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ELECTRIC CIRCUIT BREAKERS WITH COMPRESSED FLUID BLOW OUT

Filed June 18, 1938

Serial No.

214,489

2 Sheets-Sheet 1

Fig. 1

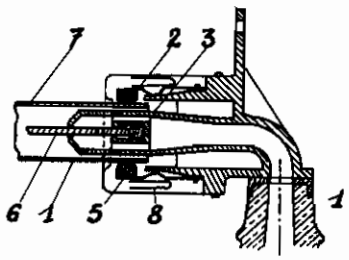

Fig. 2

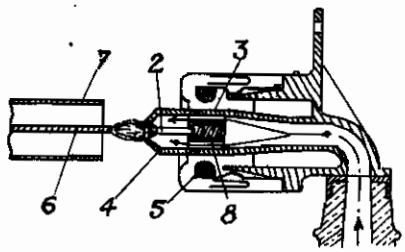

Fig. 3

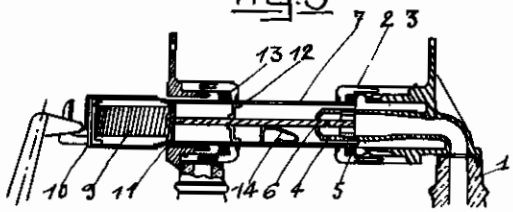

Fig. 4

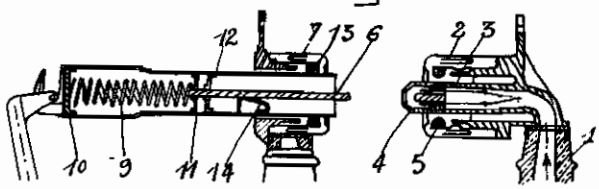

Fig. 5

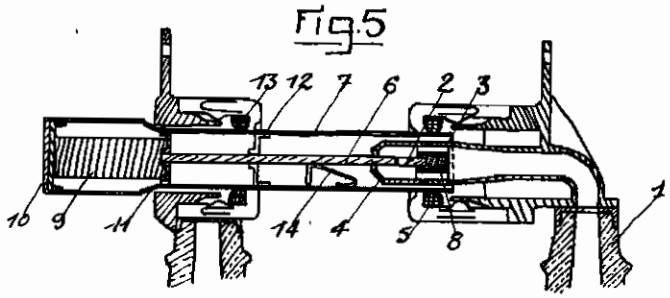

Fig. 6

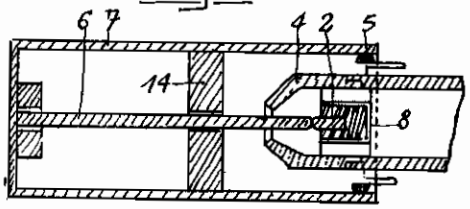

Fig. 7

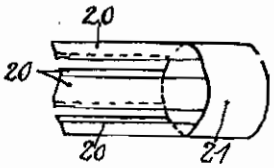

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Fig. 8

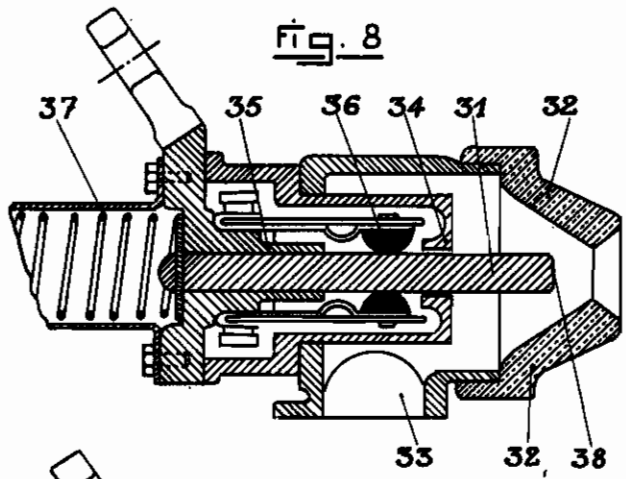


Fig 9

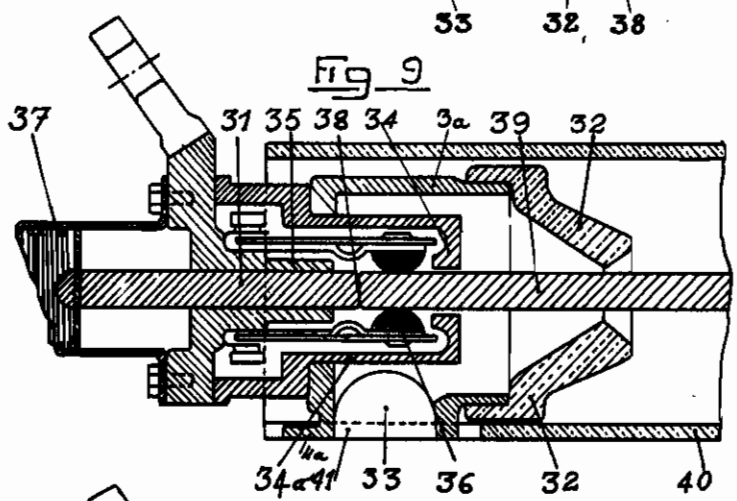
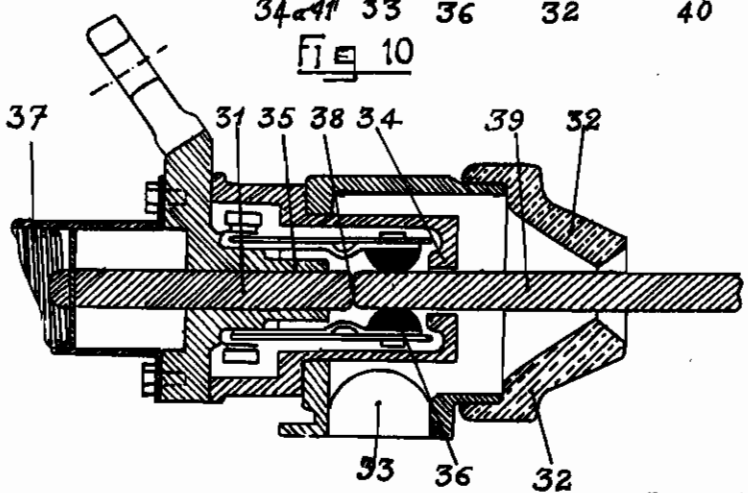


Fig 10



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ALIEN PROPERTY CUSTODIAN

ELECTRIC CIRCUIT BREAKERS WITH COMPRESSED FLUID BLOW OUT

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Application filed June 18, 1938

This invention relates to electric circuit breakers with compressed fluid blow out and has for one of its objects to provide an improved circuit breaker of the aforesaid type.

Circuit breakers of this general type, and more particularly pneumatic circuit breakers for high tension currents are known in which the fixed contact of the arc drawing device is positioned within a tubular member through which the blast is supplied; when the contacts are in closed position, in order normally to prevent passage the electric current across the end surfaces of the contacts to which the arc is connected, the current arriving from the terminal of the fixed contact of said arc-drawing device is generally supplied to the movable contact of said device through lateral contact brushes located within said tubular member.

With such an arrangement however, in the case of high intensity circuit breakers, large contacts and a tubular member of large dimensions are required, but in such case the blast would not be very efficacious. One of the objects of the present invention is to overcome this difficulty.

Another object of the invention is to provide an electric circuit breaker with compressed fluid blow out, in which the main contacts are disposed about the contacts of the arc-drawing device, said main contacts or at least those positioned about the fixed contact being outside of the blast current which latter is directed from the fixed contact of the arc-drawing device toward the movable contact of said device, said fixed contact of the arc-drawing device being always positioned within an insulating tubular member serving as a conduit for the blast.

The invention and its objects above set forth as well as others which may hereinafter appear, will be clearly understood from the following description, taken in connection with the accompanying drawing of several embodiments of the invention herein given for illustrative purposes, the true scope of the invention being more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a view, partly in section, of a circuit breaker embodying an illustrative form of the invention, the contacts of the arc-drawing device being in closed position and the fixed contact of said device being mounted upon a spring;

Fig. 2 is similar to Fig. 1, but shows the contacts of the arc-drawing device in separated or open position;

Fig. 3 shows a modification of the embodiment shown in Fig. 1, the movable contact of the arc-drawing device being mounted upon a spring;

Fig. 4 is similar to Fig. 3, but with the contacts of the arc-drawing device in separated or open position;

Fig. 5 is a view, partly in section, of a circuit breaker embodying another embodiment of the invention, in which both the movable and the fixed contact of the arc-drawing device are mounted upon springs;

Fig. 6 is a view, partly in section, of a further embodiment of the invention;

Fig. 7 is a perspective view of a special form of one of the parts belonging to the movable contact of the circuit breaker;

Fig. 8 is a sectional view of a modification of the fixed contact of the arc-drawing device;

Fig. 9 is a view, partly in section of a circuit breaker in which the fixed contact of the arc-drawing device is of the type shown in Fig. 8, both contacts of said device being in closed position; and

Fig. 10 shows a modification of the construction shown in Fig. 9.

Referring more particularly to Fig. 1, the fixed portion of the circuit breaker is mounted upon a hollow insulator 1 through which the blast is applied. Said blast may be of any suitable fluid, compressed air being herein used. The arc-drawing device comprises two relatively movable contacts; herein one of said contacts is fixed and the other is movable toward and from said fixed contact. The fixed contact 2 is located substantially on the longitudinal axis of a tubular member 3 having converging walls 4 of insulating material, said contact 2 having its end surface level with said converging surfaces during the blowing of the arc, so that the latter at the moment it is blown will be in the best position for extinction. In accordance with the invention the main contacts consist of spring pressed contact brushes 5 and are provided outside of said tubular member. The movable contact of the arc-drawing device is shown at 6 and includes a metal tube 7 which forms a main contact surrounding said movable contact 6, said tube engaging beneath the spring pressed contact brushes 5 and surrounding the tubular member 3, when the contacts 2 and 6 are moved into closed position.

It is desirable that the contacts shall possess a low electro-dynamic repulsion, particularly in the case of circuit breakers with high rupturing power. To this end the fixed contact 2 may be resiliently mounted, for example, by being backed

up by a relatively strong spring 8 to exert a strong pressure or thrust toward the movable contact 8 at the moment of closure of said contacts (Fig. 1). Upon separation of said contacts (Fig. 2) said spring will bring said contact 2 into the most favorable position for the blast. Said spring by its action always enables the tube 7 to be disengaged from said spring pressed contact brushes 5 before the separation of the contacts 2 and 6.

In accordance with the invention the movable contact 6 may be resiliently mounted instead of the fixed contact 2 (Figs. 3 and 4), for example by means of an abutting spring 9 which can thus move said contact 6 substantially axially of said contact tube 7. Said spring 9 abuts at one end against the bottom 10 of said tube 7 and at its other end against an abutment 11 secured to one end of said contact 6 and having a sliding fit in said tube 7, said abutment engaging a fixed stop 12 within said tube when said contacts 2 and 6 are in open or disengaged position, said contact 6 having a sliding fit in said stop 12. The current is supplied to said tube 7 through spring pressed contact brushes 13, a blade 14 serving electrically to connect said tube and said contact 6. Said spring 9 will be compressed when said contacts 2 and 6 are engaged or in closed position and will expand during the separation of said contacts (see Figs. 3 and 4 respectively).

In accordance with the invention both the fixed contact 2 and the movable contact 6 may be spring pressed, each as above described, and as shown in Fig. 5. This arrangement has the advantage of reducing the stress upon spring 8 and the stroke of said contact 2. Said springs 8 and 9, or either of them, could also be replaced by suitable electro-magnetic or electro-dynamic means, whereby to ensure compensation of the electro-dynamic stresses.

The movable contact tube 7 need not necessarily have continuous or solid walls, as above described but may have its walls slotted or provided with openings to reduce weight or to cause it to conform to any shape that may be given to said tubular member 3; it may for example consist of a plurality of spaced parallel members 20 (Fig. 7) which may serve as guides and electrical conductors and which are joined at their ends adjacent the fixed contact 2, to an annulus or ring 21 which surrounds said tubular member 3 and is positioned under the contact brushes 5, when said contacts 2 and 6 are brought into closed position.

It will be apparent to those skilled in the art that said brushes 5, while being outside the tubular member 3 could be so positioned as to engage the interior surface of said movable contact tube 7 at the end of the relative movement of said contacts 2 and 6 to closed position, instead of being outside said contact tube 7 as previously described. Such a construction is shown in Fig. 6.

In the illustrative embodiments above described, the compressed fluid (gas or liquid) enters the tubular member 3 axially thereof, and the corresponding main contacts 5 are outside of said member. Figs. 8 and 9 show modified constructions in which 31 indicates one of the contacts of the arc-drawing device, 32 indicates the converging walls and 33 indicates the sleeve through which the blast of compressed fluid is supplied. Said contact 31 is provided with guides 34 and 35 and with fixed main contacts 36. Said guides 34 extend about said main contacts 36 to form a covering 34*a* contained entirely within the non-convergent portion of said tubular member. As the blast of compressed fluid arrives through said lateral sleeve 33 at the bottom of said covering 34*a*, and preferably at the point where the convergent portion of said tubular member starts, the blowing of the arc retains its full efficiency. Said contact 31 of the arc-drawing means abuts against a strong spring 37 to enable it to have a certain degree of mobility longitudinally, said spring being free from tension when the contacts of the arc-drawing device are not in contact (Fig. 8) and is tensioned when they are in contact (Fig. 9). This spring is useful in that it compensates the stresses of electrodynamic repulsion to which said contacts are subjected when they are in contact. On the other hand it enables the end surface 38 of said contact 31 to be disengaged as much as possible at the moment of separation of the contacts of said arc-drawing device, whereby the blowing operation by compressed gas is improved. When the contacts of the arc-drawing device are engaged (Fig. 9), the movable contact 39 of said device engages between the main contacts 36, while the tube 40, positioned about said movable contact, surrounds said tubular member 3*a*, said tube 40 being provided with a slot 41 into which the compressed fluid supply pipe 4*a* enters during the operation. In this case the tube 40 may with advantage be made of insulating material and in fact may be dispensed with. Such a construction is shown in Fig. 10. In the construction shown in Fig. 9, however, the blowing of the arc will be more efficacious if a continuous passage, such as tube 40, be provided for the compressed fluid. Electro-magnetic or electro-dynamic compensating means may be added to the compensating spring to reenforce the action of the latter.

The invention has been described mainly in its application to pneumatic circuit breakers in which the fixed contact of the arc-drawing device is disposed under the best conditions for the blowing of the arc at the moment of separation of the contacts of said device. It will be apparent that the invention may include a tubular member of any suitable shape, the fixed contact of the arc-drawing device occupying any desired position relatively to said member. Compressed air or any other suitable compressed gas or liquid may be used. Oil has been used with success.

I am aware that the invention may be embodied in other specific forms without departing from its spirit or essential attributes, and I therefore desire the present embodiments to be considered in all respects as illustrative and not restrictive.

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