

Jan. 24, 1939.

H. A. DOUGLAS

2,145,162

ELECTRICAL CONNECTION MEANS

Filed May 31, 1935

2 Sheets-Sheet 1

Fig. 1

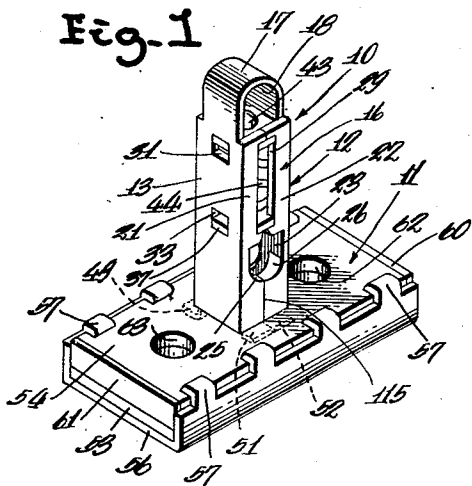


Fig. 3

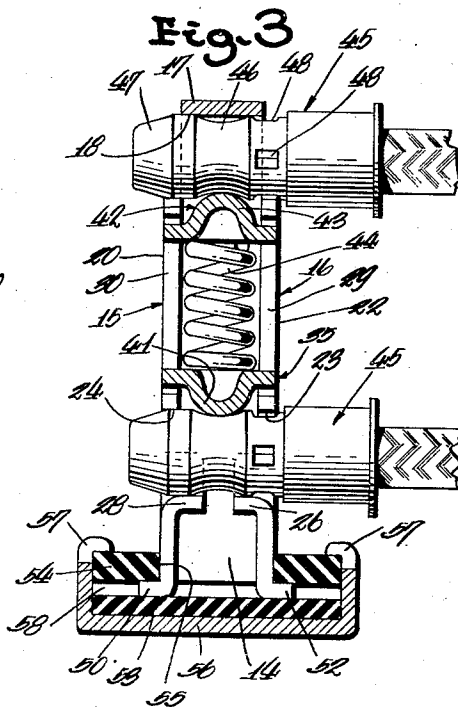


Fig. 2

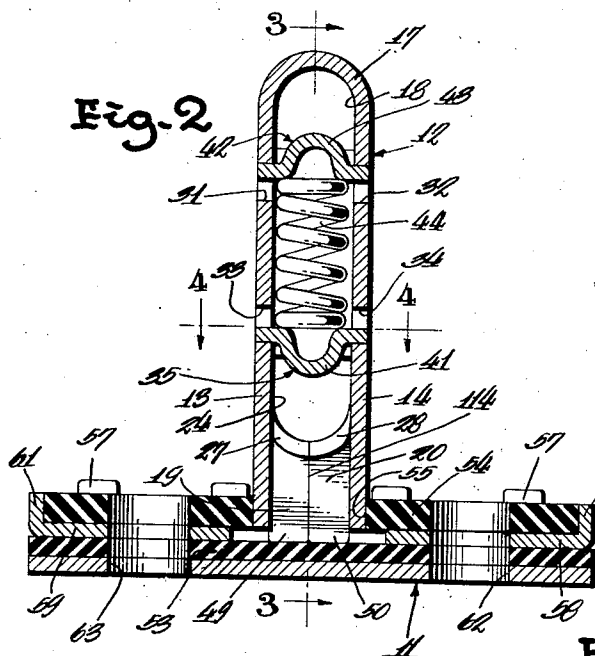
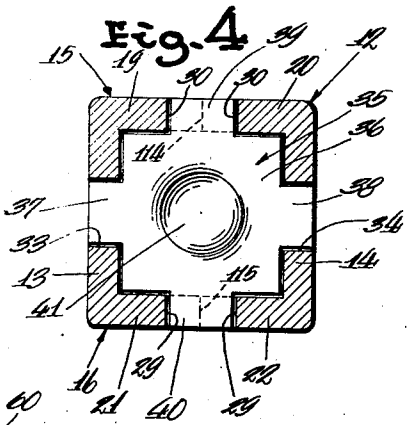


Fig. 4



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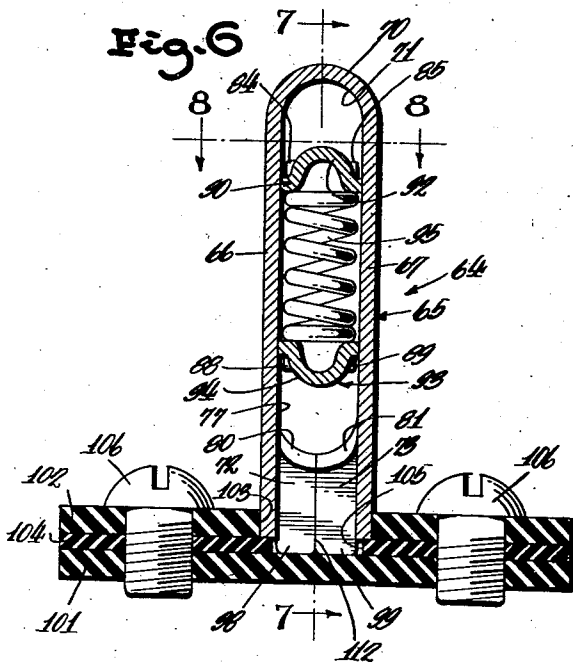
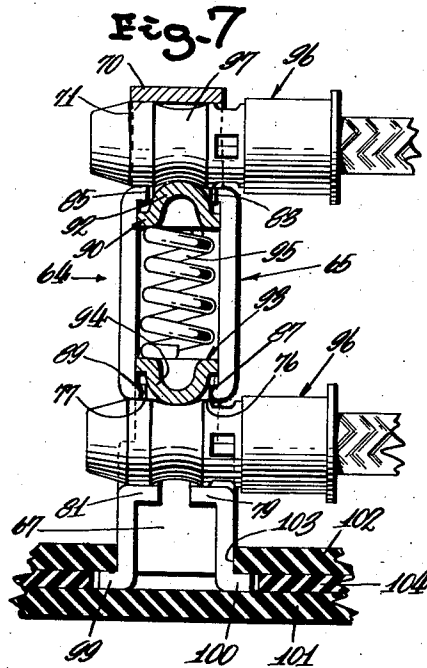
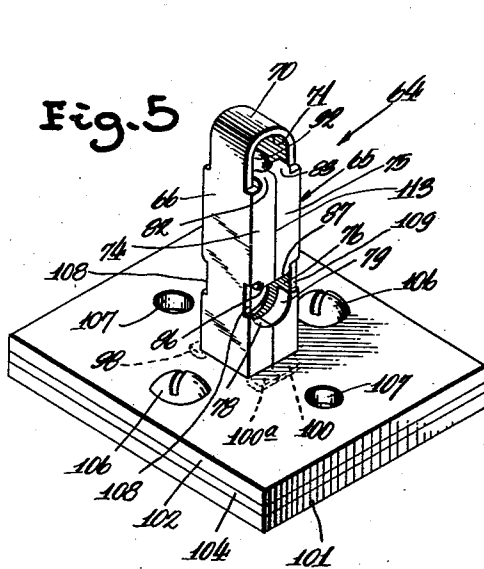
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,145,162

ELECTRICAL CONNECTION MEANS

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8 Claims. (Cl. 173—328)

My invention relates to electrical connection means, and more particularly to connection means of the snap type, providing for the interconnection of a plurality of conductor terminals at a single terminal post, and the principal object of my invention is to provide a new and improved electrical connection means. In the drawings accompanying this specification and forming a part of this application, I have shown, for purposes of illustration, several forms which my invention may assume. In these drawings:

Figure 1 is a perspective view of one embodiment of my invention, showing a connection means comprising a terminal post or connector,

Figure 2 is a longitudinal vertical sectional view of the connection means shown in Figure 1, on a larger scale than Figure 1,

Figure 3 is a section taken on the line 3—3 of Figure 2, looking in the direction of the arrows, Figure 3 including in addition a pair of conductor terminals in cooperative relation with the terminal post,

Figure 4 is a detail sectional view, enlarged, taken on the line 4—4 of Figure 2, looking in the direction of the arrows,

Figure 5 is a perspective view of another embodiment of my invention, showing a connection means comprising a terminal post or connector,

Figure 6 is a longitudinal vertical sectional view of the connection means shown in Figure 5, on a larger scale than Figure 5,

Figure 7 is a section, partly fragmentary, taken on the line 7—7 of Figure 6, showing in addition a pair of conductor terminals in cooperative relation with the terminal post, and

Figure 8 is a detail sectional view, enlarged, taken on the line 8—8 of Figure 6, looking in the direction of the arrows.

Referring to Figure 1, there is here shown a terminal post 10 mounted on a base 11. The terminal 10 includes a tubular body portion 12 having a generally square cross-section with a pair of opposite side walls 13, 14 and another pair of opposite side walls 15, 16 at right angles to the walls 13, 14. The walls 13, 14 are integrally joined at their tops by a U-shaped loop 17 providing an aperture 18, the axis of which is transverse to the longitudinal axis of the tubular body portion 12. The wall 15 is formed in halves, one half 19 integral with the wall 13, and the other half 20 integral with the wall 14. In like manner the wall 16 is formed in halves, one half 21 integral with the wall 13, and the other half 22 integral with the wall 14.

The walls 15, 16 are provided with a pair of apertures 24, 23 respectively in axial alignment with each other. The apertures 23, 24 are formed by recessing the abutting edges of the wall halves 21, 22 and 19, 20. The lower margin of the aperture 23 is increased in an axial direction by bending at right angles to the wall halves 21, 22 portions 25, 26 of these wall halves. The bent portions 25, 26 are desirably shaped to arcuate form so as together form a substantially semi-cylindrical surface. In like manner the lower margin of the aperture 24 is extended axially by bending at right angles to the wall halves 19, 20 portions 27, 28 of these wall halves. The semi-cylindrical surface formed by the bent portions 27, 28 forms a continuation of the semi-cylindrical surface formed by the bent portions 25, 26, with a gap in the surface, as may be seen particularly in Figure 3.

The wall 16, between the aperture 23 and the aperture 18, is provided with a longitudinally extending slot 29, formed by recessing the abutting edges of the wall halves 21, 22. The slot 29 stops short of the upper ends of the wall halves 21, 22 and short of the upper margin of the aperture 23 so that the ends of the slot 29 are adapted to form abutments, as will appear. The wall 15 is provided with a slot 30, identical with the slot 29 and in alignment therewith.

The wall 13 is provided with a rectangular aperture 31, the upper margin of which is in the plane of the upper ends of the slots 29, 30. The wall 14 is provided with a rectangular aperture 32, the upper margin of which is in the plane of the upper ends of the slots 29, 30 and the aperture 31. The wall 13 is also provided with a rectangular aperture 33, the lower margin of which is in the plane of the lower ends of the slots 29, 30. The wall 14 is provided with a rectangular aperture 34, the lower margin of which is in the plane of the lower ends of the slots 29, 30 and the lower end of the aperture 33.

Detent means 35 is disposed within the tubular body portion 12, for cooperation with the apertures 23, 24 and with a conductor terminal insertable through those apertures. The detent means 35 is here shown as made of a generally square plate 36 which fits slidably within the tubular body 12, as can be seen most clearly in Figure 4. The square plate 36 is provided with four lateral extensions 37, 38 and 39, 40, on opposite margins of the plate, intermediate the ends of the margins. The lateral extensions 37, 38 fit and are slidable longitudinally in the apertures 33, 34 in the opposite walls 13, 14, while

the lateral extensions 39, 40 fit slidably in the slots 30, 29 in the walls 15, 16. The square plate 36 is provided with an approximately hemispherical protuberance 41, which may be struck up from the plate 36, extending toward the axis of the apertures 23, 24.

Another detent means 42 is provided for cooperation with the aperture 18 and with a conductor terminal insertable through that aperture. The detent means 42 is provided with an approximately hemispherical protuberance 43 and is otherwise also identical with the detent means 35, the lateral projections on the square plate of the detent means 42 cooperating with the apertures 31, 32 in the walls 13, 14 and with the slots 29, 30 in a manner analogous to that already described in connection with the detent means 35.

The detent means 35 and 42 are biased to cooperative position with the apertures 23, 24 and the aperture 18 respectively by a helical spring 44 disposed within the body portion 12 of the terminal connector, one end of the spring bearing against the detent means 35 and the other end against the detent means 42. When there is no conductor terminal connected to the terminal post 10, the lateral projections on the detent means 35 about the lower ends of the apertures 33, 34 and the lower ends of the slots 29, 30, and in analogous manner, the lateral projections on the detent means 42 about the upper ends of the apertures 31, 32 and the upper ends of the slots 29, 30, as can be seen in Figures 1 and 2. When conductor terminals 45, such as shown in Figure 3, are inserted in the apertures 18 and 23, 24, the protuberance 43 of the detent means 42 is in engagement with an annular furrow 46 formed in a cylindrical part of the conductor terminal 45. The terminal 45 is provided with a frusto-conical end 47, which serves to cam the detent means 42 downwardly against the bias of the spring 44 as the terminal 45 is inserted in the aperture 18, further thrust on the terminal 45 causing the parts to snap into the position shown in Figure 3. The terminal 45 may be fastened to the conductor contained therein by swedging it to the conductor as indicated by the swedge indentations 48. Another conductor terminal 45, here shown as identical with the upper conductor terminal 45, is cooperable with the apertures 23, 24 and the detent means 35 in a manner analogous to that already described in connection with the upper terminal 45 and the detent means 42. It will of course be evident that the apertures 23, 24 in effect constitute a single composite aperture for cooperating with a single conductor terminal such as 45.

The terminal post 10 may be mounted on the base 11 by providing it with feet 49, 50 and 51, 52. The feet 49, 50 are, in this instance, extensions on the wall halves 19, 20, bent outwardly at right angles to these wall halves and the feet 51, 52 are in like manner extensions of the wall halves 21, 22, bent outwardly at right angles to these wall halves. The insulating base 11 is of composite form comprising an insulating plate 53 against which the feet 49, 50 and 51, 52 abut, and another insulating plate 54 overlying the insulating plate 53 and having an aperture 55 of the same shape and size as the outer cross-sectional contour of the body 12 of the terminal post to snugly pass the body 12. Consequently, the insulating base 54 is adapted to overlie the tops of the feet 49, 50 and 51, 52, and by clamping the insulating plates 53, 54 together, the

terminal post 10 will be held to and supported by these insulating plates. One way in which the plates 53, 54 may be held together is illustrated and comprises the provision of a metallic channel 56, in which the plates 53, 54 are disposed, the flanges of the channel being provided with fingers 57, which are clinched over the top of the insulating plate 54.

In certain instances it may be found desirable to provide spacers 58, 59 between the insulating plates 53, 54. These spacers are here shown as metallic and provided with upturned flanges 60, 61 respectively abutting the ends of the insulating plate 54. The spacers 58 are desirably made of the same thickness as the thickness of the feet 49, 50 and 51, 52 or less than that thickness. Where the thickness of the feet 49, 50, 51, 52 is not great, it is unnecessary to use spacers such as 58, 59, since the plates 53, 54 accommodate themselves sufficiently, without undue bending, when they are pressed against each other to hold the connector post. The insulating base 11 may be provided with a desired number of holes 62, 63, extending through the components of the base, adapted to receive means to fasten the base to a support.

Referring now to Figure 5 showing another embodiment of my invention, the terminal post 64 here shown includes a tubular body portion 65, having a generally square cross-section, comprising opposite walls 66, 67 and opposite walls 68, 69 extending at right angles to the walls 66, 67. The walls 66, 67 are integrally joined by a U-shaped loop 70 providing an aperture 71, the axis of which is transverse to the longitudinal axis of the tubular body portion 65. The wall 68 is made in halves, one half 72 being integral with the wall 66 and the other half 73 being integral with the wall 67. In like manner the wall 69 is made in halves, one half 74 being integral with the wall 66 and the other half 75 integral with the wall 67. The walls 68, 69 are provided with a pair of aligned apertures 77, 76 respectively. The lower margin of the aperture 76 may be extended in an axial direction by bending inwardly parts 78, 79 of the wall halves 74, 75, as already described in connection with the parts 25, 26 of Figures 1 through 3, to form a semi-cylindrical surface. In like manner the lower margin of the aperture 77 may be extended axially by bending inwardly parts 80, 81 of the wall halves 72, 73, as already explained in connection with the bent parts 27, 28 of Figures 1 through 3, to form a semi-cylindrical surface forming a continuation of the semi-cylindrical surface formed by the bent parts 78, 79.

The upper ends of the wall halves 74, 75 are provided with reduced extensions 82, 83 bent inwardly at right angles to these wall halves. In like manner the wall halves 72, 73 are provided with inwardly bent reduced extensions 84, 85. The bent extensions 82, 83, 84, 85 serve the double purpose of serving as lower margins for the aperture 71 and as abutments for detent means, as will appear. The upper margin of the aperture 76 is formed by bending in reduced portions 86, 87, at right angles to the wall halves 74, 75, and the upper margin of the aperture 77 is formed by bending inwardly reduced portions 88, 89 of the wall halves 72, 73.

The detent means 90 is provided for cooperation with the aperture 71 and a conductor terminal insertable therein. The detent means 90 comprises a square plate 91 having in the center thereof a hemispherical protuberance 92 extend-

ing toward the axis of the aperture 71. The detent means 90 fits slidably in the tubular body 65. The bent in portions 82, 83, 84, 85 serve as abutments limiting the upward movement of the detent means 90.

Another detent means 93 is provided, which has a hemispherical protuberance 94 and is also otherwise identical with the detent means 90, except that the protuberance 94 extends toward the axis of the apertures 76, 77, and is adapted to cooperate with these apertures and a conductor terminal insertable therein.

The detent means 90 is biased upwardly and the detent means 93 is biased downwardly by means of a helical spring 95 positioned within the body 65 and having one end bearing against the detent means 90 and the other against the detent means 93. In the position of the parts shown in Figures 5 and 6 the spring 95 presses the detent means 90 against the bent in portions 82, 83, 84, 85 which act as abutments, limiting the upward movement of the detent 90, and, similarly, the spring 95 presses the detent means 93 downwardly against the bent in portions 86, 87, 88, 89, which act as abutments to limit downward movement of the detent means 93.

In Figure 7 two conductor terminals 96 are shown in connected relation to the terminal post 64. The hemispherical protuberance 92 of the detent means 90 is pressed into an annular furrow 97 in a cylindrical portion of the upper conductor terminal 96 whereas the protuberance 94 of the detent means 93 is pressed into a similar furrow in the lower conductor terminal 96. The conductor terminals 96 cooperate with the terminal post 64 in the manner already described in connection with Figures 1 through 3.

The terminal conductor 64 may be mounted by providing it with feet 98, 99 forming extensions of the wall halves 72, 73, bent outwardly at right angles to these wall halves. The wall halves 74, 75 may be provided with similar extensions to form feet 100, 100a. The aforesaid feet are shown as in abutment with an insulating plate 101. Overlying the plate 101 is another insulating plate 102 provided with an aperture 103 adapted to snugly pass longitudinally over the body 65 of the terminal post 64, to come into engagement with the upper surfaces of the feet 98, 99, 100, and 100a. The insulating plates 101, 102 may be clamped together in any suitable way, this being done in this instance by providing screws 106 threaded through the insulating plates. If desired a spacer 104, here shown as of insulating material, may be provided. The spacer 104 is here shown as provided with an aperture 105, but this aperture may be omitted and the feet 98, 99, 100, and 100a, may be in contact with the spacer 104, reliance being had on some compressibility of the spacer 104 to accommodate itself to the feet, when the insulating plates 101, 102 are clamped together. The composite insulating base may be provided with holes 107 for the reception of means for fastening the base to a support.

The walls 66, 67 may have their margins, at the apertures 76, 77, provided with recesses or notches 108, 109, to facilitate the bending in of the portions 86, 87, 78, 79. The respective bent in portions such as 82, 83 and 84, 85, which act to hold the respective detent means, may have arcuate edges 110, 111.

It will be evident from the foregoing description that the terminal post 64 as well as the terminal post 10 are desirably formed of sheet metal. The halves of the body portion 65 formed in the

channel shape already described, are bent toward each other, the U-shaped loop being thereby formed, until the longitudinal edges of the channel shaped halves abut each other in common lines of registry 112, 113. In the case of the terminal post 10 the common lines of registry are indicated at 114, 115. It will be evident that in both of the illustrated embodiments the detent means and the springs for biasing them toward the positions in which they are cooperable with conductor terminals, as has been set forth, are positioned between and with respect to the halves of the bodies of the respective terminal posts, so that when the halves of the bodies have been brought together the detent means and the springs cooperating with them will have the respective positions already described and shown.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiments of my invention provide new and improved electrical connection means, serving for the interconnection of a plurality of conductor terminals at a single terminal post, readily and conveniently constructed and assembled, and accordingly, each accomplishes at least the principal object of my invention. On the other hand, it will be apparent that features of my invention are also applicable to terminal posts providing for the reception of but one conductor terminal, and, in general, it also will be obvious to those skilled in the art that the illustrated embodiments of my invention may be variously changed and modified, or features thereof, singly or collectively, embodied in other combinations than those illustrated, without departing from the spirit of my invention, or sacrificing all of the advantages thereof, and that accordingly, the disclosure herein is illustrative only, and my invention is not limited thereto.

I claim:

1. An electrical conductor terminal receiving means, comprising: a one-piece sheet metal body portion having U-shaped portions and an intermediate planar portion, the legs of said U-shaped portions having recesses; said body portion being bent intermediate its length so that the margins of said legs abut with the recesses in registering relation to form composite recesses, and the planar portion forming a conductor terminal receiving aperture; detent means cooperable with said aperture and a plug conductor terminal, and having means cooperable with said composite recesses to limit movement of said detent means; and means for biasing said detent means to operative position.

2. Electrical conductor terminal receiving means, comprising: loop means, bent from sheet metal stock, providing an aperture for receiving a conductor terminal; a plurality of juxtaposed channel-shaped parts, connected to said loop means, forming a split tubular body, the meeting margins of said channel-shaped parts being provided with complementary recesses arranged to form an aperture for receiving a conductor terminal; a pair of detent means, one cooperable with the aperture provided by the loop means, and the other cooperable with the aperture provided by the complementary recesses; and resilient means, interposed between said detent means, and constructed and arranged to urge said detent means to cooperative position with respect to the respective apertures.

3. Electrical conductor terminal receiving means, comprising: loop means, bent from sheet-metal stock, providing an aperture for receiving a conductor terminal; a plurality of complementary parts, connected to said loop means, and

so constructed and arranged to form a split tubular body, the opposed margins of said parts having complementary recesses arranged to form an aperture spaced from said loop means, for receiving another conductor terminal; and biasing means, disposed within said tubular body, and having one portion urged in a direction toward said loop means aperture, yieldably holding a conductor terminal disposed within said loop means aperture, and another portion urged in a direction toward said spaced aperture, yieldably holding a conductor terminal disposed within said spaced aperture.

4. Electrical conductor terminal receiving means, comprising: loop means, bent from sheet-metal stock, providing an aperture for receiving a conductor terminal; a plurality of complementary parts, connected to said loop means, and so constructed and arranged to form a split tubular body, the opposed margins of said parts having complementary recesses arranged to form an aperture spaced from said loop means, for receiving another conductor terminal; means carried by said body, adapted for holding said body to a support; and biasing means, disposed within said tubular body, and having one portion urged in a direction toward said loop means aperture, yieldably holding a conductor terminal disposed within said loop means aperture, and another portion urged in a direction toward said spaced aperture, yieldably holding a conductor terminal disposed within said spaced aperture.

5. Electrical conductor terminal receiving means, comprising: loop means, bent from sheet-metal stock, providing an aperture for receiving a conductor terminal, the legs of said loop means having complementary parts fitting together to form a tubular body, said body being formed with an aperture spaced from said loop means, for receiving another conductor terminal, the wall of said body adjacent said spaced aperture being bent to form a surface oppositely disposed with respect to the bight surface of said loop means, and forming a continuation surface of the adjacent part of said spaced aperture; biasing means disposed within said body, having one end adjacent the loop means aperture for pressing a terminal against the bight surface of said loop means, and its other end adjacent said spaced aperture, for yieldably pressing a conductor terminal in said spaced aperture against said continuation surface.

6. Electrical conductor terminal receiving means, comprising: loop means, bent from sheet-metal stock, providing an aperture for receiving a conductor terminal, the legs of said loop means having complementary parts fitting together to form a tubular body, said body being formed with an aperture spaced from said loop, for receiving

another conductor terminal; biasing means disposed within said body, and having one end adjacent the loop means aperture, for yieldably holding a conductor terminal in the loop means aperture, and its other end adjacent said spaced aperture, for yieldably holding a conductor terminal in said spaced aperture; portions of said body at adjacent defining margins of said loop means aperture and said spaced aperture being bent inwardly, forming abutment means at said loop means aperture, limiting movement of said one end of said biasing means in the direction of said loop means aperture, and forming abutment means at said spaced aperture, limiting movement of said other end of said biasing means in the direction of said spaced aperture.

7. Electrical conductor terminal receiving means, comprising: an axially split tubular body, having spaced-apart apertures, each receiving a conductor terminal, the opposed margins of said split having complementary recesses fitting together to form slot means extending between said apertures, end margins of said slot means stopping short of respective apertures; a detent member, for each aperture, having a finger slidably fitting within said slot means; and spring means interposed between said detent members, urging said members in a direction toward respective apertures, abutment of the fingers on said detent members with respective of said end margins limiting movement of said detent members in the direction urged; said detent members and said spring means being assemblable with or disassemblable from said body by spreading the opposed margins of said split body.

8. Electrical conductor terminal receiving means, comprising: an axially split tubular body, having spaced-apart apertures, each receiving a conductor terminal, the opposed margins of said split having complementary recesses fitting together to form slot means extending between said apertures, end margins of said slot means stopping short of respective apertures; openings provided in said body, end margins of said openings also stopping short of said respective apertures; a detent member, for each aperture, having fingers slidably fitting within said slot means, and said openings; and spring means interposed between said detent members, urging said members in a direction toward respective apertures, abutment of the fingers on said detent members with respective of said end margins of said slot means and said openings limiting movement of said detent members in the direction urged; said detent members and said spring means being assemblable with or disassemblable from said body by spreading the opposed margins of said split body.

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