May 7, 1940. K. W. WILCKENS 2,200,108

BLOW-OUT MECHANISM

Filed Aug. 10, 1938

Fig. 3

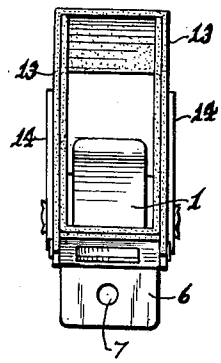


Fig. 2

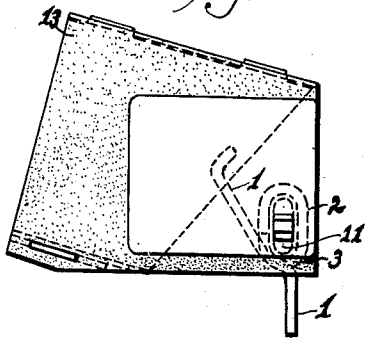


Fig. 1

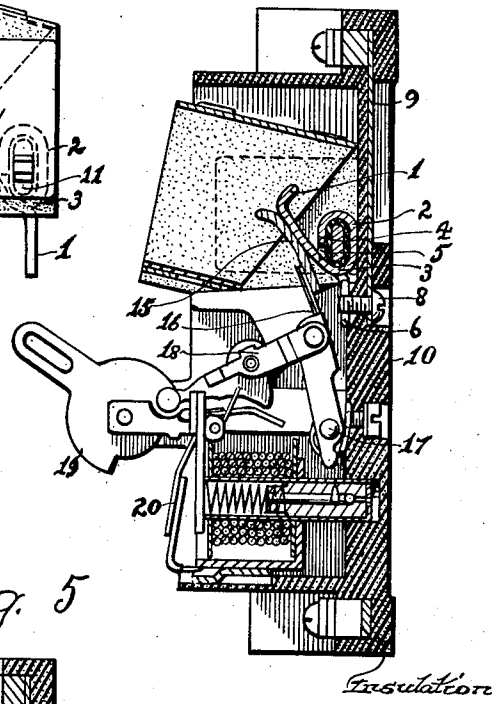


Fig. 5

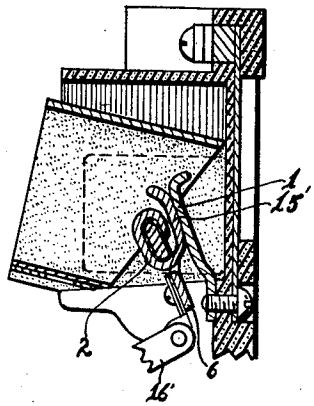
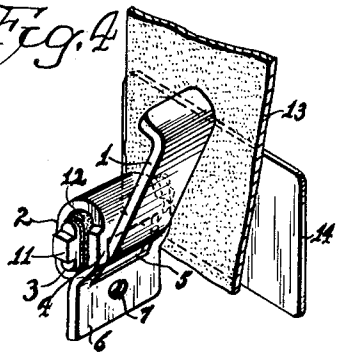


Fig. 4



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BLOW-OUT MECHANISM

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Application August 10, 1938, Serial No. 224,036

3 Claims. (Cl. 200—147)

My invention relates to the suppression of arcs formed upon the separation of the contactors of a switch or circuit breaker.

A leading object of my invention is the provision of simple, compact, inexpensive and readily installed means which will effectively suppress an arc in small circuit breakers.

In accordance with my improvements, such means may be assembled as a compact unit and mounted in the breaker casing without requiring an additional mounting means; the members for effecting the suppression of the arc being mounted upon and supported by one of the breaker electrodes. Such electrode has an end section forming a mounting member for attachment to a support, e. g. the breaker casing or switch blade, and an end section having a face forming a switch contactor. Intermediate such end sections the electrode is so bent as to form a seat for a bar having ends projecting laterally from the electrode and having thereon arc suppressing members.

Preferably the electrode is so bent as to form a magnetizing turn creating magnetic flux on the passage of current therethrough, and the bar and end members are of magnetizable material, insulated from the electrode, and forming a core and pole pieces by which the magnetic flux is concentrated and directed across the contactor face and the arc emanating therefrom so as to elongate and extinguish the arc. Between the electrode and pole pieces there may be mounted on the bar shields of hard fibre or the like from which non-ionized particles or gases are volatilized by the arc and aid in the suppression thereof. These shields also provide a thermally insulating housing protecting the pole pieces and breaker housing from the deleterious effects of the arc.

While it is preferable to provide both magnetic pole pieces and fibre shields on the ends of the electrode-supported bar, either may be used advantageously without the other.

The electrode is apertured and bent to form a closed loop with one end projecting through the aperture and its two ends diverging from one another to form respectively the mounting member and contactor. Preferably the suppressor bar is seated within the closed loop.

The characteristics and advantages of my improvements will further appear from the following description and the accompanying drawing in illustration thereof.

In the drawing, Fig. 1 is a longitudinal, vertical, sectional view through a circuit breaker embodying my improvements; Fig. 2 is an enlarged detached side elevation of the blow-out assembly shown in Fig. 1; Fig. 3 is a front elevation of the blow-out assembly shown in Fig. 2; Fig. 4 is a fragmentary perspective view of the fixed electrode and suppressing mechanism shown in Figs. 1 to 3; and Fig. 5 is a fragmentary longitudinal view of a modified construction having the blow-out assembly mounted on the movable switch blade.

In the embodiment of my invention illustrated in Figs. 1 to 4 of the drawing, a flat strip of conducting metal has a section bent to substantially V-shape with the legs 1 and 2 diverging from the crotch 3. A strip section 4 contains an aperture 5 for the passage of the leg 1 and forms with the leg 2 a closed loop. The end of the section 4 below the aperture 5 forms a mounting member 6, extending across one end of the aperture, and containing a threaded recess 7 for the engagement of a threaded mounting screw 8 which passes through a lead-in strip 9 and the casing 10.

A magnetizable core, such as the bar of soft iron 11, is encased in a fibre insulating strip 12 and mounted in and supported by the loop formed by the strip sections 2 and 4. The ends of the core 11 have mounted thereon and support a housing or shield 13, preferably formed of gas-liberating fibre, and have also mounted thereon and support the blow-out plates 14 of magnetizable material.

The outer face of the leg 1 forms a contactor for the engagement of an electrode 15 mounted upon the spring pressed switch blade 16 fulcrumed on the pivot 17. The switch blade may be operated through the toggle 18 by a handle 19 and electro-magnetic mechanism 20. Such blade operating mechanism, however, forms no part of my present invention.

The blow-out mechanism is readily assembled as a unit by seating the core 11 in the crotch formed by the legs 1 and 2 and mounting the fibre shield 13 and blow-out plates 14 on the ends of the core, which may be upset so as to rivet all the parts together. The unitary assembly thus provided may be mounted as a unit in the circuit breaker casing by means of a single screw 8, with its elbow extending toward the pivot 17 of the switch blade.

The passage of electric current through the conductors 9, 8, 6, 4, 2 and 1 creates lines of magnetic force which are concentrated in the core 11 and pole pieces 14 and are directed across the air gap between the pole plates 14 so as to

create a magnetic field containing the contactor face of the leg 1. When the electrode 15 is disengaged from such contactor face, any resulting arc is blown upward by the magnetic flux away from the fulcrum of the lever 17. The arc is thereby elongated and extinguished by being moved away from any incandescent spot to a cool surface of the electrode and is caused to impinge against the fibre shield to liberate gas tending to suppress the arc.

In the embodiment of the invention illustrated in Fig. 5, a bent electrode and associated arc suppressing mechanism such as described in connection with Figs. 1 to 4, is mounted upon the movable blade 16' to coact with a fixed electrode 15' mounted on the casing.

The electrode with which the arc suppressing mechanism is associated should be made of conducting metal which is substantially undeformable under the impact resulting from the closing of the switch blade, but which is sufficiently ductile to permit the bending of the strip upon itself to form a closed loop with an end section projecting through the aperture in the strip. The projecting end section, which forms a switch contactor, forms an angle of more than 90 degrees with the other end section of the strip, so that a maximum of magnetic flux is created with a minimum length of strip.

The aperture in the strip is of slightly greater width than the width of the tongue projecting therethrough to form the switch contactor, and such tongue is likewise spaced from the transverse edges of the aperture above and below such tongue. The strips on either side of the tongue section projecting through the aperture are held against deflection into contact with such section by the metal forming the edges above and below the tongue and the rigidity of the metal is sufficient to prevent the deflection of the tongue into contact with the upper or lower edges.

Having described my invention, I claim—

1. In a blow-out mechanism, an electrode comprising a strip containing an aperture, said strip having a section extending across one side of said aperture and providing a mounting member, said strip having an end section looped through said aperture and having an outer face providing a switch contactor.

2. In a blow-out mechanism, an electrode comprising a conducting strip containing an aperture, said strip being bent to form a loop with an end section projecting through said aperture, said end section having a face forming a switch contactor, said strip also having a section forming a mounting member connected with strip sections on opposite sides of said aperture, a core seated in and supported by said loop, and pole pieces fixed to the end of said core and extending transversely thereto past said contactor face.

3. In apparatus of the character described, a strip of metal substantially undeformable under the impact of a switch blade and containing an aperture completely surrounded by metal, said strip being looped upon itself and having an end section projecting through said aperture and said section having a surface forming a switch contactor and forming an angle of more than 90 degrees with the other end section of said strip.

KURT W. WILCKENS.