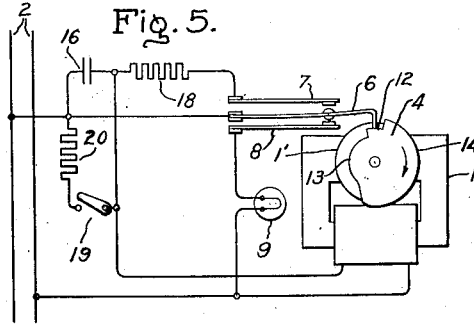
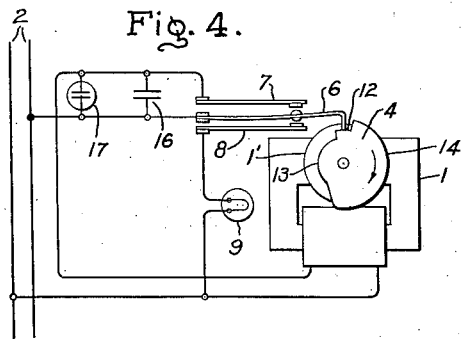
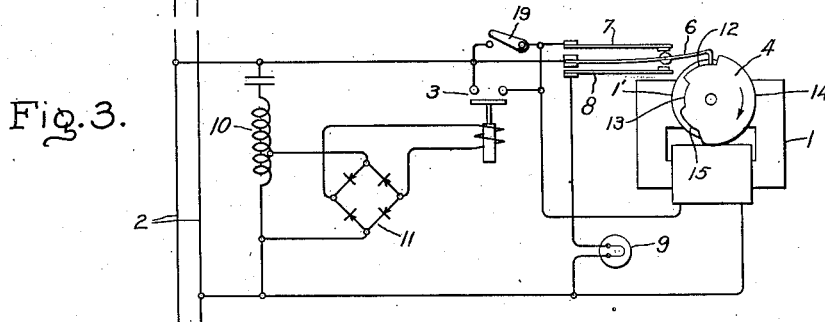
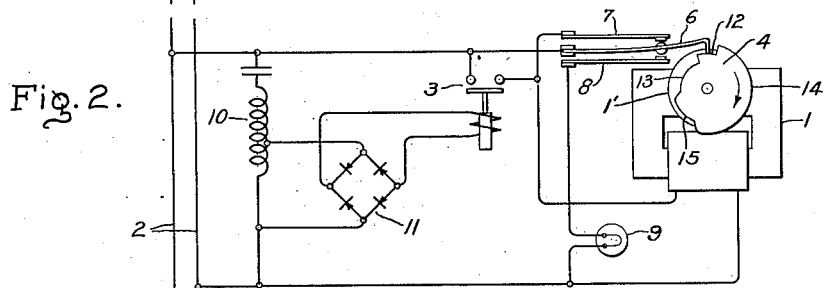
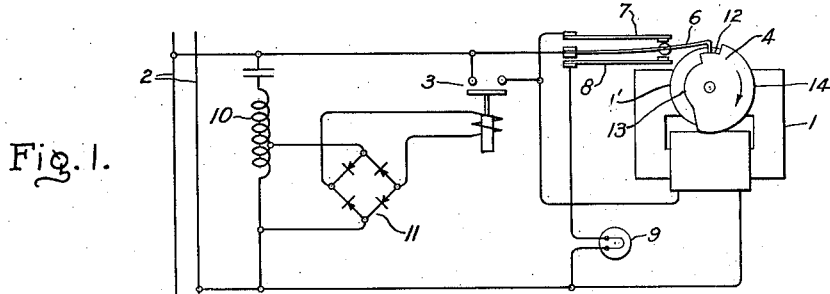


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J. L. WOODWORTH
TIME SELECTOR MECHANISM

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Inventor:
John L. Woodworth,
by *Charles E. Mulla*
His Attorney.

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TIME SELECTOR MECHANISM

John L. Woodworth, Schenectady, N. Y., assignor
to General Electric Company, a corporation of
New York

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8 Claims. (Cl. 175—375)

My invention relates to time selector mechanisms. It has for one of its objects to provide an improved time selector mechanism which is of simple and economical construction and which is reliable in operation.

A further object of my invention is to provide a time selector mechanism in which a motor of suitable form, such as those commonly employed for operation of clocks, may be employed as the actuating element of the selector.

Still a further object of my invention is to provide a selector system which, while not limited thereto, is particularly adapted for use in connection with the remote control of such devices as street lamps, for example. Thus, ordinarily street lamps are turned on in the evening and off in the morning. It is frequently desirable, however, from the standpoint of economy that a part of the street lamps be turned on at a certain time in the evening and another part at a different time; i. e. after the evening becomes darker, or the traffic heavier. Further, it is desirable that a part of the lamps which are lighted during the hours of heavy traffic in the evening be turned off at midnight or during the early hours of morning prior to the time of turning off the remainder of the lights. Thus my invention has for one of its objects to provide a receiver of simple and rugged construction which may readily be mounted in the base, or upon the support, of the lamp which it controls and which may be readily adapted for control from a remote point selectively to cause energization of the particular lamp, in connection with which it is to be used, only during the particular hours of the evening when that lamp is needed. A further object of the invention is to provide a selector of such construction that the different lights may be selectively turned on and off at the desired times and which at the same time avoids the necessity for transmitting impulses from the remote point of more than two different durations.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation may best be understood by reference to the following description taken in connection with the accompanying drawing in which Figs. 1 to 5 represent different modifications of my invention.

Referring to Fig. 1, I have shown therein a selector mechanism comprising a motor 1, the winding of which is arranged to be energized

from a power circuit 2 through the contacts of a relay 3. This motor may preferably be one of the synchronous type such as that shown in U. S. Patent No. 1,495,936 issued May 27, 1924, to H. E. Warren, and comprises an armature arranged to drive a cam 4 through a suitable gear mechanism, not shown, but which is disposed within a housing 1'. The cam 4 has a periphery comprising arcs of different radii and is arranged to control the position of a switch member 6. This switch member is biased against the periphery of the cam and reciprocates between two stationary contacts 7 and 8. When in its lower position it engages the contact 8 and closes the circuit of a lamp 9, but when in its upper position it engages the stationary contact 7 and energizes the winding of the motor 1.

The relay 3 is arranged to be controlled by carrier current transmitted over the power line 2 from which the street lamp 9 is energized. Connected across the supply circuit is a tuned circuit 10 which is resonant at the frequency of the carrier current employed. A portion of the electromotive force appearing on the inductance of this tuned circuit is rectified in any suitable way, as for example, by means of copper oxide rectifiers of the type disclosed in United States Patent No. 1,640,335, to Lars O. Grondahl, issued August 23, 1927, from which direct current is supplied to the winding of the relay 3.

As thus arranged let us assume that an impulse of carrier current of short duration is received in the tuned circuit 10. Relay 3 is then energized and completes an energizing circuit for the motor 1. The motor 1 then starts to revolve and drives the cam in a clockwise direction. After about four seconds the switch member 6 drops off from the arc 12 on to an arc of smaller radius 13 and engages the stationary contact 8 which causes energization of the lamp 9. If the carrier impulse is now interrupted the motor will be de-energized leaving the switch member 6 in its lower position and the lamp 9 lighted. If it is desired to turn the lamp 9 off a long carrier current impulse may be transmitted over the power line 2 causing the relay 3 again to be operated and the motor 1 to be energized. In response to this long impulse the cam 4 is rotated to a position such that the switch member 6 rides upon the arc 14 of the periphery of the cam; this arc having the longest radii. The switch member 6 is now operated to its upper position where it engages the contact 7 and maintains the energization of the winding of the motor 1 after the carrier impulse is interrupted.

Thus the cam 4 continues to revolve until the switch member 6 drops from the arc 14 on to the arc 12 which is the position shown in the drawing. In this position both the motor and the lamp 9 are deenergized.

As thus described the system is one well adapted to control a street lamp which is to be turned on, for example, early in the evening and off late in the morning. The short impulse which turns the street light on may be one of, for example, 6 seconds whereas the long impulse may be one of 30 seconds. The arcs 13 and 14, however, are sufficiently long to permit a considerable variation of these periods and still produce reliable control of the lamp.

The arrangement shown in Figs. 2 and 3 differ from that shown in Fig. 1 only in the shape of the cam 4. In Fig. 2 the arc 13, which is of smallest radius, is shown as shorter than that in Fig. 1, and an additional arc 15 is provided between the arc 13 and the arc 14 having a radius equal to that of arc 12. The cam shown in Fig. 3 differs from that shown in Fig. 2 only in that the arc 12 of the cam 4 is of about double the length of that shown in Fig. 2. In this way these selectors are adapted for the control of those lamps of the street lighting system, for example, which are to be selectively operated at times during which other lamps of the system which are controlled by selectors having cams of the form shown in Fig. 1 are energized. The selector of Fig. 2 is adapted for control of a lamp which is to be turned on at that time in the evening when the first lamps are turned on and to be turned off at midnight, for example, under control from the remote point. The selector of Fig. 3 is adapted to turn the lamps controlled thereby on at a time in the evening under control from the remote station after the first lamps have been turned on and similarly to turn this lamp off at midnight.

Thus, for example, if it be assumed that different lamps of a street lighting system are controlled by selectors of the type shown in each of Figs. 1, 2 and 3 the operator in controlling these lights transmits from the control station a carrier impulse of predetermined duration at each time in the evening when lamps are to be turned on and when part of the lamps are to be turned off. In response to each of these impulses the cams on each of the different selectors are rotated through a predetermined arc. During the first impulse the switch member 6 of Figs. 1 and 2 are operated to the lower position into engagement with arc 13 and contact 8 thereby lighting the respective lamps. Since the arc 12 of the selector of Fig. 3 is longer than those of Figs. 1 and 2, however, switch member 6 of this figure is not changed in position and the respective lamp 9 remains deenergized. In response to the next impulse, however, which may be transmitted later in the evening, switch member 6 of Fig. 3 will be operated to the lower position thereby closing the circuit of the respective lamp 9 whereas the switch members of selectors having cams of the form shown in Figs. 1 and 2 will not be affected. In response to the third impulse, which may be transmitted, for example, at midnight, the members 6 of the selectors of Figs. 2 and 3 ride up on the arcs 15 thereby deenergizing the lamps controlled thereby. The cam of Fig. 1 however is not rotated sufficiently to cause deenergization of the associated lamp. When it is desired that all of the lamps be turned off a long impulse is trans-

mitted, this impulse having sufficient duration to assure that all of the switch members ride up on the arcs 14 of their respective cams. In this position the motor circuits are energized through contact member 7 and all of the selectors are returned to the initial position where they are in readiness for another cycle of operations.

It will thus be seen that selectors of this type comprise a very simple and inexpensive means whereby the different operations may be selectively and reliably controlled. The motors are of a type commonly employed in electrically operated clocks and are relatively inexpensive. Since all of the motors are energized from the power system they serve to operate their respective cams through equal arcs and through arcs accurately determined by the duration of the transmitted impulses, it being assumed that the frequency of the power system remains constant. Any discrepancy, however, in the movement of the different selectors is taken care of by the arc 14 and the upper contact 7 which cooperates with the switch member 6. Since the motor is maintained energized by the switch member 7 after termination of the long impulse all of the different cams are returned to corresponding positions where they are in readiness for the next successive cycle of operation. The cams 4 may be attached to the motor in any desired way and may be readily removable, if desired, so that any selector may be adapted for control of any desired street lamp simply by choice of the cam employed in the selector.

In each of the figures I have shown the long arc 14 as substantially equal to one hundred and eighty degrees. This, however, may be varied as desired. Preferably this arc should be sufficiently long to cause the selector to be operated to the position shown in the drawing from any point on arcs 12, 13 and 14 in response to an impulse of the longer duration. With this arc so proportioned with reference to longer impulse if by chance any of the selectors get out of step with the others all of the selectors can be restored to a predetermined initial position by simply transmitting a long impulse from the central station.

In Fig. 4 I have shown a modification of my invention in which the circuits have been somewhat simplified. The tuned circuit of this figure comprises a condenser 16 which is connected in series with the winding of the motor 1 between the opposite sides of the power circuit 2. This condenser has sufficient capacitance to resonate with the inductance of the motor winding at the frequency of the carrier current employed. Thus when carrier current is supplied to the system a large voltage is built up across the condenser 16. Connected in parallel with this condenser is an electron discharge device 17 comprising a pair of spaced electrodes, which may be either similar or dissimilar, arranged in a vessel filled with a suitable attenuated gas such as neon or argon. This discharge device is normally non-conducting but when voltage of the carrier frequency is built up across the condenser 16 it breaks down and causes current of the power frequency to flow between its electrodes and through the winding of the motor 1 thereby causing operation of the motor.

Fig. 5 is similar to Fig. 4 with the exception that the discharge device 17 is eliminated and the motor 1 is directly energized with the carrier frequency. Since the condenser 16 is tuned with the inductance of the winding of the motor 1 a considerable amount of current of the carrier is

frequency flows in the winding of the motor 1, this current being sufficient to cause operation thereof. I have also shown in this figure a resistance 18 connected in series with the upper contact 7 and the winding of the motor thereby to limit the amount of power current which flows in the winding of the motor 1 when the switch member 6 is in its upper position. Thus with this arrangement the motor 1 operates at one speed when the carrier electromotive force is applied and at a different speed when energized through its upper contacts 7. Thus when this arrangement is employed it is desirable that the motor 1 be one capable of operation at the higher speed.

It may be desirable in systems of the type disclosed to provide means whereby the selector may be operated locally in the same way as is done from the control station, as by operator inspecting the installations. For this purpose I have shown a switch 19 connected in parallel with the contacts of relay 3 in Fig. 3. By operation of this switch the operator may test the operation of the selector to determine whether it is operating properly under control of the central station. In Fig. 5 this switch is shown connected in parallel with condenser 19 in circuit with current limiting resistance 20 for the same purpose. By this means the operator may operate the switch from any position to the position which it should occupy at the particular time.

It will of course be understood that my selector mechanism is not limited to operation of switches but may be utilized for selectively operating movable elements for any other purpose as to control gates, valves and the like.

While I have shown a particular embodiment of my invention, it will of course be understood that I do not wish to be limited thereto since many modifications in the arrangement and instrumentalities employed may be made and I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The combination, in a time selector system, of a switch, a motor arranged to operate said switch, means for energizing said motor for different periods of time and means responsive to energization of the motor for a certain one of said periods of time to operate said switch to one position and responsive to energization of the motor for a different one of said periods of time to operate the switch to another position.

2. The combination, in a time selector system, of a movable element, a motor arranged to operate said element, means responsive to received current impulses of different durations for energizing said motor, and means whereby when a current impulse of a certain duration is received said motor operates said element to one position and whereby when a current impulse of a different duration is received said motor operates said element to a different position.

3. The combination, in a time selector, of a switch, a motor, means controlled by the motor whereby when the motor is operated for a certain interval said switch is closed and whereby when the motor is operated for a different interval said switch is opened, and means controlled by the motor to interrupt operation of said motor in a predetermined position thereof after the motor has been operated for one of said intervals.

4. In combination, a movable element, a motor,

means to supply current impulses of different durations to the motor, means interconnecting said motor and movable element, said means being arranged normally to retain said element in a certain position and to operate it to either of two other positions in response to operation of said motor for different periods, and means responsive to movement of said movable element to one of said other positions to energize said motor until said movable element is actuated to said normal position.

5. In combination, an element arranged for reciprocal movement between two positions, a motor arranged to actuate said element, means for supplying current impulses of different durations to the motor, and means whereby when said element has been actuated from one of said positions in response to a current impulse of a certain duration the motor is deenergized upon termination of the impulse and whereby when said element is operated from the other position in response to an impulse of a different duration the motor is maintained energized after termination of the impulse until said element is actuated to said one position.

6. The combination, in a time selector, of a cam, a motor for actuating said cam, a movable element arranged for reciprocal actuation between two positions by said cam, means to supply current impulses of different durations to said motor, one of said impulses being of sufficient duration to cause actuation of said element from one of said positions to another, and another of said impulses being of insufficient duration to cause actuation of said element from said other position to said one position, and means controlled by said cam to maintain energization of said motor after said last impulse is interrupted and until said element is actuated to said one position.

7. The combination, in a time selector system, of a selector mechanism having a normal position and a plurality of other positions, means whereby in response to successive received impulses said mechanism is operated from said normal position to each of said other positions, and means whereby when the total duration of all of said received impulses exceeds a predetermined interval said selector mechanism is operated to said normal position and an element to be controlled arranged to be operated by said selector mechanism to different positions in accordance with the position of said mechanism.

8. In combination, a motor, a cam operated by said motor, said cam having a periphery comprising arcs of different radii, a switch member cooperating with the periphery of said cam and arranged for reciprocal movement between two contact making positions in accordance with said radii, a circuit for said motor including said switch member in one of said contact making positions whereby when said cam occupies a position corresponding to said one contact making position the motor is energized through said circuit until said cam is operated to a second position, means responsive to received energy for energizing said motor when said cam occupies said second position whereby the cam is operated to a position corresponding to the other of said contact making positions and an additional circuit arranged to include said switch member in said other contact making position.

JOHN L. WOODWORTH.