Oct. 2, 1928. 1,685,934

A. H. BAKKEN

CIRCUIT BREAKER

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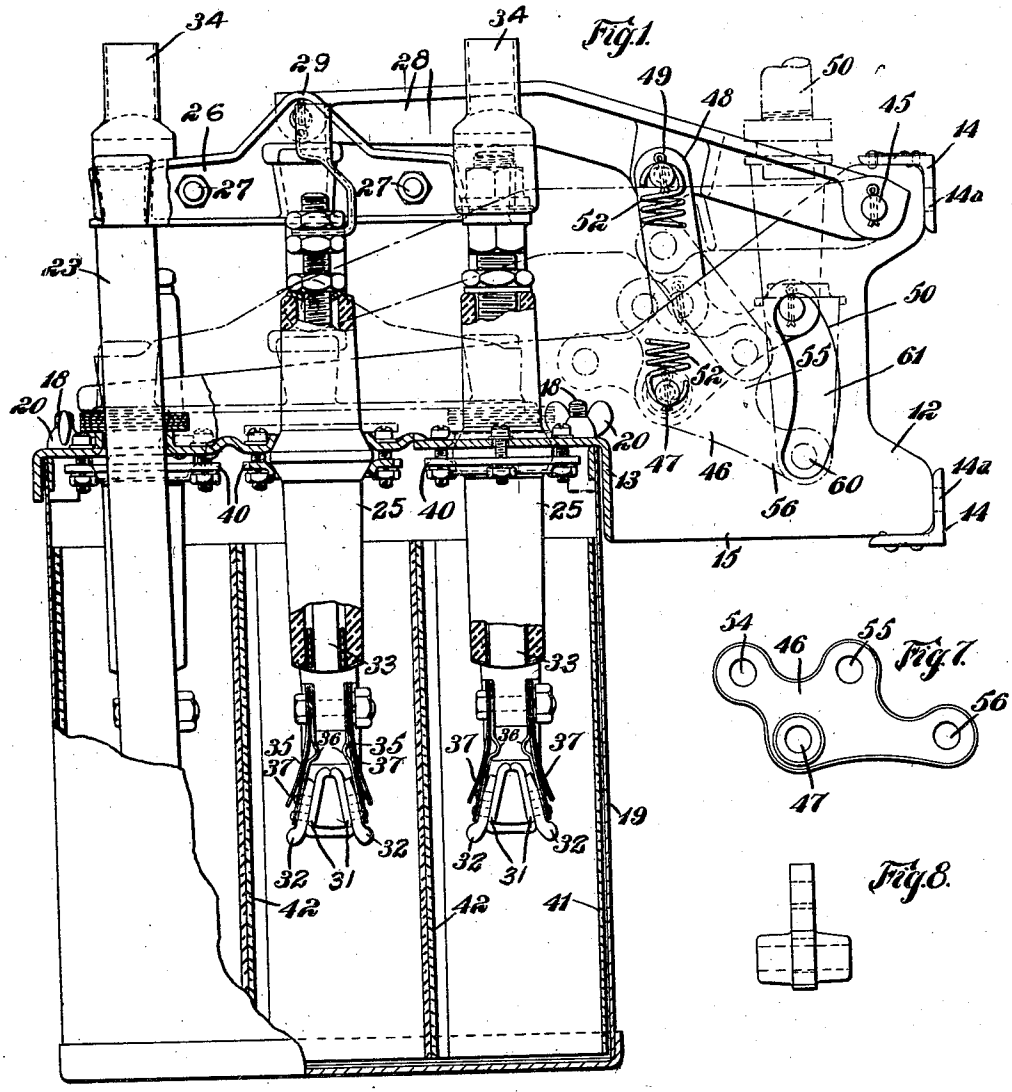


Fig. 1.

Fig. 7.

Fig. 8.

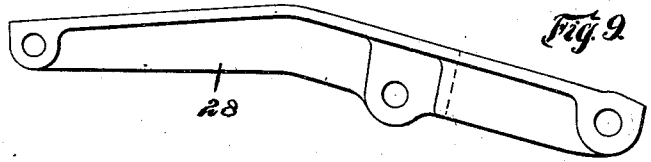


Fig. 9.

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CIRCUIT BREAKER

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Fig. 2.

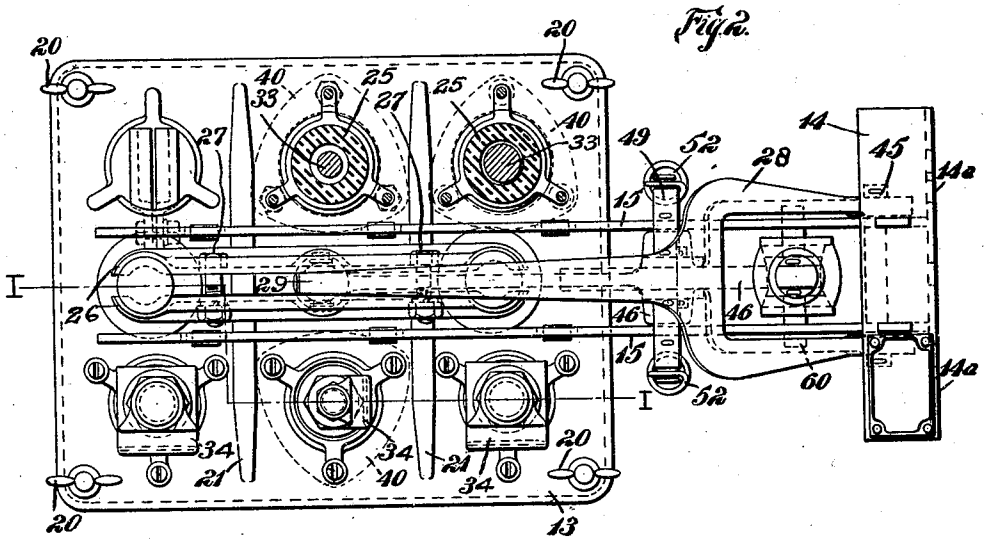


Fig. 3.

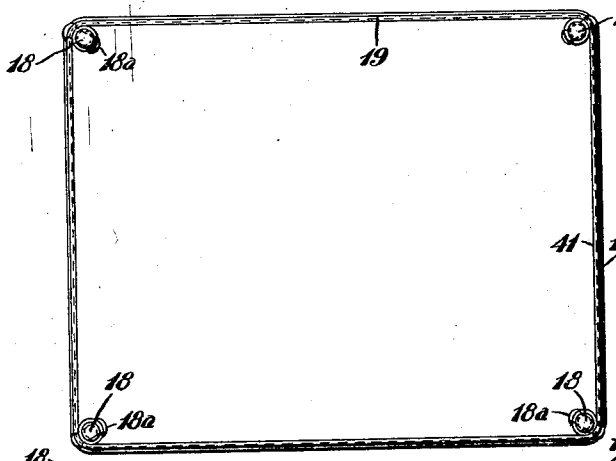
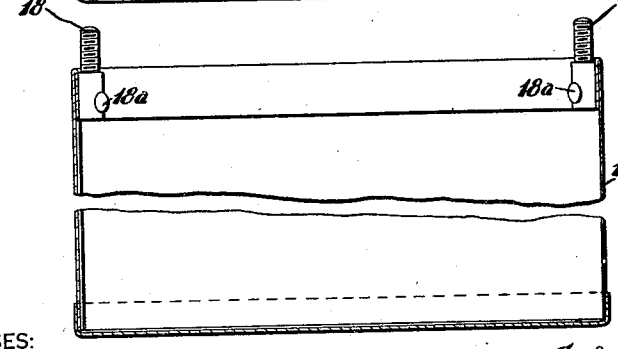


Fig. 4.



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CIRCUIT BREAKER

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Fig. 5.

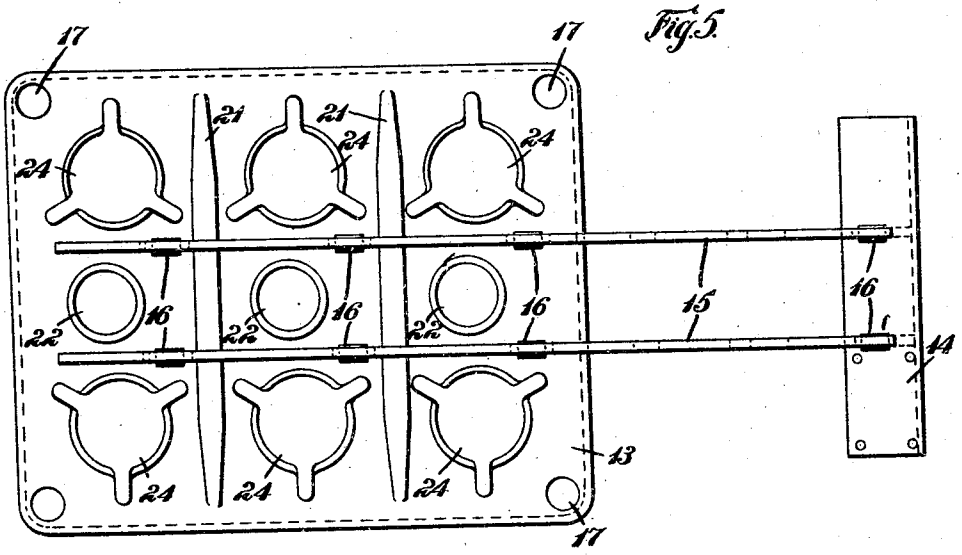
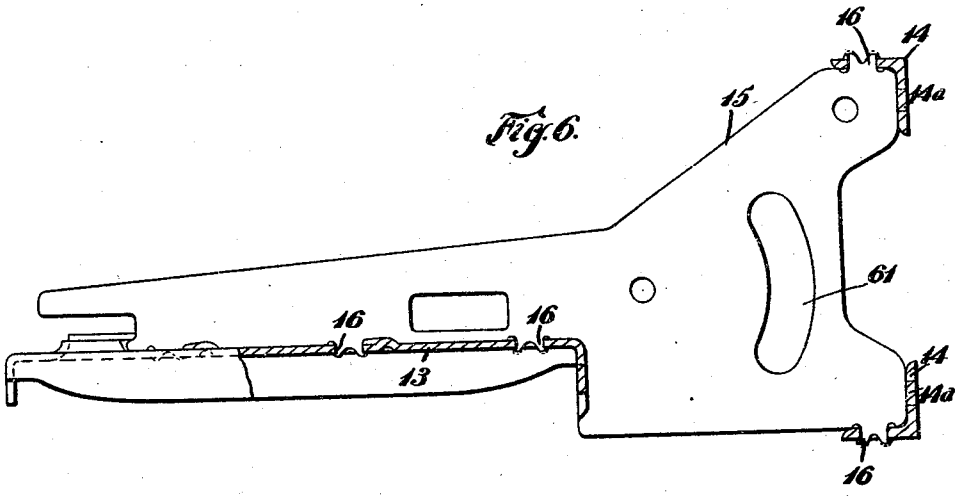


Fig. 6.



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CIRCUIT BREAKER

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Fig 10.

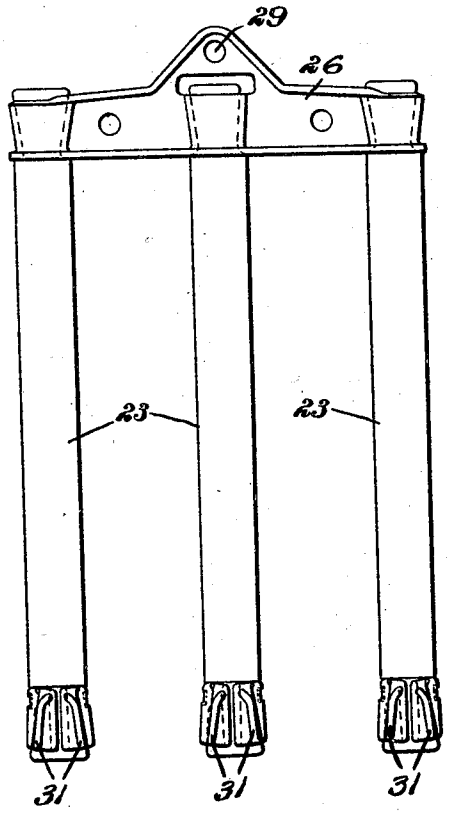
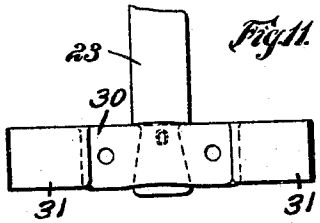


Fig 11.



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UNITED STATES PATENT OFFICE.

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CIRCUIT BREAKER.

Application filed July 9, 1921. Serial No. 483,384.

My invention relates to electrical circuit breakers and more particularly to operating mechanisms therefor and their supporting structures.

One of the objects of my invention is to simplify and to reduce the cost of construction of circuit breakers, with special reference to those of the fluid-immersed type.

Another object of my invention is to so form certain portions of the circuit breaker that they may be stamped out of sheet metal, thus avoiding the necessity of employing an unnecessary number of cast metal parts and eliminating the machining operations which have been heretofore deemed necessary.

Another object of my invention is to provide a circuit breaker in which a maximum effectiveness of operation is secured at a minimum cost of construction.

As shown in the accompanying drawings:

Fig. 1 is a view, partially in side elevation and partially in section, of a circuit breaker constructed in accordance with my invention, and taken on the line I—I of Fig. 2.

Fig. 2 is a view, partially in top plan and partially in section, of the device of Fig. 1.

Figs. 3 and 4 are plan and side elevational views, respectively, of the quenching fluid tank employed by me.

Figs. 5 and 6 are plan and side elevational views, respectively, of the supporting frame work for the circuit interrupter mechanism and the tank.

Figs. 7 and 8 are detail views of the toggle lever embodied in my invention.

Fig. 9 is a detail view of the main operating lever shown in Fig. 1.

Fig. 10 is a side elevational view of a cross bar and the lifting rods carried thereby, showing in end elevation, the movable contact or bridging members, and

Fig. 11 is a view of the lower portion of Fig. 10, taken at right angles thereto.

I provide a supporting frame 12 composed of a base portion 13, bracing members 14 and bracket members 15. The bracket members 15 are provided with lug portions 16 by means of which they are riveted to the members 13 and 14. All of these members are of stamped metal. The members 14 are provided with holes 14*a* through which bolts may extend, to secure the apparatus to a panel board or wall.

The base portion 13 is provided with openings 17 to receive bolts 18, that are carried by a fluid quenching tank 19. The tank is secured to the base by means of the bolts 18 and wing nuts 20. Ribs 21 are stamped into the base member 13 in order to impart greater strength and rigidity thereto. The member 13 is also provided with three openings 22, through which lifting rods 23 extend, and with openings 24 through which porcelain members 25 extend.

The lifting rods 23 are preferably of wood and at their upper ends are clamped between cross bars 26, of peculiar form, by means of bolts 27. This manner of holding the rods is an improvement on the former practice wherein a single perforated holding member was provided into which the end of the rod was inserted and the material then swaged inwardly around the reduced portion of the rod.

Besides effecting a more convenient and secure connection between the holding member and the rods, my construction eliminates the objectional tendency in the former construction towards the breaking and splitting of the ends of the rods.

The three lifting rods 23 are operated as a unit, through a main operating lever 28 that has pivotal connection at 29 with the cross bars 26.

Each of the rods 23 carries, at its lower end, a bridging member 30 that consists of two contact portions 31, clamped together as indicated in Fig. 11 and keyed to the lifting rods 23 to prevent rotation with respect thereto.

The contact faces 31 of the bridging member 30 are adapted to make engagement with stationary contact members 32 that are yieldingly supported on conductors 33 which pass through the porcelain members 25 and are provided at their upper ends with terminals 34.

The porcelain members 25 serve as insulators and as supports for the conductors 33 and the parts carried thereby. The lower ends of the porcelain members and the coacting enlarged portions of the conductors 33 are of semi-cylindrical form, in order that the porcelains and the conductors will be non-rotatable with respect to each other.

The stationary contact members 32 are supported from the conductors 33 by flexible members 35, and shunt connections 36 serve

to conduct the current from contact members 32 to conductors 33. Leaf springs 37 normally force the contact members 32 toward each other, and into close engagement with the movable contact members 31. By reason of the flexible mounting of the contact members 32, they automatically align themselves with the contact faces of the members 31.

The porcelain members 25 are enlarged at their middle portions, as shown more clearly in Fig. 1. This enlarged portion is clamped between the under-side of the base member 13 and a flared plate 40, in the manner shown in Figs. 1 and 2.

The tank 19 is of pressed metal and is provided with an insulating lining 41 of any suitable insulating material. Partitions 42 of insulating material are also provided between each pair of conductors 33 and the live parts associated therewith, in order to thoroughly insulate the respective sets of contact members from each other.

The tank 19 is adapted to contain fluid for quenching arcs that may be formed during the operation of the circuit breaker.

The bolts 18 are secured to the corners of the tank, as shown in Figs. 3 and 4, by means of rivets 18*a*. This construction eliminates the necessity of riveting perforated blocks to the sides of the tank, for the purpose of supporting the bolts 18.

It will be understood that each of the three rods 23 carries at its lower end a bridging member 30 that has contact members 31 adapted, at their opposite ends, to engage stationary contact members carried by two of the conductors 33, to complete a circuit across such conductors. It will be apparent that the flared walls of the openings in the base member 13 and the flared openings in clamping plates 40 are yielding and of such form, and co-act with the enlarged portions of the porcelains 25 in such manner, that any irregularities in engaging surfaces may be automatically compensated for and the porcelain thereby properly aligned and tightly embraced between the clamping members and the base member.

The operating lever 28 is pivotally connected at 29 to the pair of cross bars 24, and at its opposite end it is pivotally supported on the brackets 15 by a pin 45. As the lever 28 is moved about its pivot 45, it raises and lowers the lifting rods 23 and the contact members 31 carried thereby, to open and close the circuits. A toggle lever 46, that is pivotally supported on the brackets 15 by a pin 47, pivotally supports a link 48 that is connected to the operating lever 28 by a pin 49.

An operating rod 50 is connected to the toggle lever 46, by a pin 60, that extends through slots 61 in the brackets 15. As the operating rod is moved, motion is transmitted through the toggle lever 46 and the link 48 to the operating lever 26. In the normal operation of the device the operating rod 50 is moved upwardly to close the circuits in the manner heretofore described and locked in such position by any desired means. Upon release of the operating rod 50, a pair of tension springs 52, each of which has one end secured to the pin 49 and its other end secured to the pin 47, serve to return the moving parts of the apparatus to open position and thereby break the circuits.

The toggle link 46 is provided with perforated extensions 54, 55, and 56 so that the operating rod 50 may be operated from any desired direction. For instance, in the form illustrated herein, the link 48 and the rod 50 are connected to the extensions 55 and 56 respectively, whereas if it be found necessary to place the rod 50 in a horizontal position it may be connected to the extension 55 and the link 48 to the extension 54, while to operate the rod 50 downwardly from the extension 56 and from beneath the lower member 14, the extension 54 could be connected to the link 48. If the range of movement of the rod 50 were limited, it could be connected to the extension 55 and the extension 54 connected to the link 48.

Various changes in detail and general arrangement may be made without departing from the spirit of the invention as shown in the accompanying claims.

I claim as my invention:

1. In a circuit breaker, the combination of a pressed metal supporting member provided with openings therethrough, insulating members extending through the openings, means for attaching the insulating members to the supporting member, means whereby the insulating and the supporting members are automatically aligned regardless of irregularities on their engaging surfaces, conductor members disposed within the insulating members and each provided with an enlarged portion adjacent to one end of its associated insulating member, the enlarged portion of the conductor and the said end of the insulating member being provided with cooperating engaging faces of such contour that the conductors are non-rotatable with respect to the insulating members.

2. In combination, a stamped metal supporting member for circuit breakers provided with an opening having flaring walls, a conductor member extending through said opening and provided with an enlarged portion adjacent thereto, a clamping member provided with an opening that has its walls flared oppositely to those of the supporting member, and means for securing the said enlarged portion flared between the walls of said openings.

3. In combination, a stamped metal supporting member for circuit breakers, provided with openings having upwardly flaring

walls, conductor members extending through said openings and provided with enlarged portions, perforated clamping members, the openings of which are provided with walls flared oppositely to those of the supporting member, and means for securing the said enlarged portions between said oppositely disposed flared walls of the supporting member and the perforated clamping members.

4. In combination, an insulating member, a second member mounted in the first named member and extending exteriorly thereof, and means for preventing the rotatable displacement between the said members comprising a semi-cylindrical surface on one end of said insulating member and a cooperating grooved surface on the other member.

5. In combination, a cylindrical insulating member, a conducting member mounted in the first named member and extending exteriorly thereof, means for clamping the said member in a predetermined relative position, and means for preventing the relative rotatable displacement of said members comprising a semi-cylindrical surface on one of said members and a cooperating cylindrical grooped surface on the other member.

6. In an electrical device, a cylindrical bushing and insulating member, a conducting member movably mounted within the cylindrical member and extending exteriorly thereof, and means for preventing rotatable movement between the cylindrical member and the conducting member comprising an extended surface on one of the members and a cooperating indented surface on the other member.

In testimony whereof, I have hereunto subscribed my name this 24th day of June, 1921.

ANDREW H. BAKKEN.