

C. D. BABCOCK.
WIRELESS TELEGRAPH TRANSMITTER.
APPLICATION FILED JUNE 11, 1908.

934,875.

Patented Sept. 21, 1909.

Fig. 1.

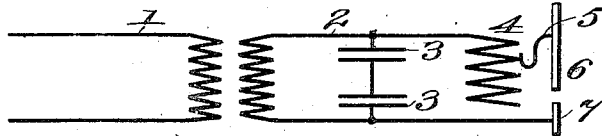


Fig. 2.

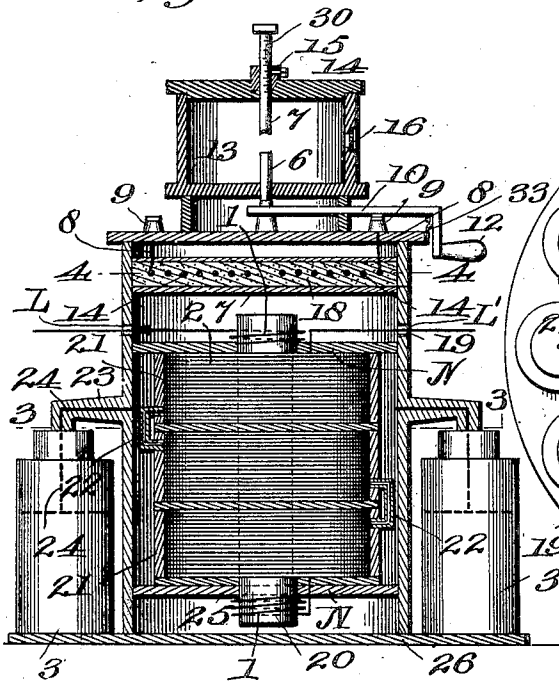


Fig. 3.

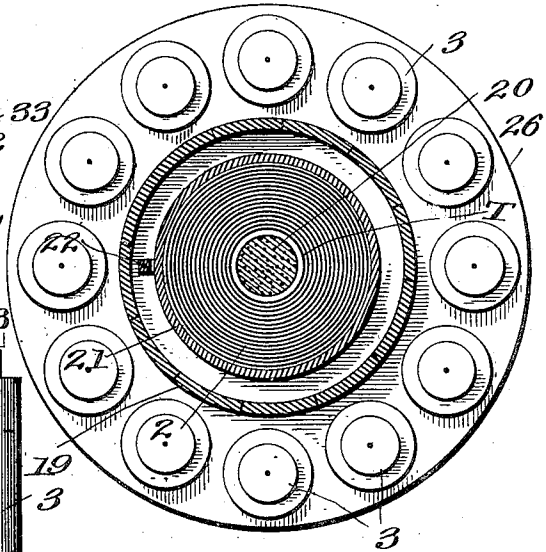
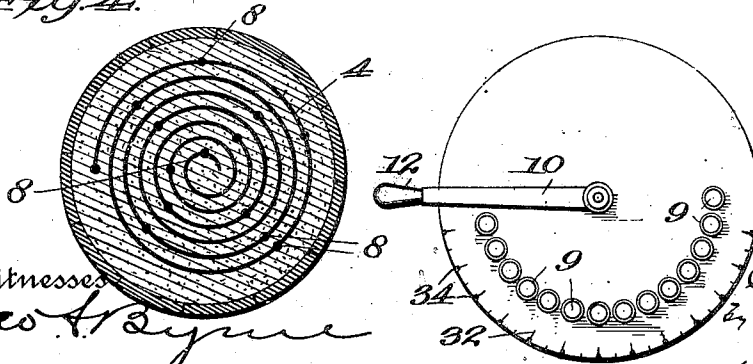


Fig. 5.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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WIRELESS-TELEGRAPH TRANSMITTER.

934,875.

Specification of Letters Patent. Patented Sept. 21, 1909.

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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 Transmitters; 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 wireless telegraph transmitters, and has for its object the production of a combination set for wireless telegraphy which will embody an efficiency and certainty of action with an economy of the space occupied; an increased durability over the sets heretofore used; an easy method of changing the lengths of the waves emitted; an improved insulation for the spark gap; and an easy method of interfering with other receiving stations when desired.

To these ends my invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals refer to like parts in all the views:—Figure 1, is a diagram of the sending circuit. Fig. 2, a sectional elevation of the sending apparatus. Fig. 3, a sectional plan of the same. Fig. 4, a section on the line 4—4 of Fig. 2, and Fig. 5, a plan of the lever and contacts for changing the lengths of the waves emitted.

1, represents diagrammatically in Fig. 2 the primary, and 2 the secondary coil of the usual step up transformer employed in wireless telegraphy; 3, the usual condensers; 4, an impedance; and 5, an adjustable contact connected to one of the spark terminals 6, while the other terminal 7 is connected to the coil 2, as shown. The condensers are joined in shunt across the terminals of the coil 2, but are in series relation to each other, as shown, in order to reduce the liability to breakage from undue rushes of current. In practice the primary of the transformer consists of its iron core 20, and the terminals of said

primary are brought out of the casing 19 through suitable openings, two of such points being indicated at L and L' Fig. 2.

The impedance 4 is preferably in the form of a spiral, and has at intervals throughout its length the connections 8, as shown, which join different lengths of the spiral to the contacts 9, over which plays the conducting lever 10, pivoted to the spark terminal 6, and provided with the insulating handle 12.

13 represents the spark gap muffler of suitable insulating material, provided with the insulating cover 14, supporting the spark gap electrode 7, to which is clamped at 15 one end of the secondary 2.

16, represents a shaded peep hole through which the operation of the spark gap may be observed; 17, a shallow box in which lie the coils of the impedance 4; and 18, the insulating material in which said coils are embedded, in order to prevent leakage between the spirals of said impedance.

19, represents the containing case for the various parts of the apparatus, which may be of any suitable non-conducting material; in practice I have found a cylinder made of wooden staves well suited to this purpose.

20, as above stated, designates the usual core for wireless telegraph open-core-dry-insulation transformers, and around this core the primary and secondary coils are supported.

21, represents suitable cylinders in which are located the secondary windings 2, embedded in an insulating compound. There may be as many or as few of these cylinders 21 as desired, but I prefer to use three, as shown.

22, represents suitable insulating tubes to permit the ends of the coils to pass out of the cylinders 21, and to be joined together.

23, are insulating arms carrying the leads 24 which connect with the inner coatings of the Leyden jars or condensers 3. These arms may extend down and support the tops of the jars, as shown.

25, are supports for retaining the parts of the transformer in proper relation; and 26, is the circular base which supports the entire set.

N and N, Fig. 2, represent suitable sup-

ports, preferably disks for retaining the members of the transformer in proper relation to each other. The primary of this transformer may be said to consist of its iron core, the exciting windings diagrammatically shown, and the insulating tube T.

In transmitting sets heretofore used, it has been customary to use independent pieces of apparatus, *e. g.* a transformer; a condenser; a spark gap; a muffler; and an inductance, and to connect up these various independent devices at the place of use. In such case, a great deal of unnecessary space is taken up, the connections are always giving more or less trouble, and various parts of the apparatus are liable to disturbance from time to time. By employing a neat and convenient sized case, however, and securing all the components of a transmitting set together, I am enabled to at once remove all these objections and annoyances, and also to greatly increase the life of the apparatus as a whole. In addition to this, by suitably calibrating the spiral 4, and properly locating the connections 8 along said spiral, I am enabled to connect the lever 10 through the contacts 9 to that length of the impedance spiral 4, which when included in the oscillating circuit will cause waves to be emitted of any desired length. That is to say, by simply turning the lever 10 to the proper contact 9, any wave length desired may be transmitted; and therefore waves of a proper length to interfere with any other receiving station, or waves of the best length to reach a given distant station, may be readily sent out at will. The contacts 9, may be suitably marked to indicate the corresponding length of its wave, as by a scale 32, and the lever 10 may be provided with a spring clip 33, engaging suitable notches 34 in the top of the case 19. Furthermore, I preferably make the terminal 7 with a concave end and provide it with a scale 30 to show the proper adjustment for the spark being used.

The operation of my improved combination transmitting set will be clear from the foregoing, and it is only necessary to say that when a message is to be sent it is only necessary to throw a switch, not shown, closing the circuit through the primary coil 1; to adjust the spark terminal 7, until the spark is established; then to adjust it by the scale 30, for that length of spark that practice has shown is the most desirable for the particular wave lengths to be used. The lever 10 is likewise adjusted to correspond to the wave length desired, and if the sparking is not then satisfactory the amount of current through the primary circuit and the capacity across the secondary terminals may be suitably changed, if desired, to get the maximum effects. Under normal conditions, however, a given wave length and a given

spark gap will correspond to a known capacity and current in the oscillating circuit, and no adjustment of the latter will be required.

When it is desired to interfere with any other receiving station, I may determine the wave lengths being sent out by any suitable wave meter, and simply oscillate my lever 10 across the contacts 9 which correspond to waves of the same length, and to waves slightly longer and slightly shorter than said length, or I may simply sweep my lever 10 back and forth across the whole series of contacts 9, and thereby send waves of all the lengths within the range of my transmitter.

I am aware that heretofore it has been proposed to assemble a greater or less number of the various components of a wireless transmitter, and to operate the same in various ways; but in all such cases it has been necessary for the operator when assembling to join up the different elements, and also to find places to store them. For example, a common way has been to provide a casing for the spark gap and condenser; another casing for the transformer, and still other casings or places for the other parts. In such arrangements, however, the connections are always giving trouble from sparks and short circuits owing to the enormous voltages dealt with, and the connecting wires themselves, which must be more or less exposed around the table or stand on which the spark gap is supported, often give shocks to those approaching them. Besides, a great deal of trouble is experienced from the fact that the operator has to overhaul the various connections so often that he is liable to not remake the right or proper connections. In my invention all these difficulties are done away with by providing a complete one piece apparatus comprising a generator of Hertzian waves, and means to easily vary the frequency of said waves by predetermined amounts. No connections are required in installing the device, beyond attaching the aerial and ground leads to the oscillating circuit, and the attaching of the primary circuit terminals to the primary of the transformer. All other connections are made in the factory, where of course they can be better made than anywhere else, and therefore all danger of improper or insufficient connections are avoided; besides, a single piece apparatus occupies less space and is more compact than the multi-piece devices heretofore used.

In addition to the above, when the impedance is embedded in an insulating material, as disclosed, the accumulation of moisture and dirt thereon is obviated, and therefore the tendency of high tension discharges from the points formed by the dust collected

thereon is prevented. Also, I regard the leading out of the taps from certain predetermined points on the impedance to be of practical importance, for it provides an easy means of contacting with the same and lessens the troubles now experienced by operators, in getting a predetermined wave length.

Of course, I do not wish to be understood as limiting myself to the exact details of operation and construction above set forth, because it is evident that both may be varied by those skilled in the art without departing from the spirit of my invention.

What I claim is:—

1. In a wireless transmitter, the combination of a suitable transformer; a condenser joined across the terminals of the secondary of said transformer; an impedance calibrated to given wave lengths in series with one of said terminals; a spark gap terminal; a lever joining the same; and a series of contacts corresponding to the calibrations of and joined to said impedance over which said lever plays for connecting said impedance, said terminal being provided with a scale for showing the lengths of the sparks employed, the whole forming one complete and single apparatus requiring no connections other than joining the aerial and ground leads to the oscillating circuit, and the primary circuit leads to the primary terminals of the transformer, substantially as described.

2. In a wireless transmitter, the combination of a suitable casing; a transformer inclosed in the same; a plurality of superposed containers for the secondary of said transformer; an extension on the base of said casing; a condenser supported on said extension; an impedance in said casing above said secondary; a spark gap above said impedance; a muffler; and a pivoted lever connected to said spark gap, and adapted to connect said impedance thereto, the whole forming one complete and single apparatus requiring no connections other than joining the aerial and ground leads to the oscillating circuit, and the primary circuit leads to the primary terminals of the transformer, substantially as described.

3. In a wireless transmitter, the combination of a suitable casing; a transformer inclosed in the same; a plurality of superposed containers for the secondary of said transformer provided with insulating connections; an extension on the base of said casing; a series of Leyden jars supported on said extension; an insulating arm extending from said casing adapted to support a connection from said secondary to said jars; an impedance in said casing connected to said secondary; a series of contacts connected to said impedance; a lever adapted to connect with said contacts; and a spark gap

with which said lever is connected, the whole forming one complete and single apparatus requiring no connections other than joining the aerial and ground leads to the oscillating circuit, and the primary circuit leads to the primary terminals of the transformer, substantially as described.

4. In a wireless transmitter, the combination of a suitable casing; a transformer, provided with a sectional secondary, inclosed in the same; a plurality of superposed containers for the secondary of said transformer provided with insulating connections to facilitate joining said sections; an extension on the base of said casing; a series of Leyden jars supported on said extensions; an insulating arm extending from said casing adapted to support a connection from said secondary to said jars; an impedance in said casing suitably calibrated to different wave lengths connected to said secondary; a series of contacts connected to said impedance; a lever adapted to connect with said contacts; and a spark gap with which said lever is connected, the whole forming one complete and single apparatus requiring no connections other than joining the aerial and ground leads to the oscillating circuit, and the primary circuit leads to the primary terminals of the transformer, substantially as described.

5. In a wireless transmitter, the combination of a suitable casing; a transformer having a sectional secondary; a plurality of containers in said casing for said secondary provided with means for facilitating the joining of the ends of said sections; a condenser supported by said casing; an impedance supported by said casing calibrated to given wave lengths; a series of contacts corresponding to said wave lengths and independently connected to said impedance; a lever playing over said contacts; a spark gap to which said lever is connected; and a muffler inclosing said spark gap, the whole forming one complete and single apparatus requiring no connections other than joining the aerial and ground leads to the oscillating circuit, and the primary circuit leads to the primary terminals of the transformer, substantially as described.

6. In a wireless transmitter, the combination of a suitable casing; a transformer having a sectional secondary; a plurality of containers in said casing for said secondary provided with insulating tubular means for facilitating the joining of the ends of said sections; a condenser supported by said casing; a spiral impedance embedded in insulating material supported by said casing calibrated to given wave lengths; a series of contacts corresponding to said wave lengths and independently connected to said impedance; a lever playing over said con-

tacts; a spark gap to which said lever is connected, having one of its terminals provided with a scale to indicate the spark length; and a muffler, provided with a peep hole,
5 inclosing said spark gap, the whole forming one complete and single apparatus requiring no connections other than joining the aerial and ground leads to the oscillating circuit, and the primary circuit leads to the primary

terminals of the transformer, substantially 10 as described.

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

CLIFFORD D. BABCOCK.

Witnesses:

MOSES ELY,

JOSEPH S. HUNT.