No. 768,301. PATENTED AUG. 23, 1904.

M. I. PUPIN.

WIRELESS ELECTRICAL SIGNALING.

APPLICATION FILED JUNE 13, 1903.

NO MODEL.

Fig. 1.

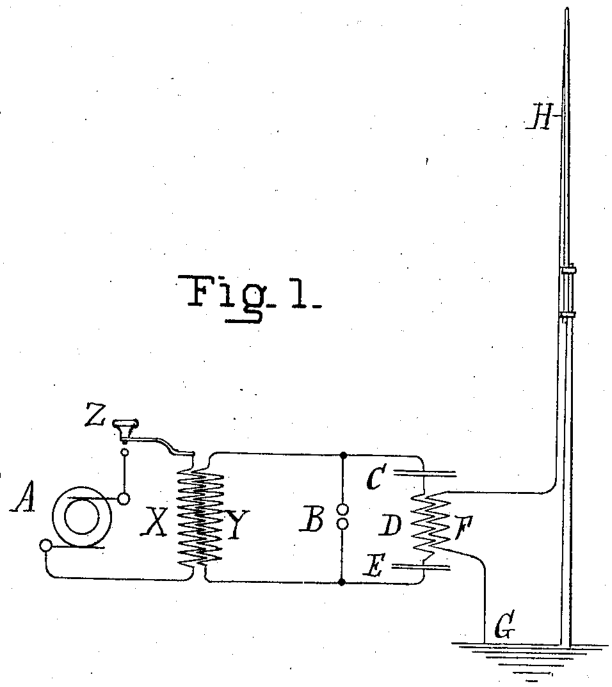
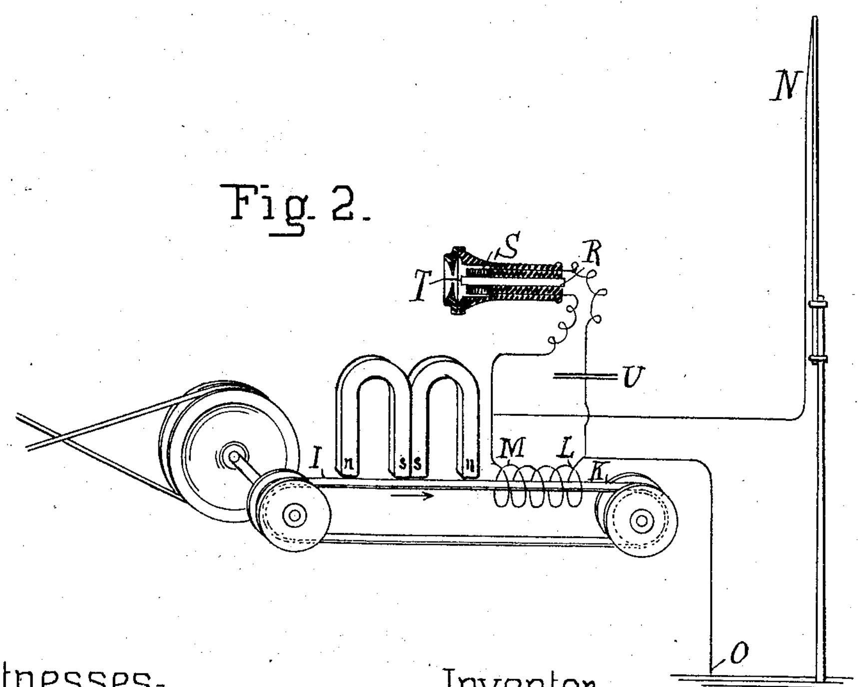


Fig. 2.



Witnesses:

Samuel W. Balch

Vernon M. Dorsey.

Inventor,

Michael I. Pupin,

by Thomas Ewing, Jr.

Attorney.

No. 768,301. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

MICHAEL I. PUPIN, OF NEW YORK, N. Y.

WIRELESS ELECTRICAL SIGNALING.

SPECIFICATION forming part of Letters Patent No. 768,301, dated August 23, 1904.

Application filed June 13, 1903. Serial No. 161,323. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL I. PUPIN, a citizen of the United States of America, and a resident of New York city, borough of Manhattan, in the county and State of New York, have invented certain new and useful Improvements in Wireless Electrical Signaling, of which the following is a specification.

My invention consists in an improvement of wireless transmission of electrical signals whereby the telephonic receiver at the receiving-station is brought into syntony with the rate at which the individual spark impulses at the sending end are delivered. In this manner the receiving apparatus is rendered selective.

In the accompanying drawings, which form part of this specification, Figure 1 is a diagram illustrating the transmitting apparatus of a wireless station, and Fig. 2 is a diagram illustrating the receiving apparatus of a wireless station.

Referring to Fig. 1, A is an alternator generating an approximately sinusoidal electromotive force of definite frequency. X Y are the primary and the secondary, respectively, of a transformer. Z is a key capable of closing and opening the primary circuit of the transformer. B is a spark-gap. C and E are condensers. D is the primary of an induction-coil. F is the secondary of this induction-coil, which is connected in series with the upright wire H G of a wireless transmitting-station. This upwright wire is grounded at G. The distance between the electrodes of the spark-gap B is such that the difference of the alternating electrical potential impressed upon it will at each one of its maxima points produce a spark between them and set up a series of oscillations in the local circuit B C D E. This frequency of the spark delivery will therefore be the frequency of the alternator. These oscillations are transmitted inductively to the upright wire H G and supply the necessary energy for the electrical waves which are transmitted from the upright wire to space. The condensers C and E and the effective inductance of the primary circuit B C D E are suitably adjusted in accordance with well-known practice.

Referring to the diagram of Fig. 2, O L M N is the upright receiving-wire of a wireless station. It is grounded at O. Connected with a suitable small coil L M is the coil S, which surrounds the permanent magnet of a telephonic receiver. The disk T of this receiver is adjusted in such a way as to have a definite frequency of free oscillation. This frequency is equal to the frequency of spark delivery or of the alternator at the transmitting end or to an integral multiple thereof. Under these conditions the electric magnetic impulses produced in the local receiving-circuit L M S U are in syntony with the vibrating period of the movable disk T. It is understood, of course, that the most favorable syntony exists when the number of impulses per second generated by the sparks at the transmitting end are equal to the natural period of the vibrating disk T at the receiving end; but sufficiently favorable results can be obtained also when the number of sparks per second delivered at the receiving end are an integral submultiple of the period of disk T.

It is desirable, but not absolutely necessary, to introduce into the local receiving-circuit a condenser U and adjust its capacity in such a way as to render the electrical period of this circuit equal to the period of the spark impulses coming from the transmitting-station.

Referring again to diagram of Fig. 2, I K is a part of an endless steel ribbon which moves in front of the poles *n s n* of a permanent magnet in the direction indicated by the arrow. It is well known that this ribbon retains a certain portion of the magnetization produced in it by the permanent magnet. It is also well known that when in its passage through the coil L M this permanent magnetization receives an impulse from an electrical wave passing through the receiving-wire it will disappear from the steel ribbon and induce an electromotive impulse in the local circuit L M S U. These electromotive impulses will have the same period as the sparks at the transmitting end, and they will produce, therefore, magnetic impulses in the coil S, which actuate the diaphragm T.

It is evident that instead of the spark-gap I may employ any other device which offers electrical resistance of disruptive character, such as a suitably-constructed mercury-vapor tube or other means for securing electrical impulses.

Having thus described my invention and the best manner known to me in which it can be carried out, what I claim, and desire to secure by Letters Patent, is—

In a wireless telegraph system, the combination of transmitting apparatus which includes a source of electrical energy, means for transmitting electrical waves to space, a local circuit comprising means suitably adjusted for giving electrical impulses of definite frequency, a transformer through which energy is impressed on the local circuit, an induction-coil through which energy is transferred from the local circuit to the means for transmitting electrical waves to space, and, at the receiving end, mechanical vibrating receiving apparatus in syntony with the frequency of the electrical impulses of the local circuit of the transmitting apparatus.

Signed at New York city, New York, this 12th day of June, 1903.

MICHAEL I. PUPIN.

Witnesses:
THOMAS EWING, Jr.,
VERNON M. DORSEY.