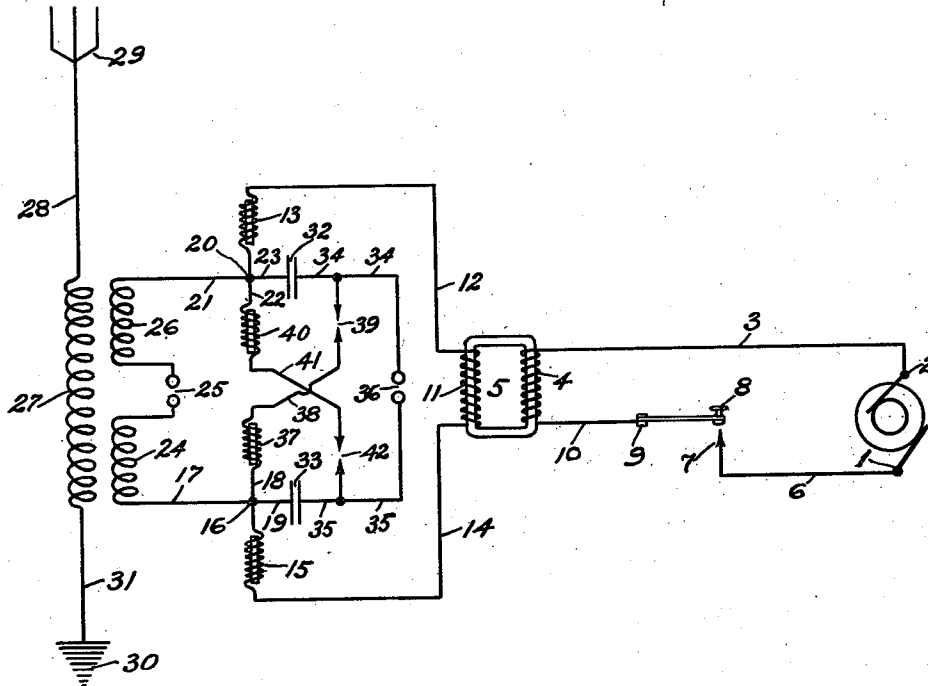


T. B. MILLER.
TRANSMITTING APPARATUS FOR WIRELESS TELEGRAPH STATIONS.
APPLICATION FILED AUG. 22, 1914.

1,217,483.

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WITNESSES:

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TRANSMITTING APPARATUS FOR WIRELESS-TELEGRAPH STATIONS.

1,217,483.

Specification of Letters Patent.

Patented Feb. 27, 1917.

Application filed August 22, 1914. Serial No. 858,159.

To all whom it may concern:

Be it known that I, THOMAS B. MILLER, citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a certain new and useful Improvement in Transmitting Apparatus for Wireless-Telegraph Stations, of which the following is a specification.

My invention relates to improvements in transmitting devices employed in wireless telegraph stations for transmitting intelligible signals from one station to a desired one of the others of such stations within signaling distances by means of successive electromagnetic waves, and the object of my invention is to arrange well known devices in connection with associated electric circuits whereby a greater proportion of the energy employed by the transmitting apparatus may effectively be utilized.

I accomplish this object by well known electrical devices which are included in certain electric circuits in the relative positions indicated diagrammatically in the accompanying drawings, wherein 1 and 2, respectively, indicate the terminals of an alternating current electric generator, the terminal 2 of which is connected by a conducting wire 3 to one terminal of a coil 4 which forms the primary winding of a transformer 5 while the terminal 1 is connected by a conducting wire 6 to one terminal 7 of a transmitting key 8, the other terminal 9 of said transmitting key 8 being connected with a conducting wire 10 with the other end of the coil 4.

The secondary winding of the transformer 5 comprises a coil 11 one terminal of which is connected by a conducting wire 12 to one terminal of a choke coil 13 while the other terminal of the coil 11 is connected by a conducting wire 14 with one terminal of a choke coil 15, the other terminal of the choke coil 15 being connected to a junction 16 of three conducting wires 17, 18 and 19, while the other terminal of the choke coil 13 is connected to a junction 20 of three conducting wires 21, 22, and 23.

The conducting wire 17 extends from junction 16 to connect with one terminal of a coil 24 whose other terminal connects with one terminal of a spark-gap 25 the other terminal of such spark-gap 25 being connected to one terminal of a coil 26 whose

other terminal is connected with the conducting wire 21.

These two coils 24 and 26 constitute two sections of the primary winding of an air core transformer whose secondary winding is indicated by the coil 27 one terminal of which is connected by a conducting wire 28 to the antenna 29 of a wireless telegraph station while its other terminal is connected to the earth 30 by a conducting wire 31.

The conducting wire 23 connects one terminal of a condenser 32 with the junction 20 while the conducting wire 19 connects one terminal of a condenser 33 with the junction 16, the other terminals of said condensers 32 and 33 being connected by conducting wires 34 and 35 respectively, to opposite terminals of a spark-gap 36, of well known form.

The conducting wire 18 leads from the junction 16 to connect with one terminal of a choke coil 37 whose other terminal is connected by a conductor 38 with one terminal of a spark-gap 39 whose other terminal is connected with the conducting wire 34; and the conducting wire 22 serves to connect the junction 20 with one terminal of a choke coil 40 whose other terminal is connected by a conducting wire 41 with one terminal of another spark-gap 42 whose other terminal is connected with the conducting wire 35.

The two spark-gaps 39 and 42 each have their electrodes made of sharp needle-like points, of suitable metal, which points are adapted to be adjusted to be disposed at different distances from each other as may be required under varying conditions of operation.

From a study of these circuits in connection with the positions of the different devices connected therein, it will be seen that the waves of alternating polarity which are induced in the coil 11 of the transformer 5 by alternating currents in coil 4 and which are of comparatively low frequency, by reason of such low frequency, will not be obstructed to a very great extent by the choke coils 13, 40, 37 and 15, and thus such waves may find comparatively free passage-way to the condensers 32 and 33 to charge such condensers 32 and 33, and such condensers are found to be connected in parallel with each other to the coil 11, since waves from the junction 20 may pass through

conducting wire 23 to condenser 32, the other terminal of which is connected by wire 34 to spark-gap 39, which offers little resistance, thence through conducting wire 5 38 to and through choke coil 37, thence through conducting wire 18 to the junction 16, the choke coil 37 offering little resistance to such low frequency waves; while the other parallel path within the condenser 33 is disposed to extend from said junction 20 10 through conducting wire 22, choke coil 40, conducting wire 41, spark-gap 42, conducting wire 35, condenser 33, conducting wire 19 to the junction 16, the junctions 16 and 15 20 being connected with the coil 11 through choke coils 15 and 13, respectively, through conducting wires 14 and 12, respectively.

Thus condensers 32 and 33 may be charged by the low frequency waves to such 20 tension that will cause them to be discharged across the spark-gaps 25 and 36 with which they are connected in series such discharge constituting waves of very great frequency which will be obstructed by the 25 choke coils 37, 40, 15, 13 and 11, whereby such discharged waves of very high frequency may find their way only through coils 24 and 26.

In other words, the condensers 32 and 33 30 are charged in multiple and discharged in series with each other, the charging electricity being in the form of low frequency waves while the discharged electricity takes the form of waves of very high frequency 35 which are obstructed in all pathways within which are included the choke coils 37, 40, 15, 13 and coil 11 and which find little resistance to their passage through the coils 24 and 26 which form the two sections of 40 the primary winding of the air core transformer of which the coil 27 is the secondary winding.

The high frequency wave energy impressed on the coil 27 of the antenna circuit can have but little reaction on the coils 45 24 and 26, since the high frequency energy due to such reaction would find obstruction in the pathways containing the different choke coils 13, 15, 37 and 40 and since the 50 remaining pathway is obstructed by the spark-gaps 25 and 36 and the condensers 32 and 33 all of which are in series with each other. Thus a very much greater proportion of the energy impressed upon the coil 55 27 by the actions of the coils 24 and 36, than has been possible heretofore, is utilized by the antenna 29 for transmitting waves to a distant station.

Obviously, other equivalent means than 60 choke coils 13, 40, 37 and 15 and the spark-gaps 39 and 42 may be employed for obstructing high frequency waves in their respective circuits without departing from the spirit of my invention.

What I claim is:

1. Signal transmitting apparatus of a 65 wireless telegraph station embodying an antenna, an air core transformer comprising a secondary coil and two primary coils, said secondary coil being connected to said 70 antenna at one of its terminals while its other terminal is connected to the earth, a spark-gap connected with the inner terminals of said two primary coils in series therewith, two condensers each having one 75 of its terminals connected to the outer terminal of a different one of said two primary coils, another spark-gap having its terminals each connected to the other terminal of a different one of said two con- 80 densers, two choke coils each having one of its terminals connected to the other terminal of a different one of said primary coils, and a source of alternating current of electricity whose two terminals are each 85 connected with the other terminal of a different one of said two choke coils.

2. Signal transmitting apparatus of a 90 wireless telegraph station embodying an antenna, an air core transformer comprising a secondary coil and two primary coils, said 95 secondary coil being connected to said antenna at one of its terminals while its other terminal is connected to the earth, a spark-gap connected with the inner terminals of 100 said two primary coils in series therewith, two condensers each having one of its terminals connected to the outer terminal of a different one of said two primary coils, another spark-gap having its terminals each 105 connected to the other terminal of a different one of said two condensers, two choke coils each having one of its terminals connected to the other terminal of a different 110 one of said primary coils, a source of alternating current of electricity whose two terminals are each connected with the other terminal of a different one of said two choke 115 coils, two other spark-gaps, two other choke coils, and two circuits which are parallel with each other and parallel with each of the two first named spark-gaps, one of said 120 circuits containing one of said other spark-gaps together with one of said other choke coils, while the other of said circuits contains the other of such other choke coils and the other one of said other spark-gaps, whereby with respect to the terminals of 125 said source of alternating current of electricity said two condensers shall be connected in circuits parallel with each other and whereby with respect to said two primary coils and said two first named spark-gaps said two condensers shall be connected in series with each other.

3. Signal transmitting apparatus of a wireless telegraph station embodying an antenna, an air core transformer comprising

a secondary coil and two primary coils, said secondary coil being connected to said antenna at one of its terminals while its other terminal is connected to the earth, a
5 spark-gap connected with the inner terminals of said two primary coils in series therewith, two condensers each having one of its terminals connected to the outer terminal of a different one of said two primary coils, another spark-gap having its
10 terminals each connected to the other terminal of a different one of said two condensers, and means comprising associated

circuits and apparatus included therein, whereby said two condensers may be 15 charged in multiple with respect to the source of charging energy and whereby they may be discharged in series with respect to said two primary coils.

In witness whereof, I, hereunto subscribe 20 my name this tenth day of August A. D., 1914.

THOMAS B. MILLER.

Witnesses:

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