

Sept. 13, 1932.

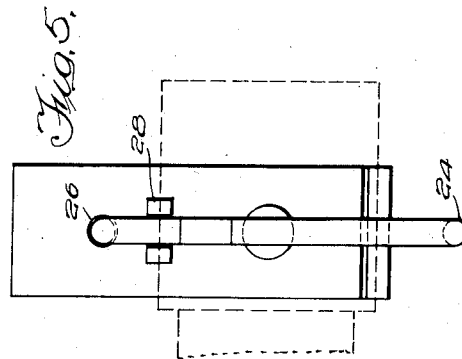
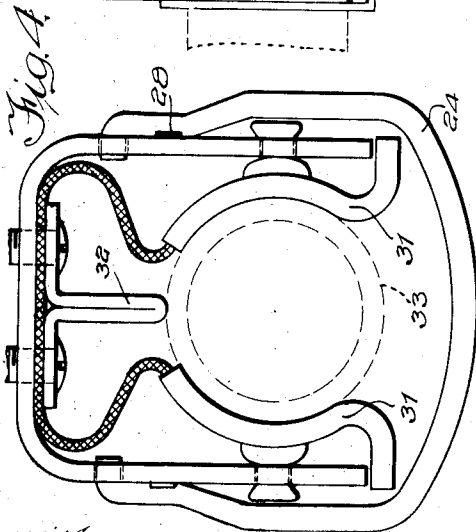
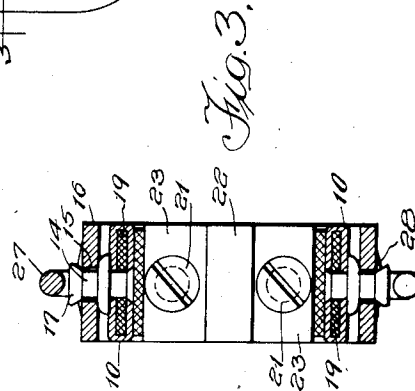
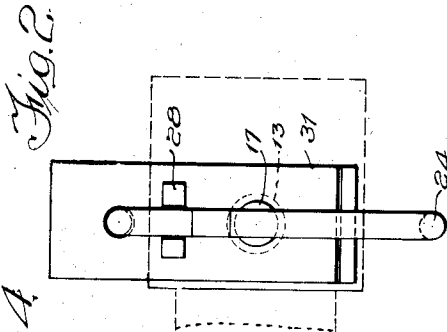
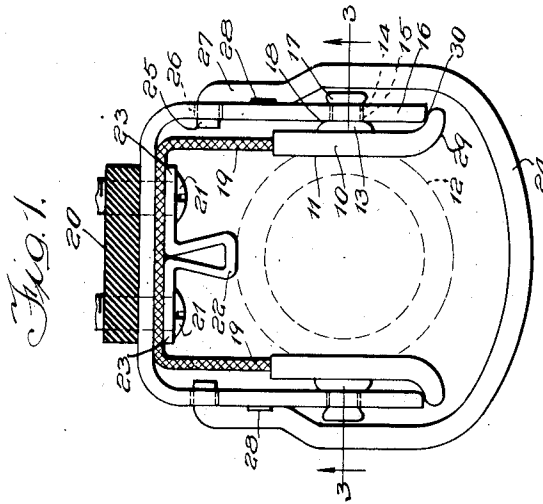
A. ALSAKER ET AL

1,876,536

FUSE CLIP

Filed April 16, 1928

3 Sheets-Sheet 1



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Sept. 13, 1932.

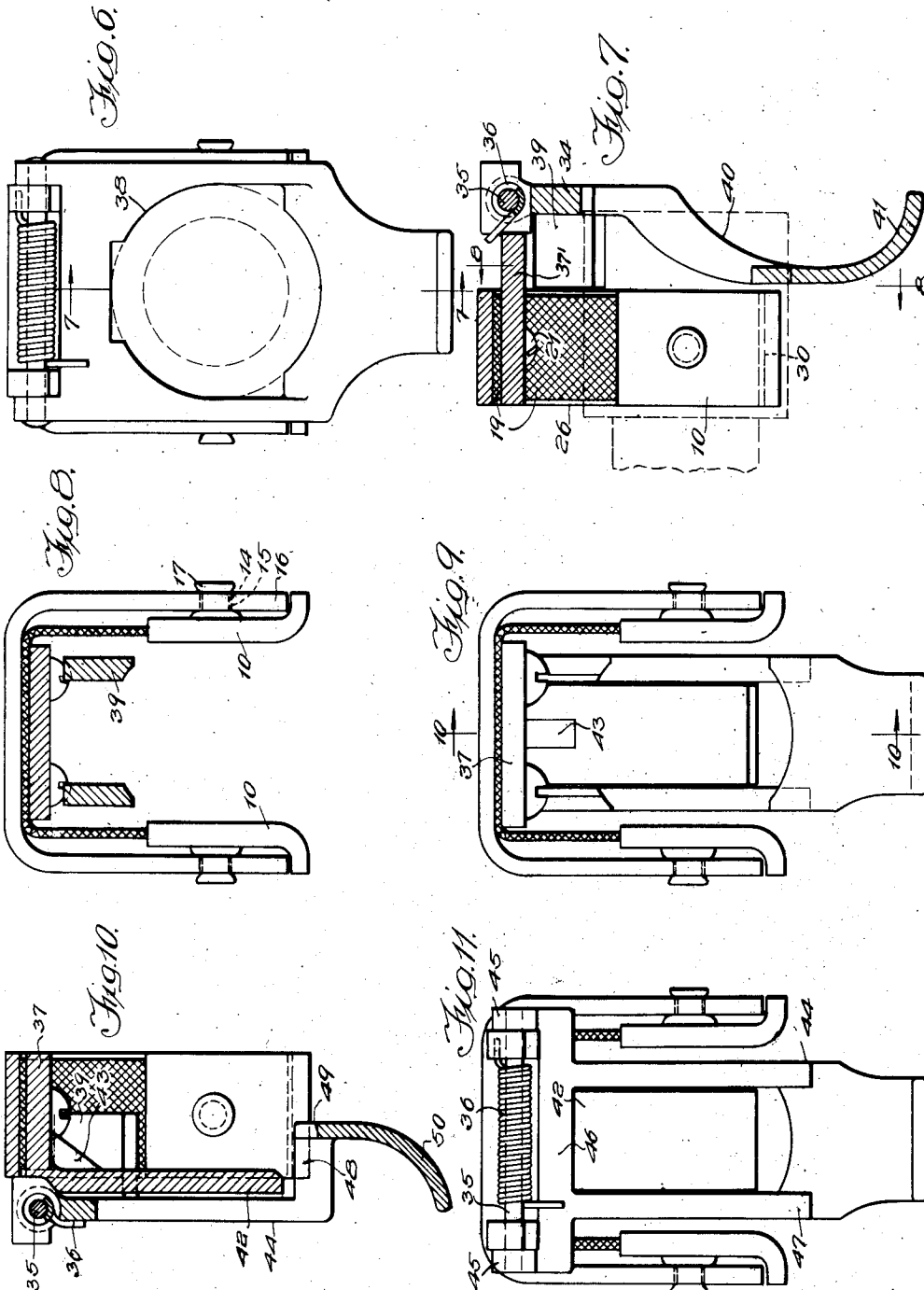
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FUSE CLIP

Filed April 16, 1928

3 Sheets-Sheet 2



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My commission expires

Sept. 13, 1932.

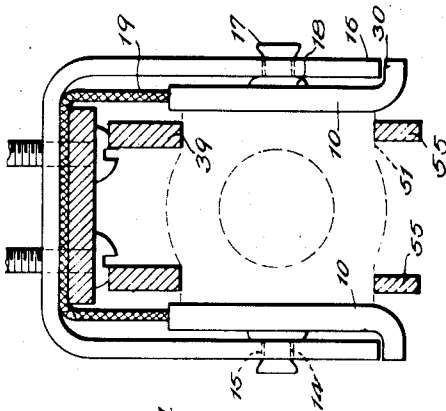
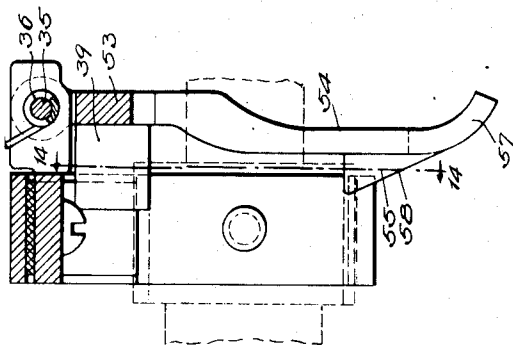
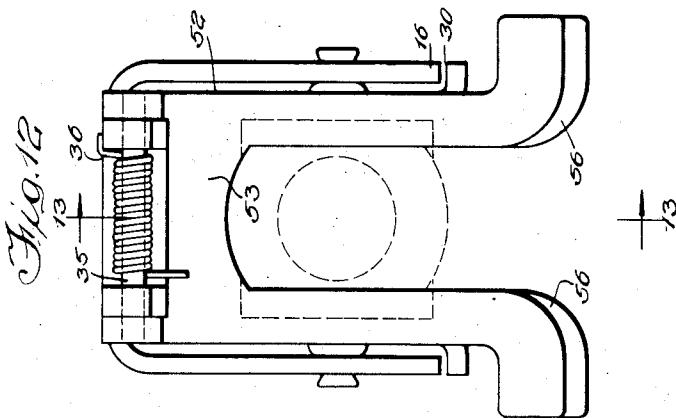
A. ALSAKER ET AL

1,876,536

FUSE CLIP

Filed April 16, 1928

3 Sheets-Sheet 3



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FUSE CLIP

Application filed April 16, 1928. Serial No. 270,210.

Our invention relates to contacts for receiving fuse terminals or the like.

In the mounting of fuses for power circuits, that is, circuits carrying substantial amounts of power such as are employed in high tension transmission work, the spacing between the contacts, and insulation requirements necessitate the mounting of the contacts on separate insulators as distinguished from low tension fuses and their contacts which are generally mounted on a common insulating board or the like.

While the fuse terminals of our invention are peculiarly adapted for high tension power work, they are not to be limited to such use since certain of the features herein disclosed and claimed are applicable to a wide variety of uses and mountings.

However, in the mounting of high tension fuses on separate insulators it is difficult to align the contacts which receive the fuse so that the rigid fuse body or shell with its ferrules or equivalent contact devices will make uniformly good contact. Failure to make good contact results in the generation of heat and consequent electrical loss which is highly undesirable.

Heretofore fuse contacts, or fuse clips as they are often termed, have been made of spring metal on the theory that the spring of the contact will cause it to adapt itself to the rigid surfaces of the fuse ferrules. From the very nature of things if the contacting surface of the fuse clip is resilient and flexible it will not retain a plain flat surface in case of misalignment such as is very difficult to avoid, or a true cylindrical surface under like conditions where the fuse ferrule presents a cylindrical external surface for making contact with the clip.

We have attacked the problem from a different standpoint. We propose to functionally separate the fuse clip or contact into two distinct parts, namely a contact part which may be rigid and inflexible and a supporting part which is adequately flexible and which applies the right contact part to the surfaces of the fuse terminal. The contact part has a universal connection of limited play or freedom with respect to the ap-

plying means, and it has suitable connections with the applying means for limiting the stresses upon this universal mounting and for holding the contact parts in such position as readily to receive the ferrule of the fuse when the fuse is to be inserted. The contact part is connected electrically to the terminal by a dead connection such as a braided ribbon of copper or the like, or other flexible connection generally termed a pig-tail.

In addition to the above broad improvement in fuse mountings, which our invention provides, we embody in the preferred form of our invention certain other improvements, namely an improved form of lock or retaining means for locking the fuse into the clip to prevent accidental or unintentional removal. This locking means has the novel function, in addition to the locking of the fuse in the clip, of serving as a means upon its release of breaking the fuse ferrule from the mounting clip.

That is to say, opening of the lock exerts a camming action upon the fuse ferrule to break it away from the clip contacts so that it may more readily be removed.

At the same time, the lock is so arranged as to interlock with the removing means to the extent that the locking means will not automatically close until the fuse is reinserted. This construction provides the additional function that the locking means will not remain in any intermediate position, that is to say, it will remain either in fully open position or in locking position, but not in intermediate position.

The organization of our fuse terminal in separately functional parts is highly advantageous in obtaining the necessary area of contact and satisfactory application of pressures to the contacting areas, but in addition the separation of the fuse clip into functionally separate parts permits these parts to be constructed in form and of materials suitable for their respective functions, for example the contact members are preferably made of hard drawn copper of high conductivity, whereas the springs supporting the same are made of phosphor-bronze, which in point of

resiliency is far superior to copper but in point of conductivity is inferior. Lower spring pressures may be employed in the fuse clip of our invention because of better distribution and greater contact area secured by the same. The floating action of the contact members makes insertion or removal of the fuse from a clip easier and renders the fuse less subject to violent handling that often results in breakage.

The rigid contact members are preferably united to the flexible braid or pigtails by crushing or flattening a tubular member of hard drawn copper upon the outside of the braid.

Now in order to acquaint those skilled in the art with the manner of constructing and operating a device embodying our invention, we shall describe in connection with the accompanying drawings specific embodiment of the same.

Figure 1 is an elevational end view of a fuse clip, incorporating our invention;

Figure 2 is a side elevational view of that shown in Figure 1;

Figure 3 is a sectional view, taken on substantially the line 3—3 of Figure 1;

Figure 4 is an end elevational view of a modified form of our invention;

Figure 5 is a side elevational view of that shown in Figure 4;

Figure 6 is an end elevational view of a modified form of our invention, particularly as to locking means;

Figure 7 is a sectional view, taken on the line 7—7 of Figure 6;

Figure 8 is a sectional view, taken on the line 8—8 of Figure 7;

Figure 9 is an elevational view of another modification of our invention;

Figure 10 is a sectional view, taken on the line 10—10 of Figure 9;

Figure 11 is an elevational view of the reverse side of that shown in Figure 9;

Figure 12 is an elevational view of another modification of our invention;

Figure 13 is a vertical section, taken on the line 13—13 of Figure 12;

Figure 14 is a sectional view, taken on the line 14—14 of Figure 13.

In Figures 1, 2 and 3, the contact members 10 have flat inner surfaces 11, for engagement with flattened surfaces on the sides of the fuse terminal 12, shown in dotted outline.

The contact members 10 are formed of hard drawn copper and to each of them is rigidly secured, by riveting or welding, a stud or pivot member 13 having a cylindrical portion 14 loosely fitted through an opening 15 in the supporting U-shaped member 16. The outer end 17 of the stud 13 is swedged in order to spread the same and prevent its removal through the opening 15. The portion of the stud 13 which is positioned between the contact members 10 and the support 16 is rounded

at 18 for giving a rolling contact with the inner surface of the support.

The contact members 10 may be made of two pieces of copper welded together as a unit and having a copper braid 19 therebetween. The braid 19 extends from the upper end of the contact members and serves as the principal means of conducting electric current from the conductor or bus-bar 20 to the fuse and, at the same time, allowing unrestrained self-alignment of the contact members 10 on the fuse terminals.

The braid 19 and the supporting member 16 are secured together and to the bar 20, by means of suitable bolts or screws 21, as shown in Figure 1. The supporting member 16 is preferably made of phosphor-bronze, having good spring qualities, and it is formed in such a manner that it normally urges inwardly on the stud 13 for holding the contact members 10 in engagement with the fuse terminal positioned therebetween.

A stop member 22 is provided above the position normally occupied by the fuse terminal and arranged to engage the upper side thereof for limiting the upward insertion of the terminal at a point where a line drawn through a diameter of the terminal will pass through the center of the two pivot studs, since at this position the greatest amount of self-alignment is permitted with the least effort. The stop member 22 is provided with a base member 23 which serves to retain the braid 19 in place and to secure onto the same by bolt 21, as shown.

To prevent accidental displacement of the fuse from the clip, we provide a guard or locking bail 24, which is of spring material. It passes beneath the terminal, around the lower portion of the clip and the end extends inwardly through opening 26 in the support 16, near the upper end thereof. A portion 27 of the bail extends parallel with the side of the support 16 and is arranged to seat between lugs 28, which are integral with the support and in moving the bail, it must spring over one of the lugs.

This springing action gives it a decided snap from unlocked position to locked position. The location of the lugs 28 is particularly important, it being noted that they are located near the opening 26, which is near the pivotal point of the locking bail and the small movement at this point necessary to move the bail over the lugs 28 is a large movement on the lower end, so that when the bail snaps over one of the lugs 28, the lower end of the bail snaps from an unlocked position to a locked position. Heretofore, it has been proposed to use locking bails with lugs positioned near the lower end of the support, but such an arrangement does not give the decided snap action from the full on to the full off position, in the manner we have provided.

The lower ends of the contact members 10 are flared at 29, permitting ease of replacement of the fuse. The end 30 is positioned relatively close to the lower end of the support 16 and arranged to engage the same upon rotation of the member 10 beyond a predetermined limit, so as to keep them in substantial alignment and prevent strain on the braid 19.

In Figures 4 and 5, we have shown a modified form of our invention, being substantially similar to that above described, but being particularly adapted for holding a cylindrical fuse terminal instead of one having flat sides. The contact members 31 are concave to fit the terminal 33 and the stop member 32 is of such height to engage the terminal for limiting its upward movement.

The bar 20, shown in Figure 1, has been omitted from the other views, as it is simply to show the relationship and operation of our invention, but is no part thereof, except as it may cooperate with the other members in the manner herein set forth.

In Figures 6, 7 and 8, I have shown a modified form of locking means, comprising a latch 34, arranged at the end of the fuse clip and adapted to operate on a pivot pin 35. A coil spring 36 surrounds the pivot pin and the ends thereof engage a supporting bar 37' and the end of the latch, for constantly urging the latch in a direction tending to close the same upon the ends of the fuse terminal shown in dotted outline. The pivot pin 35 passes through openings in the supporting bar 37' and openings in the top end of the latch, thereby hinging the members together, and the bar 37' is held to the support 26 and the braid 19, by means of bolt 21. The latch 34 is provided with a substantially circular aperture 38, arranged to receive the cylindrical end of the fuse terminal, which may extend beyond the flattened portions received between the contact members 10. Lugs 39 are secured to the latch 34 and serve as a stop, properly positioning the fuse terminal, and exerting a camming action on the fuse terminal for breaking it from the clip contacts when the latch or locking means is opened.

The latch is curved inwardly at 40, in order to fit well over the end of the terminal, and the lower end 41 is again curved outwardly for giving a cam action to the latch when the terminal is pressed thereagainst in an effort to replace the fuse, so that it is not necessary to move the end 41 manually against the action of the coil spring, since it is automatically moved, when the fuse terminal is inserted and it immediately snaps over the end of the terminal and locks it in place.

In Figures 9, 10 and 11, is shown another form of locking means, which is particularly adapted to lock the terminal which does not extend beyond the contact members. It com-

prises a latch 44, which is pivoted by a pin 35 and operated by a coil spring 36, in the same manner as that shown in Figure 7. The latch is also provided with the lugs 39 which serve as stops, and for removing the fuse terminal in the manner hereinbefore stated. The plate 42 is formed integral with and extends down from the bar 37, serving as an end stop for the fuse terminal. A stiffening flange 43 prevents excessive flexing and breaking at the point where the plate 42 joins the bar 37, as shown in Figure 10. The latch 44 consists of the hinged portions 45 at the top, connected by a bar 46. From the cross-bar 46, two parallel portions 47 extend downwardly, at a distance apart slightly greater than the width of the plate 42, in order that the latch may pass over the lower end of the plate, if moved sufficiently on the hinge pin 35 in a forward direction. The lower portion 48 of the latch is offset forwardly and an arcuate aperture 49 in the cross-member fits over the fuse terminal. The extreme lower end 50 of said cross-member is curved rearwardly, forming a cam surface, by which the latch is moved upon engagement with a fuse being inserted as previously set forth.

Another modification of our invention is shown in Figures 12, 13 and 14. This modification is particularly adapted to lock fuse terminals, provided with substantially rectangular portions 51, shown in dotted outline.

The latch or locking member 52 is hinged in the same manner as set forth in regard to Figure 6 to 11, inclusive, and is urged to a locked position by means of the coil spring 36. It comprises hinged portions 52, a cross-bar 53, downwardly extending side members 54, provided with hook members 55 arranged to engage under the flattened portions 51 of the terminal shown in Figure 14. The lower ends of the member 54 are formed with outwardly curved portions providing opposing cam faces 56 and longitudinally disposed cam faces 57, all of which cooperate to guide a fuse terminal between the members 54 and over the inclined surface 58 of the hook 55, for forcing the same rearwardly against the action of spring 36 and allowing it to be pressed against the stop 39, which when being engaged by the fuse terminal, aids the spring 36 in lodging the hook 55 below the terminal as shown, and conversely breaks the fuse terminal from its contacts when the hook 55 is moved rearwardly.

It will be apparent to those skilled in the art that the various locking means herein illustrated are adaptable to terminals of various shapes and sizes and we do not intend to be limited to the specific details herein illustrated and described, but desire to avail ourselves of such variations as come within the scope of the appended claims.

We claim:

1. A fuse clip comprising in combination non-resilient, self-aligning contact members, a resilient supporting element for urging said members into engagement with a fuse terminal, securing means fixed to said members having engagement with said element, conductors for said non-resilient contact members and locking means for preventing displacement of the fuse terminal. 70
2. A fuse clip comprising in combination, non-resilient, self-aligning contact members, a U-shaped resilient supporting element secured thereto, means for limiting the insertion of a fuse terminal between said contact members, and locking means for the fuse terminal comprising a resilient bail pivoted to said supporting element, and lugs on said element relatively close to said pivot, between which said bail engages. 75
3. A fuse clip comprising in combination, non-resilient, self-aligning contact members, a resilient supporting element for urging said members into engagement with a fuse terminal, securing means fixed to said members having engagement with said supporting element, conductors for said non-resilient contact members, cam faces on the lower ends of said contact members, and means for preventing displacement of the fuse terminal. 80
4. A fuse clip comprising in combination, self-aligning non-resilient contact members for engaging a fuse terminal, cam faces on the lower ends of said contact members, a resilient supporting element for said contact members, studs fixed on said contact members loosely engaging said supporting element, conductors for said contact members in parallel with said supporting element, said supporting element having openings therein near the upper end thereof and spaced lugs on said element relatively near said openings, a locking bail passing beneath said terminal and engaging said element between said lugs, the ends thereof engaging in said openings, means for limiting the insertion of a terminal between said contact members, and means for securing said limiting means, said conductor, and said support together and to a conducting bar. 85
5. A terminal clip comprising a support, a U-shaped member secured to the support, a pair of contacts carried by the arms of the U member to receive a terminal between them, a stop member on the inner side of the U-shaped member and against which the terminal that is received between the contacts is moved for fixing the extent to which the terminal may be inserted into the U, common means for securing the stop member and the U-shaped member to the support, and conductors between the stop member and the U-shaped member for conducting current to the contacts. 90
6. An electric terminal clip comprising a substantially U-shaped member, a pair of contacting members secured to the inner side of the U-shaped member and adapted to receive a terminal between them, conductors secured to the contacting members, a support for the terminal clip, and common means for securing the conductors and the U-shaped member together and to the support. 95
7. A clip comprising in combination, non-resilient, self-aligning contact members, resilient supporting means secured thereto for urging said contact members into engagement with a terminal, a latch hinged at one end of said clip, and means on the latch for engaging and locking the terminal in place. 100
8. A clip comprising in combination, non-resilient, self-aligning contact members, resilient supporting means secured thereto for urging said contact members into engagement with a terminal, a latch hinged at one end of said clip, means on the latch for engaging and locking the terminal in place, and stop members on said latch for limiting the extent of insertion of the terminal. 105
9. A clip comprising in combination, a non-resilient, self-aligning contact member, resilient supporting means secured thereto for urging said contact member into engagement with a terminal, a latch hinged at one end of said clip, means on the latch for engaging and locking the terminal in place, and a cam face on said latch arranged to be engaged by the terminal being inserted. 110
10. A clip comprising in combination, non-resilient, self-aligning contact members, resilient supporting means secured thereto for urging said contact members into engagement with a terminal, a latch hinged at one end of said clip, means on the latch for engaging and locking the terminal in place, stop members on said latch for limiting the extent of insertion of the terminal, and a cam face on said latch arranged to be engaged by the terminal being inserted. 115
11. A clip comprising in combination, self-aligning, non-resilient contact members for engaging a terminal, cam faces on the lower ends of said contact members, a resilient supporting element for said contact members, studs fixed on said contact members loosely engaging said supporting element, conductors for said contact members in parallel with said supporting element, a latch for locking a terminal between said contact members, a coil spring yieldingly holding said latch in engagement with said terminal, lugs on said latch for limiting the insertion of the terminal, and an arcuate stop member for the terminal. 120
12. A clip comprising in combination self-aligning, non-resilient contact members for engaging a terminal, cam faces on the lower ends of said contact members, a resilient supporting element for said contact member, 125

studs fixed on said contact members loosely engaging said supporting element, conductors for said contact members in parallel with said supporting element a latch for securing a terminal from displacement from between the contact members, said latch comprising a hinged cross-bar, a plurality of downwardly extending hooks on said cross-bar, means thereon for engaging under a terminal, and cam surfaces on the lower end of said hook for facilitating the insertion of a terminal between the contact members.

tion for camming the contact making members apart.

In witness whereof, we hereunto subscribe our names this 12th day of April, 1928.

ALFRED ALSAKER.
JAMES MARKESE.

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13. A clip comprising in combination non-resilient contact members, spring supporting means pressing the contact members toward each other, said contact members having limited universal angular motion, and motion of translation, locking means for retaining a terminal between said contacts, and members on said locking means for forcing the terminal partially from between the contact members when the locking means is actuated.

14. In combination, a pair of clips, a rigid member having metallic contact terminals at its ends adapted to cooperate with said clips, said clips comprising contacts and having universal angular motion and motion of translation, spring means supporting said contacts, means for retaining said metallic contact terminals between said contacts, and members on said retaining means for forcing said metallic terminals from between said contacts when said retaining means is actuated.

15. In combination, a pair of clips, a rigid member having metallic contact terminals at its ends adapted to cooperate with said clips, non-resilient contact members on said clips, resilient means for supporting and urging said contact members into engagement with said terminals, locking means for said terminals, said locking means comprising members for camming said terminals from between said contact members, and conducting means for said contact members independent of said supporting means.

16. In an electrical switching device, the combination with a terminal and a contact clip adapted to engage one another, a latch for locking the terminal, and cam means acted upon by the terminal for forcing the latch to its locking position responsive to movement of the terminal to its switch closed position.

17. In an electrical switching device, the combination of a pair of contact making members movable into and out of engagement with one another, a latch for locking them in their engaged position, and cam means actuated by the movement of the contact making members to their full engaging position for forcing the latch to its locking position, said cam means being actuated upon movement of the latch to its released posi-