March 24, 1953 H. FORWALD 2,632,828

ARRANGEMENT IN ELECTRIC AIR BLAST CIRCUIT BREAKER

Filed Jan. 6, 1948

Fig. 1.

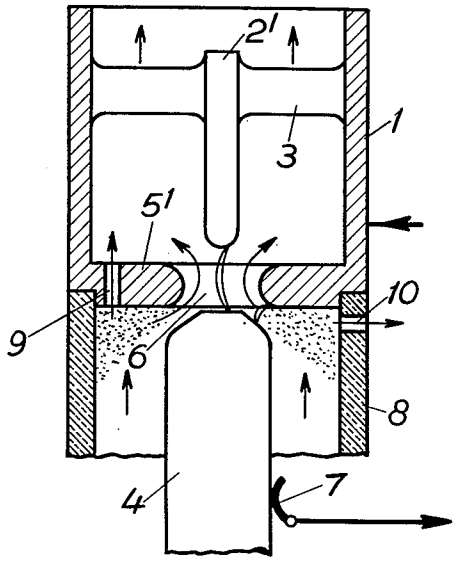
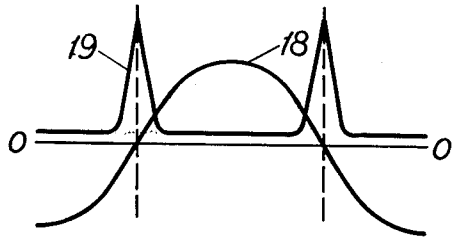


Fig. 2.



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ARRANGEMENT IN ELECTRIC AIR BLAST CIRCUIT BREAKER

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1 Claim. (Cl. 200—148)

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In electric air blast circuit breakers, extinction of the arc is usually effected by bringing the arc, in a mouth-piece or nozzle, into contact with a stream of compressed air. This nozzle may either be of insulating material or of metal and may in the latter case also serve as one contact of the circuit breaker and may then be arranged in alignment with an extra arcing contact. When the nozzle is made from insulating material, the contacts of the circuit breaker may be so arranged that one of them in its motion against the other traverses the opening in the nozzle, but the contacts of the breaker may also be so arranged that they remain permanently on the same side of the nozzle but are so arranged that the arc formed at the interruption is blown into the nozzle by the compressed air.

The present invention has for its object an arrangement in breakers of this kind, by which a considerable improvement of the breaking effectiveness of such breakers is attained.

The present invention is based upon the observation that a considerable improvement in the breaking effectiveness can be obtained by the removal of the ionized gas which is accumulated on the inlet side of the nozzle during the time the gas stream through the nozzle is blocked by the arc. According to this invention, this ionized gas is removed by the provision of air escape passages located near the inlet opening of the nozzle, said passages commencing in the space surrounding the inlet end of the nozzle in what is hereinafter referred to as the extinguishing air delivery space. These passage may either terminate in the open air or in the air escape space on the outlet side of the nozzle.

In the accompanying drawing in Fig. 1, the application of the invention to a circuit breaker is shown and Fig. 2 shows schematically the flowing conditions through the nozzle as a function of the current in the arc.

In Fig. 1, 1 designates the extinguishing chamber and 2' the arcing contact, which is attached to the walls of the chamber by means of ribs 3. 4 is the movable contact and 5' an insulating intermediary wall of the chamber dividing the chamber into an extinguishing air delivery space 8' and air escape space 1'. In the said wall 5 the nozzle is arranged. Wall 5' is of conducting material and forms the main stationary contact.

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7 is a sliding contact sliding against the movable contact. and 8 a cylinder of insulating material forming a continuation of the chamber 1 downwards from the intermediary wall 5. 9 are orifices arranged in the intermediary wall 5 near the wall of the cylinder 8 and terminating in the air escape space 1', and 10 are orifices in the wall of the cylinder 8 near the intermediary wall 5 and terminating in the open air. The orifices 9 and 10 may both be present or, either the orifices 10 or 9 may be provided. Generally it is more suitable and also sufficient with only a series of orifices 9, because by this arrangement a blast of gas sidewise from the breaker is avoided.

The form shown is such that when the current is large the arc is burning between the movable contact 4 and the stationary contact 2 as the figure shows, but when the current decreases, it is moved over to the arcing contact 2^1. By this arrangement the arc, when the current is large, will have a small length, so that the arcing voltage and thus the power development will be small.

In Fig. 2, the curve 18 schematically shows the change of the current in the arc and the curve 19 shows the effective opening of the nozzle corresponding to the amount of gas flowing through the nozzle per time unit. In Fig. 1, the spaces designated by dots illustrate the accumulation of ionized gas, which occur, if there are no channels or orifices 9 or 10 respectively. If, however, such openings are provided, ionized gas will escape through them and be replaced by fresh air coming from below except in the region close to the arc. If then the flow of air commences or is increased according to Fig. 2, the ionized air already from the beginning will be delivered to the nozzle.

I claim as my invention:

An air blast circuit breaker, comprising a nozzle traversed by a flow of extinguishing air, a main contact pair located in close proximity to the inlet side of said nozzle, an extinguishing air delivery space on the inlet side of said nozzle, an air discharge space on the other side of said nozzle, an intermediary wall separating the air delivery space from the air discharge space, the said nozzle being formed in said wall and the main stationary contact being located in said wall and the main movable contact being located in said air delivery space, and air escape passages leading from the part of said air delivery space in close proximity

to said nozzle and upstreamward of at least a part of said main contact pair to permit escape of ionized air from the said delivery space to the open air, while free passage of the stream of extinguishing air through the nozzle is blocked by the arc between the main contacts.

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