

J. F. KING.  
WIRELESS TELEGRAPHY.  
APPLICATION FILED FEB. 5, 1902.

NO MODEL.

FIG. 1.

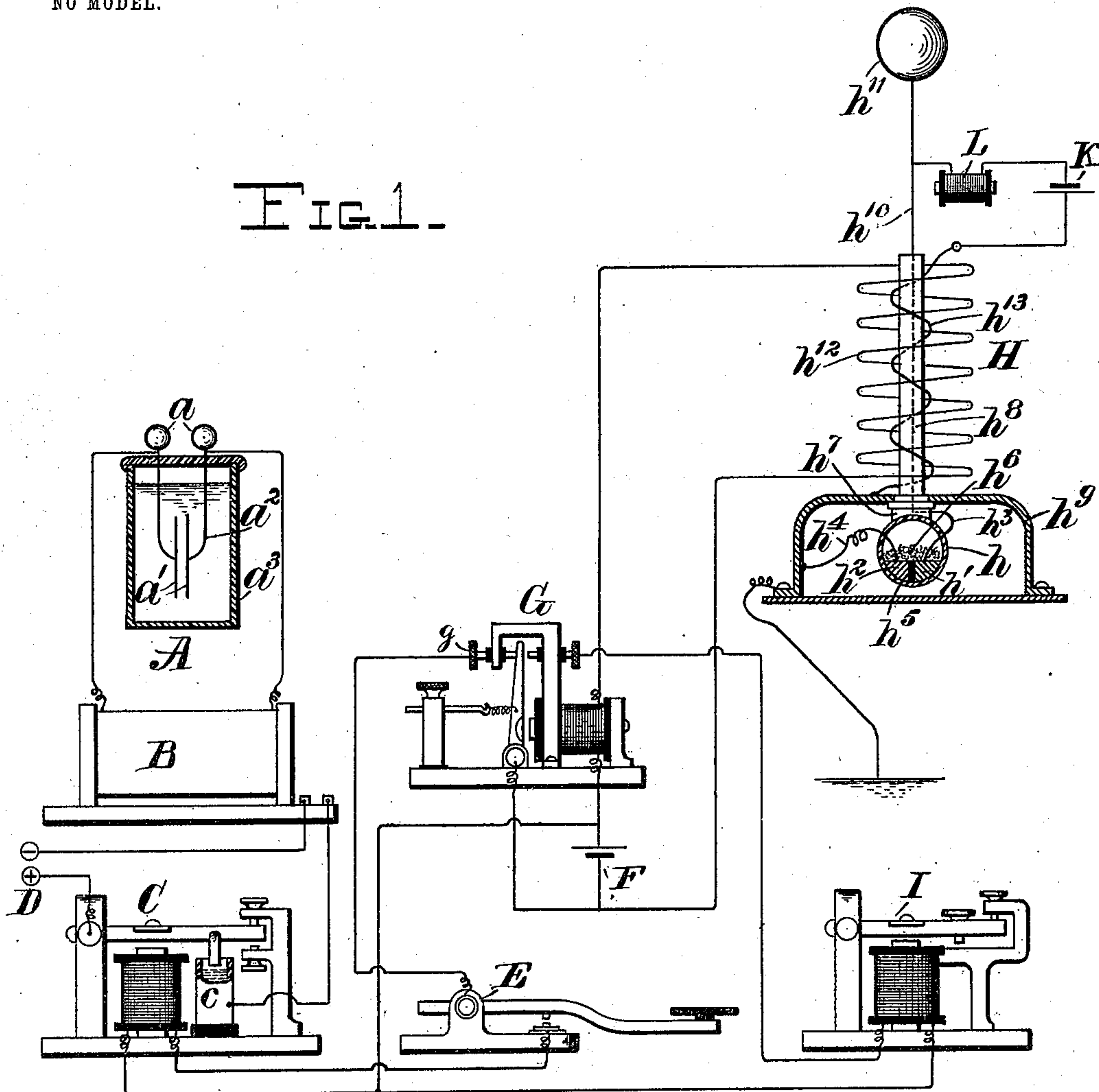
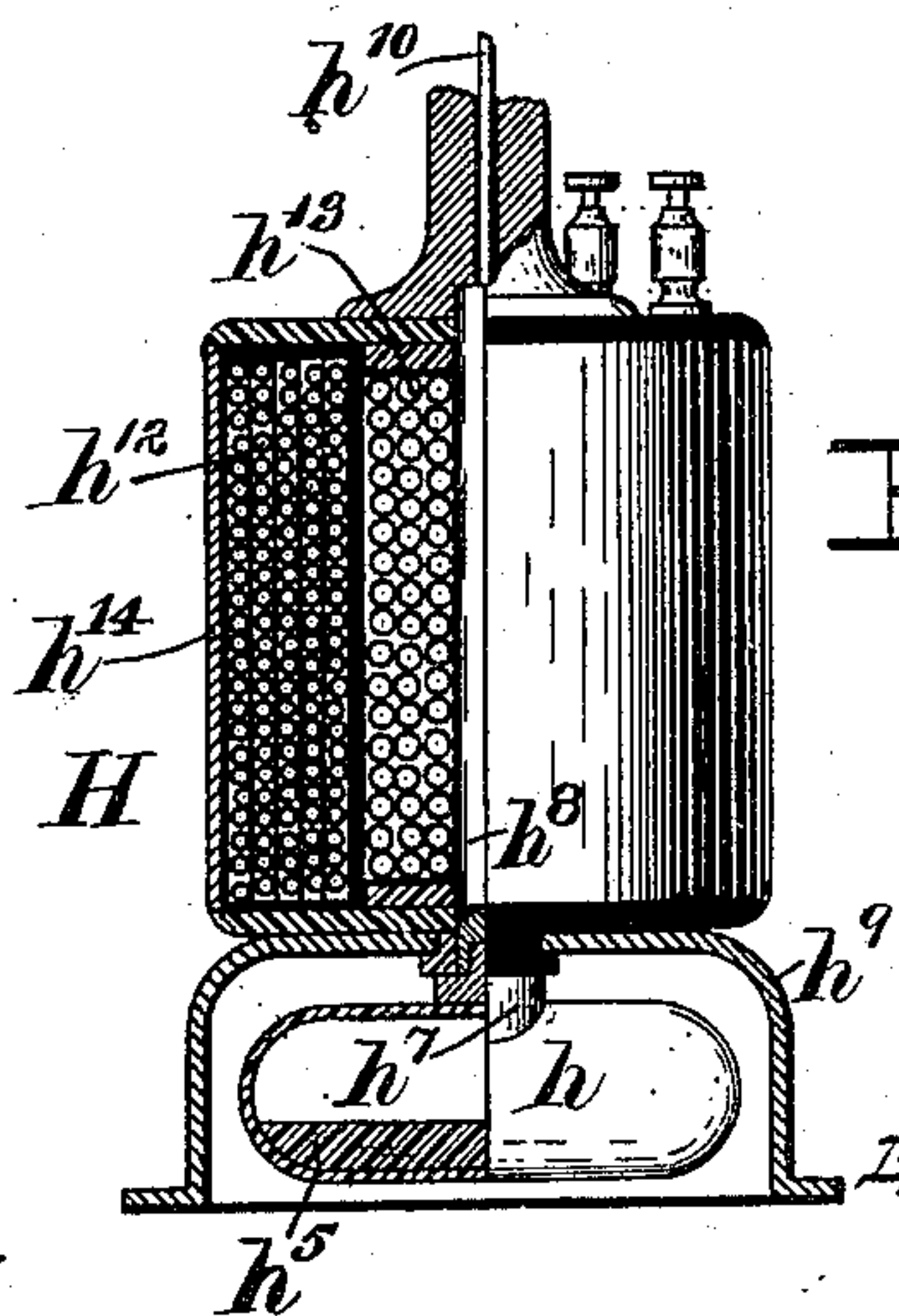


FIG. 2.



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## UNITED STATES PATENT OFFICE.

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## WIRELESS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 728,243, dated May 19, 1903.

Application filed February 5, 1902. Serial No. 92,695. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES FOSTER KING, a citizen of the United States, residing at 360 West One Hundred and Seventeenth street, New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Wireless Telegraphy; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in wireless telegraphy, the object of the said invention being to increase the efficiency of this class of telegraphs, as well as to simplify and reduce the cost of the same.

To these ends my said invention embodies the combination and arrangement of parts hereinafter fully described, and pointed out in the claims.

In order to more fully describe my said invention, reference will be had to the accompanying drawings, in which—

Figure 1 is a diagram representing the transmitting and receiving apparatus and connections embodying my invention, and Fig. 2 represents in side elevation and partly in central vertical section the coherer and combined decoherer and induction-coil.

Similar letters refer to similar parts throughout both views.

Referring first to the transmitting part of the apparatus, A represents the oscillator, comprising the usual spheres  $a$ , but in this case having capacity connected across them direct consisting of two metal plates  $a'$ , secured to preferably flexible conductors  $a^2$ , on which the spheres are mounted. The plates  $a'$  are immersed in oil, carried in any suitable receptacle, as the jar  $a^3$ . The spheres of this oscillator are connected in the secondary circuit of a Rhumkorff or other suitable induction or spark coil B.

C represents the electromagnetic transmitter, which takes the place of the ordinary transmitting-key usually connected in the primary circuit of the spark-coil. This transmitter, unlike the ordinary key, makes and breaks the said primary circuit through a mercury-cup connection  $c$ . The primary current for the coil B may be derived from any

suitable source of electricity D. This magnetic transmitter is operated by a Morse key E or other suitable contact-maker, which is connected in circuit with the magnet-coil of said transmitter through a battery F and tongue and back-stop contact  $g$  of a relay G.

The receiving apparatus comprises a coherer and combined induction-coil and decoherer H, double contact-relay G, and the sounder I. This coherer comprises, among other parts, a glass sealed tube  $h$ , in which is carried two silver plates  $h'$   $h^2$ , having preferably flat upper surfaces and separated longitudinally by insulation  $h^5$ . These plates are provided, respectively, with the platinum-wire terminals  $h^3$   $h^4$ , which are fused in the tube. On the upper flat surfaces of these plates is placed the metallic particles  $h^6$ , which form the coherer resistance. Though these particles may be of the ordinary kind used in coherers generally I preferably employ a novel form, consisting each of a magnetic core—iron, for example—surrounded by or enveloped in a non-magnetic and non-oxidizable covering, such as platinum. By thus providing the iron core with a platinum covering the particle is preserved against the destructive action of sparks. Moreover, on account of the very low resistance of the platinum and its non-oxidizable property better contact is formed and more current flows through the coherer than would otherwise be the case. Oxidation of the parts inside the coherer-tube is further prevented by exhausting the air from it. The top of the coherer-tube is secured fast to a magnet-pole piece  $h^7$ , which is in turn secured to the iron core  $h^8$  of an induction-coil. A thick copper casing  $h^9$  supports the induction-coil and surrounds the coherer and protects it from local influences. The coherer-terminal  $h^3$  connects to the aerial wire  $h^{10}$ , which passes through and is insulated from the core  $h^8$  and terminates in the sphere  $h^{11}$  or its equivalent. The other coherer-terminal  $h^4$  makes connection with the metal casing  $h^9$ , which may be connected to earth, if desired.

In contradistinction to other systems I work the receiving-relay upon a secondary or induced circuit. This circuit is the secondary  $h^{12}$  of the coherer induction-coil, which is preferably of fine German silver wire wound



to about the same resistance as the coils of the relay. The primary  $h^{13}$  of this induction-coil is connected in series with the coherer-plates, coherer-battery K, choking-coil L, and part of the aerial circuit. The connection from the primary to the coherer-terminal  $h^4$  is shown as made through the metal casing  $h^9$ . The primary and secondary coils of this induction-coil are mounted on suitable bobbins of insulation, slipped over the core, and inclosed in a suitable casing  $h^{14}$ , as shown in Fig. 2. The self induction of the choking-coil L must be sufficient to damp out all the waves that tend to pass through it, and hence through the battery K and the primary of the coherer induction-coil. The transmission is effected through the oscillator by operating the Morse key in the usual manner. The operation of this key makes and breaks the circuit through the magnet-coils of the transmitter C, and thus causes it to act through its mercury contact and make and break the primary circuit of the induction-coil B. By this arrangement a very small battery-current is made to pass through the transmitting-key, while the heavy current for the induction-coil does not pass through the key at all, but through the mercury contact, which is very much better than having this current traverse the key. The circuit of the Morse key, it will be observed, includes the tongue of the relay G and the back-stop contact, so that it will be seen that when the receiver is operating, which breaks the connection between the said tongue and contact, the transmitting apparatus cannot operate. This relay, which is in reality a double-contact switch as well as a relay, is entirely automatic in its action and overcomes the necessity of manually disconnecting the transmitter when the receiver is operating. The messages are received by oscillations striking the sphere  $h^{11}$ , connected to the aerial wire, causing the coherer particles to cohere, and thus complete the circuit of the battery K. This at once induces a current in the secondary of the coherer induction-coil connected to the relay G and at the same time energizes the magnet pole-piece  $h^7$ , which attracts the particles and causes them to decohere. This induced current, however, will not alone energize the magnet of the relay G sufficiently to cause the said magnet to attract its tongue, nor is the current from the battery F alone sufficient to operate the said relay, but the combined action of the battery and the induced current when both are acting in the same direction will be sufficient to operate the said relay. Each time this relay is thus operated it completes, through its tongue, the local circuit of the sounder I.

While I have herein shown and described a special receiver of electrical oscillations comprising the combined coherer, decoherer, and induction-coil, I do not wish to be understood as limiting my present invention to use with this special form of instrument, this

receiver being the subject of a separate application comprising a division of the present one and filed July 23, 1902, Serial No. 116,676.

Having thus described my invention, it is obvious that the same may be modified without departing from the spirit thereof; but

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a system of wireless telegraphy, the combination with a source of electricity, of an induction-coil receiving its primary current from said source, an oscillator connected directly in the secondary circuit of said induction-coil, a transmitter having an electromagnetically-operated make-and-break liquid contact located in the primary circuit of said induction-coil, and means for operating said transmitter, to cause it to make and break the said primary circuit through said liquid contact.

2. In a system of wireless telegraphy, the combination with an induction-coil and an oscillator for operating the same, of a transmitter having an electromagnetically-operated make-and-break liquid contact located in the primary circuit of said induction-coil, and means for operating said transmitter, said means comprising a key, and a key-circuit traversing the magnet-coils of said transmitter, the said circuit being made and broken by the said key alone during the transmission of a message.

3. In a system of wireless telegraphy, the combination with transmitting and receiving apparatus, of means acting to automatically render the transmitting apparatus inoperative at such times as the receiving apparatus is in operation.

4. A system of wireless telegraphy having transmitting and receiving apparatus, and automatic means operating electrically and acting to render the transmitting apparatus inoperative during the time that the receiving apparatus is in operation.

5. In a system of wireless telegraphy, the combination with the transmitting and receiving apparatus, of a key-circuit and receiving-relay operating automatically to break the key-circuit when the receiving apparatus is in operation.

6. In a system of wireless telegraphy, the combination with a transmitting key-circuit, and a receiving-circuit, of a double-contact switch having one of its contacts located in said key-circuit and the other in said receiving-circuit, and a contact-maker common to both circuits, said switch operating automatically to break the said key-circuit when the receiving apparatus is in operation.

7. In a system of wireless telegraphy, the combination with a transmitting key-circuit, and a receiving-circuit, of a double-contact receiving-relay having one of its contacts located in said key-circuit and the other in said receiving-circuit, and a contact-maker common to both circuits, said receiving-relay operating automatically to break the said key-



circuit when the receiving apparatus is in operation.

8. In a system of wireless telegraphy, a receiving-relay, a sounder operated through the tongue and forward contact of said relay and a transmitter operated through the tongue and idle back-stop thereof, said relay rendering said transmitter inoperative during the time that said receiving apparatus is in operation.

9. In a system of wireless telegraphy, a

transmitter, a receiving-relay, a combined decoherer and induction-coil, and a common source of electricity connected to said transmitter, relay and secondary of said induction-coil of said decoherer.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES FOSTER KING.

Witnesses:

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