United States Patent

Cellerini et al.

[15] **3,681,545**

[45] **Aug. 1, 1972**

[54] **DRAWOUT SWITCHGEAR**

[72] Inventors: **Albert R. Cellerini**, Beaver; **John Majcher; Charles R. Paton**, both of New Brighton, all of Pa.

[73] Assignee: **Westinghouse Electric Corporation**, Pittsburgh, Pa.

[22] Filed: **Sept. 24, 1970**

[21] Appl. No.: **75,182**

[52] **U.S. Cl.** .....**200/50 AA**, 200/166 E

[51] **Int. Cl.** **H01h 9/20**

[58] **Field of Search**.....200/50 AA, 166 E, 166 D; 339/65, 66 R, 66 M

[56] **References Cited**

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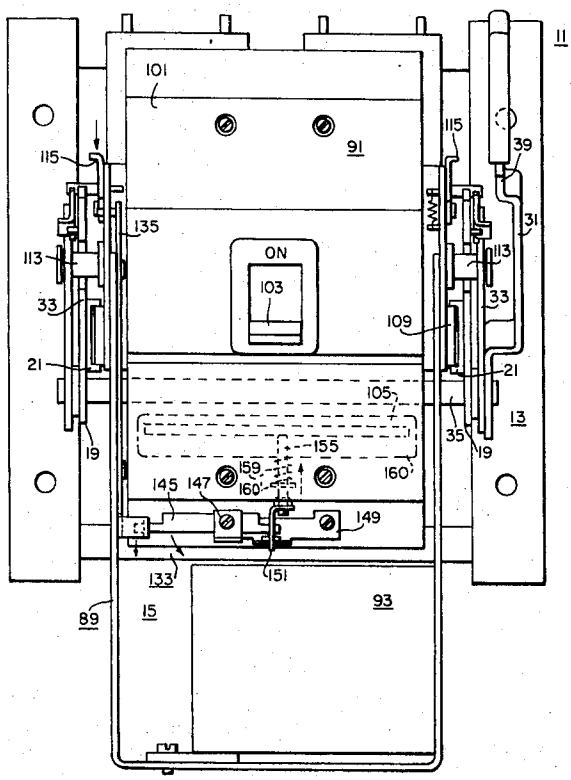
Primary Examiner—Robert K. Schaefer
Assistant Examiner—M. Ginsburg
Attorney—A. T. Stratton, Clement L. McHale and W. A. Elchik

[57] **ABSTRACT**

Improved drawout switchgear comprises interlocking means automatically operable to lock the movable assembly in the connected position with interlock defeating means operable to maintain the interlock means in a defeated position while an operator operates a levering mechanism to lever the movable assembly from the connected position to a disconnected position. The interlock means is connected to maintain the trip structure of the drawout circuit breaker in a tripped condition when the interlock means is in the defeated or non-interlocking position. Improved secondary contact means is provided for connecting and disconnecting control circuits of the switchgear.

10 Claims, 16 Drawing Figures



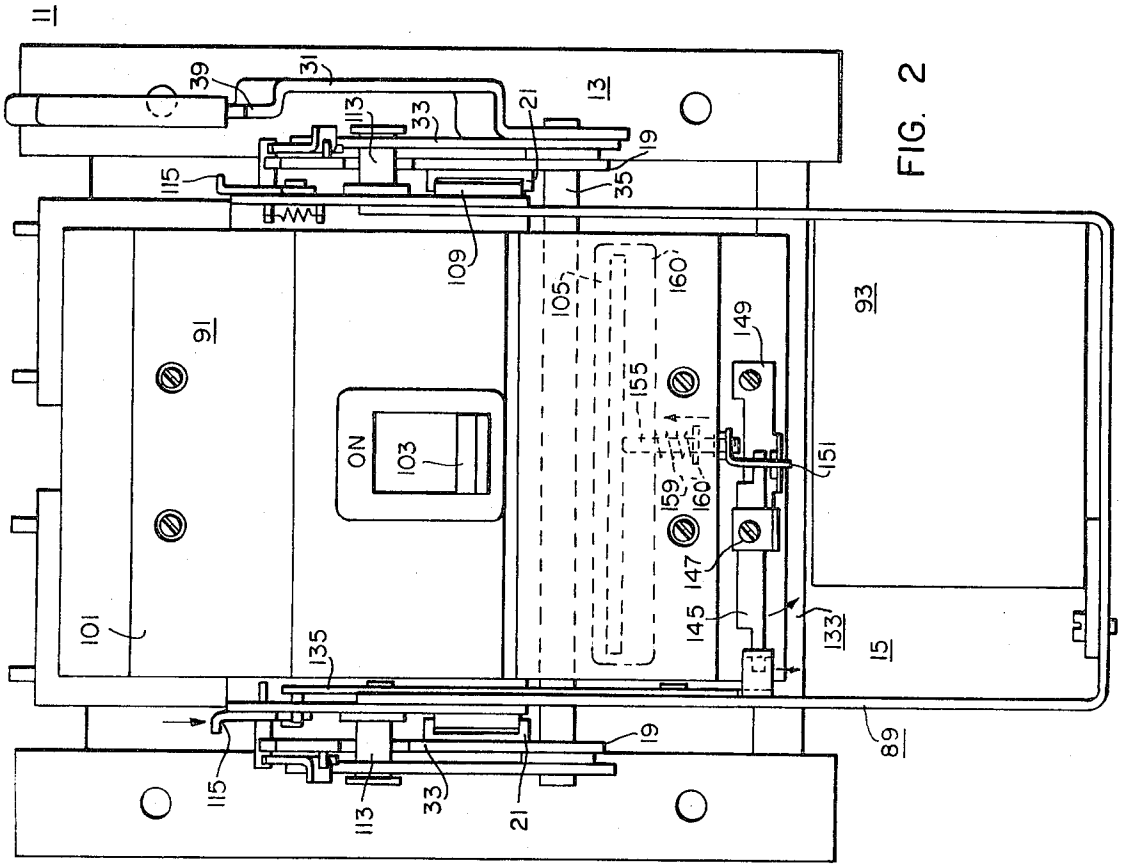

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FIG. 2

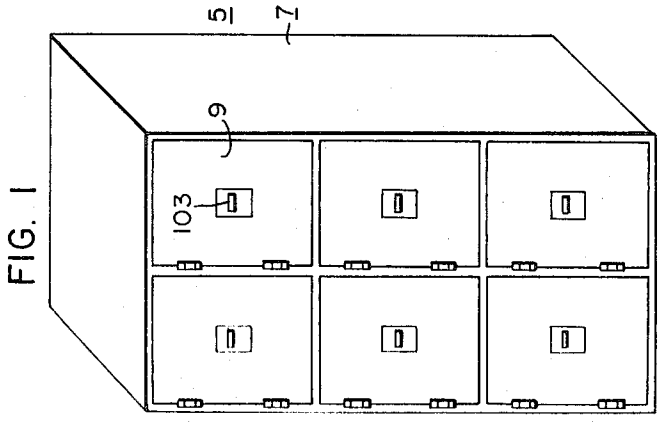
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FIG. 1

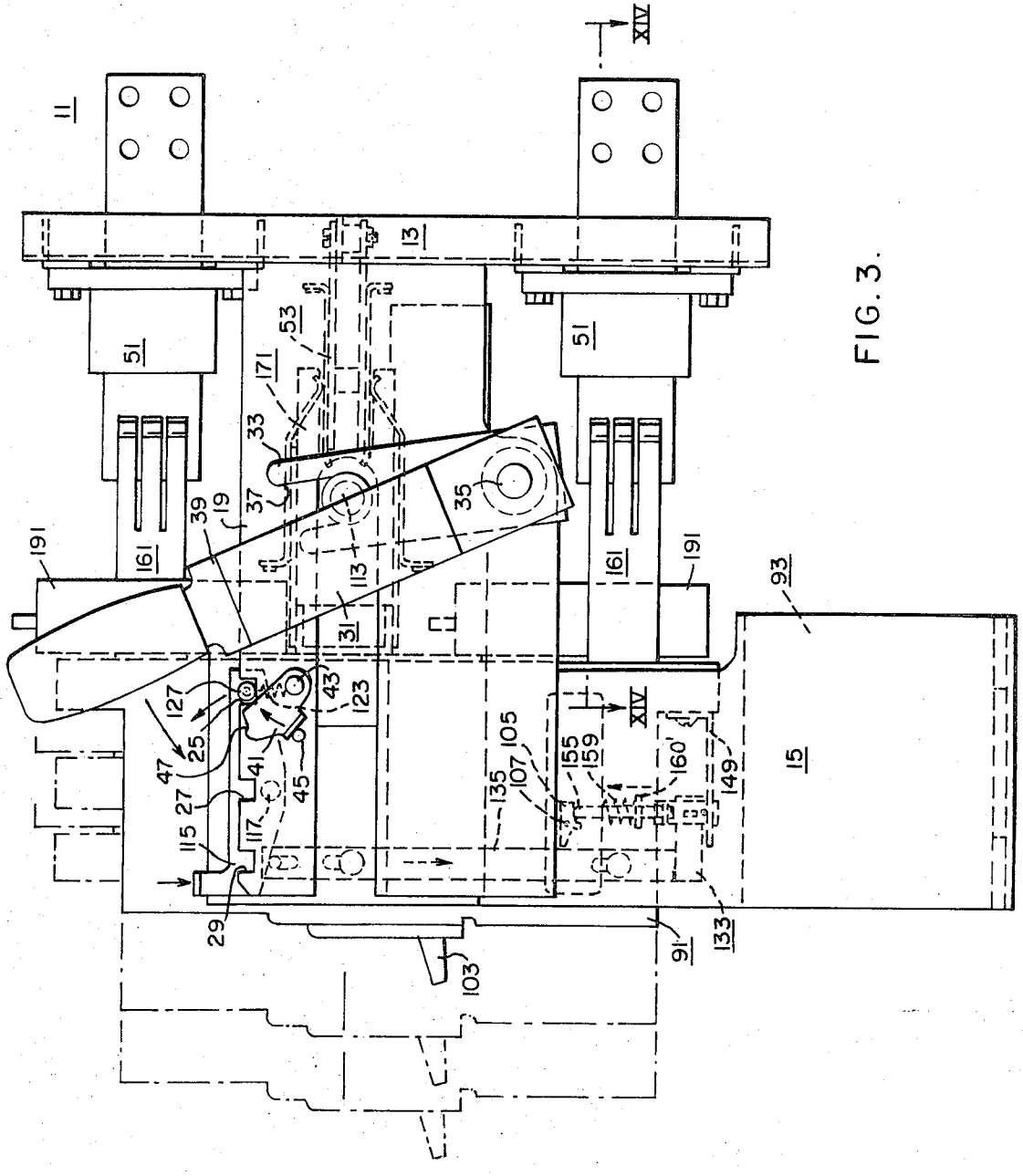
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FIG. 3.

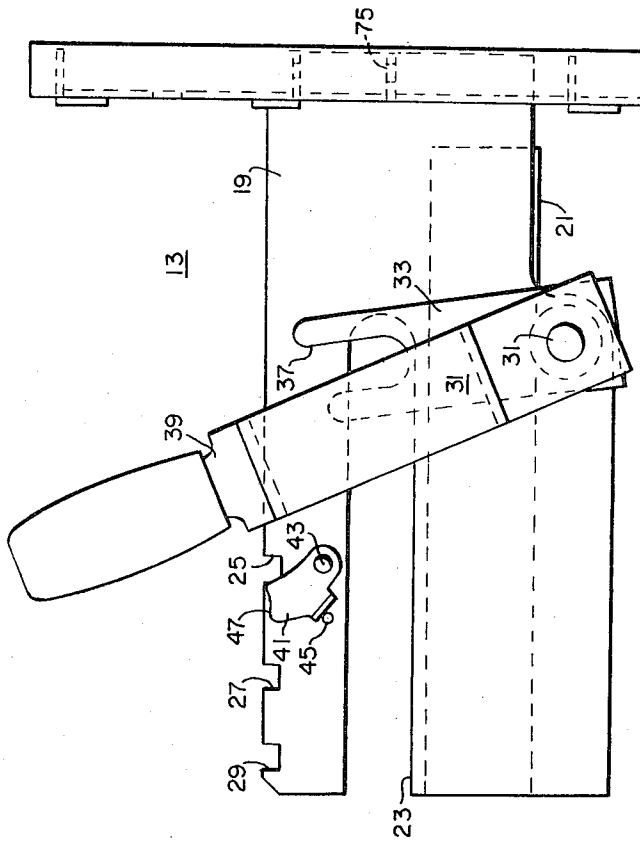
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FIG. 5

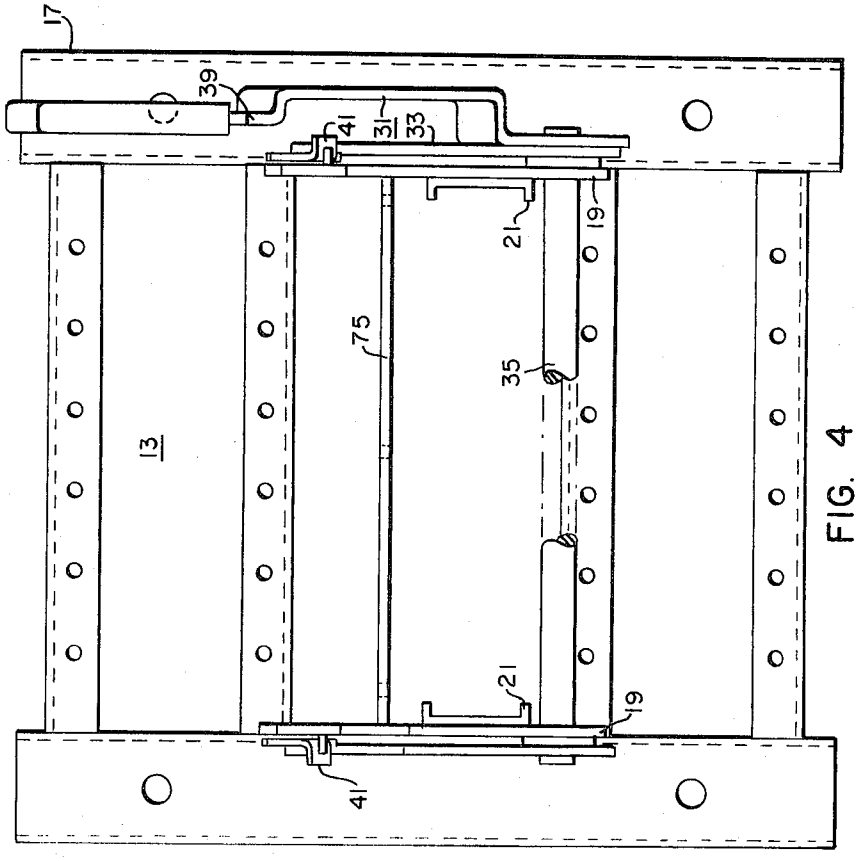
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FIG. 4

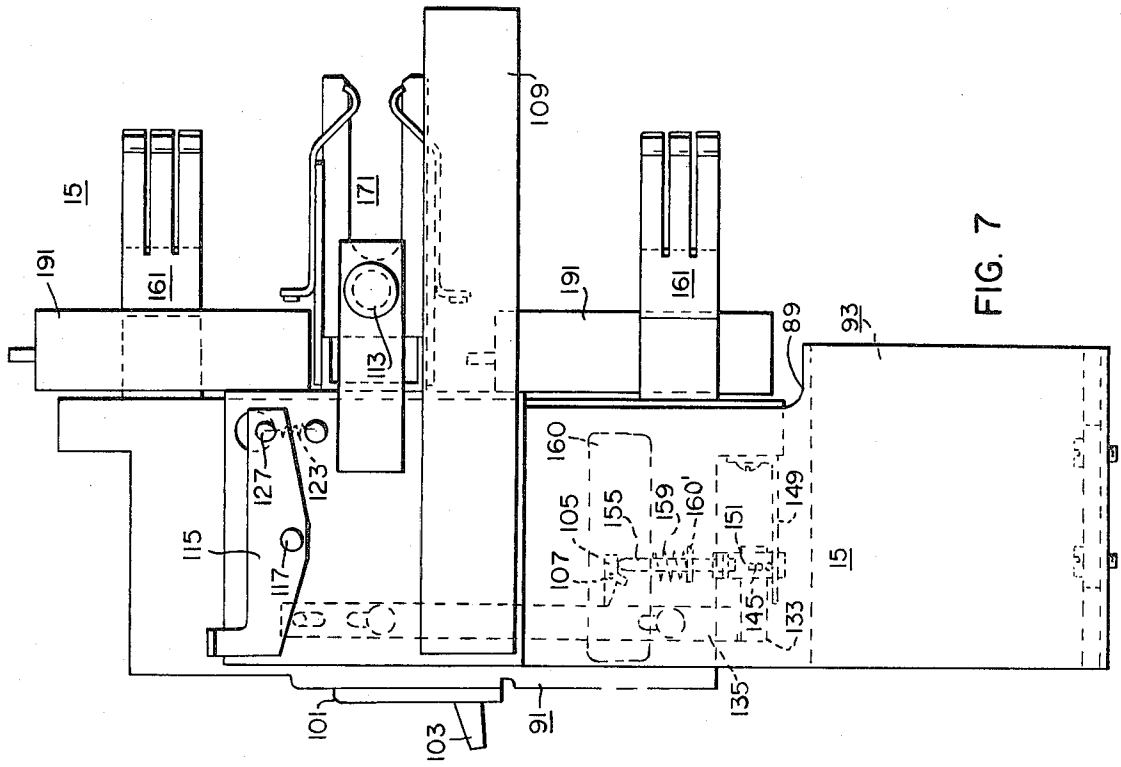
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FIG. 7

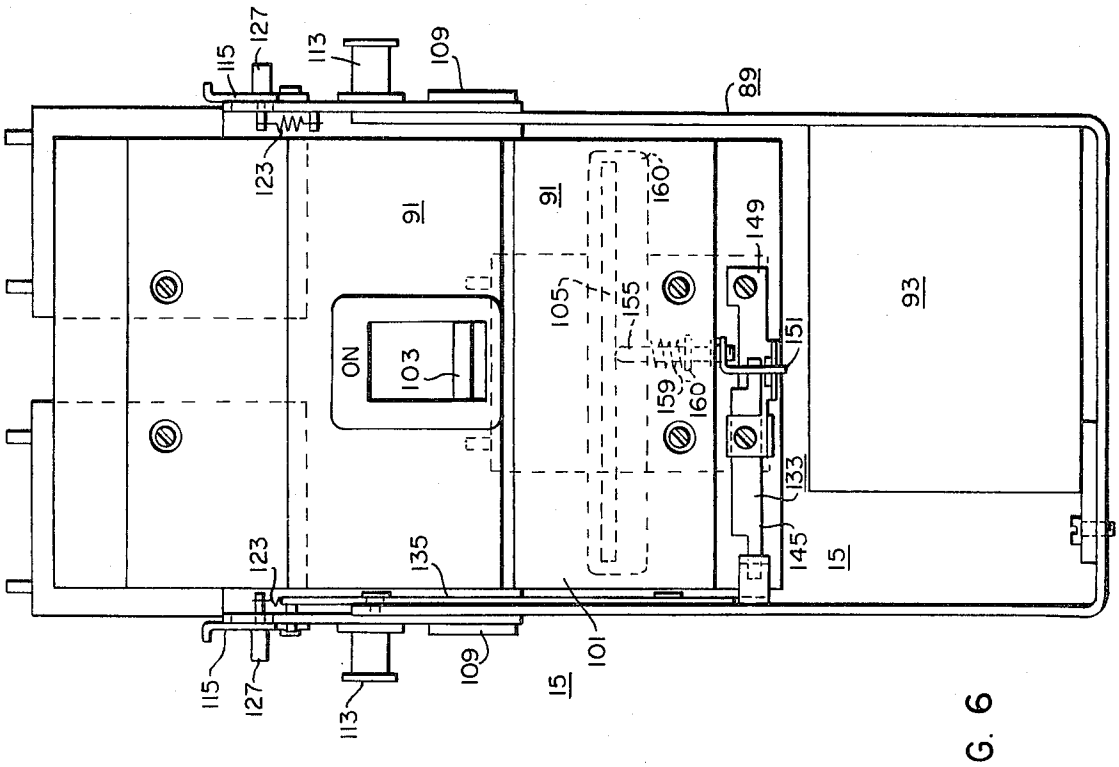
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FIG. 6

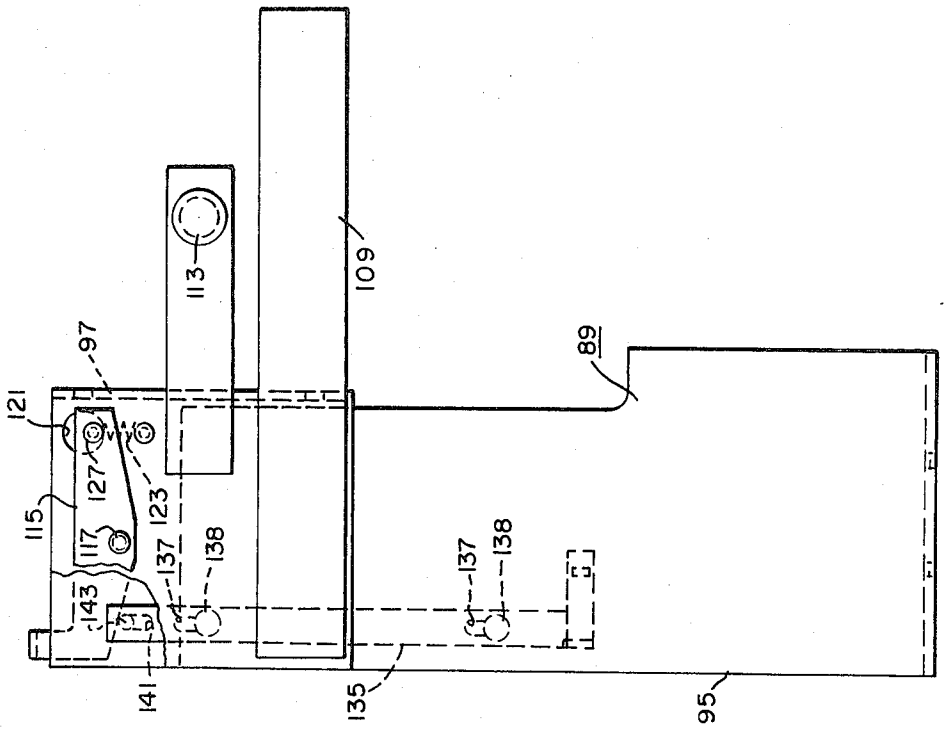
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FIG. 9.

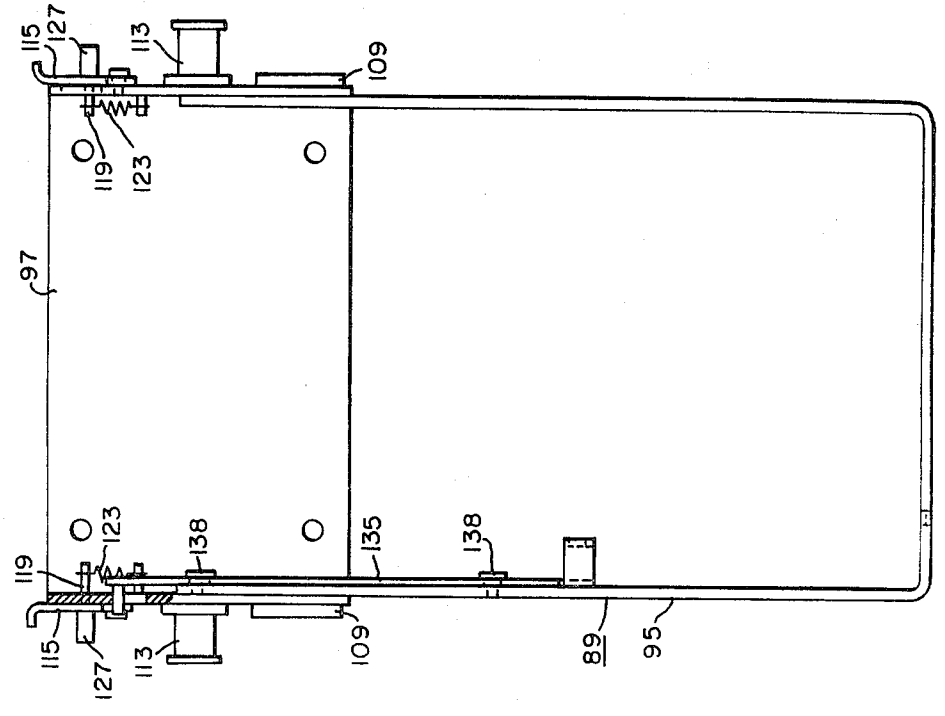
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FIG. 8.

FIG. 10

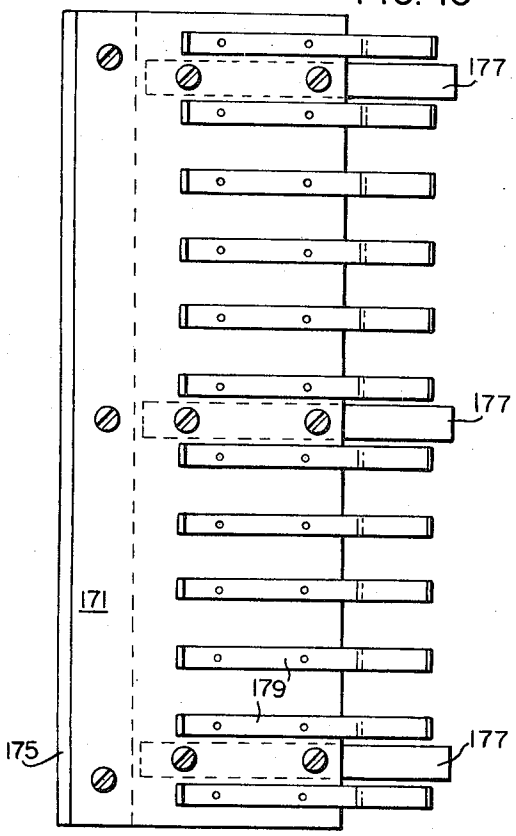
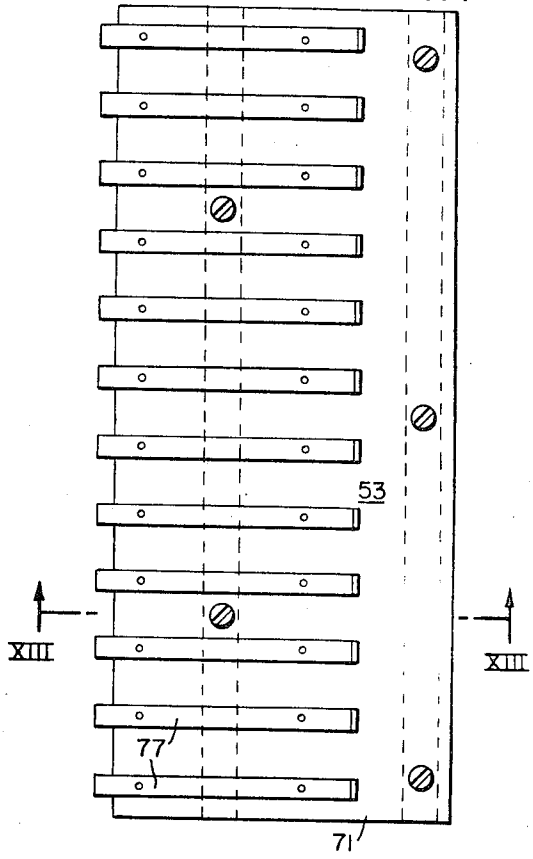


FIG. 12



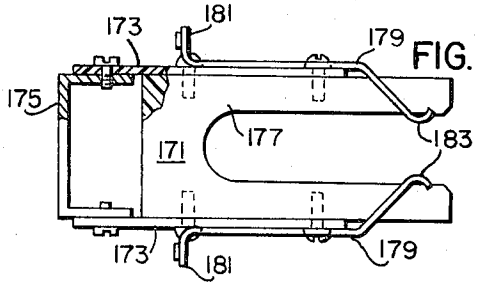


FIG. 11

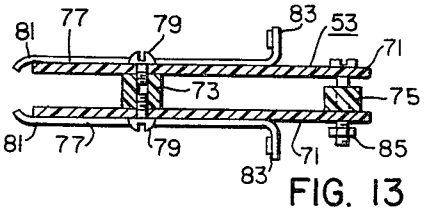


FIG. 13

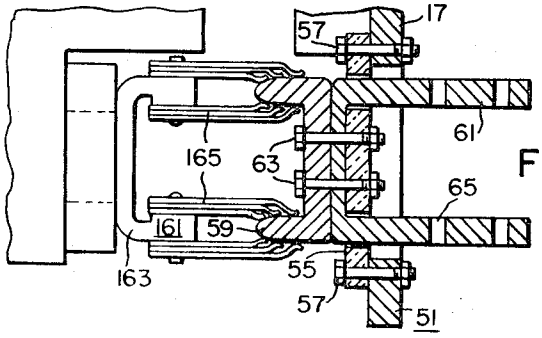


FIG. 14

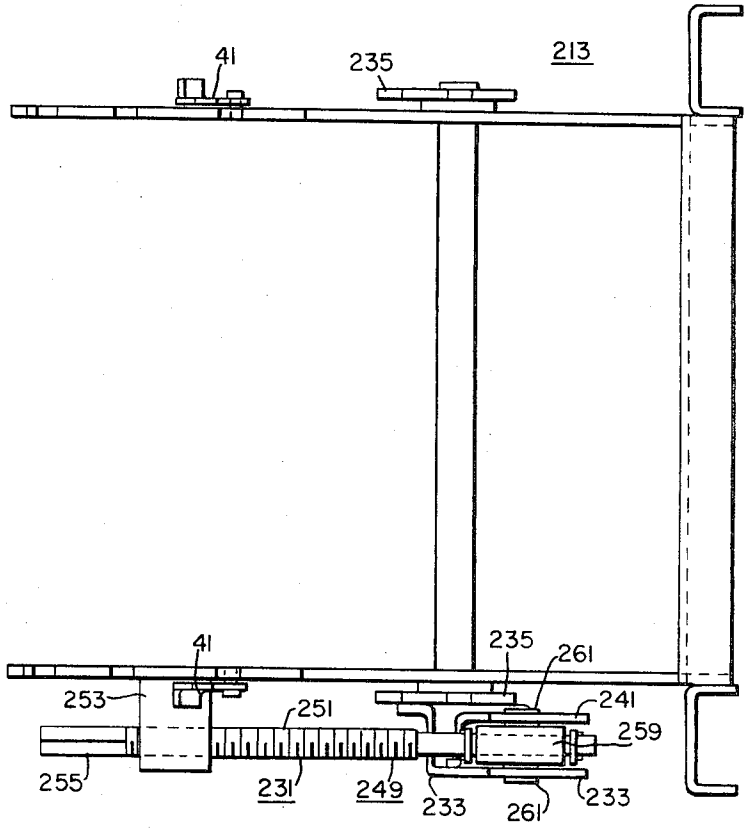

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FIG. 16

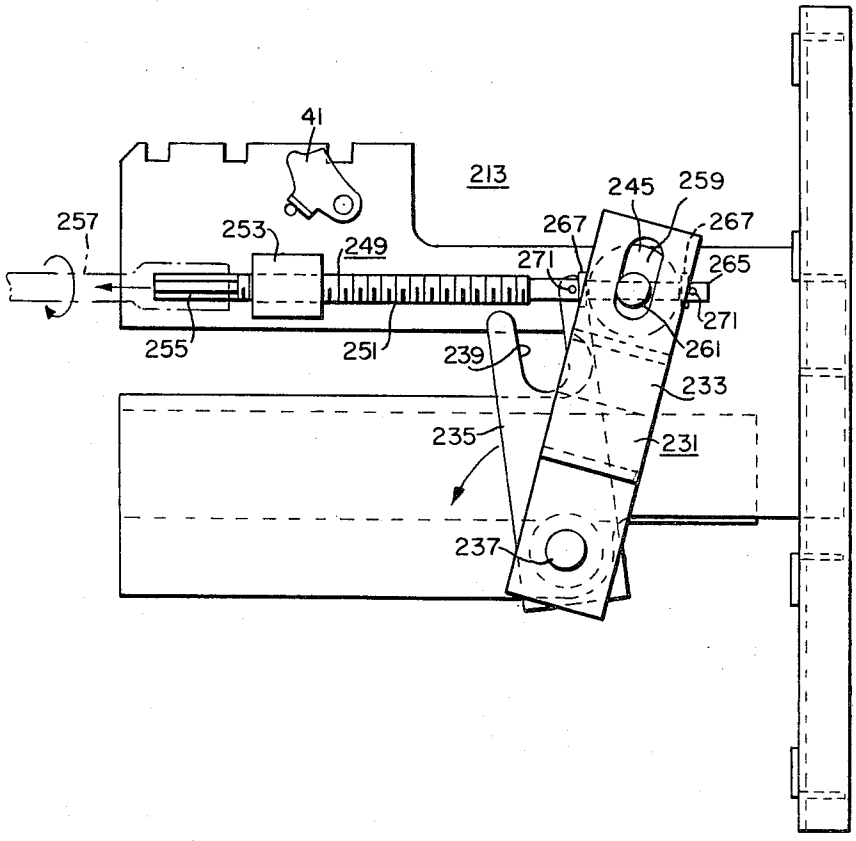
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FIG. 15

DRAWOUT SWITCHGEAR

BACKGROUND OF THE INVENTION

1. Field of the Invention:

Drawout-type switchgear.

2. Description of the Prior Art:

In the patent to Cellerini et al., U.S. Pat. No. 3,343,042 issued Sept. 19, 1967, there is disclosed drawout switchgear comprising a movable assembly having a pair of pivotally mounted interlock members thereon, which interlock members cooperate with slots in a pair of plate members of the stationary assembly to lock the movable assembly in the connected position. This invention is an improvement over the drawout switchgear disclosed in the above-mentioned Cellerini et al patent in that a pair of interlock defeating members are pivotally mounted on the stationary assembly and movable to interlock-defeating positions wherein the interlock defeating members prop the interlock members away from the slots so that an operator will have a free hand to operate the levering mechanism in order to withdraw the movable assembly from the connected position to a disconnected position.

In the above-mentioned Cellerini et al U.S. Pat. No. 3,343,042, a trip-actuating assembly, separate from the interlock members, is provided for operating the circuit breaker to the tripped position as the circuit breaker is moved from the connected to the disconnected position and as the circuit breaker is moved toward the connected position. This invention is an improvement over the structure disclosed in the Cellerini et al. U.S. Pat. No. 3,343,042 in that an improved trip actuating means is connected to one of the interlock members to provide that when the one interlock member is in a non-interlocking position on the stationary assembly the circuit breaker will be in the tripped condition.

The drawout switchgear of this invention also comprises improved secondary contact means for connecting and disconnecting control parts of the switchgear in a circuit.

SUMMARY OF THE INVENTION

Improved drawout switchgear comprises a stationary assembly and a movable circuit-breaker assembly with track means supporting the movable assembly on the stationary assembly for movement between a connected and disconnected position. A levering assembly on the stationary and movable assembly is manually operable to move the movable assembly on the track means. A pair of separable interlock members are pivotally mounted on the movable assembly and spring biased to move into slots in a pair of side plates of the stationary assembly when the circuit breaker is in the connected position to lock the circuit breaker in the connected position. The interlock members are individually manually movable to non-interlocking positions, and a pair of interlock-defeating members on the stationary assembly are individually movable to defeating positions to maintain the interlock members in non-interlocking positions to thereby provide that the operator will have a free hand to manually operate the levering device in order to move the movable assembly from the connected to a disconnected or test position. Trip actuating means is connected to at least one of the interlock members and actuated upon movement of the one interlock member to the non-interlocking position

to trip the circuit breaker and maintain the circuit breaker in a tripped condition so long as the interlock member is in the non-interlocking position. Improved simplified secondary contact means is provided for connecting and disconnecting control parts of the switchgear in a circuit.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a switchboard or control center comprising six compartments housing drawout switchgear constructed in accordance with principles of this invention;

FIG. 2 is a front view, with parts broken away, of drawout switchgear housed in one of the compartments of the control center seen in FIG. 1;

FIG. 3 is a side view of the drawout switchgear seen in FIG. 2;

FIG. 4 is a front view, with parts broken away, of the stationary assembly of the switchgear seen in FIG. 2;

FIG. 5 is a side view of the assembly illustrated in FIG. 4;

FIG. 6 is a front view of the movable assembly of the drawout switchgear seen in FIG. 2;

FIG. 7 is a side view of the movable assembly seen in FIG. 6;

FIG. 8 is a front view, with parts broken away, of the carrier structure of the movable assembly seen in FIG. 6;

FIG. 9 is a side view of the carrier structure seen in FIG. 8;

FIG. 10 is a top plan view of the movable secondary contact structure seen in FIG. 7;

FIG. 11 is an end view, with parts broken away, of the movable secondary contact structure seen in FIG. 10;

FIG. 12 is a top plan view of the stationary secondary contact structure as seen in FIG. 3;

FIG. 13 is a secondary view taken along the line XIII—XIII of FIG. 12;

FIG. 14 is a sectional view of one of the pairs of main disconnect contacts seen in FIG. 3;

FIG. 15 is a side view similar to FIG. 5 illustrating a modified form of the invention; and

FIG. 16 is a plan view of the stationary assembly illustrated in FIG. 15.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, there is shown, in FIG. 1, a control center or switchboard 5 comprising a cabinet structure 7 having six compartments therein each of which compartments is provided with a front opening that is covered by means of an openable door 9. Each of the doors 9 is provided with a suitable opening therein for receiving the operating handle of an enclosed circuit breaker when the door is in the closed position. Within at least one of the compartments of the switchboard 5 there is housed drawout switchgear 11 (FIGS. 2 and 3) constructed in accordance with the principles of this invention.

The drawout switchgear 11 comprises a stationary assembly 13 (FIGS. 2–5) and a movable assembly 15 (FIGS. 2, 3, 6 and 7).

The stationary assembly 13 (FIGS. 4 and 5) comprises a back support plate structure 17 and a pair of

side support plates 19 fixedly secured to the back support plate structure 17. A pair of tracks 21 (FIG. 4) are fixedly secured to the inner sides of the side plates 19. Each of the side plates 19 is provided with an elongated opening 23 (FIG. 5) therein. Each of the side plates 19 is also provided with three slots 25, 27 and 29 in the upper portion thereof. A levering structure 31 is also supported on the side plates 19. The levering structure 31 comprises a pair of levers 33 connected together by means of an elongated rod 35 (FIG. 4) and supported for movement about the axis of the rod 35 on the side plates 19. The rod 35 extends through suitable openings in the side plates 19 to support the rod 35 for pivotal movement. Each of the levers 33 is provided with a slot 37 at the upper end thereof. A handle arm 39 is fixedly secured to the one lever 33 to enable manual operation of the levering structure 31. Upon movement of the handle 39 the levers 33 move unitarily about the axis of the rod 35. The stationary assembly 13 also comprises a pair of interlock defeating members 41 (FIG. 5). Each of the interlock defeating members 41 is mounted for pivotal movement on the associated side plate 19 by means of a separate pin 43, and a separate stop pin 45 is provided on each of the plates 19 to limit movement of the associated interlock defeating member 41 in one direction. Each of the interlock defeating members 41 is provided with a depression 47 at the upper end thereof for cooperating within an interlock member in a manner to be hereinafter described.

The stationary assembly 13 also comprises six stationary main terminal structure 51 (FIG. 14) and a secondary stationary contact structure 53 (FIGS. 12 and 13). Each of the stationary main terminal structures 51 comprises and insulating support member 55 supported on the support structure 17 by means of four bolts 57 only two of which are seen in FIG. 14. A front conductor 59 is connected to a rear conductor 61 and both are mounted on the insulating support 55 by means of bolts 63. Each of the conductors 61 is provided with openings 65 therein for receiving bolts which enable connection of the conductor 61 with a bus bar in the switchboard.

The stationary secondary contact assembly 53 (FIGS. 12 and 13) comprises a pair of stiff flat insulating support boards 71 held in a spaced relationship by means of an elongated insulating spacer support bar 73 and a second elongated insulating support bar 75. A plurality of pairs of elongated contacts 77 are supported on the outer sides of the insulating support boards 71 with each pair of contacts 77 being secured to the insulating support boards 71 by means of a pair of nylon screws 79 which are threaded into tapped openings in the spacer bar 73. Each of the contacts 77 is provided with a contact part 81 and a terminal part 83. The terminal parts 83 of the contacts 77 are provided to receive conducting wires to enable connection of the contacts 77 in an electric circuit. The support bar 75, which is secured between the insulating support 71 by means of securing means 85, limits movement of the support members 71 toward each other. The stationary secondary contact assembly 53 is supported on the back wall support structure 13 (FIG. 3) by means of suitable securing means which secures the support bar 75 to the back wall structure 13.

The movable assembly 15 (FIGS. 6 and 7) comprises a movable supporting frame assembly 89 (FIGS. 8 and 9) with a molded-case type circuit breaker 91 and a static trip device 93 (FIGS. 6 and 7) supported thereon. The movable frame assembly 89 comprises a generally U-shaped supporting frame 95 (FIGS. 8 and 9) with a support plate 97 secured thereto. A molded-case type multi-pole circuit breaker 91 is fixedly mounted on the support plate 97. The circuit breaker 91 is of the type described in the patent to Howard A. Wagner, Patent No. 3,530,414. The circuit breaker 91 comprises an insulating housing 101 (FIG. 6) having an opening in the front thereof with an insulating handle 103 protruding through the opening to permit manual operation of the circuit breaker. An insulating trip bar 105 is supported for pivotal movement about a pivot 107 (FIG. 7) and movable in a counterclockwise (FIG. 7) direction to trip the circuit breaker in a manner well known in the art and described, for example in the above-mentioned U.S. Pat. No. 3,530,414.

A pair of elongated slide members 109 fit in the tracks 21 (FIG. 4) to support the movable assembly 15 for sliding movement on the tracks 21 of the stationary assembly. A pair of projections 113 are fixedly secured on opposite sides of the supporting frame 95. The projections 113 move in the slots 23 (FIG. 5) of the side plates 19 of the stationary assembly and they cooperate with the lever arms 33 in a manner to be hereinafter described. A pair of interlock members 115 are supported on the opposite side plates of the supporting frame 95. Each of the interlock members 115 is pivotally supported on the associated side plates for movement about a pivot pin 117 (FIG. 9) that is intermediate the ends of the interlock member 115. Each of the interlock members 115 is provided with a pin 119 (FIGS. 8 and 9) which protrudes through an opening 121 in the associated side plate of the frame 95 (FIG. 9), and a separate tension spring 123 is connected to each of the pins 119 to bias the associated interlock member 115 in a clockwise (FIG. 9) direction. A separate interlock pin 127 is provided on each of the interlock members 115 for locking the movable assembly 15 in predetermined positions on the stationary assembly 13 in a manner to be hereinafter described.

The movable assembly 15 comprises trip-actuating means 133. The trip-actuating means 133 comprises an elongated member 135 having a pair of slots 137 (FIG. 9) therein which loosely receive rivets 138 that extend through the slots 137 and are secured to the one side of the supporting frame 95. The slots 137 enable rectilinear vertical movement of the member 135. The member 135 is provided with a slot 141 therein which receives a pin 143 that is fixedly secured to the one interlock member 115. The member 135 is provided with a bent over portion at the lower end thereof which has opening therein for receiving one end of an intermediate member 145 (FIGS. 2 and 6) which is pivotally mounted intermediate the ends thereof, by means of a member 147, on a support bracket 149 that is secured to the housing of the circuit breaker 91. The intermediate member 145 extends through an opening in a generally L-shaped member 151 (FIGS. 2, 6 and 7) which is also supported on the support bracket 149. The member 151 is secured to a plunger 155 that extends inside of the circuit breaker housing. A spring

159 is mounted on the plunger 155, and supported between a stationary part 160 and a spring support 160' that is secured to the plunger 155, to bias the plunger 155 and parts connected thereto downward to the non-tripping position seen in FIGS. 2, 6 and 7. The members 151, 155 serve as actuating means for actuating the trip bar 105 upon operation of the one interlock member 115. Upon counterclockwise movement of the one interlock member 115 about the pivot 117 (FIG. 7) the pin 143 (FIG. 9) on the interlock member 115 will engage the elongated member 135 at the bottom of the slot 141 to move the elongated member 135 downward (FIGS. 2, 6 and 7). Upon downward movement of the elongated member 135, this member will pivot the intermediate member 145 in a counterclockwise (FIGS. 2 and 6) direction about the pivot 147. Counterclockwise movement of the intermediate member 145 will move the actuating means 151, 155 upward (FIGS. 2, 6 and 7) against the bias of the spring 159 during which movement the plunger 155 will move the trip bar 105 in a counterclockwise (FIG. 7) direction about the pivot 107 to a tripped position to trip the circuit breaker 91 in a manner described in the above-mentioned U.S. Pat. No. 3,530,414. As long as the interlock member 115 is held in the tripped position the trip bar 105 will be held in the tripping position and the circuit breaker will be maintained in the tripped condition. Upon release of the one interlock member 115, the associated spring 123 will bias the interlock member 115 back to the position seen in FIGS. 6 and 7, and the spring 159 will bias the plunger 155, the intermediate member 145 and elongated rod member 135 back to the initial or non-tripping position seen in FIGS. 2, 6 and 7.

The circuit breaker 91 is a three-pole circuit breaker. There are a pair of movable main terminals 161 for each pole of the circuit breaker to enable connection of the circuit breaker in an electric circuit. As can be seen in FIG. 14, each of the main terminals 161 comprises a generally U-shaped conductor 163, that is connected to the circuit breaker, and a pair of clip-on type contact structures 165 connected to the legs of the conductor 163 for plug type connection with the stab conductor 59 of the associated stationary main terminal structure 51.

The movable assembly 15 also comprises a movable secondary contact structure 171 (FIGS. 10 and 11). The movable secondary structure 171 comprises a pair of flat insulating boards 173 that are connected together by a U-shaped channel member 175 and held in a spaced relationship by means of three generally U-shaped insulating support members 177. A plurality of pairs of resilient contacts 179 are secured to the opposite sides of the insulating supports 173 with each of the contacts 179 comprising a terminal part 181 at one end thereof and a contact part 183 at the opposite end thereof. The contacts 179 are bent over to provide a space between the contacts 183 that is less than the space between the contacts 77 (FIG. 13) so that upon movement of the movable assembly into the connected position the resilience of the contacts 179 will provide contact pressure between the movable secondary contact portions 183 and the stationary secondary contacts 77. As can be understood with reference to FIGS. 10–13, when the movable assembly is moved to the test position each pair of contacts 183 will resiliently engage the associated pair of contacts 81, and each of the U-shaped insulating support members 177 will straddle the stationary insulating support boards 71 moving between adjacent pairs of the elongated stationary contacts 77 to guide the movable secondary contact structure 71 into alignment with the stationary secondary contact structure 53.

The internal mechanism of the circuit breaker 91 is of the type described in the above-mentioned U.S. Pat. No. 3,530,414. Under overload current conditions the trip bar 105 (FIGS. 6 and 7) is operated to the tripped position by means of an electromagnetic trip actuator that is actuated by means of the static trip device 93 in the manner described in the above-mentioned U.S. Pat. No. 3,530,414. The static trip device 93 is operated by means of an overload sensed by any one of three transformers or current monitors 191. There are two upper current monitors 191 (one on each of the two outside poles) and one lower current monitor on the center pole.

Referring to FIG. 3, the movable assembly 15 is shown in the fully connected position with relation to the stationary assembly 13. In this position, the movable secondary contact structure 171 is in engagement with the stationary secondary contact structure 53 and the movable main terminal structures 161 are in engagement with the stationary main terminal structures 51. The movable assembly 15 is held or locked in the connected position seen in FIG. 3 by means of the pins 127 on the interlock members 115 of the movable assembly 15 which are engaged in the notches 25 of the stationary assembly 13. In order to withdraw the movable assembly 15 from the connected position, the interlock members 115 must first be moved to the non-interlocking position. In order to defeat the interlock an operator will depress one of the interlock members 115 moving the one interlock member 115 in a counterclockwise direction about the pivot 117 and, with the other hand pivot the interlock defeating member 41 in a clockwise (FIG. 3) direction to move the depression 47 under the pin 127. The operator may then release the one interlock member 115 and the interlock defeating member 41 engaging the pin 127 will hold or prop the interlock member 115 in the non-interlocking position. The operator may then similarly move the other interlocking member 115 to the non-interlocking position and move the other interlock defeating member 41 to the defeating position under the pin 127 to hold or prop the other interlock member 115 in the non-interlocking position. With the interlocking members 115 in the non-interlocking position, the operator will then crank the handle 31 in a counterclockwise (FIG. 3) direction during which movement the lever members 31, of the stationary assembly, operating against the projections 113 of the movable assembly will move the movable assembly 15 in a rectilinear direction to the left as seen in FIG. 3. As the movable assembly 15 moves to the left, the pins 127 of the interlocking members 115 will ride on the top surfaces of the side plates 19 and the interlock defeating members 41 will fall back to the non-interlocking position seen in FIG. 3. Movement to the left by operation of the levering device 31 will be arrested when the pins 127 of the interlocking members 115 fall in the notches 27 of the

side plates 19. In this position, the movable main terminals 161 will be disconnected or disengaged from the movable main terminals 51 and the movable secondary contact structure 171 will still be in engagement with the stationary secondary contact structure 53 so that the control circuits of the circuit breaker can be operated under test conditions. In order to further withdraw the movable assembly 15 from the test position that the assembly is in when the pins 127 of the interlocking members 115 are in the notches 27, an operator with both hands will pivot the interlocking members 115 to the non-interlocking position and manually pull the circuit breaker outward which movement is relatively easy since there is no frictional engagement between the main movable terminals 161 and the main stationary terminals 51. The movable assembly will be stopped in the completely disconnected position when the pins 127 drop into the slots 29. In the completely disconnected position, the movable secondary contact structure 171 is disconnected from the stationary secondary contact structure 53.

The movable assembly 15 is movable from the completely disconnected position, wherein the pins 127 are in the slots 29, by an operator who will depress the ends of the interlocking members 115 while pushing in on the movable assembly 15. If the operator releases the interlocking members 115 after he has started the movable assembly moving inward, the pins 127 will ride on the top of the plates 19 until they drop into the notches 27 to stop movement of the movable assembly 15 in the test position wherein the movable main terminals 161 are disconnected from the stationary main terminals 51 and the movable secondary contact structure 171 is connected to the stationary secondary contact structure 53. The operator can move the movable assembly 15 from the test position by defeating the interlock members 115, holding them downward, and pushing in until the pin members 127 ride on the top surfaces of the plates 19 which movement will move the projections 113 into the slots 37 in the levers 33. Thereafter the operator can operate the handle 39 in a clockwise direction to lever the movable assembly 15 into the completely connected position seen in FIG. 3. As was hereinbefore set forth, at any time the interlock member 115 on the left (FIG. 2) is in the non-interlocking position the trip actuating structure 133 will be in the tripping position holding the trip bar 105 in the tripped position to trip the circuit breaker if the circuit breaker was not previously tripped and to maintain the circuit breaker in a tripped condition. It can be understood that for some applications only one interlock member 115 and one interlock defeating member 41 can be provided with the trip actuating means 133 being operatively connected to the one interlock member 115.

Another embodiment of the invention is illustrated in FIGS. 15 and 16. Referring to FIGS. 15 and 16, a stationary assembly 213 is shown therein which is identical to the stationary assembly 13 hereinbefore described except for the levering mechanism 231 which will be hereinafter described. Certain parts are left out of the FIGS. 15 and 16 for the purpose of clarity. The levering mechanism 231 comprises a lever arm 233 which is welded or otherwise fixedly secured to a lever 235. The lever arm 233 and lever 235 are fixedly supported on a shaft 237 that extends across the unit and that is supported on the side plates for movement about an axis normal to the plane of the paper as seen in FIG. 15. Another lever 235 is secured to the opposite end of the shaft 237. Each of the levers 235 is provided with a slot 239 at the upper end thereof for cooperating with the associated projection 113 (FIG. 2) of the movable assembly in the same manner as was hereinbefore described. As can be understood with reference to FIG. 16, an additional lever arm 241 is welded to the lever arm 233 to provide a pair of spaced lever arms with each of the spaced lever arms having an elongated slot 245 therein. A drive rod 249, having a threaded part 251 intermediate the ends thereof, is supported on an internally threaded support 253 that is welded to one of the side plates of the assembly. The rod 249 threadedly engages the support 253 so that upon rotation of the rod 249 the rod will be moved axially on the support. The rod 249 is formed with a hexagonal end part 255 for receiving a tool 257, indicated by broken lines in FIG. 15, that may be placed onto the hexagonal part 255 and rotated to rotate the rod 249. A rigid metal boss 259, having a pair of reduced-diameter pin parts 261 at the opposite sides thereof, is supported between the lever arms 233, 241 with the pins 261 extending through the slots 245 in the lever arms 233, 241. The rod 249 is provided with a reduced diameter end portion 265 that extends through an opening in the boss 259. A pair of washers 267 are supported on the end portion 265 on opposite sides of the boss 259, and a pair of pins 271 extend through openings in the end portion 265 to hold the washers in place. When it is desired to operate the levering device 231, a tool 257 is applied to the hexagonal part 255 and the rod 249 is rotated moving axially to move the boss 259 axially. During this movement the projections 261 move in the slots 245 to drive the lever arms 233, 241 and levers 235. The levers 235 cooperate with the projections 113 (FIG. 2) of the movable assembly to move the movable assembly in the same manner as was hereinbefore set forth. The interlock defeating members 41 of the stationary assembly cooperate with the interlocking members 115 (FIG. 3) of the movable assembly in the same manner as was hereinbefore described.

From the foregoing, it can be understood that there is provided by this invention, improved drawout switchgear comprising interlock means automatically operable to lock the movable assembly in a fully connected position and defeatable to enable withdrawal of the movable assembly, with interlock defeating means manually operable to a defeating position to hold the interlock means in a non-interlocking position while an operator operates a lever mechanism to lever the movable assembly from the fully connected position to a position wherein the main terminals are disconnected. Trip actuating means is connected to the interlock means to trip the circuit breaker upon movement of the interlock means to the non-interlocking position and to maintain the circuit breaker in a tripped condition so long as the interlock means is in the non-interlocking position. Improved secondary contact means is provided for connecting and disconnecting the control parts of the drawout switchgear in a circuit. The secondary contact means comprises a stationary secondary contact structure and a movable secondary contact

structure comprises a pair of flat insulating boards supported in a spaced relationship and a plurality of pairs of stationary contacts on the opposite or outer sides of the insulating support boards. The secondary movable contact structure comprises a pair of flat insulating support boards with generally U-shaped insulating spacing means supporting the insulating support boards in a spaced relationship and a plurality of pairs of movable secondary contacts on the opposite sides of the insulating support boards. During a closing operation of the secondary contact structures, each of the U-shaped insulating spacers on the movable secondary contact structure straddles the outer sides of the insulating boards of the stationary secondary contact structure and the legs of the U-shaped insulating spacers move between adjacent stationary contacts of the stationary secondary contact structure to guide the contacts of the movable secondary contact structure into alignment with the contacts of the stationary secondary contact structure.

We claim as our invention:

1. Drawout switchgear comprising a stationary assembly and a movable assembly, said stationary assembly comprising stationary main terminal means, said movable assembly comprising movable main terminal means, track means supporting said movable assembly on said stationary assembly for movement between a first position wherein said movable main terminal means is connected to said stationary main terminal means and a second position wherein said movable main terminal means is disconnected from said stationary main terminal means,

a levering structure on said stationary and movable assemblies, said levering structure being manually operable to move said movable assembly on said track means between said first and second positions,

interlock means comprising an interlock member movably supported on said movable assembly, said interlock member being automatically movable to an interlocking position when said movable assembly is moved to said first position to lock said movable assembly in said first position, said interlock member being manually movable to a non-interlocking position, an interlock defeating member on said stationary assembly for cooperation with said interlock member, said interlock defeating member being manually movable to an interlock defeating position, with said movable assembly in said first position and said interlock member in said interlocking position said interlock member being manually movable to the non-interlocking position and while said interlock member is held in the non-interlocking position said interlock defeating member being manually movable to the interlock defeating position to engage said interlock member and maintain said interlock member in the non-interlocking position upon release of said interlock member whereby said interlock member will be maintained in the non-interlocking position without being manually held in the non-interlocking position as an operator manually operates said levering structure to move said movable assembly on said track means from said first position to said second position.

2. Drawout switchgear according to claim 1, said stationary assembly comprising a plate member having a slot therein, said interlock member on said movable assembly comprising a lock part and spring biasing means biasing said interlock member toward the interlocking position, when said movable assembly reaches said first position said spring biasing means biasing said interlock member to bias said lock part into locking engagement in said slot.

3. Drawout switchgear according to claim 2, pivot support means pivotally supporting said interlock member intermediate the ends of said interlock member, said lock part being disposed on a first side of said pivot support means, and said interlock member being manually engageable on the second side of said pivot support means opposite said first side and being manually movable about said pivot support means to the non-interlocking position.

4. Drawout switchgear according to claim 3, and said interlock defeating member being pivotally mounted on said stationary assembly and manually pivotally movable to a position in interengagement with said interlock member to maintain said interlock member in the non-interlocking position to enable movement of said movable assembly from said first position by operation of said manually operable levering structure.

5. Drawout switchgear according to claim 4, said levering structure comprising a pair of levers supported in a spaced relationship on said stationary assembly and connected for simultaneous movement about a fixed pivot, said levering structure comprising a crank arm connected to move said pair of levers, and said movable assembly comprising a pair of projecting parts engageable by said pair of levers such that said pair of levers operating against said projecting parts will drive said movable assembly between said first and second positions upon operation of said crank arm.

6. Drawout switchgear according to claim 4, said levering structure comprising a pair of levers supported on said stationary assembly in a spaced relationship and connected for simultaneous pivotal movement, said levering structure comprising a pair of projecting parts on said movable assembly cooperable with said pair of levers, and said levering structure comprising a screw type operator on said stationary assembly rotatable to pivot said pair of levers to thereby drive said projecting parts to lever said movable assembly between said first and second positions.

7. Drawout switchgear according to claim 1, said movable assembly comprising a circuit breaker, said circuit breaker comprising a pair of contacts and trip means operable to a tripped position to effect automatic opening of said contacts and to maintain said contacts in the open position while said trip means is in the tripped position, and trip actuating means operatively connecting said interlock member with said trip means such that said trip means will be in the tripped position when said interlock member is in said non-interlocking position.

8. Drawout switchgear comprising a stationary assembly and a movable assembly, said stationary assembly comprising stationary main terminal means, said movable assembly comprising movable main terminal means, track means supporting said movable assembly on said stationary assembly for movement

between a first position wherein said movable main terminal means is connected to said stationary main terminal means and a second position wherein said movable main terminal means is dis-connected from said stationary main terminal means, a levering structure on said stationary and movable assemblies manually operable to move said movable assembly on said track means between said first and said second positions, interlock means comprising an interlock member movably supported on said movable assembly and automatically movable to an interlocking position when said movable assembly is moved to the connected position to lock said movable assembly in said connected position, said interlock member being manually movable to a non-interlocking position to permit movement of said movable assembly from said first position to said second position,

said switchgear comprising a circuit breaker, said circuit breaker comprising a pair of contacts and an operating mechanism operable to open and close said contacts, said circuit breaker comprising a trip member movable to a tripping position to effect automatic opening of said contacts, trip actuating means on said movable assembly, said trip actuating means comprising an elongated member operatively connected to said interlock member and supported for generally rectilinear movement, said trip actuating means comprising an intermediate member, pivot support means pivotally supporting said intermediate member intermediate the ends of said intermediate member, means operatively connecting said intermediate member to said elongated rectilinearly movable member on one side of said pivot support means, said trip actuating means comprising actuating means connected to said intermediate member on the other side of said pivot support means, and upon movement of said interlock member to said non-interlocking position said elongated member moving rectilinearly to drive said intermediate member about said pivot support means to thereby drive said actuating means to a tripped position during which movement said actuating means operates said trip member to said tripping position.

9. Drawout switchgear according to claim **8**, said interlock member being pivotally supported intermediate the ends thereof on said movable assembly, and lost-motion connecting means connecting said interlock member to said elongated member of said trip actuating means.

10. Drawout switchgear comprising a stationary assembly and a movable assembly, secondary contact means comprising a stationary secondary contact structure on said stationary assembly and a movable secondary contact structure on said movable assembly,

said stationary secondary contact structure comprising a pair of generally flat stationary insulating boards and support means supporting said stationary insulating boards in a spaced relationship, a plurality of pairs of stationary contacts supported on the opposite sides of said stationary insulating boards,

said movable secondary contact structure comprising a pair of generally flat movable insulating boards and support means supporting said movable insulating boards in a spaced relationship, a plurality of pairs of movable contacts supported on opposite sides of said movable insulating boards, said support means comprising a plurality of separate generally U-shaped insulating supports between said movable insulating boards in a spaced relationship, upon movement of said movable secondary contact structure from a disconnected position to a test position each of said pairs of movable contacts engaging the outer sides of a separate pair of said stationary contacts and said U-shaped insulating supports moving between adjacent stationary contacts to guide said movable contacts into aligned engagement with said stationary contacts.

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