlefield have been found filled to the muzzle with cartridges."

Shooting instruction was, as in the past, largely left to individual unit commanders. In March and April, 1864, the 121st New York Infantry fired 10 rounds per man at 200 yards and five rounds per man at 300 yards. The 15th New Jersey Infantry had three successive days of target practice, with each man firing a mere three shots at targets set at 300 yards. In the west, Col. Benjamin F. Scribner of the 38th Illinois Infantry instituted a more rigorous regimen. Scribner's soldiers fired at man-sized targets at ranges of 100, 200, 300, 500 and 1,000 yards, marking hits and measuring distances to determine the accuracy of their sights and the trajectory of their shots.


Moe Phillips scoped musket. Rifle courtesy of the Emo Phillips collection.

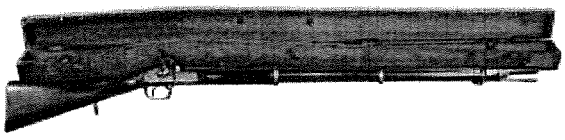
Confederate marksmanship training for line infantrymen was spotty as well, with the exception of Maj. Gen. Patrick Cleburne's division in the Army of Tennessee. Cleburne, an Irish-born British army veteran, had used British techniques to train his men in basic ballistics and range estimation since 1862. In the fall of 1863, Maj. Calhoun Benham, his chief of staff, produced a manual based on Cleburne's work and Capt. Henry Heth's largely

ignored pre-war translation of a French shooting handbook. General Bragg ordered it printed and distributed throughout the Army of Tennessee, although there is little evidence that it was implemented extensively. **SER284**

It is doubtful that the minimal infantry marksmanship training at longer ranges conducted in the spring of 1864 made any significant difference in the ensuing campaigns. Engagement ranges, although they had lengthened a bit since 1861, were still usually within 200 yards; historian Paddy Griffith computed an average 1864 engagement range as 141 yards. Later in the campaign, soldiers of the 5th New Jersey Infantry considered firing at the enemy at 200 yards "skirmishing and dueling at long range."

As 1864 ground on, more repeating arms made their way to Union foot soldiers. The percentage of privately owned Henrys in the 7th, 64th, 66th and 86th Illinois Infantry increased, with guns being delivered to units in the field as Sherman's army pushed south. When the men of the 5th and 6th Michigan Cavalry traded in their Spencer rifles for Spencer carbines in the fall of 1864, the rifles were re-issued to various Army of the Potomac infantry brigades for sharpshooter use. The state of Massachusetts bought Spencer rifles, which were issued to the 37th Massachusetts Infantry as the regiment passed through Washington in the summer of 1864, and to a sharpshooter company in the 57th Massachusetts Infantry. Some Spencer cavalry carbines were issued to infantry regiments as well, including, in December 1863, the 7th New Hampshire and 7th Connecticut, then serving in the siege of Charleston. In early 1864, however, the New Hampshire regiment turned over half of its carbines to the 40th Massachusetts Mounted Infantry.

The men of the 7th Connecticut fought well in an ultimately losing cause at Olustee, Fla., in February 1864, inflicting heavy casualties on the 64th Georgia Infantry until they were outflanked and their ammunition began to run low. In the end the African-American soldiers of the 54th Massachusetts Infantry saved the day, firing 20,000 rounds from their Enfield muzzleloaders to cover the federal retreat. In May, the Connecticut and New Hampshire regiments, nicknamed the "77th New England," used their Spencer carbines "to good



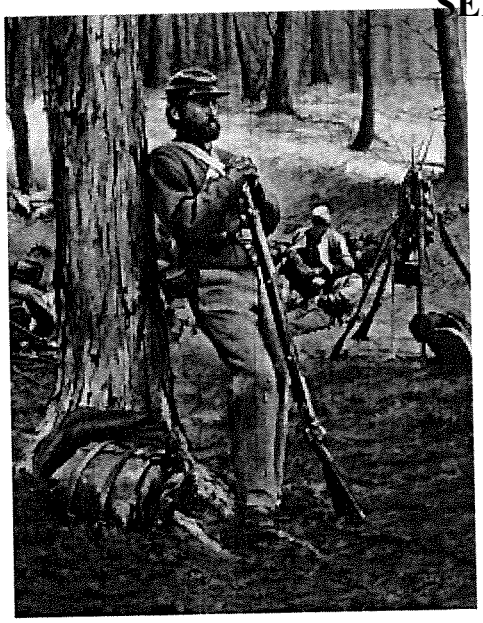
advantage" at Drewry's Bluff, Va., although Maj. Gen. Benjamin Butler's tactical ineptitude led to a retreat. Major Oliver Sanford of the Connecticut regiment said of his men that "with the Spencer carbine [and], plenty of ammunition ... nothing can stand before them."

Sharpshooters could be considered the ultimate Civil War infantrymen, and perhaps the best known such units were Col. Hiram Berdan's 1st and 2nd U.S. Sharpshooter regiments, armed with Sharps single-shot breechloaders with a few telescopic-sighted target rifles in reserve for use in static situations. Although the U.S. Sharpshooters performed well in 1864, both regiments were mustered out of service as their original enlistments expired in August and the following February. Recruits with service time remaining were transferred to line outfits from their respective states, taking their Sharps rifles with them. Sharps rifles were scattered throughout the army in other units, usually for use in skirmishing.

Berdan's regiments were not the only Union units bearing the "Sharpshooter" title. The 66th Illinois, which performed so well at Atlanta, began as "Birge's Western Sharpshooters," armed with civilian target rifles. Several companies of Ohio sharpshooters recruited in 1862 were initially issued rifle-muskets, later replaced by Spencer rifles, which like the Henry, were more suited to skirmishing than long-range work. The 1st Michigan Sharpshooters, recruited in 1862 and 1863, did not enter combat until 1864, and were armed with standard rifle-muskets. The 1st suffered heavy casualties in Virginia in 1864 fighting as line infantry, but there is evidence that some Native Americans from the regiment were allowed to camouflage themselves with cut corn stalks and roam the lines seeking targets of opportunity.

Although effectiveness varied, arguably the best sharpshooter units by 1864 were those in the Army of Northern Virginia, where brigades were authorized to form three to five company sharpshooter battalions. After testing all available arms, those battalions adopted the two-band .577-cal. muzzleloading Enfield rifle, as its five-groove fast rifling twist provided better long-range accuracy, and were issued high quality British-manufactured ammunition. They also received extensive marksmanship training and drill in small unit skirmish tactics, based on Heth's manual. These sharpshooter battalions had specific tactical assignments whenever their brigades were in action-to aggressively lead in the advance and provide an effective rear guard in withdrawal.

Each sharpshooter battalion company was issued one or two .451-cal. hexagonal-bored, fast-twist Whitworth rifles. The British Whitworths, some of which were equipped with side-mounted Davidson telescopic sights, weighed about the same as rifle-muskets, and were far more portable than the heavy target rifles used by Federal snipers. Perhaps the most famous long-range kill of 1864 was credited to a Whitworth. On May 9, at Spotsylvania, Va., seconds after proclaiming "they couldn't hit an elephant at this distance," Union Maj. Gen. John Sedgwick fell to a bullet fired from more than 600 yards away. That Sedgwick was singled out by the shooter is unlikely in the smoke and confusion of the battlefield. He had dismounted to assist an artillery battery in positioning its guns, and the battery itself was the likely target. Still, his death graphically demonstrated the long-range effectiveness of the Whitworth.



In the west, Confederate sharpshooter units, the best of them in Gen. Cleburne's Division, were armed with a mix of rifle-muskets, Whitworths and British-made .451-cal. Kerr rifles, as well as some heavy-barreled target rifles converted by the Atlanta arsenal to fire standard rifle-musket ammunition. Perhaps influenced by Cleburne's interest in long-range shooting, western Confederate sharpshooters seem to have concentrated on sniping more than skirmishing. Kentucky Sharpshooters from the Orphan Brigade were instructed to never approach within 400 yards when engaging federal artillery batteries with their Kerr rifles.

The impact of repeating firearm technology in 1864 was greatest in the Union mounted arm. Colonel John T. Wilder's "Lightning Brigade" of mounted infantry and the 5th and 6th Michigan Cavalry were issued Spencer rifles in 1863. That June, Wilder's men seized Hoover's Gap, Tenn., dismounted and used their Spencers to hold off a Confederate counterattack. Although the Michigan men had less clear results at Gettysburg, running out of ammunition at the Rummel Farm fight on July 3, both campaigns gained the Spencer an immediate following. After Spencer carbines went into production in October, Union cavalry units re-armed with them as rapidly as they reached the front. By the spring of 1864, demand was so great that the Ordnance Dept. contracted to buy every gun the Spencer factory made to replace the hodge-podge of single-shot carbines of varying

quality then in service. Cavalry Bureau Chief Brig. Gen. James H. Wilson reported that "the general desire of the best regiments is to be armed with the Spencer carbine," and the promise of Spencers was used to encourage re-enlistments.

The Henry rifle, with production limited to a few hundred guns a month, remained primarily a privately purchased infantry arm with ammunition supplied by the Ordnance Dept. Some Henrys ended up in the hands of horse soldiers, as influential Col. Lafayette Baker convinced the government to outfit his 1st District of Columbia Cavalry with them. Baker's Henrys, along with some purchased by soldiers in the 23rd Illinois Infantry, were among the few in use in the eastern theater of war, with most "sixteen shooters" found in the ranks of Sherman's western forces.

On May 9, 1864, as Grant moved south, the Army of the Potomac's 10,000-man cavalry corps conducted a massive raid deep into Virginia. At Yellow Tavern, Spencer-armed Michigan troopers combined dismounted firepower with conventional saber charges to drive the Rebels from the field, mortally wounding Confederate cavalry icon Maj. Gen. J.E.B. Stuart in the process. At Haw's Shop the Michigan men broke a stalemate and again sent the enemy running. Near Cold Harbor, Sharps and Spencer carbines broke a Confederate infantry advance in five minutes of rapid-fire shooting, and at Deep Bottom on July 28, dismounted federal cavalrymen armed with Spencers smashed an attack by four Confederate infantry brigades and pushed them from the field in disorder. In the west, the men of the Lightning Brigade successfully forded a river under fire, ducking beneath the surface to lever another round into their Spencers, and heard a startled Rebel cry out "look at them Yankee sons of bitches, loading their guns under water."

Repeating rifles did not guarantee victory, however, and they did fall into enemy hands when the battle went the other way. In a rear guard action at Brice's Crossroads, Miss., in June, a company of the 2nd New Jersey Cavalry took a wrong turn in the dark and was overrun, losing 50 Spencer carbines to Maj. Gen. Nathan B. Forrest's men. A Federal cavalry force was outflanked by Rebel infantry at Lovejoy's Station, Ga., in August and routed by a volley of musketry at 150 yds. followed by a rapid bayonet charge when the Confederates caught the dismounted Yankees reloading their Spencer magazines.

By November, Forrest had 73 Spencers in his command, and four out of five brigades in Brig. Gen. Wade Hampton's Confederate cavalry division in Virginia listed some Spencers in their ordnance reports. Virginia cavalrymen captured a number of Henry Rifles from the 1st D.C. Cavalry in a raid near Petersburg, and later used them against Yankees in the Shenandoah Valley. The employment of captured repeaters was, however, as previously noted, necessarily limited by the necessity to use captured ammunition.

One class of repeating arms that the Confederacy had in abundance, along with plenty of ammunition, however, was handguns, and many Rebel horsemen carried multiple revolvers. Union troops retrieved 36 sixguns from the bodies of six dead Missouri guerillas in late 1864, and when guerilla leader "Bloody Bill" Anderson met his end shortly afterward, he was carrying four revolvers. Multiple handguns were especially useful in the close-range, rapid-fire, hit-and-run mounted tactics favored by guerillas.

The men of Maj. John S. Mosby's 43rd Virginia Cavalry Battalion, which conducted numerous successful raids on federal supply lines in the Shenandoah Valley, usually carried four revolvers each. In November 1864, a special Spencer-armed Union unit under Capt. Richard Blazer was created to track down and destroy Mosby's Rangers, and, after some success, caught up with one of his companies at Kabletown, Va. The Rebels encountered dismounted Spencer fire and feigned retreat before turning and rapidly charging the outnumbered Yankees and delivering a blistering torrent of handgun bullets that wrecked Blazer's command in short order.

Unfortunately for the Confederacy, tactical victories like Kabletown were not reflected in the larger war. As 1864 came to a close, and more and more Spencer repeaters were delivered to the Union army, it was evident that Grant's strategy was the correct one. Atlanta had fallen and Sherman was cutting a 60-mile wide swath of destruction across Georgia on his way to Savannah and the sea with little opposition, while Gen. Hood and the remnants of his army lurched northward on a quixotic invasion of Tennessee that would end disastrously. Sheridan had decisively defeated Confederate forces in the Shenandoah Valley, once a major source of food for Lee's army, and was picking it clean. Although the Army of Northern Virginia was still a viable, if severely weakened, force, it remained pinned down in the Petersburg-Richmond siege lines by Grant and Meade. Lincoln's re-election in November sealed the deal, and a final winter of war began to set in upon the diminishing Southern Confederacy.

IN THIS ARTICLE

GUNS OF 1864 HENRY .44-CAL. REPEATING RIFLES JOSEPH BILBY

SEVEN-SHOT SPENCER REPEATING RIFLES SIXTEEN-SHOOTERS WINCHESTER VA

EXHIBIT 30

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The Model 66 Rifle

Even prior to the organization of the new company Oliver Winchester had his organization working on an improvement of the Henry rifle. The chief faults of that arm, it will be recalled, had developed in the cartridge extractor, which frequently broke off, and the slotted magazine, which was easily bent and was liable to pick up foreign material when the weapon was dropped. During the latter part of 1865 and continuing into the following year a number of patents were taken out and others acquired which covered various extracting devices and types of magazines.

After several experimental guns had been made up the Company announced a new rifle to the trade in 1866. This was the Model 1866, more commonly referred to as the Model 66, and the first gun to bear the name of the Winchester Repeating Arms Company.

According to the Company's catalog for 1867, ". . . The Winchester Rifle remains in the mechanism for loading and firing precisely the same as the Henry, except the cartridge extractor. The latest improvements consist of an entire change in the magazine and the arrangements for filling it. By these changes, the gun is made stronger yet lighter; the magazine is closed and strongly protected; it is more simple in operation, requiring fewer motions in the one case and fewer pieces in the other. Not only can this gun be fired thirty times a minute continuously as a repeater, but it can be used as a single loader without any attachment to be changed for the purpose, retaining the magazine full of cartridges to be used in an emergency, when the whole fifteen cartridges can be fired in fifteen seconds, or at the rate of sixty shots a minute, or in double-quick time, in seven and a half seconds, or at a rate of one hundred and twenty shots per minute, or two shots per second, loading from the magazines—an effectiveness far beyond that of any other arm." [3]

The gun was produced in several styles, including two sporting rifles, and a military musket. (*See Appendix A-1.*) The rifle carried 17 cartridges and the carbine 12. The ammunition was essentially the same as the original Henry cartridge, being produced with both a 200-grain pointed and a flat-nosed bullet and a standard load of 28 grains of black powder.

With the advent of the Model 66, the production of the Henry rifle was dropped. A few of the new guns were made during 1866, but manufacture really began the following year, after the move to Bridgeport had been completed. For six years the Company concentrated on this one model and during that period approximately a hundred thousand were manufactured and sold.

Promotion of Markets: Attempt to Obtain Government Adoption

As far as Oliver Winchester was concerned the Civil War had demonstrated conclusively the superiority of the repeating rifle over the single-shot. With an improved model, he began an immediate campaign to get the United States military authorities to adopt the Winchester rifle for the services. The attractions of such an adoption were twofold: there would be large and presumably regular purchases, and the prestige would help sales in other markets.

In a long memorandum, entitled "Winchester's Patent Repeating Fire Arm the Coming Gun," which was printed in the Company's catalogs from 1867 to 1875, he reviewed the development of the single-shot breech-loader and the repeating guns and stressed the popularity of the latter among troops during the Civil War. On logical grounds he could see no reason why the Government did