

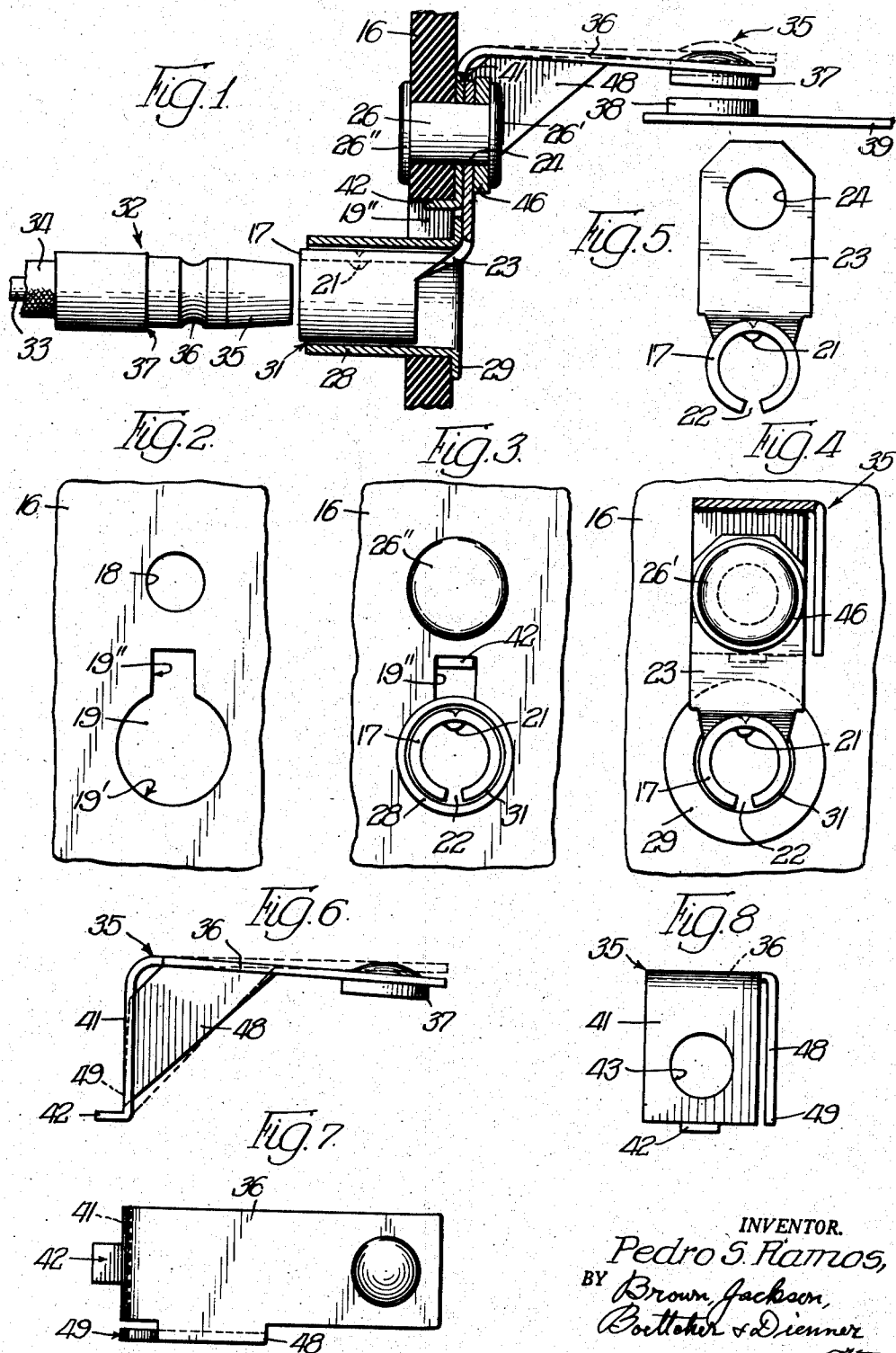
Aug. 25, 1953

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2,650,286

ELECTRICAL TERMINAL

Filed June 27, 1951



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UNITED STATES PATENT OFFICE

2,650,286

ELECTRICAL TERMINAL

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Application June 27, 1951, Serial No. 233,771

3 Claims. (Cl. 200-166)

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The present invention relates to electrical terminals of the plug-in type adapted to be mounted in an insulating panel or the like, for establishing plug-in electrical connection with a contact blade, contact clip or other electrical element carried by the panel. This type of electrical terminal provides a receptacle for receiving the plug-in end of the electrical conductor, and also provides an anchoring attachment for the contact blade, contact clip or other electrical element to which the electrical conductor is to be connected.

One of the principal objects of the present invention is to provide an electrical terminal of the above general description having an improved construction of radially expansible receptacle for resiliently receiving the plug-in end of the detachable conductor. This receptacle is provided with a longitudinal split for giving the desired resiliency to the receptacle. The presence of this longitudinal slit alone may leave the receptacle weak in the sense that if the plug-in end of the electrical conductor is forcibly pushed or pulled sidewise in the direction of this longitudinal slit there is the possibility of the slit widening to the point of permanent deformation, or to the point where the plug-in end of the conductor is released. I have avoided this objection by the unique provision of a surrounding eyelet which gives the longitudinally split receptacle ample space for a normal degree of radial expansion when the plug-in end of the conductor is inserted therein, but which prevents the longitudinally split side of the receptacle being opened or separated to an abnormal degree.

Another feature of the invention resides in the provision of an improved blade on the electrical terminal, carrying a relatively stationary contact adapted to be engaged by a relatively movable contact. This improved blade is maintained in a prestressed condition which allows the stationary contact to yield slightly when engaged by the movable contact, for the maintenance of resilient pressure between the contacts, but which positively limits motion of the stationary contact in a direction toward the movable contact when the contacts separate, so that there is no possibility of contact timing being disturbed by the blade being flexed or bent beyond a predetermined inner limit of movement toward the movable contact.

Another more specific object of the invention is to provide electrical terminals of the above general description which will be very inexpensive to manufacture and assemble, and which

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will have long wearing life. Other objects, features and advantages of the invention will appear from the following detail description of one preferred embodiment thereof. In the accompanying drawing illustrating such embodiment:

Figure 1 is a transverse sectional view through the electrical terminal, this view and the succeeding views being on a considerably enlarged scale for clarity of illustration;

Figure 2 is a front view of the insulating panel or other support, showing the two holes which are molded or punched therein for mounting each terminal;

Figure 3 is a front elevational view of the mounted terminal, as viewed from the front side of the insulating panel;

Figure 4 is a rear elevational view of the mounted terminal, as viewed from the rear side of the panel;

Fig. 5 is a front elevational view of the split receptacle and its apertured mounting lug or tongue; and

Figures 6, 7 and 8 are side, plan, and end views, respectively, of an improved contact mounting blade carried by the terminal.

In the exemplary embodiment illustrated in Figures 1, 3 and 4, I have shown my improved electrical terminal as serving to mount a relatively stationary contact 37 on an insulating panel 16, and serving to provide a plug-in receptacle 17 for receiving the plug-in end of a conductor to be connected with said stationary contact. The insulating support 16 is typically represented by a panel or plate composed of "Bakelite" or the like, but it will be understood that this insulating support may be constructed in any other form desired. Preparatory to the mounting of the electrical terminals in the insulating panel, two closely spaced holes 18 and 19 are provided in the panel for each electrical terminal, either in the original molding of the panel, or by punching or cutting operations thereafter performed in the panel. The hole 18 is an ordinary cylindrical hole for receiving an attaching rivet, as will be later described. The hole 19, preferably disposed closely adjacent to the hole 18, has a circular portion 19', and a rectangular notch portion 19'' extending from the circular portion in the general direction of the cylindrical hole 18.

The expansible receptacle 17 extends through the cylindrical portion of the key-shaped hole 19. This receptacle is composed of a sheet metal stamping curled in the form of a cylindrical tube and having a split line 22 extending the length

of the cylindrical receptacle along one side thereof. This split line 22 gives the receptacle the desired radial expansibility when the plug-in member on the end of the electrical conductor is forced into the receptacle. Punched into the wall of the receptacle 17, preferably opposite to the longitudinal split 22, is a radial indentation which forms an inwardly projecting detent hump 21 adapted to snap into an annular groove in the conductor plug, as will be later described.

Projecting at right angles from the inner end of the receptacle 17, at a point opposite to the split line 22, is a mounting tongue or lug 23. This tongue is formed integral with the receptacle 17 and is apertured at 24 so as to provide an apertured mounting lug extending parallel with the back surface of the insulating panel 16. The aperture 24 in this lug is adapted to be lined up with the cylindrical aperture 18, for receiving the anchoring rivet 26, after the assembly of the terminal has been completed.

Prior to the mounting and attachment of the expansible receptacle 17, the cylindrical portion 19' of the hole 19 is lined with a metallic eyelet 28 having a beaded inner end 29 which overlies the cylindrical portion 19' of the hole 19 on the back side of the insulating panel 16. The inner diameter of this cylindrical eyelet 28 is slightly larger than the outer diameter of the expansible receptacle 17, and the two parts are approximately aligned so that a small space 31 is provided between the outside of the receptacle and the inside of the eyelet. This space 31 is proportioned so that it will permit a normal degree of radial expansion of the receptacle 17 when the plug-in end of the conductor is inserted therein, but this space 31 is made sufficiently small so as to prevent the longitudinally split side 22 of the receptacle 17 being opened or separated to an abnormal degree by the plug-in end of the conductor.

The plug-in conductor end is indicated at 32, preferably consisting of a shaped tubular piece which is soldered or crimped over the stranded or solid wire 33 of the insulated conductor 34. This plug-in end or tip 32 has a tapered extremity 35 which facilitates introduction into the expansible receptacle 17. An annular groove 36 in back of this tapered extremity is adapted to have snap engagement over the detent hump 21 in the receptacle for holding the conductor plug in place. The radial expansibility of the receptacle, afforded by the longitudinal slot 22, facilitates the snap engagement between the detent hump 21 and the detent groove 36. An outwardly extending shoulder 37 is adapted to limit the distance that the plug-in tip can be pushed into the receptacle, by striking the outer edge of the receptacle. The eyelet 28 serves to prevent any injurious deformation of the split receptacle 17, arising either from the insertion of the plug-in tip 32 at a sidewise angle, or from a side-wise pull transmitted through the conductor 34 after insertion of the plug-in tip. For example, if the plug-in tip is inserted into the receptacle at a cocked angle with the outer end of the tip tending to press outwardly at the split line 22, the receptacle might be spread apart at the split line, if it were not for the eyelet 28. This eyelet limits the radial expansion of the receptacle occurring at the split line in the event that the plug-in tip 32 is thus inserted into the socket at a cocked angle. After the plug-in tip 32 has been pushed home into the receptacle 17, a lateral pull or jerk on the conductor 34 in the plane

of the split line 22 can also tend to cause the spreading deformation of the split receptacle. However, here again the surrounding eyelet 28 prevents such deformation of the receptacle in response to any lateral pull on the conductor 34.

Referring now to the electrical element which is mounted on the insulating panel 16 in electrical connection with the terminal receptacle 17, such electrical element is designated 35 in its entirety, and is shown in the form of a relatively stationary blade member 36 carrying a relatively stationary contact 37. This stationary contact 37 is adapted to be engaged by a movable contact 38 carried by a movable switch blade or contact spring 39 responding to a cam, solenoid or any other instrumentality for moving the movable contact into and out of engagement with the stationary contact 37. Formed integral with the blade member 36 is an angularly extending base portion 41, from the end of which is bent a narrow anchoring lug 42. An aperture 43 in the base portion 41 is adapted to receive the rivet 26. The narrow anchoring lug 42 is adapted to enter the rectangular notch portion 19'' of the hole 19 in the insulating panel 16. This assembled relation is clearly illustrated in Figure 1, from which it will be seen that the base portion 41 of the electrical element 35 is brought into registration with the rivet hole 18, and with the anchoring lug 42 extending down into the rectangular notch portion 19''. The reinforcing eyelet 28 is inserted into the cylindrical portion 19' of the hole 19 at this same time, and the receptacle 17 is then inserted into the eyelet, with the mounting tongue 23 extending across the back surface of the eyelet 28 and across the back or outer surface of the base portion 41, the aperture 24 in said mounting tongue being aligned with the aperture 43 and with the rivet hole 18. Thereupon, the rivet 26 is passed through the tongue 23, base portion 41 and panel 16 to hold the three elements 17, 28 and 35 in place. A washer 46 is preferably interposed between the inner head 26' of the rivet and the apertured tongue 23, although this is not essential. In those situations where a bus bar is employed to establish multiple connection between two or more electrical elements 35, such bus bar may occupy the position of the washer 46. The heading of the rivet may be preformed at the inner side 26' or at the outer side 26'', as desired. It will be observed that the engagement of the anchoring tongue 42 in the rectangular notch portion 19'' of the hole 19 fixedly holds the contact carrying blade element 36 against any possibility of swiveling around the axis of the rivet 26. As previously stated, the single rivet 26 serves to rigidly secure all three elements 17, 28 and 35 in fixed position on the insulating panel 16.

The blade 36 which carries the stationary contact 37 is provided with a unique arrangement of inclined stop arm 48 for the purpose of limiting flexure of this blade 36 in a direction toward the movable contact blade 39. This stop arm 48 consists of a tab of metal which is formed integral with the side edge of the blade 36 and which is bent downwardly so that it extends in the relation of an inclined gusset or strut which presents an abutment edge or point 49 adapted to abut the rear surface of the insulating panel 16 alongside the attaching base portion 41. The blade and stop arm are shaped and bent so that the abutment point 49 normally bears against the insulating panel 16 in a prestressed condition

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when the movable contact 38 is separated from the stationary contact 37. This position of the parts is illustrated in full lines. When the contacts come into engagement the movable contact exerts sufficient pressure against the stationary contact 37 to cause the blade 36 and stop arm 48 to flex upwardly substantially to the position illustrated in dotted lines. This maintains the two contacts 37 and 38 pressed together with a resilient pressure engagement. When the contacts begin to separate the stationary contact 37 starts to follow the movable contact 38 in a downward direction, but such motion is positively limited by the abutment point 49 striking the surface of the insulating panel. Furthermore, this diagonal stop arm 48 prevents any possibility of the blade 36 being accidentally bent downwardly to such an extent that it might upset proper timing of engagement or disengagement between the contacts 37 and 38.

While I have illustrated and described what I regard to be the preferred embodiment of my invention, nevertheless it will be understood that such is merely exemplary and that numerous modifications and rearrangements may be made therein without departing from the essence of the invention.

I claim:

1. In an electrical terminal for mounting in an insulating panel, the combination of two spaced holes in said panel, a tubular receptacle disposed in one of said holes, a connecting lug extending from said receptacle and having an aperture thereon aligned with the other of said holes, an electrical element having an apertured base portion aligned with said latter hole, a rivet passing through said hole, said apertured lug, and said apertured base portion, a contact bearing arm extending from said apertured base portion, and a stop arm extending from said contact bearing arm and moving directly therewith in all flexure of said contact bearing arm, said stop arm adapted to engage a stop surface for limiting flexure of said contact bearing arm in one direction relatively to said base portion.

2. In an electrical element of the class described, the combination of a base portion, a contact bearing arm extending laterally from said

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base portion carrying a relatively stationary contact adapted to be engaged by a relatively movable contact which tends to flex said contact bearing arm in a direction away from said base portion, and a stop arm carried by said contact bearing arm and moving directly therewith in all flexure of said contact bearing arm, said stop arm extending diagonally from said contact bearing arm in a direction toward said base portion and adapted to engage a stationary stop surface for limiting flexure of said contact bearing arm in a direction toward said relatively movable contact.

3. In an electrical element of the class described, the combination of a base portion, a contact bearing arm extending laterally from said base portion carrying a relatively stationary contact adapted to be engaged by a relatively movable contact which tends to flex said contact bearing arm in a direction away from said base portion, and a stop arm found integrally with said contact bearing arm to move directly therewith in all flexure of said contact bearing arm, said stop arm extending diagonally from said contact bearing arm in a direction toward said base portion and adapted to engage a stationary stop surface for limiting flexure of said contact bearing arm in a direction toward said relatively movable contact, said contact bearing arm being prestressed so that it tends to hold said stop arm against said stop surface except when said contacts are in engagement.

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