

March 7, 1939.

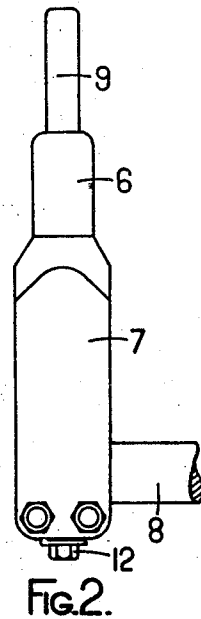
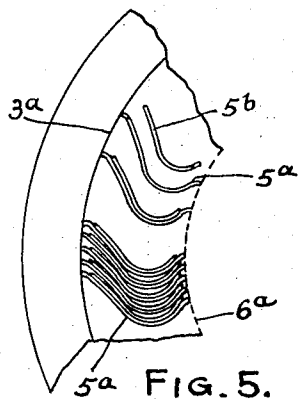
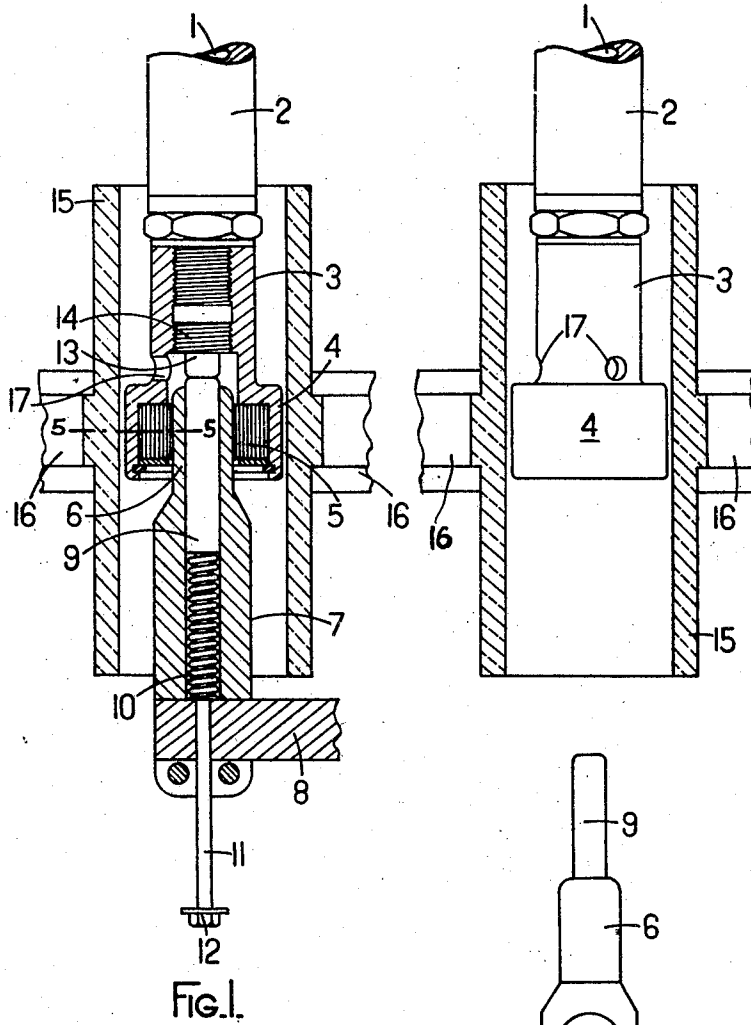
G. E. WHITEHEAD

2,150,899

CIRCUIT BREAKER

Filed March 22, 1938

2 Sheets-Sheet 1



INVENTOR
GEORGE E. WHITEHEAD
By *Norris & Bateman*
ATTORNEYS

March 7, 1939.

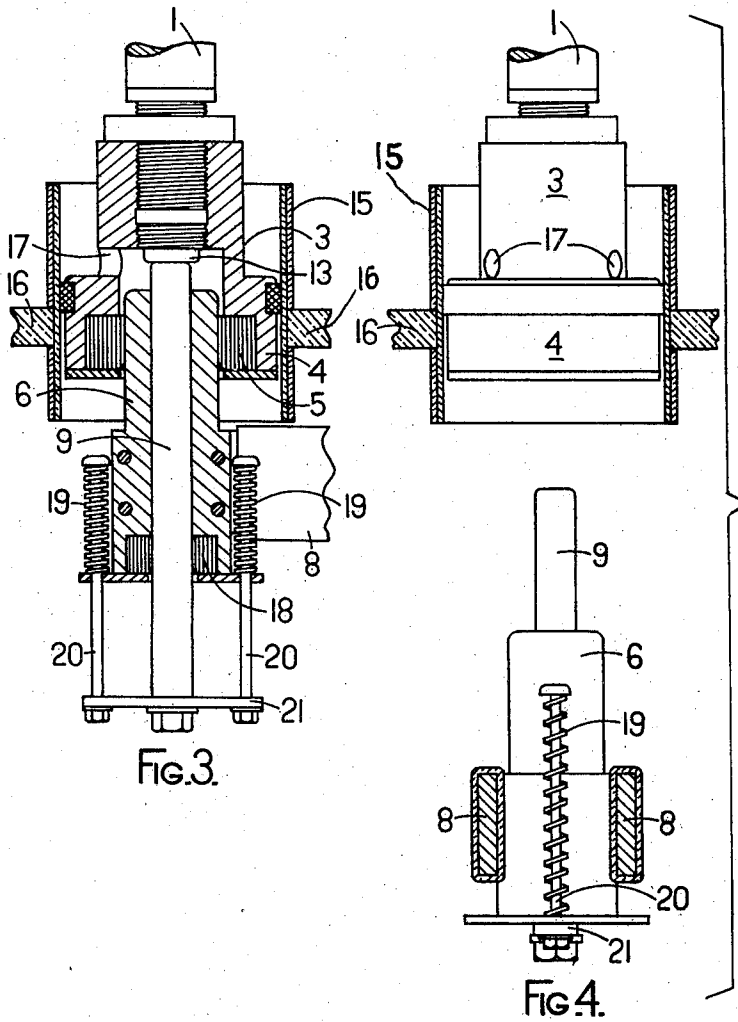
G. E. WHITEHEAD

2,150,089

CIRCUIT BREAKER

Filed March 22, 1938

2 Sheets-Sheet 2



INVENTOR
GEORGE E. WHITEHEAD
By *Norris & Bateman*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,150,089

CIRCUIT BREAKER

George Ethelbert Whitehead, Cardiff, South Wales, assignor to Whitehead Switchgear and Inventions Limited, Cardiff, South Wales, a corporation of Great Britain

Application March 22, 1938, Serial No. 197,449
In Great Britain May 7, 1937

1 Claim. (Cl. 200—150)

This invention relates to electrical switches or circuit breakers and more particularly the contacts thereof. The invention comprises modifications of the contact arrangements described in the specifications of Patent Nos. 1,992,109 granted Feb. 19, 1935, and 2,032,241 granted Feb. 25, 1936.

According to the present invention the main current carrying fixed contact is of the resilient sleeve type and is carried at the mouth of a metal housing whilst the main current carrying moving contact is in the form of a plug, the arrangement so far set forth being as shown in Fig. 3 of the specification of Patent No. 2,032,241 except that the resilient sleeve contact may be of any other type than that forming the subject of Patent No. 2,032,241, whilst there need be no free oil channels in the main plug contact. Furthermore there are essentially provided fixed and moving auxiliary arcing contacts of which the moving arcing contact is a spring urged plunger carried in an axial bore of the main plug contact and adapted to make butting engagement with a fixed arcing contact surface within the metal housing. The arrangement is such that during the closing and opening movements of the circuit breaker the arcing contacts respectively engage before and separate after the main contacts. The metal housing is provided with openings for equalizing pressure within it when the contacts open and close.

The aforesaid arcing plunger may have a relatively free sliding engagement with respect to the main current carrying plug, since it only has to carry the arc current. The moving plunger may have an extension projecting from the main current carrying member which projection may be connected if desired by a flexible conductor to the main current carrying member or to the bridge of the circuit breaker if of the double-break type. The spring of said plunger may be housed within the main current carrying plug or contact member.

In an arrangement which is alternative to that set forth in the preceding paragraph and which is particularly suitable for heavy current circuit breakers, the spring which urges the arcing plunger may be external to the main plug contact and may be duplicated and provided with guide rods, whilst said main plug carries a resilient sleeve contact, preferably in accordance with Patent No. 2,032,241 aforesaid, in which the arcing plunger is slidable.

To enable the invention to be more clearly understood reference will now be made to the accompanying drawings in which—

Figure 1 is a sectional elevation of one form of the circuit breaker contacts in accordance with the invention showing the contacts in the fully closed position and

Fig. 2 is an elevation showing the contacts in the open position.

Figs. 3 and 4 are views similar to Figs. 1 and 2 of another form of the contacts in accordance with the invention.

Fig. 5 is a fragmentary horizontal section, on an enlarged scale, taken on the line 5—5 in Fig. 1.

Referring first to Figs. 1 and 2 of the accompanying drawings, at 1 is shown one of the fixed contact stems of a circuit breaker which stem is shrouded with insulation 2. Screwed to the lower end of the contact stem 1 is the tubular housing 3 which at its lower end is enlarged to form an annular casing 4 for the circularly laminated main fixed current carrying contact 5 which per se is as described in the specification of Patent No. 2,032,241 aforesaid. As shown in Fig. 5, the contact 5 comprises an annulus of closely packed thin flexible laminae 5a, composed preferably of similarly bent strips of copper having their inner ends disposed in close relation and forming a resilient wall for engagement with the main current carrying moving contact a portion of the periphery of which is indicated by the dotted line 5a, to provide a good electrical contact therewith. The outer ends of these laminae abut against the surrounding wall 3a of a recess formed in the lower end of the housing 3. The laminae 5a may be separated by interposed similarly bent but relatively shorter laminae 5b of phosphor bronze or steel.

With the resilient socket contact 5 co-operates the main current carrying moving contact which is in the form of a plug 6 which has a downward extension 7 of larger diameter clamped to the moving crossbar 8 of the circuit breaker. The moving member 6, 7 is tubular and carries within its bore the arcing plunger 9 which is urged upwards relatively to the main contact 6 by means of the helical spring 10 which surrounds a stem 11 secured to or forming part of the plunger 9 and extending through the crossbar 8 and having at its lower end a stop 12 which limits the upward movement of the plunger 9 relatively to the plug 6. It will be appreciated that the plunger 9 is readily removable so that it can be changed in case the arcing end becomes burnt.

The plunger 9 may be arranged to fit freely in the bore of the main plug 6 and the lower end

of the extension 11 may be connected to the bridge 8 by means of a flexible conductor.

Secured within the tubular upper portion 3 of the metal housing is the fixed arcing contact 13 which conveniently has an enlarged screw-threaded portion 14 so that the fixed arcing plug 13 is readily interchangeable in case it may become burnt.

The housing 3, 4 is shown disposed within the shrouding tube 15 of insulating material which may be fixed in a perforation in a barrier 16 which may extend across the oil tank of the circuit breaker.

The housing 3 is provided with a plurality, for example three, of holes 17 for equalizing the pressure within the housing 3 during the opening and closing of the circuit breaker. The housing 3 acts after the manner of an explosion pot tending to quench the arc which forms between the fixed butt contact 13 and the plunger 9 after the main current carrying plug has been entirely withdrawn from the resilient sleeve contact 5.

Referring next to Figs. 3 and 4 the arrangement therein illustrated only differs from that shown in Fig. 1 in that in the first place the plunger 9 slides in a further resilient sleeve contact 18 carried at the lower end of the main current carrying plug 6. The sleeve contact 18 is preferably similar to the sleeve contact 5. In the second place the spring 10 shown in Fig. 1 within the lower portion 7 of the main contact plug 6, is replaced by external springs 19 surrounding headed guide rods 20 attached to a plate 21 fixed

to the lower end of the plunger 9. The arrangement shown in Figs. 3 and 4 is adapted for a heavy current circuit breaker. In one example thereof which has been found particularly successful the diameter of the main plug was about 1.7 inches (4.47 cms.) and the rating of the circuit breaker was 900 amperes.

The invention may be applied if desired to circuit breaker arrangements wherein the oil is pumped upwards through the housing 3, 4 during circuit breaker opening.

It will be understood that various minor modifications in the arrangement illustrated and described may be made within the scope of the invention.

I claim:

For an electric oil circuit breaker, a fixed metal housing having a main current carrying fixed contact of the resilient sleeve type carried at the mouth thereof, said housing having at least one hole therein above said main fixed contact, a rigid butt type arcing contact within said housing and having its contact surface above said main fixed contact, a main moving contact in the form of a plug adapted to cooperate with said resilient sleeve type contact, said plug contact being tubular, and a spring urged arcing contact in the form of a plunger carried within the bore of said plug contact and adapted to make and break engagement with said fixed arcing contact within said housing.

GEORGE ETHELBERT WHITEHEAD.