Jan. 12, 1960 H. FORWALD 2,921,168

HIGH TENSION AIR BLAST CIRCUIT BREAKER COMPRISING A NUMBER OF BREAKING UNITS WITH BREAKING CONTACTS ARRANGED INSIDE AIR CONTAINERS CARRIED BY INSULATOR PILLARS

Filed March 11, 1957

Fig.1

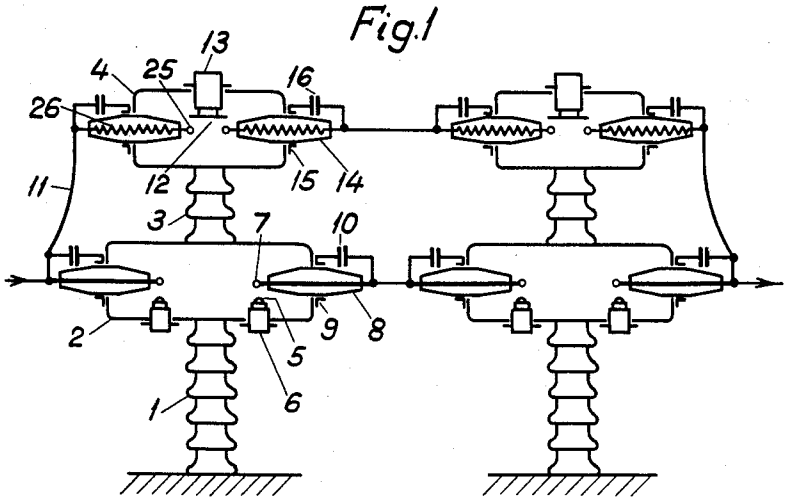
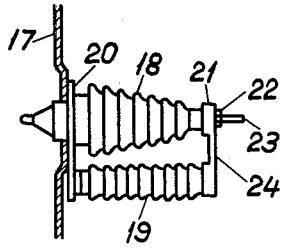


Fig.2



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United States Patent Office 2,921,168
Patented Jan. 12, 1960

2,921,168

HIGH TENSION AIR BLAST CIRCUIT BREAKER COMPRISING A NUMBER OF BREAKING UNITS WITH BREAKING CONTACTS ARRANGED INSIDE AIR CONTAINERS CARRIED BY INSULATOR PILLARS

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Application March 11, 1957, Serial No. 645,202

Claims priority, application Sweden March 19, 1956

1 Claim. (Cl. 200—145)

This invention relates to high tension A.C. circuit breakers comprising a number of breaking units with breaking contacts arranged inside air containers carried by insulating pillars, and in which compressed air is employed as the extinguishing medium. A modern high tension air blast circuit breaker comprising a number of main breaking units connected in series is very often provided with a chain of resistances connected in parallel with the claim of main breaking gaps. These resistances are often of the voltage dependent type. Auxiliary breaking units are usually arranged in the said chain of resistances. In parallel with the main breaking units, a chain of capacitors, equalizing the voltage over the open breaking gaps in the main breaking units, have been arranged. Every main breaking unit has been connected in parallel with one capacitor. In order to equalize the voltage over the breaking gaps in the open auxiliary breaking units in the chain of resistances, it has been proposed to connect part of the said chain of resistances with the chain of capacitors by means of high-ohmic resistances.

The present invention relates to a high tension A.C. circuit breaker employing air as the extinguishing medium and comprising a number of breaking units arranged in series, the contact pairs of which are arranged in a number of metallic air containers, each mounted on a pillar insulator. In the breaking units the stationary contacts are carried by bushing insulators and the movable contacts are carried by operating mechanisms inserted in the walls of the containers. The circuit breaker also comprises a chain of voltage dependent resistances which are connected only to the terminals of the circuit breaker. In the chain of resistances auxiliary breaking units are arranged their contact pairs located inside air containers insulated from the first mentioned air containers. According to the invention the chain of main breaking units and the chain of auxiliary breaking units are connected in parallel with their own chain of capacitors or other elements for equalizing the voltage distribution over the open breaking gaps of the breaking units.

Circuit breakers in which the parts in the chain of resistors, separated by the breaking gaps in the auxiliary breaking units, have been connected to capacitors or other means for equalizing the voltage over the breaking gaps of the main breaking units by means of high-ohmic resistances, have had the disadvantage that the said high-ohmic resistances of open breakers have delayed the rise of the voltage behind the first breaking gap in the chain of auxiliary breaking units, when a voltage surge reaches an open circuit breaker. As the surge is a very steep fronted travelling wave, the time delay causes a high voltage difference between the contacts in the first breaking gap in the auxiliary breaking units and an arc may occur. This disadvantages is eliminated by the arrangement according to the invention. It is also

achieved that only capacitors are used for equalizing the voltage over the breaking gaps in the circuit breaker.

One embodiment of the air blast circuit breaker according to the invention is shown in the accompanying drawing, Fig. 1 is a side view of the circuit breaker, Fig. 2 is a detail side view showing how voltage equalizing elements can be attached. Referring to the drawing, 1 indicates insulating pillars carrying pressure air containers 2 in which main breaking gaps are arranged. Insulators 3 on the containers 2 carry other pressure air containers 4, in which auxiliary breaking gaps are arranged. Movable contacts 5 of the main breaking gaps are carried by operating mechanisms arranged in a mechanism housing 6, inserted in the walls of the containers. The movable contacts 5 are electrically connected to the metallic containers 2. The stationary contacts 7 of the main breaking gaps are carried by bushing insulators 8 which are attached to the walls of the containers by means of flanges 9. Capacitors 10 are connected in parallel with the main breaking gaps and are used for equalizing the voltage over these gaps. The capacitors are suitably connected to the flanges 9 and to the conductors at the outer part of said bushing insulators. A chain of voltage dependent damping resistances are connected in parallel with the main breaking gaps, the ends of the chain of breaking gaps are connected to the terminal of the circuit breaker by means of the conductor 11. The movable contacts 12 of the auxiliary breaking gaps are carried by operating mechanisms arranged in mechanism housings 13 which are inserted in the walls of the containers 4. The movable contacts are suitably connected to the walls of the container. The stationary contacts 25 are carried by bushing insulators 14 attached to the walls of the container. Damping resistances 26 are arranged within these insulators but can also be arranged inside or outside said air container. The bushing insulators 14 are attached to the walls of the containers by means of flanges 15. The capacitors 16 are connected in parallel with their own breaking gaps. These capacitors are used for equalizing the voltage over the auxiliary breaking gaps. The capacitors 16 are suitably connected to the flanges 15 and to the conductors passing through the insulators. Figure 2 shows an example of how a capacitor may be built together with a bushing insulator. In this figure, 17 is a part of the wall of an air container, 18 a bushing insulator and 19 an insulator in which a capacitor is arranged. The flange 20 is secured to the insulator 18 and by means of screws attached to the container wall 17. A nut 22 on the conductor 23 pressed the washer 21 against the insulator 18. The washer 21 is provided with an extending part 24. The insulator 19 is arranged between the said extending part of the washer 21 and a part extending out from the flange 20. A capacitor inside the insulator 19 is electrically connected to the flange 20 and the washer 21.

In operation, the opening of the breaker is effected by the action of the compressed air on a piston which is counteracted by a spring and separates the contacts of the power breaking gap from each other, the spring being so dimensioned that sufficient contact pressure is maintained between the contacts when the gap is closed. The breaker is intended for A.C. use and is of the air blast type, the purpose of the compressed air in the containers 2 and 4 being to facilitate the extinction of the arcs and to increase the dielectric strength of the air, and the construction is of the known type in which, when the contacts are opened, the compressed air in the breaking chamber streams through one of the hollow contacts, and through a valve, to the open air thereby extinguishing the arc between the contacts. The voltage dependent resistances are of the type having a specific resistance decreasing with an increasing voltage over the re-

sistances since such resistances are more effective, due to their decreasing resistance, against transient voltages that can arise over the breaking gaps.

I claim as my invention:

A high tension A.C. circuit breaker comprising a number of metallic air containers, an insulating pillar supporting each of said containers, bushing insulators mounted in the containers, stationary contacts carried by said insulators, movable contact with air operating mechanism therefor carried in the walls of said containers, means connecting the said stationary contacts to form main breaking gaps connected with each other in series, a chain of auxiliary units in parallel with the series of said chain breaking gaps, each of said auxiliary units comprising a voltage dependent resistor in series with an auxiliary breaking gap, additional air containers insulated from the first mentioned containers and carrying the said auxiliary units, chains of capacitors for guiding the voltage

distribution over said main breaking gaps, chains of capacitors for guiding the voltage distribution over said auxiliary units, each of said last capacitors bridging an auxiliary unit, and means connecting said main breaking gaps and said auxiliary units in parallel with their own chains of capacitors.

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