

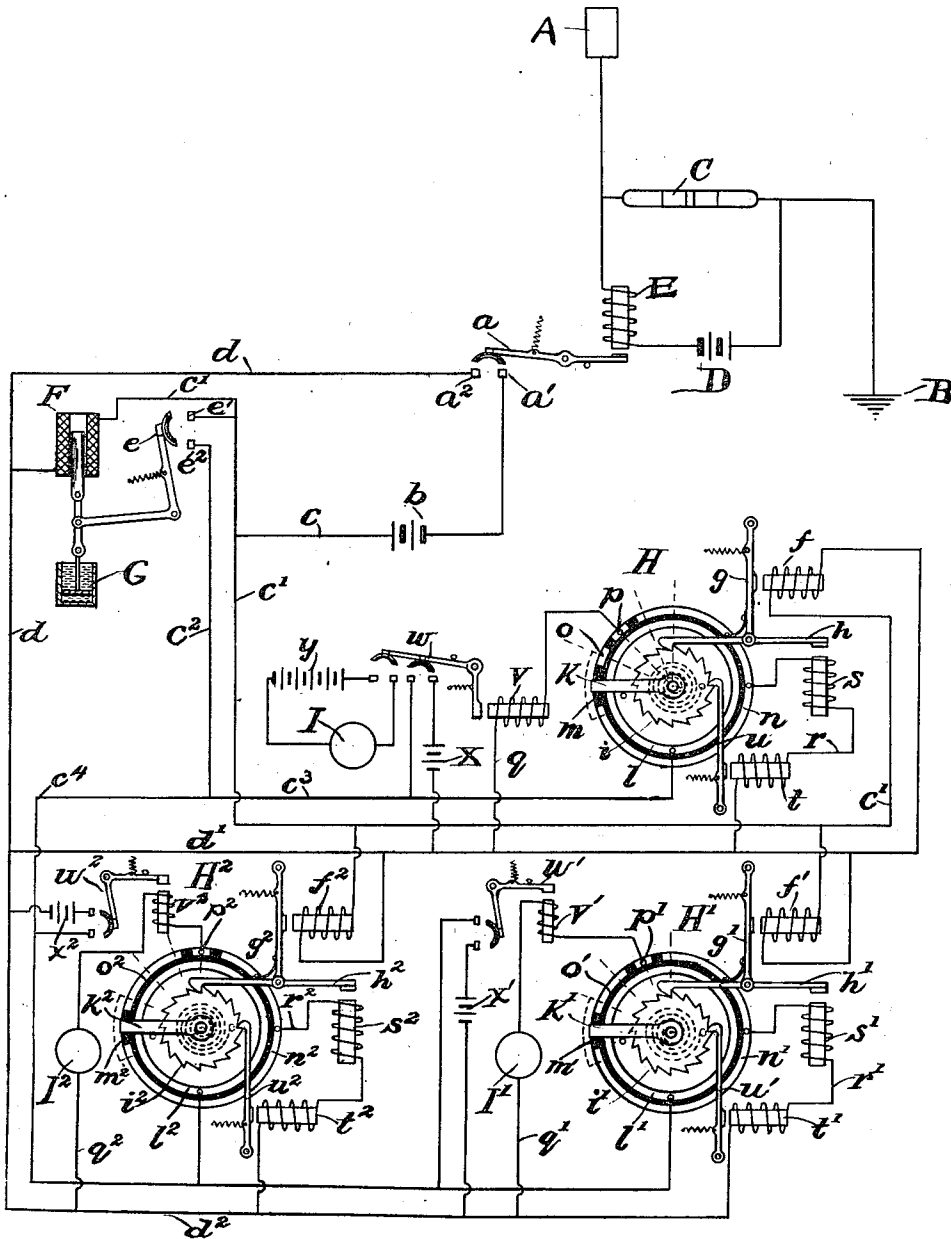
T. B. BOOTH.

ELECTRICAL RECEIVING APPARATUS.

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1,139,632.

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Witnesses  
Ernest L. Gurney  
A. E. Chesley

Inventor  
Thomas B. Booth

# UNITED STATES PATENT OFFICE.

THOMAS B. BOOTH, OF NEWTON CENTER, MASSACHUSETTS.

## ELECTRICAL RECEIVING APPARATUS.

1,139,632.

Specification of Letters Patent.

Patented May 18, 1915.

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*To all whom it may concern:*

Be it known that I, THOMAS B. BOOTH, a citizen of the United States, residing at Newton Center, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Electrical Receiving Apparatus, of which the following is a specification, throughout which similar letters refer to similar parts.

My invention consists in an improved apparatus for utilizing electrically transmitted impulses and especially Hertzian waves in the actuation of receiving apparatus, whereby the movements of the receiving apparatus are under the complete control of the operator at the sending station.

The nature of my invention will be best understood from a consideration of one specific embodiment thereof illustrated in the accompanying drawing, in connection with the following description, while its scope will be particularly pointed out in the appended claims.

In the drawing I have shown one form of my receiving apparatus.

Referring to the drawing, the usual aerial conducting plate is typified at A, and the ground plate at B. A sensitive wave responsive device is employed, such as a coherer C, of the ordinary type and is in circuit with battery D and solenoid E. The receiving apparatus so far referred to has no peculiar characteristics, and these elements may be constructed in any known manner. To them may be added, without departing from the spirit of my invention, all the known adjuncts used in this class of apparatus, but which, for the sake of simplicity, I have not herein illustrated.

A switch *a*, normally held open by a spring, is adapted to be actuated by solenoid E to bridge the contacts *a*<sup>1</sup> and *a*<sup>2</sup>. Contact *a*<sup>1</sup> is connected to one pole of battery *b*, or other suitable source of electromotive force, the opposite pole having connection through conductor *c* with conductor *c*<sup>1</sup>. The other contact *a*<sup>2</sup> is connected to conductor *d*, and through *d* to conductors *d*<sup>1</sup> and *d*<sup>2</sup>.

A solenoid F is bridged between conductors *c*<sup>1</sup> and *d*, and has its core so connected to switch *e* as to cause the latter on excitation of the solenoid to bridge contacts *e*<sup>1</sup> and *e*<sup>2</sup> connected respectively to conductors *c*<sup>1</sup> and *c*<sup>2</sup>. To conductor *c*<sup>2</sup> are connected branches *c*<sup>3</sup> and *c*<sup>4</sup>. The movement of the solenoid core and that of the

switch is impeded, however, by a retarding device or time element which I have herein shown as a dash pot G, having its plunger connected to the core and moving in a cylinder containing oil or other liquid adapted to prevent the free movement of the solenoid core, and the consequent bridging of the contacts *e*<sup>1</sup> and *e*<sup>2</sup>, excepting when the excitation of the solenoid is prolonged. The bridging switch is normally held away from the contacts by a spring.

It will therefore be seen that I have provided conductors *c* and *c*<sup>1</sup>, permanently connected to one pole of the source of electromotive force; other conductors *c*<sup>2</sup>, *c*<sup>3</sup> and *c*<sup>4</sup> connected to the same pole only on a prolonged excitation of solenoid F, and other conductors *d*<sup>1</sup> and *d*<sup>2</sup> connected to the opposite pole of said source of electromotive force on all normal excitations of solenoid E.

At H, H<sup>1</sup> and H<sup>2</sup> I have indicated a series of receiving devices to be actuated by the impulses transmitted. For illustrative purposes, I show this series to consist of but three units. It will be obvious however that this system is capable of indefinite expansion, and the series may include as many units as are desired.

Referring to receiver H, for its actuation I employ any suitable motor mechanism such as the electro-magnet *f*, which is connected across conductors *c*<sup>1</sup> and *d*<sup>1</sup>, and is accordingly energized whenever the contacts *a*<sup>1</sup> and *a*<sup>2</sup> are bridged by the switch *a*. A pivoted armature *g* is actuated by this electro-magnet against the action of a spring and carries a pawl lever *h*, which is spring-pressed into engagement with the teeth of a ratchet wheel *i*, affording a step-by-step mechanism whereby the ratchet wheel is advanced a corresponding angular distance for each impulse transmitted to the electro-magnet.

A bridging arm K is attached to the ratchet wheel to move therewith and traverse stationary contacts, resting however, as shown, in its initial position upon the inner contact ring *l* and the exterior insulation segment *m*. An exterior contact ring, separated from the inner ring by suitable insulation, is divided into three segments, *n*, *o* and *p*, the two former being electrically connected though separated by the segment of insulation *m*. Segmental contact *p* is insulated from contacts *n* and *o*, and is connected to conductor *d*<sup>1</sup> by conductor *q*, while

segments  $n$  and  $o$  are connected to  $d^1$  by conductor  $r$ .

Included in series with conductor  $r$  are electro-magnets  $s$  and  $t^1$  serving to operate suitable controlling or locking mechanism, the former when energized serving to withdraw the pawl lever from engagement with the ratchet wheel, and the latter to release the latch lever  $u$ , thereby freeing the ratchet wheel and permitting it, under the influence of a spiral spring thereon, to return the attached bridging arm to its initial position, beyond which further movement is prevented by a suitable stop.

In series with conductor  $q$ , which may be termed the operating circuit of receiving unit H, is an electro-magnet  $v$ , serving, when energized, to actuate the switch  $w$ , normally held open by a spring, and close the circuits containing the auxiliary battery  $x$  and the translating device I. The circuit containing the translating device I may be termed the working circuit, and includes also a suitable source of electromotive force  $y$ .

My invention is not limited to any particular character of translating device, but, as will more fully appear, the nature thereof will be determined by the purpose to which my invention is to be applied.

Receiving units  $H^1$  and  $H^2$  are substantially the same in construction as receiving unit H. In receiver H, however, it will be observed that the segmental contact  $p$  is so located as to be engaged by the bridging arm in the second position of the latter. In receiver  $H^1$  this contact is so located that engagement takes place in the third position, and in  $H^2$  in the fourth position of said bridging arm.

In receivers  $H^1$  and  $H^2$  I have shown no separate working circuit, but have placed translating devices  $I^1$ ,  $I^2$  directly in the operating circuits  $q^1$ ,  $q^2$ , and the auxiliary battery circuits alone are affected by the movement of switches  $w^1$ ,  $w^2$ .

It is to be understood that I am not in any way limited to the details of structure shown, or to the assemblage of parts as a whole, but my invention may be carried out in a great variety of ways and the specific forms shown are submitted for illustrative purposes only.

The operation of the apparatus described is as follows: An impulse received at plate A passes to the ground and actuates the coherer in the usual manner, causing the passage of a current from the battery D through the coherer and the electro-magnet E. The excitation of the magnet E causes the switch  $a$  to bridge the contacts  $a^1$ ,  $a^2$ , and connects conductors  $d$ ,  $d^1$  and  $d^2$  to battery  $b$ . This causes excitation of solenoids F and  $f$ . It is to be observed that the switch  $a$  responds to all Hertzian waves whether of

long or short duration; that the solenoid F is selective in its nature and completes the throw of the switch  $e$  on the transmission of prolonged waves only, and that the pawl lever at each receiver is actuated by its magnet  $f$ ,  $f^1$ ,  $f^2$ , every time switch  $a$  is closed. If a short impulse is therefore transmitted each receiver moves its bridging arm to the first position, and if followed by a second similar impulse, to the second position, and so on. If, however, a long impulse be interposed, the prolonged excitation of solenoid F will bridge the contacts  $e^1$  and  $e^2$  and connect the contact rings  $l$ ,  $l^1$  and  $l^2$  at each receiver with the battery  $b$ . Each receiver which has its bridging arm at this instant bridging the contacts  $l$  and  $n$  or  $l$  and  $o$  will establish a circuit from the battery through the magnets  $s$  and  $t$ , causing the release of the ratchet wheel and the immediate return of the bridging arm to its initial position. That receiver only having its bridging arm upon contact  $p$  at the time the long impulse is transmitted will be unaffected and will remain with its bridging arm in the same position until further impulses are received. The position of the bridging arm in the receiver at this time will establish a current through the working circuit  $q$  causing the energizing of the translating device associated therewith, and the closing of the auxiliary battery circuit X which will continue to supply current to the working circuit, after the excitation of F has ceased and the main battery circuit has been opened by the switch  $e$ . For example, if it is desired to operate the translating device  $I^1$  at receiver  $H^1$ , two short impulses followed by one long impulse should be transmitted. This will place each bridging arm in its third position, from which the bridging arms of receivers H and  $H^2$  will be immediately returned to their initial positions on the closing of the switch  $e$  following the long impulse. Bridging arm  $K^1$  however rests upon contact  $p^1$  and completes the circuit from battery  $b$  to switch  $a$ , conductors  $d$ ,  $d^2$ , and  $q^1$ , contact  $p^1$ , bridging arm  $K^1$ , contact  $l^1$ , conductors  $c^1$ ,  $c^2$ , switch  $e$  and conductor  $c$ . This causes the energizing of the translating device  $I^1$  and the excitation of magnet  $V^1$ , closing the auxiliary battery circuit which supplies current to the circuit  $q^1$  after the switch  $e$  has opened on the cessation of the long impulse. The auxiliary battery will continue to supply energy to the translating device  $I^1$  until further change is effected. If it is now desired to cease the supply of energy to the translating device  $I^1$ , the transmission of a long impulse will throw bridging arm  $K^1$  to its fourth position from which it is immediately returned to its initial position, cutting off the supply of current to  $I^1$ , deenergizing magnet  $v^1$  and opening the auxiliary battery circuit. The effect

of the long impulse on each of the other receivers is to move their bridging arms into the first position, from which position they are immediately returned to their initial positions, placing the entire series in readiness to receive a fresh set of impulses for the energization of a different translating device.

If it is desired to cease the supply of energy to I<sup>1</sup> and immediately energize another translating device in place thereof, it is only necessary to transmit the number of short impulses corresponding to that particular receiver following the same by a long impulse.

It will be plain that I have so associated electro-magnetic actuating devices with a series of translating devices that any one of the latter may be selected and energized at will by a distant operator for any desired length of time without causing energization of the remaining members of the series. It will also be evident that these translating devices may be motors, or other electro-motive devices, signals, visual or audible, or any means for effecting desired movement or manifestation of energy at the distant point.

When this invention is applied to the transmission of intelligence, the translating devices will be the signals employed, and the function of each receiving unit will be to actuate a separate signal. In this case the axiliary battery circuits will ordinarily be superfluous since their function is to prolong the energization of the translating device, while the necessary actuation of the signal will be effected on the closure of switch *e*.

My invention is particularly applicable to the transmission of intelligence, the control of moving vessels or vehicles or other objects at a distance, the control of fixed apparatus from temporary operating stations, and the productions of all movements at a distance where an established metallic conducting circuit is absent.

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

1. In a receiver for Hertzian waves, a plurality of translating devices, controlling switches therefor, an electromotive device operated by impulses transmitted from a distance and adapted to cause said controlling switches to assume successively a series of different positions, a second electromotive device also operated by impulses transmitted from a distance and adapted to energize a selected translating device and return the controlling switches for the remaining translating devices to their initial positions.

2. In a receiver for Hertzian waves, a plurality of translating devices, a controlling device for each translating device, and

means for simultaneously actuating said controlling devices through impulses transmitted and, at the conclusion of a definite wave transmission, for causing the energization, through its controlling device of any particular translating device and the return of the remaining controlling devices to their initial positions.

3. In a receiver for Hertzian waves, a plurality of translating devices, a controlling device for each translating device, adapted to assume a plurality of positions and means for returning each controlling device to its initial position from any position except its operative position on a given wave transmission.

4. In a receiver for Hertzian waves, a circuit controlling actuated device having a plurality of positions, means tending to return said device to its initial position, locking means to prevent the return of said device to its initial position and means responsive to impulses of a peculiar character to release said locking means.

5. In a signaling apparatus a plurality of translating devices, a controlling device for each translating device, means for energizing a selected translating device through its respective controlling device, and means for restoring the controlling device to its initial condition on the energization of said translating device.

6. In a signaling apparatus the combination with a plurality of translating devices, a step by step controller for each translating device, means for energizing a selected translating device through its respective controller during the step by step movement, and means for returning the controller to its initial position on the energization of its translating device.

7. A signaling system comprising a conducting circuit, means for transmitting current impulses over the circuit, signal controlling mechanism and a locking mechanism therefor associated with the conducting circuit, means for varying the character of the impulses in one way to operate the locking mechanism and in another way to operate the signal controlling mechanism.

8. The combination with a conducting circuit, of transmitting means, primary controlling mechanism operable by the transmitting means, secondary controlling mechanism under the influence of the primary controlling mechanism, a signal operable by the secondary controlling mechanism, locking means to hold said controlling mechanism, and electro-magnetic releasing means for said locking means.

9. In an electrical receiving apparatus, a plurality of translating devices, operating circuits therefor normally interrupted at certain points, circuit-making devices for said circuits, means for successively causing

said circuit-making devices to close said circuit at said interrupted points, while leaving the same deenergized, and means for selecting and energizing any predetermined circuit when the same has been closed by said circuit-making devices.

10. In an electrical receiving apparatus, a plurality of circuit-controlling devices, a receiving circuit, means for moving each of said devices in response to impulses received by said receiving circuit, a selecting circuit common to the several circuit-controlling devices adapted to render effective any selected one of said circuit-controlling devices, and means for controlling said selecting circuit through impulses of a peculiar character.

11. In an electrical receiving apparatus, the combination with a plurality of translating devices, operating circuits therefor normally interrupted at certain points, circuit-making devices, a receiving circuit adapted to transmit impulses for operating said circuit-making devices simultaneously, a selecting circuit for selecting and energizing any predetermined operating circuit, and a retarded controlling element for controlling the same.

12. In an electrical receiving apparatus, the combination with translating devices, of a plurality of circuit-controlling devices, motive devices for moving said circuit-controlling devices, a receiving circuit connected with said motive devices, and a selecting circuit common to said several circuit-controlling devices, controlled only by impulses of a peculiar character in said receiving circuit.

13. In an electrical receiver, the combination with a plurality of translating devices,

means for selectively energizing said devices by different combinations, of a plurality of kinds or orders of electrical impulses, and means for maintaining a given translating device energized until the receipt of a subsequent impulse.

14. In an electrical receiver, the combination with a plurality of translating devices, controlling means therefor, means for bringing said controlling means into a condition of operativeness with respect to any desired translating device, means for energizing such translating device if desired when such condition of operativeness is reached, and means for maintaining the same energized.

15. In a receiver for electrical impulses, the combination with a plurality of translating devices, means for selectively energizing a given translating device through the receipt of an impulse of a peculiar character, and means for maintaining the same energized after the cessation of the said impulse.

16. In a receiver for electrical impulses, the combination with a plurality of translating devices, means for selectively energizing a given translating device through the receipt of an impulse of a peculiar character, means for maintaining the same energized after the cessation of the said impulse, and means for deenergizing the said translating devices by a subsequent impulse.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS B. BOOTH.

Witnesses:

EVERETT S. EMERY,  
A. E. CHESLEY.