May 27, 1930. L. S. WALLE 1,760,532

SWITCH OPERATING MECHANISM

Filed April 24, 1928

Fig. 1.

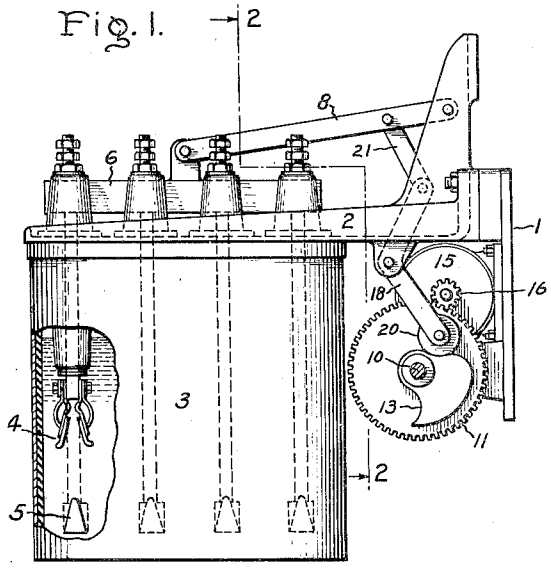


Fig. 2.

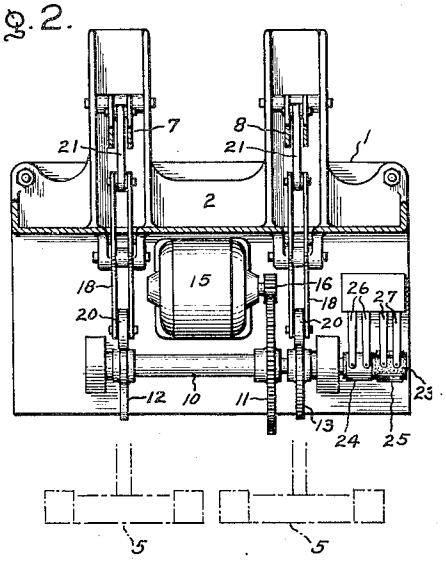
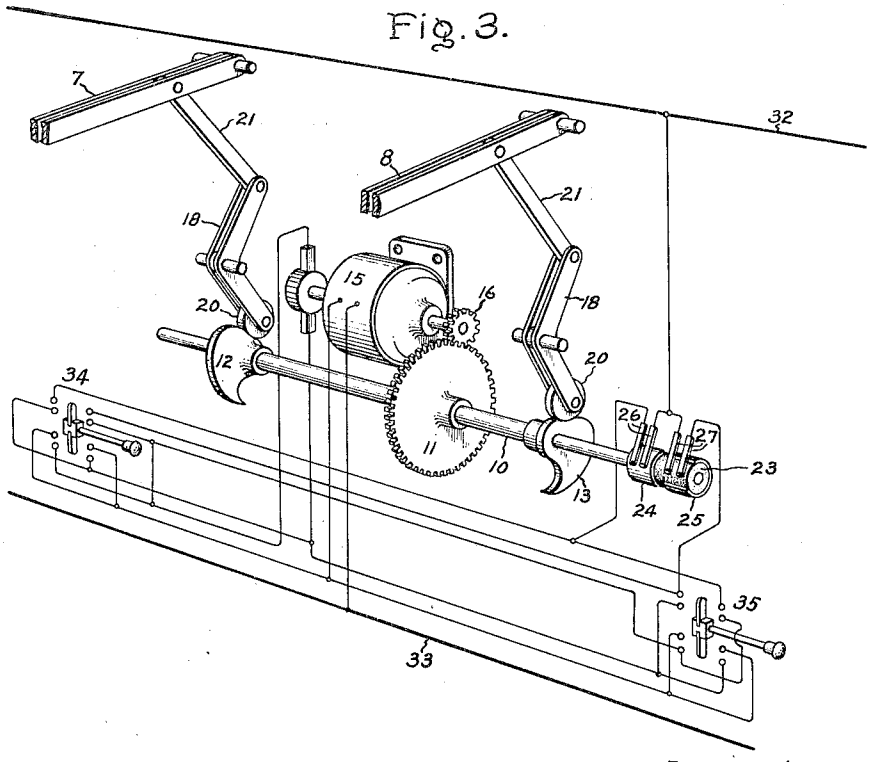


Fig. 3.



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UNITED STATES PATENT OFFICE

LUDWIG S. WALLE, OF SCOTIA, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

SWITCH-OPERATING MECHANISM

Application filed April 24, 1928. Serial No. 272,552.

My invention relates to electric switch operating mechanism and particularly to mechanism for operating alternately a plurality of switches. An object of my invention is the provision of an improved switch operating mechanism which is simple and sturdy in construction, reliable and efficient in operation and manufacturable at a moderate cost.

My invention will be better understood from the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring to the drawing, Fig. 1 is a side elevation of an operating mechanism involving my invention; Fig. 2 is a cross sectional view of the same taken on the line 2—2 of Fig. 1 and Fig. 3 is a combined perspective view of the apparatus and a circuit diagram.

In the drawing I have shown the base or frame 1 having the switch supportng bracket 2 forming the cover of two separate oil switches 3. In the present example I have shown these switches each as having four pairs of fixed contacts 4 adapted to be bridged by four movable bridging members 5, the latter being connected together through their operating rods by the yoke 6. Connected to the yokes 6 of the two switches are the respective operating levers 7 and 8 pivoted at their opposite ends to the frame 1. Rotatively supported by the frame is the cam shaft 10 to which is fixed the drive gear 11 and the two cams 12 and 13. The small electric motor 15 also secured to the frame 1 has the pinion 16 on its shaft meshing with gear 11 and is adapted to rotate in both directions. Bell cranks 18 each carry a cam engaging roller 20 at one end and at the other are connected to the respective operating levers 7 and 8 through links 21 forming toggles. The cams are identical but are reversely arranged on the shaft and so placed that when the shaft is in one position, such for example as that shown in Fig. 3, both switches are open. If the shaft is rotated in one direction one switch only will be closed and if rotated in the opposite direction the other switch only will be closed. The working faces of each cam preferably terminate in inner and outer portions which are concentric with the axis of rotation of the shaft. By means of a limit switch to be described later the circuit of the motor is opened automatically when either cam has been rotated a sufficient distance to bring the cooperating roller to the beginning of the outer concentric portion and the length of this portion is such that any further rotation of the cam will have ceased before the end of the concentric portion is reached. The limit switch which I have shown comprises the drum 23 carrying the two conducting segments 24 and 25 which serve to connect together brushes 26 or brushes 27 according to the angular position of the cam shaft.

As has already been stated, the motor 15 is adapted to rotate in either direction. Suitable connections are made between the motor and the supply circuit 32, 33 including the double throw switches 34 and 35 which may be of any well known type biased to an intermediate open circuit position whereby the direction of the current in the armature may be reversed to effect a reversal of the direction of rotation thereof.

In the position of the mechanism illustrated by Fig. 3, both main switches are open. If the main switch operated by lever 7 is to be closed, control switch 34 will be pushed to the left shown in this figure. This closes the motor circuit and the motor rotates the cam shaft in a clockwise direction raising the switch lever 7. At about the time the roller 20 reaches the outer concentric portion of the cam the segment 24 of the drum leaves contacts 26, thereby opening the motor circuit and the segment 25 connects contacts 27 preparatory to the opposite rotation of the motor. To open the main switch thus closed control switch 34 may be moved to the right which again closes the motor circuit now through contacts 27 and segment 25 with the direction of current flow in the armature reversed. In a similar manner the cam shaft may be rotated counterclockwise to raise switch lever 8 by moving control switch 35 to the right and subsequently again rotated clockwise to open the same main switch by

moving the control switch 35 to the left, the limit switch operating in a manner similar to that already described.

Among the various uses to which the switch operating mechanism involving my invention may be put are to operate a pair of switches whereby a lighting system for example may be thrown from a regular or main source of supply to an auxiliary source of supply. Another use is for the operation of motor starting switches where as in the case of alternating current motors which are started by means of compensators, a switch including the compensator is first closed and after the motor has reached a predetermined speed this switch is opened and another switch is closed to connect the motor directly to the line. In using the switch operating mechanism which I have described one of the switches for example the switch having operating lever 7, would connect the motor to the compensator and the other switch connect the motor directly to the line. To start the motor, hand switch 34 would be moved to the left to raise lever 7, switch 34 being then released. After the motor to be started has reached the desired speed, switch 35 is moved to the right and switch 34 also moved to the right but released as soon as operating motor 15 gets well under way. Cam shaft 10 thereby will rotate from one extreme position to the other in a continuous movement thus opening the switch controlling the compensator connection and closing the switch controlling the main connection. The construction which I have devised insures as so operated a definite time interval between the opening of the compensator switch and the closing of the main switch which is automatic and independent of the operator. This time interval can readily be made to suit any particular requirement by the adjustment and selection of parts, speed of the driving motor, etc. forming the apparatus.

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

1. Mechanism for the selective operation of a plurality of switches comprising an operating member for each switch, an actuating motor constructed to rotate in opposite directions, a pair of similar, reversely arranged cams driven by said motor and operatively engaging the operating member of each switch, means for closing the motor circuit to cause it to rotate in either direction and means operated in response to the rotation of the cams to predetermined positions for opening the motor circuit.

2. Mechanism for the selective operation of a plurality of switches each having an operating lever, comprising a motor constructed to rotate in either direction, a cam shaft rotated by the motor, a pair of cams on said shaft, means for actuating each of said levers from one of said cams, said means and said cams being constructed and arranged such that when the cam shaft is in one position both switches are open, when the cam shaft is rotated in one direction one switch is closed and when the cam is rotated in the opposite direction the other switch is closed, means for closing the motor circuit and means on the cam shaft for opening the motor circuit when the shaft has been turned to a predetermined position.

3. Mechanism for the selective operation of a plurality of switches each having an operating lever comprising an electric motor constructed to rotate in either direction, a cam shaft geared to said motor, a pair of similar reversely arranged cams on said shaft, a toggle mechanism connected to each of said levers and arranged each to be actuated by one of said cams, means for closing the circuit of the motor to cause it to rotate in either direction and means for automatically opening the motor circuit when the shaft has been rotated a predetermined distance in either direction, the cams being so constructed and arranged that but one switch operating lever is actuated at any one time and the actuated lever is maintained in operative position with a predetermined continued movement of the cam shaft.

4. Mechansm for the selective operation of a plurality of switches having similar operating levers comprising an electric motor constructed to rotate in either direction and having a driving pinion, a cam shaft having a gear in operative connection with said pinion, similar cams fixed on said shaft on opposite sides of said gear each cam having an inner portion and an outer porton concentric with the axis of the shaft, a toggle mechanism between each switch lever and cam comprising a bell crank having a roller engaging the corresponding cam, said cams being arranged on the shaft whereby in one position of the shaft both switches are open and the rollers engage the inner concentric portions of the cams and whereby rotation of the cam shaft in one direction causes the closing of one switch only and rotation of the cam shaft in the opposite direction causes the closing of the other switch only, manual switches for closing the motor circuit and limit switches mounted on the cam shaft for opening the motor circuit when the rollers reach the outer concentric portions.

In witness whereof I have hereunto set my hand this 23rd day of April, 1928.

LUDWIG S. WALLE.