

No. 749,371.

PATENTED JAN. 12, 1904.

L. DE FOREST.
WIRELESS TELEGRAPH RECEIVER.

APPLICATION FILED JUNE 4, 1903.

NO MODEL.

Fig. 1.

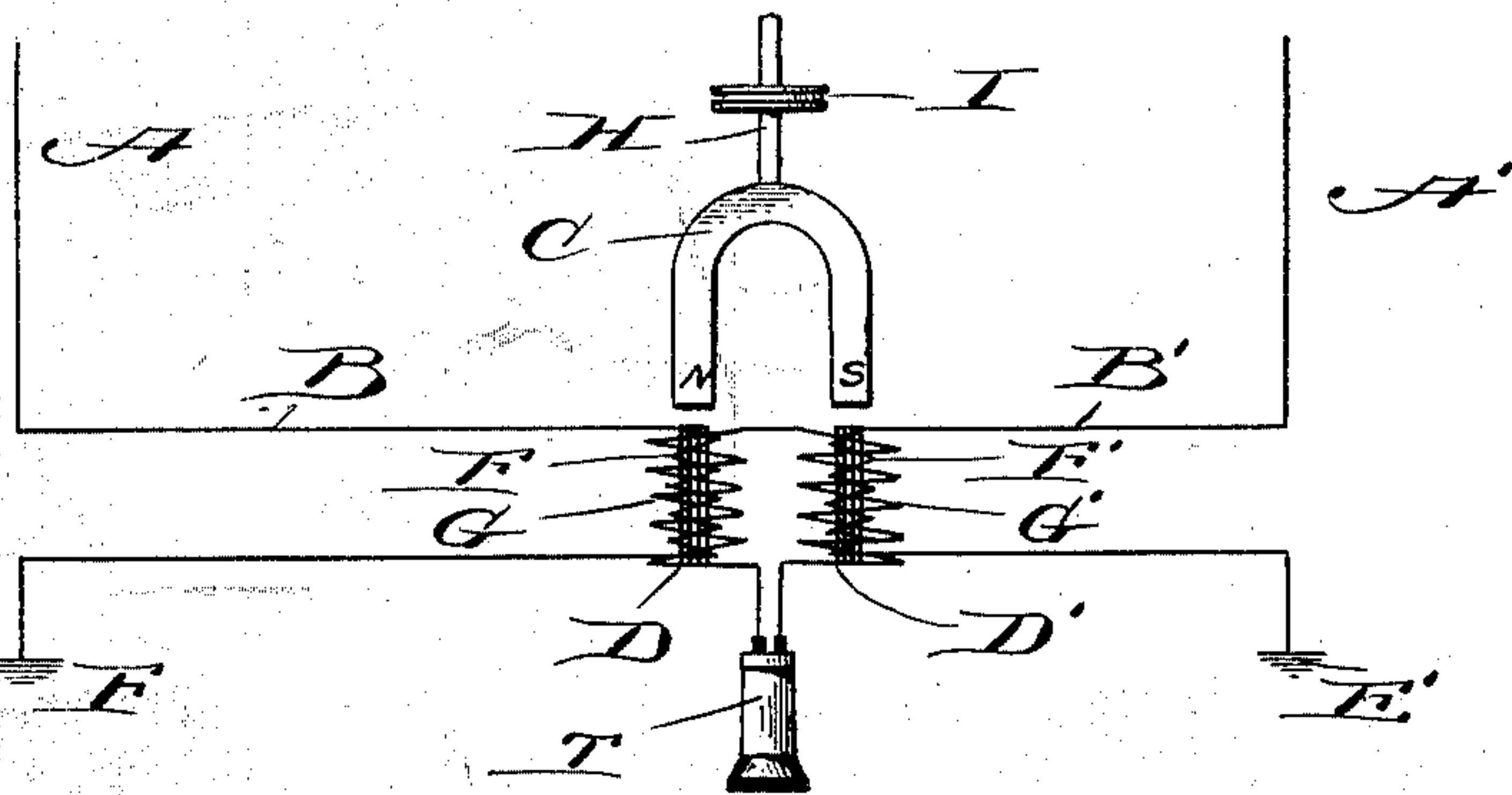


Fig. 2.

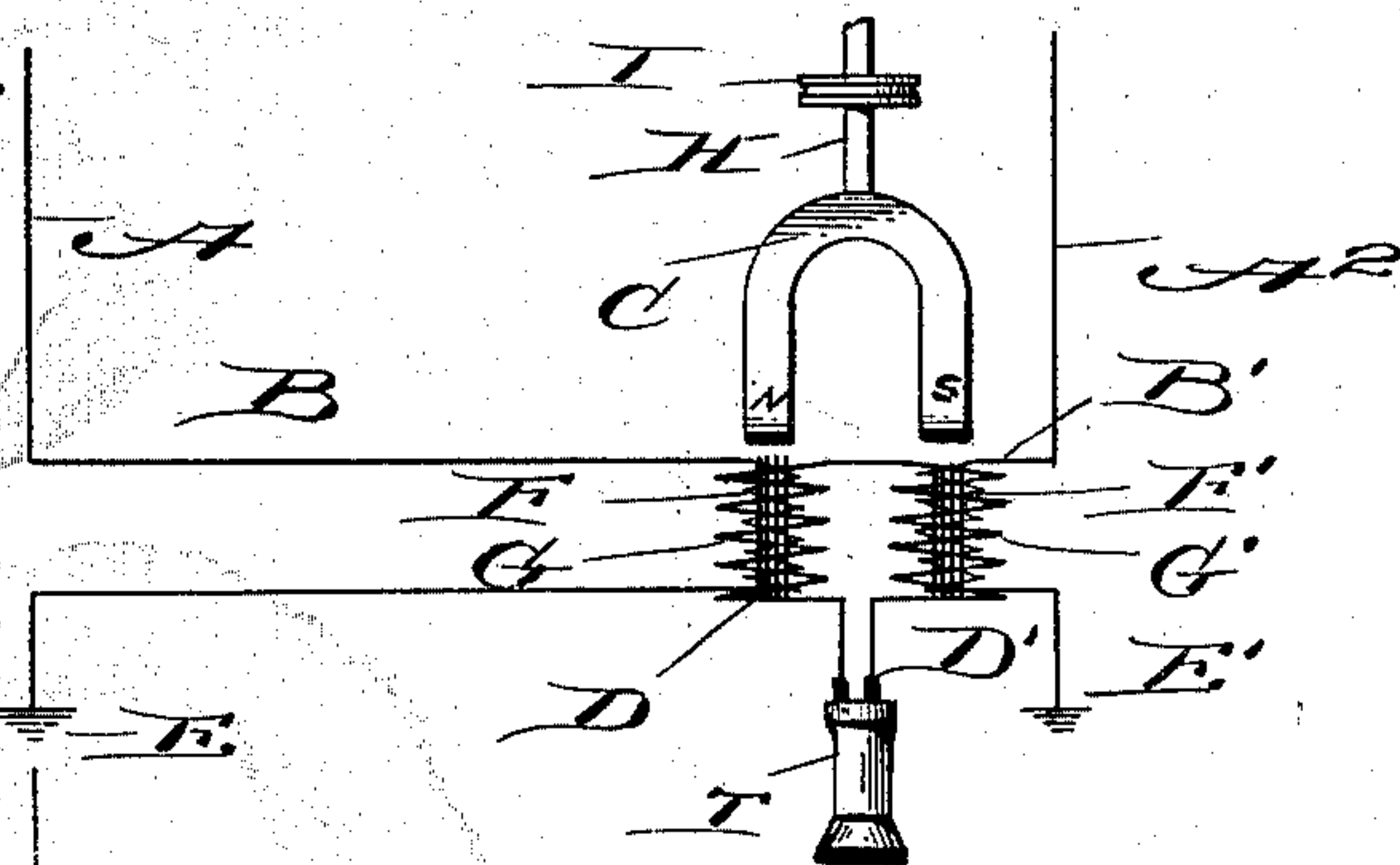


Fig. 3.

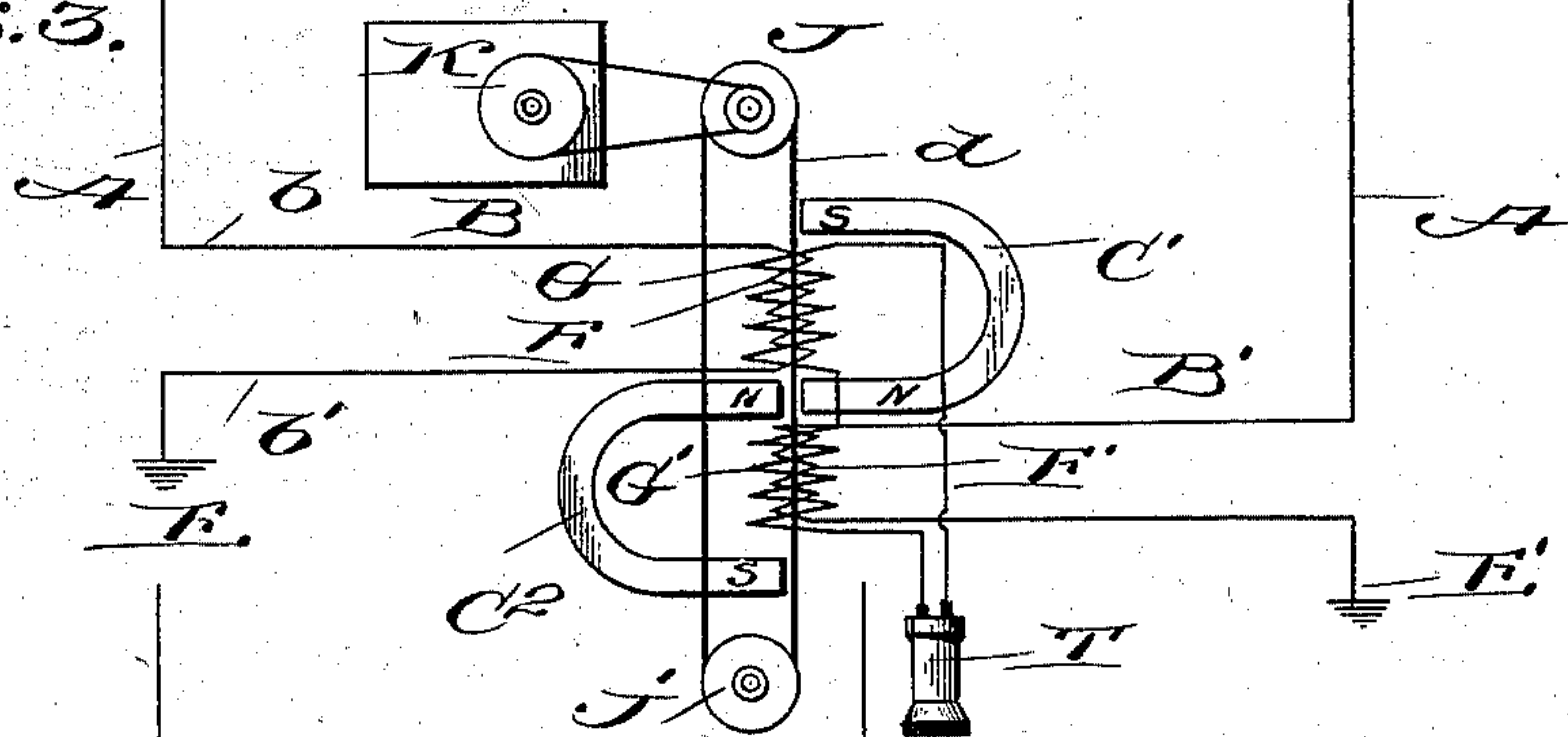
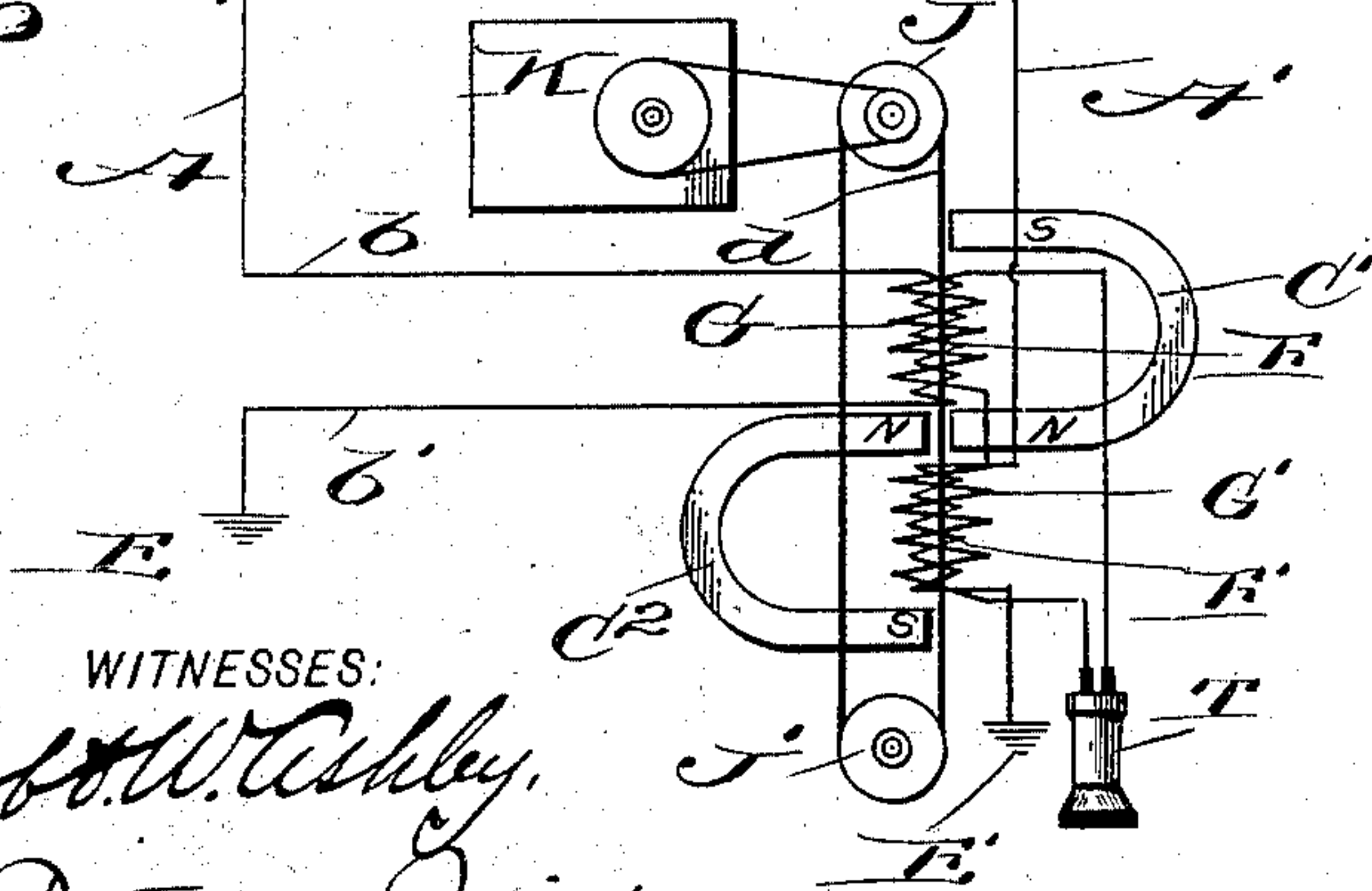


Fig. 4.



WITNESSES:

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WIRELESS-TELEGRAPH RECEIVER.

SPECIFICATION forming part of Letters Patent No. 749,371, dated January 12, 1904.

Application filed June 4, 1903. Serial No. 160,027. (No model.)

To all whom it may concern:

Be it known that I, LEE DE FOREST, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Wireless-Telegraph Receivers, of which the following is a specification.

My invention relates to improvements in receiving apparatus for wireless-telegraph systems, and particularly to the adaptation of a magnetic detector to use with a duplex system, whereby waves of other character than those for which the apparatus is designed will not injuriously affect the receiving apparatus.

My invention further relates to the adaptation of a magnetic detector for use with a plurality of receiving systems, whether those systems affect the translating instrument oppositely or additively.

The scope of my invention will be defined by the following description and the claims terminating the same.

The drawings accompanying herewith show my invention embodied in forms now preferred by me.

Figure 1 shows two tuned receiving systems each having a magnetic detector and a translating instrument oppositely affected by each. Fig. 2 is the same, except that one tuned receiving system and one untuned or aperiodic receiving system is employed. Figs. 3 and 4 are respectively like Figs. 1 and 2, except that a different form of magnetic detector is shown.

In Fig. 1 I have shown two tuned or periodic receiving systems, said systems containing, one, the antenna A and its connected resonant conductors B and the other the antenna A' and its connected resonant conductors B'. Any construction may be employed which will secure the desired tuning of the systems. I have shown a construction which I have found to be effective for this result; but any other effective means may be employed. The means shown consists of the parallel wires *bb* and *b'b'*, each pair constituting a resonant system of strong periodicity, the same being known in the art as "Lecher" conductors. One end of one wire of a pair is connected with the antenna and the corresponding end of its companion wire with the earth, as E or E'. The

opposite ends of each pair are connected by one member of a solenoid, the same in Figs. 1, 2, 3, and 4 being the coil F or F', as the case may be. Within such coils are cores D and D', which preferably consist of a bundle of fine magnetizable needles, as of steel, Figs. 1 and 2, or of a movable band of steel or iron wire, Figs. 3 and 4. The solenoids of both systems are placed in a variable magnetic field produced in any manner. I have shown this in Figs. 1 and 2 as produced by the rotation of a magnet C, which is mounted upon a shaft H and may be turned by any suitable means, as by a pulley *l* and belt from a convenient motor or clock mechanism. The two detectors and the magnet C are so proportioned and placed that the poles of the magnet in turn pass close by each detector, as is clearly shown in Fig. 1. The magnetism of the cores is thus constantly changing its sign and varying in intensity. Under these conditions the passage of the high-frequency oscillating waves induced in the resonant circuit by the aerially-transmitted impulses will cause a sudden variation in the magnetism of the detector, which may be made manifest by impressing the same upon a translating instrument. A similar effect may be obtained by subjecting the solenoids to the influence of a fluctuating or other variable magnetic field.

The means shown in Figs. 1 to 4 for causing the sudden variation in magnetism of the core to produce a signal consists of two coils G and G', which respectively surround the coils F and F' of the solenoids and are included in the local circuit which contains the translating instrument. These coils are, however, oppositely wound, so that their effects are opposite, one tending to neutralize the other. If, therefore, each are equally affected, one will exactly neutralize the other and no effect will be produced in the translating instrument. The form of translating instrument shown consists of a telephone-receiver T, which is affected as a result of the received wave so as to produce a click or series of clicks extending over the duration of the signal element. Any other form of translating instrument may be employed.

The apparatus shown in Fig. 2 is the same

as Fig. 1, except that one of the receiving systems is untuned or aperiodic. In this the antenna is connected closely and in any convenient way with its solenoid-coil F' and no special tuning devices are employed therewith.

With the duplex tuned systems shown in Fig. 1 a wave-train of a period corresponding with the period of either system will affect that system, but will not materially affect the other system if it is of a strongly selective character. In such case a signal will be indicated by the translating instrument. An aperiodic wave-train or one having a period differing with both systems will equally affect both systems and will therefore produce no result in the translating instrument.

In Figs. 3 and 4 I have shown the same kinds of receiving systems, but a modified form of detector employed therewith. In this the core consists of an endless band d of magnetizable material, as steel or iron, passing over pulleys J and J' , which are constantly turned by any convenient means, as a motor mechanism K . This band d passes successively through the coils F and F' of the two detectors and is controlled in its magnetism by the two permanent magnets C' and C'' , which restore the magnetic condition of the wire just before it enters the coils. The action of this detector is precisely the same as of the one shown in Figs. 1 and 2. Other modified forms of detectors may be employed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A receiving apparatus for wireless telegraphy, comprising two differently-tuned receiving systems, two coiled conductors and magnetic cores therefor comprising solenoids, one member of each solenoid being in its respective receiving system, means for producing a varying magnetic field to include said solenoids, and a translating instrument oppositely affected by each of said solenoids.

2. A receiving apparatus for wireless telegraphy, comprising two differently-tuned receiving systems, a separate magnetic detector

for each system and a translating instrument oppositely affected by said detectors.

3. A receiving apparatus for wireless telegraphy, comprising two differently-tuned receiving systems, a solenoid for each of said systems having its coil in the aerial circuit thereof, a magnetic core for each solenoid, means for creating a variable magnetic field which includes said solenoids, and a translating instrument oppositely affected by said solenoids.

4. A receiving apparatus for wireless telegraphy, comprising two differently-tuned receiving systems, a solenoid for each of said systems having its coil in the aerial circuit thereof, a magnetic core for each solenoid, means for creating a variable magnetic field which includes said solenoids, a local circuit containing oppositely-connected coils inductively acted upon, each by its respective solenoid, and a translating instrument in said local circuit.

5. A receiving apparatus for wireless telegraphy, comprising two differently-tuned receiving systems, a solenoid and its core for each system having its coil in the aerial circuit thereof, means for automatically remagnetizing the core of said solenoid and a translating instrument oppositely affected by variations of the magnetic conditions of said solenoids.

6. A receiving apparatus for wireless telegraphy, comprising a plurality of differently-tuned receiving systems, a solenoid and its core for each system having its coil in the aerial circuit thereof, means for automatically remagnetizing the core of said solenoid, a local circuit containing a translating instrument and coils each embracing its respective solenoid and oppositely connected in said local circuit.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

LEE DE FOREST.

Witnesses:

P. H. HALL,
H. L. REYNOLDS.