

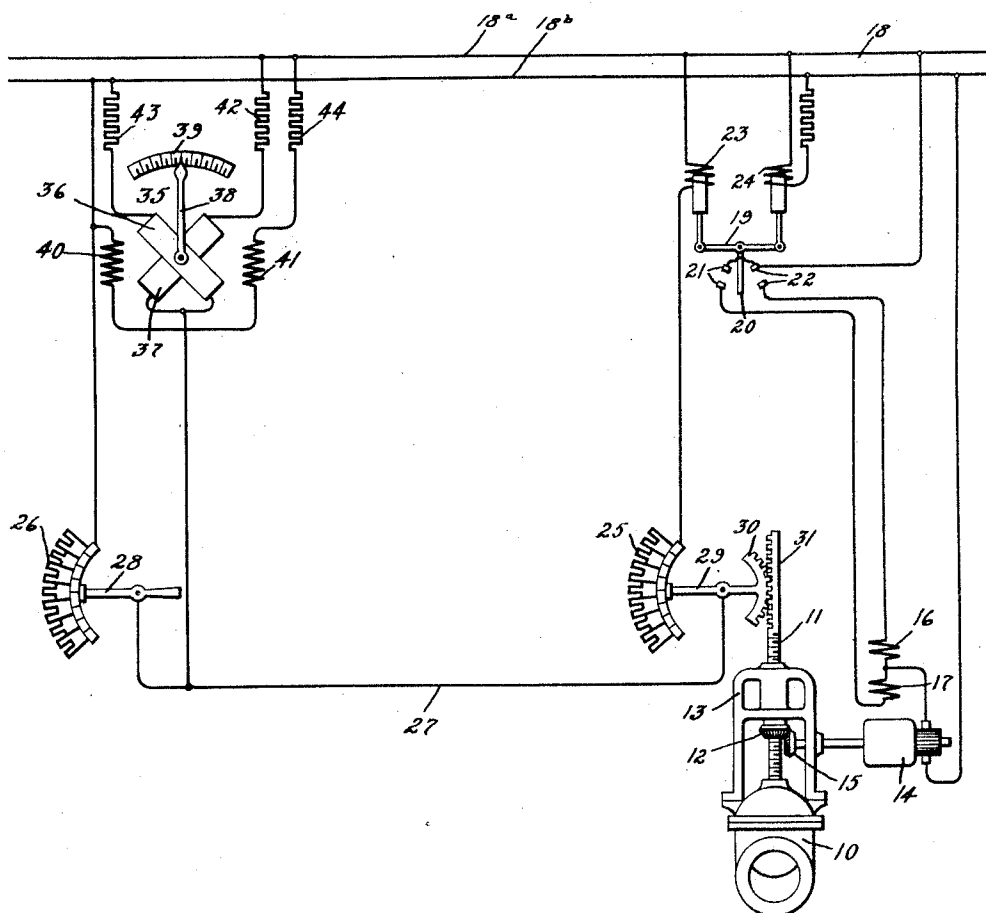
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SYSTEM OF DISTANT CONTROL

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SYSTEM OF DISTANT CONTROL.

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My invention relates to systems of distant control and has for its object the provision of simple, reliable and economical means requiring a comparatively small number of wires for controlling suitable driving means to move a controlled object.

In carrying out my invention I provide two variable rheostats connected in series in circuit with an electromagnet controlling the driving means for the controlled object. One of the rheostats may be adjusted at the control station to start the driving means, while the other is controlled by the driven object to stop the driving means when the object has been given the required movement. I also provide means for indicating the position of the controlled object.

For a more complete understanding of my invention reference should be had to the accompanying drawing, the single figure of which is a diagrammatic representation of a system of distant control embodying my invention.

Referring to the drawing, I have shown my invention in one form as applied to the distant control of a gate valve 10 although obviously my invention is applicable to the control of various other objects such as waterwheel gates, doors, steering gears, elevators, etc. The stem 11 of the valve 10 is threaded and may be raised and lowered to open and close the valve by rotating a bevel gear 12 which is in threaded engagement with the stem 11 and rotatably mounted but held against longitudinal movement on the valve frame work 13. An electric motor 14 of the series type is provided for opening and closing the valve. This motor is connected in driving relation with the bevel gear 12 through a bevel gear 15 secured to its driving shaft. The motor 14 is provided with two oppositely wound fields 16 and 17 which cause rotation of the motor in opposite directions. The energization of the motor from a suitable source of supply 18 and also the selection of the field winding to be energized depending on the required direction of rotation of the motor is determined by means of a suitable relay switch 19 comprising in the form shown a contact arm 20 which may be moved into engagement with one or the other of two pairs of contacts 21 and 22. When the contact arm is in mid position, as shown in the drawing, the motor circuit is open.

The switch 20 is operated to control the motor 14 by means of two electromagnets or operating coils 23 and 24. The coil 24 is connected through a suitable resistance permanently across the source of electrical supply 18. The coil 23 is connected in a control circuit with two similar variable rheostats 25 and 26 to the supply source 18. The variable rheostat 25 is situated adjacent the valve 10, while rheostat 26 is situated in the remote control station. The two mains or conductors 18^a and 18^b of the supply source 18 extends between the control station and the position in which the valve is located, and also a third conductor 27 connecting the two rheostats 25 and 26 in series with each other and in series with coil 23 to the supply source 18. The rheostat 26 is adjustable manually at the control station by means of a contact arm 28 which cooperates in a well known manner with contacts insulated from each other leading to intermediate points of the rheostat. In a similar manner the rheostat 25 may be adjusted in response to movement of the valve stem 11 by means of a centrally pivoted contact arm 29 cooperating at one end with contacts insulated from each other connected to intermediate points of the rheostat and bearing on its other end a gear segment 30 meshing with a rack 31 on the end of the valve stem. It will be understood that the total resistance of both rheostats is not normally connected in the control circuit, at any one time. In the particular arrangement shown the total amount of resistance normally connected in circuit, that is, when the motor is at rest, is equal to one-half of the sum of the resistances of the two rheostats.

The operation of my invention is as follows: The coil 24 exerts a constant force on its armature tending to pull it up and throw the switch arm 20 into engagement with the switch contacts 22. With the motor at rest, as shown in the drawing, this pull of coil 24 is exactly counterbalanced by the pull of coil 23 on its armature so that the switch arm 20 is maintained in mid position between the contacts 21 and 22. To open or close the valve 10, the contact arm 28 at the control station is moved to cut in or out resistance, as the case may be, whereby one or the other of coils 23 and 24 is caused to predominate and throw the switch

arm 20 in one direction or the other. The motor is then started to give the required movement of the valve and in so doing adjusts rheostat 25 to cause the energization of coil 23 to counterbalance coil 24 when the desired movement has been applied to the valve. For example, in case it is desired to move the valve toward closed position, that is, lower the valve stem 11, the switch arm 28 will be moved downward to cut in more resistance. This weakens the energization of coil 23, allowing coil 24 to throw switch arm 20 into engagement with contacts 22. The motor circuit is thus closed through field coil 16, whereby the motor is started in a direction to lower the valve stem. As the valve stem is lowered contact arm 29 is raised due to the operating connection between the two, whereby the rheostat 25 is gradually cut out until when the desired movement has been given the valve the original energization of coil 23 will be restored and the contact arm 20 moved again to mid position and the motor stopped.

I have also provided means at the control station for indicating the position of the valve comprising an instrument 35, shown as a form of power factor meter. This instrument comprises two rotatably mounted potential coils 36 and 37 placed at right angles with each other and carrying a pointer 38 which cooperates with a suitable scale 39. Stationary field coils 40 and 41 are also provided. One terminal of coil 37 is connected through a resistance 42 to supply main 18^a, while one terminal of coil 36 is connected through a resistance 43 to the supply main 18^b. The two remaining terminals of the coils 36 and 37 are connected together and to the conductor 27. The coils 40 and 41 are connected in series with a resistance 44 across the supply source. As thus connected, it will be observed that coil 36 is connected across the rheostat 26, while coil 37 is connected across the rheostat 25. The energization of the coils 36 and 37 will therefore be proportional respectively to the amount of the resistances of the rheostats 26 and 25 which are included in the control circuit, and the pointer will therefore be moved in accordance with the relative amounts of the resistances included in the control circuit to indicate the position of the valve stem.

As thus connected, it will be observed that the relay 19 and the indicating instrument 35 will not be affected by fluctuations in the voltage of the supply source. Any such fluctuations are compensated for by the various coils of the relay and instrument.

While I have described my invention as embodied in concrete form and as operating in a specific manner in accordance with the

provisions of the patent statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

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

1. A system of control comprising in combination with a controlled object, means for driving said controlled object, a source of electrical supply, a variable rheostat, a second variable rheostat controlled by the controlled object connected in series with said first variable rheostat to said supply source, and electromagnetic means for controlling said driving means connected in series with said rheostats.

2. A system of remote control comprising in combination with an object to be adjusted in position, a remotely situated control station, a variable controlling rheostat in said control station, a second variable rheostat controlled by movement of said object, driving means for said object, a magnet coil for controlling said driving means, a source of electrical supply, electrical conductors connecting said rheostats and said magnet coil in a circuit in series with each other across said supply source, said coil being arranged to stop said driving means upon the occurrence of a predetermined current in said circuit, and means in said control station for adjusting said controlling rheostat to vary the current in said circuit and thereby cause said coil to start said driving means, whereupon said driving means operates to adjust the position of said object thereby adjusting said second rheostat to reestablish said predetermined current in said circuit.

3. A system of control comprising in combination with a controlled object, an electric driving motor for said object, a source of electrical supply for said motor, a control switch for said motor arranged to be moved to either one of two positions to start the motor in either direction, means for biasing said switch to one position, a magnet coil for actuating said switch against its bias to mid-position to stop the motor and to the other of said two positions to start the motor in the opposite direction, two adjustable resistances connected in series with each other and with said coil to said supply source, means for varying one of said resistances to start the motor, and means operated by said motor for varying the other resistance to stop the motor.

4. A system of control comprising in combination with a controlled object, an electric driving motor for said controlled object, a source of electrical supply for said motor, a control switch for said motor, means for actuating said switch comprising a coil con-

nected across said supply source, a second coil, and two variable rheostats one of which is controlled by said controlled object connected in series with said second coil to said
5 supply source.

5. A system of control comprising in combination with a controlled object, a variable rheostat controlled thereby, a remote control station, a variable controlling rheostat
10 in said control station, a driving motor for said controlled object, a source of electrical

supply therefor, a control switch for said motor, a coil connected to said supply source for biasing said switch to one position, a second coil acting in opposition to the first
15 to throw the switch to another position, and electrical connections connecting said rheostats and said second coil in series across said supply source.

In witness whereof, I have hereunto set
20 my hand this 17th day of July, 1923.

HARRY W. EWALD.