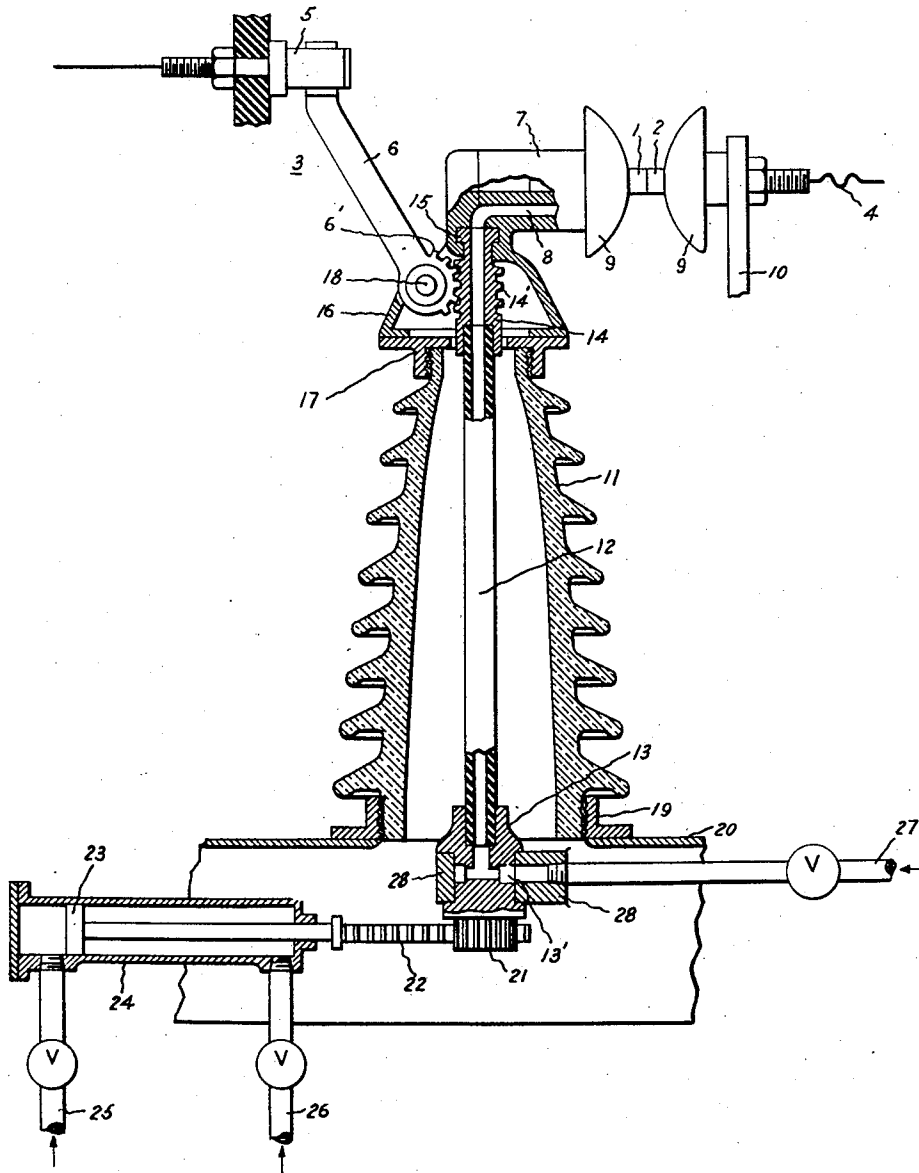


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ELECTRIC CIRCUIT BREAKER

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ELECTRIC CIRCUIT BREAKER

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My invention relates to electric circuit breakers, more particularly to high voltage circuit breakers of the gas blast type, and has for its principal object the provision of an improved and simplified gas blast circuit breaker that can be insulated for high voltages and operated through a minimum number and mass of operating elements.

In the operation of mechanically driven high voltage gas blast circuit breakers, the problem is essentially that of supplying gas pressure to the contacts, which are at line potential, and insulating the same with respect to the actuating or driving means which is usually mounted on a metallic base at ground potential. It has been proposed to use insulating gas conduits or tubing and insulating linkages including special high voltage insulators for this purpose but such designs in general have proved disadvantageous in view of the additional complexity and cost of the breaker. Also "creepage" surfaces are introduced which form a possible path for flash-over in a case of high operating potentials.

It has also been proposed to operate a high voltage gas blast switch by bodily rotating the main ceramic insulating support itself. However, this involves the movement of appreciable mass with attendant complications due to the more rugged bearing and driving mechanism structures thereby required.

In accordance with my invention the high voltage gas blast breaker or switch is mounted on a fixed ceramic insulator of suitable design for insulating the contacts at high potential, and an insulating gas supply conduit is rotatably mounted within said insulator for directly operating an element of the breaker as well as supplying gas pressure thereto. With this simplified arrangement the contacts are most effectively insulated for high voltage and the main ceramic support is suitably mounted in a stationary position.

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 a high voltage gas blast circuit breaker embodying the present invention.

The circuit breaker illustrated by way of example comprises coacting arc interrupting contacts 1 and 2 arranged to be connected in series

with an isolating or disconnect switch 3 in the main high voltage power circuit 4. The disconnect switch 3 comprises a stationary contact 5 and a coacting pivoted contact blade 6 arranged to coact with the arc interrupting contacts in a manner presently described.

The arc interrupting contacts per se form no part of the present invention and may be of the character disclosed and claimed in Biermann's Patent No. 2,084,885 granted June 22, 1937, for Electric circuit breaker. In this type of switch the contact housing indicated at 7 is provided with a gas passage 8 leading to the retractable contact 1. When gas under pressure is admitted to said passage the contact 1 is retracted and a gas jet directed into the arc path to extinguish arcing. In the case of high voltage operation a shield 9 of suitable design is provided and is located in concentric relation to the contact. The coacting contact 2 can be of the simple butt type mounted on an insulating support 10.

The disconnect switch blade 6 and the contact housing 7 are mounted at the upper part of a ceramic insulator 11 of the high voltage type. The insulator 11 is of shell-like construction for receiving centrally thereof an insulating gas supply conduit 12 leading to the gas passage 8. The insulating conduit 12 is rotatably mounted with the coupling 13 at its lower end, and at its upper end is secured to a coupling 14 which forms an extension of the conduit and continuous gas passage to the housing 7. The coupling 14, which is rigidly secured to the conduit 12 is rotatably mounted at 15 in an end cap 16 which is suitably secured by means of a mounting flange 17 to the upper part of the insulator 11. As illustrated the end cap 16 can comprise an integral part of the housing 7 and also serves as a bearing support for the pivot 18 of the disconnect switch.

For the purpose of operatively relating the insulating conduit 12 and the disconnect switch for example, the coupling 14 is provided with a worm gear drive at 14' arranged to coact with corresponding gear teeth 6' connected to the pivoted switch arm 6. Accordingly, rotation of the conduit 12 is effective to operate the disconnect switch arm 6 either to open or closed position without disturbing or affecting the gas supply line to the arc interrupting contacts. It will also be apparent that the contact structure at 1, including the housing 7 can, if desired, be swung in a horizontal direction by the insulating conduit 12 where it is desired to isolate the contacts in this manner. In such a case the

coupling 14 would simply be rigidly secured to the contact structure or housing 7, which in turn would be rotatably mounted with respect to the supporting end cap 16.

Referring more particularly to the driving and operating means, the insulator 11 is suitably mounted at 19 on a metallic base structure 20 which serves to house the operating structure and gas supply conduits for the breaker. The lower coupling member 13 to which the conduit 12 is also rigidly secured is provided at its lower end with a stub gear 21 that is operatively connected through a gear rack 22 to an operating piston 23. The piston 23 is mounted for reciprocal movement within a cylinder 24 that is connected to suitable valve controlled gas supply conduits 25 and 26 for controlling reciprocal movement of the piston. Accordingly, when gas under pressure is admitted to the cylinder 24 from either gas line, the conduit 12 is rotated about its longitudinal axis to operate the disconnect switch 3 correspondingly.

The gas supply line 27 for arc interruption is suitably connected to the conduit 12 by means of an annular coupling 28 which serves also as a fixed bearing for the rotatable coupling 13. The coupling 13 is provided with radially extending gas passages 13' for communicating with the supply line 27 when the conduit 12 is in different angular positions with respect thereto.

The operation of the circuit breaker is as follows: Assuming that the breaker is in the closed position shown and an opening operation is in order, a supply of gas under pressure is admitted under the control of suitable valve means indicated at V in the pressure line 27 to the insulating conduit 12 and breaker contact structure 1. The arc interrupting operation is usually very rapid so that the isolating operation can follow after a very brief interval. The isolating operation is effected by admitting gas under pressure by way of the valve controlled conduit 25 to the piston 23 for operating the conduit 12 and opening the disconnect switch in the manner above described. The circuit is now open and isolated and the contacts 1 and 2 can return to closed position if desired. When the breaker is to be closed the arc contacts can if desired be opened by a brief gas blast from the line 27, at which time the disconnect switch is closed by gas pressure from the line 26. The control of the various gas valves for the lines 25, 26, and 27 form no part of the present invention and may comprise either manual or remote electrical control relays, or both as desired.

It should be 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:

1. A gas blast circuit breaker comprising relatively movable contact structure including arc interrupting contacts, a high voltage insulator for supporting a movable element of said structure, said insulator being fixed, an insulating gas supply conduit positioned within said insulator along the longitudinal axis thereof and rotatably mounted with respect to its longitudinal axis, means related to said conduit and communicating with a source of gas pressure for directing gas to said arc interrupting contacts,

and means operatively connecting said conduit to said movable element for operation thereof.

2. A gas blast circuit breaker comprising relatively movable contact structure including arc interrupting contacts, a stationary high voltage insulator vertically positioned and adapted to support a movable element of said contact structure at the upper part of said insulator, said insulator being hollow, an insulating gas supply conduit vertically positioned within said insulator in parallel relation to the longitudinal axis thereof, means for mounting said conduit for rotation about its longitudinal axis, means operatively connecting said conduit to said movable element for actuating the same in accordance with rotation of said conduit, and coupling means for connecting said conduit both to a source of gas pressure and to said arc-interrupting contacts to provide a continuous gas passage.

3. A gas blast circuit breaker comprising relatively movable contact structure including arc interrupting contacts and isolating means, a stationary high voltage insulator for supporting said contact structure, said insulator being hollow, an insulating gas supply conduit mounted within said insulator for relative movement with respect thereto, means operatively connecting said conduit to said isolating means for operation thereof in accordance with movement of said conduit, and coupling means coacting with said conduit to form a continuous gas passage from a source of gas pressure to said arc interrupting contacts during movement of said conduit, and means for actuating said insulating conduit.

4. A gas blast circuit breaker comprising relatively movable contact structure including arc interrupting and movable isolating contact members, a high voltage insulator of shell-like construction vertically positioned for supporting said contact members at the upper part thereof, an insulating gas supply conduit vertically positioned within said insulator, means for mounting said conduit for rotation about its longitudinal axis, and a mechanical connection between said conduit and said movable isolating member for operating the same in accordance with rotation of said conduit, coupling means associated with said conduit arranged to form a continuous gas passage between a source of gas pressure and said arc interrupting contacts, said coupling means being operative in varying angular positions of said conduit, and actuating means for rotating said conduit independently of operation of said arc interrupting contact.

5. A gas blast circuit breaker comprising relatively movable contact structure including arc interrupting means and a disconnect switch having a pivoted switch arm, a high voltage insulator vertically positioned for supporting at its upper end said arc interrupting means and said disconnect switch arm, said insulator being hollow, an insulating conduit positioned within said insulator and mounted for rotatable movement with respect thereto, a mechanical connection between said conduit and said switch arm for operating the same in accordance with rotation of said conduit, coupling means related to said conduit for forming a continuous gas passage between a source of gas supply and said arc interrupting means mounted on said insulator, and pneumatic means for rotating said conduit independently of said arc interrupting means.

PAUL THIEME.