

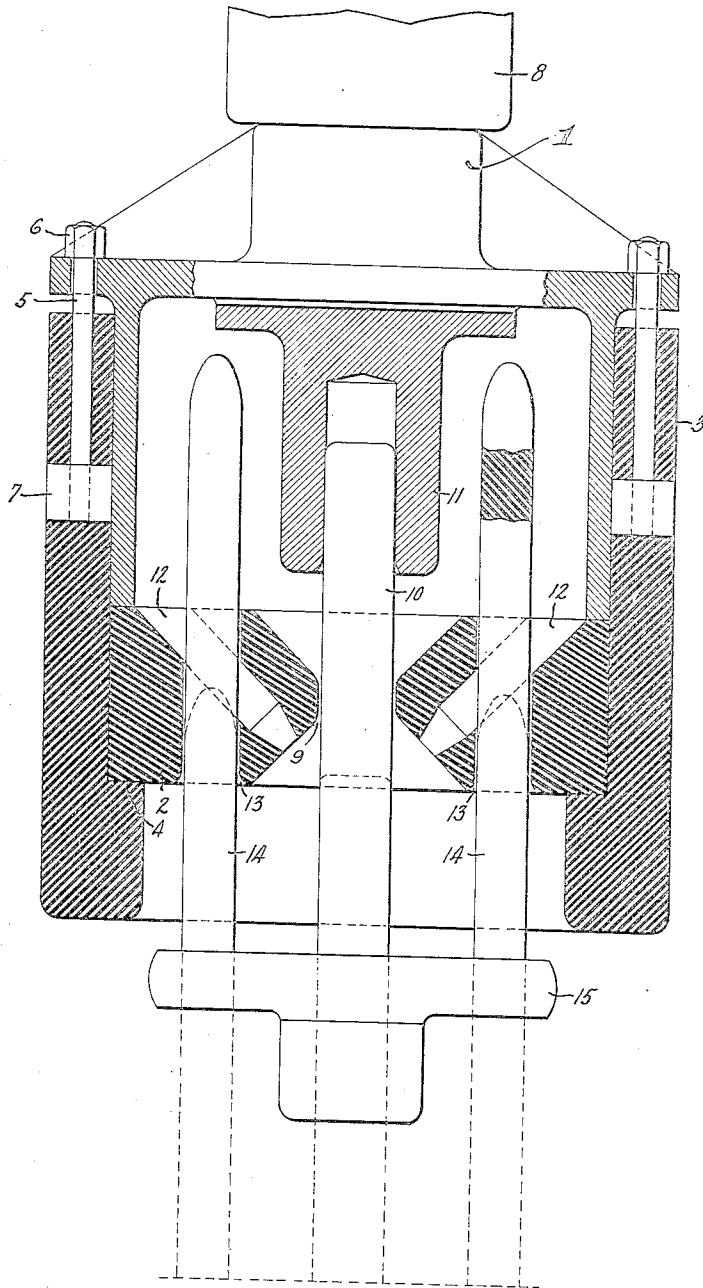
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CIRCUIT BREAKER

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CIRCUIT BREAKER

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8 Claims. (Cl. 200—150)

This invention relates to electric switches or circuit breakers of the kind in which separation of the contacts takes place in an enclosed chamber, commonly known as an explosion pot, which contains an insulating and arc extinguishing fluid such as oil. The movable contact, generally of plug or rod form, extends into said chamber through an orifice in one wall thereof and cooperates with a fixed contact mounted inside the chamber. In separating the contacts to interrupt the electrical circuit, the movable contact is withdrawn from the explosion pot and an arc is drawn through the said orifice. The arc generates pressure in the chamber and such pressure may accelerate the movement of the movable contact out of the chamber and cause insulating fluid to be discharged through said orifice into the arc path.

A principal object of this invention is the provision of an improved circuit breaker of the aforesaid type having means for effectively controlling and directing the arc extinguishing discharge or blast of insulating fluid.

According to the present invention an explosion pot is provided with one or more orifices or passages, in addition to the orifice through which the movable contact is adapted to enter and leave, leading from the interior of the explosion pot. These passages are adapted to direct insulating fluid from the explosion pot into or across the arc gap at or near the place of exit of the moving contact from the explosion pot and are provided with valve or shutter means other than the moving contact itself. The valve or shutter means are operated by or under control of the moving contact so as to allow discharge of insulating fluid through said orifices or passages at a predetermined point in the travel of the moving contact during the circuit opening movement thereof, preferably such that substantially no effective discharge of insulating fluid through the arc path occurs until the contact separation has advanced a predetermined amount.

My invention will be more fully set forth in the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Referring to the drawing, the single figure thereof is an elevational view, partly in section, of the interrupting element of an electric circuit breaker embodying my invention.

In one convenient arrangement of switch or circuit breaker embodying my invention the bot-

tom of the explosion pot comprises a block of insulating material having an orifice through which the moving contact rod operates, and one or more inclined passages arranged so as to direct insulating fluid from the explosion pot into or across the arc path at the periphery of said orifice. A fixed socket contact with which the rod or plug contact cooperates is mounted in the explosion pot and preferably extends downwardly in proximity to the said insulating block.

Valve means for controlling the discharge of insulating fluid through each of the said inclined passages may conveniently comprise a plug as a pin, blade or rod-like member of insulating material disposed parallel with the contact rod and arranged to move with the latter. The insulating valve member extends through a vertical perforation in the insulating block intersecting the said inclined passage.

With this arrangement, upon the circuit opening movement of the switch, during which the rod contact is withdrawn from the explosion pot concurrent with generation of arc pressure, discharge of insulating fluid through the inclined passage or passages is restrained until the valve member, or members, have been moved axially into such position that the upper end, or ends, thereof are withdrawn from said passages. The relative length of the contact rod and the valve member, or members, is such that the discharge of the insulating fluid across the arc gap from the said inclined passages is only permitted after the arc has been drawn out to a point beyond the orifice through which the rod contact enters and leaves the explosion pot.

Referring more particularly to the drawing, the explosion pot, which is adapted to be immersed in an insulating and arc-extinguishing fluid such as oil in a switch tank (not shown) comprises a cylindrical casting 1 of suitable metal, the lower end of which is closed by a block 2 of a suitable insulating material. It shall be understood that any suitable arc-extinguishing fluid for the application in question, either gas or liquid, may be used. The said casting and block are secured together as by means of an outer cylindrical casing 3 of insulating material which is provided at its lower end with an inwardly extending flange 4 abutting block 2. The casing 3 in turn is secured to the casting 1 as by means of studs 5 and nuts 6 and 7. The explosion pot is mounted as shown at the lower end of a lead-in conductor, part of the insulating bushing for which is shown at 8.

The insulating block 2 is formed with a cen-

tral orifice at 9 through which a contact rod 10 is adapted to move, the orifice on each side of the block 2 having a conical or diverging portion as shown by the drawing.

- 5 The upper end of the contact rod 10 is formed as a plug contact member and cooperates with a fixed socket contact member 11 electrically connected and secured to the metal casting 1. The contact 11 in the preferred arrangement extends downwardly from the top of the casting 1 into proximity to the insulating block 2. A number of inclined passages 12, for example two such passages, are formed in the insulating block 2 leading from the interior of the explosion pot to the lower conical portion of the orifice 9.

- 15 The insulating block is further formed with vertical perforations 13 which each intersect corresponding passages 12 and which are adapted to receive an insulating plug as a pin, blade or rod-like member 14 of insulating material. The insulating plug members 14 are supported at their lower ends from the carrier member 15 of the movable contact member 10 and extend freely through the respective vertical perforations 13 so as to constitute valve or shutter means for controlling the discharge of insulating fluid through the passages 12.

The operation of the above described embodiment of the invention is as follows:

- 20 The switch is shown in the closed circuit position and it will be noted that at this time the valve members 14 prevent flow through the passages 12 of oil or the like contained in the explosion pot. It will further be noted that upon the circuit opening movement of the switch during which the rod contact 10 is drawn away from the fixed contact 11 and pressure is generated within the explosion pot by the action of the resulting arc on the oil, discharge of oil through the inclined passages 12 is restrained until the insulating valve members 14 have reached a position such as indicated in dotted lines in the drawing. In this position the upper ends of said members 14 are below the intersections of the passages 12 and the respective passages 13 and the rod contact 10 will also have reached a position such as that shown in dotted lines in the drawing. It will thus be seen that due to the relative lengths of the contact rod 10 and the insulating valve members 14, the discharge of oil across the arc gap between the upper end of the contact rod 10 and the fixed contact 11 is only permitted after the arc has been drawn through the orifice 9 to a point beyond said orifice.

- 55 It is to be understood that various modifications may be made without departing from the scope of the invention; for example, any other convenient form of valve or shutter means and associated passages may be substituted for the particular arrangement herein specifically described and the invention is not limited to arrangements in which the discharge of the insulating fluid through the additional orifices or perforations is only permitted after the plug contact has been completely withdrawn from the explosion pot.

- 70 It should be further understood that my invention is not limited to specific details of construction and arrangement thereof herein illustrated, and that changes and modifications may occur to one skilled in the art without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

- 75 1. An electric circuit breaker comprising an

explosion pot containing an arc-extinguishing fluid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which an arc is drawn by a movable contact upon opening of the circuit, said pot also having a passage arranged to direct discharge of fluid from said pot into the arc path adjacent said orifice, and valve means other than said movable contact for said passage controlled by and in accordance with the circuit opening operation.

2. An electric circuit breaker comprising an arc extinguishing liquid, an explosion pot immersed in said liquid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which a movable contact is withdrawn in the circuit opening operation, said pot also having a passage arranged to direct discharge of liquid from said pot into the arc path adjacent said orifice, and insulating valve means for said passage controlled by and in accordance with the circuit opening operation.

3. An electric circuit breaker comprising an explosion pot containing an arc-extinguishing liquid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which an arc is drawn by a movable contact upon opening of the circuit, said pot also having a passage arranged to direct discharge of liquid from said pot into the arc path adjacent said orifice, and an insulating valve member for controlling discharge of liquid through said passage carried by and movable with said movable contact.

4. An electric circuit breaker comprising an explosion pot containing an arc-extinguishing liquid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which an arc is drawn by a movable contact upon opening of the circuit, said pot also having a passage arranged to direct discharge of liquid from said pot into the arc path adjacent said orifice, and an insulating valve member movable with said movable contact operable in said passage, said valve member restraining discharge of liquid from said pot during the circuit opening operation until said movable contact is clear of said orifice.

5. An electric circuit breaker comprising an explosion pot containing an arc-extinguishing liquid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which an arc is drawn by a movable contact upon opening of the circuit, said pot also having a passage arranged to direct discharge of liquid from said pot into the arc path adjacent said orifice, and an insulating plug carried by and movable with said movable contact serving as a valve for said passage, said plug being related to said movable contact so that said passage is closed during the initial circuit opening movement and is opened when said movable contact is moved to a predetermined position with respect to said orifice.

6. An electric circuit breaker comprising an explosion pot containing an arc-extinguishing liquid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which an arc is drawn by a movable contact upon opening of the circuit, said pot also having a passage arranged to direct discharge of liquid from said pot into the arc path adjacent said orifice, and valve means other than said movable contact for said passage, said valve means movable with said movable contact and

operable through a second passage intersecting said first-named passage so as to closed said first-named passage during the initial circuit opening operation.

- 5 7. An electric circuit breaker comprising an explosion pot containing an arc-extinguishing liquid, relatively movable contacts separable within said explosion pot, said pot having an orifice through which an arc is drawn by a movable contact upon opening of the circuit, said orifice having a diverging exhaust portion, said pot also having a plurality of passages arranged to direct discharge of liquid from said pot into the arc path at said diverging exhaust portion, and insulating valve means movable with said movable contact for said passages.

8. An electric circuit breaker comprising an explosion pot containing an arc-extinguishing

liquid, relatively movable contacts separable within said explosion pot including a fixed contact in said pot and a coacting rod contact, said pot having an orifice through which an arc is drawn by said rod contact upon opening of the circuit, said fixed contact extending to a point adjacent said orifice, said pot also having a plurality of passages arranged to direct discharge of liquid from said pot into the arc path at said orifice, and insulating valve members movable with said movable contact for said passages, said valve members closing said passages while said rod contact is within said explosion pot and opening said passages when said rod contact is at a predetermined position with respect to said orifice.

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