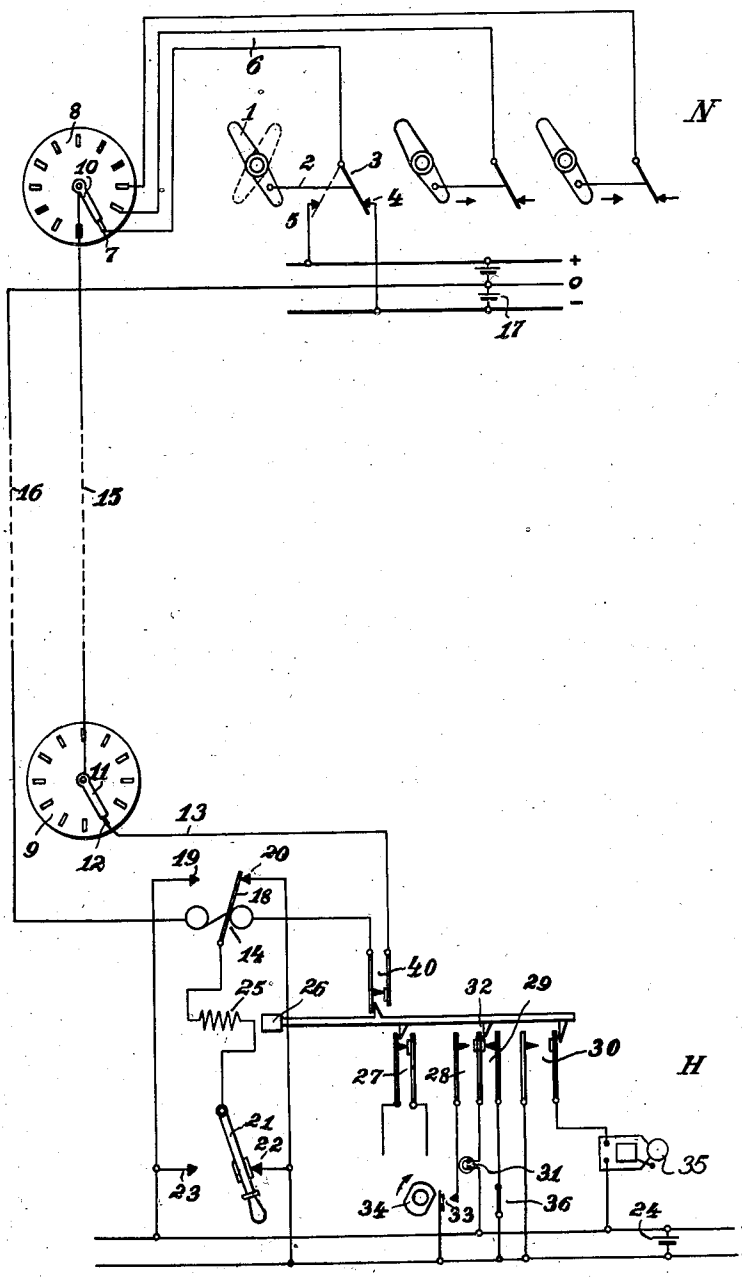
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REMOTE CONTROL PLANT

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REMOTE CONTROL PLANT

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My invention relates to improvements in remote-control plants, and more specifically to such plants as are equipped with manually operated position indicators.

In a remote-control or telecontrol plant in which the positions of adjustable members located at a substation are to be indicated at a control, master or main station, a position indicator may be employed, which is not automatically adjusted, but by hand. If any adjustable member at the substation then changes its position, so that the position indicator is no longer in the correct position, an alarm device may be set in operation. The attendant is then obliged to turn the position indicator into the correct position, so that it gives again correct indications.

It is not always possible for the attendant to correct the position of the indicator as soon as the alarm is given. It may happen that before the attendant is able to ascertain which of the adjustable members has caused the state of alarm, the member responsible for the signal is returned into its original position, so that the position indicator is again in the correct position. The state of alarm is thus ended and the attendant is not in a position to find out what has happened. In this way transient disturbances may escape the notice of the attendant, the knowledge of which might have been of value in avoiding incipient more series breakdowns.

According to my invention a state of alarm once set up can be removed again only by adjustment of the position indicator, but not by a change of the adjustable member.

An embodiment of my invention is diagrammatically illustrated in the drawing affixed hereto and forming part of my specification.

Referring to the single figure of the drawing, N is a substation in which are located the movable members, oil-immersed switches, valves or the like, the position of which is to be supervised. One of these members with reference to which I will describe my invention is designated with the reference numeral 1. This member 1 is coupled by a connecting rod 2 with the blade of a change-over switch 3, which in the position shown rests against the contact 4. If the movable member occupies the position shown in broken lines the switch blade rests against the contact 5. The change-over switch 3 is connected by a conductor 6 to the contact 7 mounted on a disc 8. Other contacts on this disc are connected to the change-over switches of the remaining movable members. With the contact disc 8 located at the substation N is electrically associated a contact disc 9 at the main station H. Over the contacts of these discs pass the contact arms 10 and 11 which are revolved synchronously by any suitable mechanism, so that when the arm 10 touches the contact 7, the arm 11 touches the corresponding contact 12. From the contact 12 a line 13 is carried through a switch 40 to a polarized relay 14, which is connected by the long distance conductor 16 to the neutral of a source of current 17 located at the substation N. A second long distance line 15 connects the two contact arms 10 and 11 with one another. The contact lever 18 of the polarized relay 14 plays between the contacts 19 and 20. A position indicator 21 operated by hand touches either the contact 22, as shown, or the contact 23. The contacts 19 and 23 are connected to each other and to the positive pole of a source of current 24. The contacts 20 and 22 are likewise connected to one another and to the negative pole of the source of current. The contact tongue 18 and the change-over switch 21 are connected to each other through an alarm relay including an electro-magnet winding 25. The armature 26 of the electro-magnet controls the pairs of contacts 27, 28, 29, 30 and 40. Across the contacts 27 is laid a signal transmitting circuit, not shown, by means of which the control member to be supervised in the substation N can be turned into one position or the other from the main station H. Through the contacts 29 and the manually operated disconnecting switch 36 a lamp 31 is connected to the source of current 24. This latter is either located in the immediate vicinity of the change-over switch 21 serving as position indicator or connected to it in any suitable manner. If the movable contact member 32 is in its other position, the contact 29 is open and the contact 28 closed. The lamp 31 is then connected with the source of current through a contact 33, which is alternately opened and closed by means of a revolving cam 34, so that the lamp 31 gives an intermittent light. An alarm signal device 35 is connected to the source of current 24 through the contacts 30. The apparatus operates in the following manner:

Let us assume that the movable member 1 has first been in the position indicated in broken lines and has just been moved into the position shown in full lines. The contact blade 18 of the polarized relay 14 then still touches the contact 19 and the switch 21 the contact 23. At the moment in which the revolving contact arms 10 and 11 touch their contacts 7 and 12, an impulse passes from the negative pole of the source of current 17

through the contact 4, the change-over switch 3, the line 6, the contact 7, the contact arm 10, the long distance line 15, contact arm 11, contact 12, line 13, polarized relay 14 and through the long distance line 16 back to the neutral of the source of current 17. The polarized relay is energized and draws the contact blade 18 against the contact 20. A local circuit thus passes from the positive pole of the source of current 24 across the contact 23, the change-over switch 21 still in contact with it, the magnet winding 25, the contact blade 18, the contact 20 and back to the negative pole, so that the electro-magnet 25 attracts its armature 26. The armature breaks the contact 27 and the signal transmitting circuit not shown; in this way it is for the time being impossible to control the member 1 from the master or main station H. The contact 29 is furthermore broken, and the contact 28 made. The lamp 31 thus does not give a steady light, but an intermittent light. The contact 30 is also closed, so that the alarm signal 35 becomes operative, which in the example illustrated is shown as an elecric bell, it being understood however that any other suitable signalling device may be substituted. The alarm signal calls attention to the fact that a change has taken place in the system.

The switch 40 also is opened upon energization of the coil 25, so that the exciter circuit of the relay 14 is interrupted. The contact blade 18 thus maintains its position until the attendant turns the position indicator 21 into the position shown in the drawing and thus closes the contact 22 and opens the contact 23. In this way the electro-magnet 25 becomes deenergized, the armature 26 is moved toward the right as by a spring (not shown) or by the resiliency of the contact members, the signal transmitting circuit is again completed by the contact 27, the lamp 31 gives a steady light again and the alarm signal becomes inoperative. The switch 40 is now closed again, so that the relay 14 can be energized again and is able to bring any changes of the position of the oil-immersed switch 1 to the notice of the attendant. The state of alarm is then set up again, and the attendant is obliged to reverse the position indicator again. It is therefore impossible for the temporary change of position of the member 1 to escape the notice of the attendant even though he may not have been in a position to take notice of the alarm signal for a considerable time.

The manual switch 36 may be opened in order to save current; the signal lamp 31 then remains dark, as long as the position of the indicator 21 corresponds with the position of the movable member 1. However, the intermittent light becomes operative at once as soon as the positions of the two parts do no longer agree. It is of advantage that the intermittent light cannot disappear as long as the position indicator has not been reversed.

Various modifications and changes may be made without departing from the spirit and the scope of the invention, and I desire, therefore, that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:

1. In an apparatus of the kind described having a main station and a substation, the combination with a member at the substation movable to a plurality of positions and a manually operated position indicator at the main station movable to positions corresponding to those of said movable member, of a switch at the main station, electromagnetic means to operate the switch in correspondence with the position of the movable member, an alarm circuit at the main station, means to close said alarm circuit when said position indicator and said switch are in non-corresponding positions and to open said alarm circuit when said position indicator is moved to a position corresponding to that of said switch, means to render inoperative said electromagnetic switch operating means when said alarm circuit is closed whereby the alarm circuit can be opened only by the movement of the manually operated position indicator to a position corresponding to the position of said switch.

2. In an electric remote control system having a main station and a substation, the combination with a member at the substation movable to a plurality of positions, of a manually operable position indicator movable to positions corresponding to those of said movable member and disposed in the main station, a switch, a relay at the main station operating said switch, means including an exciter circuit for operating the relay in correspondence with the position of the movable member to move said switch to a position corresponding to that of said movable member, an alarm circuit at said main station, control mechanism for said alarm circuit including said switch and said position indicator to close said alarm circuit when said position indicator and said switch are in non-corresponding position and to open said alarm circuit when said position indicator is moved to a position corresponding to that of said switch, and a contact switch controlled by said control mechanism simultaneously with said alarm circuit for making and breaking the electrical connections between the relay and said movable member, said control mechanism breaking said contact upon closing of said alarm circuit, whereby the alarm circuit may be broken only upon manual movement of the position indicator, the movement of said movable member to its original position being ineffective to break said alarm circuit.

3. In an electric remote control system having a main station and a substation, the combination with a member at the substation movable to a plurality of positions, of a manually operable position indicator movable to positions corresponding to those of said movable member and disposed in the main station, a switch, a relay at the main station operating said switch, means including an exciter circuit for operating the relay in correspondence with the position of the movable member to move said switch to a position corresponding to that of said movable member, an alarm circuit at said main station, a control circuit for said alarm circuit, including an alarm relay, said switch, an additional switch controlled by said position indicator, and a source of current, the control circuit being so arranged that the alarm relay is energized only when the positions of said two switches fail to agree, an interrupter contact located in the relay circuit and controlled by said alarm relay and opened when the latter is energized whereby said alarm may be broken, a periodically operated interrupter contact located in said alarm circuit, and a lamp connected to a source of current through said periodically operated interrupter contact upon the closing of the alarm circuit.

4. In an electric remote control system having a main station and a substation, the combination with a member at the substation movable to a

plurality of positions, a manually operable position indicator movable to positions corresponding to those of said movable member and disposed in the main station, a switch, a relay at the main station operating said switch, means including an exciter circuit for operating the relay in correspondence with the position of the movable member to move said switch to a position corresponding to that of said movable member, an alarm circuit at said main station, control mechanism for said alarm circuit including said switch and said position indicator to close said alarm circuit when said position indicator and said switch are in non-corresponding position and to open said alarm circuit when said position indicator is moved to a position corresponding to that of said switch, said alarm circuit remaining closed until the position indicator is moved to a position corresponding to that of the movable member, and an interrupter contact in the relay circuit, the control mechanism for said alarm system breaking said interrupter contact upon closing of the alarm circuit, whereby said alarm circuit may be broken only upon manual movement of the position indicator, said alarm circuit including a periodically operated interrupter contact, and a lamp connected to a source of current through said interrupter contact upon closing of the alarm circuit, an additional circuit including said lamp, and a manually operated switch included in said circuit to cause said lamp to emit light constantly while such switch is closed, said additional circuit being independent of the circuit portion which includes the periodically operated interrupter contact, so that the opening of said manually operated switch will not interfere with the continued operation of said interrupter contact to supply current periodically to said lamp and cause the latter to flash.

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