United States Patent [19]

May et al.

[11] **3,894,204**

[45] **July 8, 1975**

[54] **38KV LOW CURRENT FUSED SWITCH**

[75] Inventors: **William E. May**, Feasterville; **Philip C. Netzel**, Milmont Park, both of Pa.

[73] Assignee: **I-T-E Imperial Corporation**, Spring House, Pa.

[22] Filed: **Feb. 19, 1974**

[21] Appl. No.: **443,461**

[52] **U.S. Cl.. 200/50 AA**; 200/144 R; 200/153 SC; 200/163; 317/103

[51] **Int. Cl..... H01h 3/46**; H01h 9/20; H02b 11/00

[58] **Field of Search**.. 200/16 B, 16 E, 17 R, 50 AA, 200/144 R, 146, 153 G, 153 H, 153 SC, 163, 243, 304; 317/103

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Primary Examiner—James R. Scott

Attorney, Agent, or Firm—Ostrolenk, Faber, Gerb & Soffen

[57] **ABSTRACT**

A low current high voltage switch having a bridging contact comprising vertical contact probes entering arc extinguishing and confining bushings to engage the main contacts; the bridging contacts are driven in either direction by an overcenter spring operation. The switch is coordinated with a series fuse. The switch is preferably multi-pole and is truck mounted for insertion in a compartment by a racking mechanism which is interlocked with the operating mechanism to prevent operation of the racking mechanism when the switch is closed.

9 Claims, 21 Drawing Figures

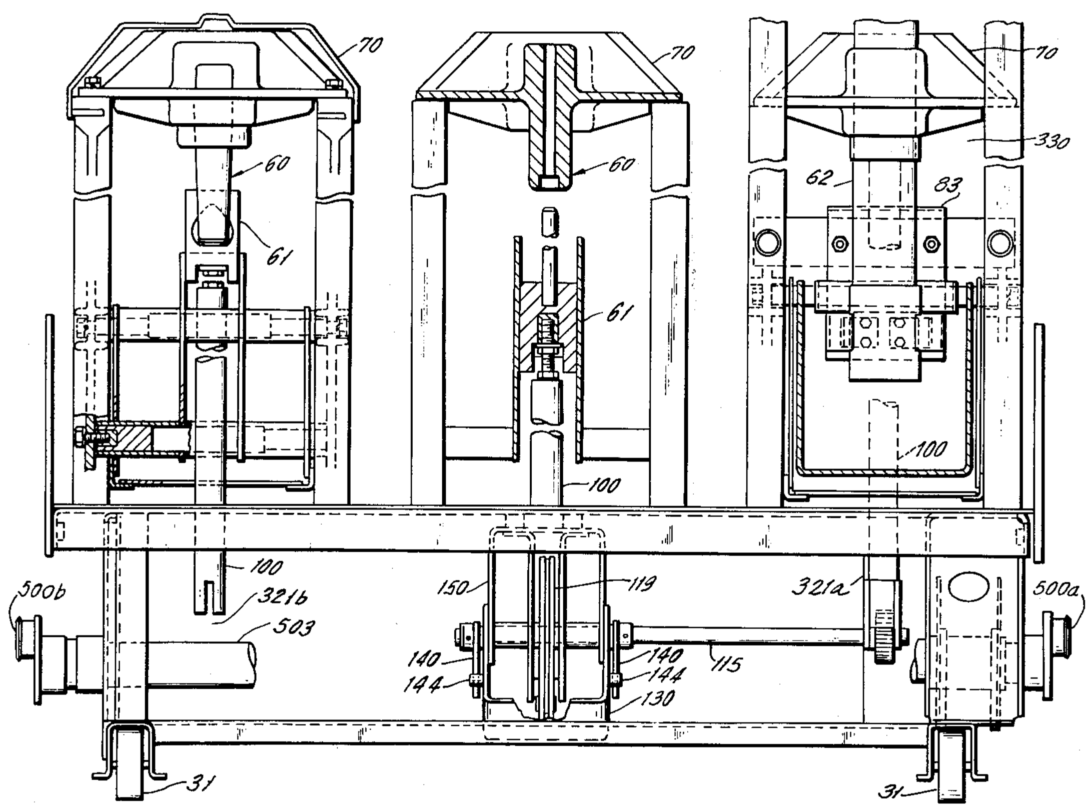


FIG. 1

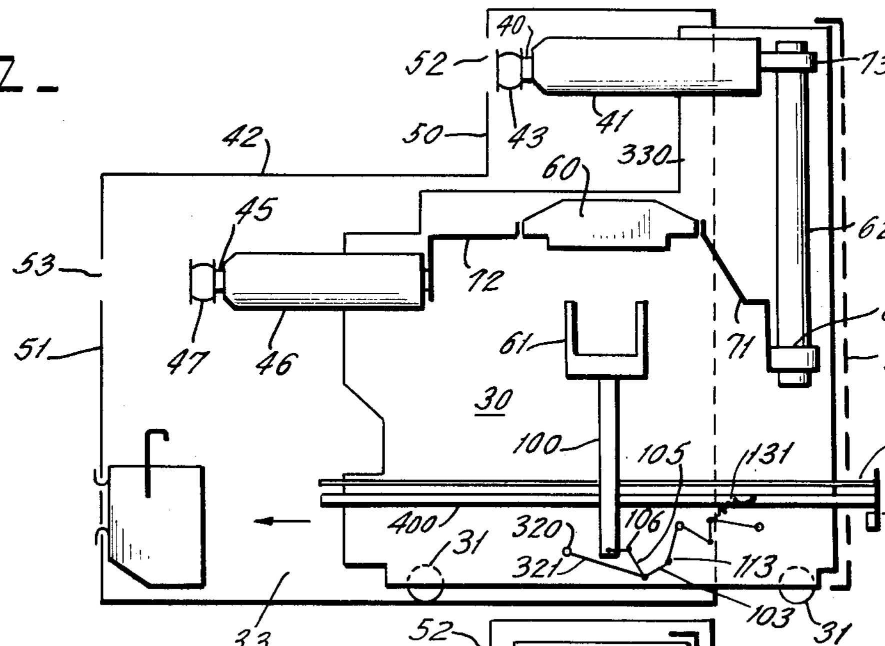


FIG. 2

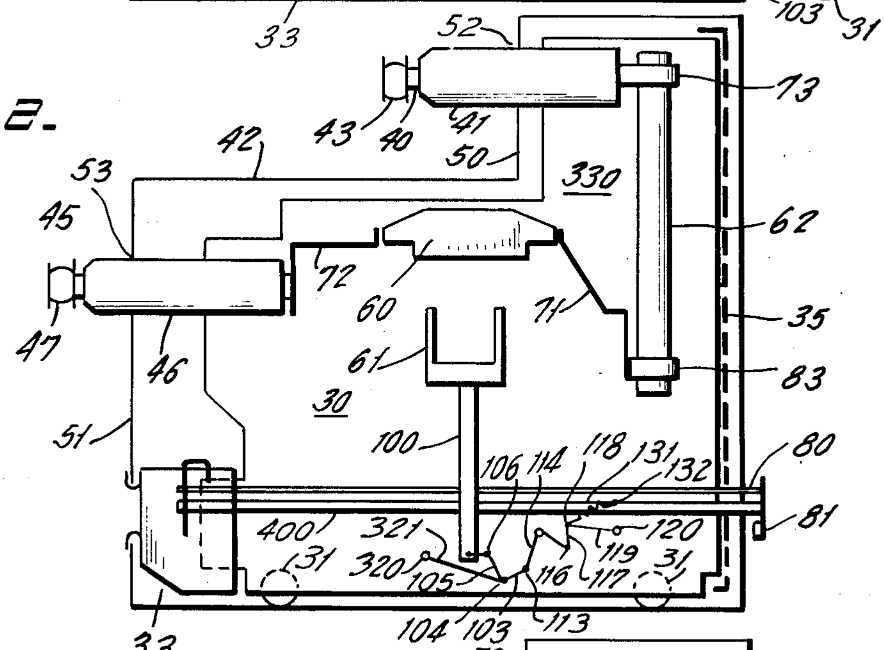
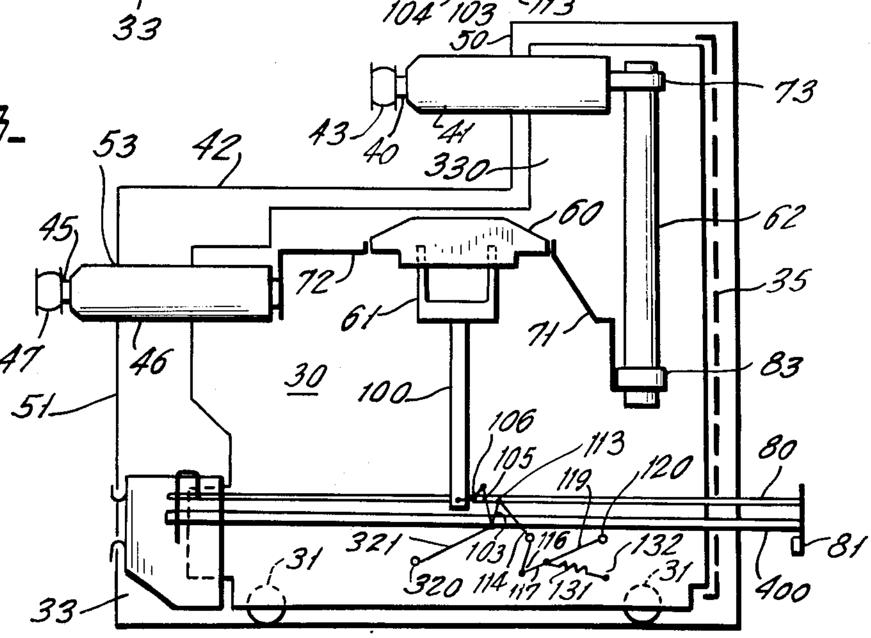


FIG. 3



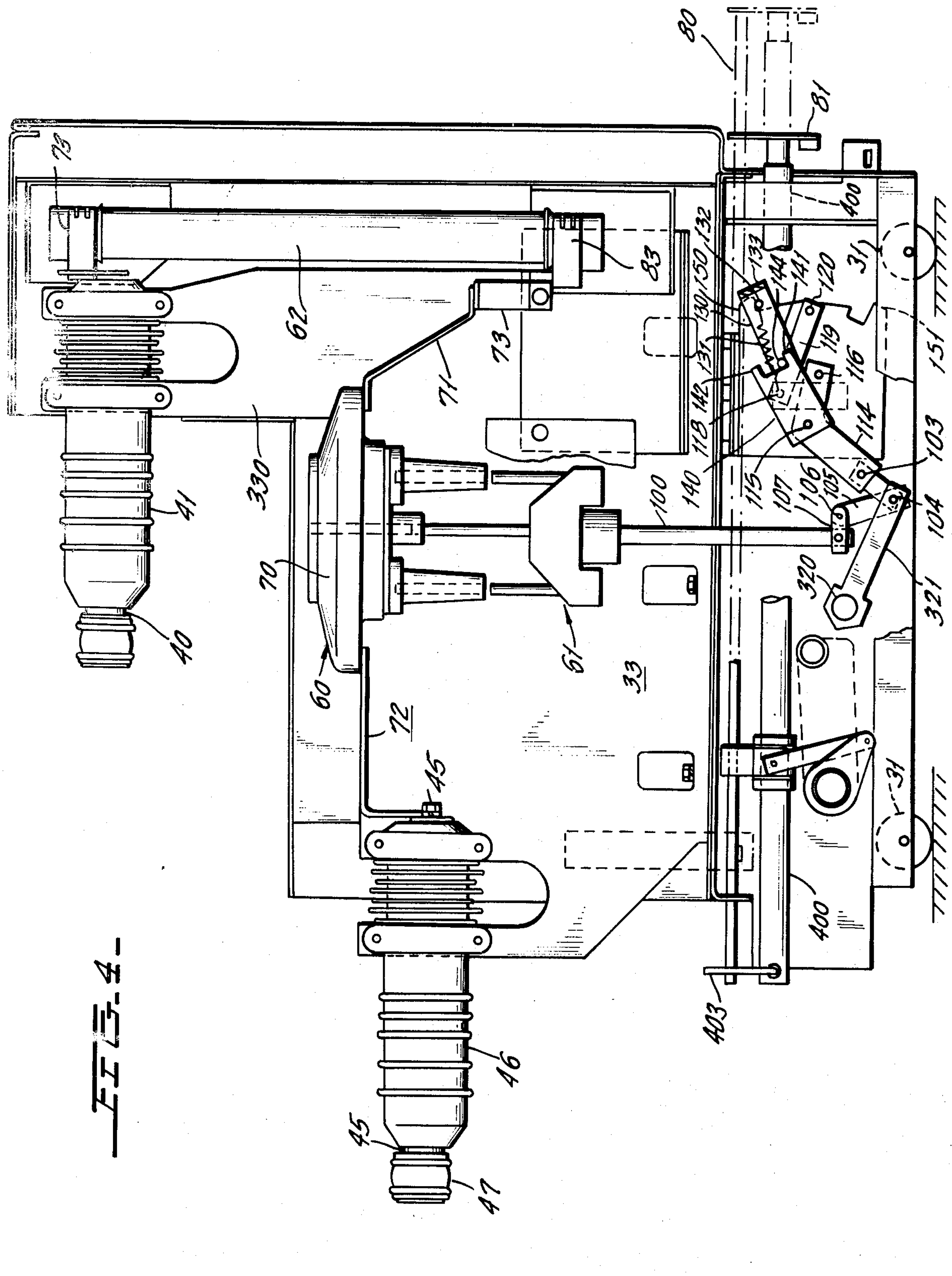

80
81
400
31
151
132
133
150
144
141
120
130
119
131
116
142
118
114
140
103
115
107
106
105
104
100
321
320
73
83
62
71
330
41
40
70
61
60
33
72
45
46
47
403

FIG. 4

PATENTED JUL 8 1975 3,894,204

SHEET 3

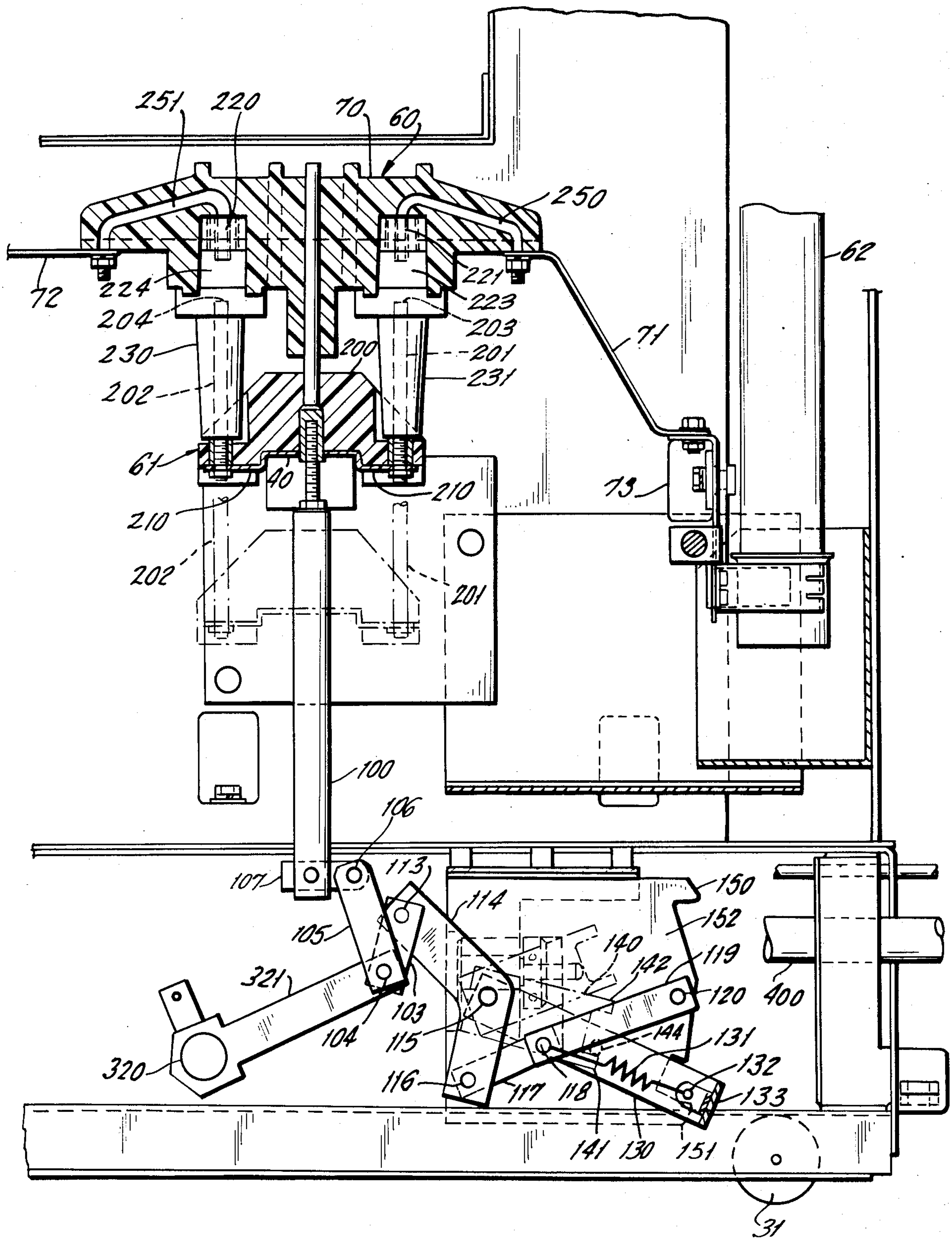
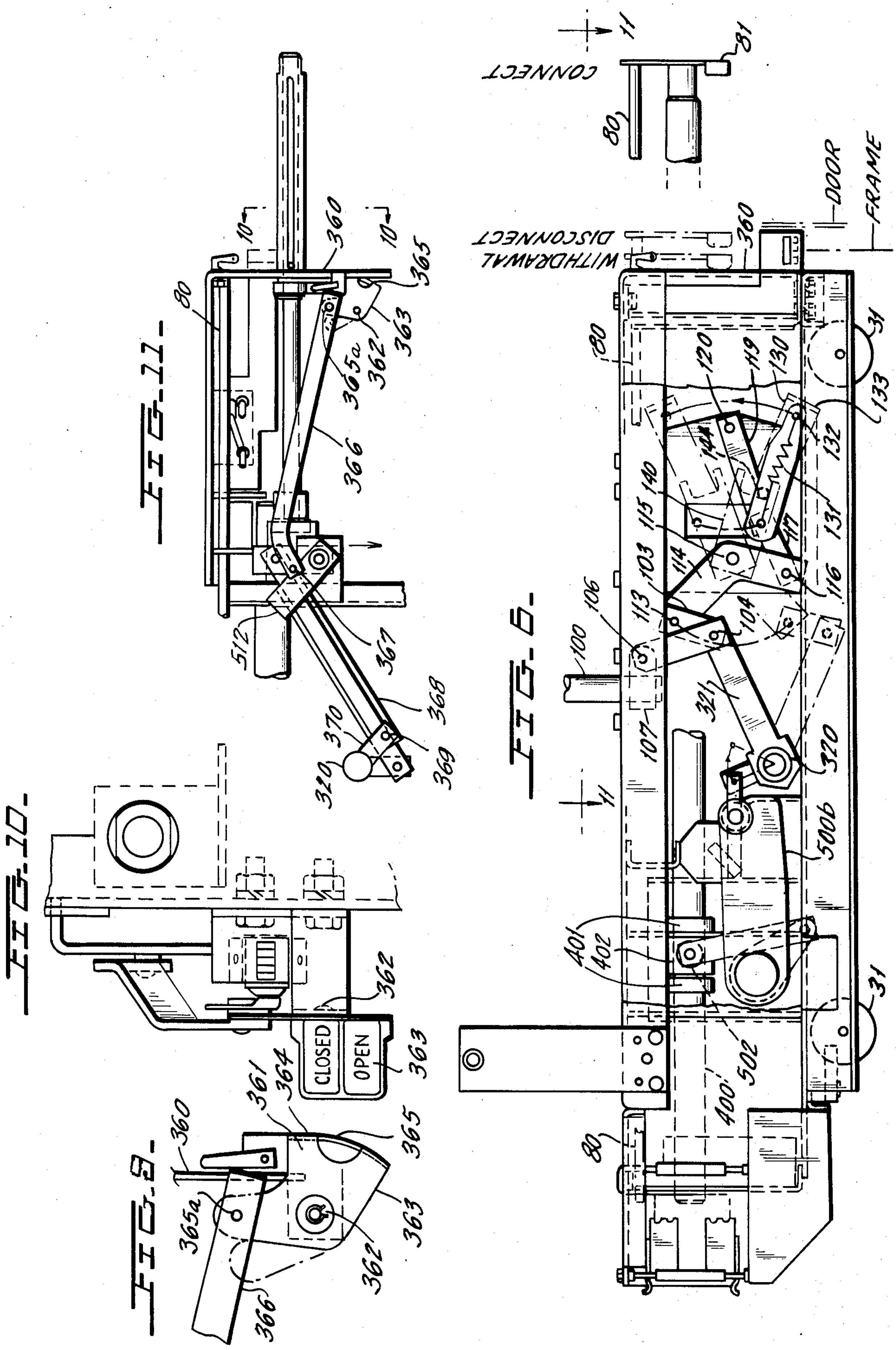


FIG. 5.


CONNECT
WITHDRAWAL DISCONNECT
DOOR
FRAME
CLOSED
OPEN
FIG. 6
FIG. 8
FIG. 10
FIG. 11

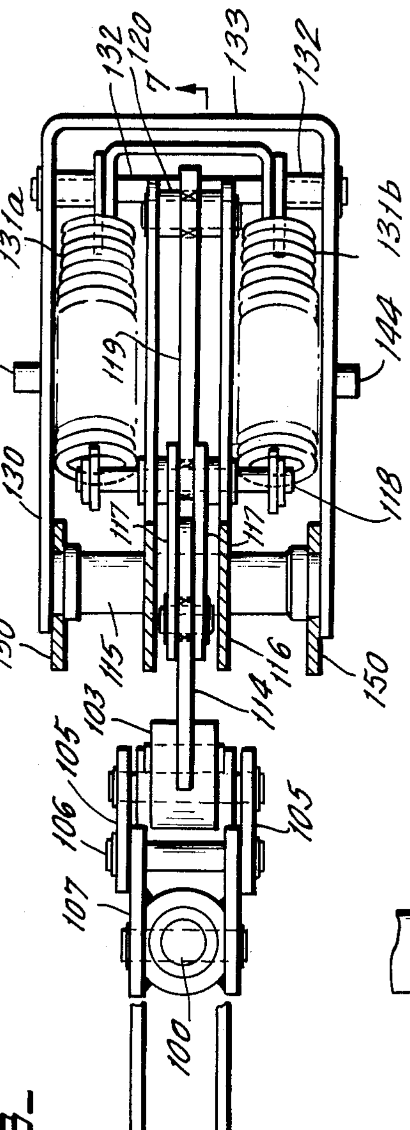


FIG. 8

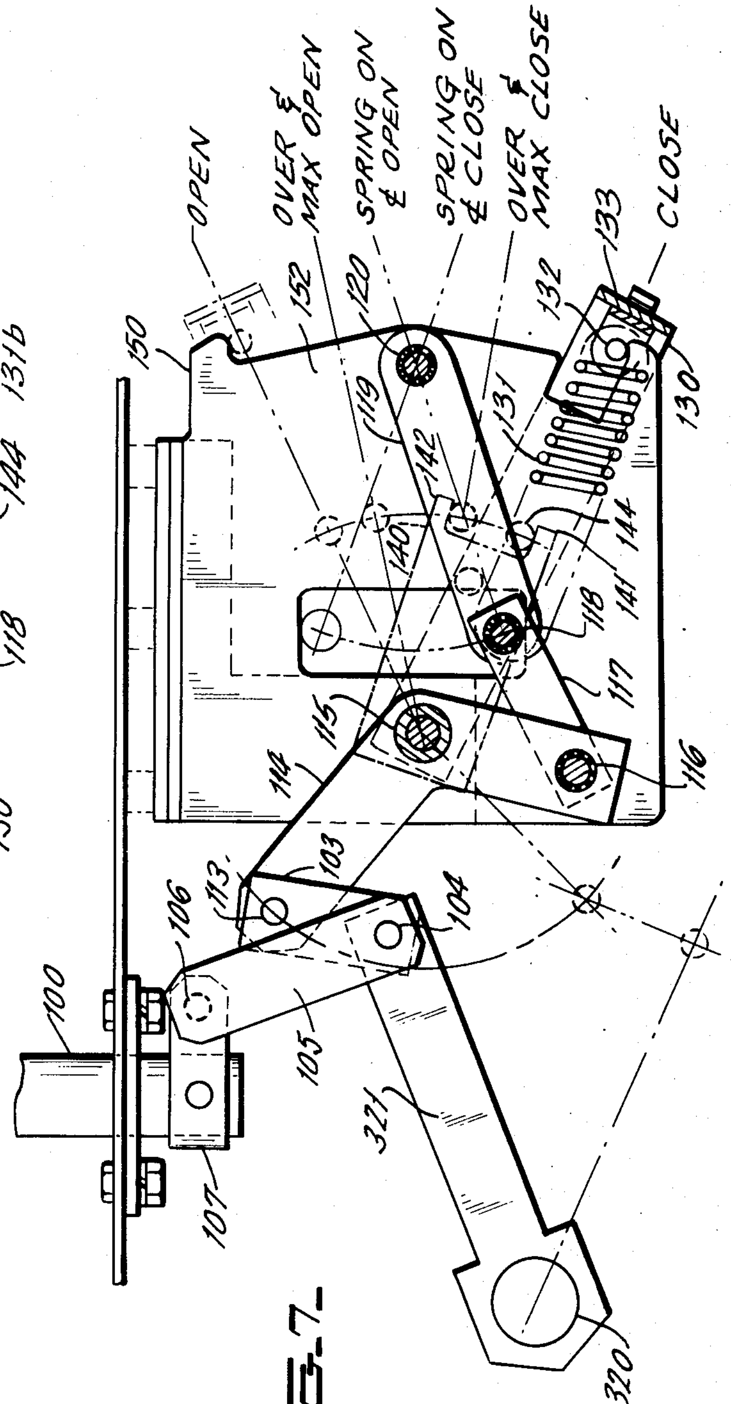

OPEN
OVER ℄ MAX OPEN
SPRING ON ℄ OPEN
SPRING ON ℄ CLOSE
OVER ℄ MAX CLOSE
CLOSE

FIG. 7

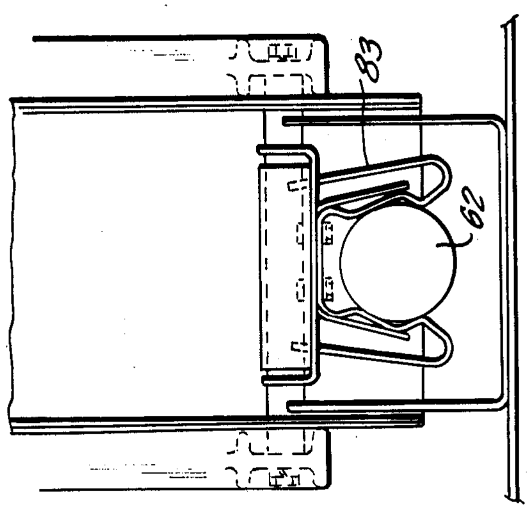


FIG. 13.

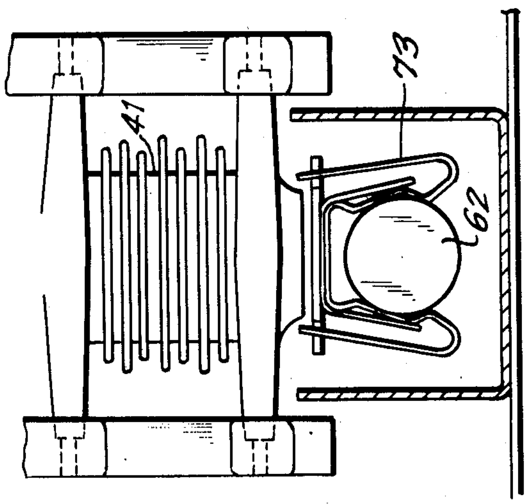


FIG. 14.

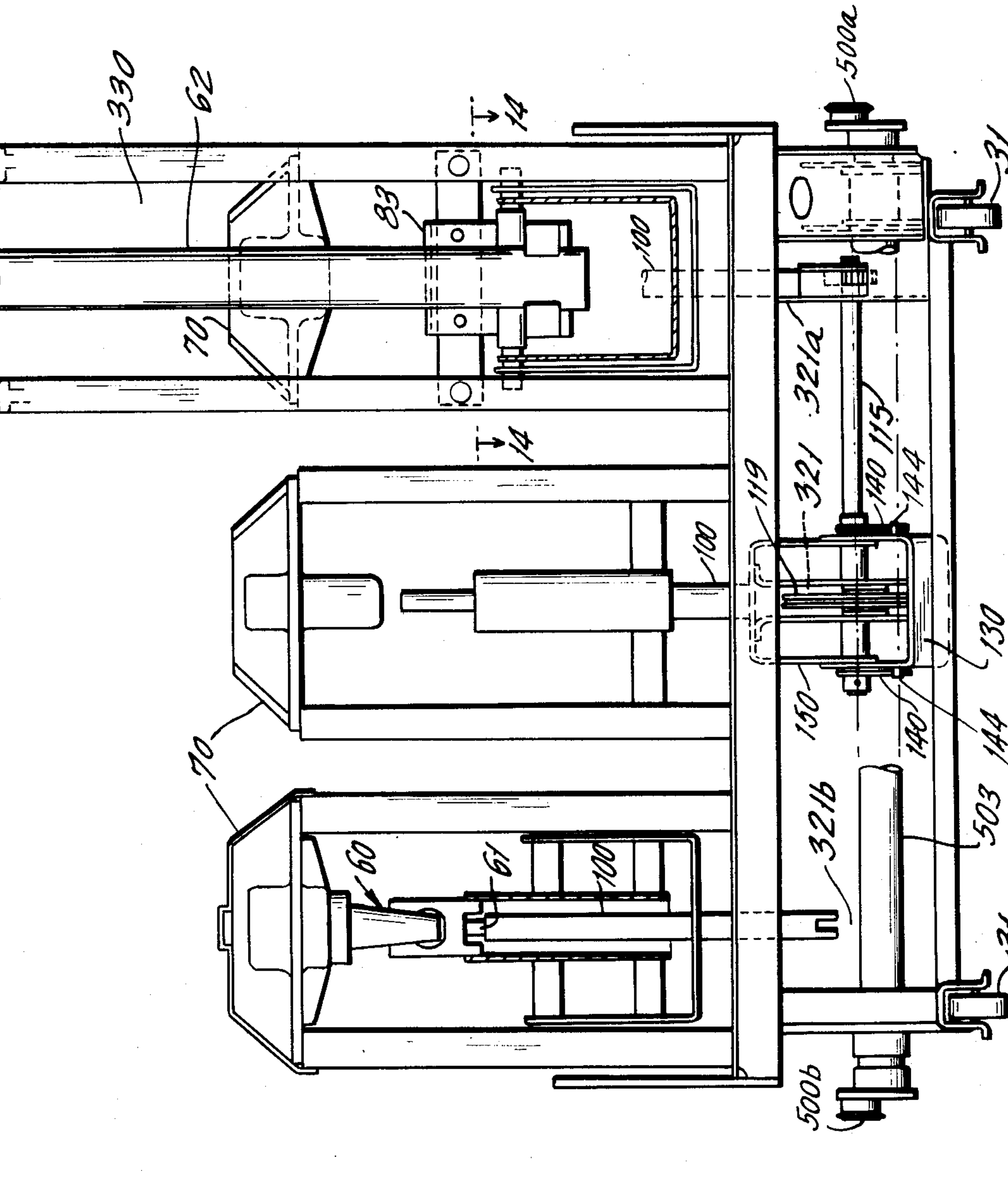


FIG. 12.

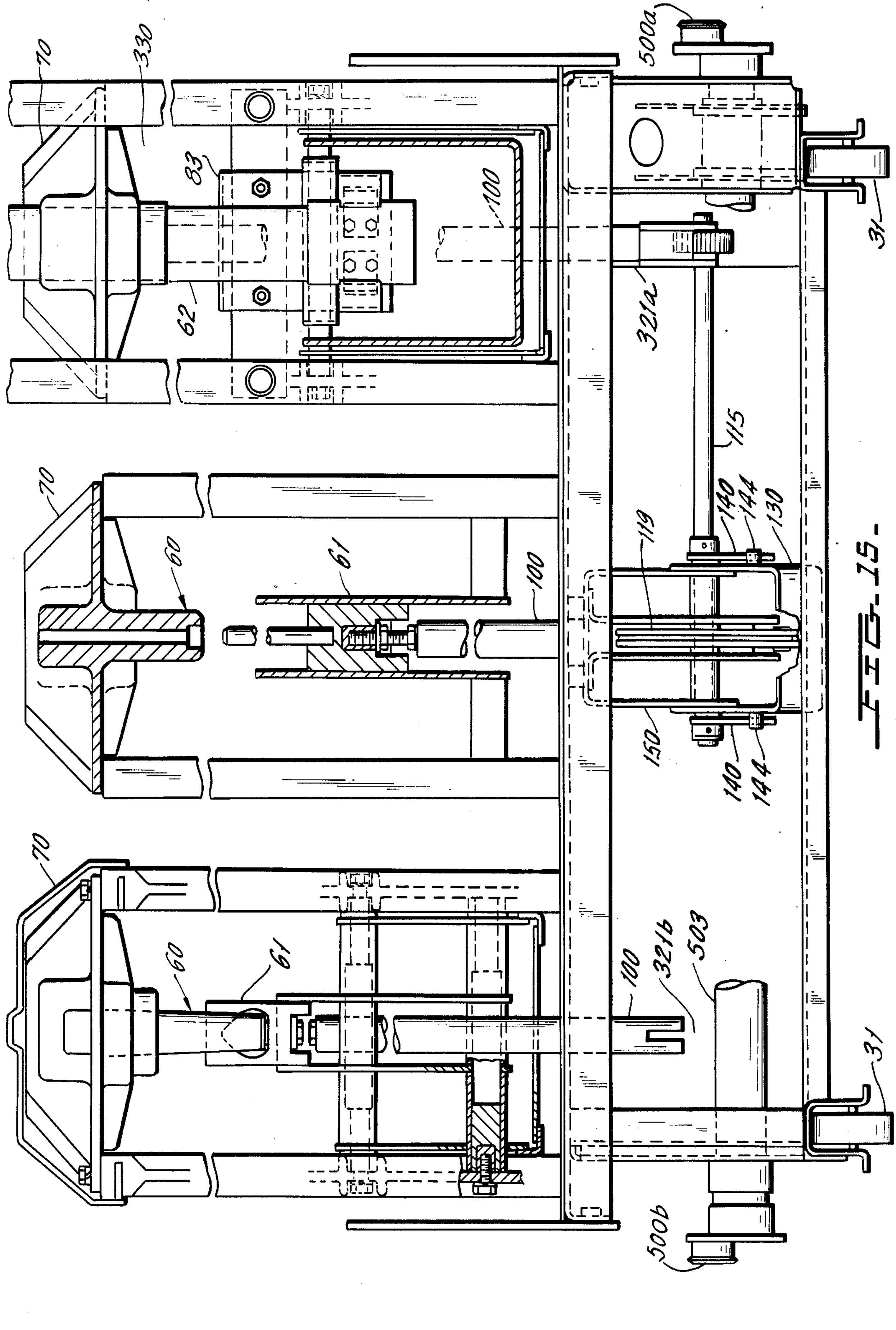

70
330
500a
83
100
62
321a
31
115
70
60
61
100
119
140
144
130
150
140
144
70
60
61
100
321b
503
31
500b

FIG. 15.

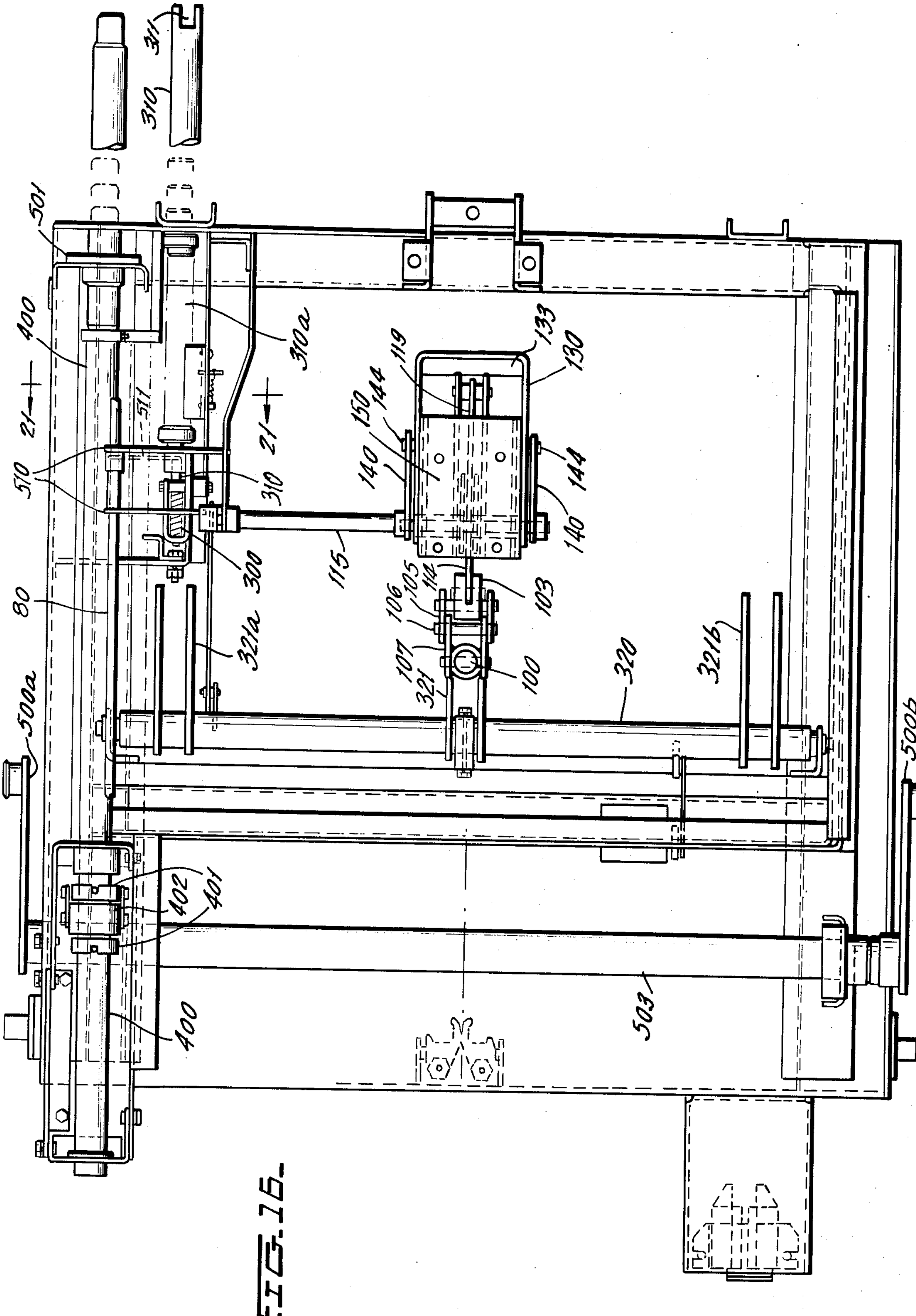

311
310
501
400
21
510
511
310
310a
119
133
130
150
144
140
115
300
80
321a
106
105
114
103
107
321
100
320
321b
500a
500b
402
401
503

FIG. 16

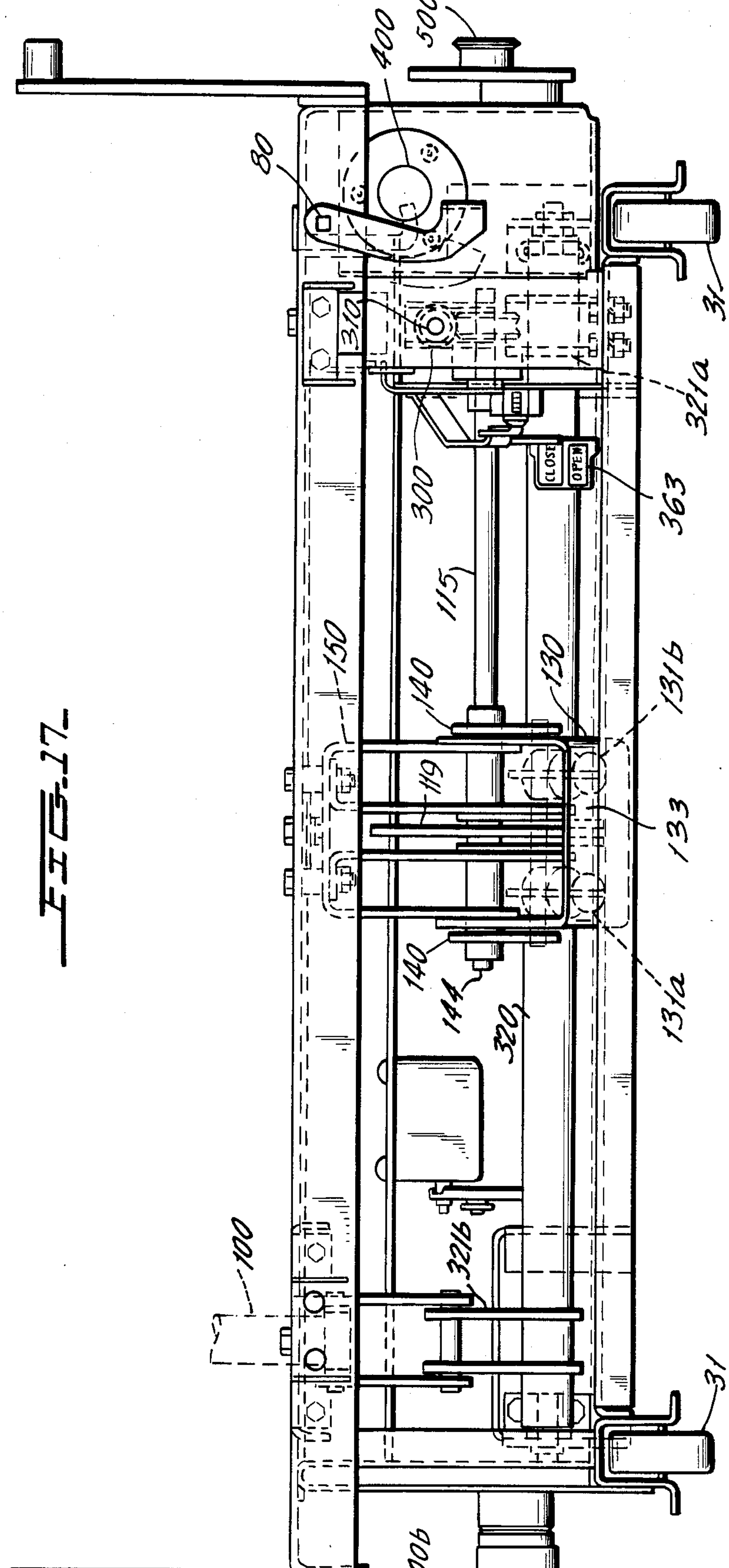

500a
400
80
31
310
321a
300
363
CLOSE
OPEN
115
150
140
130
131b
119
133
140
144
320
131a
100
321b
31
500b

FIG. 17

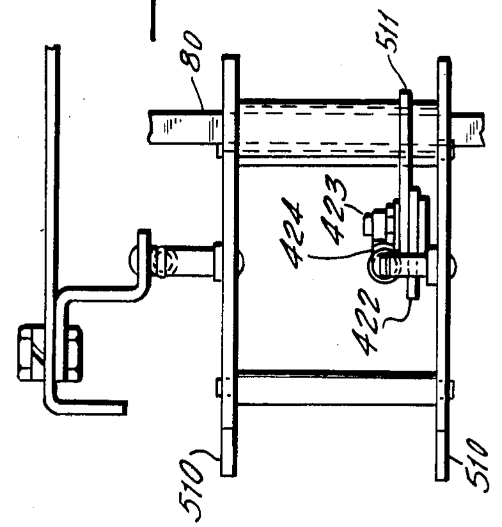


FIG. 19.

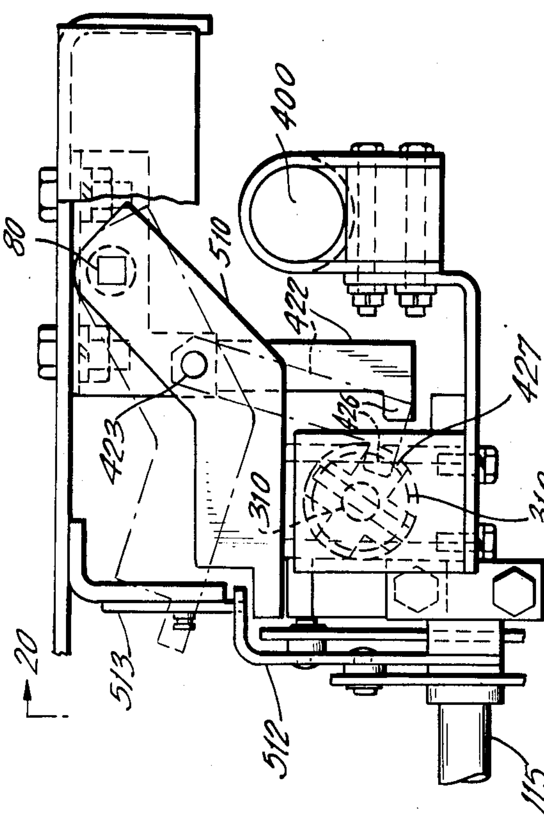


FIG. 21.

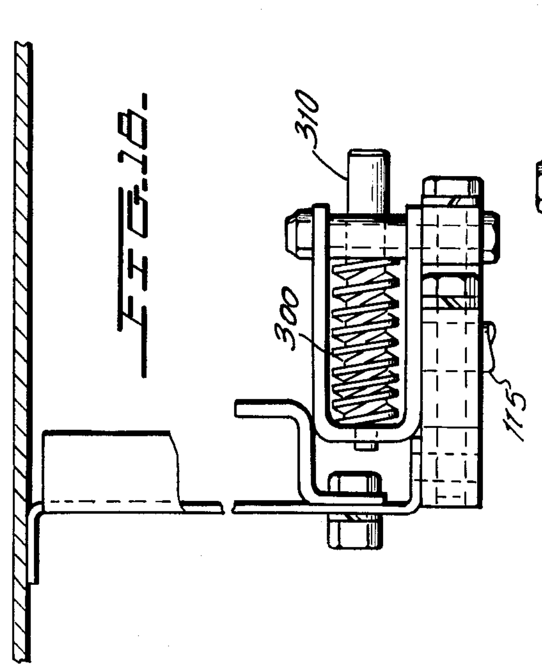


FIG. 18.

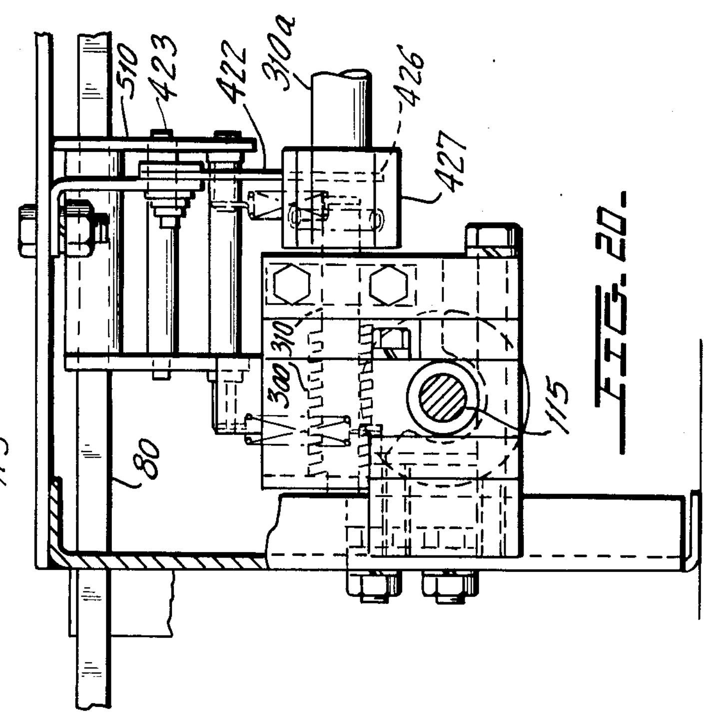


FIG. 20.

38KV LOW CURRENT FUSED SWITCH

The present invention relates to a low current high voltage switch for use in electrical systems of the order of up to 38 kilovolts. High voltage metal clad switchgear construction often requires that primary control power as well as power for heating and lighting be provided from the high voltage line through an auxiliary power transformer. This requires a high voltage low current switch that is complementary to the metal clad switchgear.

The present novel switch includes interrupting means which consists of two interrupter well bushings connected in series by a contact bridge assembly with two arc followers and contact rods. This bridge assembly is actuated through an insulated push rod by an overcenter spring mechanism. The interrupter assembly is in turn connected in series with a high voltage current limiting fuse.

The switch is mounted on a rollout truck and is installed in a switchboard. Connection between the switchboard and the switch is achieved through a capacitively graded bushing of appropriate material.

In the present invention the overcenter spring mechanism is operated through a right angle drive and a telescoping actuating shaft. The telescoping shaft extends out from the switch as the switch is racked into the switchboard. This allows the switch to be operated with the front door of the switchboard compartment closed.

Load current interruption takes place within the well bushings. As the contact rods of the bridge assembly are drawn out of the well bushings, arcs are established within the bushings. An arc follower on the end of each contact rod aids in interruption.

The maximum let-through current of the current limiting fuse is coordinated with the momentary current rating of the well bushings. The well bushings are themselves mounted in an appropriate molding of insulating material such as epoxy which also serves as a guide for the moving contact bridge assembly and operating push rod. The epoxy molding straddles the main moldings and provides terminals for connection to the lower bushing and to the lower end of the current limiting fuse.

The primary object of the present invention is the provision of a high voltage low current switch having spring controlled snap action closing and opening operation and including appropriate arc extinguishing functions.

Another object of this invention is the provision of such a switch in a low profile switchboard combined with a truck mounting arrangement and simplified racking mechanism for the switch interlocked with the operating mechanism.

Another object of the present invention is the arrangement of the said switch coordinated with a fuse in series therewith for appropriate protection of the circuit.

The foregoing and many other objects of the present invention will become apparent in the following description and drawings in which:

FIG. 1 is a schematic view of the novel switch of the present invention mounted on a truck and partly removed from the switchboard.

FIG. 2 is a schematic view corresponding to that of FIG. 1 showing the novel switch of the present invention fully racked into the switchboard but with the contacts open.

FIG. 3 is a view corresponding to that of FIG. 2 showing the contacts closed.

FIG. 4 is a side view of the novel low current high voltage switch of the present invention. FIG. 4 corresponds to the schematic illustration shown in FIG. 2.

FIG. 5 is an enlarged view of a portion of the novel switch of the present invention showing the contacts closed.

FIG. 6 is an enlarged schematic view showing the operating mechanism for the switch in conjunction with the racking mechanism.

FIG. 7 is a further enlarged side view of the operating mechanism shown at the bottom of FIG. 5 and in FIG. 6; FIG. 7 is taken on line 7—7 of FIG. 8 looking in the direction of the arrows.

FIG. 8 is a top view of the operating mechanism of FIG. 6.

FIGS. 9, 10 and 11 are detailed views of the racking interlock mechanism. FIG. 10 is a view partly in cross-section taken from line 10—10 of FIG. 11. FIG. 11 is a view partly in cross-section taken from line 11—11 of FIG. 10.

FIG. 12 is a front view of the switch showing the fuse mounting and operating elements.

FIG. 13 is a view of the lower fuse contact taken from line 14—14 of FIG. 12.

FIG. 14 is a view of the upper fuse contact taken from line 13—13 of FIG. 12.

FIG. 15 is a view corresponding to FIG. 12 showing the entire three pole switch.

FIG. 16 is a bottom plan view of the switch showing the racking and switch operating arrangement.

FIG. 17 is a detailed front view of the operating and racking elements of the switch.

FIGS. 18 and 20 are views of the operating elements of the switch and the connections to the main operating shaft. FIG. 20 is a view partly in cross-section taken from line 20—20 of FIG. 21.

FIGS. 19 and 21 are views of the racking mechanism interlock. FIG. 21 is a view partly in cross-section taken from the line 21—21 of FIG. 20.

Referring first to FIGS. 1, 2 and 3, the high voltage switch is mounted on a truck 30 having appropriate wheels 31 which enable the entire switch unit to be rolled into the compartment 33 of a switchboard and to be locked therein. The truck 30 therefore carries all of the elements of the switch in a manner hereinafter described including the front panel 35 which may be opened for servicing of the switch after the truck 30 has been moved out of the switchboard compartment 33. The compartment 33 has the recessed rear top wall 42 (FIGS. 1, 2 and 3) which is part of the low profile structure.

The truck 30 carries the upper back connection stud 40 which in turn is carried in an appropriate insulator 41 on the frame 330 of the switch and which terminates in appropriate back disconnect contacts 43. The truck also carries the lower back connection stud 45 in its insulator 46, the back connection having the back disconnect contacts 47.

The rear walls 50, 51 of the switchboard have appropriate openings 52, 53 through which the back connection studs 40 and 45 may enter to establish contact with appropriate busses leading, in this case, to the primary winding of the auxiliary power transformer (not shown). When the switch is fully racked into the switchboard compartment **33** from the position of FIG. **1** to the positions of FIGS. **2** and **3.**

The low profile structure is of the type shown in U.S. Pat. No. 3,735,065, assigned to the assignee of the present invention.

The interrupter switch is series connected from the back connection studs **45** through the stationary contact assembly **60** and through the bridging contact assembly **61** to the current limiting fuse **62** and then to the upper back connection stud **40.** This enables the interrupting capacity provided in the stationary contact assembly **60** to be coordinated with the interrupting capacity of the current limiting fuse **62.** A racking mechanism (hereinafter described more completely in connection with FIGS. **6–16**) is provided in order to move the truck **30** and the switch carried thereby to various positions within the housing. The racking mechanism serves as hereinafter described to interlock the switchgear on the truck **30** in the compartment so that the switchgear cannot be withdrawn from the compartment when the contacts are closed and provides also for various positions of the switchgear in the compartment including: a fully racked in position where the back connection studs **40** are connected appropriately to busses behind the compartment, a partially racked out position where the back connection studs are disconnected from their source of power but the moving bridging contact **61** may be operated for test purposes and an unlocked position where the switchgear may be completely racked out of the compartment provided the bridging contacts **61** are in the open circuit position.

The operating rod **100** for the bridging contact **61** is more specifically described in connection with FIGS. **4** to **7** but essentially consists of a spring driven closing member; an operator is provided to drive the spring from one overcenter position in which the contacts **61** are in one condition (open or closed) to another overcenter condition in which the contacts **61** are in the other position (closed or open). As seen in FIGS. **1** to **5** the stationary contact structure **60** comprises an insulating structure **70** supported between the conductors **71** and **72,** conductor **71** being secured to the lower contact structure **83** for the fuse **62.** Conductor **71** is secured at its opposite end to the lower back connection stud **45.**

The upper end of the fuse **62** is connected to the upper contact structure **73** (FIG. **4**) for the fuse which in turn is connected to the upper back connection stud **41.** It will thus be seen that in the event the fuse is utilized to interrupt the current, the fuse **62** may readily be removed from the contacts **73** and **83** and another fuse replaced. The fuse contacts are also seen in FIGS. **13** and **14** in detail and in FIG. **12.** This type of contact structure for a fuse is well known and requires no further description herein. Also the concept of coordinating a fuse with an interrupter is well known and requires no further description at this point.

The operating mechanism for the switch is essentially similar to that shown in application Ser. No. 396757 filed Sept. 13, 1973 now U.S. Pat. No. 3830994 and assigned to the assignee of the present invention. It may also be of the type shown in application Ser. No. 406,473 filed Oct. 15, 1973, assigned to the assignee of the present invention. This operating mechanism is shown specifically in FIGS. **4, 5** and **6** in its fully operative form and in FIGS. **1, 2** and **3** in schematic form.

The preferred method of operating operating rod **100** of the bridging contact **61** is through an overcenter spring arrangement which in effect will provide a charged spring for operation in either direction and thereby insure a smooth continuous and rapid operation so that any arc which may be drawn will not hang in an intermediate position of the contacts but will be rapidly extinguished by the continuity of movement from the position of FIG. **1** to the position of FIG. **2.**

The operating means for the rod **100** comprises a bell crank **114** which is loosely mounted on the shaft **115.** Pin **113** of bell crank **114** is connected to the link **103** which in turn is connected by pin **104** to link **105.** The opposite end of link **105** is connected by pin **106** to an extension **107** of the rod **100.** Thus as the bell crank **114** is rotated about the shaft **115** the direction of rotation of the bell crank **114** will either act to push the bridge contacts from the solid line position of FIG. **5** to the dotted line position or in the opposite direction to pull the push rod **100** up back to the solid line position. The pin **116** 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 pin **120.** 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 **116-119.** When the spring carrying link **130** is moved from the position shown in FIGS. **3** and **5** to the position shown in FIGS. **1** and **2** and through the various positions shown in FIG. **7** the spring **131** serves as it passes from one side of the toggle link **119** to the other side of the toggle link **119** to draw the toggle **117–119** toward a collapsed position in the direction of tension of the spring.

The collapse of the toggle from the position shown in FIG. **3** thereby pulls on the pin **116** driving the bell crank lever **114** counterclockwise and driving the push rod **100** carrying the bridge assembly **61** in the opening direction. When the spring carrying link **130** is moved from the position of FIGS. **1** and **2** back to the position of FIGS. **3, 4** and **5** then as the spring **131** passes through the point of alignment with the toggle link **119** to the underside of the toggle it draws the toggle **117–119** from the position of FIGS. **1** and **2** back to the position of FIGS. **3** and **5** thereby resulting in closing of the switch.

The means for moving the tension spring carrier **130** from the position of FIGS. **1** and **2** to the position of FIGS. **3, 4** and **5** and back again includes the crank **140** which has the extensions **141** and **142.** The spring carrier **130** is provided with a bearing pin **144** which is engageable by either of the extensions **141** or **142** on the crank **140.**

Crank **140** is keyed to the shaft **115.** When the shaft **115** is rotated in one direction then the extension **142** will raise the pin **144** to operate the spring carrier **130** so that the spring **131** moves to the opposite side of the toggle center and collapses the toggle toward an opening direction for the switch.

On a reverse movement of the shaft **115** the extension **141** now engages the pin **144** and results in a closing operation of the switch. Extensions **150** and **151** on guide plate **152** are provided to bear against the sideward extension of pin **132** to limit the movement of the spring carrier **130** in either direction.

FIG. **8** shows the actual construction of the link arrangement in which the tension springs **131** actually comprise a pair of tension springs **131***a* and **131***b* on the pins **132** in the carrier **130**, the carrier having the operating pins **144** and the carrier **130** also being freely rotatable mounted on the shaft **115**. The toggle **117–119** may also readily be seen as well as the bell crank lever **114** which also is loosely mounted on the shaft **115**. The operating crank **140** and its upper extension **141** may readily be seen including its cooperation with the pin **132** as well as the link connection through link **105** to extension **107** and pin **106** of the contact operating shaft.

The contact structures may be understood more readily from FIGS. **5** and **12** in which the bridging contact **61** comprises an insulating carrier **200** mounted on the operating shaft **100** and provided with vertically aligned bridging contact members **201, 202** which have appropriate contact tips **203, 204** of material which will resist an arcing condition.

In essence then the bridging contact elements **201, 202** are probe members connected electrically to a conductive cross strap **210** by which they are bridged together.

The stationary contact support **60**, as previously pointed out, is basically of an epoxy material as is the bridging member support **61**. Appropriate stationary contacts **220, 221** are located in the recesses **223, 224** of the insulating support **60** for the stationary contact. These stationary contacts **220, 221** are engaged by the ends of the contact probes **201, 202** of the bridging contact structure **61** when the structure is moved to the solid line closed circuit position of FIG. **5** and are disengaged when the structure is moved to the dotted line position of FIG. **5** or the position shown schematically in FIGS. **1** and **2**.

The housing **60** for the stationary contact structure in addition to the recesses **223, 224** is provided with bushings **230, 231** which serve to encase the moving contact elements **201, 202** when they are fully inserted in bridging relation with the contacts **220** and **221**. These bushings are also of an epoxy or other insulating material similar to that utilized for the housing **60** of the bridging contacts and serve as an arc extinguishing chute for attenuating, confining and extinguishing the arc as the arc is drawn down the tube when the moving contacts **201, 202** are moved from the solid line to the dotted line position of FIG. **5** or from the position of FIG. **3** to the position of FIGS. **1** and **2**.

The conductor strap **71** leading to the lower contact structure **73** of the fuse **62** is connected to the conductor **250** which in turn is connected to stationary contact **221**. Similarly the conductor strap **72** for the upper back connection stud **40** is connected to the conductor **251** which in turn is connected to the stationary contact **220**.

By this means therefore a simplified method is provided for operating a low current switch from a closed to an open position and extinguishing the low current arc.

It should also be noted that the profile of the switch is arranged to accommodate itself to the relatively low volume small size high voltage switchboard of the type already described in U.S. Pat. No. 3,735,065 assigned to the assignee of the present invention.

The method of operating this switch operating shaft **115** is shown in FIGS. **16, 17**, and **18** to **21**. The switch operating shaft **115** is connected by the worm gear arrangement **300** FIGS. **18** and **20** to the principal operating shaft **310** in the truck (See also FIGS. **16** and **17**). The rotation of the shaft **310** by a handle which may be connected and disconnected from the free end **311** thereof will, through the worm gear arrangement **300** shown in detail in FIGS. **18** and **20**, operate the switch shaft **115** to move the switch between the open and closed positions of FIGS. **2** and **3**. The switch is also provided with a jack shaft **320** which will operate the three pole arrangement of the type shown in FIGS. **12** and **13**. The jack shaft **320** is provided with a crank **321** which is connected to the pin **104** of the operating mechanism of FIG. **5** and the crank **321** and the jack shaft **320** are accordingly operated downwardly or clockwise when the switch is open and upwardly or counterclockwise when the switch is closed. Jack shaft **320** is provided with similar cranks **321**a and **321**b keyed to the jack shaft **320** at each of the three pole switch locations so that as seen in FIGS. **12** and **17** the operating mechanism for the center of the three pole switch may be utilized to operate the whole set of switches.

Also in FIGS. **12, 13** and **14** the fuse arrangement is shown whereby the fuse **62** is engaged by the upper contact arrangement **73** and by the lower contact arrangement **83** and the structure **330** which supports the fuse contacts is shown for one of the poles of the three poled switch but is obviously usable for each of the other poles as well so that each of the switches may be coordinated with its individual fuse.

The switch operating shaft **310** is a telescoping shaft which may slide into the shaft **310***a*, being appropriately shaped to operate the same so that the switch operating shaft will be available for actuation of the mechanism regardless of the position of the mechanism with respect to the truck on which it is mounted.

The front side frame **360** of the switch housing on the truck FIGS. **9, 10, 11** carries a bracket **361** on which is mounted the small shaft **362**. Bell crank lever **363** is pivotally mounted on the shaft. One end of the bell crank lever carries indicia tabs **364** to show the closed or open position of the switch. These tabs are visible through a window **365** (FIG. **9**) in the front side frame **360** of the switch. The opposite end of bell crank lever **363** is connected by pin **365***a* to the drive lever **366** which in turn is connected by the pin **367** to the link **368** connected by pin **369** to a crank **370** on the jack shaft **320**. The rotation of the jack shaft **320** will thereby operate the bell crank lever **363** to present the closed or open indicia to view through the window thereby signalling the condition of the switch.

The racking mechanism for inserting the truck into the compartment and for moving the truck in the compartment is shown in FIGS. **6** and **16**. Crank arms **500***a* and **500***b* carry rollers which engage in fixed cam plates in the compartment. The racking shaft **400** has an external thread which engages with a nut **501** fixed to a bracket at the front of the truck. Clockwise rotation of the shaft **400** will cause the shaft to advance out of the front of the truck. A clevis **402** is slidably mounted on the shaft **400**. This clevis **402** is positioned between two collars **401** which are pinned to the shaft **400** and rotate with it. As the shaft is moved by its reaction with the nut **501**, the clevis **402** is moved with it. Links **502** are connected between fixed pins extending outward from the sides of the clevis **402** to a crank on the cross shaft **503**. Movement of the clevis **402** along shaft **400** causes shaft **503** to be rotated by the action of the aforementioned links **502** and the cross shaft crank. Crank arms **500***a* and **500***b* are fixed to the ends of cross shaft **503** and are also rotated by the action of the **502** links and crank. As the crank arms **500***a* and **500***b* are rotated, they engage with a slotted cam surface in the fixed cam plates in the compartment. Clockwise rotation of the racking shaft **400** causes the breaker to advance into the compartment and counter clockwise rotation of shaft **400** will cause the breaker to move out of the compartment. The shaft **400** is provided with two blind holes which are engaged by stop link **403** fixed to the square interlock shaft **80** to provide for stopping the racking mechanism in the connect and disconnect positions in the compartment.

When the breaker reaches one of the stopped positions, the stop link **403** on the square interlock shaft **80** automatically engages with the hole in the racking shaft **400** and prevents further rotation of the racking shaft. The racking mechanism can only be released from a stopped position by rotation of the interlock shaft **80** by the lever **81** at the front of the breaker.

The racking mechanism and the switch operating mechanism are interlocked so that

1. the switch cannot be moved from a stopped position (connect or disconnect) unless the switch contacts are open.
2. the switch cannot be closed unless the racking mechanism is in a stopped position.
3. the racking mechanism can be padlocked in either the connect or disconnect position. This padlocking prevents moving of the switch from the stopped position but does not interfere with the operation of the switch mechanism.

Interlocking between the racking mechanism and the switch operating mechanism is accomplished in the following manner.

If the racking mechanism has been operated to move the switch truck to one of the stopped positions, the switch operating mechanism can then be operated to close the switch contacts. On the closing of the switch contacts, the jack shaft **320** is rotated in a counter clockwise direction. This causes link **368** to drive the interference link **512** in a clockwise sense. An extension on link **512** is thus positioned above the end of link **510** prohibiting the rotation of link **510.** The racking mechanism interlock shaft **80** is thus prevented from rotating and the racking shaft **400** cannot be rotated since it is held by the stop link **403.**

When the switch operating mechanism is operated to open the switch contacts, the jack shaft **320** is rotated clockwise and through link **368** rotates interference link **512** counter clockwise and permits rotation of the square interlock shaft **80** by handle **81.** This action retracts the stop link **403** from the hole in the racking shaft **400** and permits movement of the switch truck by the racking mechanism.

Rotation of the indexing shaft **80** by the handle lever **81** in a clockwise direction sets up the interlock to prevent operation of the switch mechanism when the switch truck is in an intermediate position between the fixed stopped positions. When the square indexing shaft **80** is rotated clockwise, spring **424** applies tension to latch link **422.** This causes the end of the latch link **426** to engage with a notch **427** in the operating shaft **310***a*. The shaft **310***a* is thus prevented from rotation and this prevents operation of the switch contacts while the racking operation is being carried out. The lever **510** cannot return to its counter clockwise position until a stopped position of the racking mechanism is reached. Shaft **80** is prevented from rotating counter clockwise by the action of the stop link **403** on the surface of shaft **400** between the indexing holes.

Padlocking of the racking mechanism can be accomplished when the switch truck is in one of the indexed positions in the compartment. Link **513** is moved toward the front of the switch. This causes an interference with the lever **510** and prevents racking of the switch by preventing release of the stop link **403** from the indexing hole in shaft **400.** When the link **513** is drawn forward a slotted hole is exposed. A padlock can then be inserted.

In the foregoing, the present invention has been described in connection with preferred illustrative embodiments; it is therefore preferred that the scope of the invention be determined, not by the specific disclosures herein contained, but only by the appended claims.

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

1. A low current switch comprising a movable bridging contact structure having an insulating transverse support and a pair of parallel contact probes extending therefrom;
said support having a conductor electrically interconnecting said probes;
a stationary contact structure having an insulating support extending substantially normal to said contact probes;
a pair of stationary contacts carried by said stationary contact structure;
means for connecting each of said stationary contacts in circuit;
said movable bridging contact structure and its contact probes being movable in a direction longitudinally of said probes toward and away from said stationary contacts, each of said probes being engageable with one of said stationary contacts on such longitudinal movement toward said stationary contacts;
said insulating support for said stationary contacts having a pair of insulating bushings,
each bushing extending from a stationary contact toward said movable contact structure;
each of said bushings being aligned with one of said probes;
means for moving said bridging contact structure toward and away from said stationary contact structure,
said movable contact probes entering said bushings and engaging said stationary contacts, when the movable contact structure is moved toward said stationary contact structure,
said bushings acting as arc confining structures when said contacts are open.

2. The low current switch of claim **1** in which
an overcenter spring operating mechanism is provided comprising a main operating toggle;
said operating toggle having a pair of links and a pin connecting said links; the first of said toggle links being pivotally stationarily mounted at the end opposite said pin; and operating shaft; a connecting drive between said toggle and said operating shaft; the second of said toggle links being pivotally con-

nected at the end opposite the pin to said connecting drive; a second driving connection between said operating shaft and said movable contact structure;

a tension spring and an operating handle;

said operating handle being rotatably mounted on a stationary pivot for operation in a plane parallel to said toggle; said tension spring being connected between said pin of said toggle and a portion of the operating handle remote from the pivotal mounting of said handle;

said spring snapping the handle, toggle, operating shaft and moving contacts from closed to open and open to closed positions on movement of the handle to cause the tension spring to pass the said pin of the toggle.

3. The low current switch of claim **2** wherein said switch comprises a plurality of similar contact assemblies; said contact assemblies being arranged parallel to each other;

a housing for said plurality of control assemblies; said housing including supports for said contact assemblies;

a jack shaft supported in said housing and running transversely to said contact assemblies;

one of said contact assemblies having said operating shaft, operating toggle and the aforesaid drive connection, spring and handle;

said jack shaft being connected to and rotatable by the said operating shaft of said one contact assembly and being interconnected to each of the other contact assemblies for simultaneous operation.

4. The low current switch of claim **3** wherein the circuit connected to one of said stationary contacts in each contact assembly includes a pair of spaced fuse contacts; and a coordinated fuse mounted between said fuse contacts.

5. The low current switch of claim **3** in which said switch is mounted on a truck;

a telescoping operating shaft extending along said truck;

a connection between said telescoping operating shaft and said first mentioned operating shaft.

6. The low current switch of claim **5**

a compartment

said truck being movable in said compartment;

the said telescoping operating shaft being extensible and collapsible in the direction of movement of the truck in said compartment,

the end of said telescoping operating shaft being accessible at all positions of said truck in said compartment.

7. The low current switch of claim **6**

said compartment having an upper back disconnect contact and a lower back disconnect contact for each pole;

each pole having complementary back connection studs; one of said studs being connected to the said fuse contact; and the other of said studs being connected to the other of said stationary contacts.

8. The low current switch of claim **7,**

said truck having a racking shaft extending parallel to said telescoping operating shaft;

and an interlock between the racking shaft and the switch operating shaft; said racking shaft being locked against operation in the closed circuit position of the switch.

9. The low current switch of claim **7** in which the upper back connection stud and the lower back connection stud terminate in horizontally spaced vertical planes; and the disconnect contacts of the compartment are similarly spaced.

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