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H. K. ANSINGH

SWITCH MECHANISM

Filed Feb. 20, 1923

2 Sheets-Sheet 1

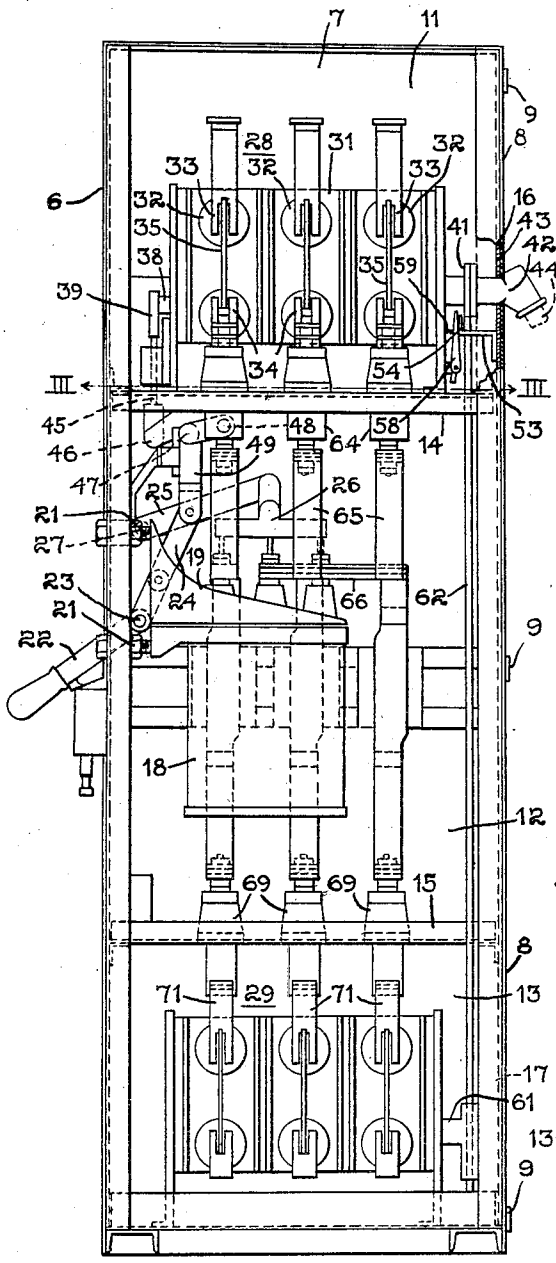


Fig. 1.

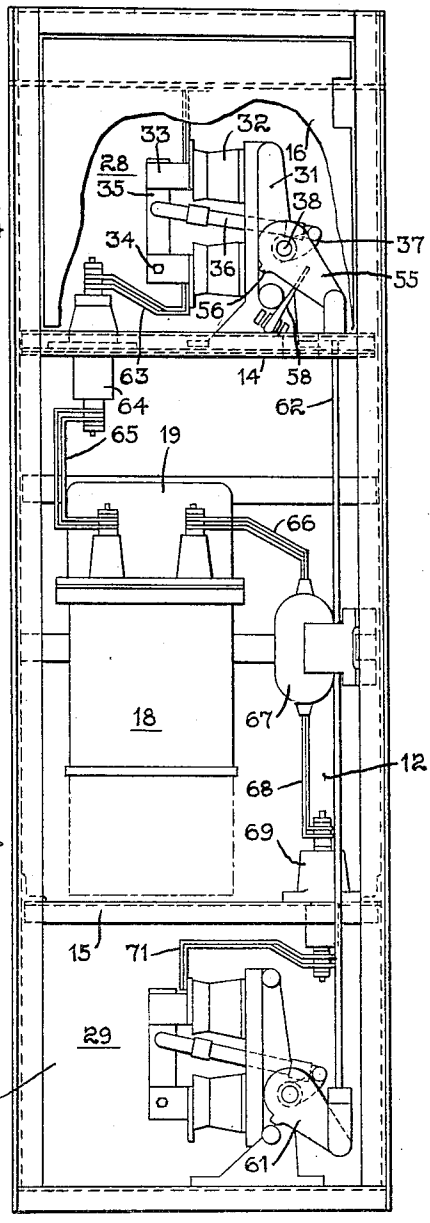


Fig. 2.

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2 Sheets-Sheet 2

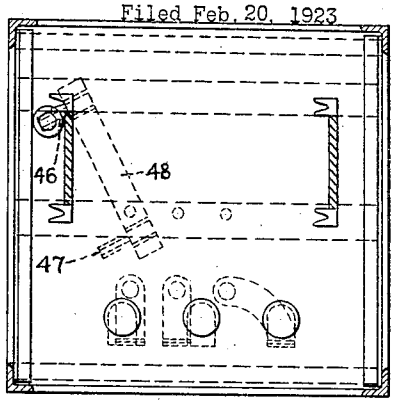


Fig. 3.

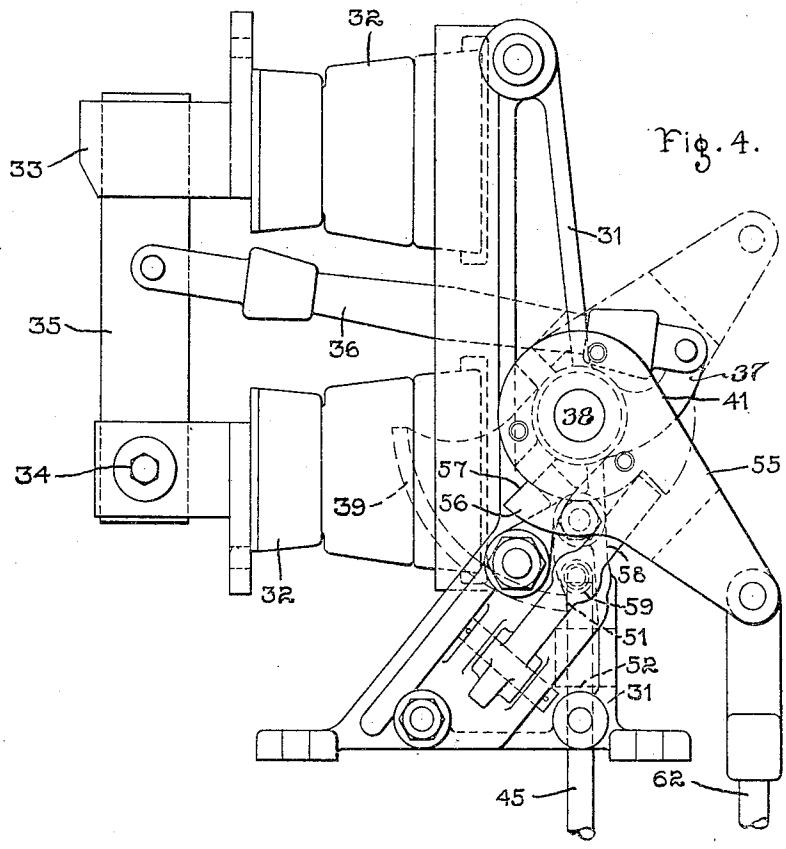


Fig. 4.

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UNITED STATES PATENT OFFICE.

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SWITCH MECHANISM.

Application filed February 20, 1923. Serial No. 620,143.

My invention relates to switch mechanism and particularly to circuit breakers of the safety type wherein the circuit breakers and disconnecting switches are enclosed within a metal housing.

One object of my invention is to provide a full-safety circuit breaker wherein the breaker is placed within a separate compartment of a housing containing separate disconnecting-switch compartments and wherein a single door serves to close all of the compartments.

Another object of my invention is to provide an enclosed circuit-breaker mechanism, having the above characteristics, wherein the circuit breaker is so interlocked with the disconnecting switches that the latter cannot be actuated so long as the circuit breaker is in closed position and wherein the door closing all compartments is so interlocked with the disconnecting switches that the latter cannot be actuated to closed position so long as the door is in open position and the door cannot be opened so long as the disconnecting switches are in closed position.

Another object of my invention is to provide a simple and inexpensive interlocking means between the circuit breaker and the disconnecting switches and between the latter and the door for the housing.

Another object of my invention is to provide a circuit-breaker mechanism wherein the disconnecting switches connected to opposite sides of the circuit breaker are so connected that actuation of one causes a corresponding movement of the other.

These and other objects, that will be made apparent throughout the further description of my invention, will be attained by means of the apparatus hereinafter described and illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevational view of a full-safety enclosed circuit breaker, a side wall being removed;

Fig. 2 is a rear elevational view of the circuit breaker shown in Fig. 1, the door being removed;

Fig. 3 is a transverse section through the circuit breaker mechanism taken on the line III—III of Fig. 1; and

Fig. 4 is an elevational view of a disconnecting switch shown in larger scale.

Referring to the drawings, the apparatus includes a sheet-metal housing having a front wall 6, side walls 7 and a rear door 8 that is hinged to one of the side walls by hinge members 9. The housing is divided into a bus-disconnecting-switch compartment 11, a circuit-breaker compartment 12 and a feeder-disconnecting-switch compartment 13 by switch and contact-member-supporting partitions 14 and 15.

The door 8 serves to close all of the compartments, but the disconnecting-switch compartments 11 and 13 are additionally provided with closure plates 16 and 17, respectively, that are detachably mounted in the framework of the housing and may be removed by the operator when access to the said compartments is desired. It will be seen, therefore, that, when the door is open, the circuit-breaker compartment 12 is immediately accessible.

The circuit breaker illustrated is of standard oil-immersed type enclosed within a tank 18 that is supported upon a bracket 19 which is secured to the front wall of the compartment 12 by means of bolts 21. The circuit breaker, as shown in Fig. 1, is in closed position and is adapted to be actuated by an operating lever 22 that is pivoted upon a shaft 23 and connected to a link 24 which, in turn, is pivoted to a lever 25 that is connected, at one end, to the bracket 26 carrying the circuit-breaker contact members and, at the other end, to a pivot shaft 27.

It will be seen from the foregoing that, when the operating handle 22 is moved upwardly, the bracket 26, carrying the circuit breaker contact members, will be moved downwardly to its open position.

The bus-disconnecting switch 28 and the feeder-disconnecting switch 29 are identical in construction with the exception of certain interlocking devices that are preferably connected to the bus-disconnecting switch. The disconnecting switch 28 is of standard construction and comprises a metal bracket 31 that is secured to the partition 14. The bracket carries three pairs of insulating bushings 32 for a three-pole system and upon one bushing of each pair is mounted the break-jaw members 33, while, upon the other bushing of each pair, is mounted the hinge-jaw members 34 of the disconnecting switch.

The disconnecting switch blades 35 are pivoted to the hinge-jaw members and are rotatably movable into engagement with the break-jaw members 33. Each blade member 35 is connected to an operating link 36 that is pivoted to a lever 37 secured to an operating shaft 38 having bearings on the bracket 31. One end of the shaft 38 carries an interlocking quadrant 39 while the other is provided with a flanged coupling member 41 to which a flanged socket member 42 is detachably secured. The socket 42 projects exteriorly of the door 8 through openings 43 in the plate 16 and the door 8. The socket is for the purpose of receiving a detachable handle 44 that is inserted within the socket for operation of the disconnecting switch.

Referring to Figs. 1 and 4, the quadrant 39 is of such shape and proportions as to be movable to opposite sides of an interlocking rod 45 that is connected to the circuit-breaker lever 25 through the medium of rocking cranks 46 and 47 secured to a rocking shaft 48 that is pivoted to the under side of the partition 14, and a connecting link 49 that is pivotally attached to the crank 47 and the lever 25.

As indicated in Figs. 1 and 4, the rod 45 is in the raised position that it occupies when the circuit breaker is in closed position. Opening movement of the disconnecting switch blades 35 is prevented by the end 51 of the quadrant 39 which engages the upper end of the rod 45 that is supported in a guide 52 on the frame 31. Therefore, the disconnecting switch-blade members cannot be moved to their open positions so long as the circuit breaker is in closed position. When the circuit breaker has been moved to open position, the rod 45 is lowered until it clears the quadrant 39. The disconnecting switch may then be opened.

When the disconnecting switch is in open position, the quadrant 39 occupies a position on the right side of the interlocking rod 45 corresponding to the position indicated in dotted lines in Fig. 4, showing the quadrant at the left side of the rod.

If the circuit breaker is moved to closed position after the disconnecting switch has been moved to open position, the quadrant 39 again prevents closing movement of the disconnecting switch blade, therefore precluding any possibility of the disconnecting switch being actuated while the circuit breaker is closed.

The door 8 is interlocked with the disconnecting switch by means of a clip 53 having a projection 54 that occupies a position behind the flange member 41 when the door is in closed position. The flange member is provided with a crank arm 55 having a lug 56 which constitutes a stop shoulder 57, the purpose of which will be hereinafter described.

When the disconnecting switch is in closed position, the crank arm 55 and the lug 56 extend in front of the projection 54 and prevent opening movement of the door so long as the disconnecting switch is in closed position. When the disconnecting switch is in open position, the crank arm 55 and the lug 56 clear the projection 54 and permit opening movement of the door.

Closing movement of the disconnecting switch, while the door is open, is prevented by means of a pivoted pawl member 58 that is normally pressed outwardly into the plane of the shoulder 57 on the flange member 41 by a spring 59. When the disconnecting switch is moved to open position, the pawl member 58 engages the shoulder 57 and prevents closing movement of the disconnecting switch blades. This pawl is displaced by a projection 54 on the door when the door is moved to closed position and permits closing movement of the disconnecting swich.

The feeder-disconnecting switch 29 is provided with crank arms 61 corresponding to the crank arm 55 on the disconnecting switch 28, and the crank arms are pivotally connected by a rod 62 which actuates the disconnecting switch 29 when the disconnecting switch 28 is actuated. The bus-disconnecting switch is connected to the circuit breaker by means of conductors 63, insulating bushings 64 and conductors 65. The disconnecting switch 29 is connected to the opposite side of the circuit breaker by means of conductors 66, a series transformer 67, conductors 68, insulating bushings 69 and conductors 71.

It will be apparent from the foregoing that the disconnecting switches cannot be actuated so long as the circuit breaker is in closed position and the circuit breaker cannot be actuated except when the disconnecting switch is in either its "on" or its "off" position. The door closing access to all compartments is locked in closed position so long as the disconnecting switch is in closed position, and the disconnecting switches cannot be actuated so long as the door is open. It is, therefore, impossible for an operator to gain access to the circuit breaker until the disconnecting switches have been opened, and it is impossible for the operator to close the disconnecting switches while the circuit breaker is in closed position. Full safety is therefore afforded by the construction above disclosed.

In certain installations, it may be desirable where feeder disconnecting switches are unnecessary, to use the lower compartment 13 for containing the potential transformers and their incidental equipment. The relative positions of the disconnecting switch and the circuits may be varied in accordance with the nature of the installation. Instead of using a permanent plate for the front of

the housing, a hinged door may be substituted having an opening through which the circuit-breaker handle may operate.

While I have described and illustrated but one embodiment of my invention, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made therein without departing from the spirit and scope of my invention, as set forth in the appended claims.

I claim as my invention:

1. Switch mechanism comprising a housing divided into three compartments, a circuit breaker in one compartment and a disconnecting switch in each of the other compartments, a single door for closing all compartments, a means for actuating the circuit breaker interlocked with one of the said disconnecting switches whereby opening movement of the circuit breaker is precluded except when the said disconnecting switch is in either of its "on" or "off" positions, and means for connecting the said disconnecting switches whereby movement of one disconnecting switch causes corresponding movement of the other.

2. Switch mechanism comprising a circuit breaker, a disconnecting switch connected on each side of the circuit breaker, means for actuating the circuit breaker interlocked with one of the said disconnecting switches whereby opening movement of the circuit breaker is precluded except when said disconnecting switch is in either of its "on" or "off" positions, or opening or closing movement of the said disconnecting switch is precluded so long as the circuit breaker is in closed position, and means for connecting the said disconnecting switches whereby movement of one disconnecting switch causes a corresponding movement of the other.

3. Switch mechanism comprising a housing divided into two compartments, a circuit breaker in one compartment, a disconnecting switch in the other compartment, a door for closing both compartments, means for so interlocking the circuit breaker with the disconnecting switch that closing movement of the former is precluded except when the latter is in "on" or "off" position, and means for preventing opening movement of the door so long as the disconnecting switch is in closed position.

4. Switch mechanism comprising a housing divided into two compartments, a circuit breaker in one compartment, a disconnecting switch in the other compartment, a door for closing both compartments, means for so interlocking the circuit breaker with the disconnecting switch that the latter cannot be actuated so long as the circuit breaker is in closed position and means for preventing opening movement of the door so long as the disconnecting switch is in closed position.

5. Switch mechanism comprising a housing divided into two compartments, a circuit breaker in one compartment, a disconnecting switch in the other compartment, a door for closing both compartments, means for so interlocking the circuit breaker with the disconnecting switch that the latter cannot be actuated so long as the circuit breaker is in closed position and means for so interlocking the door and the disconnecting switch that the latter cannot be moved to closed position so long as the door is open.

6. Switch mechanism comprising a housing divided into three compartments, a circuit breaker in the middle compartment, a disconnecting switch in each of the other compartments connected to opposite sides of the circuit breaker, means for preventing the actuation of one disconnecting switch so long as the circuit breaker is in closed position and means for connecting the said disconnecting switches whereby movement of one thereof causes a corresponding movement of the other.

7. Switch mechanism comprising a housing divided into two compartments, a circuit breaker in one compartment, a disconnecting switch in the other compartment, a door for closing both compartments, and a latch for normally preventing closing movement of the disconnecting switch and actuated by the door to releasing position when the door is moved to closed position.

In testimony whereof I have hereunto subscribed my name this ninth day of February, 1923.

HERMAN K. ANSINGH.