Sept. 8, 1942. T. OBSZARNY 2,295,266

SOCKET FOR PLUG-IN DEVICES

Filed Aug. 18, 1941

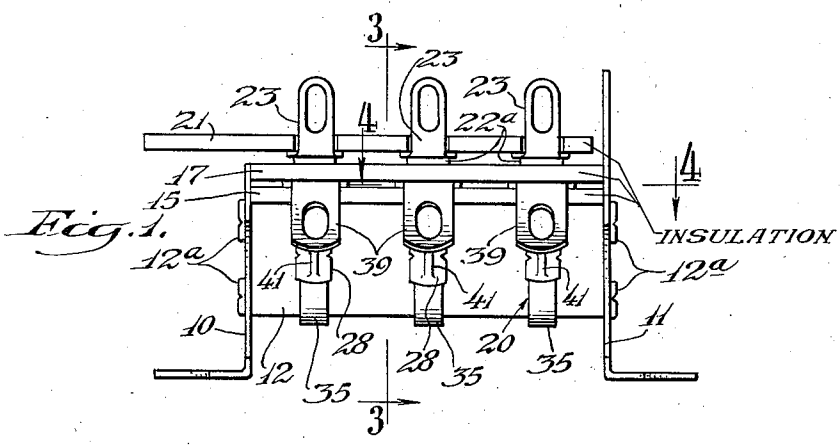


Fig. 1.

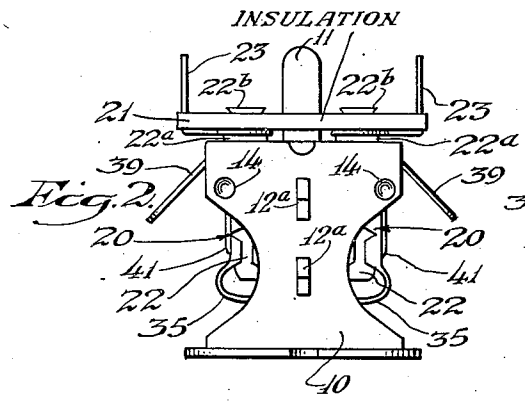


Fig. 2.

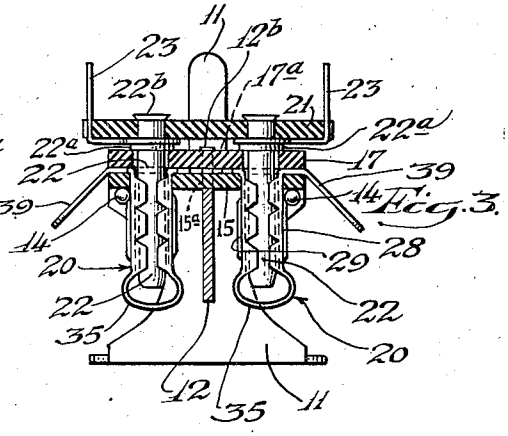


Fig. 3.

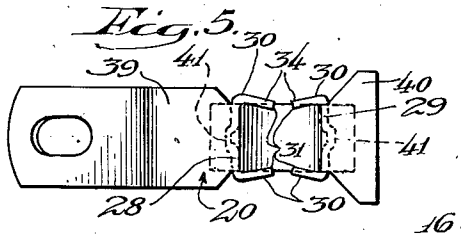


Fig. 5.

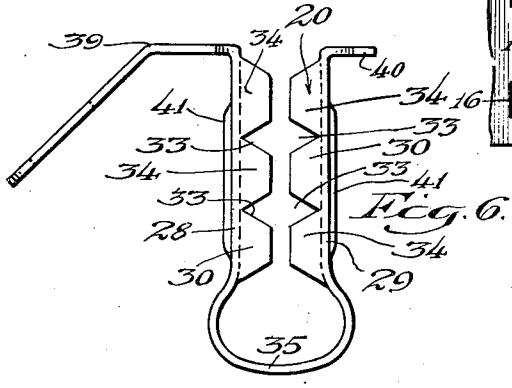


Fig. 6.

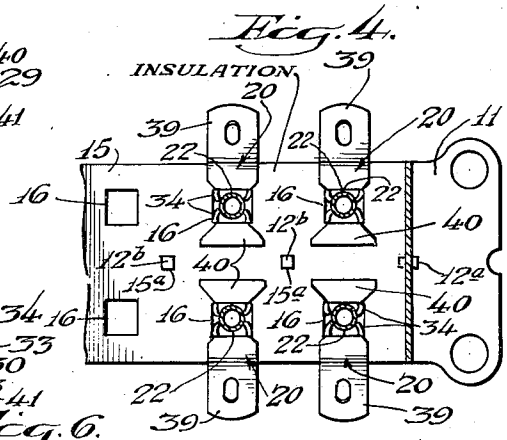


Fig. 4.

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SOCKET FOR PLUG-IN DEVICES

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7 Claims. (Cl. 173—332)

The present invention relates to detachably connectible devices for completing portions of electrical circuits, and more particularly to devices of the socket and pin terminal type. Devices of this general class are usually employed in group or bank assemblies for simultaneously connecting and disconnecting a multiplicity of electrical circuits.

More specifically this invention pertains to sockets of the type adapted to be supported at their upper ends upon a panel or other suitable supporting surface in registry with an aperture or opening to permit insertion therein or removal therefrom of a cooperating pin terminal.

One of the primary objects of this invention is to provide a novel and improved socket of the character indicated which is constructed and arranged to provide a plurality of circumferentially spaced apart longitudinally extending contact elements adapted for embracing the surface of a pin terminal, and wherein one or more of said contact elements are formed to provide a plurality of longitudinally spaced apart separate, yieldable contact fingers.

Another object is to provide an improved socket of generally U-shaped formation fabricated from a single piece of spring metal and characterized by the provision of a pair of spaced apart upright legs having their longitudinal marginal edges bent inwardly to present sharp knife edges for contacting the pin terminal throughout a substantial portion of its length.

A further object is to provide an improved socket of the character indicated characterized by the provision of a generally U-shaped metal stamping including a pair of spaced apart upright legs, the longitudinal marginal edges of which are bent inwardly to provide contacts for engagement with a pin terminal throughout a substantial portion of its length, and therein the portion connecting the lower ends of said legs is bulged outwardly to constitute a bow spring having a tendency to urge the upper ends of said legs apart.

Still another object is to provide a novel and improved form of socket of the character indicated which is simple in construction, economical to manufacture, and formed for insuring long life and positive operation.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawing in which:

Figure 1 is a side elevation of an assembly of a multiplicity of pin terminals and sockets embodying the present invention.

Figure 2 is an end elevation of the assembly.

Figure 3 is a vertical section through the assembly, taken substantially as indicated at line 3—3 of Figure 1.

Figure 4 is a horizontal section through the assembly, taken as indicated at line 4—4 on Figure 1.

Figure 5 is a top plan view of my novel form of socket structure embodying the present invention.

Figure 6 is a side elevational view of my improved socket.

For purposes of illustration, I have herein shown in the drawing an assembly of pin terminals and cooperating sockets in bank relation. It is manifest however that various other types of assemblies or grouping arrangements of terminals and sockets may be made.

In certain fields of use, the pin terminals and sockets when embodied in assemblies such as represented in Figures 1 to 4, are frequently termed plug and jack units. For convenience however the cooperating detachably connectible elements will hereinafter be referred to in this specification, as well as in the claims, as pin terminals and sockets.

In the assembly disclosed in Figures 1 to 4 of the drawing, there is shown a socket carrying structure or frame including a pair of stamped metal end plates indicated at 10 and 11 respectively, adapted to be secured to a suitable mounting. Said end plates are rigidly secured together by an upright longitudinally extending tie bar 12, the ends of which are formed with lug extensions indicated at 12*a* adapted to be extended through apertures formed in the respective end plates 10 and 11, and upset or peened over to form a rigid attachment of the elements 10, 11 and 12.

Each of the end plates is formed with a pair of horizontally spaced apart inwardly extending nubbins 14 upon which the end portions of a horizontally disposed insulating panel 15 is supported. Said panel 15 is also supported upon the upper edge of the tie bar 12, as hereinafter described.

The socket elements which are designated generally at 20 are supported and disposed in two parallel spaced apart rows from said panel 15 by seating of the body of the socket members in rectangular shaped apertures 16. The sockets are firmly held in place on panel 15 by a second superimposed panel of insulating material desig-

nated at 17, as clearly seen in Figures 1 and 3 of the drawing.

The two panels 15 and 17 with the sockets mounted in proper position, are rigidly clamped together to the tie bar 12 by means of upstanding lugs 12b formed in longitudinally spaced apart relation on the upper edge of said tie bar, and which lugs are adapted to be extended upwardly through apertures 15a and 17a of the respective panels. Said lugs 12b are peened over to form a rivet connection for rigidly securing the panels in fixed relation on the frame structure, composed of the end members 10 and 11 and the tie bar 12. The structure thus far described may be conveniently referred to as the socket assembly or socket unit assembly.

Adapted for cooperation with the sockets 20 of the socket assembly is a terminal assembly or unit which is composed of a panel 21 of insulating material carrying a plurality of depending pin terminal elements 22 located in parallel banks corresponding in spacing and location to the sockets of the socket assembly. Each of the pin terminals is in the form of a tubular element having a shoulder 22a disposed beneath the panel with an electrical conductor terminal 23 interposed between the shoulder 22a and the under side of the panel. The conductor terminals 23, for convenience, are formed of light sheet metal and are bent upwardly around the outer marginal edge of the panel 21 in upstanding relation, as seen in the drawing, to provide convenient attachment, such as by soldering, to the terminal ends of conductor wires of electrical circuits. The pin terminals 22 with the conductor terminals 23 are rigidly secured to the panel 21 by having the upper end of the terminals riveted over at the upper side of the panel, as indicated at 22b.

The socket members 20 constituting the present invention are formed of a single piece of spring metal and are in the nature of stampings. Said sockets are of generally U-shaped formation and each include a pair of upright spaced apart legs 28 and 29. The longitudinal marginal edges of each of the legs 28 and 29 are bent inwardly as indicated at 30, and as clearly seen in Figure 5 of the drawing, so as to present longitudinally extending sharp knife edge surfaces 31 adapted for biting engagement with the surface of the pin terminal 22 when inserted in said socket.

By virtue of this construction the contact surfaces 31 engage the surface of the pin terminal throughout a substantial portion of the length thereof. Each of the marginal bent portions 30 are notched as indicated at 33 so as to divide each of said portions 30 into a plurality of separate yieldable contact fingers 34. As herein shown there are two notches formed in each of the bent marginal portions 30, thus providing three separate yieldable contact fingers on each of said portions 30, and in effect providing 12 separate yieldable contact fingers for each socket for engagement with the surface of a pin terminal. By virtue of this relatively large number of separate contact fingers, electrical contact with the pin terminal is always assured. Furthermore, by reason of the biting knife edge 31 of each of the fingers, the pin terminal will be cleansed of foreign matter as it is inserted and withdrawn from the socket, and thus further insure proper electrical contact between the pin terminal and the socket.

The lower ends of the legs 28 and 29 of the socket element are connected together by an outwardly bulging portion 35 which in effect constitutes a bow spring having a tendency to yieldingly separate the upper ends of the legs 28 and 29. Thus, when the socket is inserted in the rectangular aperture 16 of the supporting panel 15, the bow spring portion 35 tends to urge the upper ends of the legs of the socket outwardly in a direction against the edges of said opening 16.

The upper end of the leg 28 of the socket terminates in an outwardly and downwardly extending conductor terminal clip 39 which, for convenience, is apertured for suitable connection to the end of a conductor wire of an electrical circuit. The upper end of the other leg 29 is bent outwardly, as indicated at 40, in opposite relation to the terminal portion 39 and which together serve to provide supporting flanges for the socket when seated in the aperture 16 of the supporting panel.

The socket 20 is so dimensioned and arranged that, when normally supported in the panel 15, upon insertion of a pin terminal 22, said pin terminal will be frictionally engaged by each of the contact fingers 34, as the pin terminal is progressively inserted downwardly into the socket. By reason of the resiliency of each of the separate contact fingers 34, good electrical contact with the pin terminal is positively assured at all times.

In order to permit utilizing relatively thin stock of spring metal for formation of the sockets, each of the leg portions intermediate the marginal inwardly bent portions 30 is formed with a longitudinally extending reinforcing rib 41. Said ribs provide adequate stiffness for the body of the legs and thereby insures good contact of each of the yieldable fingers with the pin terminal.

In connection with one widely used form of socket construction of this general type, it has been found that due to the character and lack of skill of the help assembling devices of this type with other apparatus, or in servicing of such apparatus, that frequently a socket is inadvertently bent out of line. This frequently happens during the process of soldering the conductor wire to the respective conductor terminals of the sockets and the pin terminals. When said sockets are so deformed, it was found that the sockets would frequently be stripped from the supporting panel upon insertion of the pin terminals therein. In the present construction such disadvantage is completely eliminated by reason of the fact that the bow spring portion 35 allows adequate flexibility for full accommodation of the pin terminals upon insertion or withdrawal from the socket, while at the same time insuring good positive electrical contact.

Although I have herein shown and described a preferred embodiment of my invention, manifestly it is capable of modification and rearrangement of elements without departing from the spirit and scope thereof. I do not therefore wish to be understood as limiting this invention to the precise embodiment of the invention here disclosed, except as I may be so limited in the appended claims.

I claim:

1. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange

portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, said side flanges being individually flexible in a lateral direction relatively to the body portions to readily accommodate said pin terminal between said side flanges.

2. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, and the knife edge of one or more of said side flanges being longitudinally notched to provide a plurality of separate knife edge contact fingers adapted to yieldingly engage the surface of the pin terminal when the latter is inserted in said socket.

3. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, said side flanges being individually flexible in a lateral direction relatively to the body portions to readily accommodate said pin terminal between said side flanges, and the knife edge of one or more of said side flanges being longitudinally notched to provide a plurality of separate knife edge contact fingers adapted to yieldingly engage the surface of the pin terminal when the latter is inserted in said socket.

4. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, said side flanges being individually flexible in a lateral direction relatively to the body portions to readily accommodate said pin terminal between said side flanges, the lower end of the socket, constituting the connection between the ends of said legs, being bowed outwardly to serve as a bow spring tending to urge the upper ends of said legs away from each other.

5. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, said side flanges being individually flexible in a lateral direction relatively to the body portions to readily accommodate said pin terminal between said side flanges, and the knife edge of one or more of said side flanges being longitudinally notched to provide a plurality of separate knife edge contact fingers adapted to yieldingly engage the surface of the pin terminal when the latter is inserted in said socket, the lower end of the socket, constituting the connection between the ends of said legs, being bowed outwardly to serve as a bow spring tending to urge the upper ends of said legs away from each other.

6. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, said side flanges being individually flexible in a lateral direction relatively to the body portions to readily accommodate said pin terminal between said side flanges, each of said body portions of said legs being formed with a longitudinally extending reinforcing rib.

7. As an article of manufacture, a socket for a pin terminal, formed as a stamping from spring metal of generally U-shape formation having the upper ends of the legs thereof formed to seat upon a supporting surface, each of said legs including a body portion and resilient side flange portions bent inwardly at an angle to the body portion so that the marginal edge of each of said flange portions presents a sharp knife edge adapted for biting engagement with the surface of the pin terminal when the latter is inserted in said socket, said side flanges being individually flexible in a lateral direction relatively to the body portions to readily accommodate said pin terminal between said side flanges, and the knife edge of one or more of said side flanges being longitudinally notched to provide a plurality of separate knife edge contact fingers adapted to yieldingly engage the surface of the pin terminal when the latter is inserted in said socket, each of said body portions of said legs being formed with a longitudinally extending reinforcing rib.

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