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ARRANGEMENT IN AIR BLAST CIRCUIT BREAKER PROVIDED WITH DAMPING RESISTANCE

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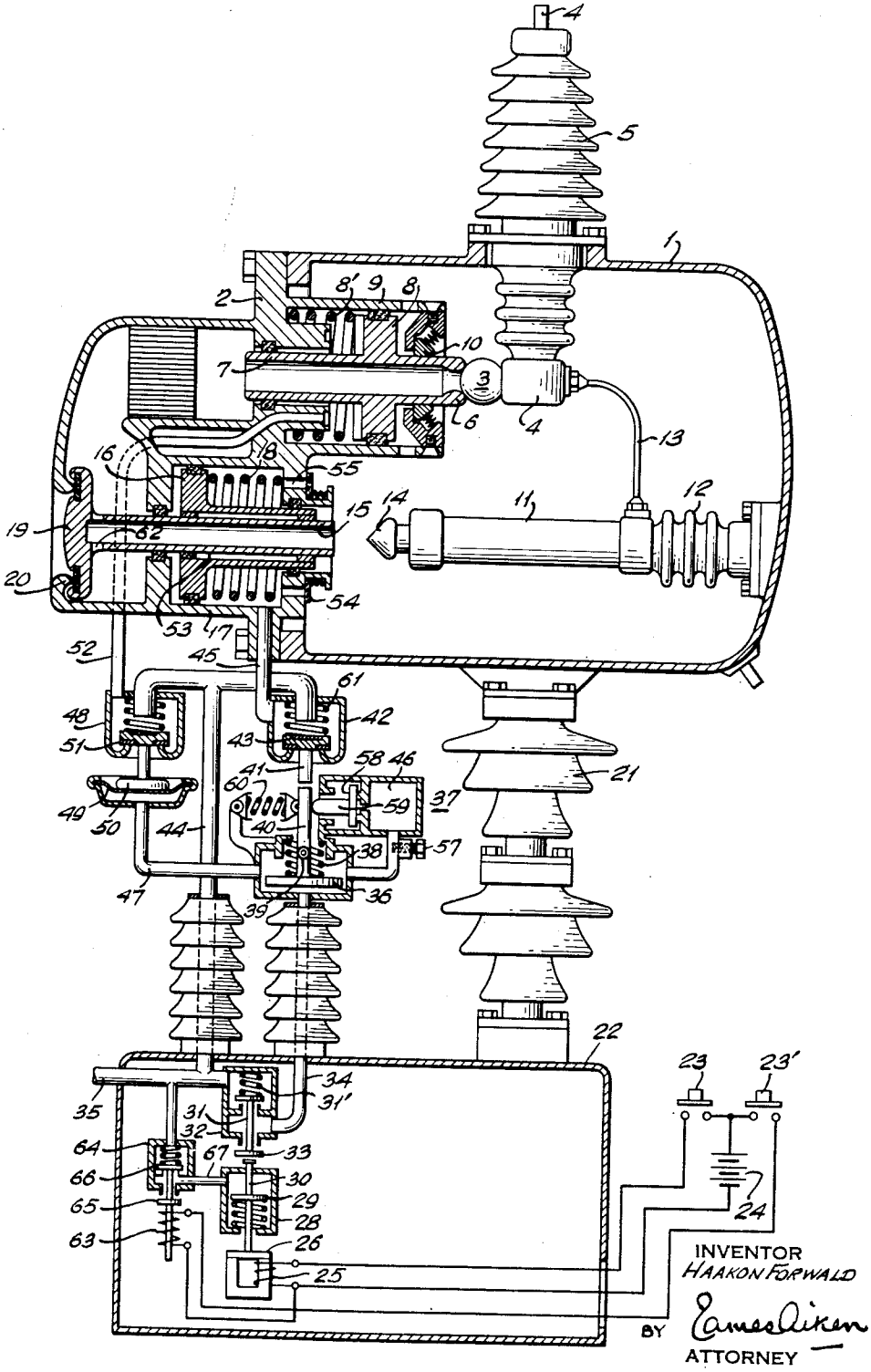

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ARRANGEMENT IN AIR BLAST CIRCUIT BREAKER PROVIDED WITH DAMPING RESISTANCE

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5 Claims. (Cl. 200—148)

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In air blast circuit breakers for high tension it is often necessary to couple the breaking gap in parallel with a resistance in order to damp overtensions which may occur. In order to avoid a too great heating of this resistance, the circuit breaker generally is so designed that the resistance is disconnected a short time after the arc has been extinguished. Circuit breakers of this kind have thus been provided with a separate member for connecting and disconnecting the resistance.

The present invention, however, has for its object to provide a device for such circuit breakers in which the said connecting and disconnecting of the resistance is performed by means of the same member that controls the flow of compressed air to the breaking gap.

On the accompanying drawing one form of a circuit breaker according to the invention is shown. On the drawing 1 designates a compressed air container which is provided with a wall 2 on which the movable contact of the circuit breaker together with the contact for the connecting in of the resistance is mounted. The stationary contact of the circuit breaker is designated by 3 and is attached to the conductor 4 in an insulating bushing 5 projecting into the compressed air container. The movable contact of the circuit breaker is designated by 6 and is in the form of a tube 7 attached to a piston 8 which is movable in a cylinder 9 attached to the wall 2. 10 is a sliding contact surrounding the tubular contact 7 for the transmission of the current from the contact 6 to the cylinder 9. 11 designates the damping resistance which suitably consists of a cylinder of sintered silicon carbide. This cylinder is carried by an insulator 12 fastened in the wall of the container 1, and the resistance 11 is connected at one end over a conductor 13 with the stationary contact 3 of the circuit breaker. The other end of the resistance 11 is provided with a contact 14, which contact is suitably mounted in yielding relation to the resistance. The connection of the resistance 11 in parallel to the contact pair 3, 6 is effected by means of a tubular contact 15 joined with a piston 16 movable in the cylinder 17 attached to the wall 2. The contact 15 is provided with a valve disc 19 which when its packing is forced against the annular formed ridge 20 blocks the escape of compressed air from the container 1. The container 1 with all the parts attached to it is carried by an insulating pillar 21 which is suitably attached to a casing 22 containing operating members for the

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circuit breaker. The operating members will be hereinafter described in connection with a description of the function of the circuit breaker.

When opening the circuit breaker a press button 23 is pressed, so that a circuit is closed from the operating battery 24 through the coil 25 on the release magnet 26. When the armature of this magnet is released the spring 27 will move the piston 29 in the cylinder 28 upwards, and the rod 30 attached to this piston will act on the stem 31 in the operating valve 32. When the stem 31 moves upwards, the valve disc 33 will close the outlet from the operating valve 32 and open a communication from the operating pipeline 34 of the circuit breaker to the pipeline 35 leading from a source of compressed air. When compressed air is supplied through the pipeline 34 it will act on the lower surface of the piston 36 in the time lag member 37. The piston 36 then moves upwards compressing the spring 38 and raising the stem 40 until the latter acts on the stem 41 of the valve 42. The lower end of the stem 40 is at the point 39 pivotally connected to the piston 36. When the valve disc 43 in the valve 42 moves upwards, it closes the outlet from the compressed air pipeline 44 but opens communication from the cylinder 17, through the pipeline 45, to the open air.

When the disc 43 moves upwards so that air from the cylinder 17 can flow out through the pipeline 45, compressed air from the container 1 will flow through the channels 53 in the piston 16 and act on the left side of the piston and move it against the action of the spring 18, so that the valve disc 19 leaves the seat or tightening ridge 20, and the tubular contact 15 comes into contact with the yieldable contact 14 of the resistance 11. Compressed air is prevented from flowing to the right side of the piston 16 by the back valve 54 which consists of a spring actuated ring forced against the holes 55, and said back valve 54 serves to maintain the container, to the right of said wall 2, filled with air under pressure. Simultaneously with the upward movement of the piston 36, a communication between the operating pipeline 34 and the time lag container 46 in the time lag device 37 is opened, and compressed air from the compressed air pipeline 34 flows through the pipeline 47 to a diaphragm actuated valve 48. When compressed air from the pipeline 47 acts on the diaphragm 49 and thus on the valve disc 50, the valve disc 51 in the valve 48 is moved upwards and closes the left side outlet from the

compressed air pipeline 44 at the same time as a communication is opened through the pipeline 52 from the cylinder 9 to the open air. When the cylinder 9 is thus emptied, the air in the container 1 will act on the piston 8 and move it to the left against the action of the spring 8^1, the contact 6 then moving away from contact 3. The compressed air will then escape from the container 1 through the contact 6 and will serve to extinguish the arc and will subsequently escape through the tube 7 and through the outlet valve 19, 20.

The time lag device 37 has for its object to close, after a predetermined time, the outlet valve 19, 20 and to open the breaking gap 14, 15 and this is effected by the means whereby the air flowing into the cylinder 46 with a speed regulated by the restriction screw 57 acts on the piston 58 which by means of the pin 59 moves the stem 40 to the side against the action of the spring 60. The valve stem 41 is then liberated so that the spring 61 can move the valve disc 43 downwards so that the communication with the open air from the cylinder 17 is closed and compressed air from the right hand outlet of the compressed air pipeline 44 can flow through the pipeline 45 to the cylinder 17 and can there act on the right hand side of the piston 16 and thus counter-act the pressure on its left hand side, so that the spring 18 can move the piston 16 to the left thus closing the outlet valve 19, 20 and opening the contact pair 14, 15.

During the motion to the left of the contact 15 compressed air from the container 1 escapes through the contact 15 and through the openings 62 close to the valve disc 19 and from there through the outlet valve 19, 20 and thus extinguishes the arc caused by the current through the resistance 11.

In order to make possible an extinction of the arc between the contacts 14 and 15, before the valve 19, 20 has been closed, the motion of the piston 16 is delayed to a certain extent by choosing a suitable cross section of the channels 53 near the center of the piston 16.

When closing the circuit breaker the press button 23^1 is pressed and then a circuit is formed from the operating battery 24 through the solenoid 63. The valve stem in the valve 64 is then moved upwards so that the outlet opening from the valve is closed by the valve disc 65, while the valve disc 66 leaves its seat, so that compressed air from the pipeline 35 can flow through the pipeline 67 to the cylinder 28 and there act on the piston 29 to move it downwards until the armature in the release magnet 26 is again attracted. When the piston 29 moves downwards, the stem 31 is moved downwards by the action of the spring 31^1, so that the communication between the compressed air pipeline 35 and the pipeline 34 is closed and the pipeline 34 is brought into communication with the open air. The spring 38 will then move the piston 36 downwards, so that the stem 40 will return to its original position in alignment with the stem 41 after the evacuation of the time lag device 37. The closing of the main breaking gap is now effected by evacuating the pipeline 47 after the piston 36 is on its way towards its lower position so that the disc 50 moves downwards, and the disc 51 closes the outlet opening from the valve 48. When the valve disc 51 moves downwards, the left hand outlet from the compressed air pipeline 44 is opened, so that compressed air can flow through the pipeline 52 to the cylinder 9 and can there act on the piston 8, so that the contact 6 is moved against the contact 3 by the action of the spring 8'.

In spite of the fact that the circuit breaker on the drawing is provided with only one main breaking gap and one damping resistance with breaking contacts, it can of course also be provided with two main breaking gaps and two damping resistances coupled in parallel with them but with one air blast or outlet valve for the two main breaking gaps, common for the two main breaking gaps and further the outlet pipe 15 may be common for the two breaking gaps disconnecting the damping resistances in that the tube 15 is provided with a fork shaped part forming a contact bridge making contact with the two contacts 14.

I claim as my invention:

1. An air blast circuit breaker comprising a compressed air container, an insulating support for said container, a wall dividing said container into two compartments, openings in said wall, a main breaking contact pair mounted in one of said compartments in close proximity to one of said openings, a damping resistance coupled in parallel with said contact pair, an auxiliary contact pair connected in series with said damping resistance and located in close proximity to another of said openings, pneumatic means for operating said main and auxiliary breaking contacts, an outlet valve from the other compartment, means connecting said valve with the movable contact of said auxiliary contact pair, a time lag device for the pneumatic operating means of said movable auxiliary contact, and means whereby said time lag device effects an immediate closing but a delayed reopening of said auxiliary contact pair.

2. A circuit breaker according to claim 1, comprising an air operated piston for said time lag device, a stem pivoted to said piston, an operating valve for the auxiliary contact pair, a stem extending from said operating valve in alignment with the said pivoted stem, a delayed air operated device for moving said pivoted stem out of alignment with said valve stem, and a spring for returning said pivoted stem to the aligned position.

3. An air blast circuit breaker comprising a compressed air container, an insulating support for said container, a wall dividing the container into two compartments, an opening in said wall, a fixed main contact in one of said compartments, a main tubular movable contact extending through said opening and providing communication between said compartments, a second opening in said wall, a fixed auxiliary contact, a movable tubular auxiliary contact mounted in said second opening and providing communication between said compartments, a damping resistance connected in parallel with the main contact pair and in series with the auxiliary contact pair, a valve carried by said auxiliary movable contact for controlling the escape of compressed air from said compartments, and a time lag device for the operation of said movable auxiliary contact, said device including means for effecting an immediate closing but a delayed reopening of said auxiliary contact pair.

4. A circuit breaker according to claim 3, comprising cylinders carried by said wall, pistons mounted in said cylinders and carrying said tubular main and auxiliary movable contacts, and spring and pneumatic means for actuating said pistons in their cylinders to open and close the contact pairs alternately.

5. A circuit breaker according to claim 3, com-

prising a cylinder carried by said wall, a piston in said cylinder actuated by spring and pneumatic means and carrying said tubular auxiliary contact, restricted channels for the passage of compressed air through said piston from one of said compartments to one end of the cylinder to move said piston and to close said auxiliary contact pair, and a back valve for controlling the flow of air between said cylinder and one of said compartments.

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