Sept. 27, 1938. H. CATRON ET AL 2,131,581

TERMINAL ASSEMBLY

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Fig. 1.

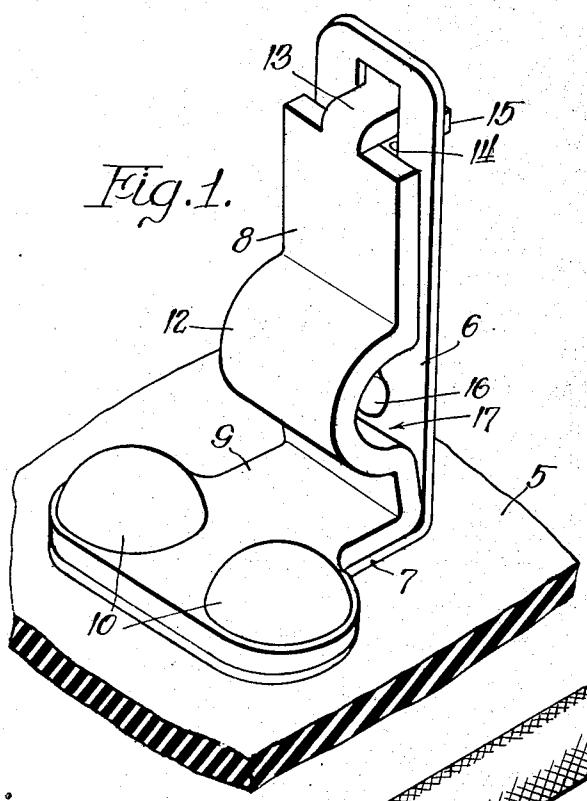


Fig. 3.

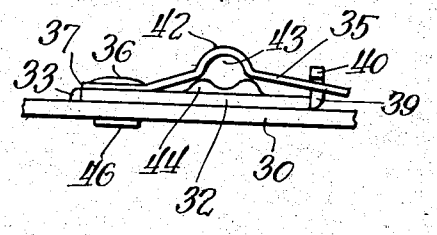


Fig. 5.

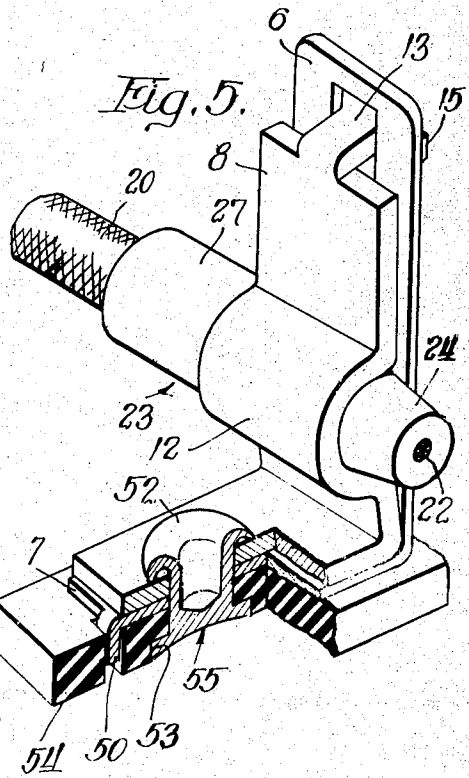


Fig. 4.

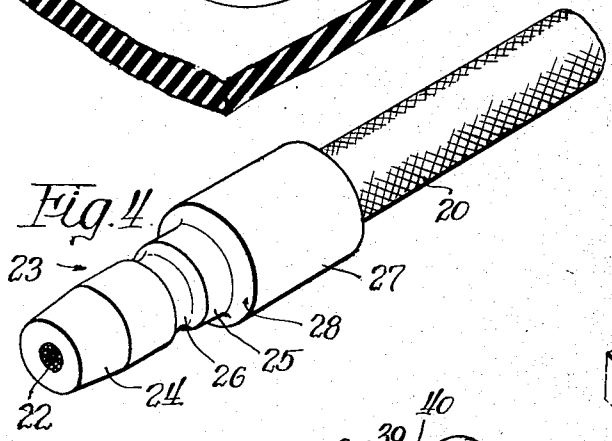
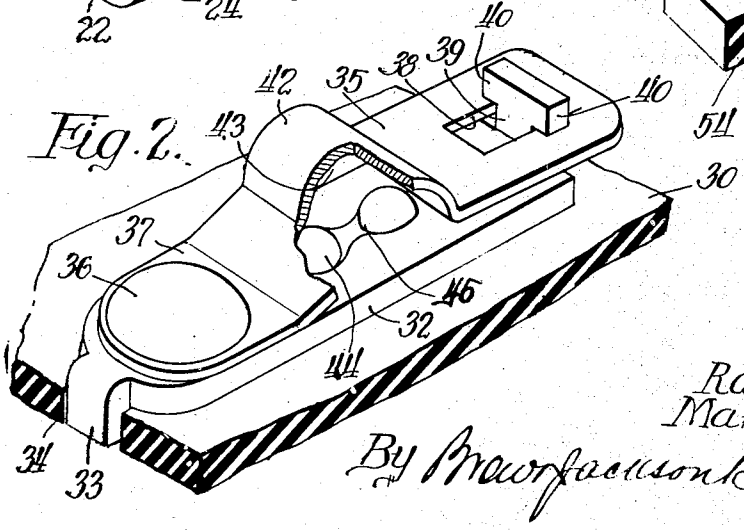


Fig. 2.



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2,131,581

TERMINAL ASSEMBLY

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Application January 7, 1935, Serial No. 620

6 Claims. (Cl. 173—328)

This invention relates to terminal assemblies, and is more particularly directed to assemblies of the type commonly known as terminal plug connectors.

Such terminal assemblies are employed for connecting electrical conductors or lead wires to switch contacts, terminal plates, and similar electrical contacting or connecting structures. We have found that it is essential, in this type of structure, to provide a terminal assembly having means for receiving a wire lead and capable of effecting positive mechanical and electrical contact therewith. Further, we have found that the terminal assembly should be of such construction that it may receive, within reasonable limits, various sizes and styles of wire leads.

The present invention provides a terminal assembly having these distinctly advantageous characteristics. In addition, the present assembly is of relatively simple design, being formed entirely from metal stampings that are capable of economical production and assembly.

As a further object of the present invention, we provide a terminal assembly of small size, which can be readily mounted in position upon a terminal plate or the like. This permits the mounting of a plurality of separate or independent terminals upon a terminal plate within a limited space, to provide a plurality of separate switch contacts or the like upon a single plate member.

Another object of the present invention resides in the provision of a structure wherein the lead wire is locked in fixed position within the assembly, and yet may be readily withdrawn therefrom when the wire is to be disconnected from the terminal.

A still further advantage secured by our invention is that the lead is automatically secured in connected position merely by the insertion of the terminal plug end of the lead wire into the assembly, thus facilitating the connection of the lead to the terminal or switch contacts.

Other objects and advantages of our invention will appear more fully from the following detailed description, which, taken in conjunction with the accompanying drawing, will disclose to those skilled in the art the particular construction and operation of a preferred form of the present invention.

In the drawing:

Figure 1 is a perspective view of one form of terminal assembly provided by our invention;

Figure 2 is an enlarged perspective view, with a portion of the structure broken away, showing a modified form of the invention;

Figure 3 is an elevational view of the structure shown in Figure 2;

Figure 4 is a detailed perspective view of the plug end of one form of lead wire used with the terminal assembly; and

Figure 5 is a perspective view, partly in section, of a terminal assembly corresponding to that of Figure 1, showing a lead wire in connected position.

Referring now in detail to Figure 1, we disclose a terminal plate or switch closure member, indicated generally at 5, which preferably is formed of insulation or the like, although it is to be understood that the plate may be formed of metal if desired. Mounted upon the plate or insulating supporting member 5 is a terminal assembly comprising a spring member 6 of generally L-shape, having the base portion 7 thereof lying upon the upper surface of the plate 5, and provided with an enlarged end portion adapted to receive suitable securing means for mounting it in fixed position upon the base 5.

Mounted in superposed relation upon the base 7 of the spring portion 6 of the terminal assembly, which is preferably formed of spring bronze or the like, is a frame member 8 having a base portion 9 of the same general configuration as the base 7 of the spring 6, the bases 7 and 9 being provided with spaced openings through which a pair of rivet members 10 are adapted to extend to secure the members 6 and 8 in fixed non-rotative position upon the base 5 of the assembly.

The frame member 8 is provided with a semi-cylindrical or rounded portion 12 formed intermediate the ends of the vertical portion thereof, and which extends outwardly away from the plane of the member 6. At its upper end, the frame member 8 is provided with an extending tongue portion 13 which projects normally from the surface of the member 8 in a direction opposite to the portion 12 thereof, and which is adapted to project through a longitudinally extending slot 14 formed in the vertical portion of the spring member 6. Preferably, the tongue 13 is provided with oppositely extending ear portions 15 for locking the end of the member 6 against lateral movement away from the frame member 8, there preferably being a limited amount of movement therebetween to accommodate longitudinal sliding movement of the member 6 with respect to the frame member 8.

The member 6 is also provided, intermediate the ends of the vertically extending portion thereof, with a raised boss portion 16 struck out from the surface thereof, and projecting into the open-

ing 17 formed between the members 6 and 8 by the rounded portion 12 of the member 8.

Referring now to Figure 4, we provide a conductor 20 having the central conductor wire 22 therein, from which the insulation has been stripped back rearwardly from the end of the wire. Mounted over the bared portion of the conductor 20, we provide a plug terminal member indicated generally at 23, comprising a tapered end portion 24, a pair of cylindrical portions 25 of substantially the same diameter and spaced apart by an intermediate annular groove 26, and an enlarged cylindrical portion 27 forming, with the rear cylindrical portion 25, an annular shoulder 28 therebetween.

Upon the insertion of the end 24 of the conductor or lead wire 20 into the opening 17 of the terminal assembly, the tapered surface serves to force the spring member 6 outwardly away from the rounded portion 12 of the member 8. This movement is further augmented by the engagement of the tapered surface 24 with the boss 16 of the member 6, whereby the member 6 is sprung away from the member 8 a distance sufficient to accommodate the passage of the sleeve portion 25 of the plug 23 into the opening 17. Upon continued insertion of the conductor 20, the normally extending shoulder 28 passes into abutting engagement with the defining edges of the members 8 and 6, limiting further inward movement of the lead wire. At this time the annular groove 26 is positioned over and receives the boss portion 16, whereby the conductor is locked against accidental withdrawal or displacement from the terminal assembly.

It will thus be apparent that merely by inserting the conductor 20 inwardly of the opening 17 between the members 8 and 6, wiping contact is effected between the internal surface of the rounded portion 12 of the member 8 and the surfaces 24 and 25 of the conductor. This serves to provide a clean, bright and effective electrical contact of low resistance between the terminal assembly and the conductor, and as the shoulder 28 moves into abutting engagement with the lateral edges of the terminal assembly, provides for positioning of the surfaces 25 in proper contacting engagement with the rounded portion 12 of the frame member 8, and positions the conductor in such manner that accidental movement of the conductor outwardly of the terminal assembly is prevented. At the same time, tension is placed upon the member 6, so that a non-vibrating and positive mechanical and electrical contact with the conductor is secured.

When it is desired to remove the conductor, this may be accomplished by merely placing sufficient tension thereupon to spring the member 6 outwardly sufficiently to pass the surface 25 over the boss portion 16 of the member 6. The flexing of the spring member 6 results in longitudinal movement thereof with respect to the tongue 13, it being guided for movement thereon in order to maintain the terminal assembly in proper alignment during insertion and withdrawal of the conductor.

Referring now to Figure 2, in which is disclosed a modified type of terminal, this terminal is adapted to be mounted upon a base 30 corresponding to the base 5 of Figure 1, and comprises a planar frame member 32 lying upon the upper surface of the base 30 and provided with an integral tongue 33 extending downwardly into a suitable recess 34 formed in the base to key the member 32 against rotation with respect to the base. A spring member 35, preferably formed of spring bronze or the like, is adapted to be mounted in superposed position over the member 32 by means of a rivet 36 extending through the base portion 37 of the spring member 35 and through the base member 32, whereby the members 32 and 35 are fixed in position upon the base 30. The spring member 35, at its opposite end, is provided with a longitudinal slot 38, which is adapted to receive the normally extending tongue 39 formed at the outer end of the base member 32, which tongue is provided with laterally offset extending ear portions 40 for keying the member 35 to the base 32 to prevent upward displacement of the member 35 with respect thereto.

The member 35 has an outwardly rounded portion 42, corresponding to the portion 12 of the member 8, which is adapted to form, with the member 32, an opening 43 into which the conductor may be inserted. The member 32 is provided with a raised boss portion 44, corresponding to the raised portion 16 of the member 6, which preferably comprises two enlarged hemispherical portions joined by an intermediate raised connecting portion of smaller diameter, as indicated at 45.

The mode of connecting the conductor 20 to the terminal assembly shown in Figure 2 is substantially the same as described in connection with Figure 1, the end portion 24 of the plug end 23 of the conductor 20 being inserted into the opening 43, and forcing the spring member 35 outwardly away from the base member 32 a sufficient distance so that the portion 25 of the plug 23 may be passed into the space between the members 32 and 35. This disposes the annular groove 26 of the plug 23 directly over the reduced portion 45 of the raised boss 44, whereby the conductor is locked in position against accidental withdrawal from the terminal assembly. The shoulder 28 limits further inward movement of the plug 23 in the same manner as described in connection with Figure 1.

It should be noted, in this embodiment of the invention, that the rivet member 36, which secures the members 32 and 35 in fixed position upon the base 30, is provided, upon the lower surface of the base, with a contact surface portion 46, which, if desired, may form a switch contact terminal adapted to be engaged by the movable arm of suitable switch operating mechanism, or which may comprise a fixed terminal to which is secured a suitable switch contact assembly, such as a spring finger or the like. If desired, the contact portion 46 of the rivet 36 may be disposed in a recessed portion of the lower surface of the base 30, whereby it lies in the plane of this surface, so that no projection outwardly of the surface is provided, whereby the switch arm or similar contacting mechanism will not be moved into abutting engagement with the lateral edges of this contact surface, but will pass smoothly over the same to effect proper wiping and contacting engagement therewith.

As shown in Figure 5, in which the conductor 20 is shown as inserted into position within a modified form of the terminal assembly structure shown in Figure 1, it will be noted that the tapered portion 24 of the plug end 23 of the conductor projects outwardly from one side of the terminal assembly, while the shoulder 28 is moved into abutting engagement with the opposite side of the terminal assembly. In this particular embodiment of the invention, the base portion 7 of

the spring member 6 is provided with a downwardly extending tongue member 50, corresponding to the tongue member 33 of Figure 2, which keys the base 7 against rotation with respect to the insulating supporting plate 5. At the same time, instead of a pair of rivets 10 being employed, only a single rivet 52 is provided, which rivet, at its opposite end, is disposed within a suitably recessed portion 53 of the insulating plate member 54, and is adapted to be provided with a smooth contacting surface 55 forming a switch contact surface lying in the plane of the lower surface of the base member 54.

It is obvious that various modifications of the particular manner of mounting the terminal assembly in position, and of interlocking the base member and spring member together, may be employed within the scope of the present invention, and that the lead-in end of the conductor may be formed in any manner capable of providing the desired spring action and contacting engagement. We therefore do not intend to be limited to the exact structure shown and described, but only as defined by the scope and spirit of the appended claims.

We claim:

1. In combination, a terminal assembly for receiving a plug end of a conductor comprising a rigid frame member having a raised boss intermediate its ends, a spring member secured at its ends to said frame member and having an intermediate arcuately rounded portion extending about said raised boss, and means for preventing movement of one end of said spring member away from the adjacent end of said frame member but providing for sliding movement longitudinally thereof, whereby the plug end of said conductor may be inserted into the rounded portion of said spring member with said boss engaging in the lateral surface of said conductor to hold said conductor in engaged position.

2. In combination, in a terminal assembly of the class described, a base, a rigid frame member, a spring member, means for securing one end of said frame member and one end of said spring member to said base, a terminal receiving arcuately curved recess formed in one of said members intermediate the ends of the latter, and interlocking means connecting the opposite ends of said members and accommodating longitudinal movement of the spring member relative to the rigid frame member so as to provide for relative arching movement of the intermediate portions of said members.

3. A terminal assembly of the class described comprising a rigid frame member, a spring member disposed in alinement therewith, means at one end of said members for clamping said members together, there being a longitudinal slot at the other end of one of the members and a part on the other end of the other member received in said slot for preventing the ends thereof from separating, the engagement of one end of the slot with said part serving as means for limiting the arching movement of the intermediate portion of said spring member away from said rigid frame member, and means formed in the intermediate portions of said members between said clamping means at one end and said slot means at the opposite end defining a conductor-receiving opening.

4. A terminal assembly comprising an insulating base, a rigid frame member and a resilient spring member mounted at one end on said base, one of said members having an arcuate rounded portion intermediate its ends forming between said members a conductor-receiving opening, one of said members having a longitudinal slot adjacent its free end and the other of said members having a normally projecting tongue adjacent its free end engaging in said slot and providing for relative longitudinal movement of said free ends of said members to accommodate arching of the intermediate portion of said spring member away from said frame member, and means on said tongue comprising oppositely extending shoulders projecting over the outer surface of said slotted member and spaced close to the face of said other member to prevent any substantial amount of movement of the free end of the spring member relative to the rigid frame member except to accommodate longitudinal movement of the spring member relative to the free end of the frame member when receiving a conductor.

5. A terminal assembly comprising a base, a rigid terminal frame member and a resilient spring member disposed alongside said rigid frame member, said members being apertured adjacent one end of each, fastening means disposed through said apertures for securing both of said members to said base, one of said members having at its opposite end a normally projecting tongue having a laterally extending head section, there being a longitudinal slot formed in the adjacent end of the other member, said slot being long enough to provide for insertion of the head section of said tongue through said slot before said fastening means has been inserted in said apertures to fasten said members to the base, and said head section lying against the outer face of the slotted end so as to hold the slotted member closely adjacent the face of the other member, the length of said slot also being sufficient to accommodate longitudinal movement of the spring member relative to the rigid member while the contact between the head section of said tongue serves to hold the spring member closely adjacent to the face of said rigid frame member, and means on at least one of said members serving as conductor-receiving means intermediate the ends of said member and arranged so that the spring member resiliently holds the conductor in position.

6. A terminal assembly comprising a pair of members one of which is resilient, means rigidly connecting one end of one member to the adjacent end of the other, means connecting the opposite ends of said members together so that the central portion of said one member tends to lie closely adjacent the central portion of the other member, there being an outwardly curved section intermediate the ends of one of said members to form a conductor-receiving recess, and a boss having a pair of protuberances on the other member facing inwardly toward said recess to engage and yieldingly hold a conductor in said curved section.

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