

[54] **SWITCHGEAR OPERATING MECHANISM
OVERCENTER SPRING TOGGLE WITH
LATCHED RESTRAINT**

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[52] U.S. Cl. **200/153 G**

[51] Int. Cl. **H01h 5/00**

[58] Field of Search **200/50 AA, 153 G**

[56] **References Cited**

UNITED STATES PATENTS

2,862,075 11/1958 Netzel 200/153 G

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[57] **ABSTRACT**

A load break high voltage disconnect switch and operating mechanism therefor comprising an over center toggle and spring effecting a snap action toward the open or closed position of the switch. The over center toggle is latched in either direction by a separate toggle for each direction. The separate toggle is extended and blocks movement of the over center toggle in a breaking direction until the spring operating handle has moved the spring over center and extended the spring fully; the spring operating handle at that point operates the latching toggle to release the over center toggle and permit a rapid snap action to occur.

5 Claims, 16 Drawing Figures

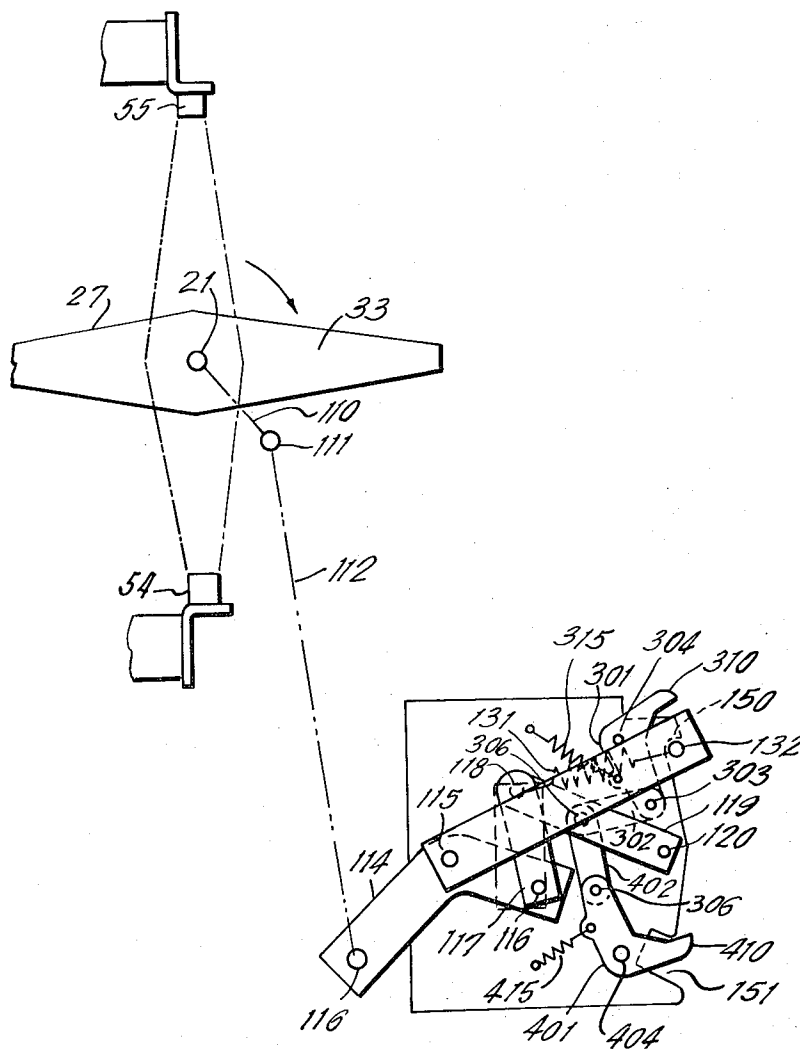


FIG. 1.

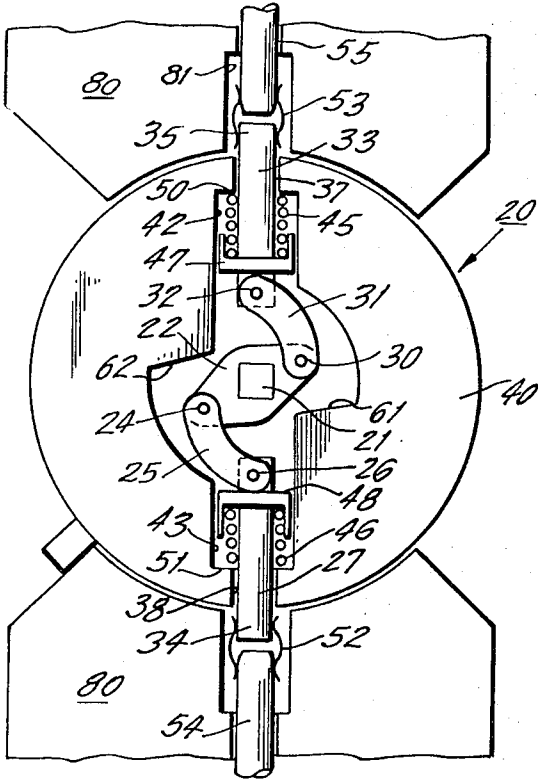


FIG. 2.

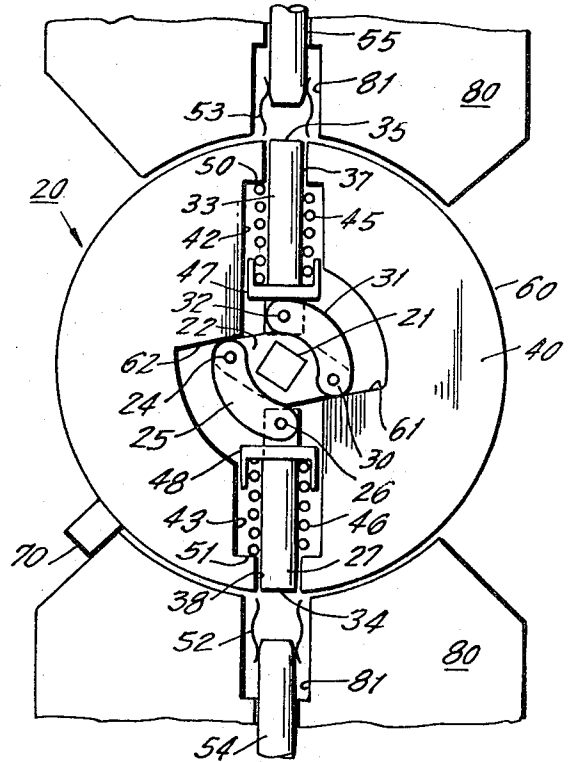


FIG. 3.

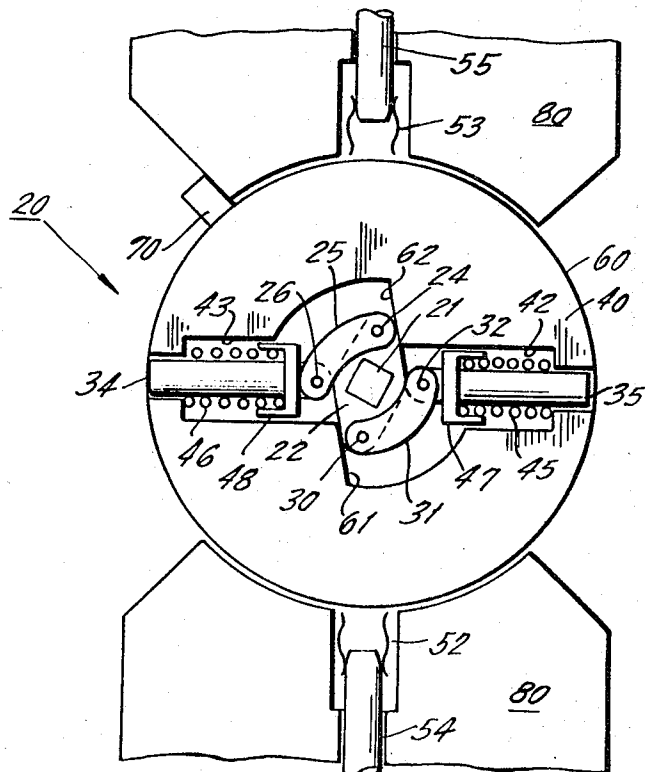
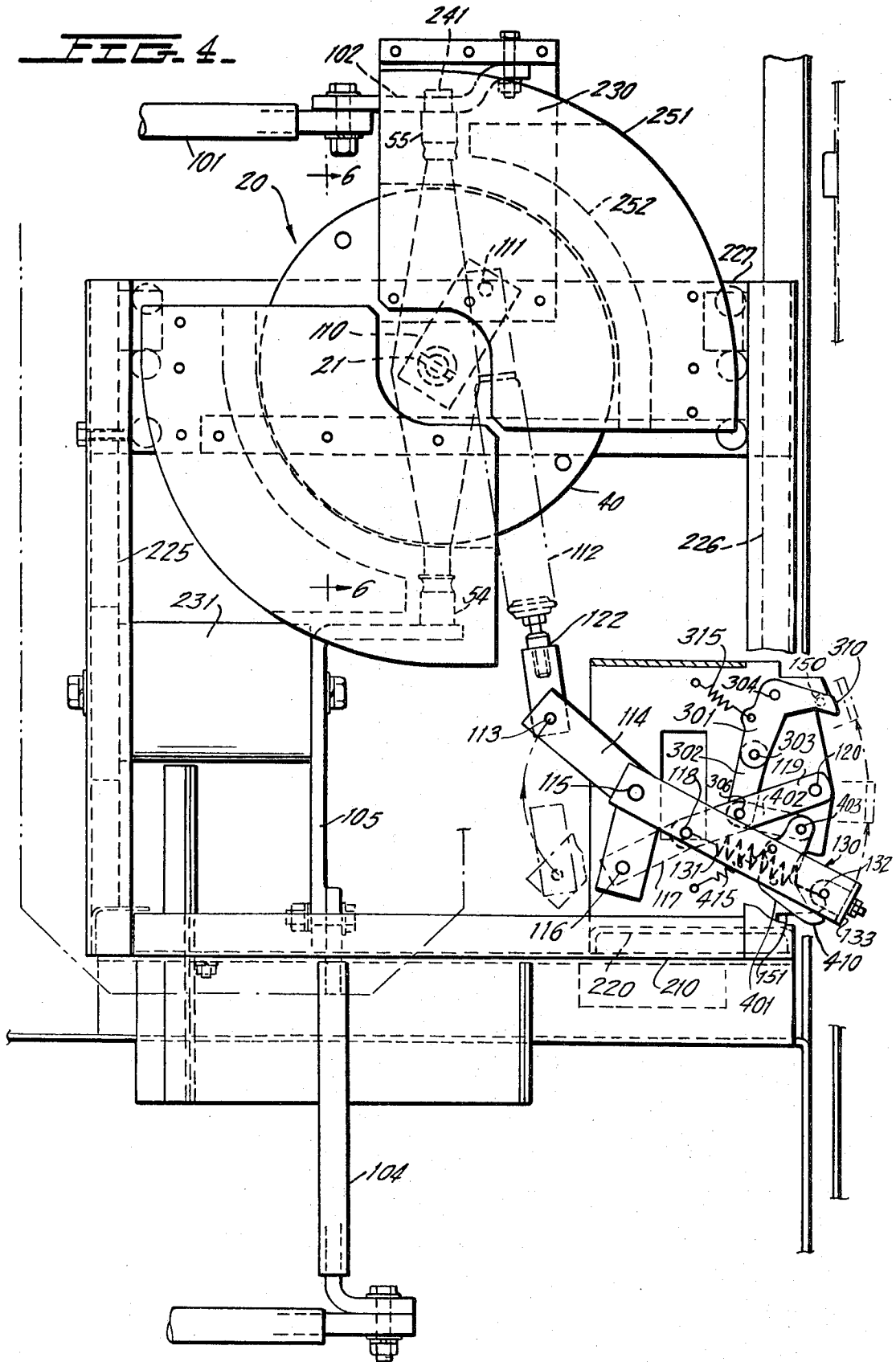


FIG. 4.



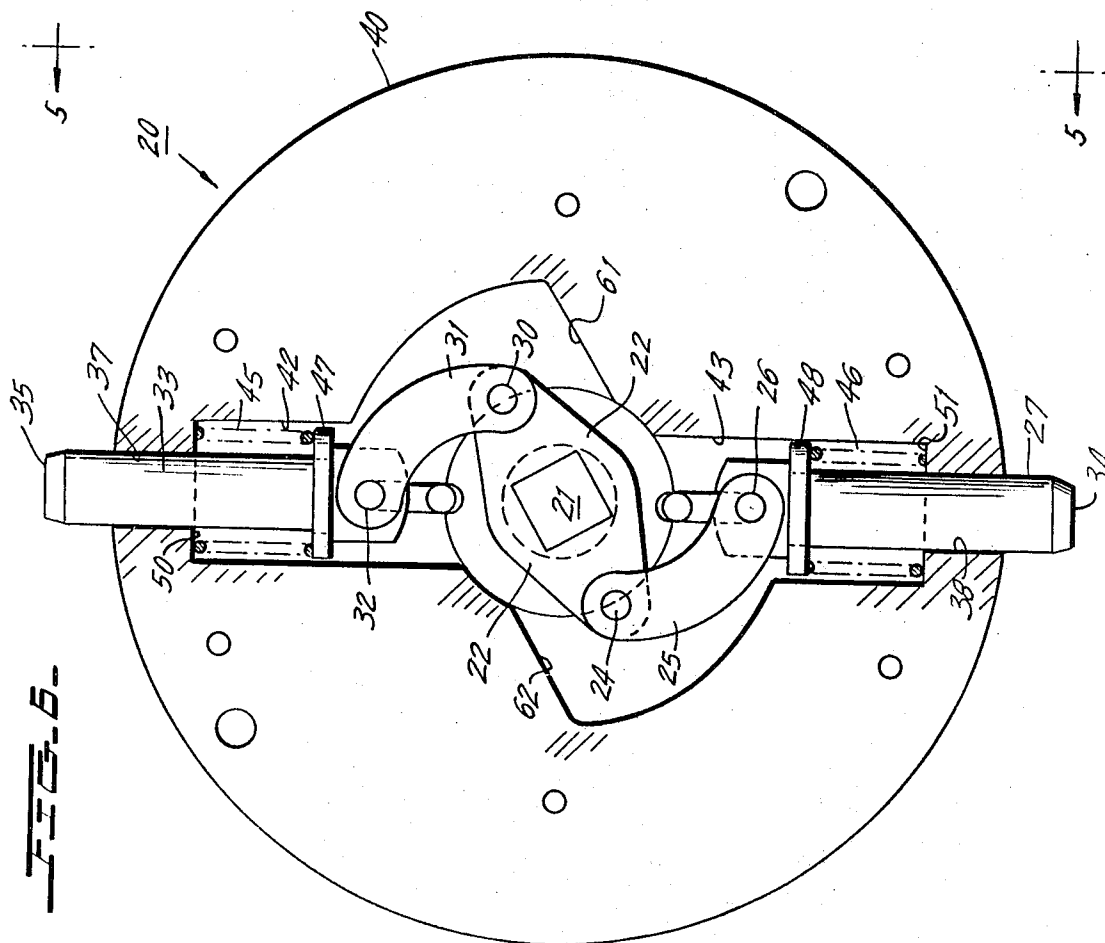
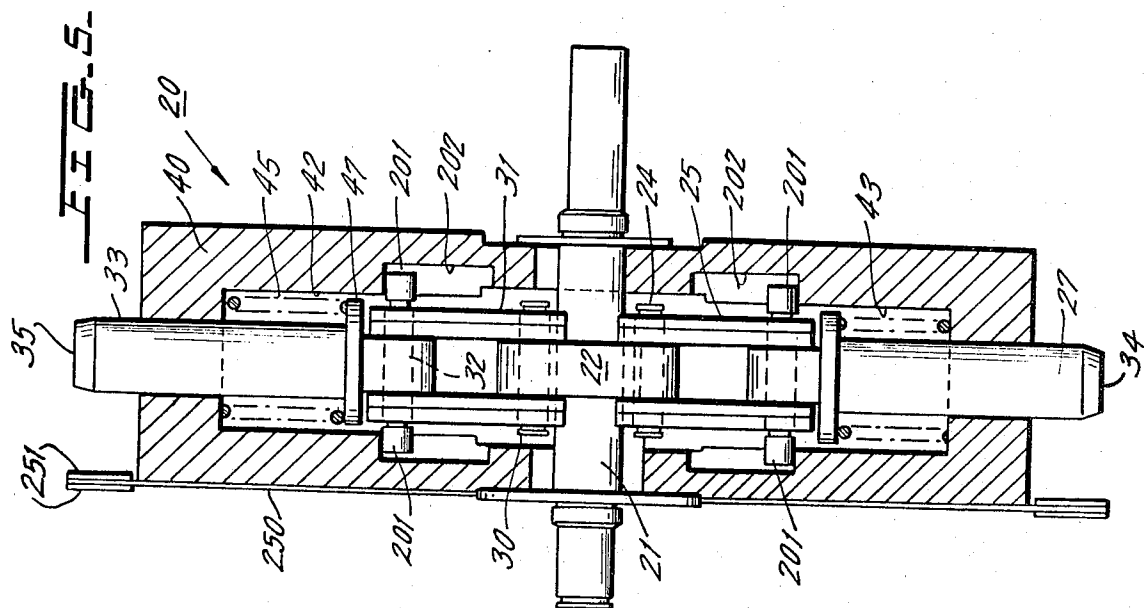
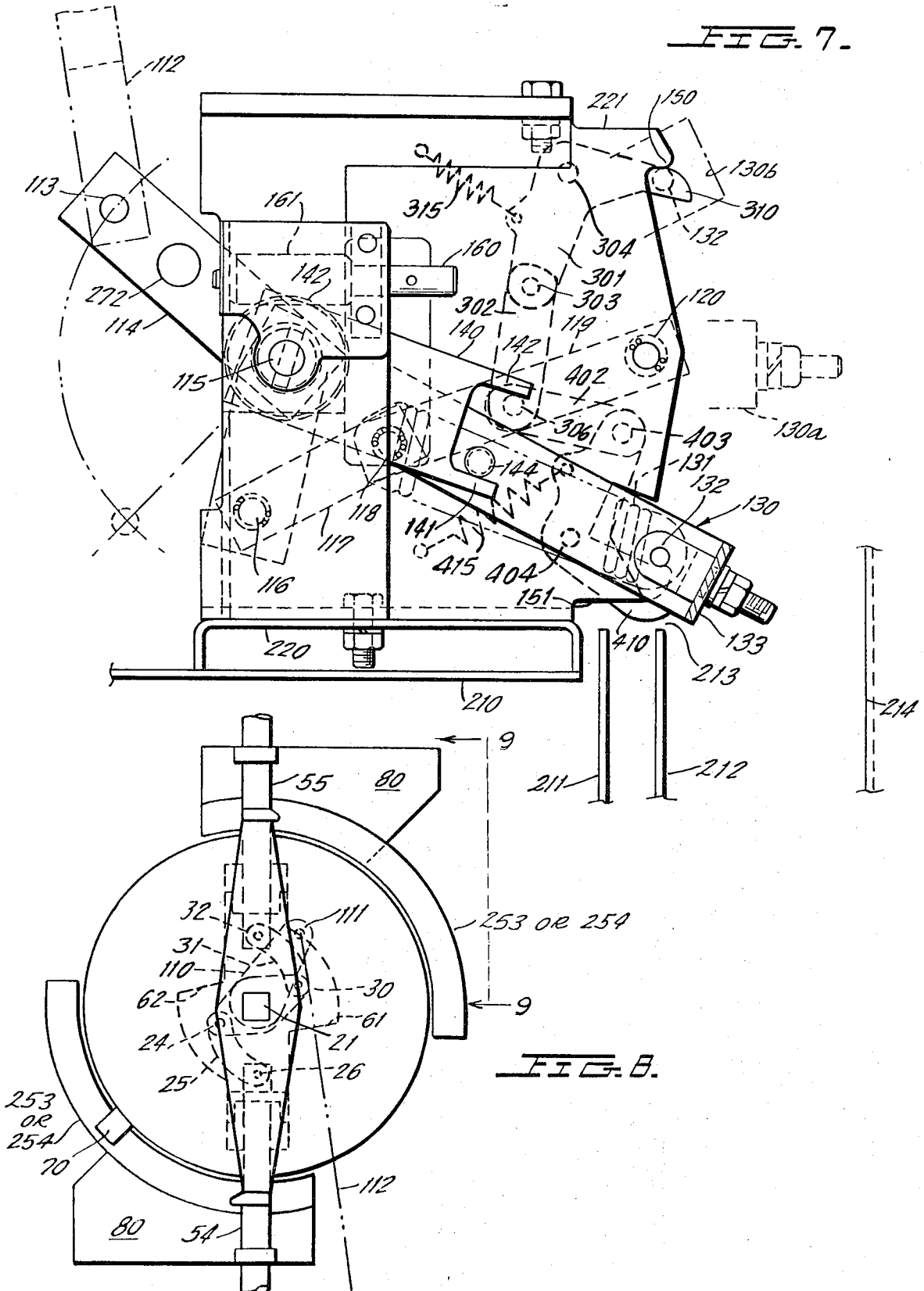


FIG. 7.



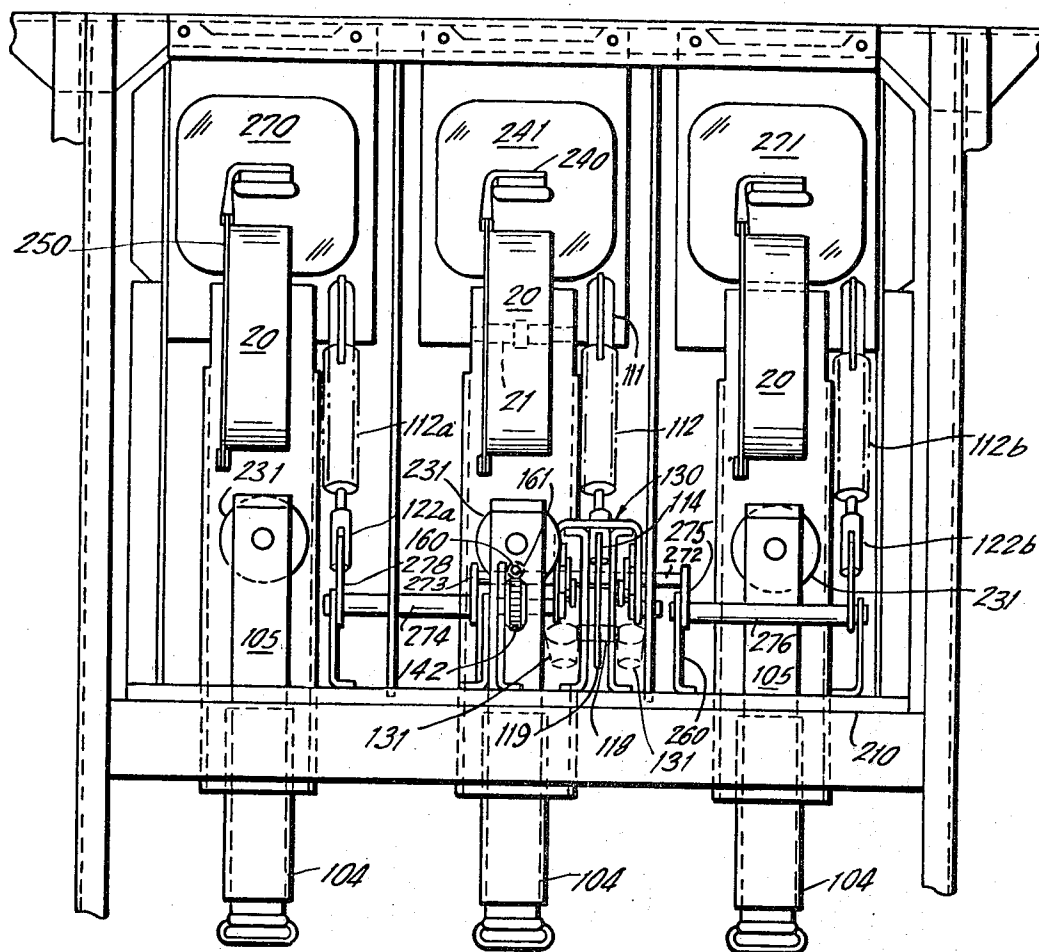


FIG. 10.

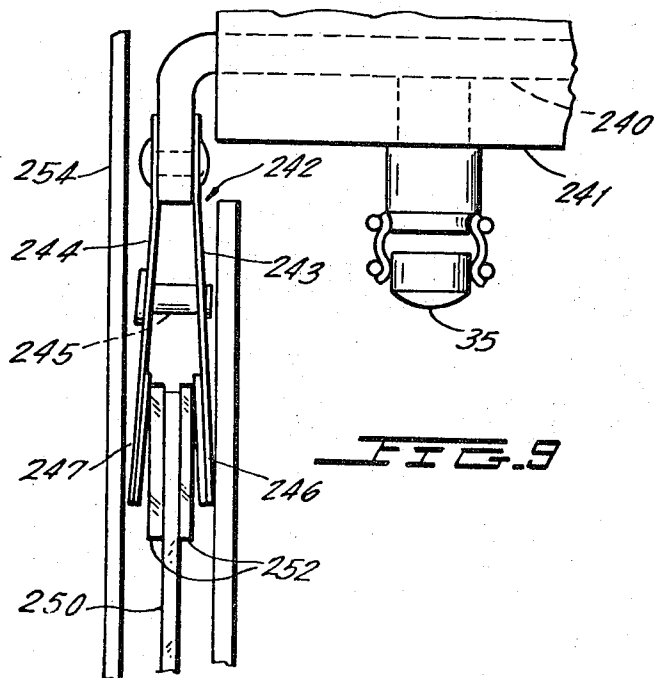


FIG. 9

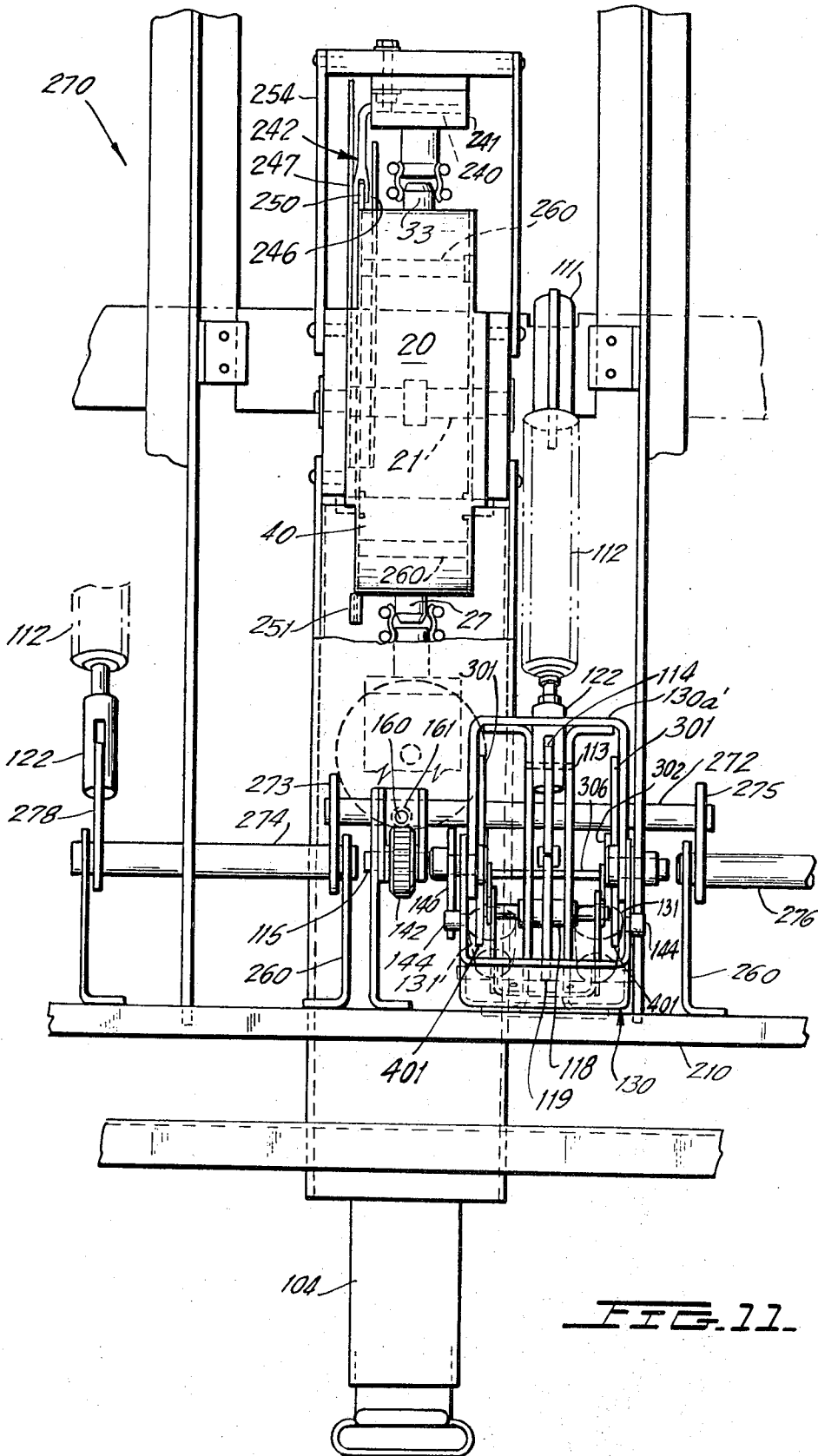


FIG. 12.

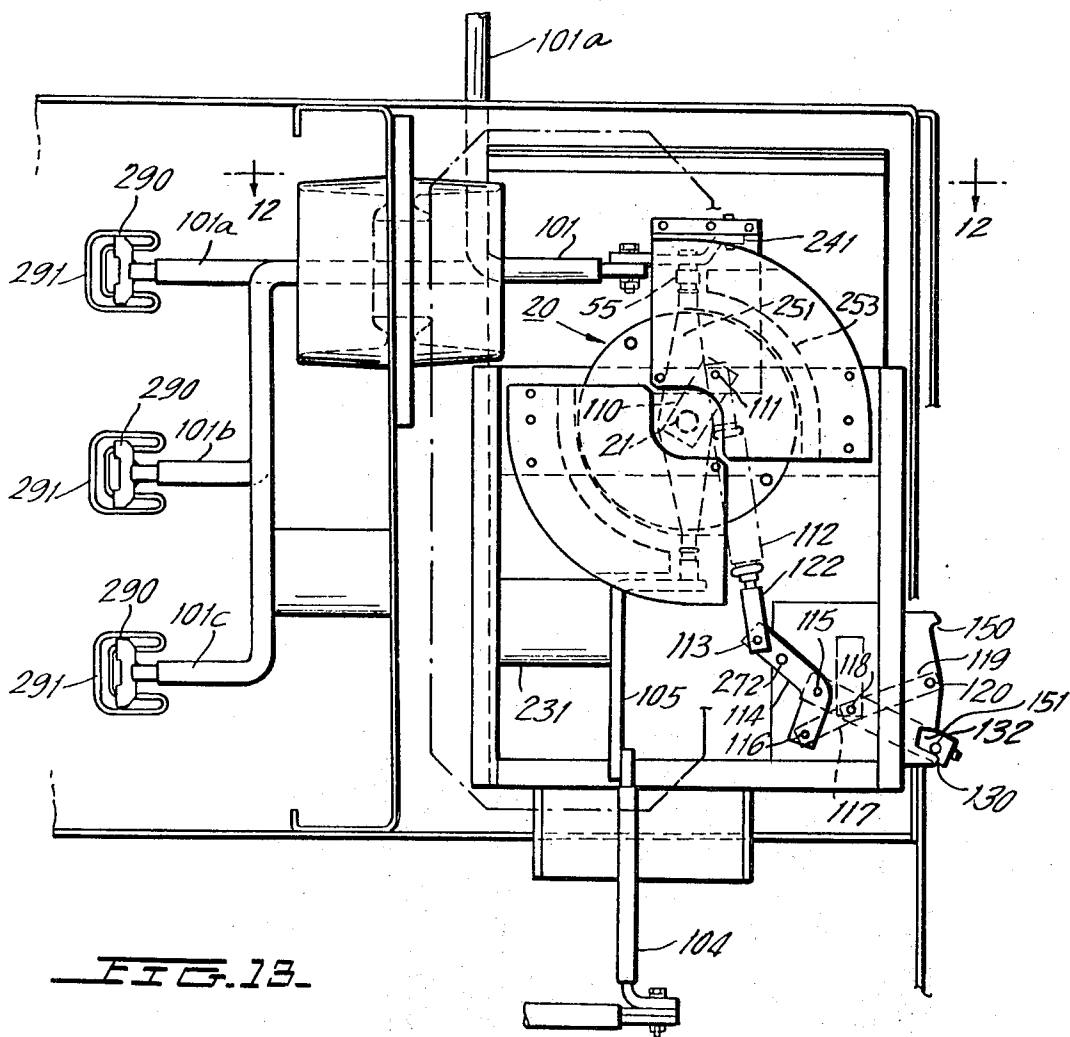
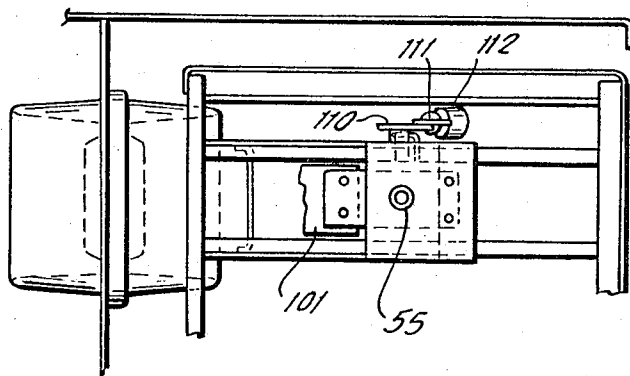
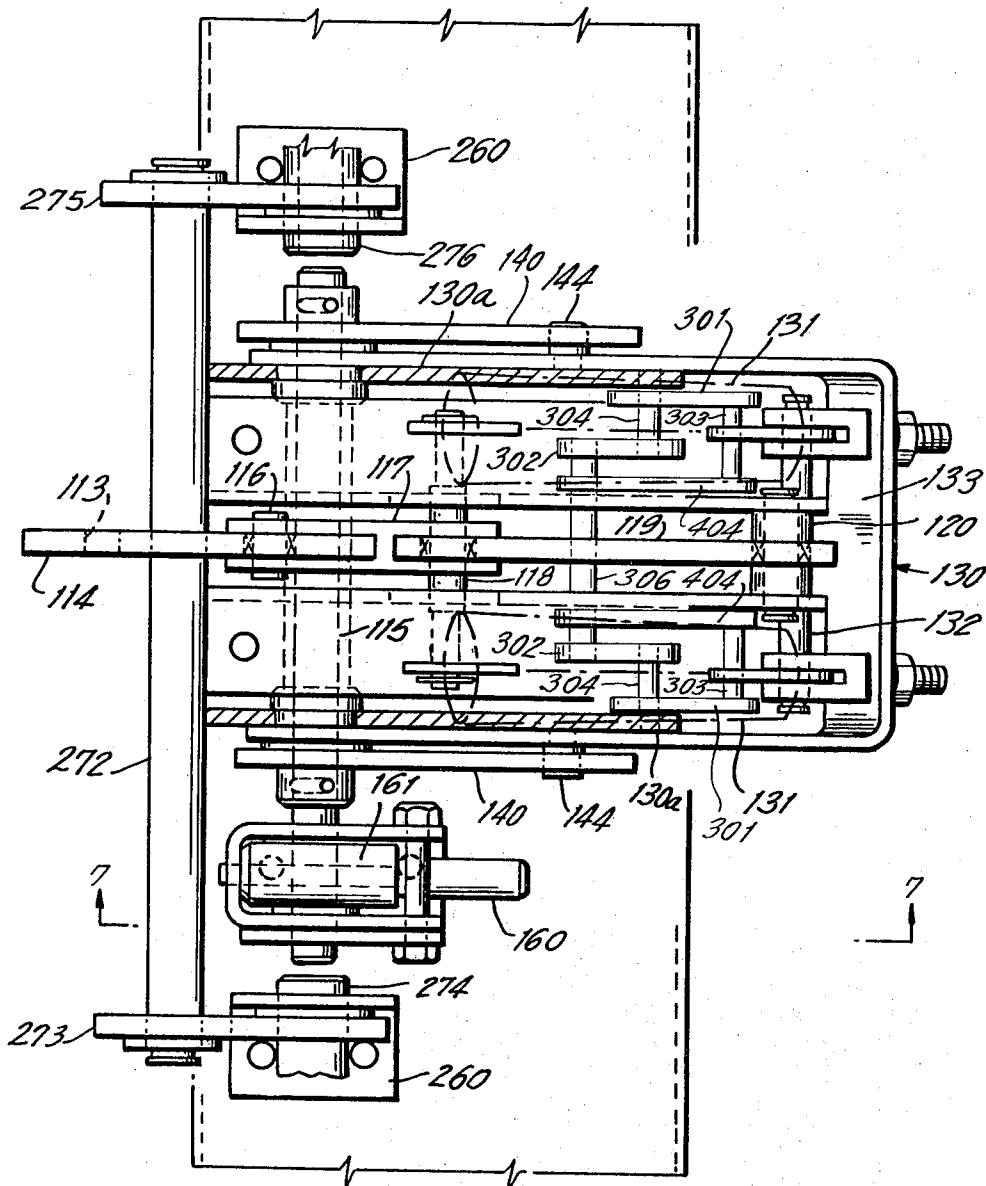
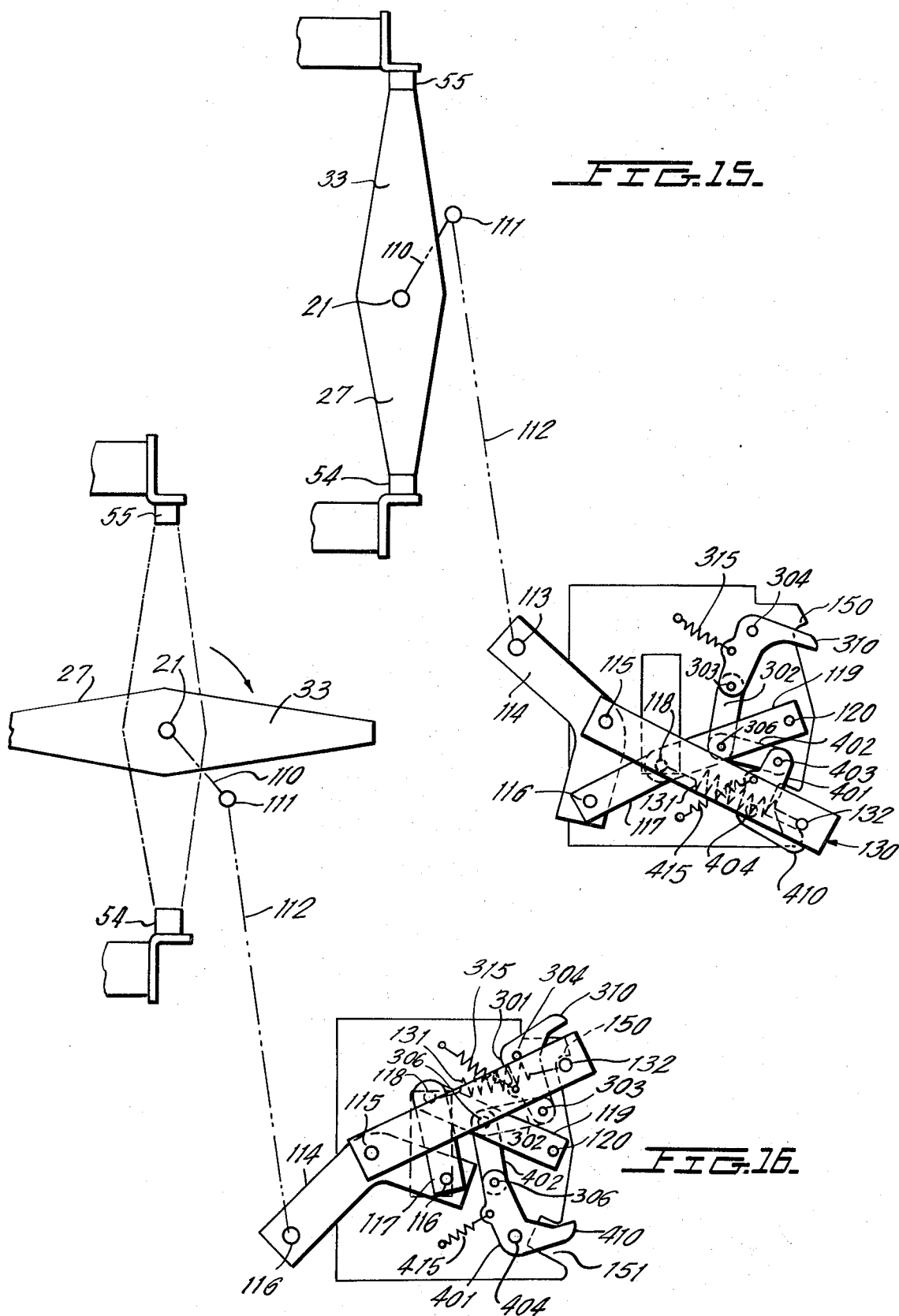


FIG. 13.

FIG. 14.





SWITCHGEAR OPERATING MECHANISM OVERCENTER SPRING TOGGLE WITH LATCHED RESTRAINT

The present invention is directed to a load break disconnect switch which can be used for load switching of transfer busses and other applications not requiring a circuit breaker and more particularly to an improved latched toggle operation which will control the operation of the switch contacts so that they will close and open with a high speed snap action and without inching or creeping.

The development of high voltage switchgear such as 38kV metal clad switchgear has necessitated the design of auxiliary devices which will be suitable for the higher voltage ratings associated with such switchgear.

Disconnect switches used at lower voltages are generally knife blade switches with a single contact gap. The use of a switch of this type at high voltage such as 38kV would require a considerable amount of space because of the large clearances needed to maintain dielectric strength in the insulation.

This application is based on the disclosure of application Ser. No. 396,757 filed Sept. 13, 1973, now U.S. Pat. No. 3,830,994 issued Aug. 20, 1974, and is directed to a modification of the operating apparatus for the switch thereof.

The primary object of the present invention is the provision, in a switchgear having an operating mechanism including a toggle and an operating spring movable overcenter on either side of the toggle, of means for blocking or latching the movement of the operating toggle until the spring is fully extended on the appropriate operating side of the toggle thereby effecting a snap action of the spring, the operating mechanism and the contact in both the opening and closing direction and thereby obviate any creeping or inching of the contacts.

The foregoing and many other objects of the present invention will be described in connection with the following description and drawings in which:

FIG. 1 is a schematic view of the novel load disconnect double break contact switch of the present invention in the closed or connected position.

FIG. 2 is a view corresponding to that of FIG. 1 showing an intermediate stage in the operation of the load break disconnect switch from the closed circuit position of FIG. 1 to the open circuit position of FIG. 3.

FIG. 3 is a view corresponding to those of FIGS. 1 and 2 showing the full open or disconnect condition of the load break disconnect switch.

FIG. 4 is a vertical cross-sectional view of an actual embodiment of the novel load break disconnect switch schematically shown in FIGS. 1, 2 and 3.

FIG. 5 is a view partly in cross-section taken from lines 5—5 of FIG. 6.

FIG. 6 is a side view of the novel load break disconnect switch of FIGS. 1 to 3, 4 and 5 showing the movable contact members in the closed position.

FIG. 7 is an enlarged view of the operating mechanism for the load break disconnect switch shown in FIG. 4.

FIG. 8 is an enlarged view of the load break disconnect switch showing particularly the arcing contact structure.

FIG. 9 is a view taken on line 9—9 of FIG. 8 showing the arcing contact structure of the load break disconnect switch.

FIG. 10 is a front view of the load break disconnect switch with the door open showing a 3 pole switch arrangement.

FIG. 11 is an enlarged detailed front view of one of the switch elements.

FIG. 12 is a top view taken along a portion of the upper side of FIG. 13.

FIG. 13 is a side view partly in section of the novel load break disconnect switch.

FIG. 14 is an enlarged view of the operating mechanism shown in FIGS. 7, 10 and 11.

FIGS. 15 and 16 are diagrammatic views illustrating the operation of the opening and closing mechanism.

Referring now to FIG. 1, the movable contact structure 20 there shown is supported by and driven by the shaft 21. A double ended crank 22 is fixed to the shaft 21 and rotatable therewith. One end of crank 22 is connected by pin 24 to the link 25 which, in turn, is connected by pin 26 to the movable contact member on rod 27; similarly the other end of crank 22 is connected by pin 30 to link 31 which, in turn, is connected by pin 32 to the movable contact or rod 33. The movable contact structures 27 and 33 are contact rods having respectively contact tips 34 and 35. Contact rods ride in the diametrically arranged recesses 37 (for contact rod 33) and 38 (for contact rod 34) in the disc 40 which is constructed of insulating material.

The recesses 37 and 38 communicate respectively with the larger internal recesses 42 and 43 within the disc 40.

Compression springs 45 (for contact rod 33) and 46 (for contact rod 27) are captured between the respective outer walls 50, 51 of the larger recesses 42, 43 and the spring keepers 47, 48 on the respective contact rods 33 and 27 in order to bias the contact rods 33 and 27 to the retracted position shown in FIGS. 2 and 3. The position however which is shown for the shaft 21 in FIG. 1 and the links 25 and 31 is such that the crank 22, shaft 21, the links 31 and 25 overcome the force of the respective springs 45 and 46 to drive the contact tips 34, 35 of the movable contact rod 27 and 33 into engagement with the stationary contact tulips 52, 53 which are mounted on the stationary contact supports 54 and 55.

When the disconnect contact is to be opened, the shaft 21 is turned clockwise with respect to FIG. 1. The initial movement of the shaft 21 clockwise with respect to FIG. 1 results in a pulling inward of each of the contact rods from the position of FIG. 1 to the position of FIG. 2, as shown therein. On completion of this inner movement of the contact rods 27 and 33 with the contact tips now flush with the outer surface 60 of the disc 40, the ends of the crank 22 engage the surfaces 61 and 62 respectively within the disc 40, continued rotation of the shaft 21 in a clockwise direction now rotates the disc to the position shown in FIG. 3 where the movable contact tips 35 and 34 are displaced a full 90° from the stationary contact tulips 53 and 52.

Thus it will be seen that the rotation of the shaft 21 through approximately 120° in a clockwise direction results in an opening of the disconnect contacts. The first 30 degrees of rotation produces the operation of withdrawing the movable contact rods 27 and 33 from their respective stationary contacts to the position of

FIG. 2. The remainder of the rotation of the shaft 21, through the remaining 90°, positions the contacts at the full double break open position shown in FIG. 3.

The compression springs 45 and 46, as shown, serve to bias the moving contact rods 27 and 33 toward the open position. These springs are fully compressed in the closed position shown in FIG. 1.

In the reverse operation, when the disconnect contact double break switch is in the position shown in FIG. 3, rotation of shaft 21 in a counterclockwise direction will first result in the rotation of the disc 40 from the position of FIG. 3 to the position of FIG. 2 where the stop 70 has moved from the position of FIG. 3 to the position of FIG. 2, halting further rotation of the disc 40 at the position where the movable contacts are aligned with the stationary contacts; further rotation of the shaft 21 will result in movement of the movable contact rods 27 and 33 into engagement with the stationary contacts as shown in FIG. 1.

It will be noted that the stop 70 fixes the closed position of the disc in FIGS. 1 and 2 where the movable contacts may be operated into engagement with the stationary contacts and the stop 70 also fixes the open position of the disc 40 and hence of the shaft 21.

The compression springs 45 and 46 which hold the contacts in withdrawn position in the position of FIG. 3 also ensure that the disc 40 will first be rotated by the rotation of shaft 21 when the structure is moved from the position of FIG. 3 to the position of FIG. 2, constituting a sufficient connection between the shaft 21 and the disc 40 so that the contacts tips 34 and 35 will not be moved out during this rotation from the position of FIG. 3 to the position of FIG. 2 until the stop 70 is engaged as shown in FIG. 2 whereupon further rotation of shaft 21 in a counterclockwise direction will result in the movement of the contacts into engagement as shown in FIG. 1.

It should also be noted here that in addition to mounting the movable contacts in the disc 40 of insulating material, a solid insulating shield 80 is provided for the stationary contact on each side, the said shield of insulating material having a recess 81 on each side into which the respective stationary contacts structures 54, 55 project. The solid insulating shield 80 is provided with and supports arc extinguishing means operating in connection with arcing contacts as hereinafter described.

It will thus be seen that by the means shown schematically in FIGS. 1, 2 and 3, a double break disconnect switch is formed which in addition to the double break permitting higher voltage gradients, the insulating disc 60 coacting with the insulating member 80 provides additional interposition means with respect to the disconnect contact providing in effect an increased break.

One of the essential elements of the operation of a disconnect switch of the form here shown is that its operation be continuous and rapid, particularly from the closed position of FIG. 1 to the open position of FIG. 3. Hence means must be provided so that the operation from the FIG. 1 position to the FIG. 2 position and then to the FIG. 3 position will be continuous and without a break in movement so that any arc which is drawn between the movable and stationary contacts will be quickly extinguished by the lengthening of the arc as the contacts are moved from the position of FIG. 2 to the position of FIG. 3.

Therefore, a direct manual or other mechanical operation should not be used in connection with this type of double break switch; since the operation should be continuous and rapid, it is preferred that a charged spring be used in order to effect this operation. It is also desirable, although not as essential, that the switch be closed rapidly and by continuous movement. Therefore, the preferred method of operating the shaft 21 is through an overcenter spring arrangement which, in effect, will provide a charged spring for operation in either direction and thereby ensure a smooth continuous and rapid operation so that any arc which may be drawn will not hang in the position of FIG. 2 but will be rapidly extinguished by the continuity of movement from the position of FIG. 1 through the position of FIG. 2 to the position of FIG. 3.

An actual structure embodying the concepts herein described in connection with the schematic views of FIGS. 1, 2 and 3 is set forth in detail in connection with FIGS. 4 to 14.

Referring first to FIG. 4 where a single pole double break disconnect switch is shown, the shaft 21, located within the disc 40, has the same operation as that previously described in connection with FIGS. 1, 2 and 3. Back connection stud 101 is connected by the strap 102 to the upper stationary contact structure in the area 55; the lower back connection stud 104 is connected by the strap 105 to the lower stationary contact structure in the area 54.

The shaft 21 is operated by a crank 110 connected by pin 111 to the link 112. Link 112 is at its other end connected by the pin 113 to the crank 114.

Crank 114 is a bell crank type of link which is loosely rotatably mounted on the shaft 115. The opposite pin 116 of the bell crank 114 is connected to toggle link 117 which through the toggle pin 118 is connected to toggle link 119, the opposite end of which is connected and rotatably mounted on the stationary pin 120. The connecting link 112 is an adjustable link which may be adjusted in length by the screw adjustment located adjacent the end 122 thereof. A tension-spring-carrying rotatable member 130 is also rotatably mounted around shaft 115.

A tension spring 131 is connected between the pin 132 at the outer end 133 of the spring-carrying-member 130 and the toggle pin 118 of the toggle 117-119.

As will be seen from the dotted line showing of FIG. 4 and the diagrammatic showing of FIGS. 15 and 16 when the spring carrying link 130 is moved from the solid line position of FIG. 4 and the position shown diagrammatically in FIG. 15 to the dotted line position of FIG. 4 and the position shown diagrammatically in FIG. 16, the tension spring 131 is moved from the solid line position of FIG. 4 and the diagrammatic position of FIG. 15 (where it urges the toggle 117-119 to extended position) to an overcenter condition above the toggle pin 118 (where the tension spring 131 collapses the toggle 117-119) thereby causing bell crank 114 to rotate in a counterclockwise direction. This results in pulling down the link 112, thereby turning the shaft 21 in a clockwise direction and rotating the disc 40 clockwise from the position schematically shown in FIG. 1 through the position schematically shown in FIG. 2 to the full open position schematically shown in FIG. 3.

The movement of the overcenter spring 131 from one side of the toggle 117-118-119 to the other can re-

sult in some initial creeping or movement of the contacts before the final movement to the open or the closed position.

The present invention is directed to a toggle arrangement where such initial movement or creeping is obviated and the toggle moves only when the spring is fully extended on the side toward which the toggle is to break.

In order to provide for this operation there is provided the additional toggle comprising the links 301, 302 connected by the toggle pin 303. The toggle is arranged so that toggle link 301 may rotate around the stationary pin 304. The toggle link 302 is connected to pin 306 on the link 119 of the main toggle 117-118-119.

It will now be seen that when the handle or operating member 130 is lifted the tension spring 131 is raised past the toggle pin 118; when the member 130 during its rotation about the pin 115 passes the point where the line between pins 132 and 115 is above the toggle pin 118, the toggle 117-118-119 cannot break upwardly owing to the fact that the toggle 302-301-303 acts as a bar to upward movement of the toggle link 119. At the completion of the upward movement of the operating member 130 the pin 132 strikes the extension 310 of toggle link 301; link 301 is now rotated counterclockwise around the pin 304 thereby breaking the toggle 301, 303, 302 and permitting the toggle 117-118-119 to break upwardly with a snap action thereby rotating the link 114 down and pushing the switch open.

It will here be noted that owing to the fact that the toggle 117-118-119 is locked by the auxiliary toggle 302-303-301 there is no inching or creeping action; instead a snap action occurs at a time when the spring 131 is fully extended and able to be most effective. Auxiliary toggle spring 315 is provided for the toggle link 301 in order to ensure that the toggle 302-303-301 will snap to the closed position when the switch is opened by pulling down the operating arm 130.

Similarly when the operating arm is in the open position with the switch closed as shown in FIG. 15 the toggle 302-303-301 is collapsed and the toggle 401-403-402 is extended with the link 402 of the toggle on pin 306 of the main toggle link 119 thereby preventing the downward collapse of the toggle 117-118-119. When the operating member 130 now moves down the pin 132 will contact the extension 410 of toggle link 401 and move the toggle toward the position shown in FIG. 16. Thus the closing operation will take place only after the spring 131 is fully extended and no inching or creeping of the switch contacts will occur. Spring 415 operates to snap the latching toggle 401-403-402 to break into the blocked position.

It will therefore be seen that the point at which the spring energy is released can be controlled by the shaping of the release link or toggle extension 310 or 410. This therefore permits all of the spring energy to be used to move the contacts and the switching device without any hesitation, inching or creeping.

The crank 140 is provided with the extensions 141 and 142. In the closed position of the switch, the bearing pin 144 extending from the side of the tension spring carrier 130 is against the extension 141 of crank 140. When the shaft 115 is rotated in a counterclockwise direction, the crank 140 is lifted, thereby raising the pin 144 of the tension spring carrier 130 and

thereby raising the spring carrier 130 to the dotted line position 130a from the solid line position of FIG. 4 and the diagrammatic position of FIG. 15.

As the spring carrier 130 passes the position where the spring 131 begins to move above the line between the pin 120 at the end of toggle link 119 and the toggle pin 118, the tension spring now begins to pull up on the toggle pin 118 and the spring carrier 130 snaps to the dotted line position 130b and the diagrammatic position of FIG. 16, collapsing the toggle 117-119 and moving the link 112-122 to the lower dotted line position of FIG. 4.

This results in rotation of crank 110 in a clockwise direction, thereby rotating the contact carrying shaft 21 in a clockwise direction, similarly rotating the disc 40 and performing the operation of movement of the contacts from the position of FIG. 1 through the position of FIG. 2 to the full open position of FIG. 3.

Similarly, when the shaft 115 is rotated in an opposite direction, that is in a clockwise direction with respect to FIG. 4, the crank 140 which is now in the upper position moves clockwise or downwardly so that the extension 142 engages the pin 144 of the tension spring carrier 130; when the line of the axis of the spring 131 passes below the axis from pin 120 to toggle pin 118, the toggle is snapped to the extended position shown in the solid lines of FIG. 4 and the diagrammatic sketch of FIG. 15 to rotate the crank 114 in a clockwise direction and raise the link 112-122 to rotate the contact carrying disc 40 from the position schematically shown in FIG. 3 through the position schematically shown in FIG. 2 to the closed circuit position of FIG. 1.

In FIG. 4 the structure is shown in the full closed position just before the initiation of the operation from the closed to the open position.

It will also be seen that in FIGS. 7 and 8 the solid line position shown for the tension spring carrier and the various parts is the closed circuit position corresponding to that shown in FIG. 4, and the dotted line positions correspond to the dotted line positions of FIG. 4 and the diagrammatic position in FIG. 16.

The operation of the shaft 115 is achieved by means of a crank which is removably secured to the shaft 160. Shaft 160 carries a worm 161 engages a worm 161 which 142 on the shaft 115. Therefore rotation of the shaft 160 in one direction will result in the snap action operation of the switch from the closed to the open position under the influence of the spring 131 and rotation of the shaft 160 in the opposite direction will result in a similar snap action operation of the switch from the dotted line or open position of FIGS. 4 and 7 (shown diagrammatically also in FIG. 16) to the solid line position or closed circuit position of FIGS. 4 and 7 and the position shown diagrammatically in FIG. 15.

The physical structure of the disc 40 already described in connection with the schematic structure shown in FIGS. 1, 2 and 3 is shown in FIGS. 5 and 6. All of the elements shown in the FIGS. 1, 2 and 3 appear in the structure shown in FIGS. 5 and 6 and are therefore similarly numbered. Added structures shown include the extension of the pins 32 for the upper movable contact 33 and the pins 26 for the lower movable contact 27 to provide bearings 201 which ride in the slots 202, 202 in the recesses 42 and 43.

As indicated in FIGS. 4 and 7, the entire switch structure is mounted on a base frame 210 having a front support frame 211 and a door 212. The door 212 is pro-

vided with an appropriate opening indicated generally at 213 through which access can be obtained for a crank to be connected to or inserted in the shaft 160, the shaft 160 being provided with appropriate recess such as a square or hex recess to receive the crank (not shown). An outer door 214 is provided which may be locked if desired in order to prevent unauthorized access to the operating members. The lower portion of the switch frame 210 carries a bottom pan 220 to which is secured an appropriate frame 221 for the operating mechanism including the toggle 117-119 and its associated operating elements. The bottom section 210 of the frame also as seen in FIG. 4 carries additional vertical frame and support structures 226, 225, and the cross bars or pieces 227, which actually support the switch structure, particularly the operating shaft 21 and the disc 40 and provide appropriate support for the stationary contacts.

The said support for the stationary contacts includes an appropriately insulated vertical support 230 carried by the cross piece 227 and an additional stand-off insulator or support 231 for the lower stationary contacts and the connection lead 105. Appropriate insulation is provided on the cross piece of the frame 227 as needed.

Arcing contact construction is provided as shown in FIGS. 4, 8, 9 and 11. As seen particularly in FIGS. 9 and 11, a stationary arcing contact support strap 240 is provided at the terminal block 241 at the end of the back connection strap 102 supported by the back connector 101 to which the stationary contact structure 55 is connected. The strap 240 supports a stationary arcing contact 242 which comprises the spring fingers 243, 244 which are held in appropriate relation to each other by the cross connecting member 245 which member may be adjustable in length in order to create appropriate contact pressure. The spring fingers 243, 244 are provided with arcing contact tips 246, 247. The disc 40, as seen in FIG. 12, carries movable arcing contacts 250, 251 which will enter into and cooperate with the stationary arcing contacts 242 when the switch is in the closed position (FIG. 4). The movable arcing contact 250 shown in FIG. 9 and at the top of the disc in FIG. 11 is duplicated exactly by the movable arcing contact 251 in FIG. 11 at the bottom. A similar stationary arcing contact to that shown in FIG. 9 is provided at the bottom connected electrically and supported by support structure for the stationary contact 54. The movable arcing contact in each case is electrically connected to the movable contact rod 33 and rod 27 through the shaft 21.

An arc extinguisher (See FIGS. 9 and 11) is provided by a pair of plates 253, 254 which are arcuately shaped and appropriately supported in stationary position at the terminals.

It will be noted that the main contacts disconnect by the initial 30° operation of the shaft 21 as shown in the initial disconnect operation when the switched structure is moved from the position of FIG. 1 to the position of FIG. 2. At this time, the arcing contacts of FIGS. 9 and 11 remain in position because the disc 40 has not moved. When the disc 40 is, on a continuation of the movement of the shaft 21, moved from the position of FIG. 2 to the position of FIG. 3, then the movable arcing contacts 250 separate from the stationary arcing contacts 242 and travel in the channel defined by the plates 253 and 254. The arc is then drawn between the arcuately shaped plates 253 and 254.

The arc extinguishing plates between which the arc is drawn are preferably made of glass-filled melamine or similar material which will gassify when in contact with the arc. The gaseous products thus formed aid in extinguishing the power arc.

It should be kept in mind that the maximum arc expected is one related to normal loads and the switch is not intended to interrupt anything greater than normal load, a circuit breaker or interrupter being provided in series with the disconnect switch for opening under other than normal load.

Thus, it will be seen that the arcing contacts make first on closing and break or open last on the opening operation of the switch. This sequence is important to prevent damage to the main contacts.

The actual structure of the novel disconnect switch is shown particularly in FIGS. 10, 11, 12, 13 and 14. As seen in these figures, the shaft 160 which carries the worm 161 (see particularly FIGS. 10 and 11) drives the worm gear 142. Worm gear 142 in turn drives the shaft 115. The bell crank 114 is rotatably mounted so that it may rotate freely with respect to the shaft 115. The bell crank 114 is connected at the pin 113 to the operating link 112-122 which in turn is connected to the disc shaft operating crank 111. The spring carrier 130 is arranged to have two springs which operate on the toggle pin 118 as previously described, the two springs 131 being shown in FIGS. 11 and 12. The shaft 115 is supported in appropriate bearings on appropriate standard 130a on the bottom frame member 210 as previously described. The motion of the bell crank lever 114 must be communicated to the poles 270, 271 on each side (FIGS. 10 and 11). For this purpose, a jack shaft 272 is carried by the bell crank 114 connected to the crank 273 on jack shaft 274 for pole 270 and crank 275 on jack shaft 276 for pole 271. Each of the shafts 274 extend coaxial with the operating shaft 115 of the center pole. Each of the shafts 274 and 276 is provided with a crank 278, 279 (see also FIGS. 10 and 11) which will operate corresponding links 112a-122a, 112b-122b for the respective poles 270 and 271. Thus, the operation of the single central pole will effect simultaneous and similar operation of the poles on each side by the utilization of operating members peculiar only to the central pole (see also FIGS. 12, 13 and 14).

In FIG. 13, alternate forms of connection of the upper back connection stud 101 are shown. The entry from the bus may be through the top of the housing, as shown by the connector 101 for each of the poles or alternatively, the entry may be through the back of the housing as shown by the connectors 101a, 101b, 101c, one for each of the poles.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure herein, but only by the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In switchgear having at least one movable contact and a complementary contact; operating mechanism for moving the movable contact into engagement with the complementary contact and out of engagement therewith;

said operating mechanism comprising:

an operating link connected to said movable contact and movable in one direction to cause said movable contact to engage said complementary contact and in the opposite direction to disengage the same;

a rotatable lever; a pivot for said lever; a first end of said lever being connected to said operating link;

a first toggle comprising a first toggle link connected at one end to the other end of said lever, a toggle pin for said toggle; said first toggle link being connected at its other end to said toggle pin; said first toggle having a second toggle link connected at one end to said toggle pin and pivoting stationarily at its other end;

an operating handle; said operating handle being connected at its inner end to and rotatable about the pivot of said rotatable lever;

a tension spring between the outer end of said operating handle and said toggle pin;

rotation of said operating handle to a position wherein the said spring extends between the outer end of said operating handle and the lever point on a line on one side of the toggle pin causing said first toggle to collapse in that direction and correspondingly rotate said rotatable lever thereby moving the operating link to operate the movable contact in one direction;

rotation of said operating handle to a position wherein said spring extends on the opposite side of said toggle pin thereafter causing collapse of said first toggle in the opposite direction to operate the movable contact in an opposite direction;

and means for latching the said first toggle after it has moved in one direction to maintain the said toggle in that position;

and additional means operable by said handle when

it has completed its movement in a direction to cause collapse of the toggle in an opposite direction, to release said latching means and permit collapse of said toggle in said opposite direction.

2. The switchgear operating mechanism of claim 1 wherein said latching means comprises a second toggle stationarily pivotally connected at one end and connected at the other end to said second link of said first toggle;

10 said second toggle being extended on movement of the first toggle in one direction and blocking return movement of said first toggle;

an extension from said second toggle adjacent its stationarily pivotal connection;

15 said operating handle engaging said extension on completion of movement of said operating handle in an opposite direction and collapsing said second toggle to permit said first toggle to collapse.

3. The switchgear operating mechanism of claim 2 wherein said latching means comprises a third toggle similar to the second toggle and extended on movement of said first toggle in an opposite direction and blocking return movement of said first toggle,

20 an extension from said third toggle adjacent its pivotal connection engageable by said operating handle to collapse said third toggle to remove the said blocking of movement of said first toggle.

4. The switchgear operating mechanism of claim 3 in which each of said second and third toggles is provided with spring means for extending said first toggle.

5. The switchgear operating mechanism of claim 3 in which, at all times, one of said second and third toggles is in blocking position with respect to said first toggle.

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