

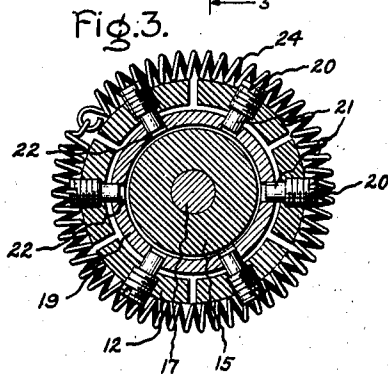
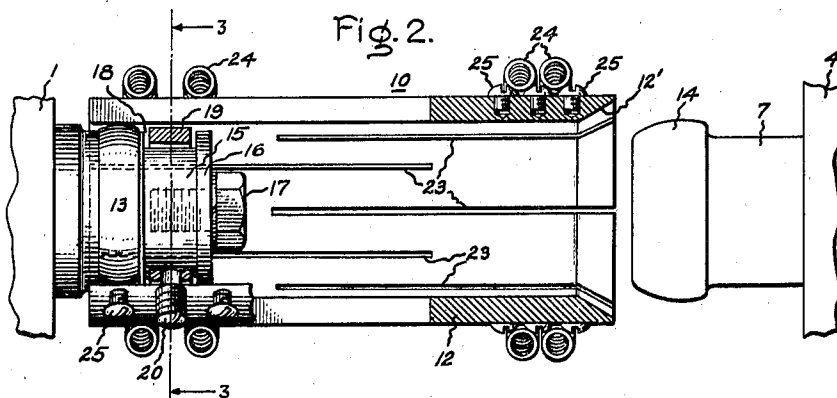
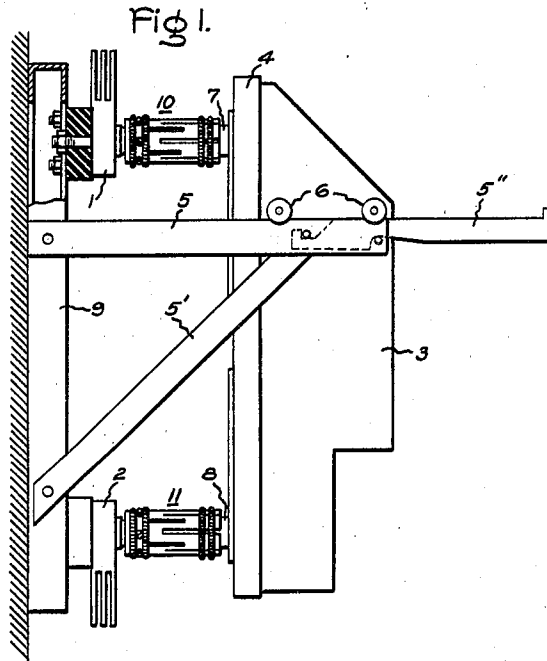
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ELECTRIC DISCONNECTING DEVICE

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ELECTRIC DISCONNECTING DEVICE

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2 Claims. (Cl. 173-363)

My invention relates to electric disconnecting devices, more particularly to those of the plug and socket type having, for example, application to electric switchgear of the draw-out type wherein a circuit interrupting unit is connected and disconnected by bodily movement of the unit, with respect to coacting circuit terminals.

My application, Serial No. 268,738, filed April 19, 1939, for "Electric disconnecting devices", is a division of the present application.

My invention has for its principal object the provision of an improved disconnecting device which is electrically efficient, readily adaptable to varying operating conditions and simple and rugged in construction.

In accordance with my invention, the socket member of the disconnecting contact device, which may be fabricated or consist of a unitary member, is tubular or cylindrical in form and has substantially circular line contact with both the stationary and movable contact structures respectively so that efficient electrical contact is maintained by said socket member at both contacts notwithstanding appreciable misalignment of said structures.

More specifically, the cylindrical socket member in one application thereof is provided with interleaving slots extending from the opposite ends thereof for insuring a high degree of resiliency and compactness of design. Where compactness of design is an essential factor, the cylindrical member can be found by a plurality of separate fingers biased so as to interconnect the coacting pair of contacts in line contact engagement.

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, Fig. 1 is an elevational view of electric switchgear of the draw-out type having disconnecting devices embodying the present invention; Fig. 2 is an enlarged longitudinal view partly in section of one of the sets of disconnecting contacts shown by Fig. 1 in the open-circuit position and Fig. 3 is a sectional view taken along the line 3-3 of Fig. 2.

A particular form of draw-out type switchgear to which the present invention is applicable is illustrated by Fig. 1 wherein a pair of stationary circuit terminals generally indicated at 1 and 2 coact with a relatively movable circuit interrupting unit 3. The unit 3 normally controls

an electric power circuit including the terminals 1 and 2.

The circuit breaker unit 3 in the present instance comprises a switch panel or base 4 on which is mounted a suitable power interrupting device, such as a conventional magnetic blow-out air circuit breaker, for example. As the details of the circuit breaker form no part of the present invention, specific disclosure thereof is believed to be unnecessary for an adequate and clear understanding of the invention.

As in the case of conventional draw-out type switchgear, the circuit breaker unit 3 is bodily movable between connected and disconnected positions with respect to the circuit terminals 1 and 2, and is guided and supported for horizontal reciprocal movement by means of a pair of stationary guide rails 5, between which the unit is positioned, and coacting rollers 6 mounted on the movable unit. Mounted in and extending through the base panel 4 of the breaker unit are the breaker terminals 7 and 8 corresponding to the terminals 1 and 2 respectively which are suitably mounted on the stationary supporting panel 9. The guide rails 5, which support the unit 3 in cantilever fashion, are suitably braced as at 5'.

The disconnecting devices for effecting the actual electrical contact between the circuit breaker unit 3 and the stationary terminals 1 and 2 are indicated at 10 and 11 respectively. Figs. 2 and 3 illustrating in greater detail the specific construction of the disconnecting contacts. Since the contacts are identical in design the disconnect device at 10 for interconnecting the terminals 1 and 7 will be described.

The disconnecting device consists essentially of tubular cylindrical member 12 composed of copper or other suitable conducting material open at the opposite ends for receivable contact elements 13 and 14 constituting parts of the stationary and movable terminals respectively. The contact surfaces of the contact elements 13 and 14 coacting with the interior cylindrical contact surface of the member 12 are of substantially spherical formation so that circular line contact is maintained at both ends of the member 12 notwithstanding appreciable misalignment of the terminals 1 and 7. In other words, the contact connection at opposite ends 50 of the cylindrical member 12 is in a certain sense analogous to a universal joint.

For the purpose of horizontally mounting the member 12 on the terminal 1, there is provided a reduced portion 15 forming an extension of

the terminal 1 and a coacting disk 16 suitably secured thereto as at 17 so as to form an annular groove 18 within which is positioned a loosely fitted ring 19. Referring more particularly to Fig. 3, the member 12 is loosely connected to the ring 19, such as by peripherally spaced screws 20 which are provided with extensions 21 having a sliding fit in corresponding apertures 22 formed in the ring 19. With this arrangement the ring 19, which is located in the annular groove 18, suitably supports the member 12 while allowing a limited universal movement thereof at the coacting contact surfaces of the members 12 and 13.

Resiliency at the coacting contact surfaces is accomplished in the present instance by providing slots 23 in the member 12 extending longitudinally from the opposite ends of the member 12 as illustrated, the slots being interleaved intermediate the ends of the member 12, the extent of interleaving depending upon the degree of resilience and mechanical strength desired. Accordingly, the unitary contact member 12 approaches the optimum with respect to compactness of design in combination with a high degree of resiliency. Resilience and adequate contact pressure at the restricted contact area are further insured by garter springs 24 positioned at the opposite ends of the member 12. As illustrated by Fig. 2, the springs are suitably positioned by axially spaced screw heads 25 which are suitably disposed at the outer periphery of the member 12.

In the operation of the disconnecting device above-described, the circuit breaker unit 3 in moving to the connected position forces the contact 14 into the cylindrical member 12 against the friction due to the bias of the springs 24 and the inherent resiliency of the member 12. The member 12 is suitably beveled as at 12' for guiding the contact 14 in case of inaccurate alinement of the terminals 1 and 7.

Assuming improper alinement within practical limits, the member 12 is simply tilted in the direction of misalignment, the contact between members 12 and 13 at the terminal 1 being substantially unaffected except that the line of contact engagement is shifted somewhat along the spherical contact surface. In order to insure maximum electrical efficiency, the contact members 12, 13 and 14 can be silver plated at the coacting contact surfaces, particularly where heavy currents are involved.

When the breaker unit 3 is to be disconnected, the breaker is first opened in accordance with well-known practice and the unit then withdrawn along the guide rails 5 to its disconnected position. In order to provide a more compact design, the guide rails 5 are provided with folding extensions 5', this feature forming no part of the present invention.

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. An electric disconnecting device for interconnecting terminals of a power circuit comprising a tubular conducting member open at the opposite ends thereof, contact elements connected to said terminals respectively adapted to extend within opposite ends of said tubular member and engage the interior contact surfaces thereof, each of said elements having substantially spherical contact surfaces for making uniform pressure, line contact with the coacting surfaces of said tubular member, and means for mounting said tubular member for limited universal movement with respect to one of said terminals including a ring member surrounding and loosely fitted on said terminal, means for locking said ring on said terminal, and means interconnecting said tubular member and said ring member.

2. An electric disconnecting device for interconnecting relatively movable terminals of a power circuit comprising a tubular conducting member open at its opposite ends, contact elements connected to said terminals respectively adapted to extend within the opposite ends of said tubular member and engage the interior contact surfaces thereof, and means for mounting said tubular members for limited universal movement with respect to one of said terminals including a ring member surrounding and loosely fitted on said terminal, means for locking said ring on said terminal, and peripherally spaced members interconnecting said tubular member and said ring member.

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