Feb. 16, 1954

J. B. OWENS ET AL

2,669,614

SWITCH OPERATING MECHANISM

Filed Nov. 3, 1949

4 Sheets-Sheet 1

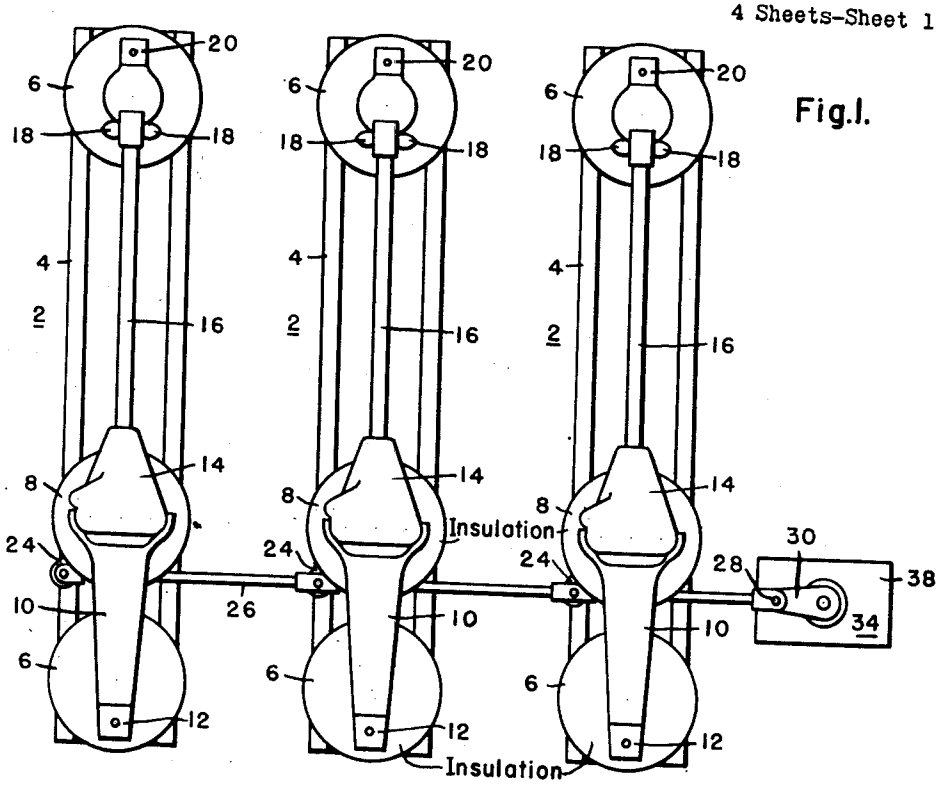


Fig.1.

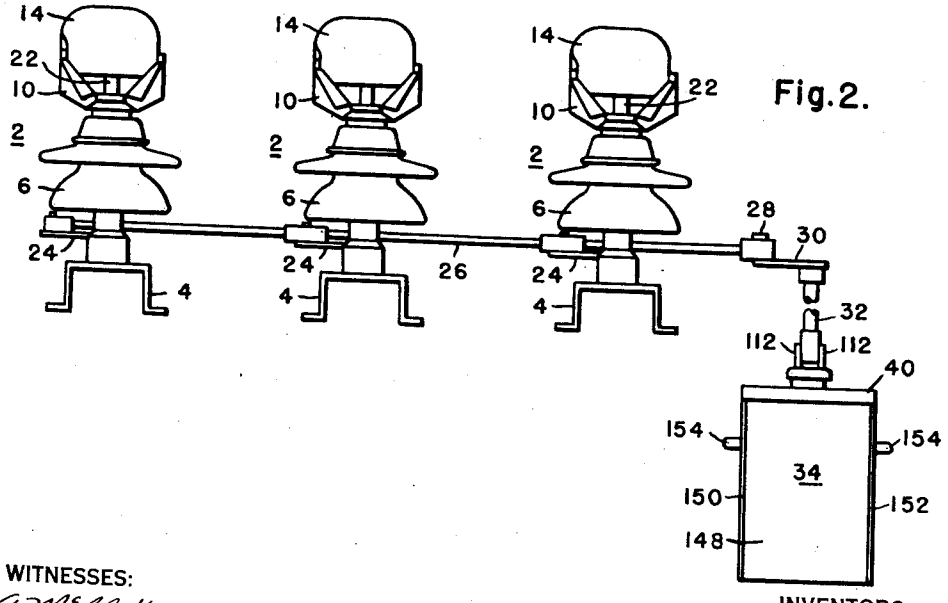


Fig.2.

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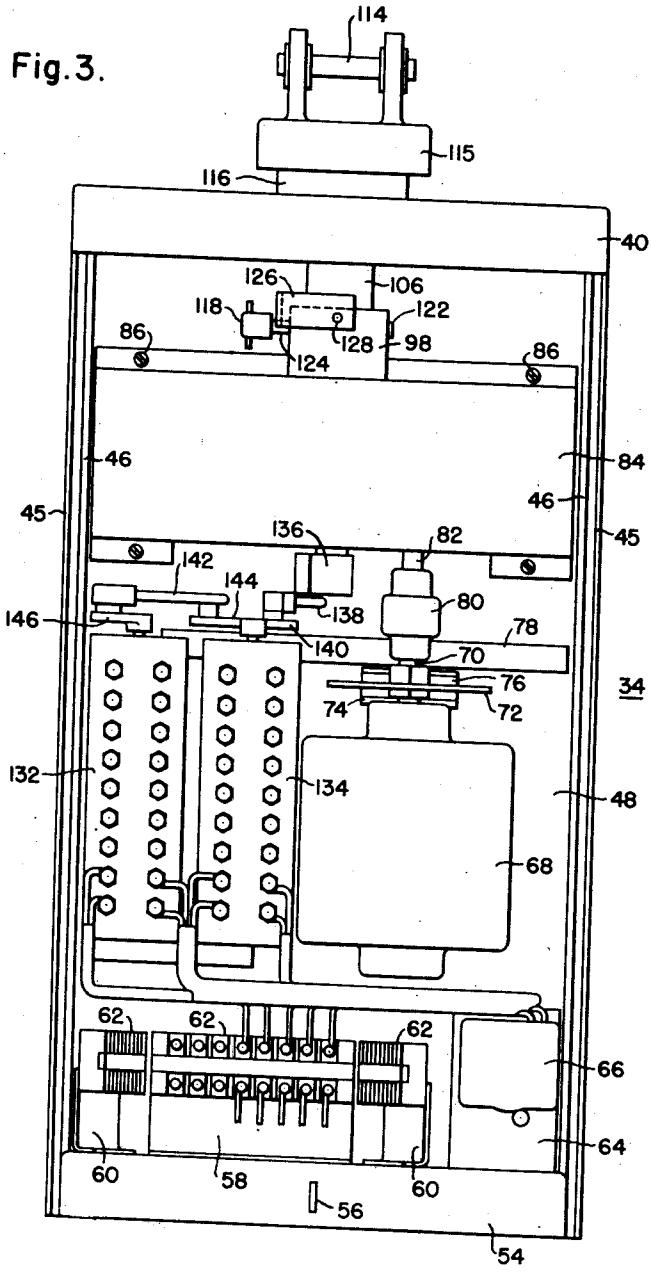
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Fig. 3.



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SWITCH OPERATING MECHANISM

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Fig. 4.

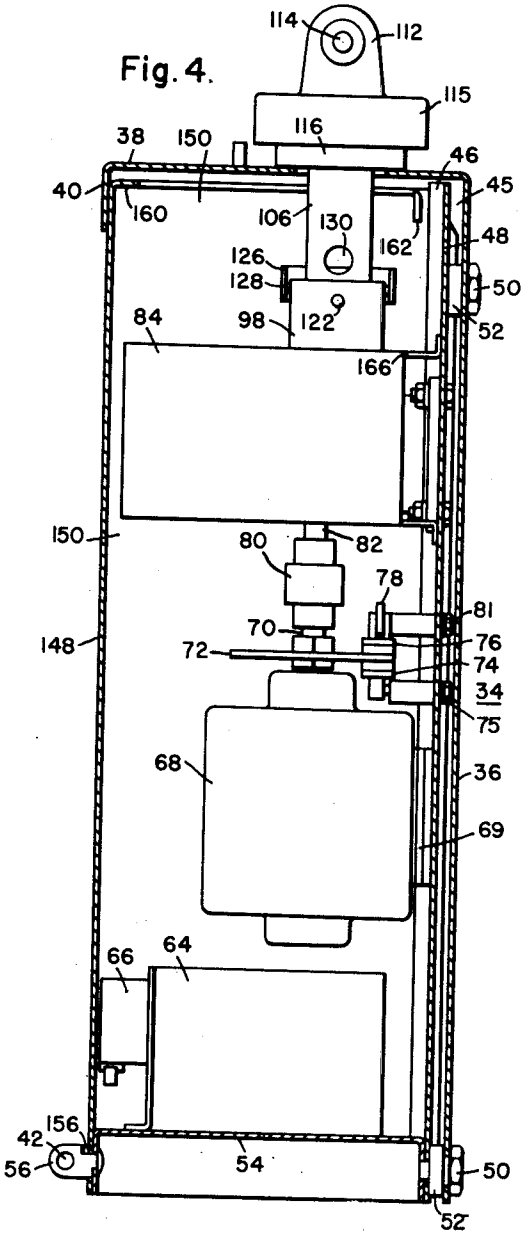
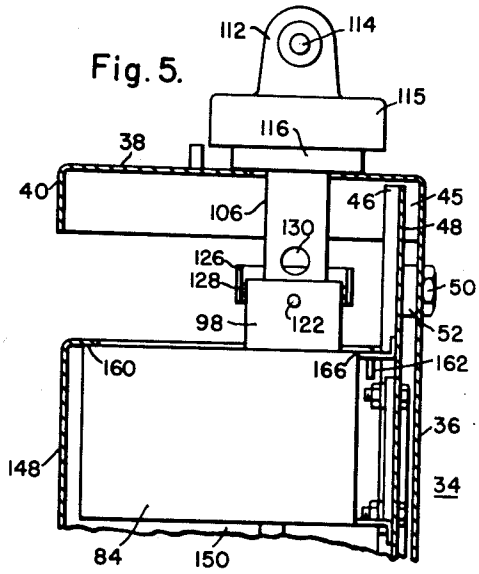


Fig. 5.



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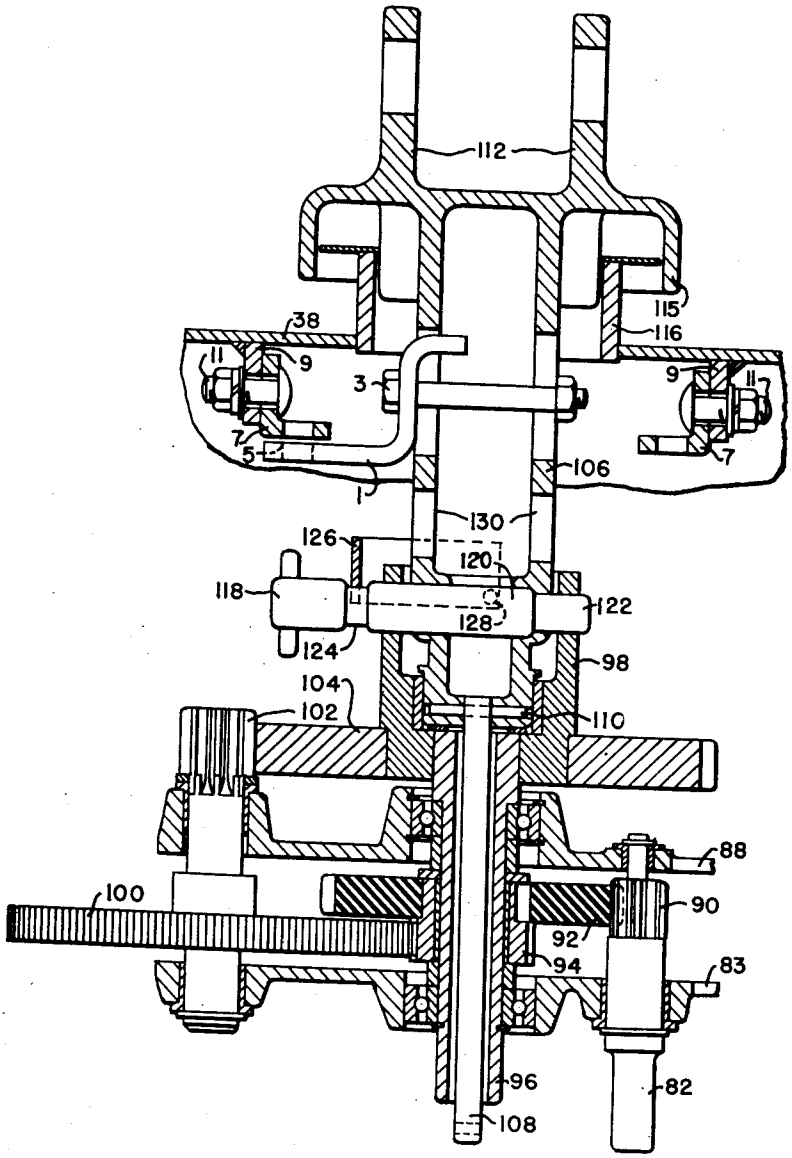
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SWITCH OPERATING MECHANISM

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4 Sheets-Sheet 4

Fig.6.



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UNITED STATES PATENT OFFICE

2,669,614

SWITCH OPERATING MECHANISM

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Application November 3, 1949, Serial No. 125,208

15 Claims. (Cl. 200—17)

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This invention relates generally to electric switch operating mechanism, and more particularly to motor operated mechanism for outdoor switches, such as disconnecting switches.

Motor operating mechanisms are provided for outdoor switches principally so that they may be operated from a remote point. However, it is sometimes necessary that such switches be manually operable, and as heretofore, motor mechanisms have been available in suitable housings with an output shaft or crank projecting from the housing, and with some sort of means at the outside of the housing for disconnecting the output shaft or crank from the motor and gearing within the housing, when it is desired to manually operate the output shaft or crank. These have the obvious disadvantage that the disconnecting means and other means for manual operation are always exposed to the weather, and of course, require an additional lock to normally prevent unauthorized operation.

Accordingly, one object of this invention is to provide a novel enclosed switch motor-operating mechanism, having provision for manual operation which is normally contained within the motor mechanism enclosure.

A more specific object of this invention is to provide a novel enclosure for switch motor-operating mechanism having provisions for manual operation independent of the mechanism and normally enclosed in the motor mechanism enclosure, with a novel cover for the enclosure which is adjustable to a partly open position where only the provisions for manual operation are exposed.

Still another object of this invention is to provide in motor-operating mechanism for switches, a novel arrangement permitting manual operation of the switches independent of the motor mechanism.

These and other objects of this invention will become more apparent upon consideration of the following detailed description of a preferred embodiment thereof, when taken in connection with the attached drawings in which:

Fig. 1 is a top view of a three-pole disconnecting switch installation operated by mechanism in accordance with this invention;

Fig. 2 is an end elevation view of the switch installation shown in Fig. 1;

Fig. 3 is an enlarged elevation view of the switch operating mechanism and its housing with the housing cover thereof removed;

Fig. 4 is a vertical cross-section view through the mechanism housing shown in Fig. 3, taken

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substantially at right angles to Fig. 3, but showing the mechanism in the housing in elevation;

Fig. 5 is a cross-section view similar to Fig. 4, but showing only the upper part of the operating mechanism, with the cover in a different position from that shown in Fig. 4; and

Fig. 6 is an enlarged cross-section view of part of the switch operating mechanism.

While this invention may be used in the operation of various types of electric switching devices, it is illustrated in Figs. 1 and 2 in connection with the operation of a plurality of disconnecting switches 2, which are generally mounted on an elevated support, such as on poles or elevated framework, at a substation or the like.

Each of the disconnecting switches 2 is adapted to be mounted on a flanged channel base 4, which has a stationary insulator 6 mounted at each end thereof, and a rotatable insulator 8 mounted adjacent one of the stationary insulators 6. The rotatable insulator 8 is joined at its upper end by a supporting brace 10 to the adjacent stationary insulator 6, and this supporting brace has a terminal pad 12 at the outer end thereof for attachment of a terminal conductor thereto. The upper end of rotatable insulator 8 has a stub shaft 22, and a journal portion which is rotatably received in a bearing provided in supporting brace 10. Operating mechanism for the switch blade 16 is enclosed in a housing 14 which is pivotally mounted on brace 10 on an axis which extends transversely to the blade, and the outer end of switch blade 16 is adapted to be received in pressure engagement with break contact jaws 18 at the closed circuit position of the switch. Contact jaws 18 are secured to the upper end of the other stationary insulator 6, on a fixture which includes a second terminal pad 20 for connection of another line conductor to the switch. For a more complete description of the particular switches illustrated and their mode of operation, reference is hereby made to H. L. Rawlins Patent No. 2,363,360, issued November 21, 1944 to the same assignee as this invention.

Generally speaking, the switches are operated to their open and closed circuit positions by rotation of their insulators 8 in opposite directions. Rotation of insulator 8 of any of the switches in a counter-clockwise direction as viewed in Fig. 1, results first in rotation of the switch blades 16 about their longitudinal axes to relieve the pressure on contact jaws 18 due to a connection of insulator shaft 22 with the blades in mechanism housing 14, and thereafter the blades are piv-

otally raised about the transverse axis on which mechanism housing 14 is mounted on supporting brace 10, due to a connection of stub shaft 22 to the housing 14. Rotation of insulators 8 in the opposite clockwise direction will close the switches and cause movement of the switch blades 16 in the reverse sequence, namely, they will pivotally move down to a position between contact jaws 18 with mechanism housing 14, and thereafter the blades will be rotated about their longitudinal axes into high pressure engagement between contact jaws 18.

Each of the rotatable switch insulators 8 has a crank arm 24 secured thereto, and as shown in Fig. 1, these crank arms are connected by an operating link 26 pivoted to the outer end of each crank arm, and this link in turn is pivoted as at 28 to the outer end of an operating crank 30 secured to the upper end of an operating shaft 32. The operating shaft 32 extends vertically downwardly, preferably to a location accessible by an operator from the ground, to be connected to motor operating mechanism 34, which is adapted to rotate operating shaft 32 in opposite directions, to effect simultaneous opening and closing of the disconnecting switches 2.

The operating mechanism 34 is shown in Figs. 3, 4 and 5 to be mounted in a housing including a stationary part comprising a rear wall 36 of sheet metal having an integral top wall 38, which terminates at the front and opposite sides in a depending marginal flange 40. Rear wall 36 of the housing also has forwardly projecting side flanges 45 which, together with flanges 46, form vertical grooves for receiving the casing cover to be hereinafter described. Vertical flanges 46 are formed on the side edges of a bracing plate 48 which is secured in closely spaced relation directly to rear wall 36, as by studs 50 secured to the bracing plates, and having collars 52 spacing the bracing plate from rear wall 36.

The bottom wall 54 of the housing is formed by a flanged base plate secured to bracing plate 48, in any desired manner, for example, as by welding or the like. The front flange of bottom wall 54 has a substantially centrally located locking lug 56 (Figs. 3 and 4) projecting therefrom for supporting the housing cover, in a manner to be described. Mounted on bottom wall 54 of the housing are a plurality of supporting brackets 58 and 60 for supporting terminal blocks 62 to which connections for the various electrically energized components of the operating mechanism may be made. A support 64 is also mounted on bottom wall 54 and this support may have a circuit breaker 66 mounted thereon for protecting the electrically energized components of the mechanism, and support 64 may also have a rearwardly extending portion on which a relay or contactor may be mounted where operation from a remote point is desired.

The drive motor 68 for the operating mechanism is adapted to be mounted on bracing plate 48, as at 69, above terminal blocks 62, with the motor drive shaft 70 arranged vertically. The motor drive shaft 70 may be provided with a suitable brake, and this may comprise a brake disc 72 slidably but non-rotatably mounted on motor shaft 70, and working between friction brake shoes 74 and 76, with a least the shoe 76 movably mounted on a brake lever 78. The particular braking arrangement which may include a solenoid (not shown) for operating brake lever 78, or the latter may be manually operated, is more particularly described and claimed in the copending application of J. B. Owens, Serial No. 125,209, on Motor Switch Operating Mechanism, filed concurrently herewith and assigned to the same assignee of this invention. Consequently, for a complete description and illustration of the operation of the braking arrangement, reference is hereby made to the aforesaid copending application.

The upper end of motor shaft 70 is coupled with an input shaft 82 of a gear train by any suitable means, preferably a universal type joint 86. By reference to Fig. 6, it will be observed that the gear train is supported between spaced journal plates 83 and 88, with the whole gear train being enclosed in a substantially U-shaped gear housing 84, having flanged ends secured to bracing plate 46 on the rear wall of the housing, for example, as by screws 86 (Fig. 3).

The input shaft 82 of the gear train is journaled in both plates 83 and 88, and has pinion 90 thereon adapted to mesh with a gear 92, preferably of a molded composition material, to reduce noise. Gear 92 is keyed to the hub of a pinion 94, with the latter being rotatably mounted on a hollow shaft 96. Hollow shaft 96 is secured at its upper end to an enlarged hollow output shaft 98 for the gear train, as will be hereinafter apparent. Pinion 94 meshes with a large gear 100 and this, in turn, is mounted on a shaft having a pinion 102 which engages a gear 104 secured on output shaft 98. A hollow shaft 106 comprises the output shaft from the entire operating mechanism, and the lower end of this shaft is reduced in size and is received in output shaft 98 for the gear train, and has a shaft 108 secured to the lower end thereof, as by a pin 110, with the shaft 108 extending downwardly through hollow shaft 96, all for a purpose to be described. The upper end of output shaft 106 has a pair of spaced apertured ears 112 formed integral therewith for receiving a connecting pin 114 for connecting operating shaft 32 therewith. Preferably top wall 38 of the mechanism housing has a sleeve 116 secured thereto, and the upper end of the output shaft 106 may have an integral skirt 115 extending over the upper end of sleeve 116.

In order to couple mechanism output shaft 106 to gearing output shaft 98, a coupling pin 118 is provided and it will be noted that this pin has an enlarged cross-section portion 120, intermediate its ends, with an outer portion 122 thereof of reduced cross-section area. In the position of the parts shown in Fig. 6, it will be observed that the openings in output shaft 98 and 106 at the left are of a size to closely receive the large cross-section portion 120 of coupling pin 118, whereas the openings in these shafts at the right are reduced to closely receive the small cross-section part 122 of coupling pin 118. It will thus be obvious that coupling pin 118 can be inserted to couple output shafts 98 and 106 only when these shafts are in the relative angular positions shown in Fig. 6 of the drawings. Coupling pin 118 is also provided with an annular groove 124 adjacent its inner end for receiving an edge of a generally U-shaped lock member 126, which, in turn, receives gearing output shaft 98, and has its ends pivotally mounted on this shaft, as at 128. It will also be noted that openings 130 are provided through mechanism output shaft 106 immediately above the upper end of gearing output shaft 98, and these openings are designed of a size to receive an operating bar which may be manually moved.

In the position of the parts shown in Fig. 6, it will be apparent that motor 68 will drive the output shafts by way of pinion 90, gear 92, pinion 94, gear 100, pinion 102, gear 104, to gearing output shaft 98, and thence by means of coupling pin 118 to mechanism output shaft 106. Incidentally, hollow shaft 96 and shaft 108 will also be operated inasmuch as the former is secured to gearing output shaft 98, and the latter is secured to mechanism output shaft 106. Now, if it is desired to manually operate mechanism output shaft 106, it will be necessary to raise lock member 126 out of groove 124 in coupling pin 118, so that the coupling pin may be removed, and mechanism output shaft may be moved independently of the gear train. It will be observed that it is not possible to insert a manual operating bar in apertures 130 of mechanism output shaft 106 until coupling pin 118 is withdrawn, because the pin maintains lock member 126 in a position where it obstructs access to the openings 130 from the left side (Figs. 3 and 6), which is the side an operating bar would have to be inserted to open switches 2. Of course, when coupling pin 118 is removed in the manner set forth above, lock member 126 will drop down until it engages the side of gearing output shaft 98, where it will be down below openings 130 and will no longer obstruct insertion of a manual operating bar in openings 130 of the mechanism output shaft 106. Following manual operation of mechanism output shaft 106, it will be impossible for the reasons previously pointed out to insert coupling pin 118 to connect this shaft to gear output shaft 98 until the two shafts are aligned in the particular angular relation shown in Fig. 6. This is of importance for reasons which will be hereinafter referred to.

Mechanism output shaft 106 has provision for locking it in the position it occupies when disconnecting switches 2 are at their open and closed circuit positions comprising, a lock bracket 1 secured to shaft 106 by a bolt 3. The outer end of lock bracket 1 has an opening 5 and is adapted to underlie openings in stationary brackets which are secured by bolts 11 to lugs 9 rigidly secured to top wall 38 of the housing. Whenever the opening 5 is aligned with the opening in a bracket 7, a padlock may be inserted through the aligned openings to thus positively lock the disconnecting switches in either the open or closed circuit position, irrespective of whether coupling pin 118 is in place or not.

For the purpose of controlling operation of motor 68, for example, to energize and deenergize it in response to 180° rotation of output shaft 98 or 106, or both, as well as for the purpose of energizing indicating circuits to indicate the position of the mechanism and hence the position of switches 2 at a remote point, there is provided in the mechanism housing, a pair of control switches 132 and 134 also mounted on bracing plate 48 at a point adjacent and at one side of motor 68. Each of these switches may have rotatable contact actuating means adapted to be actuated by a crank 136 mounted on hollow shafts 96 and shaft 108, and which may be secured to either one of these shafts, as is more particularly pointed out and claimed in the previously mentioned copending application of J. B. Owens. In either case, crank 136 is connected to control switch 134 by a connecting link 138 pivotally associated with a crank 140 on the rotatable operating crank of switch 134. This shaft may be also provided with a second crank 144 connected by

a link 142 to a crank 146 on the operating shaft for control switch 132, to effect simultaneous operation of the two control switches in accordance with movement of either or both output shafts 106 and 98. While the operation of control switches 132 and 134 is, as stated above, more particularly described and claimed in the copending application of J. B. Owens, it will be obvious from the structure herein described that if operating crank 136 is secured to shaft 108, the switches will be actuated in accordance with movement of the mechanism output shaft 106, and consequently will be moved in accordance with movement of disconnecting switches 2, irrespective of whether the mechanism output shaft 106 is operated by motor 68, or by a manual operating bar inserted in openings 130 of the mechanism output shaft when it is disconnected from gearing output shaft 98. On the other hand, if operating crank 136 for the control switches is secured to hollow shaft 96, then the switches will be operated solely in accordance with operation of gearing output shaft 98, and will not be operated at all during manual operation of switches 2 when crank 136 is disconnected from mechanism output shaft 106 upon withdrawal of coupling pin 118. Thus, it is apparent that the control switches 132 and 134 may be connected to the operating mechanism so that their positions will always correspond to the positions of the disconnecting switches, or alternatively they may be connected so that they correspond only to the positions of gearing output shaft 98, and will not be operated during manual operation of switches 2.

The cover 148 for the operating mechanism is substantially U-shaped in cross-section having opposite sides 150 and 152 with handles 154 mounted adjacent the upper ends of each of these sides. The top edge of cover 148 is provided with a flange 160 which extends inwardly across the front and for a substantial distance rearwardly along each side of the cover, with this flange terminating in downwardly turned locking lugs 162 at each side of the cover, for a purpose to be described. At the bottom of the front part of cover 148, there is provided an opening 156 adapted to receive a lug 56 provided on the front flange of bottom wall 54 of the housing, when the cover is at its upper position wherein it completes the enclosure of the operating mechanism, in cooperation with top wall 38, rear wall 36, and bottom wall 54.

In the closed position, it will thus be seen that cover 148 is supported by lug 56 on bottom wall 54 of the housing, and may be locked in this position by a padlock or the like inserted through the opening 42 in lug 56. It will be apparent that the cover may be entirely removed from the housing by merely grasping handles 154 and lifting upwardly until opening 156 clears lug 56, when the bottom of the cover may be swung outwardly and the entire cover let down and entirely removed from the housing. In applying the cover, it is simply moved upwardly into engagement with the underside of top wall 38 whereupon opening 156 receives lug 56 on the bottom wall 54, and then the cover may be dropped down and will remain in the closed position shown in Fig. 4. It will be observed that in this position flange 40 of top wall 38 completely encloses the upper end of cover 148, and the side edges of the cover are received in the spaces between flanges 45 and 46 on rear wall 36 and bracing plate 48,

to thus form a completely weather-proof housing for the mechanism.

It will also be observed that the only part of the mechanism exposed is the upper end of the output shaft 106, namely, the connecting ears 112 thereof and skirt 115 which protects the opening in top wall 38, through which the output shaft projects. Moreover, the coupling pin 118 being located within the housing is, together with the parts associated therewith, completely protected from the weather, and when a padlock is inserted in locking ear 56, it prevents access to all of the mechanism within the housing including coupling pin 118 and parts associated therewith for permitting manual operation of mechanism output shaft 106. Now, when it is desired to manually operate output shaft 106, the cover may be raised to clear lug 56, as described above and then dropped straight down until the flange 160 rests on gear housing 84. It will be observed that the inner portion of the gear housing terminates at 166 short of plate 46 to receive locking lugs 162 therebetween to prevent accidental displacement of the cover from this partially open position where only the means for uncoupling output shafts 98 and 106 is exposed. In this position of the cover (Fig. 5) the manual operating mechanism is exposed on three sides but the remainder of the mechanism is still substantially entirely enclosed so as to be protected from rain, sleet or snow. Moreover, at the partly open position of the cover shown in Fig. 5, the switch may be manually uncoupled by withdrawing pin 118 in the manner previously described, and the operating bar may then be inserted in openings 130 of mechanism output shaft 106 and the latter is thus freed to be rotated manually the 180° required for operation of disconnecting switches 2 to their open and closed positions. Moreover, after the switches have been uncoupled from the motor operating mechanism including the gearing in this manner, and manually operated, the handle can be removed and the cover raised to its fully closed position and locked. This prevents unauthorized persons from operating the switch either electrically or manually. Moreover, if it is desired to inspect or repair any of the mechanism the cover 148 may be entirely removed from the housing either from its fully enclosed position shown in Fig. 4, or from its partly open position shown in Fig. 5.

From the foregoing, it will be apparent that the switch operating mechanism herein disclosed provides a housing in which both the motor and manual provisions for operation of the switches are completely enclosed, but having a cover which can be adjusted to a partially open position wherein only the manual provisions for operation of the switches are exposed, while the remainder of the mechanism remains completely enclosed to thus protect the latter when it is necessary to manually operate the switches in bad weather. Moreover, the cover also be completely removed from the housing to allow ready access to complete mechanism for repairs and adjustments.

There is thus provided an arrangement for operating disconnecting switches wherein the manual provisions for operation are completely protected from the weather except during actual manual operation, and wherein the remainder of the motor operating mechanism is completely protected from the weather, even during manual operation, while permitting inspection and access to all of the mechanism when desired, as well as providing a relatively simple arrangement for locking all of the mechanism against unauthorized operation. The mechanism is further rendered fool-proof because of the means preventing coupling of the switches to the motor drive mechanism unless the two are at a single predetermined relative position.

Having described a preferred embodiment of the invention in accordance with the patent statutes, it is desired that the invention be not limited to the particular embodiment herein disclosed, inasmuch as it will be apparent to persons skilled in the art that many modifications and changes may be made in this structure without departing from the broad spirit and scope of this invention. Thus, the particular mechanism herein described may be used as previously pointed out to operate various types of switching equipment, and may be provided with a variety of remote controlling and controlled elements. Accordingly, it is desired that the invention be interpreted as broadly as possible.

We claim as our invention:

1. Switch operating mechanism comprising, a housing formed in part by an openable cover, an operating shaft extending through a wall of said housing, a motor and speed reducing means driven thereby mounted in said housing, manually operable means confined entirely in said housing for releasably coupling said operating shaft and said speed reducing means, and means associated with the portion of said operating shaft located within said housing for manually operating said shaft while the shaft is uncoupled from the speed reducing means, said openable cover giving access to said manually operable means for the coupling and to said means for manually operating the shaft.

2. Switch operating mechanism comprising, a housing formed in part by an openable cover, an operating shaft extending through a wall of said housing, a motor and speed reducing means driven thereby mounted in said housing, coupling means confined in said housing for releasably coupling said operating shaft and said speed reducing means, and manually operable means associated with the portion of said operating shaft located within said housing for manually operating said shaft, said coupling means at coupled position being at a location where a part thereof blocks access to said manual operating means while the shaft is uncoupled from the speed reducing means, said openable cover giving access to said manually operable means for the coupling and to said means for manually operating the shaft.

3. Switch operating mechanism comprising, a housing formed in part by a removable cover, an operating shaft extending through a wall of said housing, a motor and speed reducing means driven thereby mounted in said housing, coupling means confined in said housing adjacent said one wall for releasably coupling said operating shaft and said speed reducing means, and housing means for the speed reducing means, said housing means supporting said cover at a partially open position adjacent to but spaced from said one housing wall where said coupling means is exposed but the remaining mechanism in said housing is not exposed.

4. Switch operating mechanism comprising, a housing formed in part by a removable cover, an operating shaft extending through a wall of said housing, a motor and speed reducing means driven thereby mounted in said housing, coupling means confined in said housing adjacent

said one wall for releasably coupling said operating shaft and said speed reducing means, manually operable means associated with the portion of said operating shaft located within said housing for manually operating said shaft, and housing means for the speed reducing means, said housing means supporting said cover at a partially open position adjacent to but spaced from said one housing wall where said coupling means and said manually operable means are exposed but the remaining mechanism in said housing is not exposed.

5. Switch operating mechanism comprising, a housing formed in part by a removable cover, an operating shaft extending through a wall of said housing, a motor and speed reducing means driven thereby mounted in said housing, and coupling means confined in said housing adjacent said one wall for releasably coupling said operating shaft and said reducing means, supporting means on the cover for retaining said cover at a partially open position adjacent to but spaced from said one housing wall where said coupling means is exposed, and a stationary member in said housing positioned to cooperate with said cover at its aforesaid partially open position to house the remaining mechanism at such partially open cover position.

6. Switch operating mechanism comprising, a housing having a removable cover for at least one open side thereof, an operating shaft projecting through the top wall of said housing, reduction gearing and a motor driving said gearing mounted in said housing, coupling means in said housing above said motor and gearing adjacent said top wall for releasably coupling said operating shaft and the output shaft of said gearing, projecting means on the housing for supporting said cover at an upper position where it completely closes said open side of the housing, and supporting means for retaining said cover at a lower position where only said coupling means is exposed.

7. Switch operating mechanism comprising, a housing having a removable cover for at least one open side thereof, an operating shaft projecting through the top wall of said housing, reduction gearing and a motor driving said gearing mounted in said housing, coupling means in said housing above said motor and gearing adjacent said top wall for releasably coupling said operating shaft and the output shaft of said gearing, lug means on the housing for supporting said cover at an upper position where it completely closes said open side of the housing, projecting means on the cover for supporting said cover at a lower position where only said coupling means is exposed, and a stationary member in said housing positioned to cooperate with said cover at its aforesaid partially open position to house the remaining mechanism at such partially open cover position.

8. Switch operating mechanism comprising, a housing having a removable cover for at least one open side thereof, an operating shaft projecting through the top wall of said housing, reduction gearing and a motor driving said gearing mounted in said housing, coupling means in said housing above said motor and gearing adjacent said top wall for releasably coupling said operating shaft and the output shaft of said gearing, projecting means on the housing for supporting said cover at an upper position where it completely closes said open side of the housing, supporting means on the cover for retaining said

cover at a lower position where only said coupling means is exposed, and a housing for said gearing having a top wall extending transversely of said housing at a position to cooperate with said cover at its aforesaid partially open position to house the remaining mechanism at such partially open cover position.

9. Switch operating mechanism comprising, a housing having a removable cover for at least one open side thereof, said cover having an inwardly extending flange at its upper end, an operating shaft projecting through the top wall of said housing, reduction gearing and a motor driving said gearing mounted in said housing, coupling means in said housing above said motor and gearing adjacent said top wall for releasably coupling said operating shaft and the output shaft of said gearing, lug means on the housing for supporting said cover at an upper position where it completely closes said open side of the housing, additional lug means on the cover for supporting said cover at a lower position where only said coupling means is exposed, and a stationary member in said housing positioned to be engaged by said cover flange at said lower position of the cover to assist in supporting the cover.

10. Switch operating mechanism comprising, a housing having a removable cover for at least one open side thereof, said cover having an inwardly extending flange at its upper end, an operating shaft projecting through the top wall of said housing, reduction gearing and a motor driving said gearing mounted in said housing, coupling means in said housing above said motor and gearing adjacent said top wall for releasably coupling said operating shaft and the output shaft of said gearing, lug means on the housing for supporting said cover at an upper position where it completely closes said open side of the housing, additional lug means on the cover for supporting said cover at a lower position where only said coupling means is exposed, a stationary member in said housing positioned to be engaged by said cover flange at said lower position of the cover to assist in supporting the cover, and said flange and member when in engagement forming a partition extending transversely substantially entirely across said housing to enclose the remaining mechanism.

11. Switch operating mechanism comprising, a housing, said housing comprising a fixed portion having top, rear and bottom walls, a substantially U-shaped cover adapted when mounted at an upper position on said fixed portion to form the front and side walls of the housing, mechanism mounted in said housing on the fixed portion thereof including a motor and reduction gearing driven thereby, coupling means located adjacent said top wall for releasably coupling said operating shaft to the output shaft of said gearing, an opening in said operating shaft also adjacent said top wall for receiving a manual operating bar, a transversely extending member mounted on the fixed portion of said housing immediately beneath said coupling and shaft opening, and projecting means on the cover for supporting said cover at a lower position where the upper end thereof is adjacent said member to expose said coupling and shaft opening while enclosing the remaining mechanism in said housing.

12. Switch operating mechanism comprising, a housing, said housing comprising a fixed portion having top, rear and bottom walls, a substantially U-shaped cover adapted when mounted at an upper portion on said fixed position to form the

front and side walls of the housing, mechanism mounted in said housing on the fixed portion thereof including a motor and reduction gearing driven thereby, coupling means located adjacent said top wall for releasably coupling said operating shaft to the output shaft of said gearing, an opening in said operating shaft also adjacent said top wall for receiving a manual operating bar, a transversely extending member mounted on the fixed portion of said housing immediately beneath said coupling and shaft opening, and said cover having an inwardly extending flange at its upper end which is engageable with said member for supporting said cover at a lower position where the upper end thereof is adjacent said member to expose said coupling and shaft opening while enclosing the remaining mechanism in said housing.

13. Switch operating mechanism comprising, a housing, said housing comprising a fixed portion having top, rear and bottom walls, a substantially U-shaped cover adapted when mounted at an upper portion on said fixed position to form the front and side walls of the housing, mechanism mounted in said housing on the fixed portion thereof including a motor and reduction gearing driven thereby, coupling means located adjacent said top wall for releasably coupling said operating shaft to the output shaft of said gearing, an opening in said operating shaft also adjacent said top wall for receiving a manual operating bar, a housing for said gearing having a top wall located immediately beneath said coupling and shaft opening, and supporting means on the cover for retaining said cover at a lower position where the upper end thereof is adjacent the top wall of said gear housing to expose said coupling and shaft opening while enclosing the remaining mechanism in said housing.

14. Switch operating mechanism comprising, a housing, said housing comprising a fixed portion having top, rear and bottom walls, a substantially U-shaped cover adapted when mounted at an upper portion on said fixed position to form the front and side walls of the housing,

mechanism mounted in said housing on the fixed portion thereof including a motor and reduction gearing driven thereby, coupling means located adjacent said top wall for releasably coupling said operating shaft to the output shaft of said gearing, an opening in said operating shaft also adjacent said top wall for receiving a manual operating bar, a housing for said gearing having a top wall located immediately beneath said coupling and opening, and said cover having an inwardly extending flange at its upper end which is engageable with said top wall of the gear housing for supporting said cover at a lower position where the upper end thereof is adjacent the top wall of said gear housing to expose said coupling and shaft opening while enclosing the remaining mechanism in said housing.

15. A switch operating mechanism comprising, a housing having a rotatable operating shaft projecting therefrom, a reversible motor in said housing driving said operating shaft through reduction gearing also mounted in said housing, said motor driving said gearing in opposite directions, coupling means in said housing for uncoupling said operating shaft from said gearing, and said coupling means permitting coupling of said gearing and said operating shaft at but a single relative angular position of said gearing and operating shaft.

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