

[54] **SWITCH CONTACT CHAMBER FOR ELECTRICAL CIRCUIT BREAKERS OF THE GAS BLAST TYPE**

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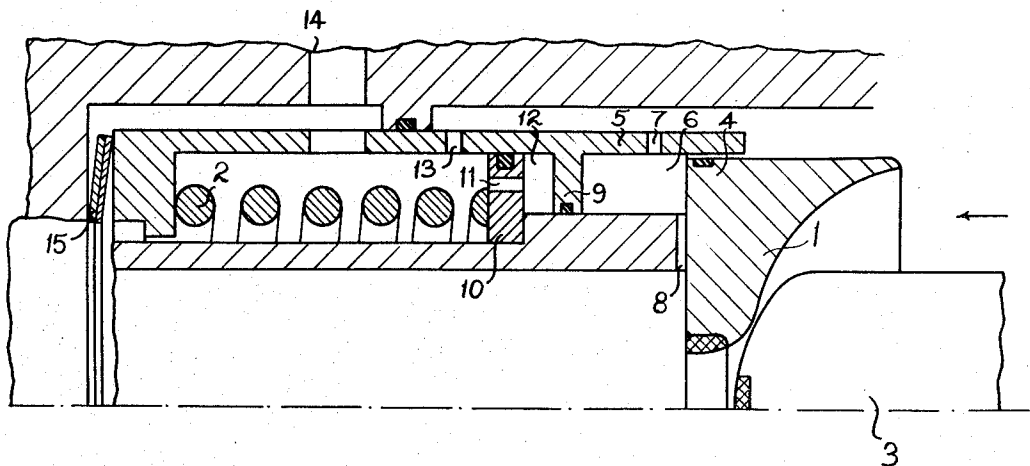
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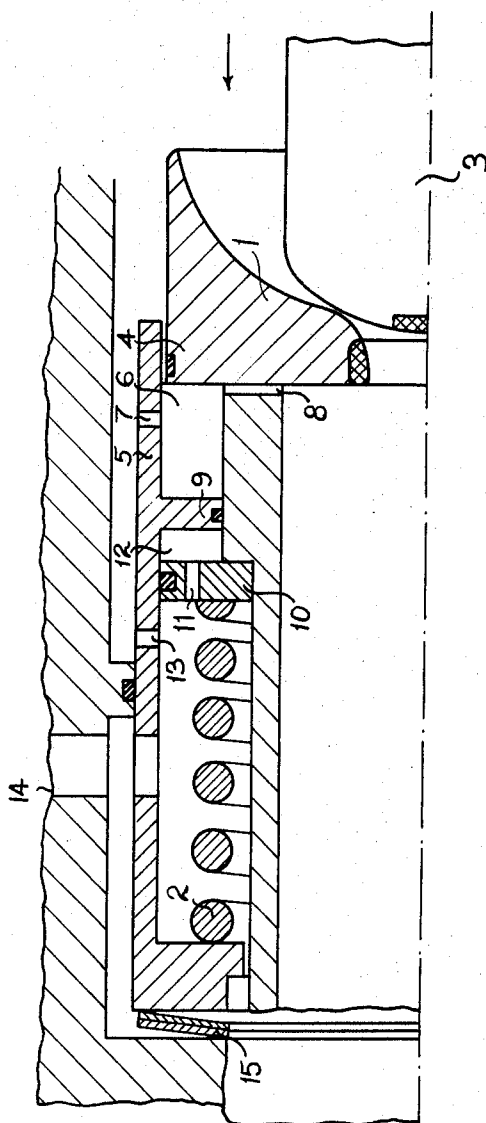
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[57] **ABSTRACT**

A circuit breaker of the gas blast type includes a switch contact chamber housing a stationary contact member and a movable contact member which is actuated by pressurized gas against a counter force applied by a spring which effects reclosure of the contacts when the pressurized gas ceases to be applied. Associated with the movable contact member is a dual piston structure operating in a damping cylinder which damps the opening movement of the movable contact as well as the reclosing movement.

2 Claims, 1 Drawing Figure





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SWITCH CONTACT CHAMBER FOR ELECTRICAL CIRCUIT BREAKERS OF THE GAS BLAST TYPE

The present invention relates to an improved structure for the switching contact chamber of a circuit breaker of the gas blast type wherein the contacts are actuated to a disengaged position by admission of pressure gas into the switch chamber and are thereafter re-closed automatically following removal of the gas pressure, there being a piston structurally combined with the movable contact member and so arranged in a damping cylinder charged by means of a choke bore with the pressure gas that the opening movement of the contact member is braked by a reduction in the damping volume.

In circuit breakers of this type occur frequently not only strong impact stresses on the contact members and thus conduct chatter, due to the undamped movement during the contact closing operation, but also because of the differences in the force of the closing spring caused by the tolerances, the closing movements are irregular. This results, for example, in multi-pole devices, not only in differences in the closing times, but also in different degrees of wear on the contact members.

The object of the present invention is to reduce the closing stresses on the contact members by means of the pressure gas driving the contact members.

This problem is solved according to the invention in that a second piston is coupled with the movable contact member in gas blast switches of the above mentioned type, which forms an additional volume in the damping cylinder subdivided by a ring, this volume increasing during the opening of the circuit and decreasing again during the closing, and in that this second piston moves over a supply cross section leading to the volume, so that the latter is charged with pressure gas when it reaches the disconnecting position.

In a further development of the invention, the damping cylinder is supported over annular plate springs in the switch chamber housing to reduce the impact stress.

The advantages achieved with the invention lie particularly in the fact that a damping volume is formed and charged with the execution of the contact opening process which transforms the kinetic energy of the moving system partly into gas energy during the return of the movable contact members. It is of particular advantage that the closing damping has a self-controlling effect. The movement over the supply cross section to the damping volume according to the invention during the closing by the second piston takes place in dependence on the force of the closing air cylinder, so that differences in the force of this air cylinder can be equalized over the additional damping volume according to the invention. Due to this self-controlling action, the damping volume for the contact closing process need not drop toward zero, which has the advantage that neither combustion nor stroke tolerances can have a substantial effect on the end velocity.

An embodiment of the invention is represented in the accompanying drawing as a part of a switch chamber of a gas blast switch, and is shown in longitudinal section.

With reference now to the drawing, the movable contact member 1 designed as a nozzle and located in the switch chamber 14 is shown in closed position. A helical spring 2 brings it to the fixed contact member 3 for contacting. During admission of pressure gas into the switch chamber, the movable contact member 1 to which the pressure is applied moves against the counter force of the spring 2 to the left to separate it from contact member 3. Formed structurally with the movable contact member is a piston 4 which operates in a damping cylinder 5 to create a volume 6 damping the opening movement, which is ventilated over the choke bore 8. This volume 6 is provided with a choke bore 7 for charging with pressure gas. In the damping cylinder 5 subdivided by a cylindrical ring 9 is arranged a second piston 10 coupled with the movable contact member, which forms a second volume 12. In the open contact position (not represented), the piston 10 exposes a bore 13 for the volume 12 acting as a supply cross section. In order to keep vibrations caused during the switching process away from the switch chamber housing 14, the

cylinder 5 is supported by way of annular plate springs 15 in the switch chamber housing.

The method of operation of the improved gas blast switch is as follows:

During the admission with pressure gas, the gas pressure accumulating in front of the nozzle-type contact member 1 in the direction of the arrow moves the latter to the left. At the same time pressure gas flows into and through the choke bore 7 from the switch chamber to the damping volume 6 so that the opening movement is braked by the diminishing damping volume 6. During the braking, the left end of cylinder 5 strikes against the switch chamber housing 14 due to the high damping pressure in the volume 6, toward the end of the opening movement. The plate springs 15 contact the left end of cylinder 5 and provide an additional damping.

When reaching the disconnecting position, the volume 12 has increased at the same time, and the piston 10 has moved over the bore 13 acting as a supply cross section so that the volume 12 can fill up with pressure gas from the interior of the switch chamber. With the closing of the pilot valve (not represented), the flow of pressure gas into the switch chamber stops, and the pressure in the switch chamber decreases. When a certain lower pressure level is attained, which depends on the inherent force factor of the spring 2, the contact member 1 moves again into the closed position with the stationary contact member 3. A stronger spring 2, compared to a weaker spring, leads to an earlier movement of piston 10 over the bore 13, due to the tolerances, so that a higher initial pressure is maintained in the damping volume 12. This has the result that the course of the contact member 1 changes little, even with varying spring forces. The same holds true for varying actuating pressures in the switch chamber 14, since the bore 13 will again be passed over during the closing when the equilibrium between the spring force and the pressure in the damping volume 12 is eliminated due to the dropping pressure.

I claim:

1. In a switch contact chamber structure for a circuit breaker of the gas blast type, the combination comprising means forming a chamber to which a pressurized gas can be admitted, a pair of contact members located within said chamber, one of said contact members being movable with respect to the other stationary contact member to effect engagement and disengagement therebetween, spring means biasing said movable contact member into engagement with said stationary contact member in the absence of pressurized gas within said chamber, a damping cylinder located within said switch chamber, the interior of said damping cylinder being subdivided by a ring into first and second damper portions, a first piston forming a part of said movable contact member and which operates within said first damper portion of said cylinder, said first damper portion of said cylinder being provided with a choke bore leading to the switch chamber for entry of compressed gas, a second piston located in said second damper portion of said cylinder and which is actuated by said movable contact member in a direction to increase the damping space within said second damper portion as said movable contact member is actuated in the direction away from said stationary contact member and to thereafter decrease the damping space within said second damper portion as said movable contact member is actuated by said spring means in the direction of said stationary contact member to effect contact re-closure, said second damper portion of said cylinder being provided with a choke bore leading to the switch chamber and which is uncovered as said second piston and movable contact member reach the disconnected position of the latter thereby to permit entry of compressed gas from said chamber into said second damper portion.

2. A switch contact chamber structure as defined in claim 1 and which further includes an annular plate spring interposed between an end wall of said damping cylinder and an abutment within said switch chamber for damping longitudinal motion of said damping cylinder.

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