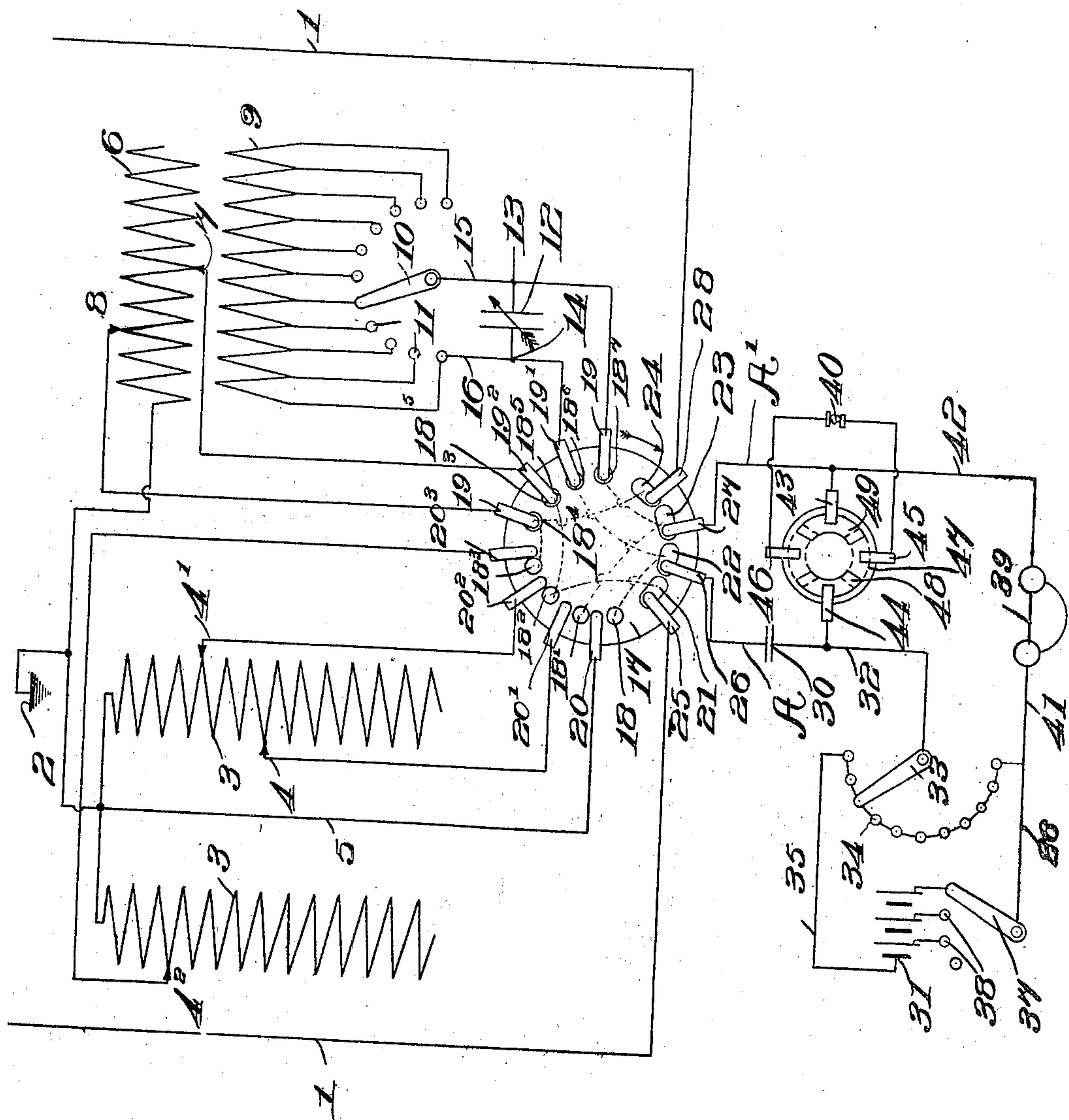


C. D. BABCOCK.  
WIRELESS TELEGRAPH RECEIVING APPARATUS.  
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Witnesses  
B. B. Collings.  
W. May. Dwall.

Inventor  
C. D. Babcock, by  
Williamson Fisher &  
Wicherson  
Attorneys



# UNITED STATES PATENT OFFICE.

CLIFFORD D. BABCOCK, OF NEW YORK, N. Y., ASSIGNOR TO THE UNITED WIRELESS TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

## WIRELESS-TELEGRAPH RECEIVING APPARATUS.

952,403.

Specification of Letters Patent. Patented Mar. 15, 1910.

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*To all whom it may concern:*

Be it known that I, CLIFFORD D. BABCOCK, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Wireless-Telegraph Receiving Apparatus; 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.

This invention relates to receivers adapted for use in wireless telegraphy and telephony and has for its object to produce a receiver of this nature which will be more efficient than those heretofore proposed.

With these objects in view the invention comprises a receiving instrument embodying an inductively connected syntonizer, a direct connected syntonizer, a variable source of electromotive force, a potentiometer controlling the electromotive force more closely than is done by merely cutting in and cutting out cells, a pole changing device for changing the direction of the current through the sensitive element, and a cut over switch which changes the receiver from the inductively connected to the direct connected syntonizer and vice versa, all as will be more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which the figure is a diagrammatic illustration of a device built in accordance with this invention, 1—1 represents any suitable receivers of Hertzian waves, 2 any suitable ground connection for the same, 3—3 the coils of any suitable direct connected syntonizer, 4, 4', and 4<sup>2</sup> any suitable means for changing the inductance of said coils and 5 any suitable connection with said coils and with the ground 2.

6 represents the primary coil of the inductively connected syntonizer, which may be in the form of an air core transformer the operative number of whose turns are adjustable through the connections 7 and 8; and 9 represents the secondary of said transformer, also adjustable as to the number of its turns in use, by means of the arm 10 playing over the contacts 11 connected to the turns of said secondary in the manner illustrated.

12 represents any suitable capacity which may be varied at will, joined at 13 and 14 to the wires 15 and 16, connected with the contact arm 10 and with the contacts 11 respectively, as illustrated.

17 represents any suitable throwover switch by means of which either of the syntonizers can be connected to the receiver to be described below; but it is preferably formed of a rotatably mounted insulating member provided with the contacts 18, 18', 18<sup>2</sup>, 18<sup>3</sup>, 18<sup>4</sup>, 18<sup>5</sup>, 18<sup>6</sup> and 18<sup>7</sup> which in one position connect with the brushes 19, 19', 19<sup>2</sup>, and 19<sup>3</sup>. The brushes 19 and 19' are connected with the wires 15 and 16 while the brushes 19<sup>2</sup> and 19<sup>3</sup> are connected with the adjustable contacts 7 and 8 of the inductive syntonizers, as illustrated. But when the switch 17 is turned in the direction of the arrow the inductive syntonizer will be cut out and the direct syntonizer will be connected in through the brushes 20, 20', 20<sup>2</sup>, and 20<sup>3</sup>, joined respectively with the wire 5 and the adjustable contacts 4, 4', and 4<sup>2</sup>, as will be readily understood from the drawings.

21, 22, 23, and 24, represent elongated contacts on the switch 17 over which play the brushes 25, 26, 27, and 28, respectively. The contact 18<sup>2</sup> is joined to the contact 21 and 19<sup>2</sup>, as indicated in dotted lines; and contacts 18 and 18' are joined to the contacts 22 and 23 respectively, which latter contacts are also respectively joined to the contacts 18<sup>6</sup> and 18<sup>7</sup>, while the contact 24 is joined to the contact 18<sup>4</sup> which is also joined to the contact 18<sup>3</sup>, all as indicated in the drawings. The contact 26 is joined to the condenser 30 which prevents the battery 31 from being short circuited through the secondary coil 6 of the inductively connected syntonizer; and the other side of the condenser 30 is connected by the wire 32 to the contact arm 33 which plays over the contacts 34 of the potentiometer. The potentiometer is joined to the battery 31 by the wire 35 and by the wire 36 connected to the contact arm 37 which plays over the contacts 38 so connected with the battery as to cut in or cut out any desired number of cells.

39 represents any suitable receiver such as a telephone receiver and 40 represents any suitable sensitive element preferably a crystal. The receiver 39 is joined to the poten-



tiometer and to the arm 37 by the wire 41, and it is joined to the brush 27 by means of the wire 42. Joined to the wire 42 is a brush 43 and joined to the wire 32 is a brush 44. Joined to one side of the sensitive element 40 is a brush 45 and joined to the other side of the same is a brush 46.

47 represents any suitable reversing switch, preferably one provided with the elongated contact strips 48 and 49 with which the brushes 43, 44, 45 and 46 are adapted to contact, as will be readily understood.

It is well known to wireless operators, that the efficiency of a sensitive element such as 40 or other Hertzian wave detector is nearly always found to depend upon the direction in which the current from the battery 31 flows through the same. In many cases the sensitiveness of the element can be very largely increased if the direction of this current is reversed, and, therefore, the reversal of such a current often enables the operator to pick up messages or parts of messages which would otherwise be lost. With the device now in use, it is very inconvenient to rapidly change the direction of the current through the sensitive element, and in fact, the operator is compelled to laboriously remove the said element, and to readjust the same after turning it around, which, as is well known, is often a very vexatious proceeding. Therefore, by the simple expedient of providing wireless telegraph and telephone receivers with a reversing switch such as 47, the operator has at hand a ready means for quickly and repeatedly changing the direction of the current through the sensitive element and as often as he pleases; and therefore, he is enabled to get greatly improved results. In addition to this the contacts 48 and 49 are so proportioned that when the switch 47 has made one-half of the movement necessary to reverse the current, the sensitive element 40 is entirely cut out from the rest of the apparatus, so it is protected from the damage resulting from near by high power discharges. This is the position in fact, in which the operator normally keeps the switch while sending, or at any other time than receiving. Heretofore it was customary to shunt the element 40, thereby making a closed circuit through which stray currents could pass and cause damage. With the cut out above, however, all liability to damage from such sources is obviated.

The above apparatus is all easily capable of being mounted in a single case, and it, therefore, comprises an instrument in which the inductively connected syntonizer may be employed when exceedingly delicate selections are to be made, and still it enables the operator to employ the directly connected syntonizer when the air is not too full of messages, so to speak. That is to say, it is

well known that the inductive type of syntonizers are too selective for general work while the direct connected type is not selective enough when the air is full of messages. Stated in another way, this invention produces a combined tuner and receiver so arranged that the operator can listen in on the direct connected tuner for all messages, and when he finds it necessary he can switch over to the inductively coupled tuner for the purpose of excluding stray messages, by simply turning a switch.

It is evident that those skilled in the art may vary the details of construction and the arrangement of parts within wide limits without departing from the spirit of my invention, and, therefore, I do not wish to be limited to any special details or arrangement, except as may be required by the claims.

What I claim is:—

1. In a wireless receiving apparatus the combination of a sensitive element; a direct connected syntonizer adapted to be joined thereto; an inductively connected syntonizer also adapted to be joined to said element; and means for connecting either of said syntonizers at will to said element, substantially as described.

2. In a wireless receiving apparatus, the combination of a sensitive element; a receiving instrument connected therewith; a direct connected syntonizer; an inductively connected syntonizer; and means for joining said element and said direct connected syntonizer and in the same operation disconnecting said element and said inductively connected syntonizer, substantially as described.

3. In a wireless receiving apparatus, the combination of a sensitive element; a receiving instrument connected therewith; a potentiometer connected with said instrument and said element; a direct connected syntonizer; an inductively connected syntonizer; and means for joining said element and said direct connected syntonizer and in the same operation disconnecting said element and said inductively connected syntonizer, substantially as described.

4. In a wireless receiving apparatus, the combination of a sensitive element; a receiving instrument connected therewith; a potentiometer connected with said instrument and said element; a battery connected with said potentiometer; means for cutting in and cutting out part of the cells of said battery; a direct connected syntonizer; an inductively connected syntonizer; and means for joining said element and said direct connected syntonizer and in the same operation disconnecting said element and said inductively connected syntonizer, substantially as described.

5. In a wireless receiving apparatus, the



combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch for connecting at will either of said syntonizers; a circuit 5 passing through said element and connected to said switch; and means for reversing the current through said element, substantially as described.

6. In a wireless receiving apparatus, the 10 combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch for connecting at will with either of said syntonizers; a circuit passing through said element and con- 15 nected to said switch; a potentiometer connected to said circuit; and means for reversing the circuit through said element, substantially as described.

7. In a wireless receiving apparatus, the 20 combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch for connecting at will either of said syntonizers; a circuit passing through said element and connected 25 to said switch; a potentiometer connected to said circuit; a battery connected to said potentiometer; means for cutting in and cutting out the cells of said battery; and means for reversing the current through said 30 element, substantially as described.

8. In a wireless receiving apparatus the combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch adapted to con- 35 nect said syntonizers one at a time; a capacity associated with the connections between said switch and one of said syntonizers; and a connection between said switch and said sensitive element, substantially as described.

9. In a wireless receiving apparatus, the 40 combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch adapted to connect said syntonizers one at a time; a capac- 45 ity associated with the connections between

said switch and one of said syntonizers; a connection comprising a current reversing means between said switch and said sensitive element; and a potentiometer connected to said element, substantially as described. 50

10. In a wireless receiving apparatus the combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch adapted to connect with either of said syntonizers at will; 55 a sensitive element; a circuit through the same connected to said switch; and means in said circuit for cutting said element off from the rest of the apparatus, substantially as described. 60

11. In a wireless receiving apparatus the combination of a sensitive element; a direct connected syntonizer; an inductively connected syntonizer; a switch adapted to connect with either of said syntonizers at will; 65 a sensitive element; a circuit through the same connected to said switch; means in said circuit for cutting said element off from the rest of the apparatus; means also in said circuit for readily reversing the current 70 through said element; and a potentiometer connected to said circuit, substantially as described.

12. In a wireless receiving apparatus the combination of a sensitive element; a cir- 75 cuit passing through the same; a reversing switch in said circuit adapted to also cut out said element; a potentiometer and an adjustable battery connected with said circuit; a second switch connected with said circuit; 80 a capacity in the said connections with said second switch; and a plurality of syntonizers adapted to be connected with said second switch; substantially as described.

In testimony whereof, I affix my signature, 85 in presence of two witnesses.

CLIFFORD D. BABCOCK.

Witnesses:

EMERSON H. CARRICO,  
J. L. FROST.