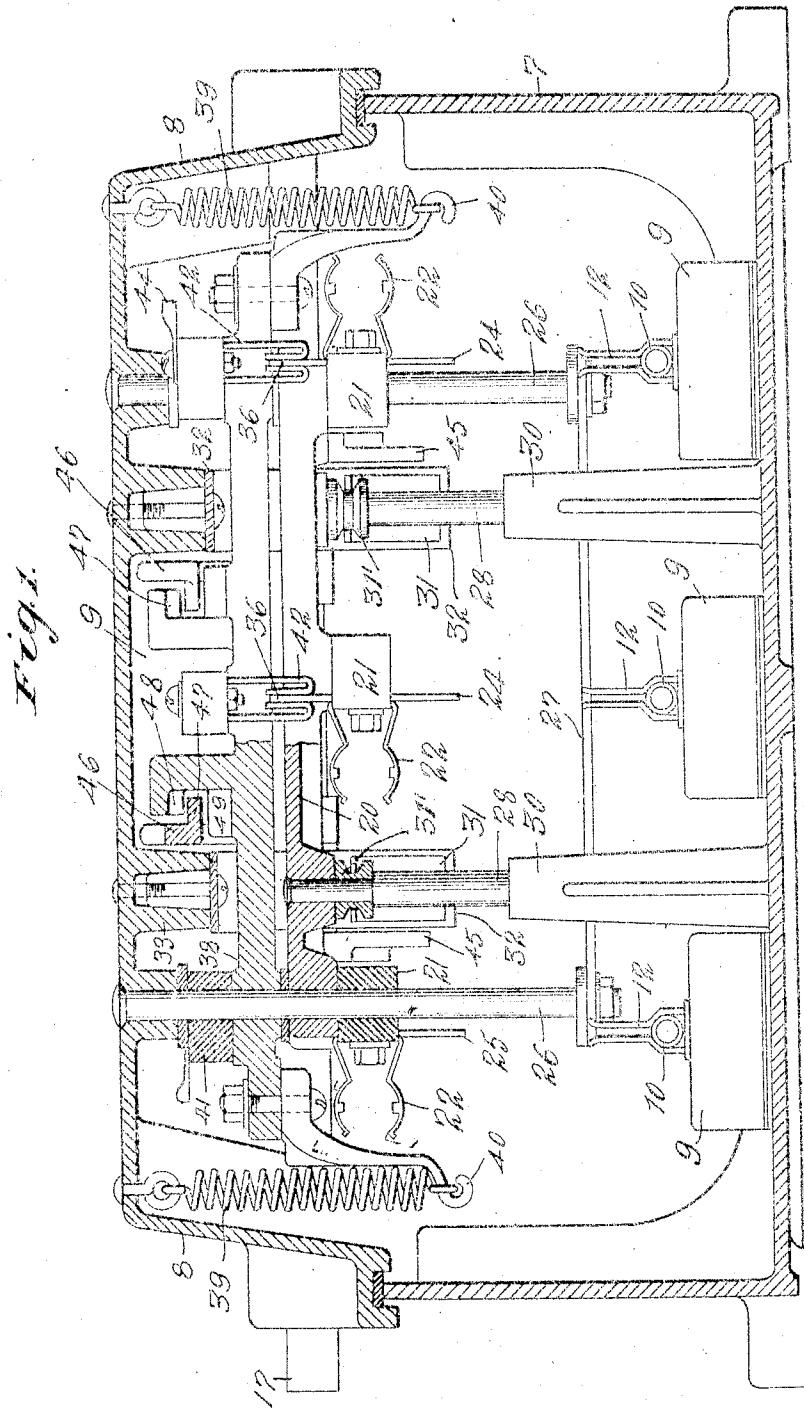


B. D. HORTON.
MECHANISM FOR ACTUATING ELECTRICAL SWITCHES.
APPLICATION FILED OCT. 23, 1911.

1,022,628.

Patented Apr. 9, 1912.

3 SHEETS-SHEET 1.



Witnesses:
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Edw. L. Russell.

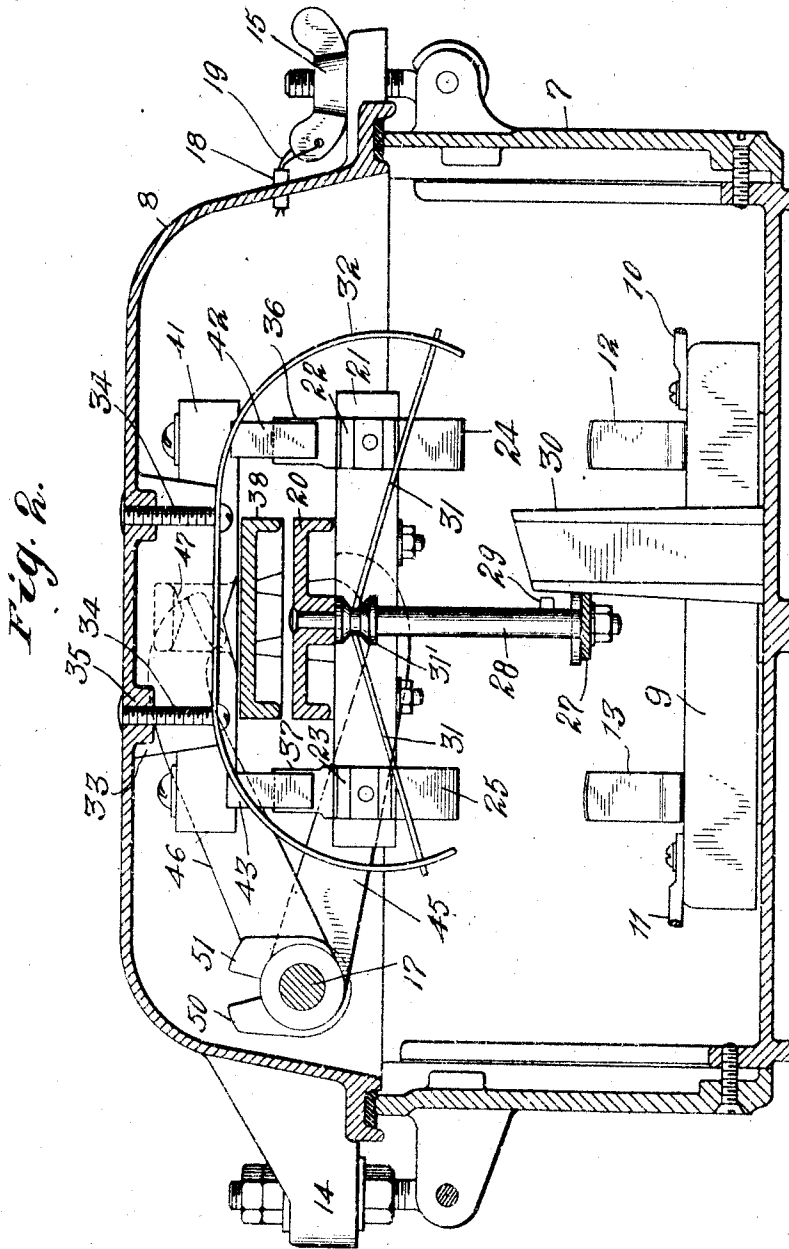
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3 SHEETS-SHEET 3.

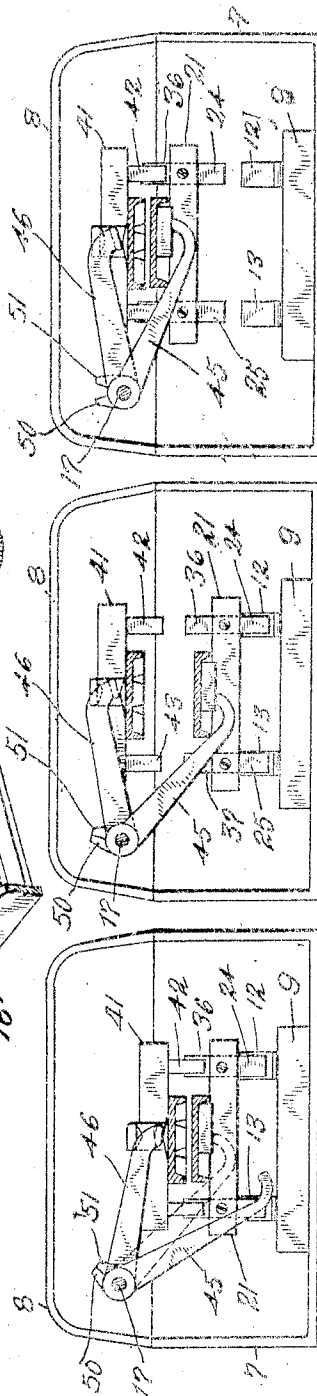
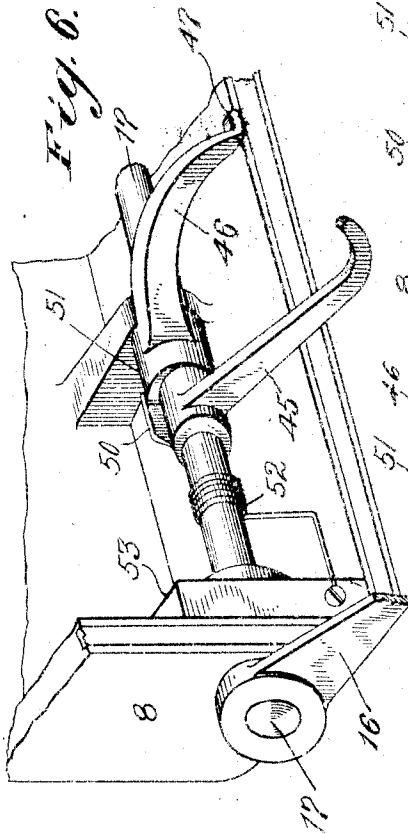


Fig. 5.

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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MECHANISM FOR ACTUATING ELECTRICAL SWITCHES.

1,022,628.

Specification of Letters Patent.

Patented Apr. 9, 1912.

Application filed October 23, 1911. Serial No. 656,162.

To all whom it may concern:

Be it known that I, Bryson D. Horton, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Mechanism for Actuating Electrical Switches, of which the following is a full, clear, and exact specification.

This invention relates to mechanism for actuating electrical switches and has for an object to provide simple and efficient mechanism for this purpose, especially for actuating compound switches embodying two members effective upon contact and several actuation. An instance of such switch is a three-phase motor starter wherein there is provided for each of the three lines a pair of switch members, one comprising a main switch having a fuse for carrying the running load, and the other an auxiliary switch having a conductor for carrying the starting load. In the idle position the running switch will be out of contact with the line circuit and the starting switch will be in contact with the running switch for paralleling the fuse of such switch and for carrying the starting load. Preferably in a three-phase motor starter the starting switch, that is, the switch for carrying the starting load or overload will, in the initial or idle position, be in circuit with the running switch and parallel the fuse thereof. When it is desired to start the motor the two switches in the position just described will be moved in unison and the running switch caused to make contact with the line circuit and at the same time cut in the starting switch. Automatic means will be functioned for holding the running switch in closed position. The starting switch will be held in the closed starting position manually against the influence of automatic opening means. Upon the release of the starting switch to the influence of its opening means, the automatic means operative upon the running switch will hold this closed during and after the opening of the starting switch and until manually shifted.

The present improvement is particularly adapted for actuating a pair or series of pairs of switch members. The general scheme of the actuating mechanism lends itself well to efficient and economical housing. Space is economized and the improved

actuating mechanism with the exception of the handle is completely housed within the housing of the switch and without appreciable increase in the size of such housing beyond that required for the switches when external actuators are employed.

In the drawings accompanying and forming a part of this specification, one practicable form of embodiment of the invention is illustrated in connection with a three-phase motor starter.

Figure 1 is a side elevation partly in longitudinal section. Fig. 2 is an end elevation partly in cross-section. Figs. 3, 4, and 5 are diagrams showing the switches and actuating mechanism in three positions; Fig. 3 in the starting position, Fig. 4 in the running position, and Fig. 5 in the off position. Fig. 6 is a perspective view of a portion of the actuator mounted upon a broken-away portion of the housing.

The various parts of the mechanism are shown mounted in a housing comprising a base portion 7, and a cover portion 8, the base portion and cover together constituting a closed box within which the various portions of the switch and its actuating mechanism are housed. The switch illustrated is intended for use in connection with a three-phase circuit. There are shown in the base portion of the housing three porcelain bases 9, to which are attached the lead wires 10 and 11 of the several circuits. Each of these bases carries a pair of switch-jaws 12 and 13, in circuit respectively with the line connections 10 and 11. The major portion of the apparatus is shown mounted in the cover of the housing. This cover is shown hinged to the body portion by a substantial hinging device 14, and is held in its closed position by means of a clamping device, as, for instance, the screw-clamp 15. It is intended that the apparatus shall be actuated from the outside by means of a handle 16, which is disposed upon the outside and which handle is mounted on the rock-shaft 17. There will be but little occasion to open the housing and this may be locked or sealed. For instance, a plug 18, may be mounted in the cover and a lead seal 19, may pass through an opening in this plug and through an opening in one of the ears of the clamping-screw of the clamp 15.

The main switch or the running switch is mounted on a framework 20, which carries

three insulation spreaders 21, upon each of which spreaders there is mounted a pair of jaws 22, 23, for receiving a fuse and downwardly-directed blades 24, 25, for closing the circuit with the switch-jaws 12 and 13 respectively. The frame 20 is guided in its reciprocations toward and from the porcelain bases 9, by rods 26, which are securely fastened to the cover of the housing. The rods are shown connected at their free ends by a yoke 27, to insure their rigidity. There are shown mounted in the frame 20, a pair of downwardly-directed arms 28, each of which is provided with a lug 29, adapted to enter a recess in the standard 30, if an attempt is made to open the cover of the housing while the main or running switch is in its closed position. A spring hinge is illustrated for causing the running switch to remain in either its open or its closed position and for assisting it in assuming the full extent of its movement in either direction. This spring hinge comprises a pair of hinge-plates 31, each of which has an end seated in a recess 31', of the arm 28, where this joins the frame 20. The outer ends of the hinge-plates are seated in the ends of a C-spring 32, which is secured to the cover of the housing. The housing is shown provided with a pair of downwardly-directed plates 33, disposed a short distance apart for making a seat for the central portion of the spring 32. The spring is shown held against this seat by means of suitable screws 34, which pass, in the present instance, through lugs 35 on the cover. This form of spring seat, rather than a solid lug cast in the top of the cover, effects a saving in weight and also is for the purpose of permitting the casting to cool readily and evenly, which would not be the case were this cast in one solid piece. It will readily be seen that upon the inauguration of the movement of the running switch and after it has passed its medial position, the spring hinge will force it to the full extent of its range of movement. The spring hinge will also return this switch to the end of its path of movement if it is moved a slight distance away from this position.

The blades 24, 25, extend upwardly above the spreaders 21, in blades 36, 37, which blades, when the running switch is closed, will be in circuit with the line. These blades form, with the parts which carry them, the base, as it were, of the starting switch, in the same manner as do the jaws 12 and 13 and their supporting porcelains constitute the base of the running switch. The frame 38 of the starting or auxiliary switch is mounted for reciprocation upon the guide-bars 26, and is normally held in its upward or open position by means of a pair of extension springs 39, which are fastened to the top of the housing and to

downwardly-extending hooks 40, secured to the frame 38. Three insulation spreaders 41 are shown mounted upon the frame 38, and each of which is provided with a pair of switch-jaws 42, 43, for respectively engaging with the switch-blades 36, 37. Each pair of switch-jaws 42, 43, is connected by means of an electrical conductor 44, of sufficient carrying capacity to accommodate the starting load or overload of the electrical apparatus with which the device is intended to cooperate. The fuses in the main or running switch will have sufficient carrying capacity to accommodate the normal running load of the electrical apparatus. The normal idle position of the two switches is that illustrated in Figs. 1, 2, and 5. In this position it will be noticed that the starting switch is in circuit with the main or running switch and that the conductor 44 therein parallels the fuse of the running switch. When it is desired to start the motor or other apparatus with which the starter is in circuit, the two switches closed together will be moved in unison toward the main base, and the blades 24, 25, will be caused to engage the jaws 12 and 13. This will place the fuse of the running switch in circuit with the line and at the same time will place the conductor 44 in circuit with the line, paralleling the fuse. The starting overload will then traverse the conductor 44 without blowing out the fuse of the running switch.

The mechanism herein illustrated for actuating the switches comprises the rock-shaft 17, with its actuating handle 16 above referred to. This shaft 17 is housed within the housing of the switch. The shaft has fast upon it a pair of arms 45, which are located in such position that they will engage the under side of the frame 20 of the running switch, that is, the side which is directed toward the main bases 9. For the purpose of moving the running switch from its open to its closed position, the rock-shaft has loose upon it a pair of arms 46, which engage the upper or outer side of the frame 38 of the starting switch for the purpose of moving this switch and the running switch to the closed position of both switches. Each of the arms 46 is shown provided with an engaging portion 47, which is seated between a pair of engaging blades 48, 49, carried by the framework 38. Movement is imparted to the arms 46 by means of engaging abutments 50, carried by the fast arms 45, which abutments 50, engage suitably-formed abutments 51, on the loose arms 46. These inter-engaging abutments are so positioned and timed that the arms 45 will have an amount of overthrow past the closed position of the running switch and the arms 46 will be free from the actuating abutments upon arriving at the open position of the starting switch, the abutment 50 for engag-

ing such arms having an amount of overthrow past the open position of such starting switch.

As before stated, the parts will normally be in the position illustrated in Fig. 5, which is the off position, the two switches in circuit one with the other. Upon starting the device the shaft 17 will be rocked, which will cause the fast arm 45 to move its abutment 50, into a position to engage the abutment 51, which will move the loose arm 46 and the two switches into the position illustrated in Fig. 3. The action of the extension springs 39 will exert an influence upon the frame of the starting switch tending to move this switch out of contact with the running switch. This tendency of the springs will be resisted by the hand of the operator until such time as he sees that the motor has reached its running speed, whereupon he will release the handle 16, which will permit the springs 39 to move the starting switch into its Fig. 4 position. The spring hinges will hold the running switch in its closed position. The rock-shaft, by means of the spring 52 which is coiled about it and engages a lug 53, will rock the shaft and bring it into the position of Fig. 4, with the arm 45 in position to engage the under side of the frame 20 of the running switch. When it is desired to stop the motor and cut off the current, the shaft will be rocked from the Fig. 4 to the Fig. 5 position, which will cause the arm 45 to raise the running switch into the Fig. 5 position.

In this description terms of direction have been employed, but it is to be remembered that these terms are used for convenience and apply to the positions illustrated in Figs. 1 to 5 of the drawings. As a matter of fact, in many installations the housing will be in a position with its base located in a vertical plane.

Although but one form of invention is illustrated and particularly described, yet it will be apparent that changes may be made within the scope of the claims without departing from the invention.

Having described my invention, I claim:
1. In mechanism for actuating electrical switches, the combination with a compound switch, of a rock-shaft having an arm fast thereon for engaging the outer side of one switch member and timed for having overthrow past the closed position thereof, of a loose arm, on the shaft for engaging the

outer portion of the other switch member, an abutment on the shaft for engaging such arm and timed for permitting overthrow of the shaft after such switch member has reached the limit of its movement.

2. In a device of the character specified, the combination with a switch embodying a running switch and a starting switch movable severally and in unison, of a rock-shaft, an arm fast with the rock-shaft and engaging the under side of the running switch, an arm loose upon the rock-shaft and engaging the upper side of the starting switch, an abutment carried by the rock-shaft for engaging the free arm and timed for permitting overthrow of the fast arm past the closed position of the running switch and for permitting overthrow of the shaft past the open position of the starting switch.

3. The combination with a main switch comprising a base and a part movable toward and from the base, of an auxiliary switch comprising a base carried by the movable part of the main switch and a part movable toward and from such base, and a rock-shaft having a fast arm for engaging the baseward portion of the movable part of the main switch and a free arm for engaging the outer portion of the movable part of the auxiliary switch, the free arm being provided with an abutment face and the shaft being provided with an abutment face for engaging the same for moving the free arm toward the base of the main switch.

4. The combination with a running switch embodying a fuse for carrying the running load, of a starting switch embodying a conductor for carrying the starting load, a rock-shaft, a pair of arms thereon having engagement with the starting switch for closing the same, and a pair of arms on the rock-shaft for opening the running switch.

5. The combination with a running switch embodying a fuse for carrying the running load, of a starting switch embodying a conductor for carrying the starting load, a rock-shaft, and arms carried by the rock-shaft and timed for actuating the switches in predetermined sequence.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

BRYSON D. HORTON.

Witnesses:

CLARENCE E. WILCOX,
VIDA M. SMITH.