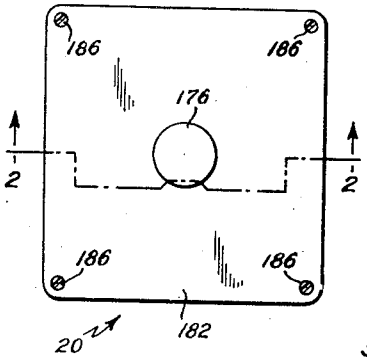
Nov. 12, 1957 W. A. MASCIOLI ET AL 2,813,168

ELECTRICAL SWITCH

Filed Oct. 11, 1956

4 Sheets-Sheet 1

Fig. 1.



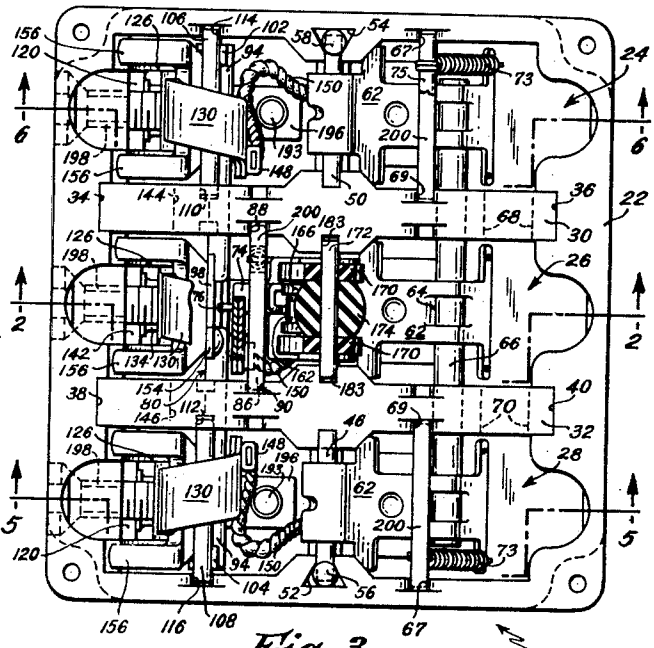


Fig. 3.

Fig. 2.

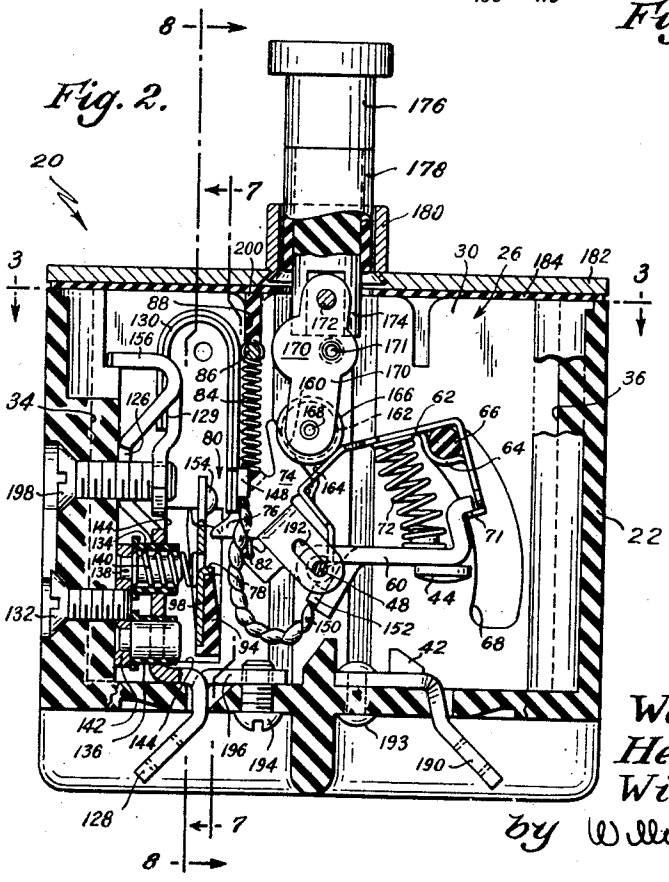
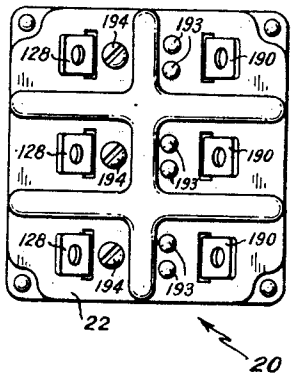


Fig. 4.



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ELECTRICAL SWITCH

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Fig. 9.

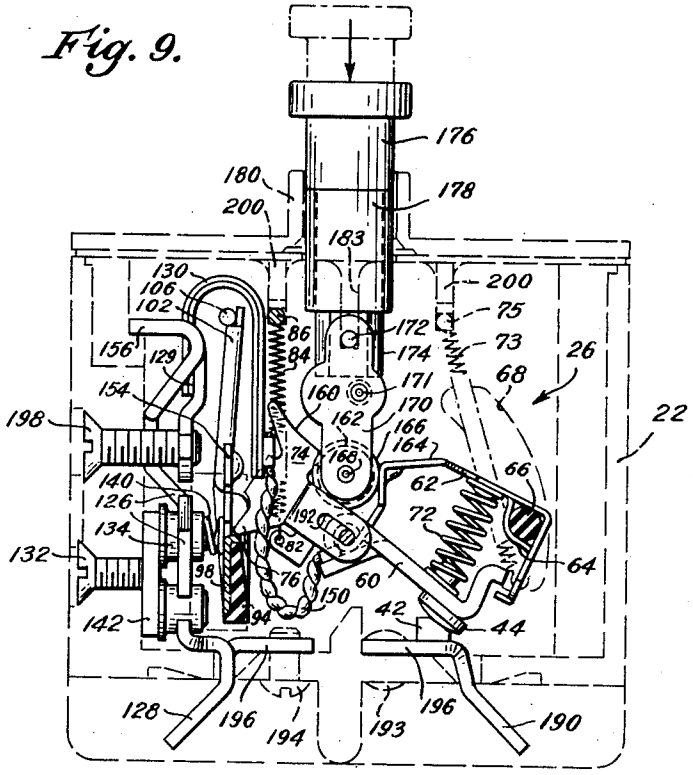


Fig. 11.

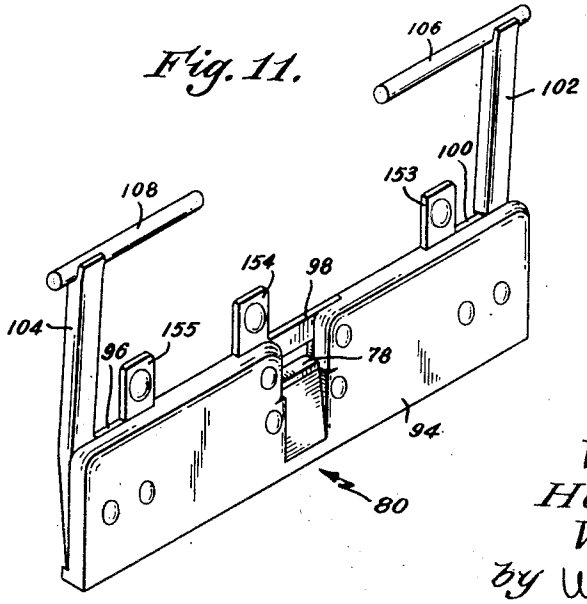
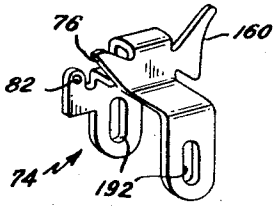


Fig. 10.



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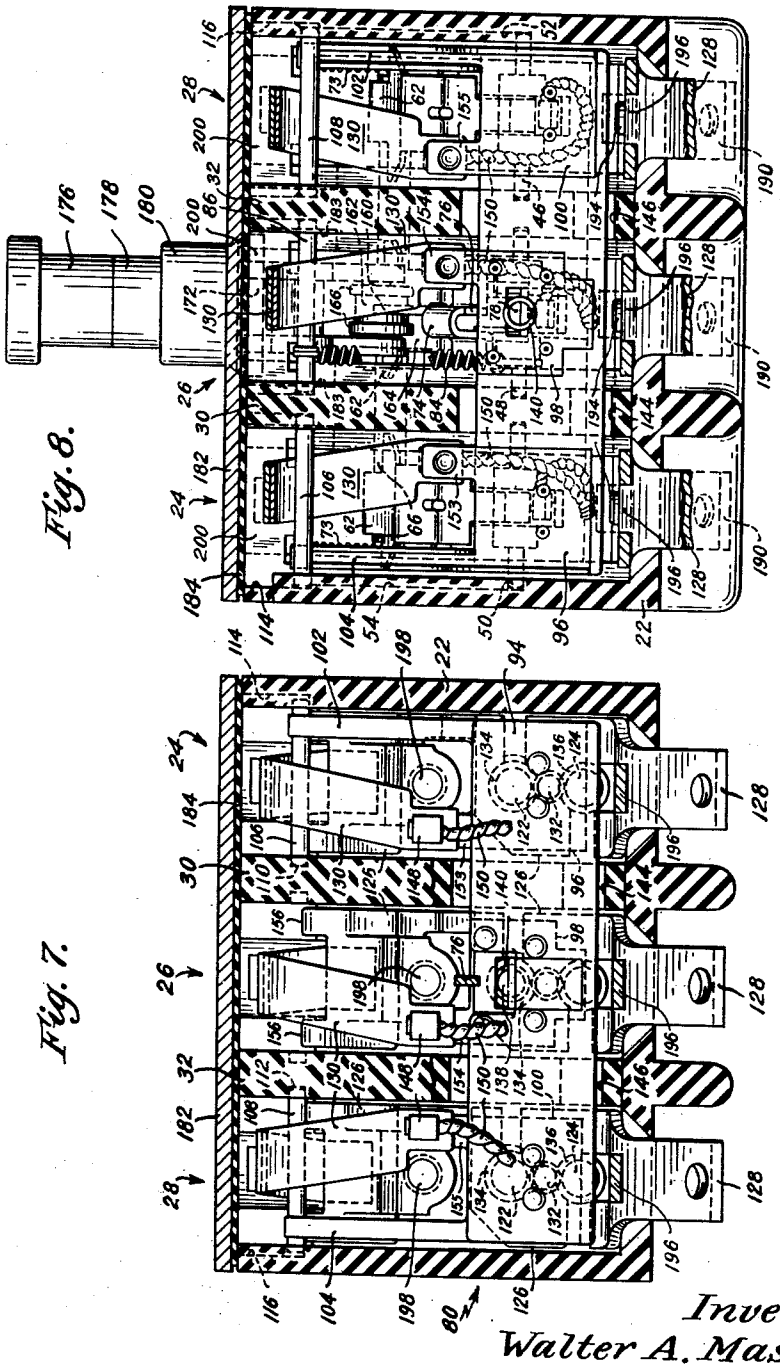


Fig. 8.

Fig. 7.

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ELECTRICAL SWITCH

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Fig. 6.

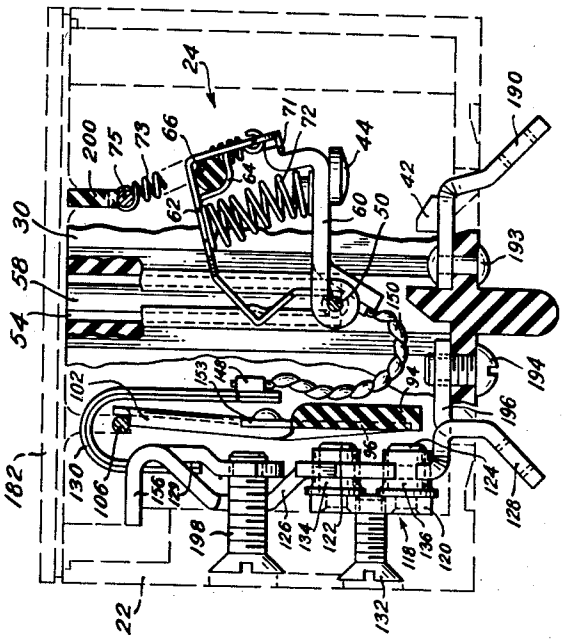
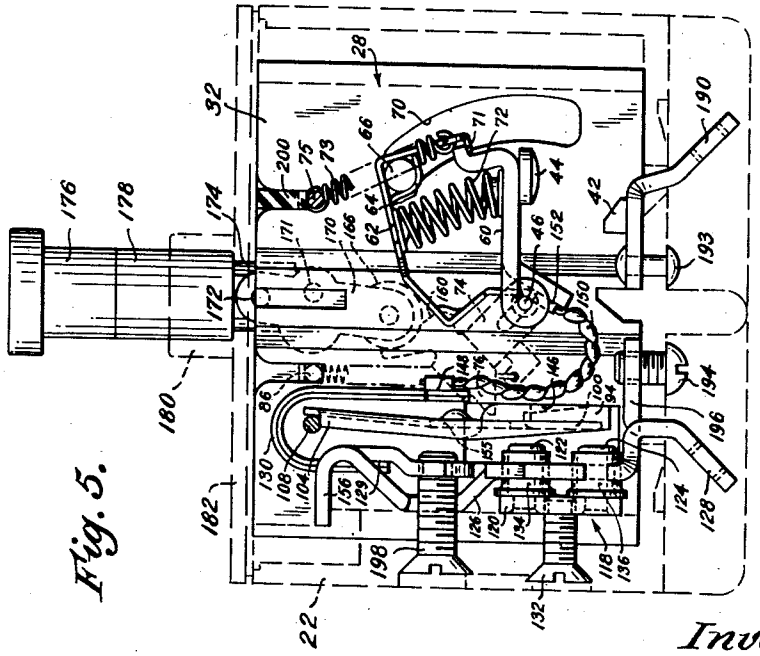


Fig. 5.



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United States Patent Office 2,813,168 Patented Nov. 12, 1957

2,813,168

ELECTRICAL SWITCH

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Application October 11, 1956, Serial No. 615,345

6 Claims. (Cl. 200—88)

This invention relates to a circuit breaker, and more particularly to a circuit breaker including a plurality of sections each of which includes electrical contacts adapted to be manually and/or automatically opened and closed.

An object of this invention is to provide such a circuit breaker having improved operating characteristics.

A further object of this invention is to provide such a circuit breaker which is capable of being built-up by means of a preassembled main subassembly which is then insertable into a casing.

A further object of this invention is to provide such a circuit breaker having high shock and vibration resistance. A further object of this invention is to provide such a circuit breaker having such high shock and vibration characteristics along with individual loading and simultaneous breaking of the contacts of the respective sections.

A further object of this invention is to provide such a circuit breaker which is compact, dependable in operation and economical to manufacture.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which several of the various possible embodiments of the invention are illustrated:

Fig. 1 is a plan view of an electrical device falling within the scope of this invention;

Fig. 2 is a sectional view of the device in released, contacts-open position, this view being taken along line 2—2 in each of Figs. 1 and 3 and being on an enlarged scale over that of Fig. 1, certain of the parts being broken away for purposes of clarity of illustration;

Fig. 3 is a sectional view taken along line 3—3 in Fig. 2;

Fig. 4 is a bottom view of the device of this invention on the same scale as that of Fig. 1;

Fig. 5 is a sectional view taken along line 5—5 in Fig. 3;

Fig. 6 is a sectional view taken along line 6—6 in Fig. 3, a portion of the internal wall of the casing being broken away clearly to show the relationship between one of the retaining pins and its recess;

Fig. 7 is a sectional view taken along line 7—7 in Fig. 2;

Fig. 8 is a sectional view taken along line 8—8 in Fig. 2;

Fig. 9 is a view similar to Fig. 2 but showing the parts in actuated, contacts-closed position;

Fig. 10 is an isometric view of the latch-engageable member of the embodiment of this invention illustrated in the drawings; and

Fig. 11 is an isometric view of the latch thereof.

It will be recognized that certain parts in several of the figures in the drawing have been omitted for the purpose of clarity of illustration.

The embodiment of this invention as particularly described herein takes the form of the circuit breaker indicated generally by the numeral 20. Circuit breaker 20 includes a casing 22 formed of an insulating material such as one of the customary molded plastics and having its upper end open (as viewed in Fig. 2). Casing 22 provides a plurality of sections generally indicated by reference numerals 24, 26 and 28, respectively, adjacent sections being divided by separators 30 and 32, respectively. It will be clear that the number of sections to be provided by the device may vary as determined by individual requirements. Separators 30 and 32 have their opposite ends disposed in inwardly facing, opposed recesses 34 and 36, and 38 and 40, respectively. Recesses 34, 36, 38 and 40 are provided by casing 22 and extend to the open end of the casing.

Each of sections 24, 26 and 28, includes a fixed contact 42, a movable contact 44 and means carrying the movable contact for pivotal movement about a common axis. This axis is coincident with the axis of each of pivot pins 46, 48 and 50, each of which is coaxial with the others. Pivot pin 48 is supported at its ends in opposed sockets provided by the adjacent portions of separators 30 and 32. Each of pivot pins 46 and 50 has one end disposed in like manner in a socket provided by the adjacent portion of the respectively adjacent separator. The opposite end of pivot pin 46 is disposed at the bottom of a dove-tailed recess 52 which extends to the open end of the casing. In like manner the opposite end of pivot pin 50 is disposed at the bottom of a similar recess 54. Retaining pins 56 and 58 are disposed in recesses 52 and 54, respectively, in abutment with the respectively adjacent pin thereby to retain that pin at the bottom of its respective recess in a manner to be particularly described later in this description.

The means mounting the movable contact 44 of each of the sections for pivotal movement about the above-stated common axis includes a contact-carrying arm 60 pivotally mounted on its respective pivot pin. Also mounted on each of pivot pins 46, 48 and 50 is a member 62. Member 62 of each of the sections includes a loop 64 deformed therefrom to provide spaced portions within which a common connecting link 66 is disposed with a snug fit whereby all of members 62 are mounted for movement in unison about the said common axis. Connecting link 66 is preferably formed of electrically insulating material and extends across all of the sections of the circuit breaker. It will be noted that each of separators 30 and 32 provides a slot 68, 70, respectively, for the reception of connecting link 66 throughout movement of members 62 between opposite extreme pivotal positions.

Each of members 62 is resiliently biased away from the member 60 with which it cooperates by means of a spring 72. Opposed shoulders provided by members 60 and 62 meet at 71 to limit the extent to which these members are biased away from each other. It will be apparent that so long as no restraining force is applied to any one of members 60, each of these members will pivot in unison about said common axis along with its respective cooperating member 62.

Member 62 of each of the outer sections has one end of a tension spring 73 connected thereto, the other end of which is connected to a pin 75. The internal walls of casing 22 provide opposed recesses 67, 67, each of which lies opposite a similar recess 69, 69 provided by the adjacent separator. Each of recesses 67, 67, 69, 69 extends to the open end of casing 22. Each of pins 75, 75 has

its opposite ends disposed at the bottom of one of these pairs of recesses. Since members 62 of the three sections are secured to common connecting link 66, tension springs 73, 73 resiliently bias all three of members 62, along with their respectively cooperating members 60, away from the fixed contact 42 of their respective sections.

In one of the sections, preferably the centermost section (or one of the centermost sections if more than three sections are provided), a latch engageable member 74 is provided and mounted for pivotal movement about the aforementioned pivot pin of that section. Latch-engageable member 74 is movable about said common axis by means later to be described to bring a projection or abutment 76 carried thereby into engagement with an opposed projection or abutment 78 fixedly carried by a latch 80. Referring to Fig. 10, latch-engageable member 74 provides an eye 82 for attachment of one end of a tension spring 84, the other end of which spring is supported by a pin 86. Separators 30 and 32 provide opposed, inwardly extending recesses 88 and 90, respectively, for the reception of the opposite ends of pin 86 whereby the pin is mounted in recesses 88 and 90 in the same manner that pins 75, 75 are mounted in their respective recesses. By means of tension spring 84 and its above-described connections, latch-engageable member 74 is resiliently biased in a clockwise direction about said common axis as viewed in Fig. 2.

Latch 80 includes a latch bar 94 formed of a suitable electrically insulating material. Mounted in fixed, mutually isolated relationship to each other on latch bar 94 are a plurality of members 96, 98 and 100. Each of members 96 and 100 includes an integral leg 102 and 104, respectively, having its distal end secured as by brazing or welding to a pin 106 and 108, respectively. The inner ends of pins 106 and 108 are disposed in sockets 110 and 112, respectively, provided by respective separators 30 and 32. The outer ends of pins 106 and 108 are disposed at the bottom of recesses 114 and 116, respectively, provided by the respectively adjacent portions of the casing. Each of recesses 114 and 116 extends to the open end of casing 22.

One of members 96, 98 and 100 is disposed in each of sections 24, 26 and 28 and each of these members acts as the armature of an electromagnet in a manner now to be described. The electromagnet means for each of members 96 and 100 is or may be substantially identical to the other and therefore a detailed description of one will suffice for both. Referring to Fig. 5, the electromagnet means for armature 100 is generally indicated by the reference numeral 118 and includes a block 120 having two pole pieces 122 and 124 integrally secured thereto. Electrically conductive means 126 extends from one end portion 128, which acts as a terminal, into the interior of the casing 22 and courses in a counterclockwise path about pole piece 124, between the pole pieces, and then in a clockwise path about pole piece 122, all as viewed in Fig. 7. Electrically conductive means 126 extends upwardly above pole pieces 122 and 124 as viewed in Fig. 5 to a point 129 at which it is secured in electrically conductive relationship to a thermostatic member 130 for a purpose later to become apparent. Block 120 is secured in fixed relation to casing 22 by means of a headed screw 132 which is threaded in tightened engagement with an aperture in the block. Each of pole pieces 122 and 124 is provided with a sleeve 134, 136, respectively, which is formed of electrically insulating material. In this manner, each of pole pieces 122 and 124 is electrically insulated from conductor 126. It will be apparent that upon the flow of current of sufficient magnitude through electrically conductive means 126, electromagnet means 118 will be energized to attract armature 100 to the left as viewed in Fig. 5 thereby swinging latch bar 94 in a clockwise direction about the axis of pins 106 and 108.

The electromagnet means for armature 98 is or may be substantially identical with that for each of armatures 96 and 100 except as pointed out as follows. Referring to Fig. 2, pole piece 138 is formed with a diameter slightly reduced over that of each of the other pole pieces to accommodate a compression spring 140 which lies in concentric relation with that pole piece and the insulating sleeve thereabout. Spring 140 has its opposite ends disposed against block 142 of this electromagnet means and armature 98, respectively. It will be apparent that compression spring 140 resiliently biases latch 80 in the counterclockwise direction as viewed in Fig. 2, the extent of counterclockwise movement of the latch being determined by engagement of latch bar 94 with the adjacent edge of openings 144 and 146 in separators 30 and 32, respectively.

Additional means are provided for swinging latch bar 94 in a clockwise direction as viewed in Fig. 2, these means being operable both independently and in combination with the electromagnetic means. These additional means take the form of a plurality of thermally responsive members 130, one for each of the sections. All of these additional means being of substantially identical form, only the additional means 130 which is disposed in section 28 need be particularly described. Thermally responsive means 130 takes the form of a bimetallic element which, as stated above, is secured in electrically conductive relationship with conductor 126. The distal end of bimetallic member 130 is connected as by brazing or welding at 148 to one end of a flexible lead 150, the other end of which is secured in electrically conductive relationship to contact-carrying arm 60 at 152. It will now be apparent that an electrically conductive path is established leading from movable contact 44 of each of the sections through the following respective parts of each section: contact-carrying arm 60, flexible lead 150, bimetallic element 130, conductor 126 and terminal 128. Upon a rise in temperature of bimetallic member 130, due to current flowing through bimetallic element 130, the distal end of this member is movable to the left as viewed in Fig. 5. The extent of movement of the distal end of bimetallic member 130 to the left as viewed in Fig. 5 is proportional to the magnitude of the current therethrough. Upon the flow of current of sufficient magnitude through bimetallic member 130, the distal end of this member is movable against that one of projections 153, 154 and 155 carried by the respective one of members 96, 98 and 100 of that section thereby to swing latch bar 94 to the left in a clockwise direction about the axis of pins 106 and 108 as viewed in Fig. 5. As noted in Figs. 7 and 8, member 130 in section 28 may be canted in the opposite direction from that of the others in order to dispose its distal end nearer latch abutment 78 than otherwise would be the case.

Electrically conductive means 126 of each of the sections includes an extension 156 which mounts the junction between itself and the bimetallic member 130 to which it is secured, in spaced relation to the adjacent wall of the casing (see Figs. 5 and 7).

It will be apparent from the above that latch bar 94 is swingable to the left in a clockwise direction about the axis of pins 106 and 108 (as viewed in each of Figs. 2, 5, 6 and 9) under the influence of each of the electromagnetic means of each of the sections and under the influence of each of the thermally responsive means of each of the sections, each independently or in combination with any one or more of the others. Until latch bar 94 is so moved to the left as viewed in Figs. 2, 5, 6 and 9, the latch 80 is operable releasably to retain the movable contact 44 of each of the sections in electrically conductive engagement with its respective fixed contact 42 in a manner pointed out as follows.

With reference to Figs. 2 and 8, latch-engageable member 74 of the center section 26 provides a cam surface 160 for cooperation with a roller 162. Member 62 of center section 26 provides a cam surface 164 for co-

operation with rollers **166, 166**. Rollers **162, 166** and **166** (see Fig. 8) are respectively mounted in coaxial relationship for rotation about a pin **168** which has its ends fixed in mutually spaced members **170, 170**. Members **170, 170** and pin **168** together form a yoke pivotally mounted for movement about a pin **172**. A link **171** has its opposite ends secured to members **170, 170**, respectively, to aid in rigidifying this yoke. Pin **172** passes in loosely interfitting engagement with apertures in the distal end of each of members **170, 170** and in similar interfitting engagement with an extension **174** of a push button **176**. As noted in Fig. 2, a sleeve **178** disposed about extension **174** is confined within a hub **180** for substantially rectilinear movement with push button **176** and extension **174** toward and away from the interior of casing **22**. Hub **180** is suitably secured in fixed relation to cover member **182** about an aperture in the latter through which extension **174** extends. The opposite ends of pin **172** ride in opposed recesses **183, 183**, each of which extends to the open end of the casing **22**. Recesses **183, 183** are provided by separators **30** and **32** as best shown in Fig. 3, these recesses guiding pin **172** for rectilinear movement in the same opposite directions as that of extension **174**. An insulating piece **184** is disposed between cover member **182** and the open end of casing **22**. Insulating piece **184** is secured tightly between cover member **182** and the open end of casing **22** by means such as headed screws **186** (see Fig. 1) which may be threaded in tightened engagement with adjacent apertures provided by casing member **22**.

The operation of circuit breaker **20** may be described as follows. With the parts in the position shown in Figs. 2, 3 and 5–8, in which the movable contact **44** of each of sections **24, 26** and **28** is in separated relation with respect to its fixed contact **42**, each of arms **62** is resiliently biased away from contact-carrying member **60** of its section to the extent limited by the engagement of the respective shoulders of these members at **71**. Also, member **62** and contact-carrying member **60** of each of the sections is resiliently biased upwardly as viewed in Fig. 2 under the influence of springs **73, 73**, and latch-engageable member **74** is resiliently biased upwardly as viewed in Fig. 2 under the influence of spring **84**. It will be noted that with the parts in the position of Figs. 2, 3 and 5–8, the combined force exerted by springs **72, 72, 72** is greater than the combined force exerted by springs **73, 73**, and that the combined force exerted by springs **73, 73** is greater than the force exerted by spring **84**. The result is that upon depression of push button **176**, rollers **166** ride along cam **164** provided by member **62** whereby roller **162** moves against cam surface **160** provided by latch-engageable member **74** thereby to swing the latch-engageable member in a counterclockwise direction about the axis of pin **48** until projection **76** moves into engagement with abutment **78** provided by latch **80**. Thereafter, roller **162** moves along cam surface **160** provided by latch-engageable member **74** thereby to move rollers **166, 166** against cam surface **164** provided by member **62**, causing member **62** along with member **60** to pivot in a clockwise direction about the axis of pin **48**. Members **62** and **60** pivot in unison with each other until movable contact **44** comes into engagement with fixed contact **42**. At this point lost motion of member **60** with respect to member **62** ensues whereby member **60** remains stationary while member **62** continues to move to the position shown in Fig. 9 at which the respective shoulders provided by members **60** and **62** are separated from each other. It will be noted that with the parts in the position shown in Fig. 9, wedging means or rollers **166, 166** and **162** have moved into an over-center position with respect to the latch-engageable member **74** and member **62**. With the parts in the position of Fig. 9, it will also be noted that an electrically conductive path is established from terminal **128** to fixed contact **42**. Each of fixed contacts **42** is fixedly secured in electrically conductive relationship with a terminal **190**. Since member **62** of each of the sections is secured to connecting link **66** as previously described, all of the members **62** along with their respective contact-carrying arms **60** are disposed in like manner with the movable contact **44** of each of these respective sections in electrically conductive engagement with its respective fixed contact **42**.

It will be recognized that by wedging the parts into over-center relationship with the structure as described above, the circuit breaker inherently possesses high shock and vibration resistance, and this along with the feature that each set of cooperating contacts is individually loaded into its contacts-closed position. Furthermore, since the means for moving each of the movable contacts into contacts-closed position is or may be identical with each of the others and since these respective means are constrained for movement by connection to a common connecting link, this feature of individual loading of the respective sets of contacts is coupled with the feature whereby a comparatively high degree of simultaneity of breaking of the respective sets of contacts is capable of being effected. To illustrate the high degree of simultaneity of breaking of the respective sets of contacts, it is noted that, under test, the exemplary circuit breaker embodiment shown and described herein was found to have accomplished breaking of the contacts of all three of the sections within a fraction of a single cycle when this circuit breaker was operatively connected in a system utilizing alternating current of 400 cycles per second.

The electrically conductive path between terminals **128** and **190** of each of the sections will remain intact until the latched condition described above is disrupted in any one of several different ways. First, push button **176** may be manually and forcibly retracted from the wedging, over-center relationship shown in Fig. 9 whereby the parts will quickly return under the influence of the respective springs to the position shown in Fig. 2. Alternatively, the parts are quickly movable from the position shown in Figs. 2, 3 and 5–8 to the position shown in Fig. 9 upon movement of abutment **78** carried by latch **80** out from under projection **76** carried by latch-engageable member **74**. As noted above, latch **80** is movable to the left in a clockwise direction about the axis of pins **106** and **108** as viewed in Fig. 2 under the independent or combined action of any one of the electromagnetic means or thermally responsive means of each of sections **24, 26** and **28**. That is, for example, under a moderate current overload through any one of bimetal members **130**, the distal end of that bimetal member is movable against its respective projection **154** to disengage abutment **78** carried by the latch from projection **76** carried by the latch-engageable member **74**. Also, upon a current overload of camparatively high magnitude such as that as might be occasioned by a short-circuit, the electromagnet means of any one of the sections **24, 26** and **28** will be energized sufficiently to attract the armature of that respective section thereby to release abutment **78** from projection **76**.

Upon movement of latch **80** in a clockwise direction about the axis of pins **106** and **108**, latch-engageable member **74** will first pivot in a counterclockwise direction since the combined force exerted by springs **73, 73** added to the combined force exerted by all of springs **72, 72, 72** is of a much greater magnitude than that of the force exerted by spring **84**. In this manner the parts are unlatched and member **62** in each of the sections moves upwardly as viewed in Fig. 2 thereby moving roller **162** against latch-engageable member **74** and causing the latter to pivot in a counterclockwise direction against the bias of spring **84**. The combined effect of springs **73, 73** and the springs **72** of all of the respective sections, is to snap the shoulder provided by each of members **62** against the adjacent shoulder provided by the respective

one of members 60 thereby to snap the movable contact 44 of each of the sections rapidly away from the fixed contact 42 with which it is associated. In this manner, welding or any other sticking between each of the movable contacts and the fixed contact with which it cooperates will be effectively broken. Continued movement of members 62 and 60 brings these parts back to the position of Fig. 2. Meanwhile, the initial counterclockwise movement of latch-engageable member 74 about the axis of pin 48 in combination with the effect of spring 84 and roller 162 results in movement of this member whereby slots 192, 192 provided by member 74 ride along pin 48. Latch-engageable member 74 and push button 176 then return to the position shown in Fig. 2 under the influence of spring 84. For additional details of the cooperative relationship among the latching and actuating parts in center section 26, reference may be had to United States Patent 2,613,296 granted on October 7, 1952, to M. B. Wood.

By virtue of openings 144 and 146 in separators 30 and 32, respectively, each of thermally responsive members 130 is disposed in mutually heating relationship to each of the others. Accordingly, if a current overload were to develop through two or more of the bimetallic members 130, each of which was thereby individually incapable of moving the distal end of that member 130 sufficiently to disengage latch 80 from projection 76, the combined effect of these bimetallic members could so release latch 80.

In assembling circuit breaker 20, the fixed contact 42 of each of the sections along with the terminal 190 secured thereto may be fixed to the casing by means such as a pair of rivets 193. With the exception of the actuating means and insulating piece 184, all of the internal parts of the device may be preassembled into a main subassembly which may be inserted as a unit into the casing. A headed screw 194 may be tightened in threaded engagement with a lateral extension 196 provided by each of terminals 128 thereby aiding in fixedly securing the electrically conductive means 126 and bimetal member 130 carried thereby to the casing. Headed screws 132 may be screwed into tightened threaded engagement with the respective aperture in the block of the electromagnet means of each of the sections thereby fixedly to secure these electromagnet means to the casing. Adjusting screws 198 may be inserted through the casing into each of the respective sections threadedly to engage an aperture in the intermediate portion of the electrically conductive means 126 of each of the sections for adjustment of the respective thermally responsive members 130.

Subsequently, each of pins 86, 75, 75 may be engaged with its respective spring and disposed in its respective recesses. A retaining piece 200 formed of electrically insulating material may be placed against each of pins 75, 75 and 86, each of these pieces having its opposite ends disposed in the same recesses as the pin against which it is placed. Retaining pins 56 and 58 may then be inserted in dovetailed recesses 52 and 54, respectively, against the respective end of pins 46 and 50. Insulating piece 184 may be placed against the inner face of cover member 182, after which sleeve 178 and push button 176 are inserted through hub 180 and assembled with the yoke formed by rollers 162, 166, 166, pin 168 and arms 170, 170. Pin 172 may then be inserted in the aligned apertures provided by arm 170, push button extension 174 and the other arm 170, the opposite ends of pin 172 are inserted into recesses 183, 183 and the cover member is then secured in place by means of headed screws 186. With cover member 182 so disposed, insulating piece 184 bears snugly against each of retaining parts 56, 58, 200, 200 and 200, thereby effectively retaining the respective parts against which these retaining parts bear.

One of the features of this invention leading to economy of manufacture is the fact that both of separators 30, 32 are or may be identical as are or may be all of the conductors 126, all of the members 62, all of contact-carrying arms 60, all of terminals 190 with their integral fixed contacts 42, all of springs 72, two of the electromagnet means 118, 118 and two of the bimetallic members 130.

It will be noted that since the latching mechanism of this invention is separate from each of bimetallic members 130, the latter members are not constantly loaded under the latching forces. One advantage of this feature is that deformation of member 130 due to such loading under high temperature conditions is avoided. Another advantage of a device incorporating this invention is that a novel arrangement is provided whereby a common latch, under the influence of means responsive to a fault in the circuit of any one of the sections, is effective simultaneously to open the contacts of all of the sections. Also, it will be apparent that circuit breaker 20 is trip-free of push button 176. That is, upon the occurrence of a fault in the circuit of any one of the sections, the contacts of all of the sections will be opened even though push button 176 is held in depressed position; and, so long as such a fault exists, depression of the push button will be ineffective to close the contacts of any of the sections.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results are attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. In combination: a plurality of fixed contacts; a plurality of arms pivotally mounted for movement about a common axis, each of said arms carrying a movable contact for cooperation with one of said fixed contacts; a latch-engageable member mounted for pivotal movement about said common axis; a plurality of additional members, each of said additional members being cooperable with one of said arms and mounted for pivotal movement about said common axis; means resiliently biasing each of said additional members away from the arm with which it is cooperable; means resiliently biasing said latch-engageable member and one of said additional members toward each other; wedging means operable to wedge said latch-engageable member and said one additional member apart into over-center relationship; a latch for releasably retaining said one additional member and said latch-engageable member in said over-center relationship when engaged with said latch-engageable member; and all of said additional members being secured to a common connecting link for movement in unison with each other; whereby movement of said wedging means to the over-center position is effective simultaneously to move each of said additional members and the arm with which it is cooperable to bring each of said movable contacts into engagement with its respective fixed contact and then to effect lost-motion between each of said arms and the additional member cooperable therewith against the resilient bias of the first-named biasing means.

2. The device as set forth in claim 1 including a plurality of thermostatic members, one electrically connected to each of said movable contacts, each of said theremostatic members being independently movable against said latch upon a current overload therethrough to release said latch-engageable member thereby to effect simultaneous separation of each of said movable contacts from its respective fixed contact; and said thermostatic members being in mutually heating relationship to each other.

3. The device as set forth in claim 1 including a

plurality of electrically conductive members, one electrically connected to each of said movable contacts, a plurality of electromagnet means mounted on said casing and each being disposed for energization adjacent one of said electrically conductive members, a plurality of armatures fixedly carried by said latch, each of said armatures being movable with said latch toward one of said electromagnet means in response to a current overload through the respective electrically conductive member thereby to release said latch-engageable member from engagement with said latch.

4. In combination: an open-ended casing formed of electrically insulating material and providing a plurality of sections; a separator formed of electrically insulating material disposed between adjacent sections; a pair of inwardly extending, opposed recesses provided by said casing for each separator, each of said recesses extending to the open end of said casing; each separator having its opposite ends disposed in its pair of recesses; each of said sections including a fixed contact carried by said casing, a movable contact cooperable with each of said fixed contacts and means carrying each of said movable contacts for pivotal movement about a common axis; said last-mentioned means of each of the sections being identical with each of the others; a common connecting link extending across said separators and fixed to all of said movable contact-carrying means thereby to constrain all of said movable contact-carrying means for movement in unison with each other about said common axis; a movable latch extending across said separators; each separator providing a slot for the reception of said connecting link and a slot for the reception of said latch; a latch-engageable member mounted for movement about said common axis; means movable against said latch-engageable member and one of said movable contact-carrying means to pivot said latch-engageable member and said one contact-carrying means about said axis and apart into over-center relationship whereby said latch-engageable member moves into releasably locked engagement with said latch and said contact-carrying means move their respective movable contacts into engagement with their respective fixed contacts.

5. The device as set forth in claim 4 including a plurality of thermostatic members, one electrically connected to each of said movable contacts, each of said thermostatic members being independently movable against said latch upon a current overload therethrough to release said latch-engageable member thereby to effect simultaneous separation of each of said movable contacts from its respective fixed contact; and said thermostatic members being in mutually heating relationship to each other.

6. In combination: a casing; a pair of cam members pivotally mounted for movement about a common axis; wedging means cooperable with said cam members to wedge the cam members apart into over-center relationship; a latch engageable with one of said cam members to retain that cam member in said over-center relationship; a plurality of fixed contacts mounted on said casing; a plurality of spaced arm members pivotally mounted for movement about said axis and each carrying a movable contact for cooperation with one of said fixed contacts; said other cam member being cooperable with one of said arm members; an additional member cooperable with each of the other of said arm members, pivotally mounted for movement about said axis and fixed, along with said other cam member, to a common connecting link for movement in unison with each other; means resiliently biasing each of said arm members away from the member with which it is cooperable; means resiliently biasing all of the members fixed to said common connecting link away from their respective fixed contacts; whereby movement of said wedging means to the over-center position is effective simultaneously to move each set of the cooperating members to bring each of said movable contacts into engagement with its respective fixed contact after which lost-motion ensues between each of said arm members and the member with which it is cooperable.

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