Nov. 22, 1966 A. BACHMAN 3,287,514

CIRCUIT INTERRUPTERS WITH IMPROVED SNAP ACTING OPERATING MECHANISM

Filed Sept. 4, 1964 3 Sheets-Sheet 1

FIG. 1

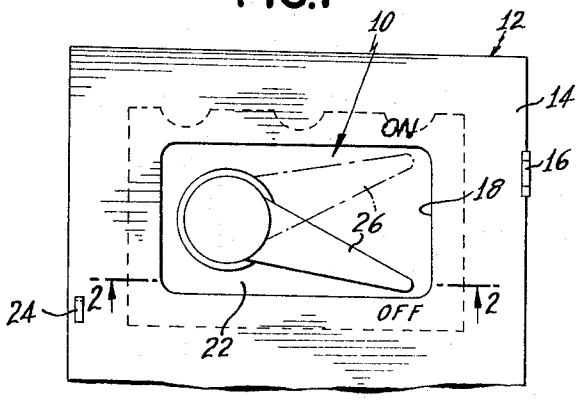


FIG. 6

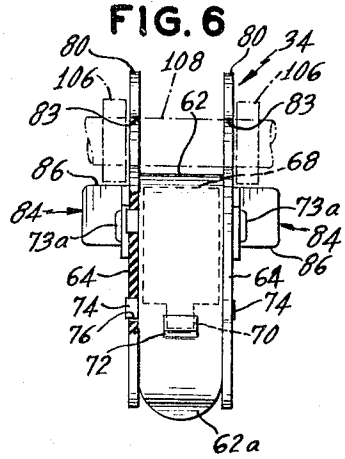
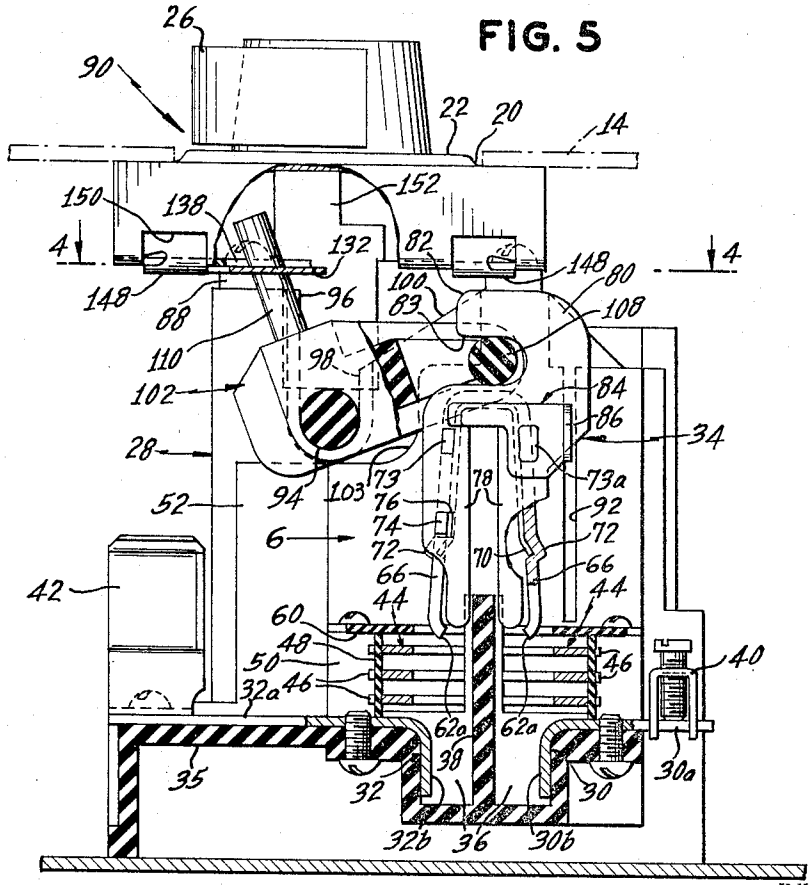


FIG. 5



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CIRCUIT INTERRUPTERS WITH IMPROVED SNAP ACTING OPERATING MECHANISM

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FIG. 2

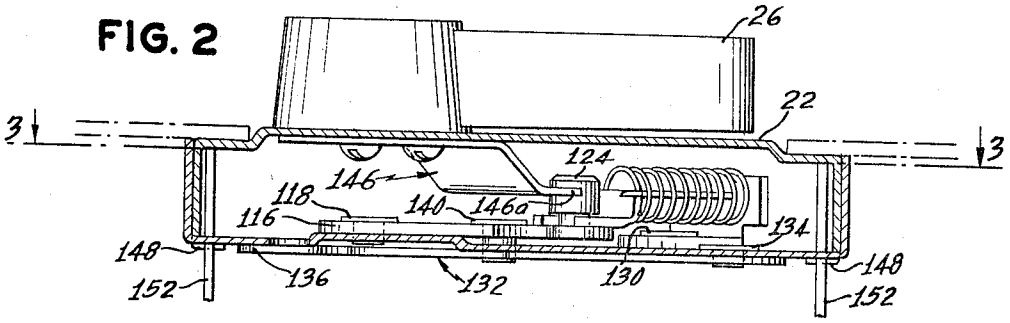


FIG. 3

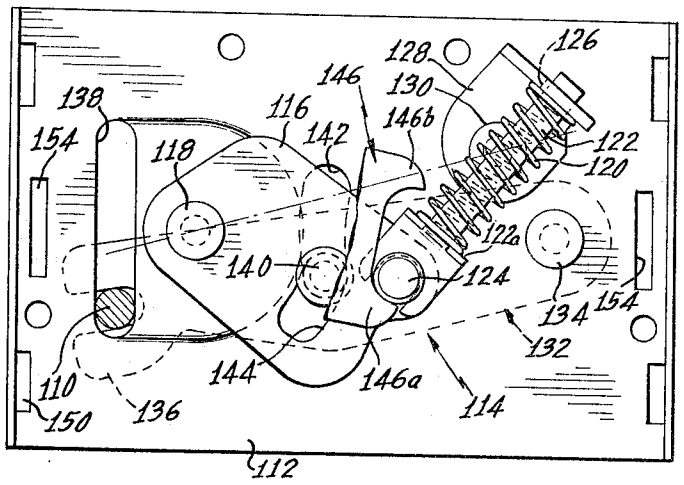
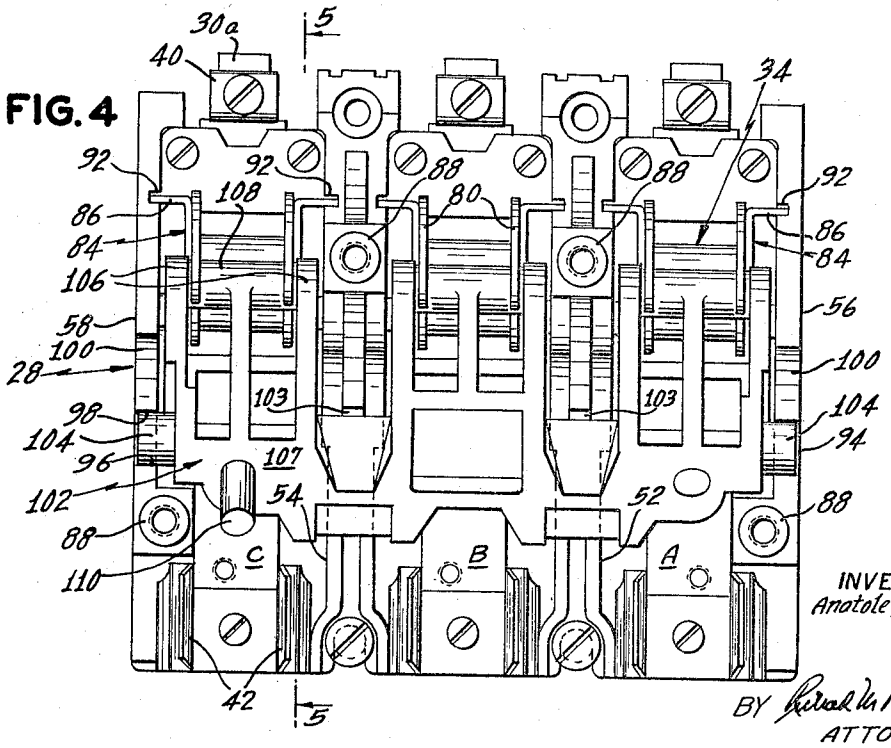


FIG. 4



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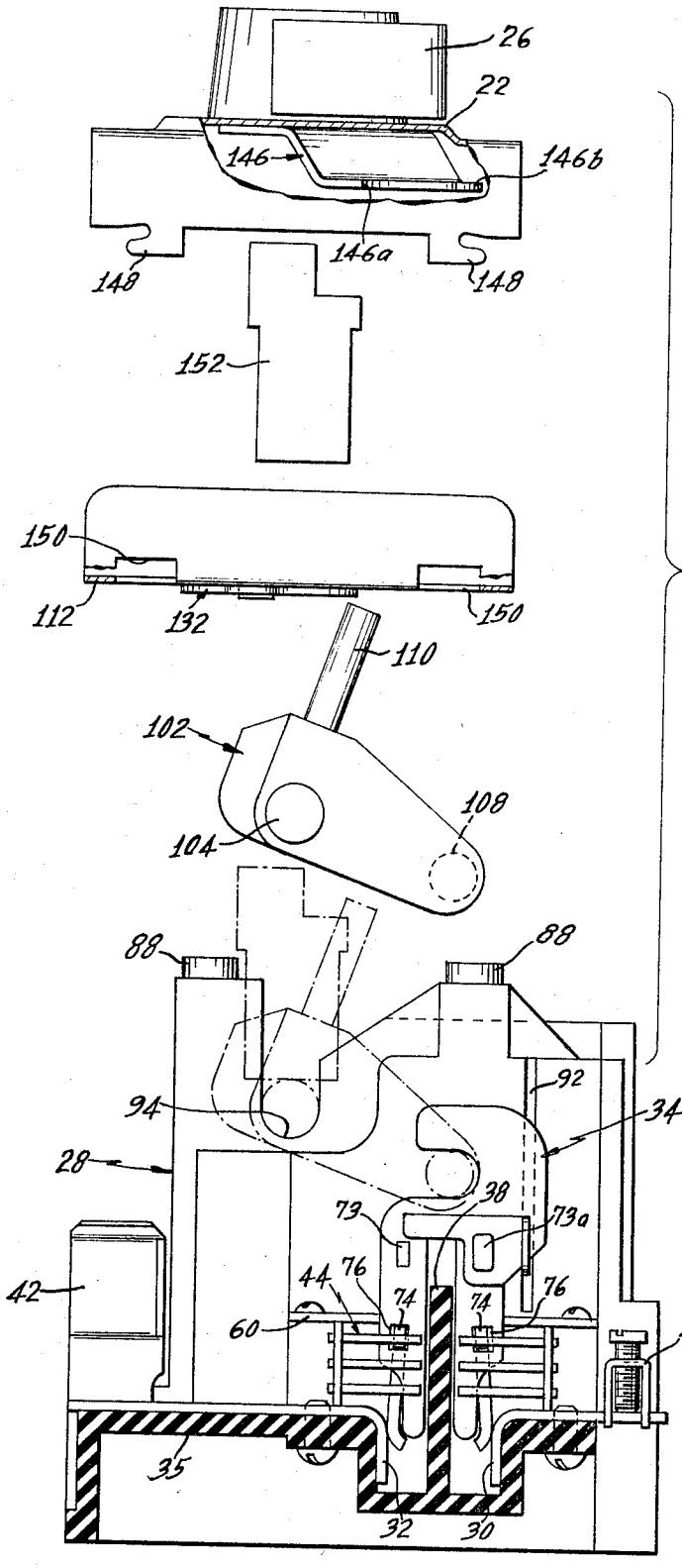


FIG. 7

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United States Patent Office 3,287,514 Patented Nov. 22, 1966

3,287,514

CIRCUIT INTERRUPTERS WITH IMPROVED SNAP ACTING OPERATING MECHANISM

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Filed Sept. 4, 1964, Ser. No. 394,474
10 Claims. (Cl. 200—17)

This invention relates to circuit interrupters and more particularly to multipole electric switches provided with a snap-acting operating mechanism.

Circuit interrupters or switches of the class herein described are widely utilized in panelboards. In such panelboards the interrupters are grouped together for economy of space and material and convenience of operation and interconnection. Many applications require that the switches be provided with quick-make quick-break operating mechanisms. In the past the quick-make quick-break operating mechanism has included overcentering spring means and has been located alongside the contact structure and thus has added to the side-to-side size of the switch. Where large numbers of switches are used the space occupied by each switch and its associated operating mechanism becomes particularly important as reflected in the size of the finished panelboard. Therefore, it is an object of this invention to reduce the side-to-side space requirement of circuit interrupters and it is another object of this invention to provide a more compact circuit interrupter having a quick-make quick-break operating mechanism.

It is another object of this invention to provide a compact readily assembled switch which is particularly adapted for assembly line methods of manufacture. A further object of this invention is to provide a unitized construction for circuit interrupters wherein operative portions of the interrupter may be preassembled for reducing the time and effort involved in manufacturing circuit interrupters.

In one embodiment of the invention, a circuit interrupter is provided which has a casing of insulation having its base lying in a given plane and upstanding walls defining a plurality of pole spaces. A pair of stationary contacts are mounted on the base in each of the pole spaces provided between the opposed walls thereof and a movable contact assembly for bridging the pair of stationary contacts is positioned in each of the pole spaces. The movable contact assemblies are reciprocable with respect to the base in a direction perpendicular to the plane of the base from a position in engagement with the stationary contacts to a remote open circuit position. The operating mechanism for the interrupter includes an overcentering spring means which is operable in a plane parallel to the plane of the base and which is spaced therefrom. Means are provided for interconnecting the contact assemblies and the operating mechanism for conjoint reciprocating movement of the movable contact assemblies between the engaged and remote positions.

The nature of the invention in its various aspects, and further objects and features of novelty will be better appreciated from the illustrative embodiment described below in which reference is made to the accompanying drawings. In those drawings:

FIG. 1 is a plan view, on a reduced scale, of a circuit interrupter incorporating the invention with a portion of the enclosure broken away;

FIG. 2 is a front elevational view, taken along the line 2—2 of FIG. 1, with some parts broken away and other parts in section showing a portion of the circuit interrupter operating mechanism;

FIG. 3 is a plan view, taken along the line 3—3 of FIG. 2, of the circuit interrupter operating mechanism;

FIG. 4 is a plan view of the circuit interrupter of FIG. 1 taken along the line 4—4 of FIG. 5;

FIG. 5 is a side elevational view, taken along the line 5—5 of FIG. 4, showing the assembled circuit interrupter;

FIG. 6 is a front elevational view of the movable contact assembly as viewed in the direction of the arrow 6 in FIG. 5; and

FIG. 7 is an exploded side elevational view of the circuit interrupter illustrating the mode of assembly.

Referring to the drawings, and more particularly to FIG. 1 thereof, there is shown a front operated circuit interrupter 10 which may be a single pole or multipole type, the latter type being shown in the illustrative embodiment. The circuit interrupter 10 is suitably mounted in enclosure 12 having a front cover 14 which is hinged to the enclosure at one side by hinges 16 so that the cover may be swung to open and closed positions. The cover has an opening 18 which interfits with the edge flange 20 of the interrupter cover plate 22 in the closed position of the cover 14 to exclude foreign matter from the enclosure and to prevent insertion of a tampering tool. The cover 14 is releasably latched or locked closed in a conventional manner by latch 24 which cooperates with the cover. The actuating handle 26 projects through the cover opening 18 and is of the front operated twist type. The handle is pivotally mounted on the interrupter cover plate 22 about an axis substantially perpendicular to the cover and is movable between "on" and "off" positions to operate the interrupter. The off position is shown in full lines in FIG. 1 and the on position is shown in phantom. In both the on and off positions of the handle 26 it is disposed within the area demarked by the opening 18 in the cover 14 so that the cover may be swung clear of the interrupter when unlatched without regard to the handle position.

Referring to FIG. 5, the circuit interrupter comprises a casing 28 of molded insulating material which houses and supports the elements of the interrupter mechanism. The interrupter or switch is provided at each pole with a pair of stationary contacts 30, 32 and a movable bridging contact 34. Each of the stationary contacts is secured to the bottom wall of the casing 28. The stationary contacts are provided with flat portions 30*a*, 32*a*, respectively, which extend along the bottom wall 35 of the casing and are also provided with depending contact areas 30*b* and 32*b*, respectively, which extend at substantially right angles to the flat portions 30*a*, 32*a*. The contact areas 30*b* and 32*b* extend into identical recesses 36 formed in the bottom wall 35. The recesses are separated from one another by a transverse wall 38 of insulation which extends upwardly from the bottom wall 35 of the casing. In the presently preferred embodiment of the invention shown in the drawings, a terminal connector 40 is shown mounted on the stationary contact 30 and a fuse clip 42 is shown mounted on the stationary contact 32. When the interrupter is in its on position (FIG. 7) the circuit through the interrupter is from the terminal 40 to stationary contact 30 through the bridging contact 34 to the stationary contact 32 and thence to the fuse clip 42.

At each side of the transverse wall 38 there is provided an arc chute 44 which comprises a plurality of spaced plates 46 that are secured to an insulator 48 as by swaging. The arc chutes 44 are maintained in operative relation with the contact areas and are restrained from lateral movement by engagement with transverse wall 38 and projections 50 formed as part of the pole space defining walls. The metal plates 46 of the arc chutes are spaced from the stationary contacts by a portion of the

insulator plate **48**. Vertical movement of the arc chutes is prevented by insulating plates **60**, secured to the top surfaces of the projections **50**, overlying the arc chutes and in engagement with the arc chute insulator **48**. The arc chute plates **46** and insulating plate **60** are suitably formed, adjacent the transverse wall **38**, to provide clearance for the moving contact **34**.

Referring to FIGS. 5 and 6, the moving contact **34** includes a U-shaped highly conductive bridging contact member **62** of copper that is carried by a pair of insulating side plates **64**. The contact member **62** has rounded contact surfaces **62***a* formed adjacent the free ends of the legs **66** that engage the stationary contacts **30**, **32**, thus providing two series breaks per pole. Contact pressure between the moving contact and the stationary contacts is built up when the moving contact is driven between the stationary contacts by the operating mechanism. In the open circuit condition the contact surfaces **62***a* of the moving contact are somewhat further apart than the distance between the stationary contacts. A spring member **68**, positioned between the legs **66** and reacting there against, augments the contact pressure when the switch is closed. The spring **68** has its ends **70** seated in outwardly lanced portions **72** of the legs and is thereby retained within the contact member. The contact member has two sets of laterally extending tangs **73**, **74** which pass through respective ones of apertures **76** formed in the side plates **64**. Each of the side plates has a pair of legs **78** adapted to straddle the transverse wall **38** and a hook-shaped portion **80** defined by an arm **82** which extends oppositely to the legs **78** and defines an opening **83** which is at right angles to the legs **78**. The openings **83** in both side plates face in the same direction. One upper tang **73***a* on each side of the contact member **62** extends through the side plate **64** and through a guide plate **84** positioned thereby. The end of the tang **73***a* is headed over and secures the contact member, side plate, and guide plate together as a unitary structure. Movement of the guide plate about the tang is prevented by the rectangular tang being received in a rectangular opening in the guide plate and then being headed thereover. Each guide plate **84** has a laterally extending ear **86**. The ears **86** on both sides of the assembly lie in a common plane. The purpose and function of these guide plates will be described in detail below. The upper set of apertures (FIG. 5) in the side plates **64** closely conform to their respective tangs **73** while the lower set of apertures are somewhat larger than the associated tangs **74** to allow movement of the contact member legs **66** relative to the side plates **64** when the moving contact engages the stationary contacts and is driven therebetween. In the circuit open position the lower tangs **74** are driven against the remote walls of the aperture by the inherent resilience of the contact member **62** and by the bias of spring **68** that reacts between the legs **66** thereof adjacent the tangs. When the contact surfaces **62***a* are in engagement with the contact surfaces **30***b*, **32***b* of the stationary contacts, the lower tangs **74** are displaced inwardly toward one another (FIG. 7).

Referring to FIGS. 4, 5 and 7, the casing **28** includes a base **35**, interphase walls **52**, **54** and exterior walls **56**, **58**. The exterior walls and the interphase walls define between them three substantially identical pole spaces, i.e., pole A is defined by walls **52** and **56**, pole B is defined by walls **52** and **54** and pole C is defined by walls **54** and **58**. Each of the walls is provided with a flat portion or support platform **88** on its upper extremity and the upper surfaces of the platforms **88** all lie in a common plane which is parallel to the plane of the base **35**. The operating mechanism **90** which includes the interrupter cover plate **22** and twist handle **26** is mounted on the supports **88**.

Referring to FIGS. 4 and 5 the opposed faces of pole space defining walls are provided with vertically extending grooves **92** that receive the ears **86** of the guide plates **84** and thereby constrain the movable contact member **34** for reciprocation relative to the stationary contacts in a plane perpendicular to the plane of the base. The exterior walls **56** and **58** of the casing are formed to provide a notch which is open at the top surface of the respective walls which notch is provided with a rounded bearing surface **94** at its lowermost extremity, a straight wall **96** on one side of the bearing surface, and a shorter wall **98** joined to a downwardly inclined wall **100** on the other side. The bottom of the notch provides a bearing surface **94** for the operating crank **102**. The portions of the interphase walls **52** and **54** in line with the notches are cut away, as at **103**, to provide a clearance for the operating crank **102**.

The operating crank or common actuator **102**, of insulation, is provided with bearing members **104** at each end that cooperate with the bearing surface **94** of the notches to rotatably support the actuator and to position the pivotal axis of the actuator in a plane substantially parallel to the base **35** of the casing **28**. Operating crank **102** is provided with multiple pairs of arms **106** that carry a bridging member **108**. The arms **106** extend from the body **107** of the crank into each of the pole spaces A, B and C for operative engagement with respective ones of the movable contacts **34**. Bridging member **108** is circular in cross section and engages the hook-shaped portion **80** of the movable contact. The members **108** provide connection between the arms **106** and the movable contacts. The various pairs of arms **106** are spaced from one another to all relative movement of the crank with respect to the interphase walls **52**, **54**. Coupling rod **110** is secured to the operating crank **102** and extends upwardly therefrom for engagement by a portion of the operating mechanism **90** to be described below. Rotation of the operating crank **102** about its pivotal axis as produced by the operating mechanism causes the reciprocation of the movable contacts **34** between the on and off positions.

The operating mechanism **90** includes the cover plate **22**, that carries the twist handle **26**, and a mechanism plate **112**. Mechanism plate **112** is secured to the casing **28** at the supports **88** and carries a snap-acting overcentering toggle linkage **114** (FIG. 3) on its upper surface. The plate **112** lies in a plane parallel to the plane of the base **35** and the movement of the toggle **114** lies in this plane. The overcentering mechanism **114** includes a cam plate **116** pivoted at **118** on the plate **112**. Overcentering spring **120** is positioned about link **122** which engages a pin **124** carried by the cam plate **116**. Pin **124** forms the knee of the toggle **114**. The other end of link **122** is slidable through an aperture **126** in a support member **128** which is pivotally mounted at **130** on plate **112**. Spring **120** reacts between support **128** and a widened portion **122***a* of the link adjacent the point of engagement with the pin **124**. A lever **132**, pivoted at one end at **134** on the underside of the mechanism plate, is bifurcated at its free end **136** to receive the coupling rod **110** between the legs thereof. The coupling rod **110** extends upwardly through the mechanism plate **112** through aperture **138**. Lever **132** is provided with a pin **140** that passes through an aperture **142** in the mechanism plate for engagement with a slot **144** formed in the cam plate **116**. Pin **140** and slot **144** provide a lost-motion connection between the overcentering mechanism **114** and the coupling rod **110**.

As previously described, the twist handle **26** is pivotally mounted on the cover plate **22** for movement between the on and off positions about an axis which is perpendicular to the plane of the operating mechanism **90** and the plane of the base **35** of the casing **28**. Member **146** is secured to a portion of handle **26** that extends through the cover plate **22** for pivotal movement therewith at the opposite face of the plate **22** in operative relation to the overcentering mechanism **114**. Member **146** has a pair of spaced legs **146***a* and **146***b* (FIG. 3) for engagement with the toggle knee pin **124** carried by cam plate **116**. In-

terlocking tabs **148** and slots **150** are provided in the cover plate **22** and mechanism plate **112** respectively for securing these parts together. Positioning members **152**, of insulation, are located in apertures **154** in the mechanism plate, and are retained in the plate against displacement by coaction with the cover plate and the mechanism plate. The members **152** extend below the plane defined by the supports **88** and are interposed between the exterior walls **56**, **58** of the casing and the respective adjacent outside arms **106** of the operating crank **102**. The insulators **152** close the notch formed in the outside walls **56** and **58** and serve to retain the bearing portions **104** of the operating crank in position in engagement with the bearing surface **94** of the notches formed in the outside walls (see FIG. 5).

The mode of assembly of the illustrative embodiment of the invention will be best understood from the following description taken in conjunction with FIG. 7. The stationary contacts **30** and **32** are secured to the base **35** of the casing **28** and then the arc chutes **44** are positioned thereover. The cover plate **60** for the arc chute is next inserted and secured to the projections **50**. The moving contact assemblies **34** are then inserted into the respective pole spaces with the guide plates **86** in engagement with the grooves **92**, and the legs **78** of the insulating side plates straddle the transverse wall **38**. The portions of the contact on opposite sides of the wall **38** are identical and the contacts may be characterized as having their axis of symmetry aligned with one another and transverse the planes of the broad faces of the walls. The operating crank **102** is next inserted, being dropped into position, with the bridging members **108** entering into engagement with the hooked portions **80** of each of the movable contacts **34**. The descent of the operating crank **102** continues until the bearing surfaces **104** thereon engage the bearing surfaces **94** formed in the side walls **56**, **58** of the casing. Next, the mechanism plate **112** is positioned on and secured to the supports **88** with the coupling rod **110** of the operating crank **102** between the legs of the operating lever **132** carried by the mechanism plate. Insulators **152** are then inserted into the apertures **154** in the mechanism plate and are positioned between the exterior walls **56**, **58** of the casing and the respective adjacent arms **106** of the operating crank **102**. The cover plate **22** is then engaged with the mechanism plate by means of the tabs **148** and slots **150**, respectively, with the legs **146***a* and **146***b* of the handle-carried member **146** straddling the pin **124**. The completed interrupter **110** is then mountable in the enclosure of FIG. 1.

The illustrative embodiment of the invention is illustrated in FIGS. 1 through 5 in the off or open circuit position. At this time the movable contacts **34** are elevated to a position clear of the stationary contacts **30**, **32**. When the twist handle **26** is driven from the off position to the on position, the leg **146***a* of the member **146** secured to the handle drives the knee pin **124** of the toggle **114** overcenter of a line between the pivots **118** and **130**. During the initial portion of this movement the spring **120** is compressed between link portion **122***a* and support **128** thereby building up the force required to operate the interrupter. Once the center line position has been passed the pin **124** travels overcenter with a snap action which snap action is transmitted to the lever **132**. The lost motion coupling between the cam plate **116** and pin **140** allows movement of the handle toward the operating position without disturbing the position of the lever **132** until the snap action is ready to occur. The snap movement of the pin **124** causes cam plate **116** to drive against the pin **140** coupled to the lever **132**. When the pin **124** snaps overcenter it also drives against the leg **146***b* of the member **146** and thus pivots the operating handle **26** to the on position.

When the lever **132** is driven from the off position shown in FIG. 3 to the on position, the operating crank **102** is caused to pivot on the bearing surfaces **94** provided in the exterior walls by virtue of the connection between the coupling rod **110** and the bifurcated lever end **136**. Pivotal movement of the operating crank **102** about its axis, which is disposed in a plane perpendicular to the planes of the respective walls and interphase barriers, causes pivotal movement of the bridging member **108** about the crank axis. The movable contacts are restrained to vertical movement by virtue of the engagement of guide plate ears **86** thereon with the grooves **92** formed in the opposed surfaces of the walls and barriers. The snap movement of lever **132** causes a rapid movement of the contact assemblies **34** toward and into engagement with the stationary contacts **30** and **32**. The rounded contact surfaces **62***a* of the moving contact first engage the contact surfaces **30***b* and **32***b* respectively of the stationary contacts and then are driven between them assuring firm contact pressure. The force of the spring **120** as transmitted through the lever **132** to the common actuator or crank **102** provides sufficient force for driving the contact surfaces **62***a*, **30***b* and **32***b* together against the inherent resilience of the legs **66** of the bridging member **62** and the bias of the contact pressure augmenting spring **68** positioned therebetween.

When the interrupter is to be turned reverse movement of the parts occurs, i.e., the leg **146***b* of the member attached to the operating handle **26** drives the pin **124** overcenter in the reverse direction. One again, the lost-motion coupling between the pin **140** and the cam plate **116** allows movement of the handle to occur without disturbing the position of the operating crank **102**. Once the pin **124** crosses overcenter then the actuator **102** is moved reversely from the position shown in FIG. 7 to the position shown in FIG. 5 and the moving contact assemblies **34** are lifted from engagement with the stationary contacts **30**, **32**, by virtue of the force stored in the overcentering spring **120**. In the event that the interrupter is opened under load the transverse wall **38** separates the arc into two segments and the arc chutes **46** act to extinguish the arcs formed between the moving contact and the adjacent contact in a manner well known in the art.

While the overcentering mechanism **114** has been illustrated in conjunction with reciprocable contacts it may also be advantageously employed with pivoted contact arms as shown and described in my copending application entitled "Circuit Interrupter," Serial No. 394,521 filed September 4, 1964 which is assigned to the assignee hereof.

While there has been disclosed above an exemplary embodiment of the invention which is presently preferred, it will be apparent to those skilled in the art that various modifications and changes may be made therein without departing from the spirit or scope of the invention.

What I claim is:

1. A circuit interrupter including a casing having a base lying in a given plane and upstanding walls defining a plurality of pole spaces, a pair of stationary contacts mounted on said base in each of said pole spaces, movable contacts in each of said pole spaces, said movable contacts being movable in a direction perpendicular to the plane of said base from a position engaging said stationary contacts to a remote position, operating mechanism for said interrupter mounted on said casing, said operating mechanism including overcentering spring means, said overcentering spring means being operable in a plane parallel to the plane of said base, and means interconnecting said movable contacts and said operating mechanism for snap acting conjoint reciprocating movement of said movable contacts between said engaged and remote positions.

2. A circuit interrupter including a casing having a base lying in a given plane and upstanding walls defining a plurality of pole spaces, said walls having their broad faces aligned in parallel planes perpendicular to the plane

of said base, a pair of stationary contacts mounted on said base in each of said pole spaces, movable contact assemblies in each of said pole spaces, said movable contact assemblies being aligned with their axis of symmetry transverse to the planes of the walls and being movable in a path perpendicular to the plane of said base from a position engaging said stationary contacts to a remote position, means for guiding said contact assemblies in said perpendicular path, operating mechanism for said interrupter mounted on said casing, said operating mechanism including overcentering spring means, said overcentering spring means being operable in a plane parallel to the plane of said base, and means interconnecting said movable contact assemblies and said operating mechanism for conjoint reciprocating movement of said contact assemblies between said engaged and remote positions along said perpendicular path.

3. A circuit interrupter including a casing having a base lying in a given plane and upstanding walls defining a plurality of pole spaces, said walls having their broad faces aligned in parallel planes perpendicular to the pane of said base, said walls formed in each pole space to provide a pair of opposed grooves perpendicular to the plane of said base, a pair of stationary contacts mounted on said base in each of said pole spaces, movable contact assemblies in each of said pole spaces, said movable contact assemblies being aligned with their axis of symmetry transverse to the planes of the walls and being movable in a path perpendicular to the plane of said base from a position engaging said stationary contacts to a remote position, said contact assemblies having portions engaging said grooves for guiding said assemblies in said perpendicular path, operating mechanism for said interrupter mounted on said casing, said operating mechanism including overcentering spring means, said overcentering spring means being operable in a plane parallel to the plane of said base, and means interconnecting said movable contact assemblies and said operating mechanism for conjoint reciprocating movement of said contact assemblies between said engaged and remote positions along said perpendicular path.

4. A multipole circuit interrupter including a casing having a base, upstanding walls, and interposed barriers of insulation, said walls and said interposed barriers being spaced from one another and having their broad faces aligned in parallel planes, said planes being perpendicular to the plane of the base, a pair of opposed stationary contacts mounted on said base between the confronting faces of said walls and barriers, a movable bridging contact complementary to said stationary contacts, guide means for said movable contact means formed in said opposed faces of said walls and barriers, said movable contact having portions engaging said guide means and thereby being positioned for reciprocating motion in a plane perpendicular to said base from a position in engagement with said stationary contacts and a postion remote therefrom, a common actuator bar spanning said walls and interposed barriers and having portions engaging said movable contacts in each of said spaces respectively, said actuator bar being pivoted in the walls of said device, a coupling rod secured at one end to said actuator bar, and operating mechanism for said interrupter mounted on said walls opposed to said base and having an operating handle movable between a first position and a second position in a plane parallel to the plane of said base, said operating mechanism including a snap-acting overcentering mechanism connected to said handle and being operable in a parallel plane spaced therefrom, said overcentering mechanism including a lever formed to provide connection between said coupling rod and said operating mechanism said overcentering mechanism moving said movable contacts between said remote position and said engagement position in response to movement of said handle between said first position and said second position.

5. A multipole circuit interrupter including a casing open at the top and having a base and upstanding walls defining a plurality of pole spaces, said walls having their broad faces aligned in parallel planes perpendicular to the plane of the base, said walls having portions of their respective top surfaces lying in a common plane parallel to the plane of the base, stationary line and load contacts in each of said pole spaces, a bridging contact movable relative to said stationary contacts between a position in engagement therewith and a remote position, guide means in each pole space for restraining the movement of said bridging contact to a plane perpendicular to the plane of said base and parallel to the planes of said walls, the outermost of said walls of said casing being notched at their top surface to provide bearing surfaces thereon, a common actuator positioned in said notches in bearing engagement with said surfaces for pivotal movement of said actuator about an axis perpendicular to the planes of said walls, said actuator having portions having operative engagement with respective ones of said movable contacts, operating means for said interrupter mounted on the top surfaces of said walls, said operating means including a twist handle pivotal about an axis perpendicular to the plane of the base and a snap-acting overcentering mechanism coupled to said handle and operable in a plane parallel to the plane of the base, means connecting said overcentering mechanism to said common actuator to thereby move said common actuator and said movable contacts in response to operation of said twist handle, and means carried by said operating means for retaining said common actuator in said notches.

6. Front-operated switching apparatus including an operating handle having a pivot, an overcentering spring mechanism operable in a plane perpendicular to the axis of said pivot, said overcentering spring mechanism including a link having a pivot whose axis is perpendicular to said plane and a stressed spring connected to said link and acting along a line that crosses said pivot of said link, and a lost-motion coupling between said link and said handle enabling reverse snap-acting overcentering operations of said mechanism, a switch operating crank pivoted about an axis parallel to said plane and having a pin-and-slot coupling with said link for operation thereby, and companion contacts operable between closed and open positions and including one movable contact mechanically connected to said operating crank for operation thereby.

7. A multipole circuit interrupter including a casing having a base and upstanding walls defining a plurality of pole spaces, a stationary contact mounted on said base in each of said pole spaces, a movable contact in each of said pole spaces, said movable contacts being movable from a position engaging said stationary contacts to a remote position, means coupling said movable contacts for conjoint movement between the aforesaid positions, means on said walls providing bearing surfaces for pivotally supporting said coupling means, operating mechanism for said coupling means for moving said movable contacts, said operating mechanism being mounted on said walls, and means interposed between said operating mechanism and said coupling means for retaining said coupling means in engagement with said bearing surfaces.

8. A multipole circuit interrupter including a casing having a base and upstanding walls defining a plurality of pole spaces, a stationary contact mounted on said base in each of said pole spaces, a movable contact member in each of said pole spaces, said movable contact members being movable from a position engaging said stationary contacts to a remote position, a crank having axially aligned bearing portions and axially aligned eccentric portions for coupling said movable contact members for conjoined movement between the aforesaid positions, notches having upwardly facing openings formed in said walls providing bearing surfaces at the bottom of said notches engaged by the bearing portions of said crank for pivotally supporting said crank, operating mechanism for said crank for moving said movable contact members, said operating mechanism being mounted on said walls,

and means interposed between said operating mechanism and said bearing portions of said crank for retaining said bearing portions in engagement with said bearing surfaces.

9. A multipole circuit interrupter including a casing having a base and upstanding walls defining a plurality of pole spaces, a stationary contact mounted on said base in each of said pole spaces, a movable contact member in each of said pole spaces, said movable contact members being movable from a position engaging said stationary contacts to a remote position, a crank having axially aligned bearing portions and axially aligned eccentric portions for coupling said movable contact members for conjoined movement between the aforesaid positions, notches having upwardly facing openings formed in said walls providing bearing surfaces at the bottom of said notches engaged by the bearing portions of said crank for pivotally supporting said crank, said crank eccentric portions engaging said movable contact members in a direction transverse the path of movement of said movable contact members when said crank is positioned in said notches, operating mechanism for said crank for moving said movable contact members, said operating mechanism being mounted on said walls, and means interposed between said operating mechanism and said bearing portions of said crank for retaining said bearing portions in engagement with said bearing surfaces.

10. A multipole circuit interrupter including a casing having a base and upstanding walls defining a plurality of pole spaces, a stationary contact mounted on said base in each of said pole spaces, a movable contact members in each of said pole spaces, said movable contact members being movable from a position engaging said stationary contacts to a remote position, a crank having axially aligned bearing portions and axially aligned eccentric portions for coupling said movable contact members for conjoined movement between the aforesaid positions, notches having upwardly facing openings formed in said walls providing bearing surfaces at the bottom of said notches engaged by the bearing portions of said crank for pivotally supporting said crank, a front cover part secured to said casing, a pivoted manual actuator mounted in said cover for motion about an axis perpendicular thereto, said manual actuator having a portion engageable with said crank, and a part confined between said front plate and the bearing portions of said crank opposite the bottoms of said notches.

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