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R. A. MILLERMASTER

2,193,202

WIRING-TERMINAL DEVICE

Filed March 13, 1939

Fig. 1

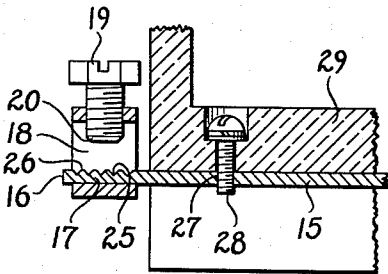


Fig. 2

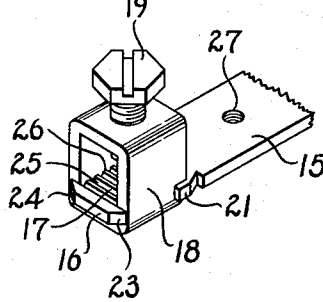


Fig. 3

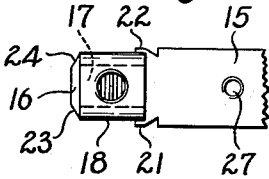


Fig. 4

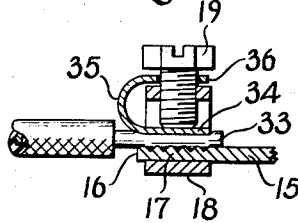


Fig. 5

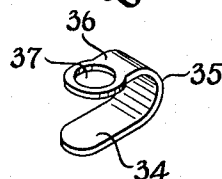


Fig. 6

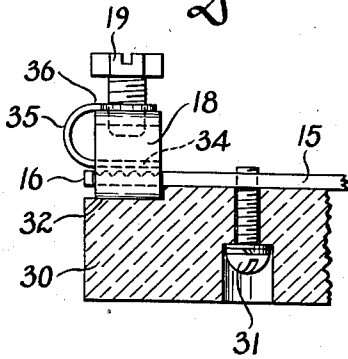


Fig. 7

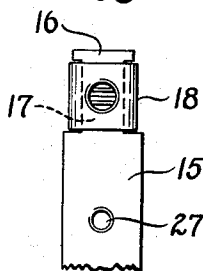


Fig. 8

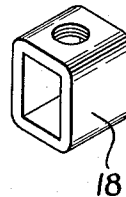
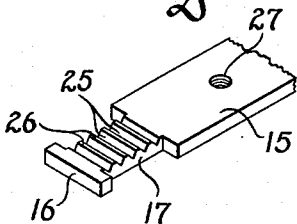


Fig. 9



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## UNITED STATES PATENT OFFICE

2,193,202

## WIRING-TERMINAL DEVICE

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to Cutler-Hammer, Inc., Milwaukee, Wis., a cor-  
poration of Delaware

Application March 13, 1939, Serial No. 261,527

6 Claims. (Cl. 173-269)

This invention relates to improvements in wiring-terminal devices, and the invention relates more particularly to improvements in the so-called clamp-type, solderless wiring terminals.

5 An object of the invention is to provide an electrically satisfactory wiring-terminal device of the aforementioned character which is more rugged and durable than such devices as heretofore constructed.

10 Another object is to provide means for insuring against shearing or other damage to the circuit wire during operation of the terminal device to wire clamping position.

15 Another object is to provide novel means of alternative form for supporting parts of the wiring-terminal device.

20 Another object is to provide a wiring-terminal device affording a very good electrical connection and a very tight mechanical connection between the same and a circuit wire.

Another object is to simplify the construction and facilitate assembly of the parts of such wiring-terminal devices.

25 Other objects and advantages of the invention will hereinafter appear.

This application is a continuation in part of my application, Serial No. 184,715, filed January 13, 1938, for fuse pull-out devices.

30 The accompanying drawing illustrates certain embodiments of the invention which will now be described, it being understood that the embodiments illustrated are susceptible of modification in respect of certain structural details without departing from the scope of the appended claims.

35 In the drawing,

Figure 1 is a vertical sectional view of a clamp-type, solderless wiring-terminal device constructed in accordance with my invention, the same being supported by a cooperatively formed metal conducting strip or bus member, which is in turn attached to a suitable insulating base.

40 Fig. 2 is a perspective view of the terminal device shown in Fig. 1, and illustrating the manner in which the same is rigidly attached to a bus member of suitable form.

Fig. 3 is a top plan view of the terminal device shown in Figs. 1 and 2, the clamping screw or bolt being removed for purposes of illustration.

50 Fig. 4 is a vertical sectional view of a wiring-terminal device which may be identical with that shown in Figs. 1 to 3, but having captively associated therewith a clamping member to be interposed between the clamping end of the screw and the circuit wire.

Fig. 5 is a perspective view of the added clamping member shown in Fig. 4.

Fig. 6 is a side elevational view of a wiring-terminal device like that shown in Fig. 4, but modified by omitting the rigid connection between said device and the bus member (as shown in Figs. 2 and 3), the insulating base to which the parts may be attached, for retention thereof in assembled relation, being shown in vertical section.

Fig. 7 is a top plan view of certain of the parts shown in Fig. 6, the screw or bolt being removed, and the swaging or upsetting of the bus member (as shown in Figs. 2 and 3) being obviated.

Fig. 8 is a perspective view of the steel tube section of rectangular form in transverse cross section which I prefer to employ, and

Fig. 9 is a perspective view of an end portion of the bus member, in its intermediate form when employed as shown in Figs. 1 to 4, and in its final form when employed as shown in Figs. 6 and 7.

Referring first to Figs. 1 to 3 and 8, the numeral 15 designates a strip metal conductor or bus member which has aligned portions of its opposite sides cut away to provide a head portion 16, and a neck 17 of a width and length corresponding rather closely to the internal width and the length, respectively, of a hollow metal member 18 of substantially rectangular form in transverse cross section. Member 18 is preferably formed by cutting or sawing the desired length thereof from a seamless steel tube of substantially rectangular form in cross section, as illustrated.

One wall of member 18 is provided with a relatively large tapped opening to accommodate the threaded shank of a screw 19, the diameter of which shank is only slightly less than the width of the rectangular opening or passage through member 18, as indicated by the dotted lines in Fig. 3 representing the inner surfaces of the side walls of member 18 and the side edges of the aforementioned neck portion 17 of member 15. The head of the screw 19 is preferably of hexagonal (as shown) or other polygonal contour, to provide for operation thereof by a suitable wrench, and the same is also preferably provided with a kerf to alternatively provide for operation thereof by a screw driver. The lower end of screw 19 is preferably flat, to provide a relatively large clamping area. However, I prefer to provide the lower end of screw 19 with a beveled or tapered edge 20 (Fig. 1) to facilitate initial threading thereof into said tapped opening.

With reference to Fig. 2, it is to be understood that member 18 is initially tilted laterally in one direction or the other (prior to assembly of screw 19 with respect thereto, or with said screw sufficiently withdrawn to permit clearance for the head 16, in the condition of the latter shown in Fig. 9, at diagonally opposite portions or corners of the opening in said member 18). Member 18 is then turned to upright position, as shown in Fig. 2, and while the neck 17 is held against the inner surface of the lower wall of the opening in member 18, a pair of integral lugs 21 and 22 (Fig. 3) are swaged or bent inwardly from opposite side edges of the member 15 into engagement with the exterior walls of member 18; and opposite ends of head 16 are swaged against the forward edges of the respective side walls of member 18, as shown at 23 and 24 in Figs. 2 and 3, to rigidly and permanently secure member 18 to member 15.

The exposed surface of neck 17 within member 18 is preferably provided with a series of parallel grooves and ridges 25, the grooves as shown being V-shaped, and the same being sufficiently spaced from each other to afford flat upper surfaces 26 for the ridges formed therebetween. Said exposed surface of neck 17 may, of course, be roughened in any other desired manner, to provide a proper gripping surface for the conductor or wire pressed thereagainst by tightening of the clamping screw 19. As will be understood, the flat lower end of the shank of screw 19 acts to clamp a conductor tightly and directly against the copper bus member 15; and hence both member 18 and screw 19 may be formed of steel, to insure proper strength and durability of these parts.

Bus member 15 may be provided with a tapped opening 27 for cooperation with the threaded shank of a screw or bolt 28 which is used to clamp member 15 to a suitable insulating base, such as shown at 29 in Fig. 1. As aforescribed in connection with Figs. 1 to 3, member 18 is rigidly attached to the free end of member 15 in a manner to provide for support of the former out of engagement with base 29. However, the member 18 of the device shown in Figs. 1 to 3, might be positioned as shown in Fig. 6 with respect to an insulating base such as shown at 30, to provide a backing for member 18, and to relieve any bending strain upon bus member 15 as an incident to tightening of the screw 19.

With a supporting arrangement such as shown in Fig. 6 it is of course unnecessary to rigidly unite member 18 directly to member 15, thus obviating the necessity for upsetting member 15 in the manner shown at 21, 22 and 23, 24 in Figs. 2 and 3. That is to say, with members 18 and 15 loosely assembled with respect to each other as shown in Figs. 4, 6 and 7, and with member 15 attached to base 30 by screw 31 as shown in Fig. 6, tilting movement of member 18 relatively to member 15 is prevented by engagement of the former with shoulder or ledge 32 of base 30, and head 16 of member 15 acts to prevent endwise displacement of member 18 with respect thereto.

As shown in Fig. 4, upon tightening of screw 19 the conductor or wire, such as 33, will be clamped with the desired degree of pressure against the grooved and ridged or otherwise roughened neck portion 17 of member 15, the ridges being adapted to bite into or positively engage the wire 33 upon application of a sufficient degree of pressure thereon by operation of screw 19. In order to insure application of

the clamping pressure in a straight line against the upper surface of the wire or conductor 33, and to prevent distortion, twisting or cutting of the wire by the lower end of screw 19, I prefer to interpose between the latter and the wire the flat or plate portion 34 of an auxiliary metal clamping member (preferably formed of steel). Said member is provided with an integral intermediate curved or bowed portion 35 and a portion 36 substantially parallel with portion 34; portion 36 being provided with an eye or opening 37 (Fig. 5) to accommodate the shank of screw 19, whereby said auxiliary clamping member is held captive in properly assembled relation to the other parts, as shown in Fig. 6.

As will be apparent from consideration of Fig. 6, the curved portion 35 of said auxiliary clamping member acts as a guide to facilitate insertion of the bared end of the wire 33 (Fig. 4) between portion 34 and the upper surface of neck portion 17, said auxiliary member being free to move vertically upwardly to freely accommodate said wire, assuming a proper degree of withdrawal of screw 19, as shown in Fig. 6. Thereafter upon tightening of screw 19 the lower end of the latter engages portion 34 to press the same in a straight line against the upper surface or edge of the wire 33, as indicated in Fig. 4.

It is to be understood that the auxiliary clamping member of Fig. 5 may be used in conjunction with the device of Figs. 1 to 3; and, conversely, that said auxiliary clamping member may be omitted or removed from the device shown in Figs. 4, 6 and 7.

What I claim as new and desire to secure by Letters Patent is:

1. In a device of the character described, in combination, a copper bus member having a portion of reduced width adjacent to one end thereof whereby a head and two sets of spaced shoulders are provided, a steel tube section of substantially rectangular contour having a length substantially corresponding to the distance between the shoulders of said sets and an internal width substantially corresponding to the width of said reduced portion, said head being diagonally inserted through said tube section and thereafter turned to provide for seating of said reduced portion against the bottom wall of said tube section, portions of certain of said shoulders being upset against the outer surfaces of the side walls of said tube section to rigidly and permanently secure the latter to said bus member, the upper end wall of said tube section having a tapped opening formed therein, a metal member having an operating head portion and a threaded shank portion for engagement with said opening, said shank portion being movable toward said bus member whereby a conductor when inserted into said tube section is clamped against the reduced portion of said bus member, and said metal member having its operating head portion exposed at the upper surface of said tube section.

2. A solderless wiring terminal comprising a copper bus member having a head portion of reduced width and a neck portion of further reduced width whereby two sets of longitudinally spaced shoulders are provided, a cold rolled steel tube section of substantially rectangular contour having a length to be accommodated between the shoulders of said sets and an internal width to accommodate said reduced portion, said tube section being turned diagonally and moved over said head portion and the same being thereafter turned upright to seat the bottom wall thereof

against the lower surface of said neck portion, the side edges of said bus member adjacent to the inner end of said tube section being upset over the outer surfaces of the side walls of the latter to rigidly and permanently secure said tube section to said bus member, the upper surface of said neck portion being formed to provide alternate grooves and ridges, the upper end wall of said tube section having a tapped opening formed therein, a cold rolled steel screw the shank of which has threaded engagement with said opening and which shank has a substantially flat end movable toward said grooves and ridges whereby a conductor when inserted into said tube section is clamped against said grooves and ridges, and said screw having a kerfed head of polygonal contour to provide for operation thereof by alternative means.

3. In a device of the character described, in combination, a flat bus member of copper or similarly highly conductive metal having a portion of reduced width adjacent to but spaced from one end thereof whereby a head and two sets of spaced shoulders are provided, a seamless steel tube section of polygonal contour in transverse cross section having a length substantially corresponding to the distance between the respective sets of shoulders and an internal width substantially corresponding to the width of said reduced portion, said head being tilted for insertion thereof through said tube section and the same being thereafter turned to provide for seating of said reduced portion against the bottom wall of said tube section, the upper end wall of said tube section having a tapped opening formed therein, a steel screw the shank of which has threaded engagement with said opening, said shank being movable vertically toward the reduced portion of said bus member, for the purpose set forth, and said screw having an operating head portion exposed at the upper surface of said tube section.

4. In a device of the character described, in combination, a flat bus member of copper or similarly highly conductive metal having a portion of reduced width adjacent to but spaced from one end thereof whereby a head and two sets of spaced shoulders are provided, a seamless steel tube section of polygonal contour in transverse cross section having a length substantially corresponding to the distance between the respective sets of shoulders and an internal width substantially corresponding to the width of said reduced portion, said head being tilted for insertion thereof through said tube section and the same being thereafter turned to provide for seating of said reduced portion against the bottom wall of said tube section, the upper end wall of said tube section having a tapped opening formed therein, a steel screw the shank of which has threaded engagement with said opening, said screw having an operating head portion exposed at the upper surface of said tube section, and an auxiliary metal clamping member of approximately U-shape in transverse cross section, one arm of said U being positioned above said tube section and having an opening to freely accommodate the shank of said screw, the other arm of said U being positioned within said tube section and underlying said shank for free straight line movement by the latter toward the reduced portion of said bus member, for the purpose set forth.

5. In a device of the character described, in combination, a flat bus member of copper or similarly highly conductive metal having a portion of reduced width adjacent to but spaced from one end thereof whereby a head and two sets of spaced shoulders are provided, a seamless steel tube section of substantially rectangular contour in transverse cross section having a length substantially corresponding to the distance between the respective sets of shoulders and an internal width substantially corresponding to the width of said reduced portion, said head being tilted for insertion thereof through said tube section in a diagonal relationship to the latter and thereafter turned to provide for seating of said reduced portion against the bottom wall of said tube section, the upper end wall of said tube section having a tapped opening formed therein, a steel screw the shank of which has threaded engagement with said opening, said shank being movable vertically toward the reduced portion of said bus member, for the purpose set forth, said screw having an operating head portion exposed at the upper surface of said tube section, a molded insulating base having a surface to which said bus member is rigidly secured, and said base having a ledge formed thereon and underlying the aforementioned end of said bus member to snugly accommodate the lower end wall of said tube section, whereby said base cooperates with said bus member to positively retain said tube section in assembled position.

6. In a device of the character described, in combination, a flat bus member of copper or similarly highly conductive metal having a portion of reduced width adjacent to but spaced from one end thereof whereby a head and two sets of spaced shoulders are provided, a seamless steel tube section of substantially rectangular contour in transverse cross section having a length substantially corresponding to the distance between the respective sets of shoulders and an internal width substantially corresponding to the width of said reduced portion, said head being tilted for insertion thereof through said tube section in a diagonal relationship to the latter and thereafter turned to provide for seating of said reduced portion against the bottom wall of said tube section, the upper end wall of said tube section having a tapped opening formed therein, a steel screw the shank of which has threaded engagement with said opening, said screw having an operating head portion exposed at the upper surface of said tube section, a molded insulating base having a surface to which said bus member is rigidly secured, said base having a ledge formed thereon and underlying the aforementioned end of said bus member to snugly accommodate the lower end wall of said tube section, whereby said base cooperates with said bus member to positively retain said tube section in assembled position, and an auxiliary sheet metal clamping member bent to approximately U-shape in transverse cross section, one arm of said U being positioned above said tube section and having an opening to freely accommodate the shank of said screw, and the other arm of said U being positioned within said tube section and underlying the shank of said screw for free straight line movement by the latter toward the reduced portion of said bus member, for the purpose set forth.

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