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P. M. CHRISTENSEN

2,419,007

FUSE TERMINAL CLIP

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Fig. 1

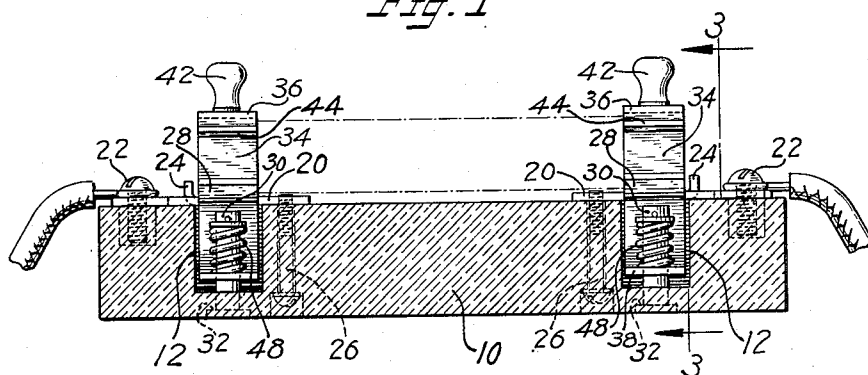


Fig. 2

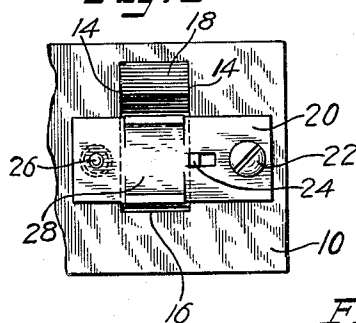


Fig. 3

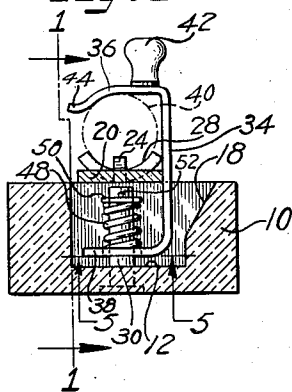


Fig. 4

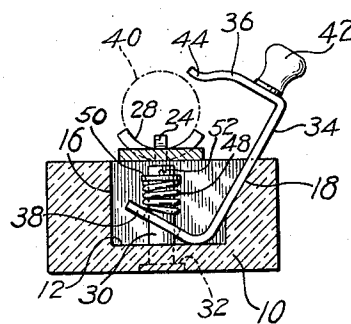
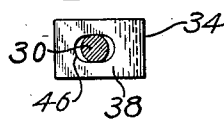


Fig. 5



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UNITED STATES PATENT OFFICE

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FUSE TERMINAL CLIP

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16 Claims. (Cl. 173-259)

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This invention relates to improvements in clips for holding and electrically engaging fuse terminals.

It is an object of the invention to provide a fuse terminal clip requiring a very small amount of manual force to attach a fuse to or disengage the same from said clip.

It is another object of the invention to provide a fuse clip to attain the foregoing object and also comprise relatively few component parts which will nevertheless serve to firmly clamp the fuse terminals in electrical engagement with the contact member embodied in the clip.

It is a still further object of the invention to provide a fuse clip in which the fuse terminal engaging members yieldably clamp the fuse terminal therebetween.

A further object of the invention is to provide means to guide and limit the movement of the fuse terminal engaging and clamping member with respect to the fuse terminal contact embodied in the clip construction.

The details and other objects of the invention are described and illustrated in the following specification and said accompanying drawings forming a part thereof.

The accompanying drawings show the embodiment of the invention which is deemed preferable, but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

In the drawing,

Fig. 1 is a sectional side elevation of a fuse block supporting a pair of spaced fuse terminal clips embodying the present invention, said view being a section on the line 1-1 of Fig. 3.

Fig. 2 is a fragmentary top plan view of one end of the fuse block and a fuse terminal contact, the clamping member being omitted from said view.

Fig. 3 is a sectional end elevation of the fuse block and terminal clip taken on the line 3-3 of Fig. 1. The component parts of the terminal clip in said view are shown in their fuse terminal clamping positions.

Fig. 4 is a view similar to Fig. 3 but showing the component parts of the clip construction in the position to which they are moved while inserting or removing a fuse from said clip construction.

Fig. 5 is a partially sectioned bottom plan view of the clamping member of the fuse clip con-

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struction, said view being taken on line 5-5 of Fig. 3.

Fuse clips of conventional design embodying a pair of opposed spring arms respectively provided with curved seats or opposed flat faces to receive a terminal of a fuse usually require a relatively great amount of force to remove a fuse from or insert the same in said clip due to the fact that, if firm electrical contact or engagement is to be present between the fuse terminal and the clip, the clip must be made of spring-like material which is sufficiently strong to insure said firm engagement and is usually so strong that considerable force is required to move said terminal with respect to said clip. If the conventional clip is made so that the fuse terminal may be easily inserted in or removed from said clip and require only relatively little force to do so, the clip must be made of such relatively light or weak spring-like material that firm electrical engagement between the clip and fuse terminal is not assured.

It is therefore one of the principal purposes of the present invention to embody in a fuse clip easily operable members which will require much less force to operate than the conventional clip, described above, and yet insure firm electrical contact between the clip and the fuse terminal engaged thereby.

The foregoing desirable objects are attained by providing a structure in which the opposed clamping members adapted to engage opposite sides of a fuse terminal are held in clamping engagement with said terminal by a relatively strong spring but said structure is such that, when relatively moving the opposed clamping members for purposes of inserting or removing a fuse terminal from the clip, the full force of the spring will not be opposed during such relative movement of said clamping members.

In the drawings, a conventional fuse block 10 of insulating material is provided with a pair of spaced recesses 12. The end walls 14 and also one side 16 of said recesses are substantially vertical to the bottom of the fuse block. The other side wall 18 is inclined for the major portion of its length with respect to said bottom of the fuse block for purposes to be described.

A pair of fixed contacts 20, formed of current conducting material, are respectively mounted on said fuse blocks so as to overlie the recesses 12. One end of each contact is threaded to accommodate a terminal screw 22 and an upstruck ear 24 is also provided on each contact 20 to define the operative position of the fuse longitudinally of the fuse block. Each contact 20 is secured to

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the fuse block by suitable means such as a screw 26 threadably engaging the same and extending through a suitable aperture therefor in the fuse block. Each contact is also provided with an arcuate fuse terminal receiving seat 28 preferably formed by a pair of opposed ears which are struck up and curved from the body of the contact 20.

Projecting upward from the bottom of each recess 12 is an anchor 30 illustrated as a cylindrical and headed pin which passes through a suitable aperture formed in the fuse block 10, said aperture also having an annular shoulder 32 to accommodate the head of the pin and prevent upward movement thereof with respect to the fuse block.

A substantially C-shaped clamping member 34 is provided with opposed ends or legs 36 and 38 which are respectively adapted to clampingly engage fuse terminal 40 and be connected to the anchor 30. The leg 36 is provided with a manually engageable button or knob 42 by which the clamping member may be readily manipulated. Furthermore, said leg 36 is also provided at its free end with a reversely curved portion 44 providing a cam surface to facilitate engagement and disengagement of the leg 36 with the fuse terminal 40. The leg 38 of the clamping member is provided with an elongated opening 46 which receives the pin comprising the anchor 30, said opening being preferably formed with rounded ends to conform to the cylindrical surface of said anchor. The opening 46 not only permits the clamping member to be linearly moved with respect to said anchor but said opening is elongated to permit pivotal movement of the clamping member on said anchor from the position shown in Fig. 3 to that shown in Fig. 4, said pivotal movement freely taking place without binding. The clamping member is pivoted principally to move the leg 36 into or from engagement with the fuse terminal while the linear movement of the clamping member is principally to effect clamping of the fuse terminal against the contact seat. Such clamping movement will not be totally linear, however, but will be partially pivotal also.

Anchor 30 is surrounded by a helical spring 48 which at one end engages the upper surface of the leg 38 of the clamping member and at the other abuts an annular washer 50 secured to the upper end of said anchor by a locking pin 52 which extends transversely to the anchor through a suitable hole formed therein.

The vertical dimension of the clamping member 34 is such that when the leg 36 thereof is in clamping position with respect to the fuse terminal 40, as viewed in Fig. 3, there is ample clearance between the underside of the leg 38 of the clamping member and the bottom of the recess 12 to enable the spring 48 to exert its full force downward on said clamping member to insure firm electrical engagement between the fuse terminal 40 and seat 28 of contact 20.

When it is desired to remove a fuse from the seats 28, the button 42 of each clamping member is moved toward the right, as viewed in Fig. 3, whereby the curved portion 44 of leg 36 will slightly cam the clamping member upward against the action of spring 48 and permit the outer end of leg 36 to slide transversely of the base block and over the upper surface of the fuse terminal 40 until the clamping member 34 reaches the position shown in Fig. 4. Such disengaging movement of the clamping member is

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limited by its engagement with the inclined wall 18 of recess 12. Furthermore, substantially at the time that the curved end 44 of the clamping member disengages the upper surface of the fuse terminal, the angular portion of the clamping member, which connects leg 38 to the remainder of said clamping member, will be substantially in position to abut the bottom of recess 12 without much additional downward movement.

This is a desirable feature since, when the clamping member is moved from the position in Fig. 4 to that in Fig. 3 incident to clamping the fuse terminal, the clamping member would otherwise have to be moved upward a certain amount against the action of spring 48 while moving to its terminal clamping position shown in Fig. 3.

It will be observed that when the clamping member is in the position shown in Fig. 4, the spring 48 is compressed and is so held by the leg 38 of the clamping member while said clamping member remains against wall 18. The remainder of the clamping member thus serves as a lever to maintain leg 38 in said position, the portion of the base of the recess which coacts with the above-mentioned angular portion of the clamping member serving as a fulcrum. Should the clip not contain a fuse terminal, the clamping member 34 will be normally disposed in a substantially vertical position with respect to the base block 10 and leg 38 will be disposed against the base of the recess 12. When it is desired to insert a fuse terminal while the clip is so disposed, the clamping member is moved from the position just described to that shown in Fig. 4 and, during such movement, said angular portion of the clamping member will fulcrum on the base of the recess 12 to compress spring 48 and otherwise assume the position shown in Fig. 4. Such movement will require only a small amount of manual force in view of the relative lengths of the portions of the clamping member 34 which are disposed on opposite sides of said angular portion.

Inasmuch as the movement of the leg 36 of the clamping member to or from terminal clamping position is substantially transverse to the direction of the force imposed upon said clamping member by spring 48, the full force of said spring does not have to be opposed in order to insert a fuse terminal in the instant clip construction or remove the fuse terminal therefrom. Thus, the spring 48 may be made quite strong in order to insure firm electrical engagement between the fuse terminal 40 and the contact seat 28, while the manipulation of the clamping member 34 remains easy and requires relatively little force in comparison to that exerted by the spring 48 in a direction linearly of anchor 30.

Movement of the clamping member from the position shown in Fig. 4 to that shown in Fig. 3 is limited by engagement of the clamping member 34 with one side of the seat 28, as shown in Fig. 3. Furthermore, the width of the contact 34 is slightly less than the distance between the end walls 14 of recess 12 so that movement of the clamping member in the recess will take place without binding but said end walls 14 will serve to maintain the clamping member in proper alignment with respect to the seat 28 while being moved pivotally and linearly to its clamping or non-clamping position. The sides of the seat 28 also preferably extend upward sufficiently far to prevent the possibility of accidental dislodgement of the fuse from the seat while the clamping member is being moved into clamping en-

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gagement with said terminal or removed from engagement therewith. Further, opening 46 is made sufficiently long to readily permit movement of the clamping member between the positions respectively shown in Figs. 3 and 4. Clamping member 34 is also preferably made of material which is sufficiently rigid to resist deformation although slight deformation or bending of said member during use will not materially detract from the benefits of the invention.

In the foregoing description, the terms used to denote position or movement of certain elements of the invention, such as bottom, top, upward, downward, and the like, are used when considering the fuse block and clips in the normal position which is that illustrated in Fig. 1 when the sheet is held vertically. Said descriptive terms are to be considered in the same relative sense regardless of the position in which the fuse block may be actually mounted in use.

While the invention has been illustrated and described in its preferred embodiment and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways, falling within the scope of the invention as claimed.

What I claim is:

1. A fuse terminal clip construction comprising in combination, an insulating base provided with a recess, a contact provided with a seat adapted to receive a fuse terminal, a clamping member having a part in said recess and a portion adapted to engage said fuse terminal and clamp it in said seat of the contact, an anchor for said clamping member, mechanism operatively connecting said clamping member and anchor and comprising means adapted to permit movement of said portion of the clamping member in a plurality of directions transversely of the fuse, said movement of said portion in said directions respectively effecting engagement between the clamping member and fuse terminal and effecting firm clamping of said fuse terminal against the seat of said contact, and biasing means in said recess engaging said part of the clamping member and adapted to urge said clamping member in one of said transverse directions and in directions toward said seat to effect firm clamping of said fuse terminal against the seat of said contact.

2. A fuse terminal clip construction comprising in combination, an insulating base provided with a recess, a contact provided with a seat adapted to receive a fuse terminal, a clamping member having a part in said recess and a portion adapted to engage said fuse terminal and clamp it in said seat of the contact, an anchor for said clamping member, spring means engaging said part of the clamping member in said recess, and means operatively connecting said clamping member and anchor, said means permitting pivotal movement of said clamping member transversely of the fuse and linear movement of said clamping member with respect to said anchor and toward said seat, whereby said portion of said clamping member may be pivotally moved into engagement with said fuse terminal and substantially linearly moved to effect firm clamping of said fuse terminal against the seat of said contact.

3. A fuse terminal clip construction comprising in combination, an insulating base provided with a recess, a contact provided with a seat adapted to receive a fuse terminal, a clamping

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member having a part in said recess and a portion adapted to engage said fuse terminal and clamp it in said seat of the contact, an anchor for said clamping member in said recess, and means including a biasing member operatively connecting said clamping member and anchor in said recess, said connecting means having a slot through which said anchor projects and permitting pivotal and linear movement of said clamping member with respect to said anchor, whereby said portion of the clamping member may be pivotally moved into engagement with said fuse terminal whereas said biasing member substantially linearly moves said clamping member to effect firm clamping of said fuse terminal against the seat of said contact.

4. A fuse terminal clip construction comprising in combination, an insulating base provided with a recess, a contact provided with a seat adapted to receive a fuse terminal, a clamping member having a part in said recess and a portion adapted to engage said fuse terminal and clamp it in said seat of the contact, spring means engaging said part of the clamping member in said recess, an anchor for said clamping member, means operatively connecting said clamping member and anchor, said means having a slot through which said anchor projects and permitting pivotal and linear movement of said clamping member with respect to said anchor, whereby said portion of said clamping member may be pivotally moved to engage the fuse terminal and substantially linearly moved to effect firm clamping of said fuse terminal against the seat of said contact, and means adapted to be engaged by the clamping member to limit the pivotal movement thereof in one direction.

5. A fuse terminal clip construction comprising in combination, an insulating base provided with a recess, a contact provided with a seat adapted to receive a fuse terminal, a clamping member having a part in said recess and a portion adapted to engage said fuse terminal and clamp it in said seat of the contact, an anchor for said clamping member, said clamping member being pivotally movable transversely of the fuse and also linearly toward said seat, means including a biasing member operatively connecting said clamping member and anchor in said recess, said means permitting pivotal and linear movement of said clamping member with respect to said anchor, whereby said portion of the clamping member may be pivotally moved into engagement with said fuse terminal whereas said biasing member substantially linearly moves said clamping member toward said seat to effect firm clamping of said fuse terminal against the seat of said contact, and means adapted to be engaged by the clamping member to limit the pivotal movement thereof in one direction.

6. A fuse terminal clip construction comprising in combination, an insulating base having an electric contact provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved into engagement with said fuse terminal and clamp it in said seat of the contact, spring means for biasing said leg to clamp said terminal, an anchor for said clamping member, and means operatively connecting the other leg of said clamping member and anchor, said connecting means permitting pivotal and linear movement of said clamping member with respect to said anchor to effect engagement of said one leg of the clamping member with said fuse terminal and

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also effect firm clamping of said fuse terminal to said contact seat by said one leg of the clamping member.

7. A fuse terminal clip construction comprising in combination, an insulating base having an electric contact provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved into engagement with said fuse terminal and clamp it in said seat of the contact, an anchor for said clamping member, and mechanism including biasing means operatively connecting the other leg of said clamping member and anchor, said mechanism comprising means adapted to permit pivotal and linear movement of said clamping member with respect to said anchor to effect said engagement of said one leg of the clamping member with said fuse terminal during said movement of said clamping member and also permit said biasing means to move said leg of said clamping member against said fuse terminal and effect firm clamping thereof against said seat of said contact.

8. A fuse terminal clip construction comprising in combination, a contact provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved into engagement with said fuse terminal and clamp it in said seat of the contact, spring means for biasing said leg to clamp said terminal, the other leg of said clamping member having an aperture therethrough, and a pin stationarily mounted with respect to said contact and disposed through said aperture in said other leg of the clamping member to comprise an anchor for said clamping member, said pin having a cross-sectional area less than that of said aperture to permit limited pivotal movement of said clamping member with respect to said pin and also permit free movement of said clamping member linearly of said pin to effect said engagement of said one leg of the clamping member with said fuse terminal and also effect firm clamping of said fuse terminal to said contact seat by said one leg of the clamping member.

9. A fuse terminal clip construction comprising in combination, a contact provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved into engagement with said fuse terminal and clamp it in said seat of the contact, the other leg of said clamping member having an aperture therethrough, and a pin stationarily mounted with respect to said contact and disposed through said aperture in said other leg of the clamping member to comprise an anchor for said clamping member, said pin having a cross-sectional area less than that of said aperture to permit limited pivotal movement of said clamping member with respect to said pin to effect engagement and disengagement of said one leg of the clamping member with and from said fuse terminal, and a spring mounted to coact with said clamping member and normally bias it linearly of said pin in one direction to effect firm clamping of said fuse terminal to said contact seat by said one leg of the clamping member.

10. A fuse terminal clamp construction comprising in combination, an insulating base provided with a recess, a contact secured to said base adjacent said recess and provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to engage said fuse terminal and the other leg disposed in said recess, an anchor

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mounted in said recess and engageable with said other leg of said clamping member, and mechanism operatively connecting said anchor and other leg and comprising means adapted to permit pivotal and linear movement of said clamping member with respect to said anchor and contact seat to effect coengagement of the fuse terminal and said one leg of the clamping member and also effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member incident to such movement of said clamping member, certain walls of said recess in the base being positioned so as to be adapted to maintain said clamping member in proper alignment with said contact seat during said movement of said clamping member.

11. A fuse terminal clamp construction comprising in combination, an insulating base provided with a recess, a contact secured to said base adjacent said recess and provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to engage said fuse terminal and the other leg disposed in said recess, an anchor mounted in said recess and engageable with said other leg of said clamping member, and mechanism operatively connecting said anchor and other leg and comprising means adapted to permit pivotal and linear movement of said clamping member in opposite directions with respect to said anchor and contact seat to effect coengagement of the fuse terminal and said one leg of the clamping member and also effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member incident to said movement of said clamping member, certain walls of said recess in the base being positioned so as to be adapted to maintain said clamping member in proper alignment with said contact seat during said movement of said clamping member and another wall of said recess being positioned to engage said clamping member during pivotal movement thereof in one direction to limit said pivotal movement of the clamping member.

12. A fuse terminal clamp construction comprising in combination, an insulating base provided with a recess, a contact secured to said base adjacent said recess and provided with a seat adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to engage said fuse terminal and the other leg of said clamping member being disposed in said recess and provided with an aperture, spring means for biasing said one leg to clamp said terminal and a pin projecting upward above the base of said recess and disposed through said aperture in said other leg of said clamping member to comprise an anchor for said clamping member and said pin having a smaller cross-sectional area than that of said aperture to permit pivotal and linear movement of said clamping member with respect to said pin and contact seat to effect coengagement of the fuse terminal and said one leg of the clamping member and also effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member incident to such movement of said clamping member, certain walls of said recess in the base being positioned so as to be adapted to maintain said clamping member in proper alignment with said contact seat during said movement of said clamping member.

13. A fuse terminal clamp construction comprising in combination, an insulating base pro-

vided with a recess, a contact secured to said base adjacent said recess and provided with a seat overlying said recess and adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved to overlie said contact seat and engage said fuse terminal, the other leg of said clamping member being disposed in said recess, an anchor mounted in said recess and engageable with said other leg of said clamping member, and mechanism operatively connecting said anchor and other leg and comprising means adapted to permit pivotal and linear movement of said clamping member with respect to said anchor and contact seat to effect coengagement of the fuse terminal and said one leg of the clamping member and also effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member incident to such movement of the clamping member, certain walls of said recess in the base being positioned so as to be adapted to maintain said clamping member in proper alignment with said contact seat during said movement of said clamping member.

14. A fuse terminal clamp construction comprising in combination, an insulating base provided with a recess, a contact secured to said base adjacent said recess and provided with a seat overlying said recess and adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved to overlie said contact seat and engage said fuse terminal and the other leg of said clamping member being disposed in said recess and provided with an aperture, spring means for biasing said one leg to clamp said terminal, and a pin projecting upward above the base of said recess and disposed through said aperture in said other leg of said clamping member to comprise an anchor for said clamping member and said pin having a smaller cross-sectional area than that of said aperture to permit pivotal and linear movement of said clamping member with respect to said pin and contact seat to effect coengagement of the fuse terminal and said one leg of the clamping member and also effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member incident to such movement of said clamping member, certain walls of said recess in the base being positioned so as to be adapted to maintain said clamping member in proper alignment with said contact seat during said movement of said clamping member.

15. A fuse terminal clamp construction comprising in combination, an insulating base provided with a recess, a contact secured to said base adjacent said recess and provided with a seat overlying said recess and adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved to overlie said contact seat and engage said fuse

terminal and the other leg of said clamping member being disposed in said recess and provided with an aperture, a pin projecting upward above the base of said recess and disposed through said aperture in said other leg of said clamping member to comprise an anchor for said clamping member and said pin having a smaller cross-sectional area than that of said aperture to permit pivotal movement of said clamping member with respect to said pin and contact seat to effect engagement and disengagement of said one leg of the clamping member with and from said fuse terminal, and spring means mounted to coact with said clamping member and normally bias it linearly of said pin in one direction to effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member.

16. A fuse terminal clamp construction comprising in combination, an insulating base provided with a recess, a contact secured to said base adjacent said recess and provided with a seat overlying said recess and adapted to receive a fuse terminal, a substantially C-shaped clamping member having one leg adapted to be moved to overlie said contact seat and engage said fuse terminal and the other leg of said clamping member being disposed in said recess and provided with an aperture, a pin projecting upward above the base of said recess and disposed through said aperture in said other leg of said clamping member to comprise an anchor for said clamping member and said pin having a smaller cross-sectional area than that of said aperture to permit pivotal movement of said clamping member with respect to said pin and contact seat to effect engagement and disengagement of said one leg of the clamping member with and from said fuse terminal, manually engageable means carried by said clamping member and by which it may be pivotally moved as described, and spring means mounted to coact with said clamping member and normally bias it linearly of said pin in one direction to effect firm clamping of said fuse terminal between said contact seat and said one leg of the clamping member.

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