April 9, 1935. C. H. REYNOLDS 1,997,082

ELECTRICAL CONNECTION

Filed Aug. 10, 1931

Fig. 1.

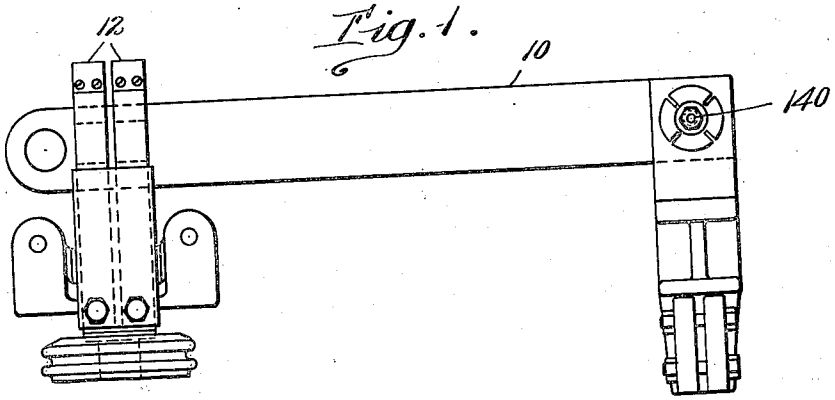


Fig. 2.

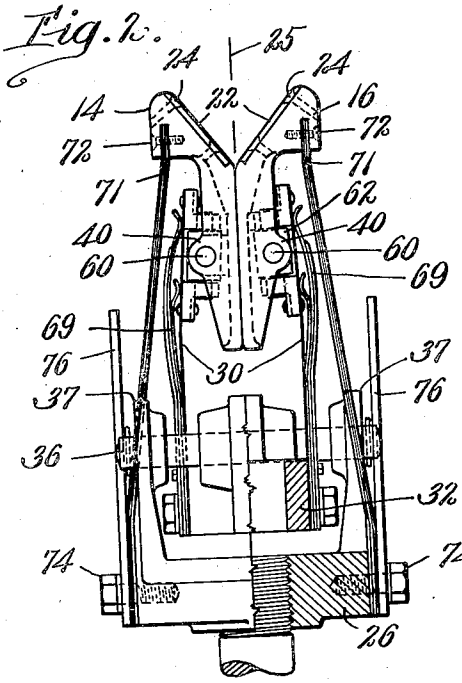
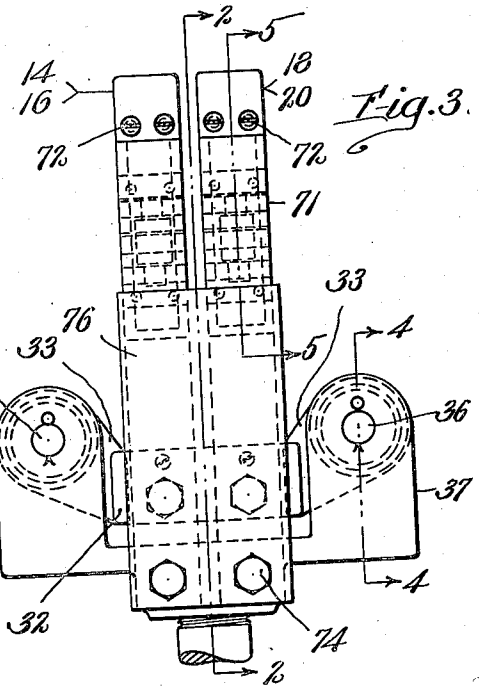


Fig. 3.



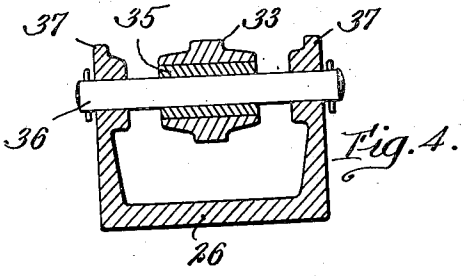
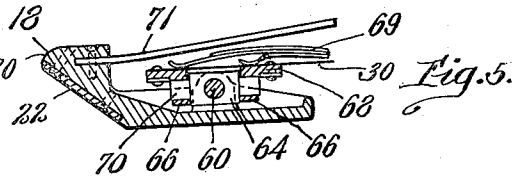


Fig. 4.

Fig. 5.



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ELECTRICAL CONNECTION

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6 Claims. (Cl. 200—166)

This invention relates to an electrical connection in which a movable blade or contact member co-operates with one or more pairs of clips or contact members between which the blade is moved to effect the electrical connection desired.

The invention has for one of its objects to provide means whereby the pair of contacts or clips may be moved bodily as a unit by the movable blade from a position out of alignment with the path of movement of the movable blade or contact member into the said path, so as to enable the pair of contact members and the movable blade to be mounted upon separate supporting members and ensure the contact members of the pair making equally good and substantially uniform contact with the movable blade and thereby overcome defects in the apparatus due to non-alignment of the co-operating contact members when their separate supporting members are arranged in operative relation.

The invention also has for its object to provide means whereby distortion or irregularities in the shape of the blade or movable contact member may be compensated for so as to enable the pair of contact members to automatically adjust themselves to the shape of the blade and thereby assist the aligning element in effecting a superior and uniform engagement of the movable blade with the pair of contact members co-operating therewith.

With these objects in view and such others as may hereinafter appear, the invention consists in the electrical connections and switches and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined at the end of this specification.

In the drawing illustrating the preferred embodiment of the invention:

Fig. 1 is a side elevation of a sufficient portion of the high tension disconnecting switch embodying the present invention to enable the invention to be understood;

Fig. 2, a view partly in section and partly in end elevation taken on the line 2—2 of Fig. 3;

Fig. 3, a side elevation of the contacting clips and their supporting mechanism;

Fig. 4, a sectional view on the line 4—4 of Fig. 3; and

Fig. 5, a sectional detail taken on the line 5—5 of Fig. 3.

In general the present invention contemplates an electrical connection comprising two contacting members relatively movable into and out of engagement. Provision is made for mounting one of the contact members in a novel and improved manner to permit it to align itself automatically with the other contact member.

In the preferred and illustrated embodiment of the invention the electrical connection is shown as comprising a switch having a movable switch member and a self-aligning contact member with which the switch member co-operates to close a circuit. The self-aligning contact member may and preferably will comprise one or more pairs of co-operating contacts or clips slidably mounted upon a supporting member to be capable of being automatically and bodily moved in a direction transverse to the plane of the movable switch member to the end that when the movable switch member is out of alignment for any reason and approaches and engages the clips as it is about to pass between them, the clips are bodily moved into a position in alignment with the movable switch member. Provision is also made for enabling the clips to align themselves automatically to variations in the angular relation of the switch member, and to this end a swivel or universal connection is preferably provided between each clip and its supporting member.

Referring now to the drawing, 10, 12 represent two contact members forming the electrical connection and which as herein shown comprise a movable switch member 10 and a co-operating set of self-aligning clips 12. The switch member 10 is herein shown as pivoted at 140 to be capable of being swung on its pivot to and from circuit-closing position. The self-aligning clips indicated generally at 12 are herein shown as comprising two sets of clips 14, 16, and 18, 20, the individual pairs of which co-operate with the movable switch member 10 when the latter has been moved down into a position between each pair of clips. The upper surfaces of the individual clips are inclined outwardly from a center line and are preferably provided with hardened metallic bearing plates 22 secured by screws 24 to the individual clips, as shown. The inclined surfaces of the plates 22 constitute cam surfaces which are adapted to be engaged by the movable switch member 10 when the latter is moved into circuit-closing position and is for any reason out of alignment with the center line 25.

Provision is made for operatively supporting the individual clips 14, 16, 18 and 20 upon a support 26 in a manner such as to permit the clips to be free to slide as a unit in a direction transverse to the plane of movement of the movable switch member, so that when the switch member approaches to pass between the clips and happens to be displaced from the center line 25 irrespec-

tive of the exact position of the clips, the engagement of the switch member with the inclined plates 22 will automatically effect the bodily movement of the entire set of clips into a position where the movable switch member becomes aligned with the center line 25. As herein shown, each clip member is mounted upon the upper end of a relatively stiff steel spring 30 and the latter is bolted to the side of a carriage or block 32.

The block 32 is slidably supported at opposite ends upon the support 26, and as herein shown is provided with two arms 33, each of which is provided with a transverse bore having a graphite bushing 35 slidably mounted upon a transversely extended shaft 36 projecting through bored holes in upright sections 37 of the supporting member 26, as illustrated in detail in Figs. 2, 3 and 4.

From an inspection of Fig. 2 and the description thus far, it will be apparent that the carriage or block 32 is free to slide upon the shafts 36 and through the springs, 30, the entire set of clips 14, 16, 18 and 20 are likewise free to move with the carriage as a unit transversely and with a minimum resistance.

In this manner the clips may be regarded as slidably mounted upon the supporting member 26 and are free to float in a transverse direction within the limits of movement permitted by the engagement of the block or carriage 32 with the individual uprights 37 of the supporting member 26 at each side thereof.

In certain instances in practice, the movable switch member 18 may approach the clips at an angle with relation to its normal plane of movement, and in order that the clips may be self-aligning to adapt themselves to angular variations in the position occupied by the switch member as it is moved into circuit-closing position, I have provided a swivel or universal connection between the individual clips and their supporting block or carriage 32, and as herein shown each individual clip is provided with ears 40 in which are journaled one set of pivots 60 of a universal or swivel joint indicated generally at 62.

One of the members 64 of the universal joint is free to rock upon the pivots 60 to enable the clip to rock about the pivots 60 as an axis, and the member 64 of the universal joint is itself journaled in upper and lower arms 66 of the second member 68 of the universal joint, whereby the clips and the first member 64 of the universal joint may also rock about the shafts 70 as an axis, the latter being formed integrally with the first member 64 of the joint.

The upper ends of the steel supporting springs 30 are herein shown as riveted or otherwise secured to the second member 68 of the universal joint, and with this construction it will be apparent that each individual clip is capable of a pivotal or rocking movement in two general directions at right angles to each other about the pivots 60 and 70, thus enabling the individual clips to automatically adjust themselves to any and all angular variations in the position of the movable switch member.

The co-operating pairs of clips 14, 16 and 18, 20 are normally urged toward one another under spring pressure, and as herein shown leaf springs 69 bolted to the sides of the block or carriage 32 are extended upwardly and engage the outer sides of the steel supporting springs 30 at the sides of the second member 68 of the universal joint and serve to yieldingly hold the co-operating clip members in engagement with the movable switch member when the latter is in circuit-closing position.

An electrical connection is provided between the individual clips 14, 16, 18 and 20 and the supporting piece 26 preferably by a plurality of flexible sheet copper leads 71 soldered in and secured by screws 72 to the heads of the individual clips as illustrated and secured at their lower ends of the sides of the supporting piece 26 by bolts 74, which extend through guard plates 76 to clamp the leads to the supporting piece 26.

The guard plates 76 are extended upwardly for a substantial distance and serve to prevent ballooning outwardly of the flexible copper leads 71 in the event of heavy surges of the current by reason of the magnetic field produced around the leads.

In this manner the guards 76 confine the leads and enable a plurality of the present switches to be installed side by side without liability of electrical interference one with the other by reason of ballooning of the flexible leads.

From the description thus far it will be observed that when the movable member 10 of the switch is displaced laterally from the center line 25 of the set of clips and is, in such a position, moved into engagement with the plates 22 on either set of clips, the engagement of the switch member with the inclined plates 22 will operate to cause the clips and their associated supporting parts including the universal joints 62, the springs 30, and the carriage 32, to be bodily slid as a unit into a position in which the switch member becomes aligned with the center line of the clips so that upon continued movement of the switch member, a most efficient contact is obtained between it and the individual clips.

In the event that the switch member is for any reason displaced angularly from its normal plane of movement, the universal joint connection between the individual clips and their supporting carriage enables the clips to align themselves with the switch member and provide a most efficient contact therewith.

In practice the present invention finds particular use in connection with oil switches and circuit breakers of the truck type in which one contact member is mounted upon the truck and the other contact member is mounted upon the wall or other stationary part of the building. Because of the natural and inherent variations in the different trucks, it is desirable that the two contacts be capable of self-aligning in the manner above described in order that a most efficient contact may be insured between the two contact members.

While the invention has been illustrated as embodied in a switch, it will be understood that it may be embodied in other forms of electrical connection such as ground contacts, circuit breakers, and the like, and furthermore, while for convenience of description one of the contact members has been referred to as a movable contact member, it will be understood that either contact member or both may be movable.

Having thus described the invention, what is claimed is:

1. In an electrical connection, in combination, a pair of contact clips, a supporting member, a block slidably mounted upon said supporting member, and means for supporting said clips upon the said block comprising spring members secured to the block, and a swivel connection

between the spring members and the contact clips.

2. In an electrical connection, in combination, a pair of cooperating spring-pressed contact clips adapted to receive between them a second contact member, a support, a carriage mounted to slide on the support in a direction transversely of the contacting faces of the clips, and means for operatively supporting the contact clips upon the movable carriage including a swivel connection between each clip and the said carriage to thereby permit said contact clips to be turned with relation to said carriage and align themselves automatically and to be bodily movable with said carriage into alignment with the aforesaid second contact member.

3. In an electrical connection, in combination, a pair of cooperating spring-pressed contact clips adapted to receive a second contact member between them, a support, a carriage mounted to be capable of movement in a transverse direction upon said support, and means for operatively supporting the contact clips upon said carriage to move with the latter as a unit said means including universal joints between the contact clips and said carriage.

4. In an electrical connection, in combination, a pair of cooperating contact clips, a supporting member, an intermediate carriage slidably mounted upon the supporting member, springs secured to said intermediate carriage and said contact clips for mounting the contact clips upon said carriage to slide therewith, flexible leads connecting said clips and said supporting member, and universal joint connections between the said supporting springs and said clips to thereby permit said contact clips to swivel in two planes and to be moved bodily with said carriage in a direction transversely of the contacting faces of said clips.

5. In an electrical connection, in combination, a movable blade, contact clips with which said movable blade co-operates to enter between the same and make contact therewith, a movable carriage, means for securing said contact clips to said carriage to move therewith as a unit, a stationary supporting member for said carriage having arms spaced apart and shafts carried by said arms upon which said carriage is slidably mounted to enable said carriage and both of the contact clips carried thereby to be bodily moved as a unit on said shafts by the engagement of said blade with either of said contact clips, when the latter are normally out of alignment with the path of movement of said blade.

6. In an electrical connection, in combination, a movable blade, contact clips with which said movable blade co-operates to enter between the same and make contact therewith, a movable carriage, means for securing said contact clips to said carriage to move therewith as a unit, said means including a swivel joint for each contact clip, a supporting member for said carriage having arms spaced apart and shafts carried by said arms upon which said carriage is slidably mounted to enable said carriage and both of the contact clips carried thereby to be bodily moved as a unit on said shafts by the engagement of said blade with either of said contact clips, when the latter are normally out of alignment with the path of movement of said blade.

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