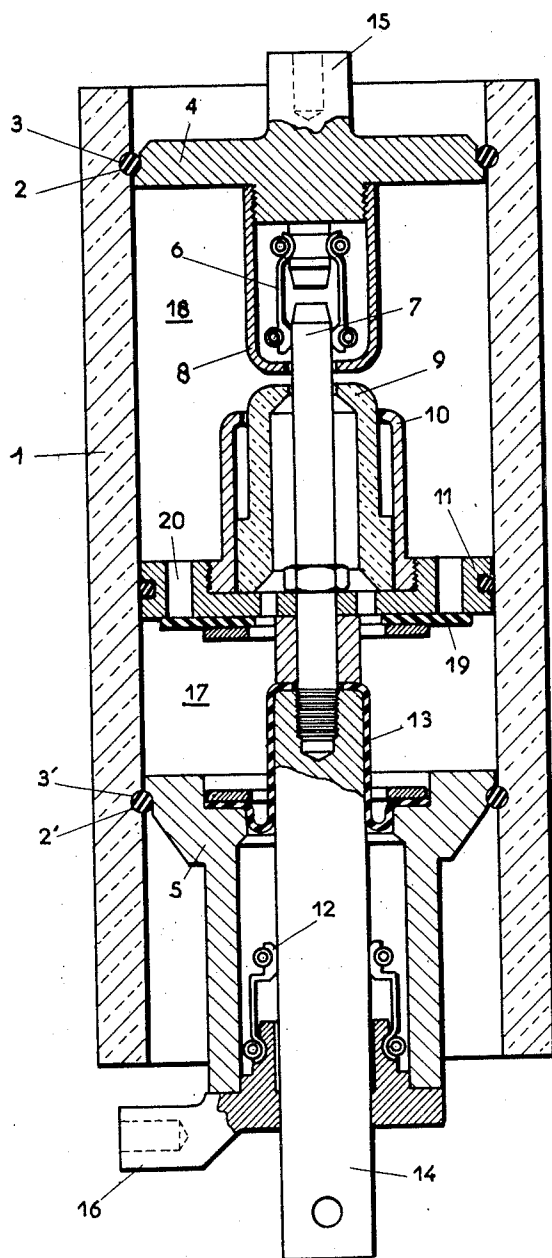


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RESPONSIVE TO DIFFERENTIAL PRESSURE  
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## GAS BLAST CIRCUIT BREAKER HAVING ACTUATING MEANS RESPONSIVE TO DIFFERENTIAL PRESSURE

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4 Claims. (Cl. 200—148)

This invention relates to circuit interrupters which operate in a closed compressed gas atmosphere, in which a piston member which is integral with the movable contact, is moved in a cylinder and creates the necessary gas pressure for directing an extinguishing blast on the arc produced by the circuit interruption.

In prior art circuit interrupters of this type the entire apparatus is mounted in a sealed casing which contains permanently an appropriate compressed gas, such as sulfur hexafluoride.

It is an object of this invention to increase the interrupting force of the prior art circuit interrupters by causing the extinguishing gas to undergo a strong cooling during the arc extinguishing operation, which is obtained by causing the gas to expand while doing work.

It is another object of the invention to provide blast conditions which are clearly improved in regard to those of related prior art interrupters.

It is a further object of the invention to arrange the arc extinguishing chamber in such a way as to have a combination of small over-all dimensions of the apparatus and a dependable dielectric construction.

These and other objects and advantages of the invention would become apparent upon reading the following detailed description of an embodiment of the invention in conjunction with the accompanying drawing in which the invention is illustrated by means of a non-limiting example.

In the drawing the circuit interrupter is shown in the closed position and the single figure shows the apparatus in an axial section.

In this figure the insulating housing is illustrated as a cylinder designated by numeral 1. It has at each end a circular groove 2 and 2', in which an annular seal 3 and 3' respectively is received. A closure member or cover 4 engages the upper seal 3, while a closure member 5 engages the lower seal 3' to thus seal the space between the two closure members in an airtight manner. The airtight condition of the interrupting chamber may be obtained either by means of a stuffing box or similar conventional device (not shown) which presses down the annular seals, or simply by the action of the compressed gas itself, which pushes the closure members 4 and 5 strongly against the respective seals. It will be observed that the closure members 4 and 5 are set inwardly of the ends of the cylindrical housing in such a way as to increase the travelling distance of the leakage current. The cover member 4 carries a fixed contact 6 which cooperates with a movable contact 7. As shown, a lightning arrester 8 protects the fixed contact.

The movable contact is surrounded by a blast tube 9, which is adapted to slide freely inside of a guide sleeve 10, which is integral with a blast piston 11 slidably mounted in the cylinder formed by the housing 1. The lower closure member 5 is connected to a friction contact 12 and to a sealing membrane or diaphragm 13, which is preferably reversible and more generally known as a "Bellofram" bellows. The central collar of this diaphragm is fixed in an airtight manner on a drive piston or rod 14 which serves as an actuating member and is integral with the movable contact and whose lower part is

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connected to a control device (not shown) by which the movable contact may be operated and locked in position. As clearly shown, one end of the drive piston 14 is exposed to the pressure of the compressed gas within the housing while its outer end is exposed to a lower pressure outside of the housing. The electrical current is introduced at 15 and leaves at 16. The inside of the housing is filled with a suitable compressed gas, preferably a gas which is electrically negative.

The piston 11 divides the inside of the housing 1 into two compartments 17 and 18 and carries a flap valve 19 which allows the space in compartment 17 to be filled quickly during a fast closing-opening operation. The flap valve may consist of an annular member of an elastic material which closes a row of annular openings 20, provided in the piston member 11. Of course, the valving function could be carried out by the piston itself instead of a seal, it would be provided with an elastic gasket having a flanged portion which would provide a sealing action only in the desired direction.

The blast tube 9 may be constructed of a suitable insulating material. If it is desired to subject the blast tube to the action of the arc, the inner walls of the tube may be coated by means of a refractory or metallic lining such as a lining of copper. The tube may also be constructed entirely of metal, but in that case care must be taken to insulate it electrically from the movable contact, for example in such a way that the piston 11 is made of an insulating material. The inside of the blast tube communicates with the compartment 17.

The operation of the circuit interrupter according to the invention is as follows:

To produce the opening of the circuit interrupter it is sufficient to release the locking device which controls the movement of rod 14. As the compressed gas exerts constantly on diaphragm 13 a force which tends to drive the rod 14 downwardly, the entire movable assembly is moved rapidly in that direction. During this movement the piston member 11 over-compresses the gas contained in space or compartment 17 which causes the blast tube 9 to be lifted upwardly by the compressed gas which passes to the inside of the blast tube around the movable contact and the support rod. The blast tube will be maintained in the "up" position until the movable contact which is received in the tube, is retracted below the blast opening of the tube. The circuit breaking arc which is drawn between the ends of the fixed contact and movable contact is quickly extinguished by the blast of compressed gas which rushes from the orifice provided in the upper end of the blast tube. At the end of the downward movement of the piston member the guide sleeve 10 which surrounds the blast tube pulls the blast tube 9 downwardly.

It will be understood that the blast tube could be arranged to be fixed relative to the movable contact. In this case the fixed contact consists preferably of a rod whose extremity penetrates inside the blast orifice and engages the movable contact under the effect of a compression spring.

What is claimed is:

1. A circuit interrupter of the gas blast type including a closed cylindrical housing containing a compressed gas, a stationary contact, a movable contact separable from said stationary contact to establish an arc therebetween, a blast piston movable with said movable contact within said housing, said blast piston being disposed around said movable contact and having at least one orifice associated therewith whereby movement of said blast piston causes gas to be forced through said orifice to said arc, a rod having one end within said housing connected to said movable contact and another end outside of said housing exposed

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to a lower pressure, means providing a seal between said rod and housing, said rod being adapted to be locked in a position corresponding to interengagement of said contacts, said compressed gas within said housing biasing said rod to a position corresponding to separation of said contacts when said rod is unlocked and free to move.

2. A circuit interrupter according to claim 1 wherein and a pair of closures defining its end walls, and sealing means between said cylinder and closures, said closures being spaced from the ends of said cylinder so as to increase the path of any leakage current.

3. In a gas blast circuit interrupter of the type having a closed cylindrical housing containing a compressed gas and a pair of contacts, at least one of said contacts being movable to establish an arc, the combination of a blast piston movable with said movable contact within said housing dividing said housing into two chambers of variable volume, means for establishing communication between said chambers, movement of said blast piston in one direction forcing gas through said means towards an arc produced by separation of said contacts, a rod having

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an end in said housing rigidly connected to said movable contact and movable therewith, said rod having an end projecting from said housing exposed to a pressure lower than that of said gas, and sealing means including a diaphragm maintaining said rod and housing in fluidtight relationship, said rod being adapted to be locked in a position corresponding to interengagement of said contacts, said rod under unlocked conditions responding to differential pressure acting on said diaphragm to effect displacement of said movable contact and blast piston.

4. A circuit interrupter according to claim 3 wherein said sealing means is a reversible flexible diaphragm.

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