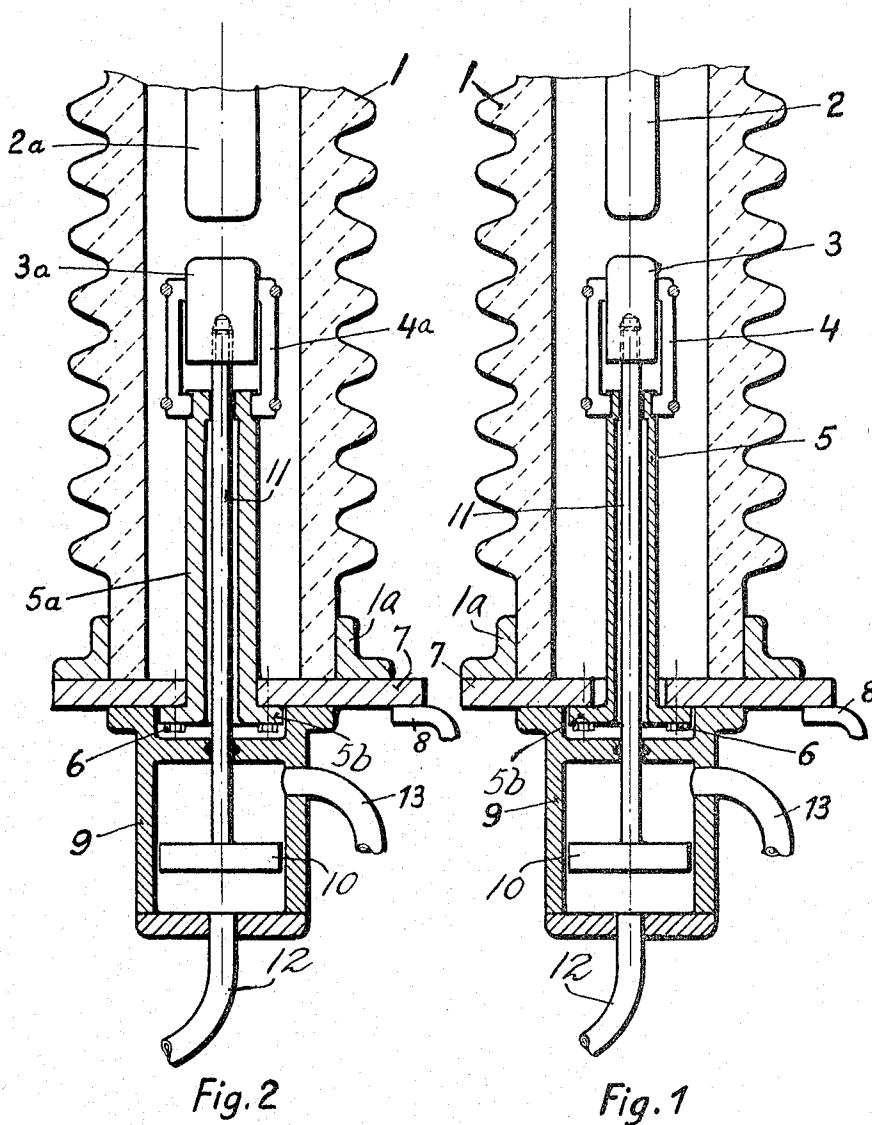


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INTERCHANGEABLE CONTACT ARRANGEMENT
FOR ELECTRICAL CIRCUIT BREAKERS
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1

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INTERCHANGEABLE CONTACT ARRANGEMENT FOR ELECTRICAL CIRCUIT BREAKERS

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This invention relates to an arrangement of the contacts in electric circuit-breakers, particularly compressed gas circuit-breakers, in which at least one of the contact members is movable by drive means. Modern switch-gear design calls for the provision of electric power circuit-breakers for a particular rated voltage, all having the same rupturing power, and differing solely in their respective current ratings. This means that the members which carry the current and particularly the contact members of the circuit-breaker must be designed to suit the required different current ratings.

A circuit-breaker comprising a quenching chamber for different current ratings and comprising a tubular contact member has already been proposed, in which the external diameter of the tubular contact member and hence the internal diameter of the quenching chamber containing the same are always identically the same for every current rating, whereas the internal diameter of the tubular member varies with the current rating required. Since substantially the entire length of the contact member carries the current, so that its cross section is determined by the rated current, the application of the described arrangement to high current ratings necessarily leads to a considerable increase in the inertial mass which must be moved. Consequently the power of the drive means must be raised accordingly and more powerful damping devices are needed to provide the same kinematic behavior for ensuring the electrical efficiency of the circuit-breaker. On the other hand, from the point of view of economy the necessity of having to adapt the drive means and damping devices as well as the movable contact member to the desired current rating is an undesirable feature.

For the purpose of providing a standard design for a series of circuit-breakers of the same type for different current ratings the present invention therefore proposes that circuit breakers for the same voltage having the same rupturing power but for carrying different rated currents should all be fitted with the same drive means for operating the movable contact member, the latter comprising a movable wearing contact which has a small mass in relation to the overall mass of the entire movable assembly, the current from the movable wearing contact being transferred to a stationary conductor by a laminated wiper element, and only the wearing contact, the stationary conductor and the number of laminations of the wiper being designed to suit the required current rating of the circuit-breaker.

The idea which underlies the invention will now be more particularly described by reference to the accompanying drawings in which

FIG. 1 is an arrangement of the contacts in a compressed gas circuit-breaker of the kind proposed by the present invention, and

FIG. 2 is a contact arrangement similar to that illustrated in FIG. 1 excepting that it is designed for a higher current rating.

In FIG. 1 the quenching chamber is indicated at 1. This encloses the contact member of the circuit-breaker. The latter comprise a stationary contact member 2 which faces a cooperating movable contact member 3. The

2

latter is a wearing contact electrically connected to a fixed tubular conductor 5 by a laminated contact 4 which in a manner as such known to the art forms a socket shaped wiper embracing the wearing contact. At the bottom end of the quenching chamber 1 is a fitting 1a firmly affixed to a flange 7. The tubular conductor 5 which passes through the flange 7 has a plate-shaped flange 5b at its bottom end electrically connected to flange 7 by screws 6. 8 indicates the connection of the external cable to flange 7. Likewise attached to flange 7 is a cylindrical housing 9 which slidably contains a piston 10. The two parts 9 and 10 form a pressure gas actuator for operating the movable contact member 3, the piston 10 being connected to contact member 3 by a piston rod 11 extending through the hollow interior of conductor 5. The movable contact member 3, as shown in FIG. 1 is attached to the upper end of piston rod 11 in such manner as to enable it to be removed and replaced with a somewhat larger mass contact member 3a as shown in FIG. 2. Pipes 12 and 13 are provided for the admission of compressed air into chamber 9 above and below piston 10 so as to establish a double acting cylinder.

In FIG. 2 in which the general arrangement of the contacts is the same as in FIG. 1, but which is designed to carry twice the rated current, corresponding parts are indicated by the same reference numbers as in FIG. 1. Here it will be seen that the parts 2, 3, 4 and 5 of FIG. 1 have been exchanged and replaced with similar parts 2a, 3a, 4a and 5a but which have a larger cross section for carrying the higher current, the stationary contact member 2a the movable wearing contact 3a and the tubular conductor 5a having correspondingly larger external diameters and the number of laminations of the tulip formed wiper part 4a being appropriately increased.

The above described circuit-breakers function as follows: The drawings show the contact members 2, 3 separated, i.e. in rupturing position. For closing the circuit through these contacts compressed gas is admitted into the chamber below piston 10 through pipe 12, the chamber above the piston being simultaneously vented in known manner by valve means not shown in the drawings. Piston 10, piston rod 11 and the movable wearing contact 3 (or 3a respectively) are therefore forced upwards into contact with the stationary contact member 2 (or 2a respectively). The current can now flow from part 2 (or 2a), through 3 (or 3a), 4, 5 (or 5a), 6 and 7 to cable 8. For rupturing the circuit, the chamber above piston 10 is filled with compressed air through pipe 13, the chamber below piston 10 being vented in known manner by valve means not shown in the drawing. The masses which must be moved for switching in or out operation comprise parts 10, 11 and 3 (FIG. 1) or 10, 11 and 3a (in FIG. 2). Since the length of the movable wearing contact 3 (or 3a) is kept as short as possible and this member therefore has a relatively small mass in relation to the total movable mass, the same drive means 9, 10 and 11 can be used in both circuit-breakers although their current ratings are different. The rate of movement of the movable contact member is therefore substantially the same in both circuit-breakers.

The proposed arrangement permits a series of circuit-breakers of the same type for the same voltages and having the same rupturing power, but differing in their respective current ratings, to be economically produced, because the drive means of all the circuit-breakers of the series can be of the same standard design. This reduces the cost of manufacture besides reducing the number of spare parts which must be kept in stock.

I claim:

1. In an electrical circuit breaker, the combination comprising a pair of contact members located within an arc quenching chamber, at least one of said contact members

3

being movable and detachably secured to one end of a drive rod forming part of a drive means for actuating said drive rod and hence also said movable contact member into and out of engagement with the other contact member, said movable contact member having a mass which is small in relation to the total movable mass represented by said movable contact member and its drive means, a laminated wiper member surrounding and electrically connected with said movable contact member, said wiper member being secured to one end of a stationary tubular conductor surrounding said drive rod, and means detachably securing said tubular conductor in place at its other end thereby enabling said circuit breaker to be sized for different current ratings by correspondingly sizing said detachably arranged movable contact member, wiper member and stationary tubular contact member but with use of the same drive means for all current ratings.

4

2. An electrical circuit breaker as defined in claim 1 wherein said drive means is a double acting pressure gas operated cylinder the piston rod element of which is constituted by said drive rod.

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