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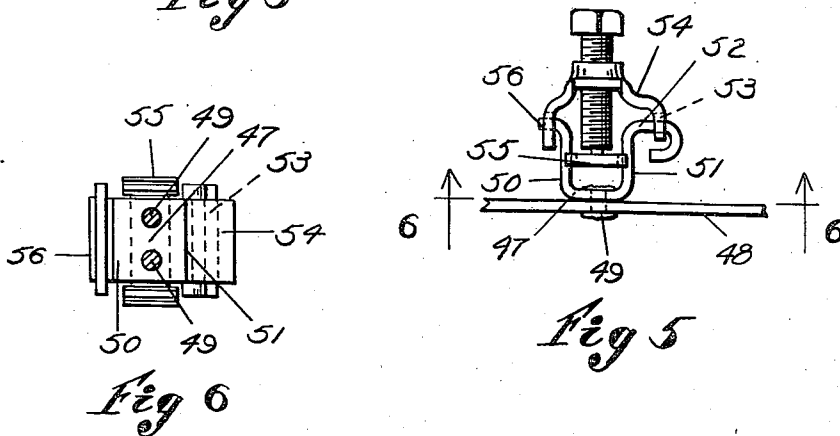
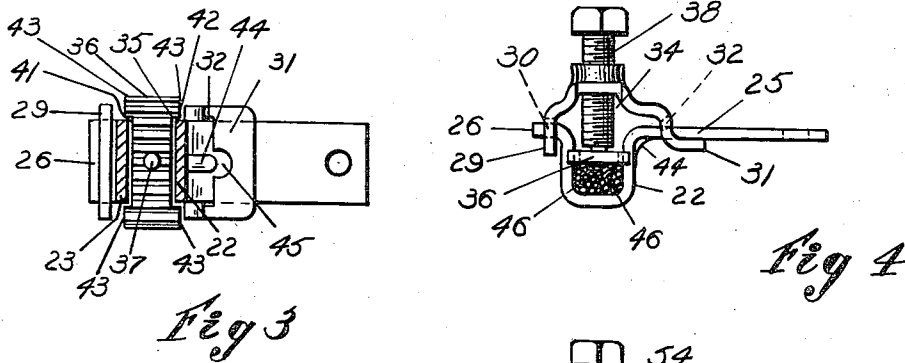
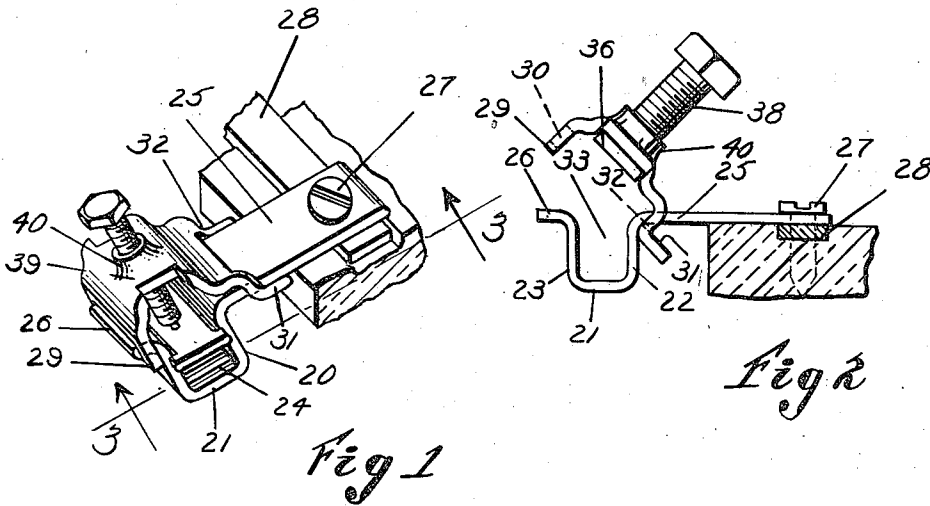
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2,265,911

SOLDERLESS WIRE CONNECTOR

Filed Aug. 18, 1939

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

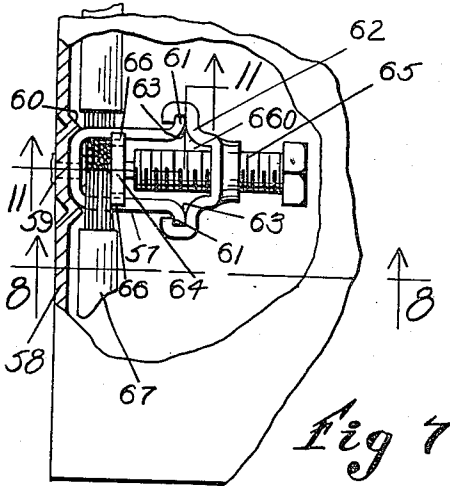


Fig 7

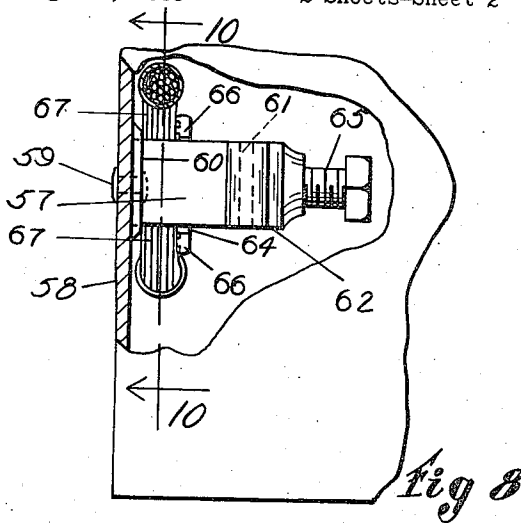


Fig 8

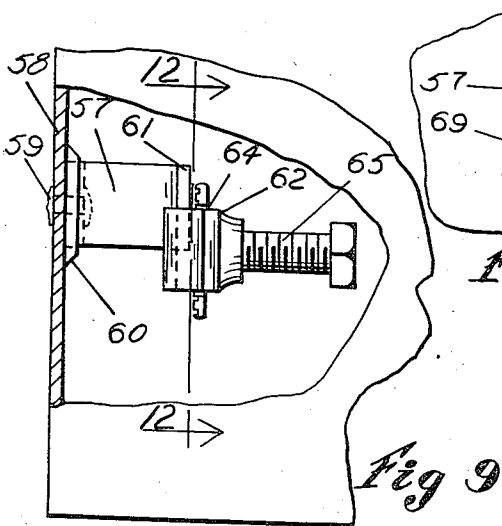


Fig 9

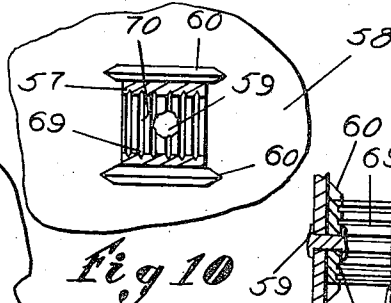


Fig 10

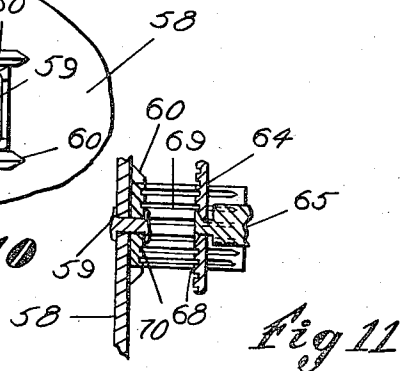


Fig 11

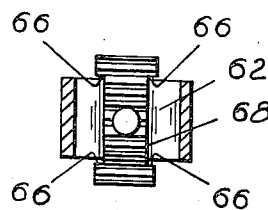


Fig 12

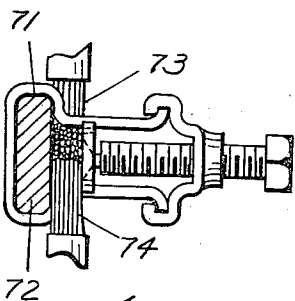


Fig 13

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UNITED STATES PATENT OFFICE

2,265,911

SOLDERLESS WIRE CONNECTOR

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Application August 18, 1939, Serial No. 290,876

8 Claims. (Cl. 24-125)

The present invention relates to solderless wire connectors and has for an object the provision of an inexpensively constructed connector having a wide range of adaptability in the art.

Another object of the invention is to provide a connector consisting of metal stampings and having a removable cap wherein the binding screw element is in fully threaded engagement and with which the binding screw is inseparably associated.

Still another object of the invention is to provide a solderless connector having an effective interlocking arrangement between a removable cap and the yoke or body of the connector.

A further object of the invention is to provide a solderless wire connector having an open top yoke wherein one or more wires may be readily entered and a removable cap with means to effect mechanical and electrical bonding, the cap being subject to modifications adapting it for complete removal and disassociation from the yoke and for movement to open position without complete disassociation from the yoke.

These and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which:

Fig. 1 is a perspective view of a wire connector of the invention associated with a bus-bar and showing the parts in closed condition.

Fig. 2 is an in view of the device of Fig. 1 with the parts open for the reception of the wire.

Fig. 3 is a view taken on line 3-3 of Fig. 1.

Fig. 4 is a view similar to Fig. 3 but showing the device operatively connecting a pair of stranded wires.

Fig. 5 is an end elevational view showing a modified form of the device mounted as a ground clamp on a metallic wall.

Fig. 6 is a view taken on the line 6-6 of Fig. 5.

Fig. 7 is a fragmental side elevational view of a metal electrical cabinet, part broken away and part shown in cross-section with a further modified form of the device of the invention operatively connected thereto and holding a pair of ground wires.

Fig. 8 is a view taken on line 8-8 of Fig. 7.

Fig. 9 is a view showing the device of Fig. 8 with the wires removed and the cap partially replaced.

Fig. 10 is a view taken on line 10-10 of Fig. 8.

Fig. 11 is a view taken on line 11-11 of Fig. 7.

Fig. 12 is a view taken on line 12-12 of Fig. 9.

Fig. 13 is an end view of still another modification of the device of the invention operatively

connecting a bus-bar and a pair of conductor wires.

Heretofore solderless wire connectors have been formed primarily of castings and have involved relatively costly machining. Such solderless wire connectors, furthermore, were usually made for a single size of wire or for a very restricted range of wire sizes and the cost thereof was further influenced by these factors. In devices produced from castings or machined solid stock it has been prohibitively expensive to provide a suitable device wherein the parts are not subject to ready separation and loss. With the departure from this type of fabrication to formed strip metal connectors, numerous other disadvantages have been encountered. By the present invention the disadvantages attending the manufacture and use of solderless wire connectors have been substantially obviated.

The devices embodying the present invention comprise an open topped yoke member which may be conveniently formed of stamped strip metal, a movable cap adapted to seat across the opening of the yoke, a binding plate to move downwardly into the open yoke rotatably secured on a binding screw which has full threaded engagement in the cap and a means to preclude lifting or shifting of the cap relative to the yoke.

Referring now to the drawings, the device shown in Figs. 1 to 4, inclusive, comprises a U-shaped yoke member indicated generally at 20 and comprising a flat base 21 and upright integral walls 22 and 23 on opposite sides of the base, the inside faces of the base and side walls of the yoke being roughened or ribbed as shown at 24 in Fig. 1. Walls 22 and 23 are provided, respectively, with out-turned flanges 25 and 26, the former of said flanges being extended and suitably perforated or notched whereby a mounting means is provided for the reception of a fastening means such as a screw 27 whereby the connector is mounted and also electrically connected with a conductor such as a bus-bar 28. The movable cap is inexpensively made of a piece of punched and formed strip metal having a down-turned flange 29 with a slot 30 therein in which flange 26 of the yoke may seat and at the opposite end a downwardly and outwardly-turned flange 31 with a slot 32 aligned with opposed slot 30 for receiving the flange 25 of the yoke. The cap, as thus far described, is adapted to have the flange 25 of the yoke inserted through slot 32 while holding the parts substantially as shown in Fig. 2 wherein a loosely hinged connection is made between the parts and the cap

may be bodily shifted transversely of the opening 33 in the yoke and along the flange or strip 25. It will be readily apparent that one or more conductor wires may be dropped into the yoke through the opening 33 when the movable cap is thus positioned. When the connector is mounted on an electrical appliance (for example, as shown in Figs. 1 and 2), it is possible to open and close the yoke by means of the cap without at any time completely removing the cap. The intermediate portion at the cap is bridged upwardly to form a substantially rectangular recess 34 in which the restricted center portion 35 of a clamping plate 36 may seat. The clamping plate 36 has the reduced end 37 of clamping screw 38 passing loosely therethrough and then spread to provide a rotatable connection between the binding screw and clamping plate. The screw 38 has threaded engagement in the top wall 39 of the cap, the said top wall having a drawn hollow threaded nipple 40 integral therewith in order to provide ample threaded engagement between said cap and said binding screw. Clamping plate 36 is notched out on opposite sides at 41 and 42 to provide shoulders 43 at each of the four corners thereof, said shoulders being retractable into the width of rectangular recess or channel 34 in the cap while the reduced width of the clamping plate permits said plate to be passed between the inner roughened faces of the side walls of the yoke. The shoulders 43 not only assist in precluding rotational movement of the clamping plate relative to the yoke walls but they also preclude longitudinal shifting of said clamping plate between the walls. It will be apparent, therefore, that unless the clamping plate 36 is fully retracted into the recess in the cap, it will be impossible to move the cap away from its engaged position on the yoke as illustrated in Figs. 1 and 4. The cap is desirably formed of stamped and formed strip steel and may be hardened if desired. The yoke may be formed of the same or a different metal if desired. If the yoke is formed of copper and the device is intended for use, as shown for example in Figs. 1 to 4, inclusive, the angle between side wall 22 and flange 25 may be reinforced by upsetting or deforming a reinforcement shoulder 44, in which case it is also necessary to form a notch 45 in the shoulder portion 31 of the cap to enable the hinged movement and shifting of the parts.

In operation, when the connector is mounted and opened, as shown in Fig. 2, one or more stranded conductor wires 46 may be dropped into the open top of the yoke, whereupon the shoulder 31 is shifted toward the shoulder 44 until the flange 29 passes beyond the end of shoulder 26, whereupon the end of said shoulder may be entered into the slot 30. When the binding screw 38 is turned, clamping plate 36 substantially centers itself between the inner walls of the yoke and, once entering the space between the yokes, it is impossible to shift the cap in any direction relative to the yoke. The continued tightening of the binding screw deforms the stranded wires or cables 46 against roughened or serrated inner faces of the yoke and on the similarly roughened or serrated under-face of the clamping plate. A strong mechanical and an excellent electrical bond is thus effected. A stranded cable may be inserted at any point intermediate its ends without cutting the cable, thus materially facilitating wiring operations wherein a number of connector wires or ground wires are to be electrically connected with each

other and, if desired, with other conductors at or adjacent some centralized or given point.

In the modified form of the device shown in Figs. 5 and 6, the essential distinction over the device of Figs. 1 to 4 lies in the provision of the bodily fixing of the yoke at its bottom wall and the development of one of the lateral shoulders into a modified hinge connection between the yoke and the cap. In this form the base 47 of the yoke is adapted to be affixed to another member 48 which may be a bus-bar or the wall of a cabinet by means of one or more rivets 49. The side wall 50 of the yoke is substantially identical with the side wall 23 of the yoke in Fig. 2. The side wall 51 of the yoke has its top flange 52 extending outwardly and through a slot 53 in the cap 54 and thence downwardly around the bottom of the slotted portion of said cap. The cap is capable of limited lateral shifting across the yoke so long as the clamping plate 55 is completely retracted in the top of the cap 54. Thus the connector may be opened for the insertion of wires substantially as previously described and for adjustment of the cap to the position shown in Fig. 5. When clamping force is exerted by the binding screw and clamping plate and directed against wires or other members inserted in a yoke, the upward pull of the cap is directed on the shoulders 52 and 56 of the yoke. The relation of the plate 55 with the side walls of the yoke and of the cap with the shoulders of the yoke is a mutually supporting relationship so that the connection between the cap and the yoke cannot weaken even though sufficient pressure is imposed by continued turning of the binding screw to actually bulge walls 50 and 51 below the clamping plate 55. This same mutual strengthening support is inherent in all of the modifications of the device herein shown.

Referring now to the modified forms shown in Figs. 7 to 13, there are provided structures affording the same simple and sturdy construction and effective clamping, these structures differing from the hereinbefore described structures only in the provision of a slidably removable cap which may be completely disassociated from the wire receiving yoke. As shown for example in Figs. 7 to 12, the yoke, indicated generally at 57, is adapted to be rigidly secured to a metallic member 58, which may be the sheet metal wall of an electrical cabinet, by means of a single rivet 59 which holds the yoke in a seat between a pair of parallel embossed ridges 60 in the member 58. Uniform short shoulders 61 are provided on opposite sides of the open end of the yoke and a slidably removable cap 62 has its edges turned downwardly and inwardly providing a pair of channels 63 to slidably receive flanges 61. Clamping plate 64 carried by binding screw 65 in the manner hereinbefore described may be retracted into the recess 660 in the cap at which time the shoulder 61 may be slidably moved into and out of the groove 63 in the cap (see Fig. 9). Upon entering the clamping plate between the side walls of the yoke by means of the binding screw 65, the overhanging shoulders 66 of the clamping plate ride along the outer edges of the yoke walls and preclude the shifting of the cap relative to the yoke.

It will be apparent that with the yoke permanently mounted within a cabinet, for example a switch box, and serving as a ground clamp, a ground wire 67 may be brought from the outside or from another ground connection within the cabinet and laid in the open yoke and car-

ried on to another grounding connection without severing the wire and without any appreciable effort on the part of the installing electrician. One or more other wires may have their terminal ends or any intermediate parts thereof likewise brought into the open yoke, whereupon cap 62 may be slidably mounted on the top of the shoulder 61 and the binding screw 65 tightened for firmly clamping all of the inserted wires between the bottom and sides of the yoke and the bottom of the clamping plate. The roughening of the contacting faces on the clamping plate and yoke as shown herein, for example in Figs. 10, 11 and 12, may be effected by sharp-edged parallel ribs 68, 69, and 70.

As shown in Fig. 13, the yoke and cap member are in all respects as described and shown in connection with Figs. 7 to 12, inclusive, excepting only that the base of the yoke is enlarged to provide a hollow eye or way 71 to slidably receive a conductor bar, such as a bus-bar 72, upon which the solderless connector is self-clamping when operatively compressed upon one or more inserted conductors such as 73 and 74.

What is claimed is:

1. A solderless wire connector comprising a yoke having opposed outwardly extending shoulders at its top, a cap seating on the shoulders and extending across the open top of the yoke and having portions engaging beneath said shoulders, a binding screw threadedly penetrating the cap for entry into the open top of the yoke, and a plate rotatably mounted on the end of said screw and having lateral notches slidably receiving the sides of the yoke whereby the cap is held against removal when said plate is entered in the yoke below the top of the shoulders said cap recessed on its underside to receive said plate above the shoulders of the yoke permitting disassociation of said cap and yoke.

2. A solderless wire connector comprising a yoke, a cap, complementary means on the yoke and cap to removably mount the cap on the yoke, a binding screw extending threadedly through the cap, a clamping plate rotatably secured to the end of the screw and selectively movable, by operation of the screw, to a position wholly within the cap and to another position at least partially within the yoke, the plate in the last named position precluding disassociation of the complementary retaining means.

3. In a solderless wire connector the combination of a yoke having an open top for the reception of one or more conductor wires, a removable cap closing the open top of the yoke, said cap having a recess above the open top of the yoke, complementary means on the yoke and cap to preclude movement of the cap directly upwardly of the open top of the yoke, a binding screw threadedly mounted in said cap for movement into and from said yoke, a binding plate rotatably carried by the end of the screw for clamping inserted wires in the yoke and means upon the plate to preclude shifting of the cap relative to the yoke when said plate is completely moved out of the recess and is entered into the open top of the yoke.

4. In a solderless wire connector the combination of a yoke comprising a bottom member and a pair of upstanding parallel walls, integral outwardly turned shoulders at the top of said yoke walls, a cap adapted to span the open top of the yoke and having down-turned portions engageable beneath the shoulders on the yoke walls, a screw actuated clamping plate carried

by the cap and having its opposed longitudinal walls notched for the reception of the yoke walls and precluding shifting of the cap relative to the yoke when said plate is entered between the walls of the yoke having a recess wherein the plate is retractable above the top of the yoke walls permitting removal of the cap from the yoke.

5. In a solderless wire connector the combination of a yoke having a pair of substantially parallel upstanding walls, outwardly turned flanges at the tops of said walls, a cap removably spanning the open top of said walls and seating on said shoulders, said cap having down-turned slotted edges providing ways for the reception of the shoulders on the yoke whereby the cap is removably secured on the yoke, and a clamping plate having slidable contact with the inner faces and the edges of the yoke walls whereby relative shifting of the yoke and cap is precluded, said cap having a recess therein wherein the clamping plate may be retracted to permit relative shifting and removal of the cap from the yoke.

6. In a solderless wire connector a U-shaped yoke, a cap for said yoke, complementary slot and shoulder means at one side of the cap and yoke for opening and closing the yoke, a complementary slot and shoulder means at the other side of the cap and yoke providing a shifting and hinged movement of the cap relative to the yoke and permitting engagement and disengagement of the first mentioned shoulder and slot means, and a binding screw means including a plate member retractable wholly within the cap for clamping an inserted conductor within the yoke and binding the complementary shoulders and slots and for precluding shifting of the cap and yoke when said plate is at least partially within the yoke.

7. In a solderless wire connector a wire receiving yoke, a cap member separably hinged thereto in one side of the yoke, said yoke adapted for the reception of a securing means whereby the yoke is fixedly mounted on the receiving body to limit movement of the cap for precluding separation of the cap from the yoke, complementary engageable means on the yoke and cap cooperating with said hinge means to close the yoke with said cap, and binding screw means carried by the cap including a plate retractable wholly within the cap to permit mounting and removal of the cap on and from the yoke and engageable upon an inserted conductor in the yoke and retaining said hinged and complementary connections in binding relation, said plate positionable within the yoke for precluding removal of the cap independently of binding pressure of said plate.

8. In a solderless wire connector the combination with a body, of a yoke member adapted at one point for fixed attachment to said body, a cap for the yoke removably hinged to the yoke at one side thereof prior to mounting of the yoke on said body and limited by said body upon attachment of the yoke thereto to preclude removal of the cap from the yoke, and a binding screw means including a plate for clamping an inserted conductor in the yoke and simultaneously binding the cap against shifting relative to the yoke at said hinged and complementary engaging means, said plate retractable to a position wholly within the cap and wholly without the yoke wherein the complementary engaging means are disengageable for removing the cap from the yoke.

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