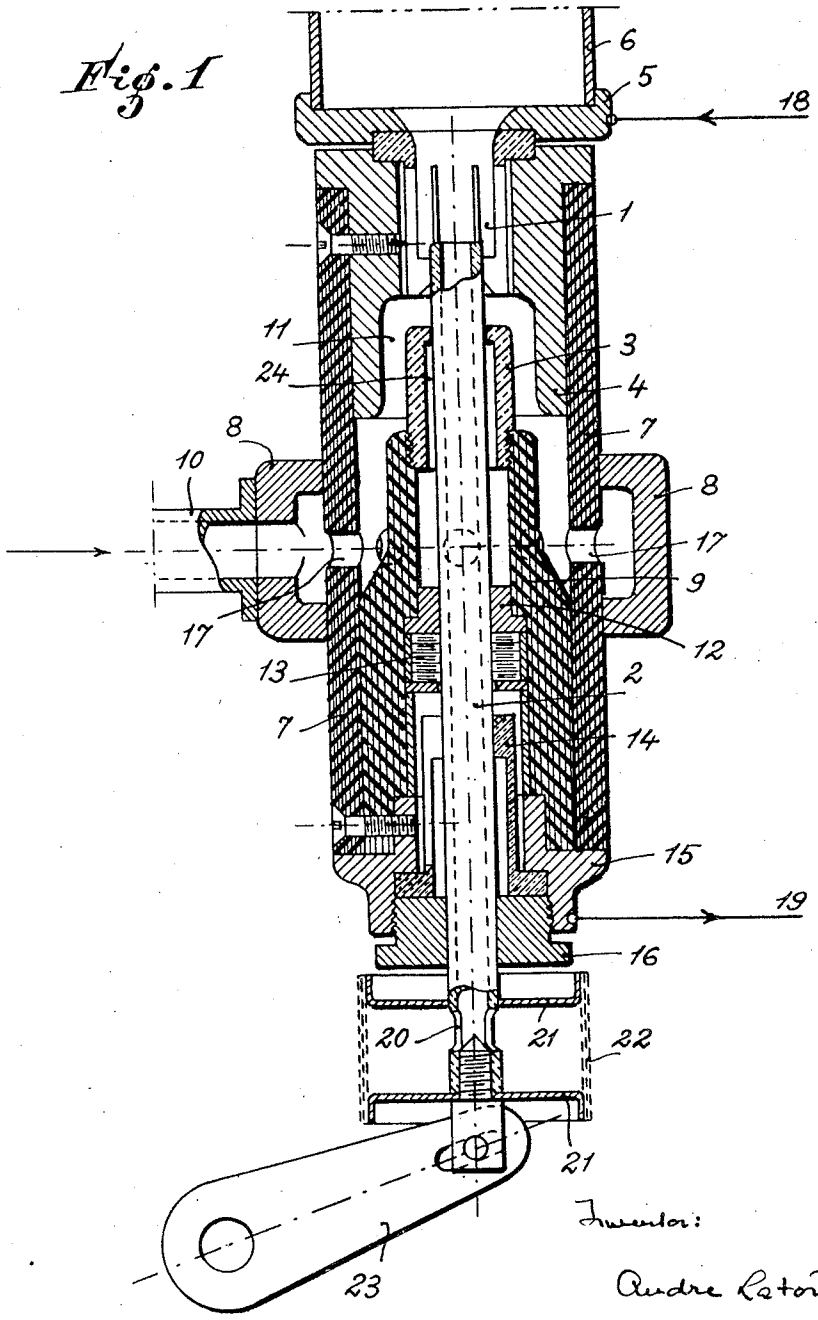
Jan. 17, 1950 A. LATOUR 2,494,661

GAS BLAST CIRCUIT BREAKER

Filed Jan. 23, 1947 2 Sheets-Sheet 1

Fig. 1



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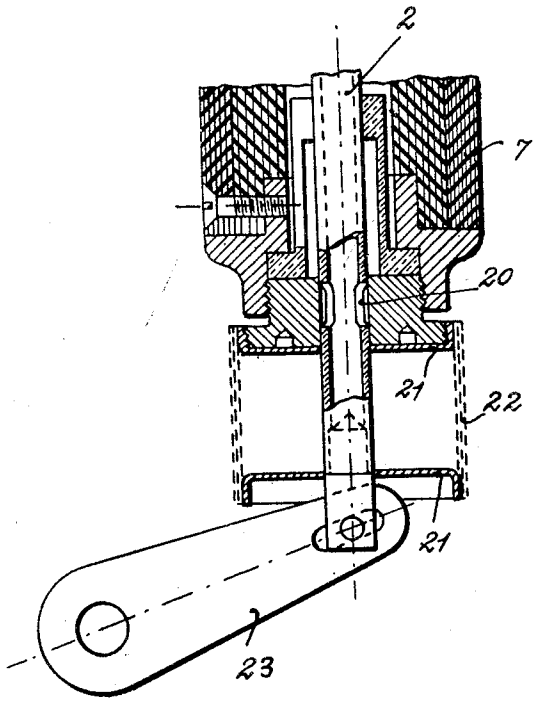

Fig. 2

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GAS BLAST CIRCUIT BREAKER

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Patent expires May 5, 1959

6 Claims. (Cl. 200—148)

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My present invention relates to electric circuit breakers, and relates more particularly to circuit breakers wherein a blast of compressible fluid is used to extinguish the arc.

Among the objects of my invention is the provision of such a circuit breaker wherein the exterior surface of the movable contact is shielded from the arc and heated fluid.

A further object of my present invention is to provide for means to prevent the fluid after it has been heated by the arc from making contact with the exterior surface of the movable member and to direct the same away from said surface towards exhaust.

With the above and other objects of the invention in view, the invention consists in the novel methods, construction, arrangement and combination of various devices, elements and parts as set forth in the claims hereof, certain embodiments of the same being illustrated in the accompanying drawings and described in the specification.

The novel features which I consider as characteristic for my invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is an axial sectional view of a circuit breaker in accordance with my invention; and

Fig. 2 is a fragmentary sectional view, similar to Fig. 1, but embodying a modification.

In carrying the invention into effect, in the embodiments which I have selected for illustration in the accompanying drawings and for description in this specification, and referring now particularly to Fig. 1, I provide a casing 7, preferably made of insulating material. Said casing 7 is endless and hollow and may, for instance, be of cylindrical shape. The casing 7 is provided, about midway of its length with a series of radially arranged openings 17 for the entry of pressurized fluid.

A collar 8 surrounds said midway portion of the casing and is rigidly secured thereto and may be connected, with a pipe 10, to a pressure source of the fluid and serves the purpose to convey fluid received from the pipe 10 to all of said openings 17 for discharge thereof to the interior of the casing 7.

A deflector member 4 is mounted near one end on the interior of said casing 7 and has a central

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aperture adapted to receive a stationary or fixed electrode or contact 1. Said electrode 1, as illustrated in Fig. 1, is hollow and may be made in the shape of a slotted tube having free ends turned inwardly for making under the tension of its own resiliency, contact with the outer surface of the movable electrode 2.

The other end of said fixed electrode 1 is provided with a flange that is rigidly secured to the deflector member 4 by a cover 5 that has a central opening intercommunicating with the central opening of the hollow stationary electrode 1, serving as an exhaust passage for heated fluid.

A pipe or muffler 6 is connected to said cover 5 for conducting the exhaust fluid. Said cover 5 preferably is made of conducting material and is electrically interconnected by means of a lead 18 to an electric circuit (not shown) to be interrupted by the switch in accordance with my present invention.

The deflector 4 may be mounted in the casing 7 by means of screws, as shown, or by any other suitable fastening means. The interior of said deflector 4 is recessed for directing incoming fluids as will be explained later on.

On the opposite end of said casing 7 there is mounted on the interior a hollow holding member 9 that is made of insualting material and that may be secured to the casing by means of screws, as shown, or by any other suitable fastening means. An endless hollow member 3 is mounted on the inner end of said holding member 9 and extends with ones end to a point near the inner recessed surface of said deflecting member 4 forming therewith a passage 11 of U-shaped cross-section for receiving fluid and for directing the same towards the inner breaking plane defining end of said stationary electrode 1.

The exterior of said holding member 9 converges at a point opposite to said openings 17 to provide a space between its exterior and the wall of said casing 7 and said space is intercommunicating with the passage 11 for conducting the gases from the openings 17 towards said stationary electrode 1. The remainder of said holding member 9 abuts on its exterior with the wall of the casing 7 to prevent the fluid from expanding into any direction other than towards the stationary electrode 1.

The movable electrode 2, which is preferably of hollow, elongated tubular form, is reciprocable on the interior of said holding member 9 but is spaced from the interior thereof. The movable electrode 2, in its normal contact making position extends at one longitudinal end into said sta-

tionary electrode 1 and is firmly gripped there by the resilient inwardly turned ends thereof for good electrical contact, and extends with the opposite end to the exterior of said casing. Said movable electrode is open on said first, contact making, end and in that position its interior communicates with the interior of the stationary contact 1, the cover 5 and the exhaust 6. The other end that protrudes from the casing has lateral exhaust openings 20 and is secured by means of a cam and cam follower to an insulated reciprocable crank 23, by means of which the movable contact 2 may be reciprocated towards and from the contact making position illustrated in Fig. 1.

The movable electrode 2 is supported about midway of its length in normal position, by a guiding ring 12 that is provided at one side with packing means 13.

A conductive cover 15 is connected to the opposite end of said casing 7 and carries an apertured second guiding ring 16 which slidably engages said movable electrode 2. A brush 14 is clamped between the cover 15 and the guiding ring 16, and is interconnected, by means of the cover 15 to a lead 18 of said aforementioned circuit. An exhaust or muffler 21 is provided near the exhaust end of said movable electrode 2 and may be provided with screens 22 for receiving and conducting exhaust fluid discharged through the exhaust opening 20 from the interior of said movable electrode 2.

The hollow member 3 may either be made of conductive material or of insulating material, but, since it is mounted on the insulated support member 9, it cannot form an electrical contact for the arc which develops upon disengagement of the electrodes. Said hollow member 3 surrounds a portion of said movable electrode 2 in the normal position thereof near said breaking plane of said stationary contact 1. The member 3 preferably includes a portion, near said breaking plane that extends transversal of the longitudinal extension of said movable electrode 2, and is shaped disc-like. The interior of said disc-like portion surrounds said movable electrode 2 but is spaced therefrom and forms with the exterior thereof a narrow endless gap. The remainder of said hollow portion 3 extends from the outer contour of said disc-like portion in a direction away from said breaking plane substantially parallel to said movable electrode 2 and its interior is spaced from the outer surface of said electrode 2 for a greater distance than the width of said gap and provides an annular chamber 24 that intercommunicates with said gap and the gap forms an open end of restricted area for said chamber 24.

Said chamber 24 extends in the opposite direction to said guiding ring 12 which, together with the packing 13, provides an effective closure for said chamber 24 making it impermeable to the passage of fluid at said end.

The operation of the above described embodiment is as follows:

During the normal, contact making position of the movable electrode 2, fluid enters the interior of the casing under pressure being conducted by said pipe 10 to said collar 8 and through said openings 17 and guided by said support member 9 and the deflector 4 into the passage 11 formed between the recess of the deflector 4 and the exterior of the hollow member 3. Thereby, the pressurized fluid is directed to the breaking plane. At the same time, fluid will also enter through said gap into said chamber 24 and will fill the same and have essentially the same pressure in said chamber 24 as in said passage 11. Consequently, the pressure of fluid in the chamber 24 is equalized with that of the passage 11, and at that stage no pressure differential exists. Upon contact disengagement, an arc will be formed between the stationary contact 1 and the end of the movable contact 2 which is moving away from said stationary contact 1. This will cause the temperature of the surrounding fluid to rise, and, due to the pressure of the fluid, it will be blasted in opposite directions on one hand through the stationary contact 1 towards the exhaust 6, and on the other hand through the interior of the movable electrode 2 to the exhaust passages 20 and into the muffler 21.

The disc-like portion will deflect the heated fluids as well as the arc through the interiors of the hollow electrodes and, aided by the pressurized fluid in said chamber 24, will prevent that either the hot fluid or the arc make contact with the exterior surface of the movable electrode 2.

This shielding of the outer surface of the movable electrode 2 above described, will preserve said surface intact for ensuring good contact surface with the stationary electrode 1 for repeated engagement and disengagement of said electrode over protracted periods of time.

In the embodiment shown in Fig. 2, the muffler 21 is not movable with the movable electrode 2, but is mounted stationary with relation to the casing 7.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of electric circuit breakers differing from the type described above.

While I have illustrated and described the invention as embodied in circuit breakers wherein a blast of compressible fluid is used to extinguish the arc, I do not intend to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of my invention.

Without further analysis, the foregoing will so fully reveal the gist of my invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characterisics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a fluid blast electric circuit breaker, including a casing having apertures to admit to its interior fluids from a blast pressure source, in combination, a hollow fixed electrode in said casing, an elongated movable electrode cooperating with said fixed electrode and being hollow and open at the contact engagement end and having outlets near the other end disposed at least in contact disengaging position on the exterior of said casing, said fixed electrode having near one side a breaking plane defining the location of arc-forming disengagement from said movable electrode, means secured in said casing and electrically insulated from either electrode and closely surrounding a portion of said movable electrode but closely spaced therefrom forming a chamber therewith for receiving static fluid and being fluid-impermeable at one end, said means

arranged to direct the flow of fluid to said breaking plane, and after disengagement to direct said fluid in opposite directions to the interiors of said electrodes for exhaust, whereby the exterior of said movable electrode will be shielded from high temperature contact.

2. In a fluid blast electric circuit breaker, including a casing having apertures to admit to its interior fluids from a blast pressure source, in combination, a hollow fixed electrode in said casing, an elongated movable electrode cooperating with said fixed electrode and being hollow and open at the contact engagement end and having outlets near the other end disposed at least in contact disengaging position on the exterior of said casing, said fixed electrode having near one side a breaking plane defining the location of arc-forming disengagement from said movable electrode, means secured in said casing and electrically insulated from either electrode and arranged for directing fluid to said breaking plane and having a part surrounding said movable electrode forming with the exterior thereof an endless gap, and having on the part extending from said first part for a portion coaxially of said movable electrode for forming with the exterior thereof a chamber having a restricted pressure equalizing path constituted by said gap on one end and having its opposite end impermeable to the passage of fluid, whereby fluid may enter from the exterior of said insulated means into said chamber to fill the same prior to contact disengagement and thereafter the entry of fluid thereinto will substantially be restrained.

3. In a fluid blast electric circuit breaker, including a casing having apertures to admit to its interior fluids from a blast pressure source, in combination, a hollow fixed electrode in said casing, a circular movable electrode cooperating with said fixed electrode and being hollow and open at the contact engagement end and having outlets near the other end disposed at least in contact disengaging position on the exterior of said casing, said fixed electrode having near one side a breaking plane defining the location of arc-forming disengagement from said movable electrode, annular means secured in said casing and electrically insulated from either electrode and arranged for directing fluid to said breaking plane and having a part surrounding said movable electrode forming with the exterior thereof an endless circular gap, and having an other part extending from said first part for a portion coaxially of said movable electrode for forming with the exterior thereof an annular chamber having a restricted pressure equalizing path constituted by said gap on one end and having its opposite end impermeable to the passage of fluid, whereby fluid may enter from the exterior of said insulated means into said chamber to fill the same prior to contact disengagement and thereafter the entry of fluid thereinto will substantially be restrained.

4. In a fluid blast electric circuit breaker, including a casing having apertures to admit to its interior fluids from a blast pressure source, in combination, a hollow fixed electrode in said casing, an elongated movable electrode cooperating with said fixed electrode and being hollow and open at the contact engagement end and having outlets near the other end disposed at least in contact disengaging position on the exterior of said casing, said fixed electrode having near one side a breaking plane defining the location of arc-forming disengagement from said

movable electrode, means secured in said casing and electrically insulated from either electrode and arranged for directing fluid to said breaking plane and having a part surrounding said movable electrode forming with the exterior thereof an endless gap, and having on the part extending from said first part for a portion coaxially of said movable electrode for forming with the exterior thereof a chamber having a restricted pressure equalizing path constituted by said gap on one end, means at the opposite end of said chamber for closing the same to the passage of fluid, whereby fluid may enter the exterior of said insulated means into said chamber to fill the same prior to contact disengagement and thereafter the entry of fluid thereinto will thereby be restrained.

5. In a fluid blast electric circuit breaker, including a casing having apertures to admit to its interior fluids from a blast pressure source, in combination, a hollow fixed electrode in said casing, an elongated movable electrode cooperating with said fixed electrode and being hollow and open at the contact engagement end and having outlets near the other end disposed at least in contact disengaging position on the exterior of said casing, said fixed electrode having near one side a breaking plane defining the location of arc-forming disengagement from said movable electrode, a hollow member secured in said casing and electrically insulated from either electrode and disposed coaxially with said movable electrode and surrounding the same for a portion and including an end part near said breaking plane extending transversally of said movable electrode forming with the exterior surface thereof an endless gap of predetermined width, another part of said member forming with the exterior surface of said movable electrode a chamber intercommunicating on one end with said gap constituting a pressure equalizing path of restricted area for said chamber and having its opposite end impermeable to the passage of fluid, a deflector secured to said casing defining with the exterior of said hollow member a passage for said fluid adapted to direct the same towards said breaking plane, whereby fluid entering said casing under pressure while the electrodes are interengaged will expand from said passage through said gap into said chamber and fill said passage and said chamber at substantially equal pressure, and upon electrode disengagement the arc heated fluid will be blasted in opposite directions through the interiors of said hollow electrodes for exhaust and be restrained from entering said fluid-filled chamber so that the exterior surface of said movable electrode will be kept free of high temperature contact with the arc and hot fluid.

6. In a fluid blast electric circuit breaker, including a casing having apertures to admit to its interior fluids from a blast pressure source, in combination, a hollow fixed electrode in said casing, an elongated movable electrode cooperating with said fixed electrode and being hollow and open at the contact engagement end and having outlets near the other end disposed at least in contact disengaging position on the exterior of said casing, said fixed electrode having near one side a breaking plane defining the location of arc-forming disengagement from said movable electrode, a hollow member secured in said casing and electrically insulated from either electrode and disposed coaxially with said movable electrode and surrounding the same for a portion and including an end part near said breaking

plane extending transversally of said movable electrode forming with the exterior surface thereof an endless gap of predetermined width, another part of said member forming with the exterior surface of said movable electrode a chamber intercommunicating on one end with said gap constituting a pressure equalizing path of restricted area for said chamber and having its opposite end impermeable to the passage of fluid, a deflector secured to said casing defining with the exterior of said hollow member a passage for said fluid adapted to direct the same towards said breaking plane, whereby fluid entering said casing under pressure while the electrodes are interengaged will expand from said passage through said gap into said chamber and fill said passage and said chamber at substantially equal pressure, and upon electrode disengagement the arc heated fluid will be blasted in opposite directions through the interiors of said hollow electrodes for exhaust and be restrained by said end part of said member and the pressure of the fluid within the

chamber from entering into said chamber so that the exterior surface of said movable electrode will be kept free of high temperature contact.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 21,125	Ruppel	June 20, 1939
716,475	Read	Dec. 23, 1902
1,937,482	Ruppel	Nov. 28, 1933
1,987,885	Whitney	Jan. 15, 1935
2,060,282	Clerc	Nov. 10, 1936
2,303,825	Cox	Dec. 1, 1942

FOREIGN PATENTS

Number	Country	Date
859,295	France	June 3, 1940