Aug. 3, 1943. R. A. MILLERMASTER ET AL 2,325,698

FUSE CLAMPS

Original Filed Oct. 30, 1941

Fig. 1

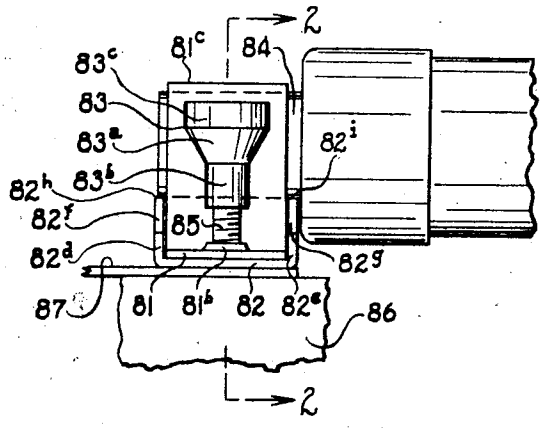
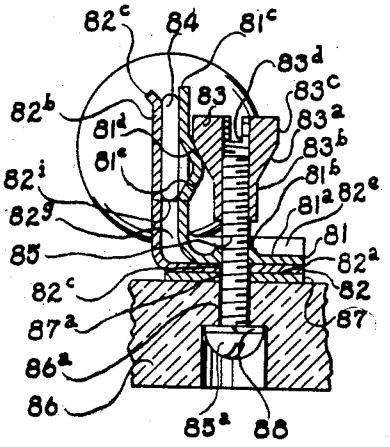


Fig. 2



Inventors.
Ralph A. Millermaster
Alex A. Writzmann.
By Frank H. Hubbard
Attorney

Patented Aug. 3, 1943

2,325,698

UNITED STATES PATENT OFFICE

2,325,698

FUSE CLAMP

Ralph A. Millermaster, Whitefish Bay, and Alex A. Writzmann, Milwaukee, Wis., assignors to Cutler-Hammer, Inc., Milwaukee, Wis., a corporation of Delaware

Original application October 30, 1941, Serial No. 417,106. Divided and this application December 11, 1942, Serial No. 468,616

15 Claims. (Cl. 200—134)

This invention relates to improvements in fuse clamps.

A primary object of the invention is to provide a fuse clamp of improved and simplified construction.

Another object is to provide a novel form of clamp which is particularly adapted for use with a fuse having terminals of the knife-blade type.

Another object is to provide such a fuse clamp whose main body portions are formed of a strip or strips of sheet metal of good electrical conductivity.

Another object is to provide for formation of the main body portions of the fuse clamp from metal strips of different widths, whereby the amount of scrap produced is minimized.

Another object is to provide for rigidly uniting one main body portion to the other by spot-welding.

Another object is to provide novel means for strengthening or reinforcing one main body portion of the fuse clamp.

Other objects and advantages of the invention will hereinafter appear.

This application is a division of our application, Serial No. 417,106, filed October 30, 1941, for improvements in electric switches.

The accompanying drawing illustrates a preferred embodiment of the invention, which will now be described; it being understood that the embodiment illustrated is susceptible of modification in respect of certain structural details thereof without departing from the scope of the appended claims.

In the drawing, Figure 1 is a side elevational view of a blade-type fuse clamp constructed in accordance with my invention, portions of the insulating supporting base and the fuse being broken away, and

Fig. 2 is a vertical sectional view, on the line 2—2 of Fig. 1.

The fuse clamp illustrated in the drawing is adapted for use in conjunction with fuses having blade-type terminals. Said clamp comprises a pair of elements 81 and 82 respectively stamped from blanks punched from copper strips of different widths. The horizontal portion 81^a of element 81 is provided with all upwardly extruded and tapped opening 81^b, the substantially vertical portion 81^c of said elements having a pair of upper relatively widely spaced parallel vertical slits and a pair of lower relatively narrowly spaced parallel vertical slits, with transverse slits connecting the former with the latter. The material between said pairs of slits is then bent outwardly, as shown in Fig. 2 to provide a relatively wide downwardly angled cam surface 81^d and a relatively narrow upwardly angled strut or reinforcing portion 81^e formed integrally therewith. Said cam surface 81^d is preferably of concave form (not shown) in horizontal cross section, whereby the same is adapted to closely fit and guide the adjacent portion of a conical cam surface 83^a formed upon an operating nut 83 of the form illustrated.

Element 82 has a horizontal portion 82^a underlying portion 81^a of element 81 and projecting laterally therebeyond to a predetermined point, where it merges with the vertical portion 82^b, which extends upwardly in substantially parallel relation to portion 81^c, the upper end of portion 82^b being preferably flared, as shown at 82^c to facilitate insertion of the blade-type terminal 84 of a fuse between portions 81^c and 82^b. Said horizontal portion 82^a is preferably provided with an opening 82^c (Fig. 2) affording clearance for the shank of a bolt 85 which extends upwardly through a clearance passage 86^a in an insulating base 86, and through a clearance opening 87^a in a bus member 87 or the like, and takes into the aforementioned tapped opening 81^b in portion 81^a; a lock washer 88 being preferably interposed between the head 85^a of said bolt and base 86 to prevent accidental loosening of the bolt. The shank 85 extends upwardly a relatively great distance beyond portion 81^a for cooperation with the aforementioned adjustable cam nut 83, the latter having an internally threaded downward extension 83^d to insure a sufficient area of threaded engagement with shank 85; and said nut having a cylindrical upper end portion 83^c provided with a kerf 83^d to accommodate a screw-driver or other operating or adjusting tool.

As shown, element 82 is provided with integral flange portions which extend upwardly from the horizontal portion, as indicated at 82^d and 82^e, and inwardly from the vertical portion 82^b, as indicated at 82^f and 82^g, the upper edges 82^h and 82^i of the latter serving as stops to limit the degree of downward insertion of a blade terminal 84 between portions 81^c and 82^b. Thus flange portion 82^g is integral with and a continuation of flange portion 82^e, and flange portion 82^f is integral with flange portion 82^d. Also, as will be readily understood, said integrally connected flange portions 82^d, 82^f and 82^e, 82^g serve to substantially reinforce and rigidify the member 82 and to resist outward bending of the vertical portion 82^b thereof as an incident to clamping

action of portion 81c against a blade terminal upon downward adjustment of nut 83. In practice the horizontal portion 81a of element 81 is spot welded or otherwise rigidly secured to horizontal portion 82a of element 82 (preferably adjacent to the right-hand end of said elements, Fig. 2) to insure maintenance of said elements 81 and 82 in properly assembled relationship and of unit form prior to mounting thereof upon base 86. A similar result could, of course, be obtained by shaping elements 81 and 82 as integrally connected parts of a single metal blank and then bending or reflexing the parts, at the point of connection thereof, to the relative positions shown in Figs. 1 and 2. The arrangement just described had the disadvantage that a substantial amount of scrap would result from formation of the part corresponding to element 81 illustrated.

We claim:

1. In a support for blade-type fuse terminals, in combination, a pair of elements formed of strip sheet metal and bent to substantially L-shape in vertical cross section, the base portion of one element being positioned upon the base portion of the other and rigidly connected thereto, the vertical portions of said elements being normally spaced apart to accommodate a fuse blade terminal therebetween, the vertical portion of the upper element being bent to provide an integral cam surface projecting downwardly and laterally over the base portion thereof, a bolt having its threaded shank projecting upwardly through the base portions of said elements to rigidly attach the same to a suitable support, and a nut having threaded engagement with said shank for vertical adjustment relatively thereto, said nut having a peripheral cam surface for cooperation with the cam surface first mentioned to provide for movement of one of said vertical portions toward and from the other.

2. In a support for blade-type fuse terminals, in combination, a pair of elements formed of strip sheet metal and bent to substantially L-shape in vertical cross section, the base portion of one element being positioned upon the base portion of the other and rigidly connected thereto, the vertical portions of said elements being normally spaced apart to accommodate a fuse blade terminal therebetween, one of said elements having integral flanges on opposite sides thereof and arranged to span the distance between the vertical portions of said elements, the upper edge portions of said flanges being adapted to act as stops to limit the degree of downward insertion of a fuse blade terminal, the vertical portion of the upper element being bent to provide an integral cam surface projecting downwardly and laterally over the base portion thereof, a bolt having its threaded shank projecting upwardly through the base portions of said elements to rigidly attach the same to a suitable support, and a nut having threaded engagement with said shank for vertical adjustment relatively thereto, said nut having a peripheral cam surface for cooperation with the cam surface first mentioned to provide for movement of one of said vertical portions toward the other.

3. In a support for blade-type fuse terminals, in combination, a pair of elements formed of strip sheet metal and bent to substantially L-shape in vertical cross section, the base portion of one element being positioned upon the base portion of the other and rigidly connected thereto, the vertical portions of said elements being normally spaced apart to accommodate a fuse blade terminal therebetween, one of said elements having integral flanges on opposite sides thereof and arranged to span the distance between the vertical portions of said elements, the upper edge portions of said flanges being adapted to act as stops to limit the degree of downward insertion of a fuse blade terminal, said flanges extending throughout the length of the base portions of said element and upwardly through a part of the length of the vertical portion thereof, to thereby substantially strengthen said element and resist bending of said vertical portion thereof, the vertical portion of the upper element being bent to provide an integral cam surface projecting downwardly and laterally over the base portion thereof, a bolt having its threaded shank projecting upwardly through the base portions of said element to rigidly attach the same to a suitable support, and a nut having threaded engagement with said shank for vertical adjustment relatively thereto, said nut having a peripheral cam surface for cooperation with the cam surface first mentioned to provide for movement of one of said vertical portions toward and from the other.

4. In a support for blade-type fuse terminals, in combination, a pair of stamped sheet metal elements bent flatwise to substantially L-shape, the base portion of one element being superimposed upon the base portion of the other element and rigidly connected to the latter, the vertical portions of said elements being normally spaced apart a sufficient distance to permit ready insertion of a fuse blade terminal therebetween, the vertical portion of the inner element having a cam surface formed integrally therewith and projecting laterally therefrom, and a separate cam member threadedly supported relatively to said elements and adjustably movable relatively to said cam surface to forcibly effect movement of the vertical portion of said inner element toward and to permit resilient movement thereof from an inserted fuse blade terminal.

5. In a support for blade-type fuse terminals, in combination, a pair of stamped sheet metal elements bent flatwise to substantially L-shape, the base portion of one element being superimposed upon the base portion of the other element and rigidly connected to the latter, the vertical portions of said elements being normally spaced apart a sufficient distance to permit ready insertion of a fuse blade terminal therebetween, the vertical portion of the inner element having a cam surface formed integrally therewith and projecting laterally therefrom, a separate cam member threadedly supported relatively to said elements and adjustably movable relatively to said cam surface to forcibly effect movement of the vertical portions of said inner element toward and to permit resilient movement thereof from an inserted fuse blade terminal, said outer element being of substantially channel-form in transverse cross section throughout the base portion and throughout a substantial portion of the height of the vertical portion thereof to rigidify and resist substantial outward bending of the latter under the force applied to said cam member.

6. In a support for blade-type fuse terminals, in combination, a pair of stamped sheet metal elements bent flatwise to substantially L-shape, the base portion of one element being superimposed upon the base portion of the other element and rigidly connected to the latter, the vertical portions of said elements being normally spaced apart a sufficient distance to permit ready

insertion of a fuse blade terminal therebetween, the vertical portion of the inner element having a cam surface formed integrally therewith and projecting laterally therefrom, a separate cam member threadedly supported relatively to said elements and adjustably movable relatively to said cam surface to forcibly effect movement of the vertical portion of said inner element toward and to permit resilient movement thereof from an inserted fuse blade terminal, and said outer element being of substantially channel-form in transverse cross section throughout the base portion and throughout a substantial part of the height of the vertical portion thereof to rigidify and resist substantial outward bending of the latter under the force applied by said cam member, the upper extremity of said channel affording parallel edge portions to positively limit the degree of insertion of a fuse blade terminal between said vertical portions of said elements.

7. In a supporting clamp for a fuse terminal of the knife-blade type, in combination, a pair of cooperating clamping elements formed of sheet metal of good electrical conductivity, each of said elements being of substantially L-shape, the base portion of one element being superimposed upon the base portion of the other, the vertical portion of said one element being substantially parallel to the corresponding portion of the other and normally spaced from the latter a distance slightly greater than the thickness of a knife-blade fuse terminal to be associated therewith, said vertical portion having a downwardly and outwardly inclined cam formed integrally therewith, means for rigidly securing said clamping elements to a suitable support, and a cam member threadedly supported relatively to said clamping elements and vertically adjustable relatively to said first mentioned cam, for the purpose set forth.

8. In a support for blade-type fuse terminals, in combination, a resilient clamping element comprising a section of strip copper bent flatwise to substantially L-shape, the horizontal base portion of said element having an upwardly extruded and tapped opening formed therein, the vertical portion of said element having a pair of relatively widely spaced upper parallel vertical slits and a pair of relatively narrowly spaced lower parallel vertical slits with transverse connecting slits, the area defined by said slits being bent out of the plane of said vertical portion to provide a downwardly and outwardly inclined cam portion of segmental form in transverse cross section and a downwardly and inwardly inclined strut formed integrally with said cam portion to reinforce the latter, a second element comprising a section of relatively wider strip copper punched and bent flatwise to substantially L-shape, said last mentioned element being of channel form in transverse cross section throughout the base portion and throughout a part of the height of the vertical portion thereof, the base portion of said last mentioned element having an opening formed therein to provide clearance for a securing bolt, a headed bolt having its threaded shank extending upwardly through an insulating base, through said clearance opening and through the tapped opening in said first mentioned element to rigidly secure the same to said base, said bolt shank extending upwardly a substantial distance beyond the base portion of said first mentioned element, a nut having threaded engagement with said bolt shank, said nut having an exterior surface of inverted frusto-conical form for cooperation with said cam portion aforementioned, and said nut being formed at the upper end thereof to facilitate vertical adjustment thereof by a suitable tool with respect to said bolt shank.

9. In a support for blade-type terminals, in combination, a resilient clamping element comprising a section of strip copper bent flatwise to substantially L-shape, the horizontal base portion of said element having an upwardly extruded and tapped opening formed therein, the vertical portion of said element having a pair of relatively widely spaced upper parallel vertical slits and a pair of relatively narrowly spaced lower parallel slits with transverse connecting slits, the area defined by said slits being bent out of the plane of said vertical portion to provide a downwardly and outwardly inclined cam portion of segmental form in transverse cross section and a downwardly and inwardly inclined strut formed integrally with said cam portion to reinforce the latter, a second element comprising a section of relatively wider strip copper punched and bent flatwise to substantially L-shape, said last mentioned element being of channel form in transverse cross section throughout the base portion and throughout a part of the height of the vertical portion thereof, the base portion of said last mentioned element having an opening formed therein to provide clearance for a securing bolt, the base portion of said first mentioned element being superimposed upon the base portion of said last mentioned element and said base portions being integrally connected by spot welding, a headed bolt having its threaded shank extending upwardly through an insulating base, through said clearance opening and through the tapped opening in said first mentioned element to rigidly secure the same to said base, said bolt shank extending upwardly a substantial distance beyond the base portion of said first mentioned element, a nut having threaded engagement with said bolt shank, said nut having an exterior surface of inverted frusto-conical form for cooperation with said cam portion aforementioned, and said nut having a kerf formed therein at the upper end thereof to facilitate vertical adjustment thereof by a screwdriver or the like with respect to said bolt shank.

10. In a supporting clamp for a fuse terminal of the knife-blade type, in combination, cooperating clamping elements formed of sheet metal of good electrical conductivity, each of said elements being of substantially L-shape, the vertical portion of one of said elements being substantially parallel to the corresponding portion of the other and normally spaced from the latter a distance slightly greater than the thickness of a knife-blade fuse terminal to be associated therewith, said vertical portion having a downwardly inclined cam formed integrally therewith, means for rigidly securing said clamping elements to a suitable support, and a cam member threadedly supported relatively to said clamping elements and vertically adjustable relatively to said first mentioned cam, for the purpose set forth.

11. In a supporting clamp for a fuse terminal of the knife-blade type, in combination, a pair of cooperating clamping arms formed of sheet metal of good electrical conductivity, said arms being arranged in substantially parallel relationship to and normally spaced from each other a distance slightly greater than the thickness of a knife-blade fuse terminal to be associated therewith, a downwardly inclined cam on one of said

arms, means for securing said arms to a suitable support, and a cam member threadedly supported relatively to said arms and adjustable relatively to said first mentioned cam, to effect movement of the arm associated therewith toward, or to permit movement thereof from, the other arm of said pair.

12. In a supporting clamp for a fuse terminal of the knife-blade type, in combination, a pair of cooperating clamping arms formed of sheet metal of good electrical conductivity, said arms being positioned approximately vertically in substantially parallel relationship to each other and normally spaced apart a distance slightly greater than the thickness of a knife-blade fuse terminal to be associated therewith, said arms having integral portions bent to extend laterally at right angles thereto in overlying relationship one to the other, said portions being rigidly connected with each other, means penetrating said portions for rigidly securing the same to a suitable support, an outwardly inclined cam carried by one of said arms, and a cam member having threaded engagement with said securing means and adjustable relatively to said first mentioned cam, to forcibly effect clamping movement of one arm toward the other or to permit said one arm to move away from the other, for the purpose set forth.

13. In a support for blade-type fuse terminals, in combination, a pair of elements formed of strip sheet metal and bent to substantially L-shape in vertical cross section, the base portion of one element being positioned upon the base portion of the other and rigidly connected thereto, the vertical portions of said elements being normally spaced apart to accommodate a fuse blade terminal therebetween, the vertical portion of the upper element being bent to provide an integral cam surface projecting downwardly and laterally over the base portion thereof, a bolt having its threaded shank projecting upwardly through the base portions of said elements to rigidly attach the same to a suitable support, a nut having threaded engagement with the upper end portion of said shank for vertical adjustment relatively thereto, said nut having a peripheral cam surface for cooperation with the cam surface first mentioned to provide for movement of one of said vertical portions toward and from the other, and said nut including an internally threaded downward extension of reduced size in transverse cross section, said downward extension being adapted to clear said first mentioned cam surface and to insure a relatively large degree of threaded connection of said nut with said shank in all positions of engagement of said peripheral cam surface with said first mentioned cam surface.

14. In a support for blade-type fuse terminals, in combination, a pair of elements formed of strip sheet metal and bent to substantially L-shape in vertical cross section, the vertical portions of said elements being normally spaced apart to accommodate a fuse blade terminal therebetween, the vertical portion of one element being bent to provide an integral cam surface projecting over the base portion thereof, a bolt having its threaded shank projecting upwardly through the base portions of said elements to rigidly attach the same to a suitable support, and a nut having threaded engagement with said shank for vertical adjustment relatively thereto, said nut having a cam surface for cooperation with the cam surface first mentioned to provide for movement of one of said vertical portions toward the other.

15. In a support for blade-type fuse terminals, in combination, a pair of elements formed of strip sheet metal and bent to substantially L-shape in vertical cross section, the vertical portions of said elements being normally spaced apart to accommodate a fuse blade terminal therebetween, one of said elements having integral flanges, the upper edge portions of said flanges being adapted to act as stops to limit the degree of downward insertion of a fuse blade terminal, the vertical portion of the other element being bent to provide an integral cam surface projecting laterally over the base portion thereof, a bolt having its threaded shank projecting upwardly through the base portions of said elements to rigidly attach the same to a suitable support, and a nut having threaded engagement with said shank for vertical adjustment relatively thereto, said nut having a cam surface for cooperation with the cam surface first mentioned to provide for movement of one of said vertical portions toward the other.

RALPH A. MILLERMASTER.
ALEX A. WRITZMANN.