Dec. 5, 1950 R. F. KIESER 2,532,625

BINDING SCREW CONNECTION

Filed April 22, 1949 2 Sheets-Sheet 1

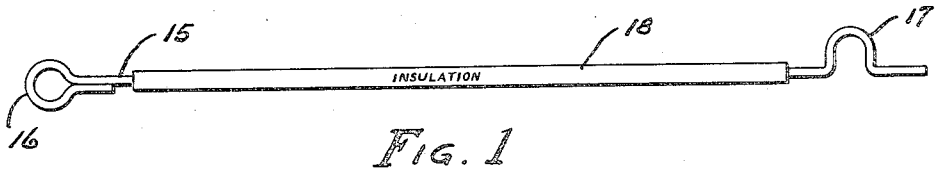


FIG. 1

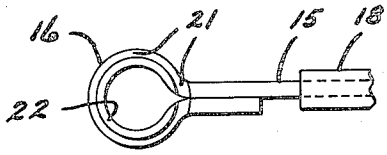


FIG. 2

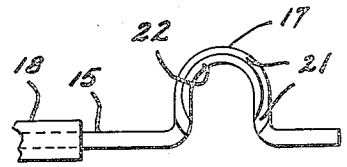


FIG. 3

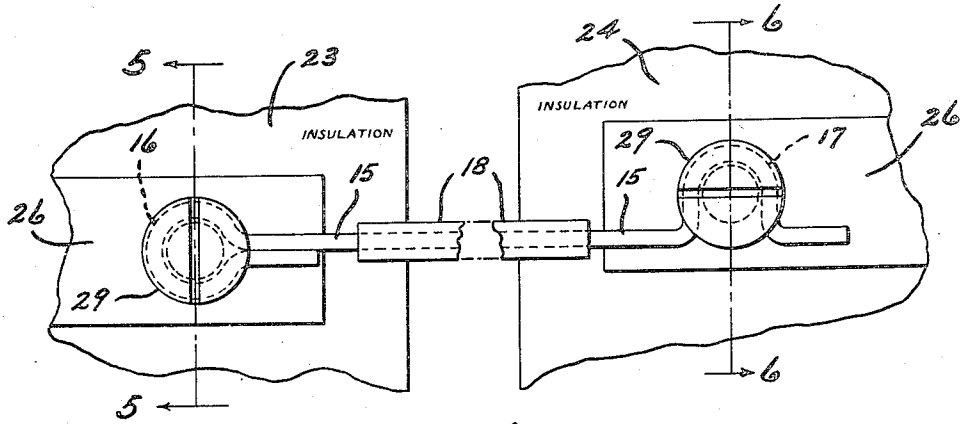


FIG. 4

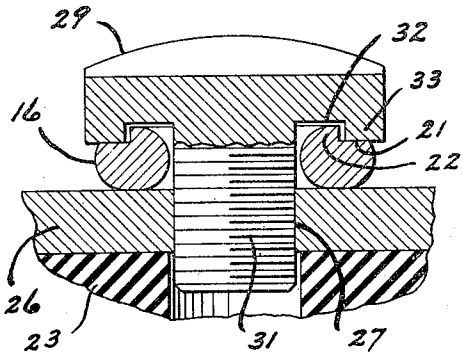


FIG. 5

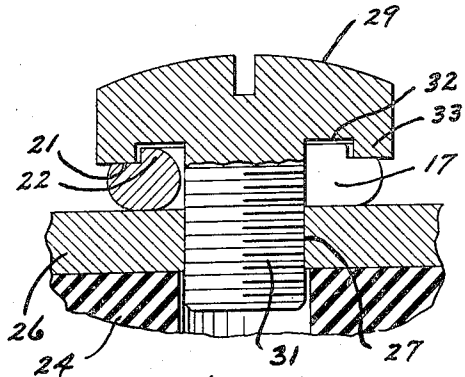


FIG. 6

INVENTOR.
ROY F. KIESER.

BY
Spencer, Hardman & Fehr
HIS ATTORNEYS

Dec. 5, 1950 R. F. KIESER 2,532,625

BINDING SCREW CONNECTION

Filed April 22, 1949 2 Sheets-Sheet 2

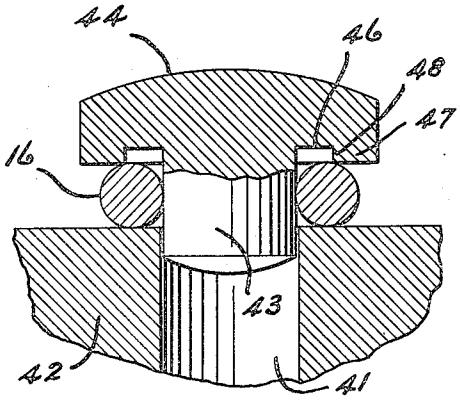


FIG. 7

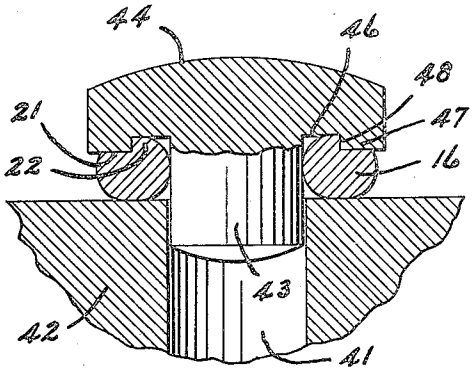


FIG. 8

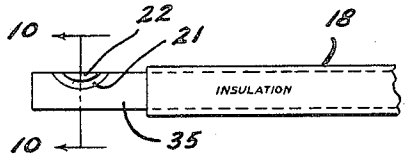


FIG. 9

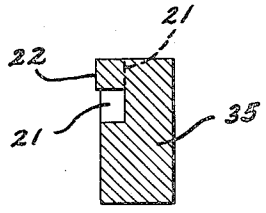


FIG. 10

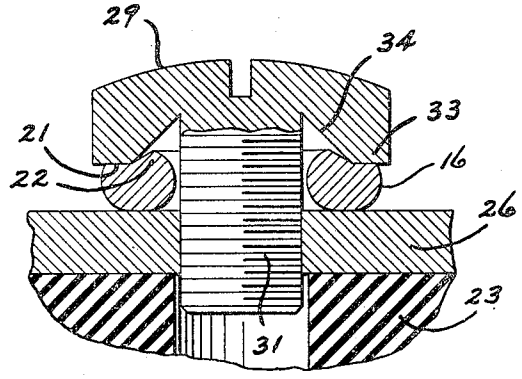


FIG. 11

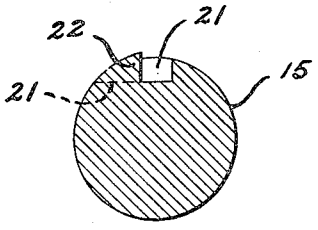


FIG. 12

INVENTOR.
ROY F. KIESER.

BY
Spencer, Hardman & Fehr.
HIS ATTORNEYS

Patented Dec. 5, 1950 2,532,625

UNITED STATES PATENT OFFICE

2,532,625

BINDING SCREW CONNECTION

Roy F. Kieser, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application April 22, 1949, Serial No. 89,095

3 Claims. (Cl. 173—259)

1

This invention relates to electrical connections.

An object of my invention is to provide an improved connection of a lead wire with a terminal of an insulated switch block or the like.

Another object of my invention is to provide an interlocked connection of a lead wire conductor with the head of a screw threaded into a terminal to prevent slippage of the conductor from beneath the screw head.

A further and more specific object of my invention is to provide on a lead wire conductor, at the point of connection thereof to a terminal by a hold-down screw, an arcuate shaped recessed surface and a raised portion adjacent thereto adapted to be received in a recess in the underside of the head of the screw for locking the conductor wire against slippage in all directions relative to the screw.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 shows a lead wire conductor adapted to be connected to a terminal on two switches or the like, provided with a fully looped end and a half looped end;

Fig. 2 is an enlarged planular view of the looped end of the lead wire conductor showing a recessed surface formed therein and a raised portion adjacent thereto;

Fig. 3 is an enlarged planular view showing the half looped end of the lead wire deformed in a fashion similar to that disclosed in Fig. 2;

Fig. 4 is a fragmentary plan view illustrating the connection of the ends of the lead wire shown in Fig. 1 to insulated terminals of two switches or the like by hold-down screws;

Fig. 5 is an enlarged sectional view taken on the line 5—5 of Fig. 4, showing the screw connection of the looped end of the lead wire to the terminal;

Fig. 6 is a sectional view similar to Fig. 5 showing the screw connection of the half looped end of the lead wire to a terminal;

Fig. 7 is an enlarged sectional view showing a portion of a lead wire inserted between a punch and die;

Fig. 8 is a view similar to Fig. 7 showing the punch moved relative to the die and illustrating a portion of the lead wire deformed to the desired shape;

Fig. 9 is a view showing a modification of the invention applied to a flat conductor bar;

2

Fig. 10 is an enlarged sectional view taken on the line 10—10 of Fig. 9 showing the raised portion and recessed surface formed in the flat bar;

Fig. 11 is an enlarged sectional view similar to Figs. 5 and 6 showing a modified form of recess in the underside of the head of a hold-down screw; and

Fig. 12 is an enlarged sectional view of a round wire having the niche illustrated in Fig. 9, formed therein.

My invention is particularly directed to connections of heavy electric current conducting solid wire members of, say for example, a size known to the trade as No. 6 or No. 8 wire which wire members are precut to the desired length for conveying electric current between terminals of switches and/or panels spaced a predetermined distance apart and employed in electric ranges, clothes driers and other electrical appliances. Such appliances are usually provided with terminals having a hold-down screw, threaded thereto for clamping the lead wire or conductor to the terminal, and my invention is specifically directed to an improved and interlocked connection of a lead wire to a terminal which connection will prevent breaking certain electrical circuits in the appliance by inadvertently striking and bending the lead wires while working on the wiring system or other parts thereof. My invention facilitates the assembly of branch or lead wire connections in electrical appliances while at the same time insures that, after the hold-down screw at the terminals have been tightened against the lead wire to clamp the wire to the terminal beneath the head of the screw, the lead wire will not be slipped from the screw until the screw is intentionally loosened to permit the wire to be disconnected or removed from the terminal.

Referring to the drawings, for illustrating my invention, I have shown in Fig. 1 thereof a conductor member or lead wire member 15, of round cross-section, provided with a substantially fully looped end 16 and a substantially half looped end 17, and having suitable rubber or the like insulating material 18 surrounding the same intermediate the stripped or exposed ends thereof. The wire 15 is solid and is formed of a material of high electrical conductive properties such, for example, as copper. While I have disclosed a round wire for illustrative purposes my invention is not so limited as will appear hereinafter. The top surface of the looped ends 16 and 17 of wire member 15 are each deformed or furnished with a rabbet providing a flat recessed arcuate shape

in planular contour bearing surface 21 around the outside of the wire loops and a shouldered or raised portion 22 substantially coextensive therewith around the inside of the wire loops (see Figs. 2 and 3). The recessed surface 21 and the raised arcuate shaped portion 22 of the rabbeted parts of the stripped ends 16 and 17 of wire 15 preferably, although not necessarily, extend throughout an arc greater than 180 degrees.

In Fig. 4 of the drawings I show insulating blocks 23 and 24 which may represent a part of a switch or a part of a multiple terminal panel. Each of the blocks 23 and 24 carry or have a terminal conductor bar 26 inserted therein and the bar terminals are each provided with a threaded hole 27 (see Figs. 5 and 6) for the reception of a round-headed hold-down screw 29. It will be noted by reference to Figs. 5 and 6 of the drawings that screw 29 comprises a round threaded shank part 31 projecting from the head thereof and threaded into the threaded hole 27 in terminal bar 26. It will also be noted that the underside of the head of screw 29, surrounding the threaded shank part 31 thereof, has a cylindrical recess 32 therein providing a shouldered clamping ring surface 33 around and adjacent the recess. The recess 32 is preferably a flat bottomed counterbore but may, if desired, be in the form of a tapered bottom 34, such as is shown in the modification illustrated in Fig. 11 of the drawings. By again referring to Figs. 5 and 6 it will be noted that the ring 33 on screw 29 is a flat surfaced ring and clamps against the arcuate shaped flat recessed bearing portion 21 of wire loops 16 and 17 and that the arcuate shaped raised portion 22 of the wire loops fit into or are disposed within the recess 32 provided in the underside of the head of screw 29 to thus interlock the wire loops 16 and 17 to the screw and to the terminals 26. The shouldered portions at the side of the recessed surface 21, opposed to the raised portion 22 on wire loops 16 and 17, are positioned adjacent the side wall of the screw head and augments the interlocking of loops 16 and 17 to the screw 29. This interlocking arrangement of the wire 15 to screw 29 forms a means for securing or locking the wire against slippage in all directions from beneath the head of the screw to provide an improved electrical connection of a lead wire with a terminal.

In Figs. 7 and 8 of the drawings I have shown one method of deforming or rabbeting the exposed or uninsulated part of wire conductor 15 to provide the arcuate shaped flat bottomed recessed bearing portion 21, the shouldered raised portion 22 and the short right angled shouldered portions on the side of recess 21 opposed to the portion 22 at the point thereof to be engaged by the screw 29. While I have disclosed this method for illustrative purposes only it is to be understood that the cross-sectional contour of the wire or of a bar may be deformed to the desired shape in any suitable manner, either manually or by an automatic machine. In Fig. 7 I show the bare looped end 16 of wire 15 placed over a hole 41 formed in a die 42. A shank portion 43 of a plug or punch, having a head 44, is passed through the wire loop and inserted into the hole 41 in die 42. The underside of the plug or punch is provided with a counterbore 46 about the shank portion 43 thereof, thus forming a ring 47 about the counterbore 46 having the shoulder 48. Shoulder 48 of ring 47 rests on the top of the wire loop 16 and the plug or punch is then struck a blow by a hammer or like tool to drive the shank portion 43 of the punch farther into the hole 41 in die 42. The force of the hammer blow causes the shoulder 48 on the underside of head 44 of the plug or punch to bite into and deform the wire loop 16 into the shape of a rabbet to provide the recessed portion 21 and the raised portion 22 on the wire, as shown in Fig. 8 of the drawings and also the shouldered portions opposite the raised portion 22 as shown in Figs. 2 and 3. As the shoulder 48 on the plug or punch bites into the wire the material of the wire adjacent the recessed surface 21 is deformed or flows upwardly into the recess 46 to slightly raise this portion of the wire above its initial height. It is to be understood that the deformation of the wire 15 may, like the variation in the shape of the counterbore or recess 34, in screw 29, vary in cross-sectional contour as shown in Fig. 11 of the drawings so long as a flat surface 21 is recessed relative to the normal diameter of the wire and a raised portion 22 therearound is provided. It will be noted that, due to the ends 16 and 17 of wire 15 being looped or half looped, the recessed bearing surface 21 and the raised portion 22 extend around an arc greater than 180 degrees. It will also be noted that the hammer blow employed to provide the recessed bearing portion or surface 21 and raised portion 22 on wire 15 will slightly flatten the opposed or bottom-side of the wire. The flattened bottom-side of the wire 15 is desirable and provides a greater surface area to be clamped to the terminal 26 and consequently a better electrical contact therebetween. While I have shown the looped ends 16 and 17 of wire 15 as being deformed by the illustrated method it is to be understood that a straight portion of a conductor bar member 35, as is disclosed in Figs. 9 and 10, or a straight portion of a round wire, as is disclosed in Fig. 12, may also be rabbeted along one of its edges.

In the modification of my invention illustrated in Figs. 9 and 10 of the drawings I have shown the rabbeted recessed bearing surface 21 and the raised shoulder portion 22 in the form of a niche along one edge of a flat rectangular conductor bar member 35. When the ring clamping surface of a screw, such as screw 29, is tightened in place upon the recessed bearing surface 21 on bar 35 the raised arcuate portion 22 on the bar member fits in the recess of the screw and the shouldered portion on the opposite side of the recessed surface 21 is adjacent a side wall of the screw head to thereby interlock the screw and the bar 35 together to prevent slippage of the bar from beneath the head of the screw. In this form of my invention, like that previously described, the bar 35 can be removed from under the screw 29 only by intentionally loosening or backing the screw away from the bar. In Fig. 12 of the drawings I have shown another modification of the invention wherein the arcuate rabbeting of a straight piece of round wire in the form of a niche along one side thereof may also serve to interlock a straight wire portion to a terminal screw.

From the foregoing it should be apparent that I have provided an electrical connection between a lead wire conductor and an electrical terminal wherein the lead wire or conductor is interlocked with the terminal screw in such a manner that it will not be inadvertently slipped from beneath the screw head. My improved connection affords

ample protection against accidentally breaking the contact between a lead wire and its terminal because, even if the terminal screw should become slightly loosened, the arcuate shaped raised portion of the wire being disposed or fitting in the underside of the screw head will prevent slippage of the wire laterally away from the screw.

While the forms of embodiment of the invention as herein disclosed, constitute preferred forms, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. An electrical connection including a terminal and a substantially round insulated solid wire having a part thereof stripped of its insulation and contacting said terminal, means for attaching said stripped part of the wire directly to said terminal, said means comprising a screw having a head and a shank part projecting therefrom and threaded into said terminal, the underside of said screw head about said shank part being provided with a flat bottomed counterbore and a ring around the counterbore, said stripped part of the round wire being deformed at the point of attachment thereof to said terminal to provide an arcuate shaped recessed surface and a raised portion substantially coextensive therewith adjacent the shank part of said screw, and said ring on said screw being clamped against said recessed surface of said wire with said raised portion thereof fitting in the counterbore of said screw head for locking the wire against slippage from beneath the screw.

2. An electrical connection including a terminal and an insulated solid conductor member having a part thereof stripped of its insulation and contacting said terminal, means for attaching said stripped part of the conductor member directly to said terminal, said means comprising a screw having a head and a shank part projecting therefrom and threaded into said terminal, the underside of said screw head having a recess about said shank part to provide an adjacent shouldered ring clamping surface around the recess, a portion of said stripped part of the conductor member being deformed at the point of attachment thereof to said terminal to provide an arcuate shaped recessed bearing surface and a raised portion substantially coextensive therewith adjacent the shank part of said screw, and said ring clamping surface on said screw being clamped against said recessed bearing surface of said conductor member with said raised portion thereof fitting in the recess of said screw head for locking the conductor member against slippage from beneath the screw.

3. An electrical connection including a terminal and an insulated solid conductor member having a part thereof stripped of its insulation and contacting said terminal, means for attaching said stripped part of the conductor member directly to said terminal, said means comprising a screw having a head and a shank part projecting therefrom and threaded into said terminal, the underside of said screw head about said shank part being provided with a recess and a ring around the recess, a portion of said stripped part of the conductor member being deformed at the point of attachment thereof to said terminal to provide an arcuate shaped flat recessed surface, a raised portion on one side of said flat recessed surface and a shouldered portion on the other side of said flat recessed surface, and said ring on said screw being clamped against said flat recessed surface of said conductor member with said raised portion thereof fitting in the recess of said screw head and said shouldered portion thereof adjacent the side wall of said screw head for locking the conductor member against slippage from beneath the screw.

ROY F. KIESER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
838,729	Lockwood	Dec. 18, 1906
1,225,297	Willard	May 8, 1917
1,395,788	Anthony	Nov. 1, 1921
1,751,405	Herman	Mar. 18, 1930

FOREIGN PATENTS

Number	Country	Date
872,877	France	Mar. 2, 1942