

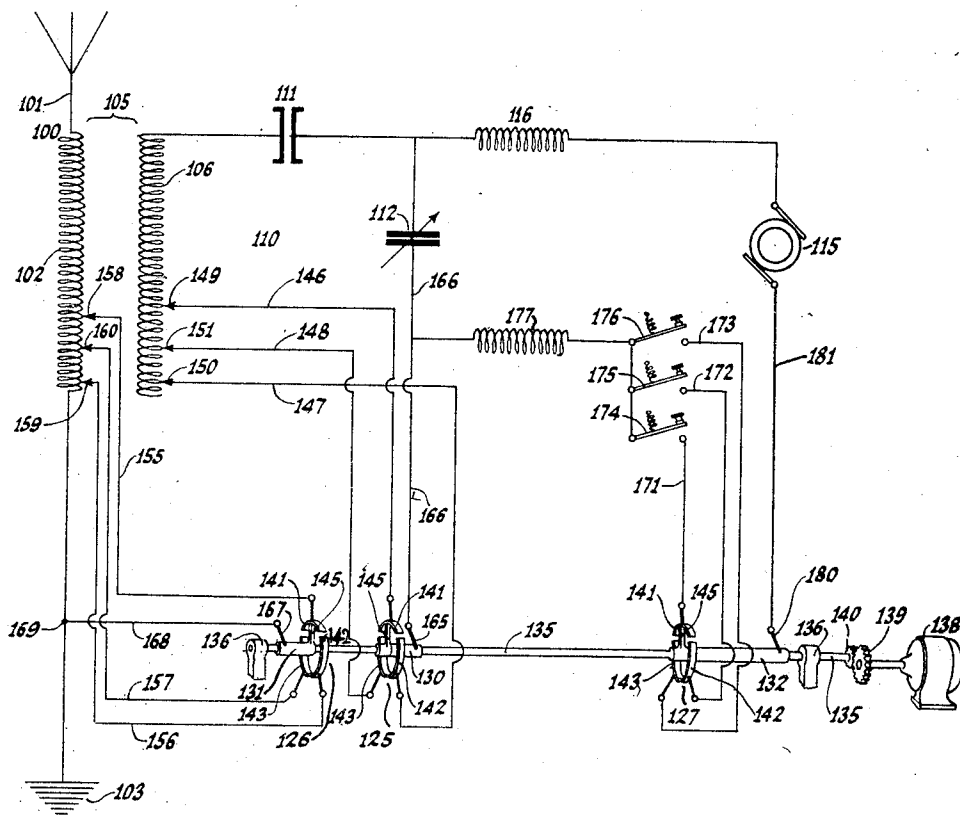
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SYSTEM FOR TRANSMITTING ENERGY

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SYSTEM FOR TRANSMITTING ENERGY.

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This invention relates to a system for transmitting energy, and, more particularly to a transmitting system for multiplex signalling, by which is meant signalling by means of a plurality of independent messages simultaneously transmitted.

The embodiment of the invention herein-after described, by way of example, is intended for multiplex telegraphy.

It has heretofore been proposed to employ in telegraphy a series of high frequency carrier waves interrupted at the transmitter at a frequency such as to give after detection at a receiver an audible note of a desired pitch, thus enabling such a note to be produced at the receiver without the employment there of a heterodyne device or an audio-frequency interrupter. The present invention provides a transmitter at which high frequency carrier waves are interrupted at a readily-audible frequency and which is furthermore so arranged that during the audio-frequency interruptions in a series of waves radiated from the transmitter one or more series of waves of a different frequency or frequencies are radiated. With such an arrangement, a plurality of independent messages may be simultaneously transmitted on series of waves of different frequencies, each of which is radiated during intervals in the radiation of waves of the other frequency or frequencies, so that the occurrence of undesired beats or other interference between waves of different frequencies is avoided.

In order to achieve the advantages above indicated, an important feature of the invention resides in the provision in a system for transmitting energy of a circuit and means for supplying energy to the circuit in the form of a plurality of series of waves of different frequencies occurring periodically in rotational sequence and each interrupted at a readily-audible frequency. The circuit above referred to is preferably made resonant to energy of the different frequencies supplied to it, and to this end the tuning of the circuit may be changed in rotational sequence synchronously with the delivery to the circuit by the supplying means of series

of waves of said different frequencies. Moreover, the circuit may have the form of an open or otherwise constructed, aerial circuit, and the means for supplying energy to the circuit is so constructed as to cause waves of the different frequency or frequencies to occur during the audio-frequency interruptions in the series of waves of each of said frequencies. In order to enable a plurality of messages to be simultaneously transmitted by the use of the invention, means is also provided for independently modifying each of the series of waves of said different frequencies in accordance with a message.

A further, important feature of the invention resides in the provision of a resonant circuit which may serve as a radiating aerial circuit, in combination with means for periodically changing the tuning of the circuit and key-controlled means for supplying to the circuit energy of the frequencies to which it is periodically tuned. A convenient means for periodically changing the tuning of the resonant circuit from one to another of a plurality of different, predetermined frequencies includes a suitable commutator. Such a commutator is employed in the embodiment of the invention herein-after described. The energy supplying means is also provided with a similar commutator, and manually-operable keys are respectively connected in series with the alternatively operative sections of the last-mentioned commutator.

The energy supplying means provided in accordance with the principles of the invention includes means for causing alternating currents of different frequencies to be produced from a source of energy, and means for controlling the generation of the alternating currents comprising elements operable respectively when currents of the different frequencies are produced, together with separate, manually-controlled keys respectively connected with the elements and operable to modify independently energy of the different frequencies in accordance with a plurality of different messages equal in number to the number of the different fre-

quencies. Preferably, and in the illustrated embodiment of the invention, the means for causing the alternating current generator to produce current of different frequencies comprises an oscillatory circuit the tuning of which determines the frequency of the energy produced by the generator.

Still other objects and features of the invention will appear as the description proceeds and will be pointed out in the appended claims.

The single figure of the drawing is a diagrammatic representation of a radio transmitting system embodying the invention.

In the transmission system illustrated in the drawing, an open, aerial circuit 100 including an antenna 101 has in series therewith an inductance coil 102, through which the antenna is grounded as at 103. The coil 102 forms the secondary of an oscillation transformer 105 including a primary inductance coil 106, which is in a closed, oscillatory circuit 110 including a spark gap device 111 and a variable condenser 112. The closed circuit 110 is arranged to be energized by any suitable source of direct current as, for instance, a direct current generator 115, one pole of which is connected through a choke coil 116 to one side of the variable condenser 112.

For selectively varying the frequency of the oscillations emitted by the open aerial circuit 100 by simultaneously and correspondingly varying the inductance 102 of the open aerial circuit 100 and the inductance 106 of the closed circuit 110, means are provided, including a primary commutator 125, a secondary commutator 126 and an auxiliary commutator 127. These commutators include respectively three co-axial conducting sleeves, 130, 131 and 132 which surround and are rigidly secured to but insulated from a shaft 135 arranged to be rotated in fixed bearings 136 at a predetermined rate of, for instance, 1,000 revolutions per second by any suitable means as, for instance, an electric motor 138. The motor 138 rotates a comparatively large gear 139 about a fixed axis, this gear 139 being arranged to engage a relatively small gear 140, which is rigidly secured to one end of the shaft 135. Surrounding each sleeve 130, 131 and 132 and co-axial therewith is a series of fixed, spaced, conducting segments 141, 142 and 143, which are arranged to be consecutively engaged by corresponding conducting arms 145 rigidly secured to the corresponding sleeves 130, 131 and 132. The segmental conductors 141, 142 and 143 of the three commutators 125, 126 and 127, and the corresponding arms 145 are so arranged that the three arms 145 are moved simultaneously into and out of engagement with the corresponding segmental conductors 141, 142 and 143, that is, the arms 145

are moved simultaneously out of engagement with the segmental conductors 141, for instance, and are then simultaneously moved into engagement with the succeeding set of segmental conductors 142. The three segmental conductors 141, 142 and 143 of the primary commutator 125 are electrically connected respectively by conductors 146, 147 and 148 to three taps 149, 150 and 151 which are adjustably connected to the primary coil 106. The three segmental conductors 141, 142 and 143 of the secondary commutator 126 are connected respectively by three conductors 155, 156 and 157 to three taps 158, 159 and 160 which are adjustably connected to the secondary coil 102. The primary commutator 125 is provided with a fixed brush 165, which is connected by a conductor 166 to the side of the variable condenser 112 away from the spark gap 111. The secondary commutator 126 is provided with a fixed brush 167, which is arranged to engage the corresponding sleeve 131 and which is connected by a conductor 168 to the open, aerial circuit 100 at a point 169 between the secondary coil 102 and the ground 103. The three segmental conductors 141, 142 and 143 of the auxiliary commutator 127 are arranged to be connected selectively to the conductor 166 between the variable condenser 112 and the brush 165 through three conductors 171, 172 and 173, three normally open keys 174, 175 and 176 respectively and a choke coil 177. The auxiliary commutator 127 is provided with a fixed brush 180, which is connected by a conductor 181 to the terminal of the generator 115 remote from the choke coil 116.

In the operation of the transmission system illustrated herein the primary and secondary coils 106 and 102 are so divided by the corresponding taps 149, 150 and 151, and 158, 159 and 160, that as the arms 145 of the commutators 125, 126 and 127 are rotated, the open, aerial circuit 102 and the closed, oscillatory circuit 110 are varied successively and in rotational sequence in such a manner that the two circuits are constantly in proper tune and so that the closed circuit 110 including the spark gap device 111, the variable condenser 112 and more or less of the primary coil 106 is caused to oscillate successively at different, predetermined frequencies, for instance, 1,000,000, 800,000 and 900,000 per second, each time that the shaft 135 is rotated through a single revolution. The arrangement is such that when all three keys 174, 175 and 176 are open, the circuit through the generator 115 is open, and consequently no oscillations are produced in the closed circuit 110 or radiated from the open, aerial circuit 100, but when any one of the keys 174, 175 or 176 is closed, oscillations having a corresponding frequency, for instance, of 1,000,000 per sec-

ond, are set up in the closed circuit 110 including the primary commutator 125, the coil 106, the spark gap device 111, and the variable condenser 112. For instance, when the key 174 is closed, the circuit through the generator 115 is closed each time that the corresponding arm 145 passes over the corresponding segmental contact 141 of the auxiliary commutator 127, and at the same time the circuit is closed through the corresponding portion of the primary coil 106, the spark gap device 111, variable condenser 112, brush 165, sleeve 130, arm 145, segmental contact 141 of the primary commutator 125, conductor 146 and tap 149. Also at the same time the corresponding portion of the open, aerial circuit is short-circuited through the corresponding tap 158, segment 141, arm 145, sleeve 131, brush 167 of the secondary commutator 126, and the conductor 168, to maintain the open, aerial circuit in sympathy with the closed, oscillatory circuit 110 as modified by the primary commutator 125. Each frequency must be received by a separate station tuned to that particular high frequency. The rate of rotation of the commutator shaft 135 will make this come in audible groups.

Although only one of the many forms in which this invention may be embodied has been shown herein and the corresponding method of operation described, it is to be understood that this invention is not limited to the specific system or to the specific method of operation described, but may be applied in various systems and with various methods of operation without departing from the spirit of the invention or the scope of the appended claims.

Having described my invention, what I claim is:

1. In a system for transmitting energy, the combination with an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator and means for energizing the closed, oscillatory circuit, of means for changing the tuning of said circuit in rotational sequence to different frequencies, and devices located outside of said oscillatory circuit and operable manually to modify the energization of said circuit in accordance with a plurality of different messages equal in number to the number of said different frequencies.

2. In a system for transmitting energy, the combination with an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator and means for energizing the closed, oscillatory circuit, of means for changing the tuning of said circuit in rotational sequence to different frequencies, and means for controlling the energization of the oscillatory circuit

comprising commutating instrumentalities located outside of said oscillatory circuit and operable respectively when the closed, oscillatory circuit is tuned to different respective frequencies, separate connections between said instrumentalities and said oscillatory circuit, and separate, manually-controlled keys interposed in the connections between said instrumentalities and the oscillatory circuit for modifying energy of said different frequencies in accordance with a plurality of different messages, corresponding in number with the number of said different frequencies.

3. In a system for transmitting energy, the combination with an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, a spark gap in said circuit and means for energizing the closed, oscillatory circuit, of means for changing the tuning of said circuit in rotational sequence to different frequencies, and means separate from the tuning-changing means for controlling the energization of the oscillatory circuit, said controlling means comprising commutator sections operable respectively when the closed, oscillatory circuit is tuned to different frequencies, separate connections between said sections and said oscillatory circuit, and separate manually controlled keys respectively interposed in the connections between said instrumentalities and the oscillatory circuit for modifying energy of said different frequencies in accordance with a plurality of different messages.

4. In a system for transmitting energy, the combination with an aerial circuit, of means for making the aerial circuit resonant to a plurality of different frequencies, an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator and means for energizing the closed, oscillatory circuit, of means for changing the tuning of said circuit from one to another of said different frequencies, and means separate from the tuning-changing means for controlling the energization of the oscillatory circuit, said last-mentioned means comprising instrumentalities operable respectively when the closed, oscillatory circuit is tuned to different respective frequencies, connections between said instrumentalities and said oscillatory circuit and separate manually-controlled keys interposed in the connections between said instrumentalities and the oscillatory circuit for modifying energy of said different frequencies in accordance with a plurality of different messages.

5. In a system for transmitting energy, the combination with an open, aerial circuit of means for making the aerial circuit

resonant to a plurality of different frequencies, an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, a spark gap in said circuit and means for energizing the closed, oscillatory circuit, of means for changing the tuning of said circuit in rotational sequence to different frequencies, and means for controlling the energization of the oscillatory circuit comprising a commutator having sections operable respectively when the closed, oscillatory circuit is tuned to said different frequencies, separate connections between said sections and said oscillatory circuit, and separate manually-controlled keys interposed in the connections between said instrumentalities and the oscillatory circuit for modifying energy of said different frequencies in accordance with a plurality of different messages respectively.

6. In a system for transmitting energy, the combination with an aerial circuit, of means for making the circuit resonant to a plurality of different frequencies, means for supplying energy to said circuit comprising an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, means for successively tuning said closed, oscillatory circuit in rotational sequence to the respective frequencies to which the aerial circuit is resonant, and separate means for modifying energy of the respective frequencies in accordance with messages to be transmitted, and last-mentioned means including a commutator operated in synchronism with the means for tuning the oscillatory circuit to the different frequencies.

7. In a system for transmitting energy, the combination with an aerial circuit, of means for making the circuit resonant to a plurality of different, predetermined frequencies, means for supplying energy to said circuit comprising an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, a commutator for successively changing the tuning of said closed, oscillatory circuit in rotational sequence from one to another of said frequencies, a source of direct current, a commutator for controlling the source of direct current in synchronism with changes in the tuning of said closed, oscillatory circuit, said last-mentioned commutator including alternatively-operative sections, and separate manually-operable keys corresponding in number with the alternatively-operative sections of the last-mentioned commutator for independently modifying energy of said different frequencies in accordance with different messages.

8. In a system for transmitting energy,

an open, aerial circuit, means for making such circuit resonant to energy of a plurality of different frequencies, means for supplying energy to the open, aerial circuit comprising an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, means for changing the tuning of said oscillatory circuit, separate connections for causing the oscillatory circuit to be energized at said different frequencies respectively, said connections including a commutator located outside of the oscillatory circuit and operating in synchronism with the tuning-changing means, and an independent control device in each of said connections for independently modifying energy of said different frequencies in accordance with different messages.

9. In a system for transmitting energy, an aerial circuit, means for making the aerial circuit resonant to energy of a plurality of different frequencies, means for supplying energy to the aerial circuit comprising an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, means including a commutator for changing the tuning of said closed, oscillatory circuit in rotational sequence so as to cause the generator to produce in rotational sequence energy of the frequencies to which the aerial circuit is resonant, and means for controlling the energization of said closed, oscillatory circuit comprising a commutator having sections corresponding with those of the first-mentioned commutator, separate connections between each of the sections of the last-mentioned commutator and said closed, oscillatory circuit, and a key interposed in each of said connections for independently modifying energy of said different frequencies in accordance with different messages.

10. In a system for transmitting energy, an aerial circuit, means for making the aerial circuit successively resonant to a plurality of different predetermined frequencies in rotational sequence, said means comprising a commutator and connections between the sections of the commutator and different points of the aerial circuit, means for supplying energy to the aerial circuit comprising an alternating current generator including a closed, oscillatory circuit for determining the frequency of the energy produced by the generator, means including a commutator analogous to the first-mentioned commutator for changing the tuning of the closed, oscillatory circuit in rotational sequence and in synchronism with changes in the tuning of the aerial circuit so as to cause energy to be supplied to the aerial circuit at different times at the different frequencies to which the aerial circuit is tuned,

and means for controlling the energization of the closed, oscillatory circuit comprising a commutator analogous to the first-mentioned commutator and operable in synchronism therewith, separate connections between the sections of the last-mentioned commutator and the closed, oscillatory circuit and separate manually-operable keys interposed in said connections respectively for independently modifying the different frequencies produced in the system in accordance with a plurality of different messages. 10

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