April 20, 1926. 1,581,368

H. R. VAN DEVENTER

RADIO CONTROL APPARATUS

Filed Jan. 16, 1924 5 Sheets-Sheet 1

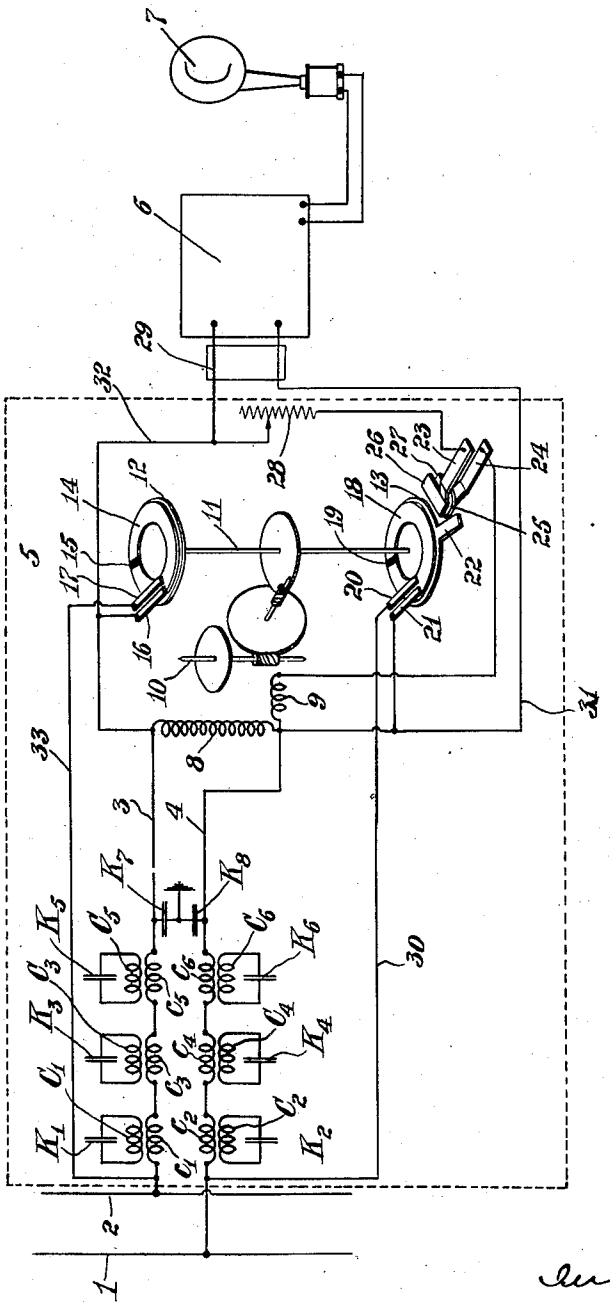


Fig. 1.

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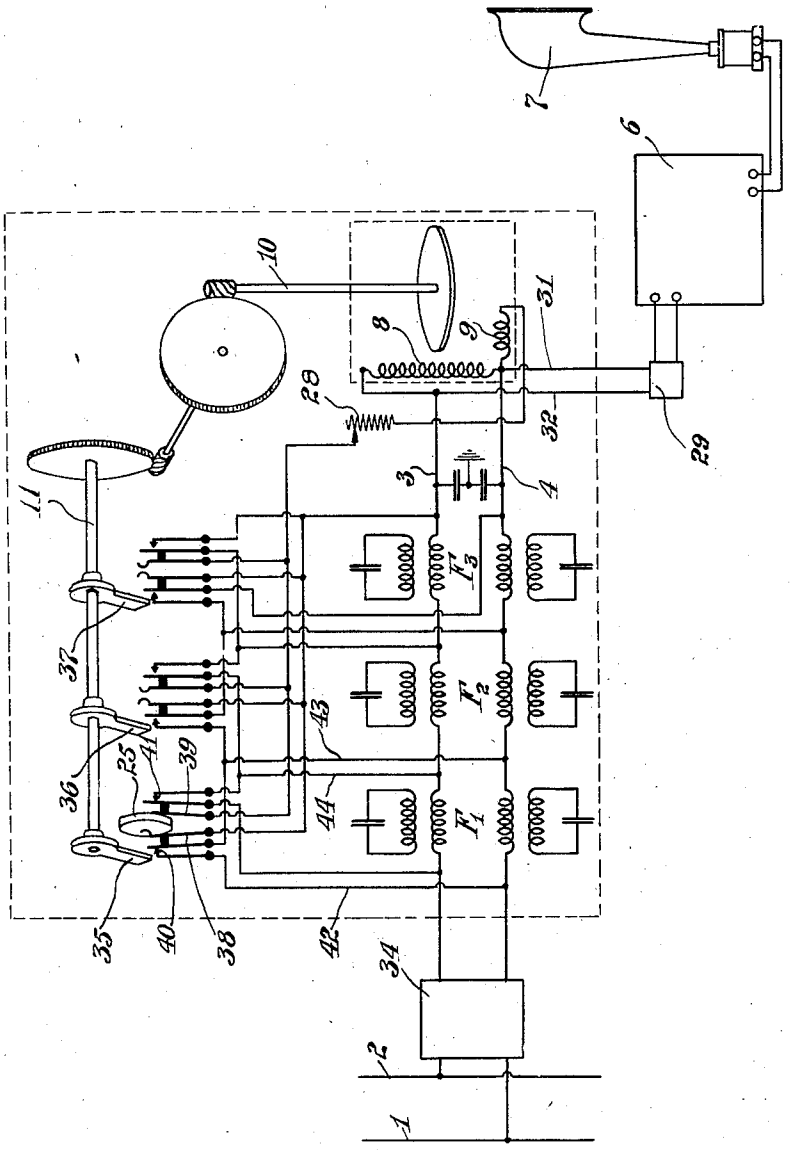


Fig. 2.

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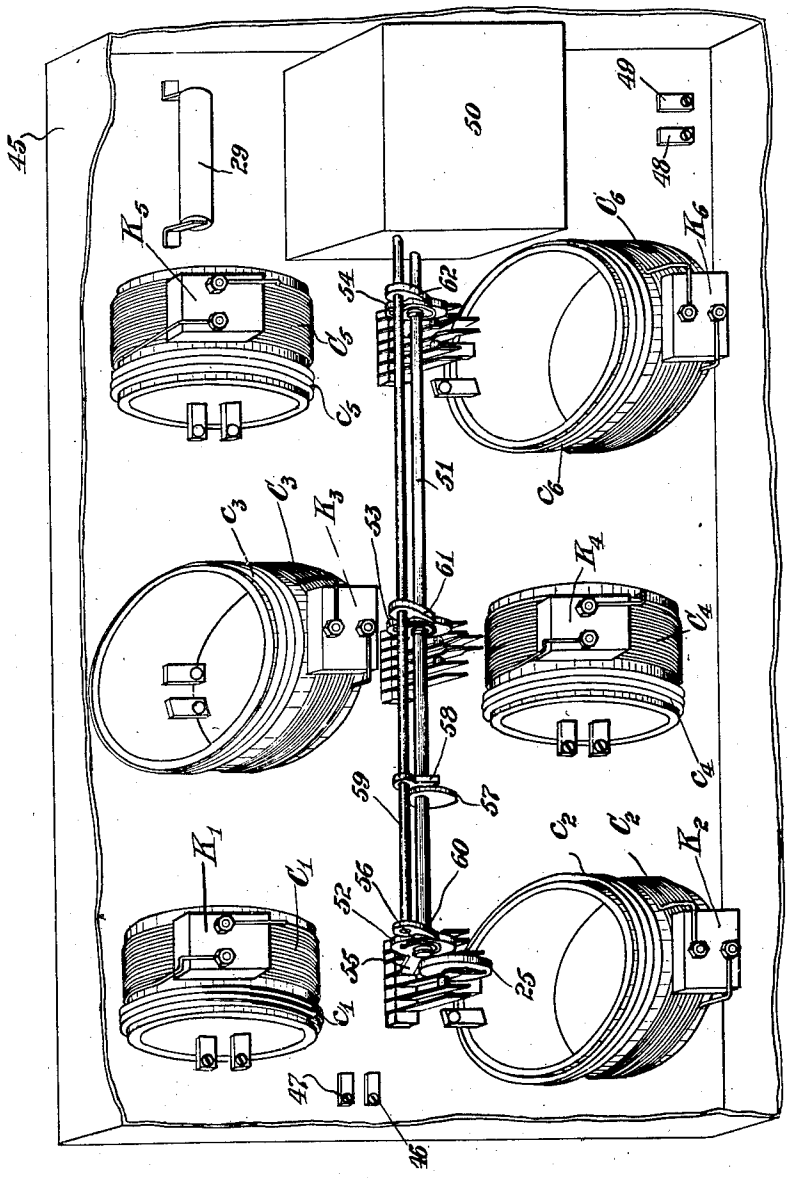


Fig. 3

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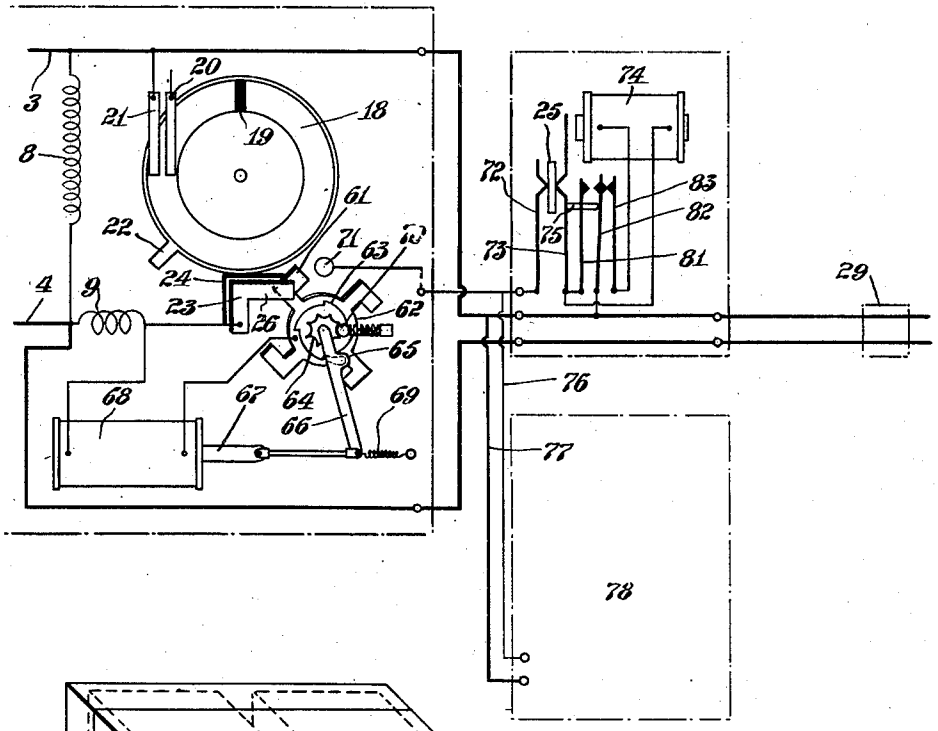
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H. R. VAN DEVENTER

RADIO CONTROL APPARATUS

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Fig. 4.



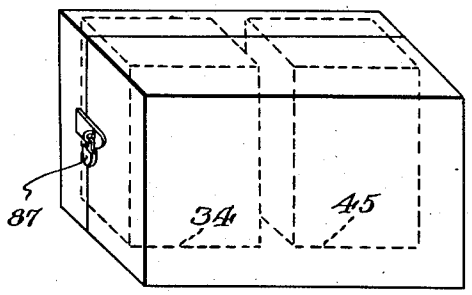
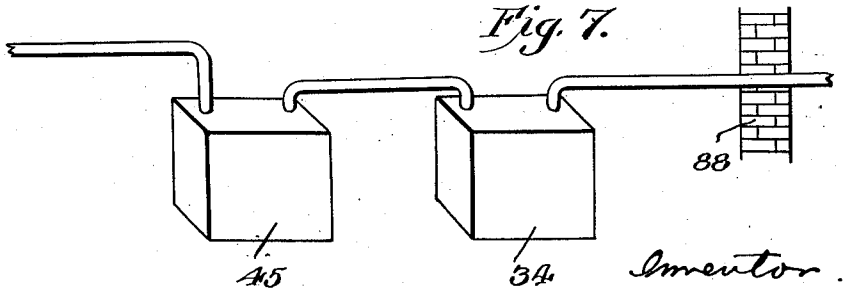


Fig. 6

Fig. 7.



Inventor.

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April 20, 1926.

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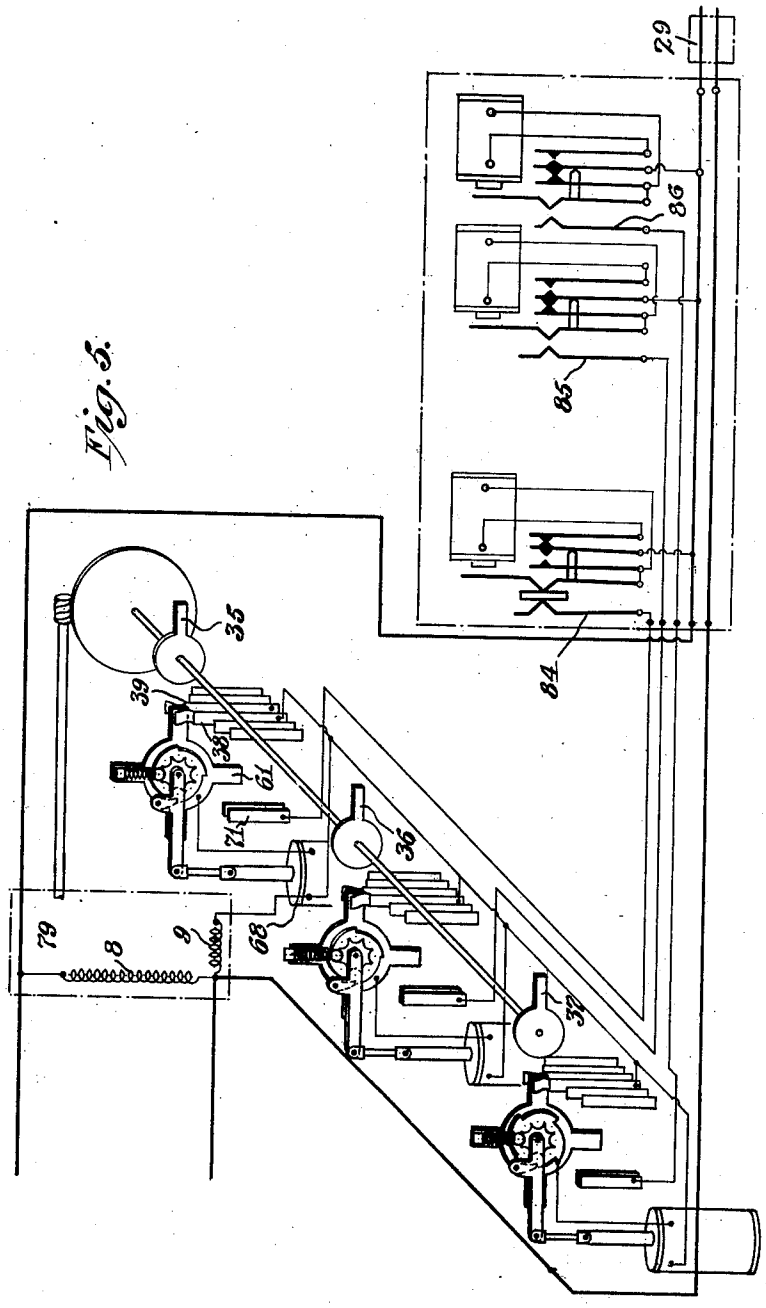
H. R. VAN DEVENTER

RADIO CONTROL APPARATUS

Filed Jan. 16, 1924

5 Sheets-Sheet 5

Fig. 5.



Inventor

H. R. Van Deventer

Patented Apr. 20, 1926. 1,581,368

UNITED STATES PATENT OFFICE.

HARRY R. VAN DEVENTER, OF NEW YORK, N. Y., ASSIGNOR TO DUBILIER CONDENSER & RADIO CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

RADIO CONTROL APPARATUS.

Application filed January 16, 1924. Serial No. 686,560.

To all whom it may concern:

Be it known that I, HARRY R. VAN DEVENTER, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Radio Control Apparatus, of which the following is a specification.

This invention relates to improvements in methods of communication wherein currents of high or radio frequency are employed.

The invention is primarily intended to be applied to cases where communication is to be established by the aid of the so-called wired wireless system; that is to say, in cases where currents of high or radio frequency are transmitted along conductors or wires.

Generally speaking, the invention is an improvement on a system shown in an application of William Dubilier, Serial No. 638,167, filed May 11, 1923. In such application there are described and disclosed means whereby high frequency currents or currents of radio frequency may be excluded from, or admitted to conductors, such as, for example, the wires of an electric lighting system.

It is the object of this invention to provide coin controlled means to govern the admission or exclusion of high frequency signaling currents to a particular circuit.

It is a further object of the invention to provide coin controlled means operable remotely to govern the admission of high frequency signaling currents to any particular circuit.

A further object of the invention is attained by the use of a single container for the various apparatuses used, said container being arranged to be sealed at a single point.

A feature of the invention is the provision of selecting means by which a particular one of a plurality of high frequency signaling currents may be admitted to a particular circuit.

An additional feature of the invention is the use of a time measuring device to determine the length of time during which high frequency currents of a selected high or radio frequency may be admitted to a particular circuit.

A further feature of the invention is accomplished by providing a frequency selecting means which may be remotely controlled, and which, when operated, will admit a desired frequency to a particular circuit for a predetermined time interval.

The invention will be better understood from the following detailed description taken in connection with the accompanying drawings.

In the drawings, Fig. 1 shows a coin controlled time measuring apparatus arranged to admit a plurality of currents of various high frequencies to a particular circuit;

Fig. 2 shows an arrangement in which any one of a plurality of high frequency currents may be admitted to a particular circuit, together with means whereby the particular frequency desired may be selected;

Fig. 3 shows details of the operating mechanism diagrammatically indicated in Fig. 2;

Fig. 4 shows a remote control system which is capable of use with an arrangement generally similar to that shown in Fig. 1;

Fig. 5 shows a remote control system in which a particular desired high frequency may be admitted to a circuit;

Fig. 6 shows a container for the frequency selecting apparatus and the meter used in connection with the ordinary lighting or power service; and

Fig. 7 shows the location of the lighting or power circuit of the high frequency control apparatus with respect to the house meter.

Referring now to Fig. 1, conductors 1 and 2 are connected to any desired source of electrical supply which may be used for lighting or other purposes. Superimposed on the direct or low frequency current are various high frequency currents suitable for use with high frequency receiving apparatus. Conductors 3 and 4 extend to a radio receiving equipment through a time measuring device indicated generally at 5. The high frequency currents are normally excluded from conductors 3 and 4 in the following way.

Inductances c_1, c_3 and c_5 and inductances c_2, c_4 and c_6 are connected in series with conductors 3 and 4, respectively. These inductances consist of only a few turns of wire which will offer a negligible resistance to the low frequency or direct current lighting service. Secondary coils C_1, C_3, C_5, C_2, C_4 and C_6 are inductively coupled to the various primary inductances. Each secondary circuit includes a condenser (indi-

cated at K_1, K_2, K_3, K_4, K_5 and K_6). The secondary circuits are tuned to the various frequencies at which the high frequency signaling currents are transmitted and the tuned secondaries in combination with the primary windings serve to choke out the frequencies corresponding to their tuning. A pair of condensers K_7 and K_8 are bridged across the conductors 3 and 4, there being a ground connection between the condensers. As described in the previously mentioned application of William Dubilier, Serial No. 638,167, signaling currents of a frequency corresponding to the tuning of the various sets may be admitted or excluded by either short-circuiting the various tuned filters or allowing them to remain in circuit.

The device shown in Fig. 1 is a coin-controlled mechanism arranged to short-circuit the various filters for a predetermined length of time, after which the filters will again be brought into circuit to shut out signaling currents of a frequency corresponding to their tunings. That is, the person operating the receiving set indicated generally at 6 with a loud speaker 7 may admit to said receiving set certain frequencies at will for a certain length of time, after which further payment must be made before he can again receive high frequency currents.

It will be assumed that the lighting service is supplied with direct current over the main conductors 1 and 2. The time measuring device consists of a shunt motor having a field winding 8 and an armature winding 9. An adjustable resistance 28 is provided and connected in series with the armature winding to provide suitable means for controlling the motor. The motor armature is arranged to drive a shaft 10, which by means of suitable reduction gears, controls the rotation of a shaft 11. Secured to the shaft 11 and arranged to rotate with it are two discs 12 and 13 of insulating material. Mounted on disc 12 is a commutator consisting of a conducting portion 14 and an insulating portion 15. The insulating portion 15 extends through only a few degrees. While brushes 16 and 17 are resting on the conducting portion 14 a circuit is completed from one brush to another, which circuit is opened during the interval that the insulating segment 15 is passing under the brushes.

A commutator consisting of a conducting portion 18 and an insulating portion 19 is mounted on disc 13, the insulating portion 19 bearing the same angular relation to the shaft 11 as does the insulating portion 15 of the upper commutator. Brushes 20 and 21 cooperate with the lower commutator in the same way as brushes 16 and 17 cooperate with the upper commutator. The disc 13 is also provided with a projection 22 which acts as a coin ejecting lever. Contact springs 23 and 24 are arranged to receive and hold the coin indicated at 25 after it has been inserted in any desired or well-known form of slot and chute arrangement. The contact springs 23 and 24 are provided with extensions 26 and 27 for a purpose which will be more apparent from the following description.

The detailed operation of the device is as follows. When a coin 25 is inserted between the contact springs 23 and 24, a circuit is completed through such springs and the motor is put into operation. It will be noted that the shunt field 8 is connected directly across the supply conductors 3 and 4. The circuit of armature 9 extends from conductor 4, winding of armature 9, spring 24, coin 25, spring 23, adjustable resistance 28 and thence to conductor 3. The normal position of the device is with brushes 20 and 21 resting on insulating segment 19 and brushes 16 and 17 resting on insulating segment 15. As soon as the motor is put into operation the discs 12 and 13 are put into motion and the insulating segments 15 and 19 are moved out from under their respective brushes, allowing the conducting segments 14 and 18 to become effective. When a circuit is completed through brushes 16 and 17 and brushes 20 and 21, the various filters are short-circuited, and the high frequency signaling currents are supplied directly to the receiving set 6 through a suitable outlet box 29. The circuit to the receiving set may be traced from conductor 1 to conductor 30, thence through brush 20, segment 18, brush 21, conductor 31 to one side of the receiving set, and returns by way of the other side of the receiving set, conductor 32, brush 16, segment 14, brush 17, conductor 33 and thence to conductor 2. It will readily be seen that the various filters are completely short-circuited and can have no effect in shutting out the various high-frequency signaling currents.

The motor continues to operate and drive shaft 11 through the reduction gears until the projection 22 nears the end of a complete revolution, at which time this projection will strike the coin 25 and force it out from between the springs 23 and 24 into a suitable receptacle. The projection 22 is made of conducting material and will keep the motor circuit closed after the coin has dropped into the receptacle and until the projection 22 is entirely clear of the contact springs. When this occurs, the motor is stopped, since the armature circuit is now open. The angular relation of the projection 22 with respect to the insulating segments 15 and 19 is such that when the motor circuit is opened and the device brought to rest, the various brushes 16, 17, 20 and 21 are resting on the insulating segments, so that the short-circuit around the various

filters is removed and the high frequency signaling circuits are excluded. Upon insertion of another coin the cycle of operations is repeated, the filters are again short-circuited and the receiving set may be tuned in to any one of the three frequencies until the discs 12 and 13 have again made a complete revolution.

It is of course obvious that the motor may be arranged to rotate at any desired speed, and that by means of suitable gearing any predetermined time interval may be allowed in return for the unit sum represented by the coin inserted.

Fig. 2 shows a further development of the above described device. By means of the device shown in Fig. 2 it is possible to admit any one of a plurality of normally excluded frequencies. This would have many practical advantages since it might be desirable to charge at different rates for the various high-frequency signaling currents. The apparatus shown is substantially like that of Fig. 1, and so far as has been possible, the like parts of the drawing are numbered to correspond in the two figures. In Fig. 2, however, the filters have been generally designated as F_1, F_2 and F_3. Current is supplied to the subscriber from the power mains 1 and 2 through a service meter 34 and thence through the filters to an outlet box 29. From the outlet box connections may be made to the various lighting or power circuits and to a high-frequency signal receiving set 6 and a loud speaker 7. The connections of the filters in the circuit are identical with those described in Fig. 1 and need not be described. A motor identical with that previously described may be used and operates a shaft 11 through a suitable train of reduction gears. The shaft 11 carries three operating fingers 35, 36 and 37 in place of the discs 12 and 13 of Fig. 1. A set of contact springs is provided for each filter.

Assuming that the subscriber wishes to admit to his receiving set signaling currents of a frequency corresponding to that to which the filter F_1 is tuned, he will insert a coin 25 in a chute which will lead the coin 25 into a position to engage and make contact with springs 38 and 39. The insertion of the coin also causes the closure of contacts 40 and 41. The closure of contacts 40 and 41 short-circuits the filter F_1. The circuit to the receiving set 6 now extends from conductor 1, meter 34, conductor 42, contact 40, conductor 43, conductor 4, conductor 31 through the outlet box 29 to the receiving set, and thence back to the outlet box, conductor 32, conductor 3, conductor 44, contact 41, through the service meter to conductor 2. The closure of a circuit through springs 38 and 39 completes a circuit for the armature of the motor. This circuit extends from conductor 1 to conductor 4 as described, armature winding 9, resistance 28, spring 39, coin 25, spring 38 to conductor 3, and thence to conductor 2 as described. The motor continues in operation until the shaft 11 has made a complete revolution, at which time the coin 25 is dislodged, removing the short-circuit about filter 1 and causing the motor circuit to be opened.

It is believed that the above description will serve to illustrate how either filters F_2 or F_3 may be short-circuited at will by inserting coins to operate the springs corresponding to these filters.

Fig. 3 shows a practical arrangement of apparatus in a suitable box 45. Input terminals are indicated at 46 and 47 and output terminals are indicated at 48 and 49. The box 50 encloses the motor and reduction gears. The various filters will not be described since their construction and arrangement are well understood. Corresponding parts bear numerals corresponding to those in Figs. 1 and 2. The various spring pile-ups correspond in every way to those shown and described in Fig. 2, and the circuit arrangement is identical with that shown in Fig. 2. However, a novel coin ejecting arrangement is disclosed in Fig. 3 and will now be described.

A shaft 51 is arranged to be driven by the motor through the reduction gears. Rotatably mounted on the shaft 51 are discs 52, 53 and 54. Each disc carries an ejecting finger, one of which is clearly shown at 55. Spiral springs, such as 56, are used to couple the discs to the shaft 51 and tend to cause the discs to rotate with the shaft. Should the ejecting fingers, such as 55, encounter an obstacle, the discs are, however, held stationary while the shaft 51 rotates and stores up energy in the springs. A cam 57 is secured to shaft 51 and rotates therewith. The cam 57 cooperates with a rocking lever 58 secured to an auxiliary shaft 59 suitably mounted for rotation. Secured to the shaft 59 are pawls 60, 61 and 62 arranged in operative relation to the various discs in such a manner that the edge of the pawl normally rides on the periphery of the disc.

The motor is put in operation upon the insertion of the coin 25, which at the same time short-circuits the filter associated with the contact springs which have been operated by the coin. It will be assumed that the coin has been inserted, as shown, in the contact spring set shown at the left of the drawing. The disc 52 revolves with the shaft, being driven by the spring 56 until the ejecting finger 55 is about to strike the coin 25. At this time the pawl 60 drops into a notch in the periphery of disc 52 and locks the disc against further rotation. The shaft 51 continues to revolve and store up energy in spring 56 until cam 57 engages

trip finger 58, rocking shaft 59 upward and disengaging pawl 60 from the notch in the periphery of disc 52. When the pawl 60 is disengaged, the energy stored up in the spring causes the ejecting finger 56 to snap around and eject the coin sharply and follow it through the contact springs, after which the circuits are opened as previously described. The opening of contact springs removes the short circuit about the filter and stops the motor.

Fig. 4 shows an arrangement in which the controlling device which is used to admit the high frequency signaling circuits may be controlled remotely. That is, the coin collect device may be in an apartment, whereas the actual switching device may be located in the basement. The filters and control and time-measuring equipment of Fig. 4 correspond in every way with that shown in Fig. 1, the only difference being that the device is put into operation by means of contact members such as 61, instead of by the insertion of a coin. The insertion between the contact springs 23 and 24 of the contact members 61 is controlled at a distant point by the insertion of a coin. When the coin is inserted a solenoid is operated to cause a contact member 61 to complete a circuit through springs 23 and 24 to start the motor which in turn causes the filters to be short-circuited.

The contact members 61 are mounted on extensions of a rotatable disc 62 to which are secured a ratchet wheel 63 and a centering cam wheel 64. The ratchet wheel 63 is driven by a pawl 65 carried by a lever arm 66 which may be actuated by the plunger 67 of a solenoid 68. The spring 69 restores the pawl 65 to its normal position after actuation of the solenoid. A spring-pressed ball or roller 70 cooperates with the cam wheel 64 and by forcing its way into the depressions in the cam wheel causes the advance of the rotating mechanism at proper times and for a purpose which will be made more apparent hereinafter.

When the device is in its normal position, one of the contact members 61 is in engagement with a conducting stud 71.

It will be noted that there are only four teeth on the ratchet wheel. When the switch is in its normal position, that is, with one of the members 61 in engagement with stud 71, the ratchet wheel is in such a position that energization of the solenoid will advance the contact member 61 a half step, or one-eighth of a revolution. This is sufficient to cause the contact member 61 to enter between and make contact with springs 23 and 24.

The device at the remote station consists of a coin chute, various contacts arranged to be closed upon the insertion of a coin, and a coin collect magnet 74. The operation of the device is as follows. When a coin 25 is inserted, circuit is completed from spring 72 to spring 73 at the remote station, whereupon a circuit is completed from conductor 4, armature winding 9, winding of solenoid 68, contact member 61, stud 71, spring 72, coin 25, spring 73, spring 81, spring 82 and thence to conductor 3. It should be noted that springs 81, 82 and 83 are shown in the drawing as in their off-normal positions. Before the coin is inserted, contacts 81 and 82 are in engagement while springs 82 and 83 are not in engagement. An extension 75 on spring 73 serves to push spring 82 out of engagement with spring 81 and into engagement with spring 83. Spring 81 is arranged, however, to have a slight follow, so that springs 81 and 82 do not break their contact before solenoid 68 has had an opportunity to operate in the above traced circuit. If contacts 82 and 83 should close before contacts 81 and 82 separate, no harm will be done, since under this condition the coin collect magnet 74 is short-circuited over an obvious path.

When the solenoid 68 operates, it draws in the plunger 67 and causes the ratchet wheel to advance through an eighth of a revolution, bringing a contact member 61 into engagement with springs 23 and 24. The completion of circuit through springs 23 and 24 causes the motor to be put into operation to drive the discs and short-circuit the filters, as completely described in connection with Fig. 1. After a complete revolution of the disc 18, projection 22 engages the contact member 61 and forces it out from between the springs, and after the contact finger 22 moves out of engagement with the springs, the motor is stopped with the discs in a position to remove the short circuit from about the filters. When the contact member 61 is pushed out by the finger 22, it is caused to snap over into engagement with stud 71 by the action of spring-pressed roller 70 on the centering cam wheel 64. The engagement of member 61 with stud 71 at this time completes a circuit from conductor 4, armature winding 9, winding of solenoid 68, member 61, stud 71, contact 72, coin 25, contact 73, winding of coin collect magnet 74, contact 83, contact 82 and thence to conductor 3. The solenoid 68 is of relatively low resistance and the coin collect magnet operates to collect the coin. It should be noted that the resistance of coin collect magnet 74 is sufficiently high to prevent the operation of solenoid 68 when connected in series with it. Upon insertion of another coin, this cycle of operations is repeated.

Control of the apparatus at another distant point could very easily be accomplished by simply connecting conductor 76 and 77 to control apparatus similar to that shown in the upper dotted rectangle and as indi-

cated generally by the lower dotted rectangle 78.

Fig. 5 will now be described. This figure shows an arrangement which is in effect a combination of the arrangements shown in Figs. 2 and 4. As in Fig. 2, a plurality of filters are provided so that the high frequency signaling current to be admitted to the receiving set may be selected at will, and as in Fig. 4, the admission of the selected frequency may be remotely controlled. Corresponding parts have been numbered so far as possible with like reference characters. It should be noted that the normal contact stud 71 of Fig. 4 has been shown in Fig. 5 as a leaf spring, but its function is identical. A solenoid operated, ratchet and pawl mechanism is provided for each frequency for which there is a filter. The ratchet and pawl mechanism drives a wheel carrying contact fingers 61, as in Fig. 4, which perform the same functions with respect to the various spring pile-ups as the coin performs in the arrangement shown in Fig. 2. The motor and reduction gears are indicated by the dotted rectangle 79. The arrangement of the filters with respect to the power circuit and with respect to the various contact spring sets which are controlled by the members 61, is identical with that shown in Fig. 2, and has not been shown in detail, since the manner in which these springs may start the motor and short-circuit their associated filters is so obvious from the preceding description as to need no further disclosure.

The apparatus at the remote control station consists of a suitable container in which are coin slots representing each one of the frequencies for which corresponding filters have been provided. There is a spring pile-up and coin collect magnet for each coin slot. The spring pile-ups and coin collect magnets correspond in every way to the arrangement shown in Fig. 4, excepting that the conductors connected to springs 84, 85 and 86 extend to the normal contact pieces of the switches corresponding to the frequencies which the coin-controlled springs are arranged to select. The switch 84 is shown in its operated position, while the other two switches are shown in their normal positions.

The operation of any particular switch is identical with that just described in connection with Fig. 4 and should need no further description. It is obvious that if the switches are all in their normal positions, the insertion of a coin into any one of the three spring sets will cause the corresponding switch to be moved out of its normal position by means of a circuit closed through its normal contact and the operating solenoid, and that the solenoid will operate the switch through forty-five degrees to operate the contacts to close circuits and accomplish results as described in connection with Fig. 2. The result is that obviously a remote selective control of the frequency to be admitted is established.

Fig. 6 shows a desirable arrangement for housing the controlling apparatus and the service meter in a common box which may be closed and locked by means of a suitable padlock 87. By employing this arrangement, a single lock or seal may be utilized to prevent tampering with either of the devices.

Fig. 7 shows the manner in which the high frequency controlling device 45 is connected with respect to the service meter 34, that is, it is shown as connected on the house side of the meter, the incoming line being indicated as coming in through a house wall 88 to the service meter 34 and thence to the controlling apparatus.

What I claim is:

1. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit and coin controlled means to govern the admission of said currents to said conductors.

2. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, and coin controlled means to govern both the admission of said currents to said conductors and the exclusion of said currents from said conductors.

3. In a signaling system, means for carrying a plurality of currents of differing frequencies, said currents being of relatively high frequency said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, and coin controlled means to admit a current of desired frequency to said conductors.

4. In a signaling system, means to produce a plurality of currents of differing frequencies, said currents being of relatively high frequency, conductors, filters connected in circuit with said conductors, there being a filter for each current frequency, and coin controlled means to selectively short-circuit said filters.

5. In a signaling system, means for carrying currents of relatively high frequencies, said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, means to govern the admission of said currents to said conductors, and a time measuring device to determine the length of the time interval for which said currents are admitted to said conductors.

6. A coin-controlled, frequency-selecting

device, and means for carrying electrical energy other than signal energy connected thereto.

7. A coin-controlled, frequency-selecting device and time-measuring apparatus to determine the duration of operation of said device, and means for carrying electrical energy other than signal energy connected thereto.

8. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, and a motor driven switch to govern the admission of said currents to said conductors and to measure the duration of such admission.

9. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, a motor driven switch to govern the admission of said currents to said conductors and to measure the duration of such admission, and coin-controlled means to put said motor into operation.

10. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, and a motor driven rotary switch to govern the admission of said currents to said conductors.

11. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, switching means to govern the admission of said currents to said conductors, a station remote from said switching means, and coin-controlled means at said distant station to control the operation of said switching means.

12. In a signaling system, means for carrying currents of relatively high frequencies said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, switching means to govern the admission of said currents to said conductors, controlling mechanism for said switching means, a distant station, a coin-operated device thereat, and means to operate said controlling means in response to actuation of said coin-operated means.

13. In an electrical system, means for carrying current said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, switching means to govern the connection of said current to said conductors, a rotary mechanism for controlling said switching means, a distant station, a coin-operated device thereat, and means to operate said rotary mechanism in response to the actuation of said coin-operated means.

14. In a signaling system, means for carrying a plurality of currents of differing frequencies, said currents being of relatively high frequency said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, switching means to govern the admission of said currents to said conductors, a station remote from said switching means, and coin-controlled means at said distant station to selectively control the operation of said switching means to admit a current of desired frequency to said conductors.

15. A remotely controlled, coin-actuated, frequency-selecting device, and means for carrying electrical energy other than signal energy connected thereto.

16. In a signaling system, means for carrying current of relatively high frequencies, said means comprising a circuit for the delivery of electrical energy other than signal energy, conductors connected to said circuit, coin-controlled means to govern the admission of said currents to said conductors, a separate source of current, a meter for measuring the extent of use of said second current, and means for enclosing or encasing said apparatus within a suitable casing arranged to be locked or sealed at a single point.

In testimony whereof I affix my signature.

HARRY R. VAN DEVENTER.