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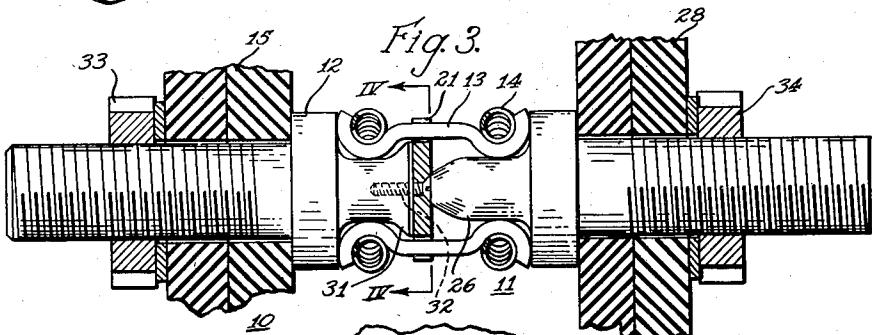
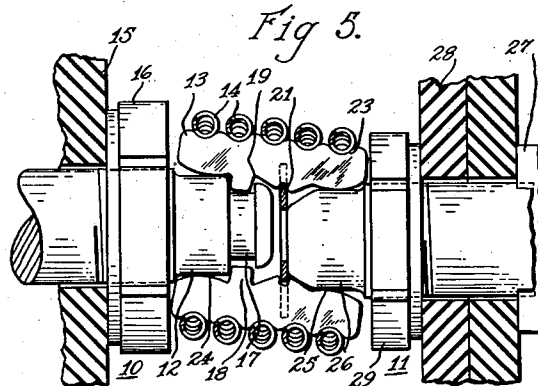
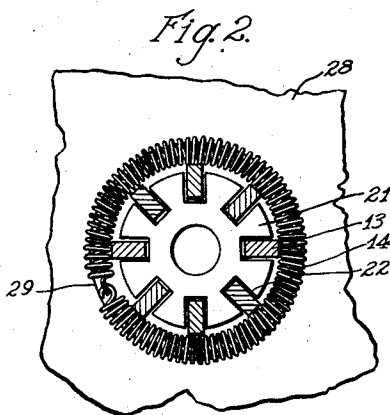
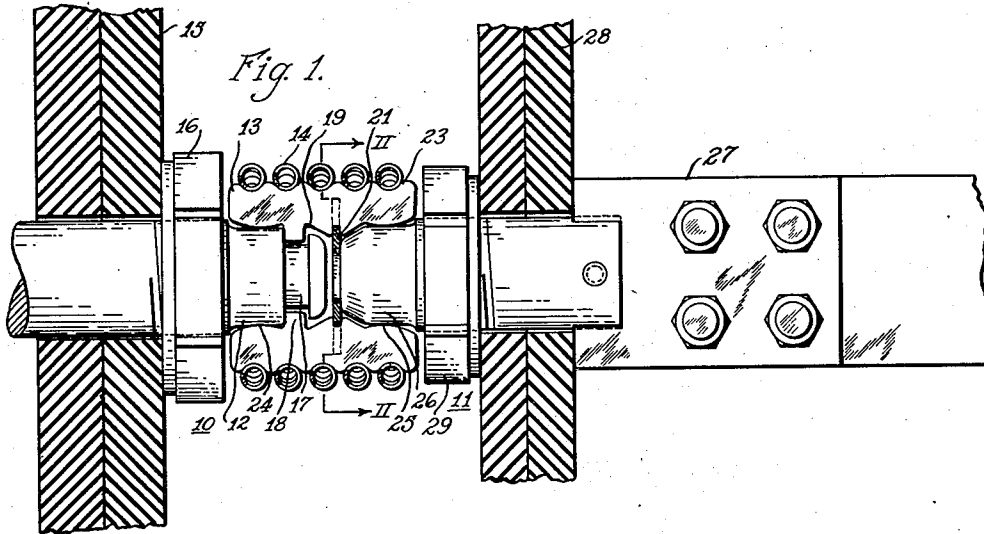
M. J. RUBEL ET AL

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DISCONNECTING CONTACT

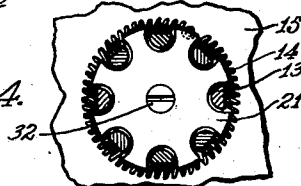
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2 Sheets-Sheet 1



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Fig. 4.



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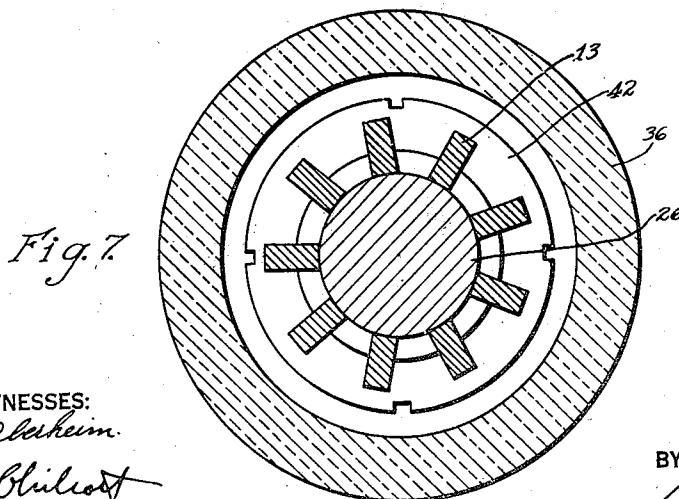
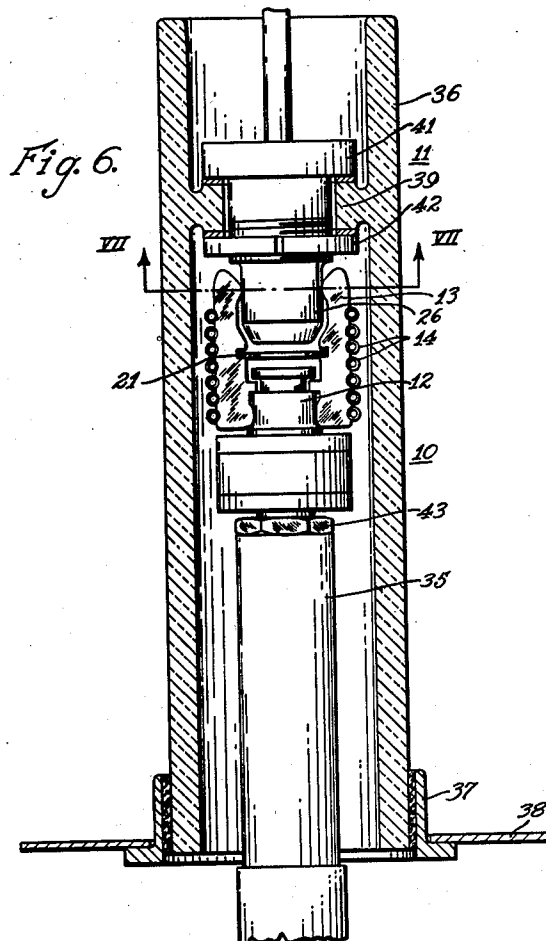
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DISCONNECTING CONTACT

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2 Sheets-Sheet 2



WITNESSES:

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2,265,006

DISCONNECTING CONTACT

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Application September 9, 1939, Serial No. 294,118

4 Claims. (Cl. 173—363)

Our invention relates, generally, to electric switches, and more particularly, to the contact members of electric switches suitable for disconnecting removable circuit breakers from the current conductors of a power system.

An object of our invention, generally stated, is to provide a disconnecting contact which shall be simple and efficient in operation and which may be economically manufactured and installed.

A more specific object of our invention is to provide a disconnecting contact of the plug and socket type suitable for connecting round current conducting members.

Another object of our invention is to provide a disconnecting contact which shall have a high current carrying capacity and shall be suitable for use on high voltage power systems.

A further object of our invention is to avoid the use of flexible current conducting members or shunts in a disconnecting contact.

Still another object of our invention is to provide a disconnecting contact in which equal pressure is produced at each contact point.

A still further object of our invention is to provide a full floating disconnecting contact to permit a relatively large amount of misalignment between the connected members in all directions.

Other objects of our invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In general, the disconnecting contact embodying our invention comprises a moving contact and a stationary contact. The moving contact utilizes the stud of a circuit breaker as a contact and supporting member for a plurality of contact fingers disposed around the stud. The contact fingers are equally spaced around the periphery of the contact surface by a spacing plate. Contact pressure is provided by a plurality of helical springs spaced along the contact fingers, which are retained on the breaker stud by engaging shoulders on the fingers and the stud. The stationary contact comprises a round plug inserted within the cylindrical opening provided by the contact fingers.

For a fuller understanding of the nature and objects of our invention, reference may be had to the following detailed description, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, partially in section and partially in elevation of a disconnecting contact embodying our invention;

Fig. 2 is a view, in section, taken along the line II—II of Fig. 1;

Fig. 3 is a view, partially in section and partially in elevation, of one modification of the invention;

Fig. 4 is a view, in section, taken along the line IV—IV of Fig. 3;

Fig. 5 is a view, in elevation, showing the disconnecting contact members in a misaligned position;

Fig. 6 is a view, partially in section and partially in elevation, of another modification of the invention; and

Fig. 7 is a view, in section, taken along the line VII—VII of Fig. 6.

Referring to the drawings, and particularly to Fig. 1, the disconnecting contact shown therein is comprised of two parts, a moving contact 10 and a stationary contact 11. The moving contact 10 comprises a round stud 12, which may be part of a circuit breaker structure (not shown), a plurality of contact fingers 13 disposed around the periphery of the stud 12 and a plurality of helical springs 14 bent into ring formation to bias the contact fingers inwardly to maintain contact pressure between the stud 12 and the fingers 13. The circuit breaker stud 12 may be secured to an insulating panel 15 by means of a spanner nut 16.

A keyway 17 is provided in the stud 12 for receiving an inwardly extending projection 18 on each of the contact fingers 13. Thus, the projection 18 engages the sides of the keyway 17 to retain the fingers 13 on the stud 12. It will be noted that the keyway 17 is wider than the projection 18, thereby providing a clearance 19 between the edge of the keyway and the shoulder 18 to permit longitudinal motion of the contact finger. In this manner, a desirable contact wiping action is obtained between the contacting surfaces of the fingers 13 and the stud 12.

The contact fingers 13 may be equally spaced around the periphery of the stud 12 by means of a spacing plate or washer 21, as shown in Fig. 2. The spacing plate 21 is provided with equally spaced radial notches 22 for receiving the contact fingers 13, thereby maintaining the fingers in spaced relation and also keeping them in a radial position.

The springs 14 may be equally spaced along the contact fingers 13, each finger being provided with grooves 23 for the springs 14. It will be seen that the spacing plate 21 is so located that a larger number of springs are on the moving circuit breaker stud side of the plate

than on the stationary stud side. Furthermore, the spacing plate 21 is designed to limit the inward movement of the disengaged ends of the contact fingers when the moving contact 10 is removed from the stationary contact 11.

Therefore, there is a definite tendency to hold the contact fingers firmly against the circuit breaker stud 12 when the contact is in the disconnected position. However, when the contact is in the engaged position, as shown in Fig. 1, the spacing plate 21 floats between the fingers and does not act as a fulcrum point for the contact fingers. The contact fingers are then firmly pressed against the contact surfaces 24 and 25. Since the springs 14 are equally spaced on the contact fingers 13, equal pressure is produced at the contact points 24 and 25, the contact fingers 13 functioning as beams with uniformly distributed loads.

The stationary contact 11 comprises a round plug 26, into one end of which copper blades 27 may be inserted to provide for the conventional method of connecting to bus bars. The plug 26 may be secured to an insulating panel 28 by means of a spanner nut 29, similar to the nut 16.

As shown in Fig. 5, the contact assembly is full floating and permits a relatively large misalignment in all directions between the circuit breaker stud 12 and the stationary plug 26. Since a large misalignment between the circuit breaker stud and the stationary contact can be accommodated without detriment to the current carrying capacity of the contact, it is possible to eliminate many expensive jiggling operations in the manufacture and the assembly of metal switchgear structures containing removable circuit breaker units. In this manner, the cost of manufacturing and assembling switchgear of this type may be materially reduced.

Furthermore, the use of flexible shunts in the contact structure is entirely avoided, thereby further reducing the cost. Also there is no possibility of trouble being caused by poor soldering since there are no soldered connections in the structure. It will be seen that the current passes directly through the contact fingers 13 from the one contact stud to the other, without going through flexible shunts or soldered connections.

In the modification of the invention shown in Figs. 3 and 4, which was designed for lighter duty than the structure described hereinbefore, the contact fingers 13 are semi-circular in cross-section. Furthermore, the fingers are bent or curved at each end to engage the studs and also to provide seats for the springs 14.

The stud 12 is provided with a shoulder 31 to prevent the contact fingers from sliding off the stud 12 when the moving contact is removed from the stationary contact. If desired, the spacing plate 21 may be secured to the stud 12 by means of a screw 32, as shown. The stud 12 is secured to the panel 15 by means of a nut 33 and the plug 26 is secured to the panel 28 by a similar nut 34.

In the modification of the invention shown in Figs. 6 and 7, which was designed for use with high potential circuit breakers of the vertical lift type, the moving contact 10 is carried by a circuit breaker bushing 35 and the stationary contact 11 is mounted inside of a cylindrical sleeve 36, which may be composed of porcelain or other suitable insulating material. The lower end of the sleeve 36 may be cemented in a flanged supporting ring 37 which is secured to a metal plate 38 disposed at the bottom of the superstructure

of a metal-clad switchgear structure (not shown).

An internal flange 39 is provided in the sleeve 36 to which the plug or stud 26 of the stationary contact is secured. As shown, the flange 39 is clamped between a shoulder 41 on the top of the stud 26 and a nut 42 which may be drawn tightly against the bottom of the flange 39. The stud 12 of the moving contact 10 is threaded into the breaker bushing 35 and locked by means of a lock nut 43.

The structure of the moving contact shown in Fig. 6 is similar to that shown in Fig. 1 with the exception that the fingers 13 are somewhat longer and, as shown in Fig. 7, more fingers are provided. Also, as shown in Fig. 6, more springs 14 are provided to increase the contact pressure, thereby making a contact assembly having a high current carrying capacity. In this modification the springs 14 are so disposed on the fingers 13 that a higher contact pressure is maintained between the fingers 13 and the stud 12 than between the stud 26 and the fingers.

From the foregoing description, it is apparent that we have provided a disconnecting contact which is simple in structure, low in cost and has a high current carrying capacity. Furthermore, the present structure permits a large misalignment between the moving contact and the stationary contact, which makes it particularly suitable for use with truck type and other removable circuit breakers.

In compliance with the requirements of the patent statutes, we have shown and described certain embodiments of our invention. However, it is to be understood that the invention is not limited to the precise constructions herein shown, the same being merely illustrative of the principles of the invention.

We claim as our invention:

1. A disconnecting contact comprising a round stud, a plurality of rigid contact fingers movably disposed around the periphery of said stud in spaced relation, resilient means for maintaining contact pressure between the stud and the fingers, means on the stud cooperating with means on the fingers for retaining them in position on the stud, and a plate supported entirely by the fingers and having radial notches therein for retaining the fingers in a radial position and in spaced relation around the stud, said fingers having means thereon for retaining said plate in position.

2. A disconnecting contact comprising a round stud, a plurality of rigid contact fingers movably disposed around the periphery of said stud in spaced relation, resilient means for maintaining contact pressure between the stud and the fingers, means on the stud cooperating with means on the fingers for retaining them in position on the stud, and a circular plate disposed inside of the fingers and having a radial notch on its periphery for each one of the contact fingers to retain them in a radial position and in spaced relation around the stud, said fingers having notches therein for retaining said plate in position.

3. In a disconnecting contact, in combination, a plug and a socket for receiving the plug, said socket comprising a circular stud, a plurality of individual rigid contact fingers movably disposed around the periphery of said stud in spaced relation, a plurality of helical springs for biasing the fingers inwardly into engagement with the stud and the plug, a floating washer disposed

inside of the fingers for equally spacing said fingers in a radial position and for limiting the inward movement of said fingers when the plug is removed, and means for retaining said washer in position.

4. In a disconnecting contact, in combination, a plug and a socket for receiving the plug, said socket comprising a circular stud, a plurality of contact fingers movably disposed around the periphery of said stud in spaced relation, a plurality of helical springs for biasing the fingers inwardly into engagement with the stud and the

5 plug, means on said stud cooperating with means on said fingers for maintaining the fingers in engagement with the stud, and a washer loosely disposed inside of the fingers and having radial slots therein for retaining the fingers in a radial position and preventing collapsing of the fingers when they are withdrawn from said plug, said fingers having notches therein for retaining said washer in position.

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