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ELECTRICAL SOCKET FOR MINIATURE COMPONENTS

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FIG. 1

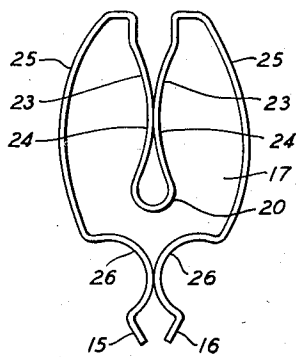


FIG. 2



FIG. 3

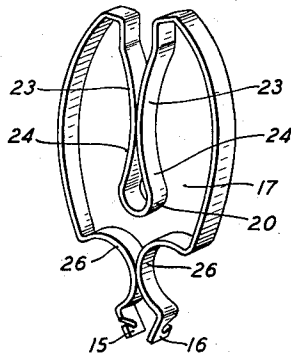


FIG. 4

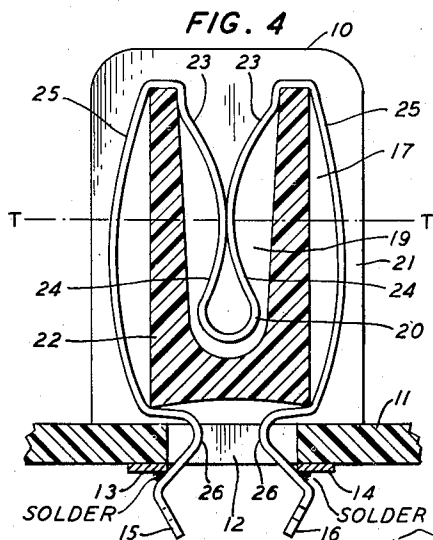


FIG. 5

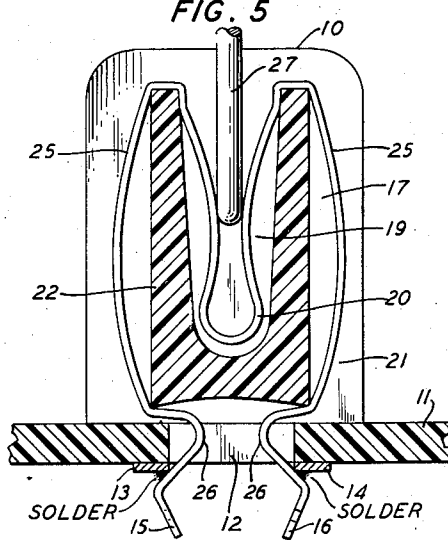


FIG. 6

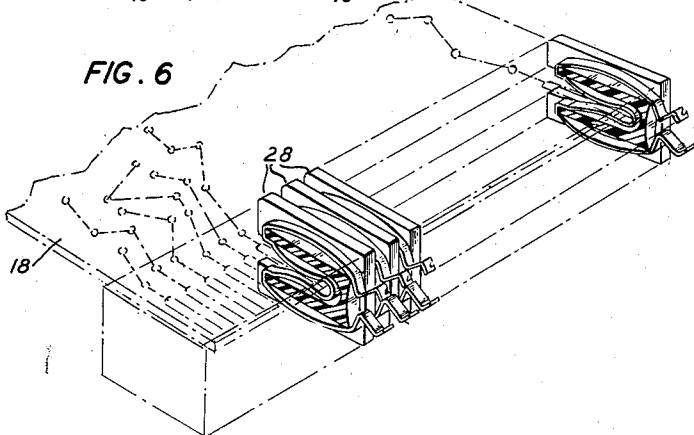
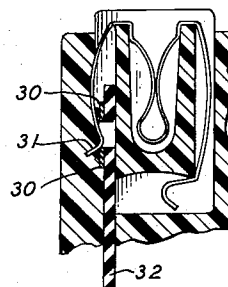


FIG. 7



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## ELECTRICAL SOCKET FOR MINIATURE COMPONENTS

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8 Claims. (Cl. 339-17)

This invention relates to electrical connectors and more particularly to sockets or receptacles wherein miniature components may be readily positioned to effect a reliable electrical connection and yet be readily removed.

Due to the recent developments in the art of electronics it is now possible and practicable to use circuit components which are extremely small. Of necessity these small, and miniature components, must be provided with means for establishing electrical contact with the circuits involved. Therefore, it is imperative that the contact element which is intended to receive the components be not only small and unobtrusive but establish a firm and reliably uniform electrical contact with the component involved, and permit its ready and repeated removals without damage to the apparatus. Furthermore, it is important that the components have a limited amount of free movement in their respective connectors to permit the associated contact members to align themselves when making the connection and to permit some movement between parts to obviate or limit the damage thereto when the component may be mishandled or forced out of position.

It is with the structure of a novel type of socket and contact member therefore that this invention is concerned.

One object of this invention is to provide a socket particularly suitable for the mounting of miniature apparatus components.

Another object of the present invention is the provision of a connector or socket wherein the soldering terminals are remote from the contact portion of the spring.

A further object of the invention is the provision of a connector or socket wherein the spring contact member is a single unitary structure and so shaped as to make a firm and reliable contact to the prong of a member inserted therein.

A still further object is to provide a greatly increased electrical surface leakage path between adjacent spring elements by means of a barrier partition.

A still further object is to provide a floating pin contacting member which though anchored to circuitry does not inhibit the floating characteristic.

In accordance with a feature of this invention, the spring contact is so shaped as to be self-locking to the socket body without additional devices or manipulation to retain other than merely snapping it into position.

Another feature of this invention resides in the provision of a contact spring which is so mounted in a receptacle that it is free floating and will align itself readily with the contact member to be inserted therein though the latter be positioned somewhat from its ideal location or plane of insertion.

A further feature of the invention pertains to the provision of a contact member, which due to its novel shape, wherein the point of tangency of the springs are below the center line of the springs, exerts considerable force on the inserted prong or contact, but permits the ready removal thereof.

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A still further feature of that soldering of the remote ends of the spring contacts can be effected individually or en masse without danger of fouling the contacting surface by flux or its vapors.

The socket of this invention which incorporates a novel type of spring contact member, comprises a plug of insulating material having a recess or recesses. Mounted in each of the recesses thereof is a spring contact member which is adapted to receive and embrace a pin or plug member inserted therein. The contact spring comprises a continuous strip of metal bent back upon itself to provide a downwardly extending loop portion having converging and diverging walls. The contact spring member is out of contact with the side walls of the socket except at its supporting edges and is free to move within the confines of the walls of the recess. The non-pin or plug contacting ends of the contact spring extend over the outer upper surface of the insulating-supporting edges and terminate at the bottom anchoring edges thereof in return bend portions. The extending return bend portions provide resilient means for securing the socket to a supporting "printed wire" panel and also provide means for establishing electrical contact with wiring on the rear of a panel. Between the upper supporting and the bottom anchoring edges of the socket the spring is shaped to bow away from the intervening face of the socket member. In the structure of this invention the soldering elements are isolated from the pin receiving portion of the contact spring by the bottom wall of the insulated member.

The invention will be more clearly understood from following detailed description when read in connection with the accompanying drawing in which:

Fig. 1 is an elevational view of a spring contact member illustrative of this invention;

Fig. 2 is a side elevational view of the contact of Fig. 1;

Fig. 3 is a view in perspective of the contact member disclosed in Fig. 1;

Fig. 4 is a fragmentary cross-sectional view, with the spring contact member of Fig. 1 mounted in an insulating member with the extending portions of the contact spring in contact with conductors on the rear side of an insulating panel;

Fig. 5 is a view similar to Fig. 4 and illustrates the position the contact spring assumes when a contact pin is inserted therein;

Fig. 6 is a fragmentary cross-sectional view partly in phantom which shows the connector of this invention enclosed in a housing and establishing contact with a plurality of conductors on an insulating panel; and

Fig. 7 is a fragmentary view partly in section of a modified form of the connectors shown in Fig. 1 and completely encapsulated.

In the preferred embodiment of my invention, as shown in the drawing, the socket 10 may be mounted on a panel 11 as shown in Figs. 4 and 5, or it may be incorporated in a multi-connector as shown in Fig. 6. The panel 11 is constructed from a suitable insulating material and may be the panel on which circuits and various other electrical components are mounted. In the more compact devices certain of the components and/or circuitry which make up the completed panel, may be printed, painted and adhesively or otherwise secured to the panel. As shown in Figs. 4 and 5, the socket or connector 10 of this invention is illustrated as making contact through a suitable aperture 12 in the panel 11 with the electric conductors 13 and 14 on the opposite or underside of panel 11, with the free ends 15 and 16 of the spring contact member 17 in engagement with the conductors 13 and 14.

In other embodiments of the invention, contacting ele-

ments other than in line, such as circular, rectangular, square or irregular arrangements, are equally feasible and practical.

In the device in Fig. 6, a multi-connector is provided with the main body portion of the connector overlying the circuit cord 18 (shown in dot and dash) with the conductors on the panel engaged by the inner free floating portions of the spring contact member 17.

The socket or connector of my invention comprises a body member 22 of suitable insulating material provided with a central cavity 19 to receive the free floating return bend portion 20 of the spring member 17. The body member 22 is also provided with a flange or partition 10 which extends around the perimeter of the body member 22 which is heretofore described as provided with a cavity 19.

The flange or partition portions on the body member provide separating and insulating wall sections between the adjacent spring members 17.

The insulating body member 22 may be of any suitable length depending upon the number of contacts or circuits to be accommodated by that particular conductor. The spring contact member 17 as shown in detail in Figs. 1, 2 and 3, is constructed preferably from a strong resilient metal having a comparatively low electric resistance. The member 17 is so shaped to provide a good firm electrical contact which permits the easy removal of the cooperating contact member and at the same time, be free floating with respect to the main insulating body portion 22.

The spring 17, as shown, is constructed from a strong resilient metal, for example Phosphor bronze and has a unique configuration in that the central or return bend portion 20, which establishes the electrical contact with the cooperating component, comprises converging and diverging portions 23 and 24. As indicated at T—T, the point of tangency of the converging and diverging portions of the spring member 17 are located below the center line of the free floating return bend portion 20.

The free ends of the member 17, at the upper portion thereof, are bent outwardly at substantially right angles with respect to the free floating portion 20, are bent at 25—25 to provide the outwardly extending arcuate portions and inwardly at their lower ends 16 and 16 to provide the arcuate portions 26—26. This novel type of construction permits the contact spring member 17 to firmly embrace the insulating member 22 and at the same time provides a free floating contact engaging member which firmly engages the pin or contact member 27 of a cooperating device.

In the structure as shown in Fig. 6, a plurality of spring contact members 17 as heretofore described, are mounted on a common insulating member 23 and with the free ends 16 and 16 of the spring member 17 extending from the rear and thereof to permit the electrical contact thereto and to establish electrical contact at their front end as heretofore described.

In the embodiment shown in Fig. 7, the basic structure is somewhat similar to that shown in the other figures except that one of the free ends of the spring 17 is foreshortened as at 31 and is soldered to conductor 30 which is attached to a panel member 32 all of which are encapsulated in the insulating material as shown.

While I have shown and described preferred embodiments of my invention it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention.

What is claimed is:

1. A socket element for connecting electrical components comprising a body member of insulating material having a recess therein, a looped spring member positioned in the recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a metallic strip bent back upon itself to provide return bend portions, said re-

turn bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a cooperating member inserted therebetween, the upper portions of said spring member bent back upon themselves in engagement with and extending around said body member away from the recess and terminating in downwardly extending lug portions for securing the socket element to a panel and attachment of electrical conductors.

2. A socket element for connecting electrical components comprising a body portion of insulating material having a recess therein, a looped spring member centrally positioned in the recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring comprising a continuous metallic strip, bent back upon itself to provide a downwardly extending loop having return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a pin positioned therebetween, the upper portions of said spring member bent back upon themselves, in engagement with and extending in spaced relation with respect to the outer surface of said body member, away from the recess and terminating in downwardly extending portions bent back upon themselves to provide resilient means for securing said socket to a supporting panel and to provide soldering terminals isolated from the bottom portion of said looped spring member by the wall of said body member.

3. A socket element for connecting electrical components comprising a body member of insulating material having a recess therein, a looped spring member centrally positioned in said recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a single metallic strip bent back upon itself to provide return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a cooperating member inserted therebetween, transverse grooves extending around the perimeter of said body member, the upper portions of said spring member bent back upon themselves, in engagement with and extending around said body member away from the recess, positioned in said grooves and terminating in extending lug portions for securing the socket element to a panel and attaching electrical conductors thereto.

4. A socket element for connecting electrical components comprising a body portion of insulating material having a recess therein, a looped spring member centrally positioned in said recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a continuous metallic strip bent back upon itself to provide a downwardly extending loop having return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a pin positioned therebetween, said body member having grooves extending around the perimeter thereof, the upper portions of said spring member bent back upon themselves and extending in spaced relation around the outer surfaces of said body member away from the recess, positioned in said grooves and terminating in portions bent back upon themselves to provide resilient means for securing said socket to a supporting panel and to provide soldering terminals isolated from the bottom portion of said looped spring member by the wall of said body member.

5. A socket element for connecting electrical components comprising a body member of insulating material having a recess therein, a looped spring member centrally positioned in said recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a single metallic strip bent back upon itself to provide

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return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a cooperating member inserted therebetween, the point of tangency of said converging and diverging return bend portions being below the center line of said spring member, the upper portions of said spring member being bent back upon themselves in engagement with and extending around said body portion and terminating in downwardly extending lug portions for securing the socket element to a panel and attachment of electrical conductors thereto.

6. A socket element for connecting electrical components comprising a body member of insulating material having a recess therein, a looped spring member centrally positioned in said recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a continuous metallic strip bent back upon itself to provide a downwardly extending loop having return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a pin positioned therebetween, the point of tangency of said converging and diverging return bend portions located below the center line of said looped member, the upper portions of said spring member bent back upon themselves in engagement with and extending in spaced relation around the outer surface of said body member away from the recess and terminating in downwardly extending portions bent back upon themselves to provide resilient means for securing said socket to a supporting panel and to provide soldering terminals isolated from the bottom portion of said looped spring member by the wall of said body member.

7. A socket element for connecting electrical components comprising a body member of insulating material having a recess therein, a looped spring member centrally positioned in said recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a single metallic strip bent back upon itself to provide return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a cooperating member inserted therebetween, the point of tangency of said converging and diverging return bend portions being below

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the center line of said looped member, said body member having grooves extending around the perimeter thereof, the upper portions of said spring member bent back upon themselves in engagement with and extending around said body member away from the recess, positioned in said grooves and terminating in extending lug portions for securing the socket element to a panel and attaching electrical conductors thereto.

8. A socket element for connecting electrical components comprising a body member of insulating material having a recess therein, a looped spring member centrally positioned in said recess and having the lower portion thereof out of contact with the side walls and bottom of said recess, said spring member comprising a continuous metallic strip bent back upon itself to provide a downwardly extending loop having return bend portions, said return bend portions converging and diverging along their length for facilitating the reception and to insure the embracement of a pin positioned therebetween, the point of tangency of said converging and diverging return bend portions located below the center line of said looped member, said body member having grooves extending around the perimeter thereof, the upper portions of said spring member bent back upon themselves in engagement with and extending around said body member away from the recess, positioned in said grooves and terminating in portions bent back upon themselves to provide resilient means for securing said socket to a supporting panel and to provide soldering terminals isolated from the bottom portion of said looped spring member by the wall of said body member.

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