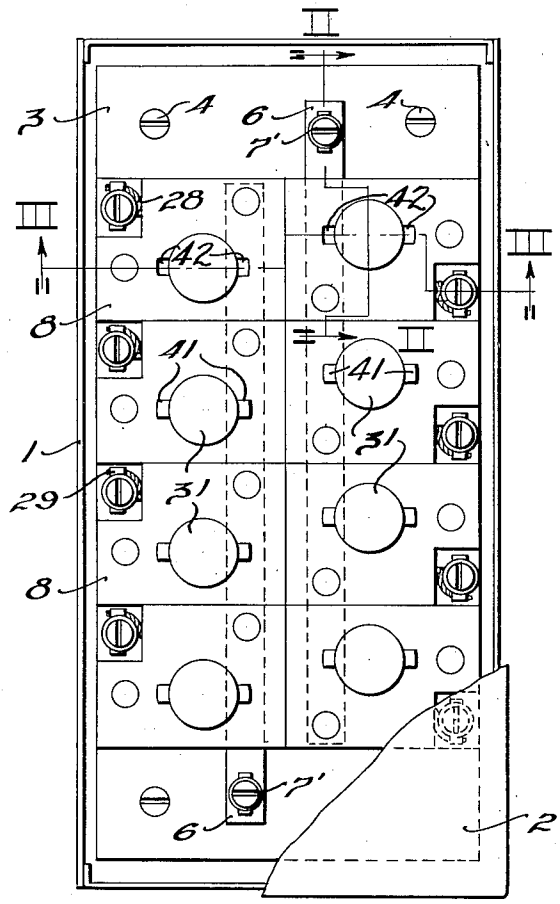
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CIRCUIT BREAKER

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Fig. 1.



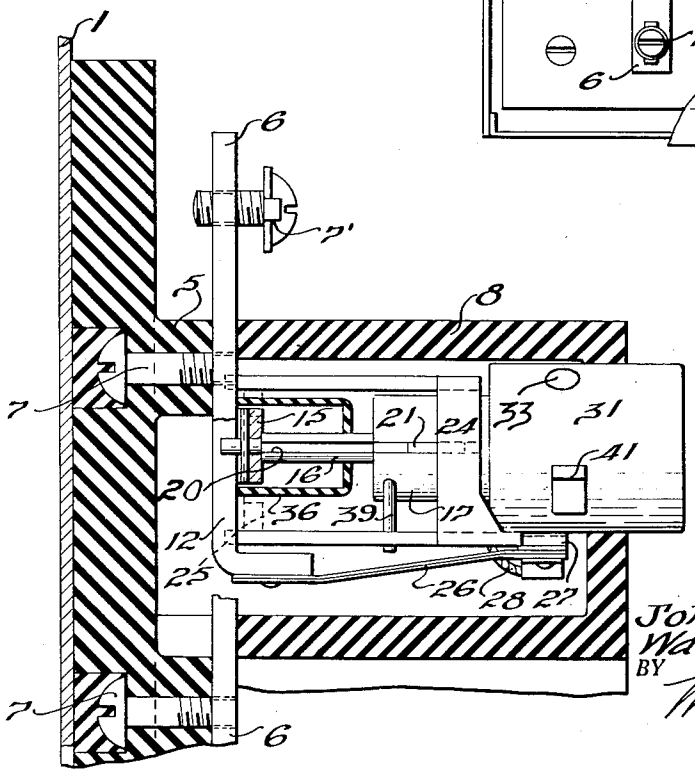


Fig. 2.

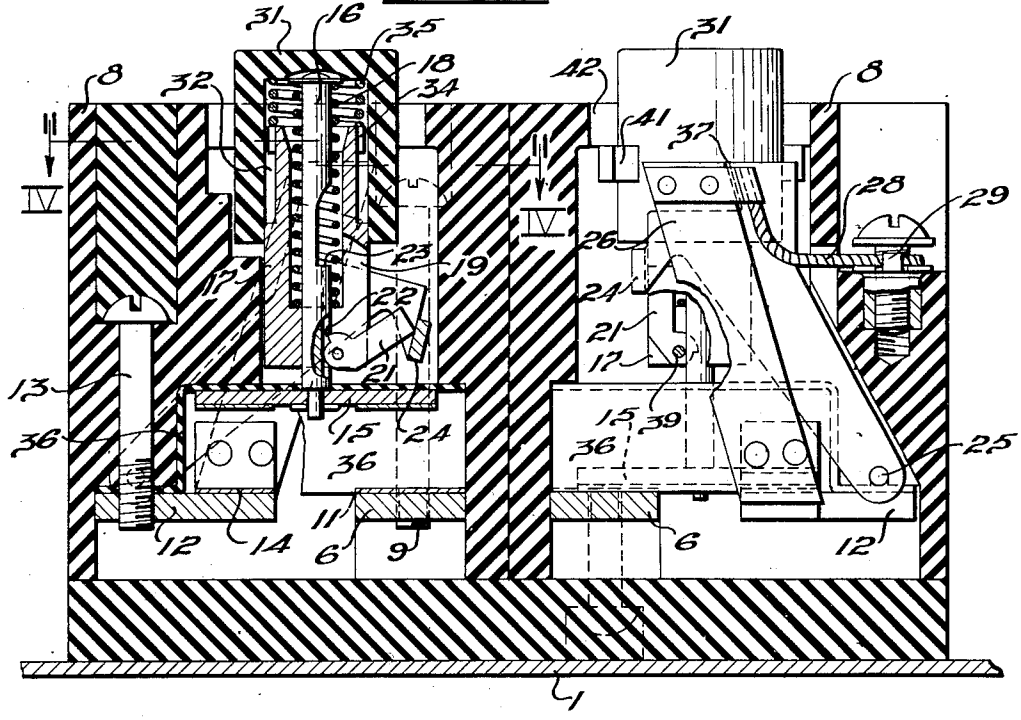
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CIRCUIT BREAKER

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Fig. 3.



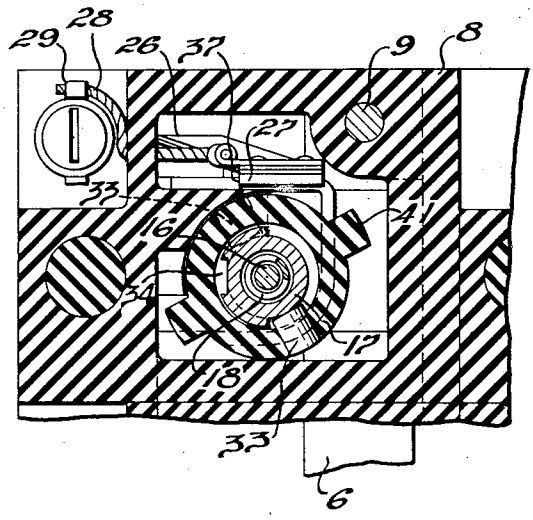


Fig. 4.

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CIRCUIT BREAKER

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Fig. 5.

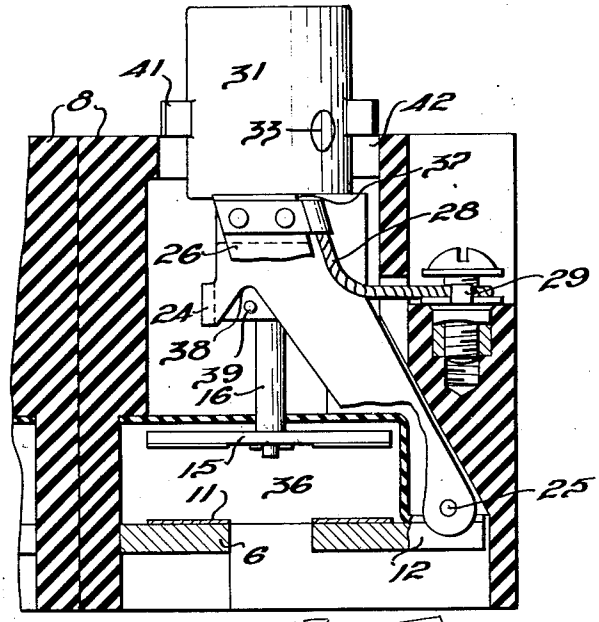
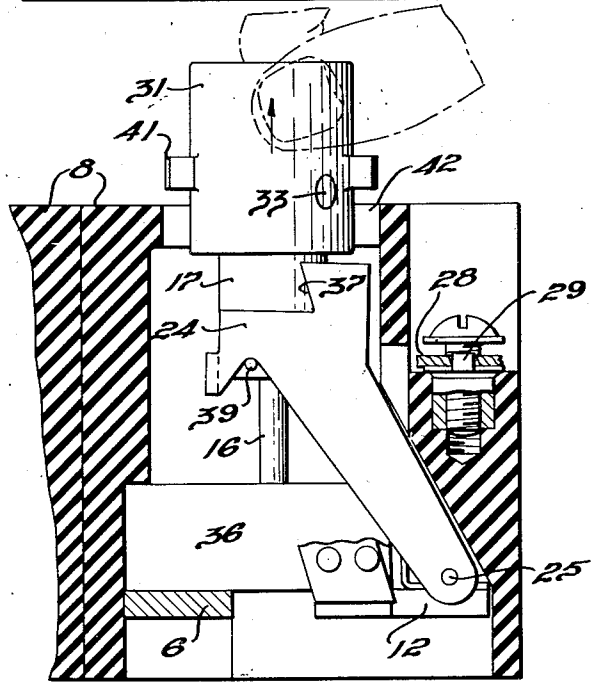


Fig. 6.



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Patented May 2, 1939 2,156,761

UNITED STATES PATENT OFFICE

2,156,761

CIRCUIT BREAKER

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Application October 31, 1935, Serial No. 47,525

19 Claims. (Cl. 200—116)

This invention relates to automatic electric circuit breaker apparatus and automatic circuit breaker mechanisms.

One object of this invention is to provide an improved grouping of automatic electric circuit breakers having common electrical and mechanical features.

Another object of this invention is to provide a group of automatic electric circuit breakers sealably supported over a common bus.

Another object of this invention is to provide a group of electric circuit breakers sealable against outside tampering but provided with communicating passageways allowing common venting of arc gases.

Another object of this invention is to provide an improved and economical form of circuit breaker mechanism.

Another object of this invention is to provide circuit breaker apparatus including an outer box enclosing a sealable group of circuit breakers having improved features of simplicity and economy and common mounting features.

Another object of this invention is to provide an improved form of automatically and manually openable circuit breaker mechanism, the automatic circuit opening being trip-free of the operating handle.

Other objects and features of this invention will be readily apparent to those skilled in the art from the following specification and the appended drawings illustrating certain preferred embodiments of the invention in which:

Figure 1 is a top plan view of the circuit breaker apparatus according to the present invention with the outer cover broken away.

Figure 2 is a fragmentary sectional view taken on line II—II of Figure 1.

Figure 3 is a sectional view taken on the line III—III of Figure 1.

Figure 4 is a fragmentary sectional view taken on the line IV—IV of Figure 3.

Figure 5 is a fragmentary sectional view of the breaker shown at the right in Figure 3 but showing the parts in manual "off" position.

Figure 6 is a view similar to Figure 5 with the parts in the resetting position.

The circuit breaker apparatus illustrated in the drawings comprises an outer sheet metal enclosing box 1 having an openable cover 2 hingedly or otherwise mounted thereon in a conventional manner. This box may be equipped with the usual knockouts, cover latch or similar features as is conventional in the art. Within this outer box is mounted a group of circuit breakers. In the embodiment specifically illustrated and described there is shown a unit comprised of two groups of four electrically common mechanisms on a common base. It is, of course, readily understood that any number of individual mechanisms may be included in any group and that any number of separate groups may be mounted in a single enclosing box or cabinet. As the separate groups in the unit are entirely distinct electrically and also mechanically except for the common mounting on the base in the box, only one of these groups will be hereinafter described.

The group comprises an insulating base 3 secured to the back of the box by the studs 4. The front face of this base is provided with a plurality of aligned supports 5 upon which is rigidly secured a bus bar 6 by means of studs 7. These studs may extend from the back of the base and be waxed in place to mount the bus bars on the base in a relatively permanent fashion. A connection stud 7' is provided on the exposed end of the bar. Over the bus 6 are disposed a plurality of individual cup-shaped insulating members 8 in which are supported the individual circuit breaker mechanisms. The opposite walls of these members are cut out to fit over the bus so that their outer walls extend into close fitting engagement with the base 3. The members 8 are secured in position by studs 9 which are threaded into the bus 6 and serve to rigidly secure the members in position. The head of this stud is waxed in place to form sealed enclosures for the circuit breaker mechanisms.

Within each of the members 8 the bus bar is provided with a stationary contact 11 rigidly supported thereby. A conductor 12 is supported on the member 8 by stud 13, which is waxed in place, and supports a secondary stationary contact 14 thereon. A bridging conductor 15 is provided with contact surfaces adjacent its opposite ends for cooperation with the contacts 11 and 14 on the bus 6 and the conductor 12. The conductor 15 is supported on the end of a rod 16 which is slideably received within a generally cup-shaped member 17. A compression spring 18 is disposed between the head of the rod 16 and the member 17 normally tending to move the headed end of the rod away from the member. The member 17 is provided with a slot 19 at the bottom and at one side thereof within which slot is pivotally mounted a latch 21 having a latching surface 22 adapted to engage in a latching notch 23 on the rod 16. The rod 16 is also provided with a longitudinal slot 20 on its periphery providing clearance for the latch 21 in the released movement

of the rod 16. The latch 21 is normally maintained in latching position by a member 24 pivoted on the cup-shaped supporting member 8 as at 25.

A bimetallic strip 26 is rigidly mounted at one end upon the conductor 12 and extends upwardly therefrom with its free end provided with a latching element 27 for the latch retaining member 24. A flexible lead 28 connects the free end of the bimetallic strip 26 with the outside circuit connector 29.

An operating push button 31 in the form of an inverted cup-shaped member is mounted over the member 17 and is movable with relation thereto both longitudinally and rotatably. This movement may be secured by the enlarged peripheral groove 32 in the member 17 within which are disposed the pins 33 on the push button 31. The push button is inserted in position by the passage of the pins 33 through the grooves 34 at the top of member 17. A compression spring 35 stresses the push button relative to the member 17 and serves to apply the contact pressure in a manner to be hereinafter described.

An insulating fibre shield 36 surrounds the contact portions of the breaker and is held in place between the conductor 12 and the supporting member 8.

The member 24 is more clearly shown in Figures 5 and 6 in which is shown the latching surface 37 which engages with the latching element 27 on the free end of the bimetallic element 26. The under part of one arm of the member 24 is provided with a notch 38 adapted to receive a pin 39 mounted on the member 17 for a purpose to be hereinafter described.

The push button 31 is provided with exterior locking lugs 41 slideable within the grooves 42 in the top of the cup-shaped member 8 and rotatable beneath the top of said member to hold the push button in the "on" position.

The operation of the individual mechanism will now be described.

The mechanism as shown in Figure 2 and at the right in Figure 3 is in the normal "on" position. The push button 31 has been pressed in and rotated whereupon the lugs 41 having passed through the grooves 42 are now disposed beneath the top of member 8 and secure the push button 31 in an interior position. The compression spring 35 has been stressed by the pressing of the push button and stresses the member 17 toward the base. The member 17 and rod 16 are securely latched together by the latch 21 and the bridging conductor 15 is held in its circuit closing position with the contact pressure maintained by the spring 35.

To manually separate the contacts the push button 31 is rotated back in position where lugs 41 are beneath the grooves 42 whereupon the push button is pulled outwardly moving the parts to their normal "off" position with the bridging conductor 15 raised to its upper position remote from the contacts 11 and 14 as shown in Figure 5. The operation to closed circuit position is then as previously described.

Upon the occurrence of an overload the bimetallic strip 26 becomes heated and warps away from the member 24 which then rotates about its pivot 25 to release the latch 21. This movement of the latch 21 and the member 24 occurs under the bias of the spring 18. As the latch is released the rod 16 is free to move upwardly to the position shown at the left in Figure 3 carrying with it the bridging conductor 15 and breaking the circuit through the breaker.

To reset the parts after an automatic separation of the contacts the push button is rotated to the position where the lugs 41 are beneath the grooves 42 and the push button is pulled upwardly as in the manual separation of the contacts. In this operation the pin 39 engages in the notch 38 in the member 24 and pulls it into the position where the latching surface 37 engages the latching element 27 on the free end of the bimetallic strip 21 which in the meantime has moved back to its normal position. This upward movement of member 24 rotates the latch 21 back into its normal latching position. It is seen that this final rotation will take place only in the extreme position of the push button at which time the member 17 will have been moved upwardly to place the latch in its proper relation to the rod 16 and thus stress the spring 18. After the latching of the member 24, the parts will then be in their normal manual "off" position and the circuit may be closed by pressing the push button and rotating the lugs 41 into engagement with the under surface of the top of the cup-shaped member 8.

The adjacent walls between the circuit breakers in the group are cut away so as to provide communication between their interiors to permit the gases generated by the opening of the circuit through any circuit breaker mechanism to be expelled throughout the interiors of all the circuit breakers in the group, thus rendering less necessary any vent to the outer air.

The connector 7 at the end of bus 6 may be utilized as a bus tap or as a main terminal for the breakers. When used as a main terminal the individual circuit breaker mechanisms will each lead to a separate circuit; when used as a bus tap one of the circuit breakers will function as a main breaker leading to the bus 6 which in turn will feed through other individual mechanisms to the individual circuits. In this arrangement the circuits fed through the load breakers will thus be provided with main and branch protection having at all times two circuit breakers in series with any short which may occur. However, when the extension 8 is used as a bus tap, feeding therefrom will be only through the main breaker. In some instances it may be desirable to cut off the bus 6 within the last circuit breaker interior of each group and to close the opening in the end wall of the group whereupon the feeding to the branch circuit will always be through two circuit breaker mechanisms whereof one provides main protection to all the branch circuits and the other individual mechanisms provide branch protection for their individual circuits.

In the appended claims the terms "box" and "cover" are to be construed to include "cabinet" and "door" respectively.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims:

What is claimed is:

1. Electric circuit breaker apparatus comprising an insulating base, a conductor mounted on said base, a plurality of cup-shaped insulating members mounted over said conductor and cooperating with said base to form sealable enclo-

sures, a circuit breaker mechanism within each enclosure and an operating member for each mechanism projecting through the enclosures.

2. Electric circuit breaker apparatus comprising an insulating base, a conductor mounted on said base, a plurality of cup-shaped insulating members mounted over said conductor and cooperating with said base to form sealable enclosures, a circuit breaker mechanism within each enclosure and an operating member for each mechanism projecting through the enclosures, a stationary contact for each circuit breaker being directly supported by the conductor within the enclosures.

3. Electric circuit breaker apparatus comprising an insulating base, a conductor mounted on said base in spaced relation thereto, a plurality of cup-shaped insulating members mounted over said conductor, the end walls of said members being cut away to receive said conductor, the walls of said members cooperating with each other and said base to form sealable enclosures, a circuit breaker mechanism within each enclosure and an operating member for each mechanism projecting through the enclosures.

4. Electric circuit breaker apparatus comprising an insulating base, a plurality of individual enclosures mounted over said base in sealable relation, individual circuit breaker mechanisms within the enclosures, the interiors of said enclosures being in direct communication whereby the gases formed by an arc drawn upon the operation of any one mechanism may be vented to the other enclosure interiors.

5. Electric circuit breaker apparatus comprising an enclosing box, a plurality of sealable circuit breaker enclosures within said box, said enclosures having direct communication without opening to the box and sealed from exterior access whereby the gases formed by an arc within any enclosure may be vented throughout the enclosure interiors.

6. Electric circuit breaker apparatus comprising an insulating base, a bus bar mounted on said base, a plurality of individual circuit breaker mechanisms mounted in individual enclosures attached to said bus bar and cooperating with said base to sealably enclose said mechanisms and bus bar, one contact of each of said mechanisms being supported by said bus bar.

7. Electric circuit breaker apparatus comprising a plurality of cup-shaped insulating bases, individual circuit breaker mechanisms mounted in said bases, an insulating plate, a bus bar supported by said plate, one contact for each mechanism being supported by said bus bar, and means for sealably mounting said bases on said plate to enclose said mechanisms and bus bar with said one contact in position to cooperate with their respective mechanisms.

8. Electric circuit breaker apparatus comprising a plurality of cup-shaped insulating bases, individual circuit breaker mechanisms mounted in said bases, an insulating plate, a bus bar supported by said plate, one contact for each mechanism being supported by said bus bar, and means for sealably mounting said bases on said plate to enclose said mechanisms and bus bar with said one contact in position to cooperate with their respective mechanisms, a second contact for each mechanism, and a reciprocating bar having contact faces at its ends for cooperating with said contacts.

9. An electric circuit breaker including spaced stationary contacts, a reciprocable conductor having contact faces adjacent to its end and adapted to bridge said contacts, an element connected to said conductor, a second element movable relative to said first mentioned element, a latch connecting said elements for common movement, a latch retaining member pivotally mounted on a stationary part, a current responsive latch for said member, and a spring biasing said elements for relative movement whereby on release of said latch retaining member the reciprocable conductor will be moved to open circuit position under the action of said spring.

10. An electric circuit breaker including spaced stationary contacts, a reciprocable conductor having contact faces adjacent to its end and adapted to bridge said contacts, an element connected to said conductor, a second element movable relative to said first mentioned element, a latch connecting said elements for common movement, a latch retaining member pivotally mounted on a stationary part, a current responsive latch for said member, a spring biasing said elements for relative movement, a push button movably connected to said second element, a spring biasing said push button relative to said second element, a stationary latching surface for said push button, said push button engaging said surface by manual rotation, the last mentioned spring maintaining pressure between said contact faces and contacts.

11. In an automatic electric circuit breaker, stationary and movable contacts, a reciprocable element connected to said movable contact, a second reciprocable element slidably receiving said first element, a spring biasing said elements for relative movement, a latch pivoted on said second element and engaging a surface on said first element, release of said latch permitting said first element to move said movable contact to open position under the action of said spring, a latch retaining member pivoted on a stationary part and normally slidably engaging said latch and a current responsive holding means for said member.

12. In an automatic electric circuit breaker, stationary and movable contacts, a reciprocable element connected to said movable contact, a second reciprocable element slidably receiving said first element, a spring biasing said elements for relative movement, a latch pivoted on said second element and engaging a surface on said first element, release of said latch permitting said first element to move said movable contact to open position under the action of said spring, a latch retaining member pivoted on a stationary part and normally slideably engaging said latch, a current responsive holding means for said member, a push button slideably receiving said second element, a spring forming the operative connection between said push button and second element in one direction and means for latching said push button with said spring compressed to exert pressure between the cooperating contacts.

13. In an automatic electric circuit breaker, stationary and movable contacts, a reciprocable element connected to said movable contact, a second reciprocable element slideably receiving said first element, a spring biasing said elements for relative movement, a latch pivoted on said second element and engaging a surface on said first element, release of said latch permitting said first element to move said movable contact to open position under the action of said spring, a latch retaining member pivoted on a station-

ary part and normally slideably engaging said latch, a current responsive holding means for said first element, a spring biasing said elements in the path of the released position of said member whereby outward movement of said second element after release of said member will relatch the mechanism in normal relation.

14. In an automatic electric circuit breaker, stationary and movable contacts, a reciprocable element connected to said movable contact, a second reciprocable element slideably receiving said first element, a spring biasing said elements for relative movement, a latch pivoted on said second element and engaging a surface on said first element, release of said latch permitting said first element to move said movable contact to open position under the action of said spring, a latch retaining member pivoted on a stationary part and normally slideably engaging said latch, a current responsive holding means for said member, a push button slideably receiving said second element, a spring forming the operative connection between said push button and second element in one direction, means for latching said push button with said spring compressed to exert pressure between the cooperating contacts, and a pin on said second element adapted to cooperate with said member to reset said parts upon outward movement of said push button after an automatic operation.

15. Electric circuit breaker apparatus comprising a common conductor carrying a plurality of contact faces thereon, a plurality of insulating bases mounted over said conductor, said bases having compartments therein receiving individual automatic electric circuit breaker mechanisms having movable contact surfaces adapted to cooperate with the contact faces on the conductor to perform the switching operation, said mechanisms being sealed within their compartments from exterior access and at least certain of said compartments being in communication to provide a common venting chamber for the mechanisms in said certain compartments for the gases generated by an arc formed between said contact faces and surfaces.

16. Electric circuit breaker apparatus comprising a common conductor carrying a plurality of contact faces thereon, a plurality of insulating bases mounted over said conductor, said bases having compartments therein receiving individual automatic electric circuit breaker mechanisms having movable contact surfaces adapted to cooperate with the contact faces on the conductor to perform the switching operation, said mechanisms being sealed within their compartments from exterior access and at least certain of said compartments being in communication to provide a common venting chamber for the mechanisms in said certain compartments for the gases generated by an arc formed between said contact faces and surfaces, and insulating formations in back of said common conductor and connected to said bases to substantially enclose the main body of said conductor.

17. Electric circuit breaker apparatus comprising a common conductor carrying a plurality of contact faces thereon, a plurality of insulating bases mounted over said conductor, said bases having compartments therein receiving individual automatic electric circuit breaker mechanisms having movable contact surfaces adapted to cooperate with the contact faces on the conductor to perform the switching operation, said mechanisms being sealed within their compartments from exterior access and at least certain of said compartments being in communication to provide a common venting chamber for the mechanisms in said certain compartments for the gases generated by an arc formed between said contact faces and surfaces, insulating formations in back of said common conductor and connected to said bases to substantially enclose the main body of said conductor, and a portion on said conductor extending beyond said bases and serving as a terminal for the attachment of circuit wires leading current to said individual mechanisms.

18. Electric circuit breaker apparatus comprising a common conductor carrying a plurality of contact faces thereon, a plurality of insulating bases mounted over said conductor, said bases having compartments therein receiving individual automatic electric circuit breaker mechanism having movable contact surfaces adapted to cooperate with the contact faces on the conductor to perform the switching operation, said mechanisms being sealed within their compartments from exterior access, and insulating formations in back of said common conductor and connected to said bases to substantially enclose the main body of said conductor.

19. Electric circuit breaker apparatus comprising a common conductor carrying a plurality of contact faces thereon, a plurality of insulating bases mounted over said conductor, said bases having compartments therein receiving individual automatic electric circuit breaker mechanisms having movable contact surfaces adapted to cooperate with the contact faces on the conductor to perform the switching operation, said mechanisms being sealed within their compartments from exterior access, and mating openings in certain adjacent walls of said bases cooperating to provide communication between certain of said compartments and a common space for the dissipation of gases generated by arcs formed between the contact faces and surfaces of the mechanisms in said certain compartments.

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CERTIFICATE OF CORRECTION.

Patent No. 2,156,761. May 2, 1939.

JOHN G. JACKSON, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 3, claim 13, strike out the words "first element, a spring biasing said elements" and insert instead member, and a pin on said second element; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of June, A. D. 1939.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.

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