

- [54] **GAS-BLAST CIRCUIT BREAKER**
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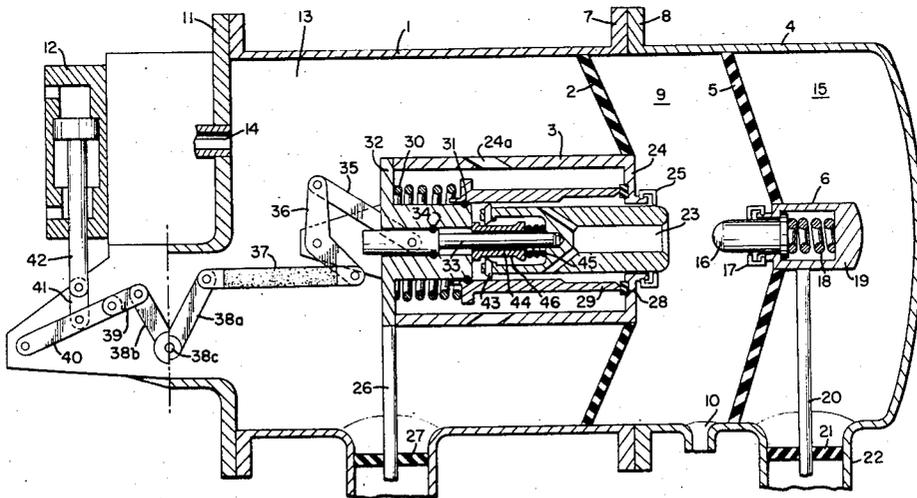
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UNITED STATES PATENTS
 3,590,187 6/1971 Kane et al. 200/148 BV

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[57] **ABSTRACT**

A circuit breaker of the gas-blast type includes an essentially stationary contact member and a movable nozzle contact member actuated by a drive mechanism and through which gas stored in the contact chamber at high pressure passes to a low-pressure chamber to facilitate arc extinction. A blast valve controlling gas flow through the nozzle contact to the low-pressure chamber includes a movable sleeve surrounding the nozzle contact which is spring loaded to a closed position in the rest position of the contacts, i.e., open or closed, but is entrained temporarily by the movable nozzle contact member through a temporarily effective interlocking mechanism therebetween immediately upon its disengagement from the stationary contact member so as to effect a temporary opening of the blast valve simultaneously with contact disengagement to blast and extinguish the arc, the valve sleeve being returned to its closed position by its spring loading as soon as it is released from the movable contact member.

2 Claims, 2 Drawing Figures



GAS-BLAST CIRCUIT BREAKER

The present invention relates to a gas-blast circuit breaker with a blast valve disposed between a high-pressure chamber and a low-pressure chamber, the blast valve being adapted to open relative to the rupturing motion of a movable contact, constructed as a nozzle, and to reclose after the movable contact reaches the off position.

In gas-blast circuit breakers of the kind heretofore described it is important that, so far as is possible, for the blast valve to open simultaneously with the rupturing motion of the contacts, so that the arc, the appearance of which accompanies the opening of the contacts, can be immediately and intensively blown by the compressed gas.

It is known in such circuit breakers for the movable nozzle contact to be driven by a linkage and for the blast valve to be pushed open by a separate lever and relative to the motion of the linkage, so that, after completion of the rupturing motion, the linkage ceases to act upon the blast valve which is thus able to return into the closed position. Such an arrangement is disclosed in German Auslegeschrift 1,246,853.

However, systems of the kind heretofore described are complex, require separate reversing levers, which may be engaged only for defined motions, and furthermore require spatial separation between the nozzle contact and the valve.

It is the object of the invention to simplify gas-blast circuit breakers of the kind mentioned heretofore, the nozzle contact and blast valve being disposed in a space-saving manner so that the contact gap and the blast valve are disposed as closely as possible to each other while the functional relationship between their respective motions is reliably defined.

According to the invention this problem is solved in that in a gas-blast circuit breaker of the kind initially mentioned the operating component of the blast valve is constructed as a sleeve incorporating therein the movable contact which is biased in the closing direction by the force exerted by a spring, and that an interlocking system is provided between the sleeve and the contact member to couple the movable contact member and the sleeve non-positively while the movable contact member is moving to the "break" position.

In a further embodiment of the invention the interlocking system comprises elements which are radially movable relative to the axis of the movable contact member and, for the zone defining the rupturing motion, are thrust against an extension of the sleeve by means of a guide member, provided with slotted links and being coupled to the contact member, the interlocking elements sliding back into the slotted links of the guide member at the end of the rupturing motion.

The advantages obtained with the invention are due particularly to the fact that the nozzle and blast valve are disposed closely adjacent to each other in space-saving manner and that the opening of the blast valve depends, in simple manner, on the rupturing motion of the movable contact, constructed as a nozzle, without impairing the automatic reclosing of the blast valve which is thus made necessary.

One embodiment of the invention is described hereinbelow by reference to the accompanying drawings in which:

FIG. 1 is the sectional diagram of a gas-blast circuit breaker according to the invention in the "break" position; and

FIG. 2 shows the same circuit breaker in the "make" position.

As disclosed in FIGS. 1 and 2, the novel circuit breaker substantially comprises a container 1 including therein a gas-tight transverse insulator 2 supporting the driven circuit breaker part 3, the container part 4 including therein a gas-tight transverse insulator 5, supporting the non-driven circuit breaker part 6 and a driving part, not referenced in its entirety.

The container 1 and the container part 4 are connected to each other in an end-to-end manner by means of flanges 7 and 8. A high-pressure chamber 9 in container part 4 supplied with high-pressure gas through a connecting socket 10, is disposed between the two gas-tight insulators 2, 5. A low-pressure chamber 13 within container part 1, provided with a cover 11, has a socket 14 for the return of the switching gases which collect in the low-pressure chamber. The low-pressure chamber 13 and a chamber 15 provided in the container part 4 between its end wall and insulator 5 are normally filled with low-pressure gas which acts as an insulant. The end cover 11 of the container 1 also functions as a support for a driving cylinder 12.

The non-driven circuit breaker part 6 comprises a mating contact member 16 with contact fingers 17, a spring 18 for producing the contact thrust, a housing 19 and a terminal 20, brought out through the insulator 21 from a neck portion 22 on the container part 4 for connection to other apparatus. The driven contact breaker part 3 comprises the movable contact member 23, constructed as nozzle and being mechanically guided in a housing 24 and being galvanically connected through contact fingers 25 to housing 24. A terminal 26 connects the housing 24 through a gas-tight insulator 27 to other apparatus. A circular seal 28 of the blast valve is provided in the housing 24. The valve sleeve 29 of the blast valve is biased in the closing direction by means of a spring 30 to engage the end of the sleeve with seal 28. Another seal 31 provides sealing action between the valve sleeve 29 and the end member 32. The movable nozzle contact member 23 is fixedly connected to a rod 33 which is guided in the end member 32 and is sealed by sealing means 34. A link 35 acts on the rod 33 and this link is coupled to a driving piston 42 through a toggle lever 36, a driving insulator 37, a rocker lever 38a, 38b, link 39, lever 40 and a link 41. Latching bolt 43, actuated by a guide member 44, are disposed at the inner end of the movable contact member 23. A compression spring 45 is disposed between the movable contact member 23 and the guide member 44. The rocker lever 38a, 38b is journaled by means of a shaft 38c which is brought out from the cover 11 in sealed manner. One arm 38a of the lever is disposed within the container 1 while the other arm 38b is disposed outside the vessel. The link 39 and the lever 40 are extended in the rupturing position and thus form a dead center point.

For the "make" operation, the motion of the driving piston 42 is transmitted by the levers and links 35 to 41 to the rod 33 and thus to the movable contact member 23. In the "make" position, the mating contact member 16 is thrust back by the movable contact member against a counter force exerted by a spring 18. The compression spring 45 thrusts the guide member 44

onto a shoulder portion of the rod 33 and the inclined cam surface of the guide member 44 thrusts the latching bolts 43 radially outward so that they bear against an extension of the valve sleeve 29 (FIG. 2) when the movable contact member is in the make position. The link 35 and the toggle lever 36 also assume a dead center point configuration in the "make" position.

If the "break" position is obtained, starting from the "make" position (FIG. 2); in other words if the movable contact member 23 is moved to the left by the drive mechanism, the latch bolts 43 will initially entrain the valve sleeve 29 until the guide member 44 strikes the end member 32, thus cancelling the interlock between the valve sleeve 29 and the movable contact member. To this end, the latch bolts 43 slide back in the longitudinal slots 46 of the guide member 44 so that spring 30 is able to return the valve sleeve 29 into the closed position. For the period of time that the valve sleeve is open, high-pressure gas can flow from the high-pressure chamber 9 through the movable contact member 23 into the housing 24 and from there through ports 24a into the low-pressure chamber 13 while extinguishing the arc which is established between the contact members. A compressor, not shown, the suction line of which is connected to the socket 14 enables the gas which collects in the low-pressure chamber 13 to be pumped back through the connecting socket 10 into the high-pressure chamber 9.

I claim:

1. In a circuit breaker of the gas-blast type, the combination comprising a pair of contact members one of which is constituted by a nozzle contact member, a drive mechanism for actuating said nozzle contact member to engage and be disengaged from the other contact member, a container structure providing a high-pressure contact chamber in which pressurized gas is stored, a low-pressure chamber, a blast valve controlling gas flow through said nozzle contact member from said high-pressure contact chamber to said low

pressure chamber, said blast valve including a movable sleeve surrounding said nozzle contact member, spring means loading said valve sleeve to its closed position in the rest position of said contact members, and a temporary interlocking mechanism between said nozzle contact member and said valve sleeve effective immediately upon actuation of said nozzle contact member in the contact disengaging direction thereby to entrain and move said valve sleeve to its open position and establish gas flow from said high-pressure contact chamber through said valve into said low-pressure chamber, said valve sleeve thereafter being returned to its closed position upon release by said interlocking mechanism from said nozzle contact member.

2. A gas-blast circuit breaker as defined in claim 1 wherein said drive mechanism for actuating said nozzle contact member includes a longitudinally movable drive rod secured to said nozzle contact member opposite the nozzle end thereof, and wherein said temporarily effective interlocking mechanism between said nozzle contact member and valve sleeve includes a guide member in the form of a sleeve slidable along said drive rod, a compression spring surrounding said drive rod having one end thereof bearing against said nozzle contact member and the opposite end bearing against one end of said guide member, said guide member being provided with longitudinally extending slots, and radially displaceable elements mounted in a rearward extension of said nozzle contact member and which are displaced in a radially outward direction by said guide member to engage said valve sleeve when said nozzle contact member occupies its closed-contact position, said radially displaceable elements being released from said valve sleeve by radially inward movement into said slots following a limited longitudinal displacement of said guide member by said nozzle contact member to a stop position via said compression spring.

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