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VALVE FOR THE MOMENTARY BLASTING OF THE INTERRUPTER CONTACTS GAP IN PRESSURISED GAS CIRCUIT BREAKERS

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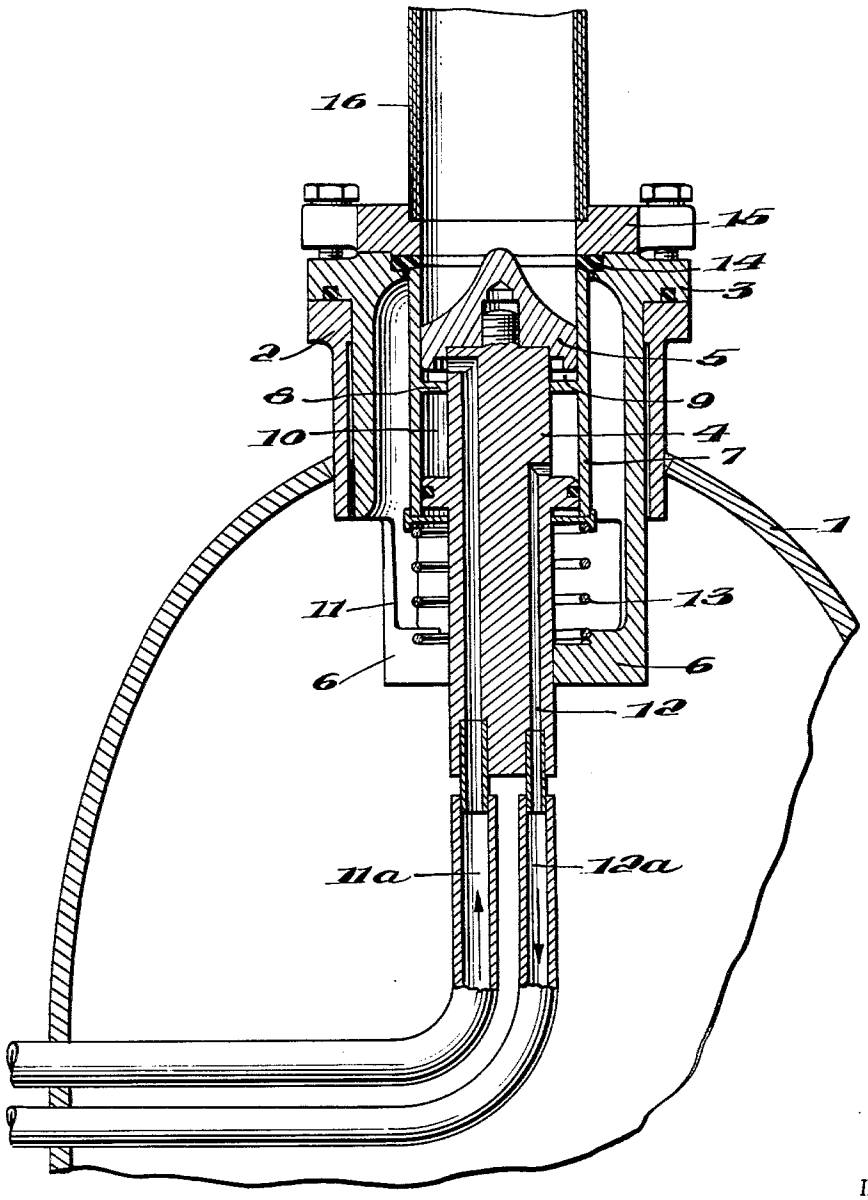

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VALVE FOR THE MOMENTARY BLASTING OF THE INTERRUPTER CONTACTS GAP IN PRESSURISED GAS CIRCUIT BREAKERS

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1 Claim. (Cl. 137—219)

The invention relates to an improvement in the construction of the valve utilized momentarily blasting with gas the gap formed between the interrupter contacts in pressurised gas circuit breakers in order to assist in extinction of the arc. In this valve, the movable valve element possesses an operating piston which forms both an operating chamber and a damping chamber with the fixed guide pieces whereby in order to open the valve, the piston operating chamber is filled with pressurised gas, and for closing the valve, a resetting spring is provided.

In circuit breakers in which the arc, caused by opening of the interrupter contacts in the arcing chambers, is extinguished by a blast of pressurised gas it is very important that, to achieve a good extinguishing of the arc, the extinguishing gas should flow into the arcing chamber as free as possible from turbulence. For this purpose it must be ensured that no turbulence is caused in the valve itself which releases the gas from the gas container and allows the gas to flow to the arcing chambers. The usual type of valve possesses a plate-shaped closing piece which operates together with the corresponding valve seats. The gas flowing through the valve must thus flow around the plate-shaped closing piece with resulting considerable changes in direction whereby a disadvantageous turbulence is caused in the gas flow. A further disadvantage of the ordinary valve is that as a result of the pressure which acts on the valve plate in the closed position, a relatively large force is necessary to open the valve. Besides this the sealing materials, e.g. rubber, always used in these valves are severely stressed thus reducing their life span. As a remedy it has been proposed that the closing pressure which is exerted on the valve plate be partially compensated by providing a compensating piston connected to the valve plate. This solution however results in an increase in the number of parts, which in turn results in an increase in the cost of the valve while the mass to be moved and the necessary installation space is also increased.

The present invention has for its purpose to provide a mode of construction for the valve which avoids the above mentioned disadvantages and which provides a turbulence-free flow of the gas through the valve. The invention therefore proposes that the valve member consist of a single cylindrical body provided with circular ring-shaped operating pistons whereby the operating pistons and the fixed guide pieces for the movable valve member are placed inside the latter around which the gas flows. In this way it is achieved that when the valve is in the closed position a moderate pressure can be maintained by the closing piece on the sealing material while the gas flows around the valve member with a minimum change in direction.

The accompanying drawing which is a view in vertical diametral section shows one mode of construction with reference to which the new arrangement will be explained in more detail. In the drawing **1** is the gas-supply container into which a support **2**, which carries the valve, is welded. This support consists of a flange

part **3** to which the guide pieces **4**, **5** are connected at its lower end by means of the ribs **6**. The guide piece **5** is streamlined in construction and is connected to the guide piece **4** by means of a screw connection. The movable valve member **7** surrounds the two guide pieces **4**, **5** but is capable of moving with respect to these pieces and possesses a ring-shaped operating piston **8** on its inner surface. This piston **8** separates the operating chamber **9** from the damping chamber **10**. The guide piece **4** contains a canal **11** which leads to the operating chamber **9** and a canal **12** which leads to the damping chamber **10**. The connecting pipes **11***a* and **12***a* which pass through the gas container **1** are connected to the canals **11** and **12** respectively. The resetting spring **13** acts between the ribs **6** and the valve member **7**. The seal **14** is positioned on the flange **3** and is fixed in place by the capping piece **15** into which the gas conduit **16**, which leads to the arcing chamber (not shown here), is set.

The method of operation is as follows:

To open the valve, which is shown in the closed position in the drawing, a control valve, not shown here, allows pressurised gas to reach the operating chamber **9** through the connecting pipe **11***a* and the canal **11** in the usual manner. The pressure acting from above on the piston **8** causes the cylindrical member **7** to be moved downwards so that the stream of pressurised gas from the gas container **1** is allowed to pass through the gas conduit **16** to the interrupter contacts, not illustrated. The piston **8** moving downwards causes a compressive damping action in the damping chamber **10**. This damping action can be regulated to achieve the desired operating conditions by means of an adjustable orifice for example (orifice is not shown here), positioned at the end of the connecting pipe **12***a*. The connecting pipes **11***a*, **12***a* are led out through the housing of the gas container **1** in a gas tight manner either on the underside or also in certain cases through the side wall of the container **1** so that the parts, such as control valve and orifice, connected to these pipes are easily accessible. In order to close the valve once again after a given time the chamber **9** is exhausted by means of the impulse type control valve connected to the connecting pipe **11***a*. The resetting spring **13** then returns the cylindrical member **7** to the closed position shown in the drawing. In this position the force exerted on the seal ring **14** by the cylindrical valve member **7** is determined by the operating pressure in the gas container **1** and the ring cross-section, determined by the thickness of the wall of the cylindrical valve member **7**, whereby the force of the resetting spring operates in a complementary manner. In this way the stressing of the seal **14** can be minimized, in spite of the large cross-section of the valve opening, in a simple manner by the suitable choice of resetting spring **13** and the wall thickness of the member **7**. When the valve is in the open position, the gas has an unimpeded passage because the guide pieces **4**, **5** and also the operating piston **8** are not in the region of main flow. The ribs **6** are in a zone where the velocity of flow is still small so that they do not cause any disturbing turbulence.

This new arrangement permits an inexpensive and space-saving construction of valves favourable to gas flow for pressurised gas circuit breakers. As a result of the small mass to be moved, the response time, and the time for the valve to open, are both shortened thereby achieving a desirable short breaking-time of the circuit breaker.

We claim:

In a valve construction for use in controlling flow of a pressurized gas from a supply container to the interrupter contacts of a circuit breaker for the purpose of blasting said contacts with the gas upon opening of said

contacts to facilitate extinction of the arc formed therebetween, the combination comprising an outlet from said pressurized gas container which includes a ring-shaped sealing ring constituting a valve seat, said outlet being established by a cylindrical support member at one end of which said sealing ring and valve seat are located and said support member further including inwardly facing ribs, a movable valve member constituted by a single piece hollow cylindrical body one end of which is adapted to close against said sealing ring, said cylindrical body also including an inwardly extending piston portion dividing the interior of said body into a piston operating chamber at one side of said piston and a damping chamber at the opposite side of said piston, stationary guide means in the form of an elongated guide member located within said cylindrical body for said body and its piston portion, said elongated member being secured to said ribs of said support member and including internal longitudinally extending canals leading respectively to said piston operating and damping chambers, connecting pipes coupled to said canals and which are brought through the wall of said pressurized gas supply container,

and a resetting coil spring for said movable cylindrical valve body, said resetting spring surrounding said elongated guide member and being under compression between said ribs of said support member and the end of said cylindrical valve body opposite the end engaged with said sealing ring, the pressurized gas flowing to said outlet around said cylindrical valve body and being passed through the peripheral gap between the end of said cylindrical valve body and said sealing ring upon movement of said cylindrical valve body axially of itself in the valve opening direction when pressurized gas is admitted to said operating piston chamber.

References Cited by the Examiner

UNITED STATES PATENTS

2,361,225 10/1944 Meyer ..... 251—63 X

FOREIGN PATENTS

49,950 12/1909 Switzerland.

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