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 [21] Appl. No. **44,374**
 [22] Filed **June 8, 1970**
 [45] Patented **Jan. 11, 1972**
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Original application July 15, 1968, Ser. No.
774,779, now Patent No. 3,538,491.
Divided and this application June 8, 1970,
Ser. No. 44,374

[56]

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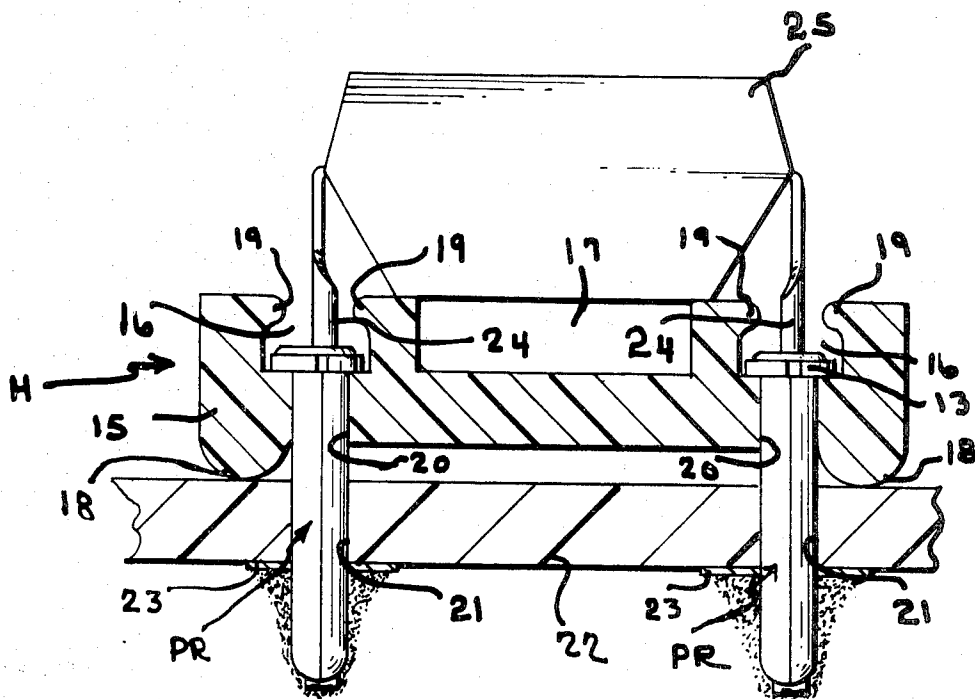
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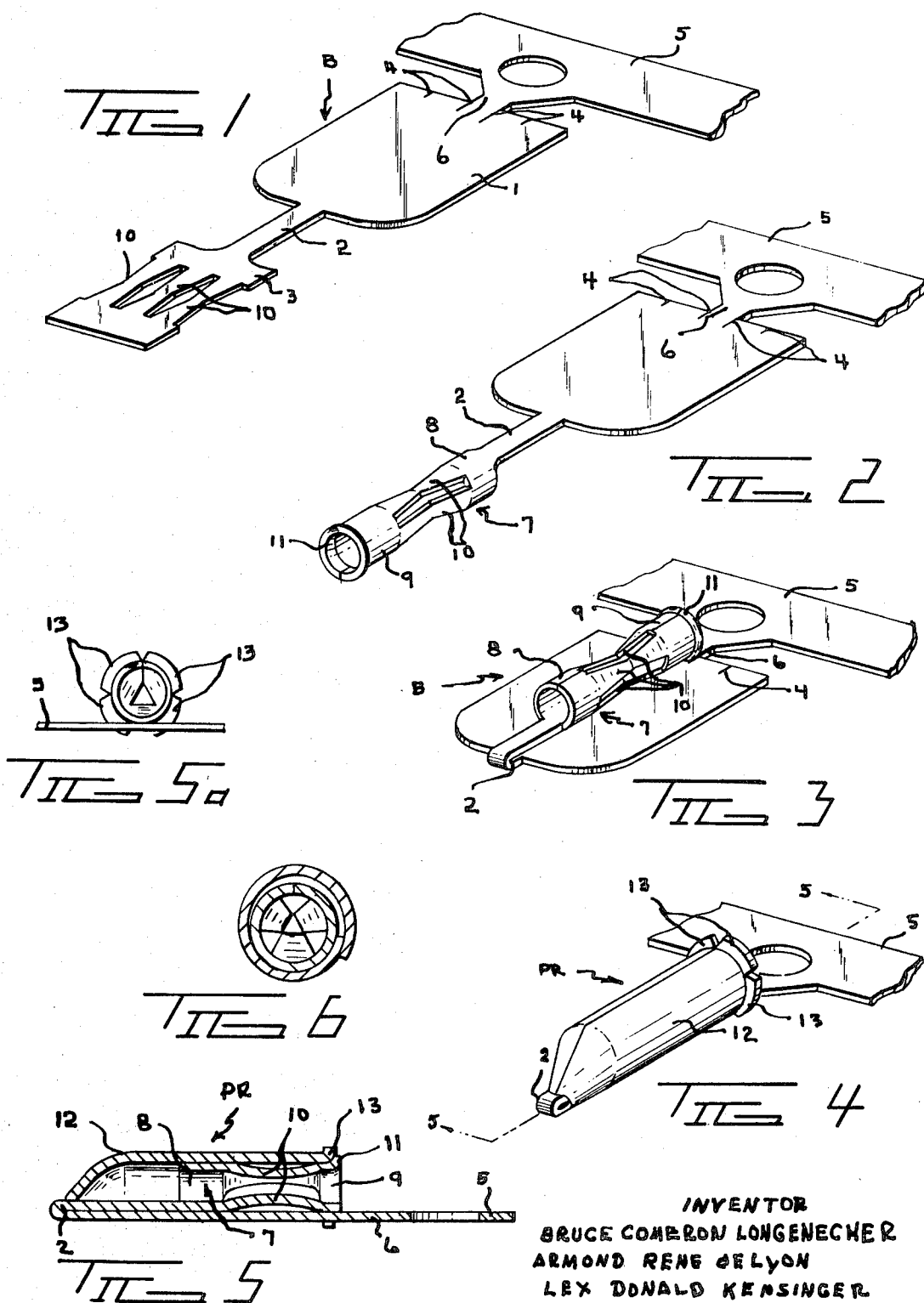
[54] PIN RECEPTACLE AND CARRIER MEMBERS THEREFOR

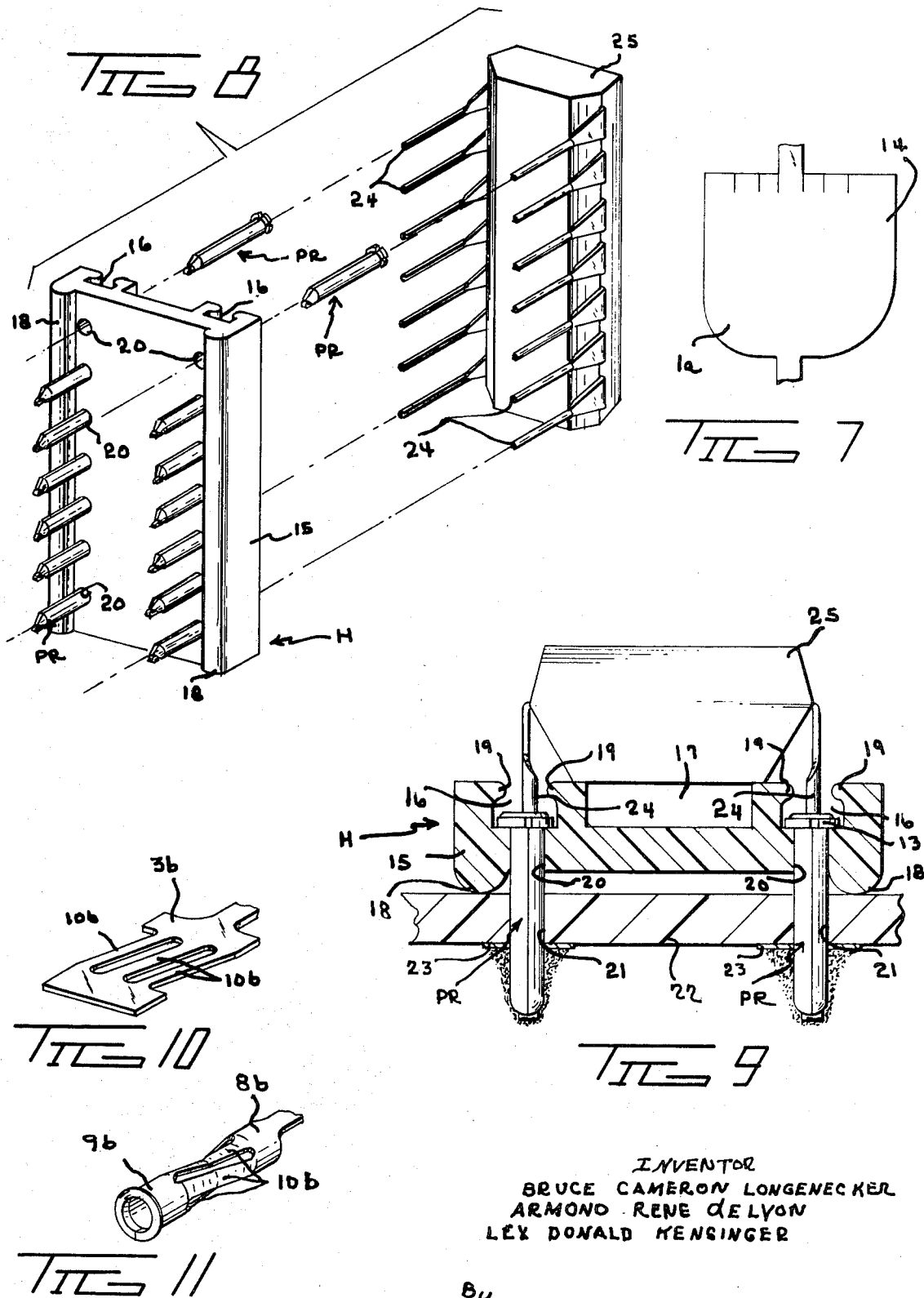
2 Claims, 12 Drawing Figs.

[52] U.S. Cl. 339/176 M,
 339/17 CF, 339/221 M, 339/275 B
 [51] Int. Cl. H01r 13/50
 [50] Field of Search 339/17, 18,
 176, 221, 256, 258, 275

ABSTRACT: An integral pin receptacle comprises a seamed barrel member having a necked-down end and an extension extending inwardly from the necked-down end which is formed into a spring contact member enclosed within the barrel member and provided with spring members extending substantially parallel to an insertion axis from adjacent an open end of the barrel member and inwardly along the barrel member. The pin receptacles are carried in spaced relationship in a carrier member for connection with conductor members of an electrical component.







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PIN RECEPTACLE AND CARRIER MEMBERS THEREFOR

This invention is a division of application Ser. No. 744,779, filed July 15, 1968, now U.S. Pat. No. 3,538,491.

This invention relates to electrical connectors and more particularly to electrical receptacles for detachably receiving pins, solid lead wires and the like and carrier means to carry the pin receptacles.

Pin receptacles are disclosed in U.S. Pat. Nos. 3,168,366 and 3,237,149 wherein the spring contact portions are stamped and formed elements which are then placed in cavities of a screw machine pins to form the pin receptacles. These pin receptacles have proven satisfactory but they are expensive to make because of the formation of two distinct parts and then assembling the parts together to form the unitary pin receptacles.

Accordingly, an object of the present invention is to provide an integral, one-piece pin receptacle.

Another object is the provision of a one-piece pin receptacle which is closed to seal the interior of the receptacle against the passage of solder therein.

A further object is to provide a one-piece pin receptacle having the capability of gripping a wide range of pin sizes and applicable to a wide tolerance range of printed circuit board holes.

An additional object of the invention is the provision of a pin receptacle having a spring body for resiliently fitting within a printed circuit board hole, yet which is closed along the sides and bottom to seal the interior of the receptacle against the passage of solder during solder-dipping of the printed circuit board.

A still further object is to provide an integral, one-piece pin receptacle for disposition within an opening in a mounting member and having an integral pin-contacting spring assembly which is protected from contact by solder.

Still a further object is the provision of a header for connection with leads of an electrical component wherein the header comprises the aforementioned pin receptacles disposed within channels of a carrier member having projections overhanging insertion ends of the pin receptacles to maintain the pin receptacles in position therein, the carrier member being provided with means to space the bottom surface thereof away from a surface of a mounting member onto which the header is to be mounted.

A still additional object is to provide a pin receptacle and carrier member of inexpensive construction formed in accordance with standard mass-production techniques.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIG. 1 is a perspective view of a blank from which the pin receptacle is to be formed;

FIGS 2 through 4 illustrate the various steps in the formation of the pin receptacle;

FIG. 5 is a view taken along lines 5—5 of FIG. 4;

FIG. 5a is a rear end view of FIG. 5;

FIG. 6 is a cross-sectional view of the pin receptacle illustrating an embodiment thereof;

FIG. 7 is a part plan view of the barrel member prior to being formed into the configuration of FIG. 6;

FIG. 8 is a perspective exploded view of a header and electrical component for engagement therein;

FIG. 9 is a cross-sectional view of the header of FIG. 8 with the electrical component in position thereon;

FIG. 10 is a perspective view of an embodiment of the apertured member of the blank to form a spiraled-spring contact assembly; and

FIG. 11 is a perspective view of FIG. 10 in an assembled condition forming the spiraled spring contact assembly.

In the illustrative embodiment of the invention as shown by FIGS. 1 through 5 and 5a, pin receptacle PR is formed from a blank B including a generally rectangular member 1, an extension 2 and an apertured member 3. Rectangular member 1 at the end at which extension 2 is connected is provided with rounded corners and at the other end slits 4 are formed. Member 1 is connected to a carrier strip 5 via projection 6.

As illustrated in FIG. 2, apertured member 3 is formed into a spring contact assembly 7 including annular members 8 and 9 connected together by curved spring members 10 which are bent inwardly toward the axis of spring contact assembly 7. A flared mouth 11 is provided at the outer end of annular member 9.

After spring contact assembly 7 has been formed, it is along with extension 2 bent back over rectangular member 1 as illustrated in FIG. 3 and member 1 is then formed as an open-seamed barrel member 12 enclosing all but flared mouth 11 of spring contact assembly 7 therewithin as illustrated in FIG. 5. As can be discerned, a part of extension 2 extends outwardly from the closed end of barrel member 12 and the seam along barrel member 12 is closed to the extent that no solder can enter the interior of the barrel member when the pin receptacle is subjected to flow-soldering techniques since the admission of solder within barrel member 12 would impair the operation of spring contact assembly 7. Thus, for all intents and purposes, barrel member 12 is sealed to the admission of solder therewithin when subjected to a soldering operation.

Slits 4 in rectangular member 1 of blank B during the formation of rectangular member 1 into barrel member 12 permit the formation of ears 13 at the open end of barrel member 12 adjacent flared mouth 11 of spring contact assembly 7 and these ears provide stop means to limit the movement of pin receptacle PR within a hole of a printed circuit board or a carrier member.

When spring contact assembly 7 is formed, spring members 10 extend parallel with respect to the insertion axis thereof, and, as a result of their inwardly directed configuration, they form a substantially triangular configuration to define an engaging area for engagement with a range of sizes of pin members of IC-components, transistors, miniature vacuum tubes or other similar electrical components that are provided with pin contacts. The inwardly directed configuration of each spring member can be at a location axially spaced from the other inwardly directed configurations thereby defining axially spaced contact-engaging areas which decreases the insertion force of a pin contact within the spring contact assembly and still provides excellent contact-engaging characteristics on the pin contact. The proximity of barrel member 12 with respect to spring contact assembly 7 enhances the spring characteristics of the spring contact assembly because it prevents the spring contact assembly from opening up to the extent of not providing proper contact-engaging characteristics during the movement of the pins therein.

In order that the pin receptacle be fittable into various sizes of holes in printed circuit boards or mounting members and to be resiliently maintained therein until a soldering operation can be performed, FIGS. 6 and 7 illustrate pin receptacle PRa which is an embodiment of the pin receptacle wherein rectangular member 1a is provided with an extension 14 along one of the sides thereof so that when rectangular member 1a is formed into barrel 12a, as illustrated in FIG. 6, extension 14 overlaps the other side of the barrel member in a resiliently engaging manner in order to prevent the admission of solder within the barrel member. The pin receptacle of FIG. 6 is accordingly resiliently fittable into different size holes of a printed circuit board or mounting member and the inner engagement between extension 14 and the other side of barrel member 12a is such to prevent the flowing of solder within

barrel member 12a when such is subjected to a soldering operation. The force of engagement between extension 14 and the other side of barrel member 12a in addition to the area of engagement therebetween are factors determinative of the nonadmission of solder within barrel member 12a.

Pin receptacles PR and PRa can be mounted in holes or printed circuit boards and secured to the conductive paths thereon in accordance with conventional flow-soldering practices and pins of IC-component, transistors, and miniature electronic tubes can be electrically connected thereto by insertion within the spring contact assemblies.

FIGS. 8 and 9 illustrate a header H which comprises a carrier member 15 having channels 16 and 17 disposed in the top surface and projections 18 extending outwardly from the bottom surface. The outer ends of channels 16 are provided with inwardly directed projections 10 overlying the bottom surfaces thereof.

Carrier member 15 is made in accordance with well-known extrusion-molding practices and after being molded as a continuous strip, carrier members 15 are cut in accordance with the appropriate length from the continuous strip after being subjected to a hole-punching operation to punch holes 20 within channel 16 so that pin receptacles PR can be inserted therein with ears 13 engaging the bottom surfaces of channels 16 thereby forming header H. Inwardly directed projections 19 are suitably flexible so that ears 13 clear them and thereby define retaining means to retain the pin receptacles in position in holes 20. Holes 20 are also suitably formed so as to be of a smaller diameter than the barrel members of pin receptacles PR so that a snug fit is obtained enhancing the retaining characteristics on the pin receptacles.

Header H is positioned in appropriately formed holes 21 in a printed circuit board 22 and the pin receptacles are soldered to conductive paths 23 in accordance with conventional flow-soldering techniques to thereby secure the pin receptacles in electrical contact with conductive paths 23. Once the header has been secured in position on the printed circuit board, pins 24 of IC component 25 are inserted within pin receptacles PR and retained in position on the header via the spring-engaging characteristics of the spring contact assemblies of the pin receptacles onto pins 24. Channel 17 provides a ventilation space between the header and the IC-component and projections 18 space header H from the printed circuit board to provide another ventilation space for the header. Header H can be formed to accommodate the appropriate number of pin

receptacles of the component which is to be connected thereto.

The lower end of the pin receptacle may be open to receive therein an end of a wire which is to be crimped or flow-soldered therein and the lower end of the pin receptacle would preferably have a split bellmouthed configuration to define means to facilitate the insertion of the end of the wire therein to as well as holding means to hold a range of wire sizes therein. The open ends of the pin receptacles may also receive posts which are secured therein as by crimping for use in wire-wrapping techniques or the like.

The cantilever spring members can be formed at angular dispositions relative to annular members 8 and 9 as illustrated by FIG. 10 so that when the spring contact assembly is formed the spring members are disposed inwardly and at an angle with respect to an insertion axis of the spring contact assembly to provide spirally formed spring members as illustrated by FIG. 11 which provide a greater contact-engaging area for engagement with a mateable pin.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiments of the invention, which are shown and described herein, are intended as merely illustrative and not as restrictive of the invention.

The invention is claimed in accordance with the following:

1. An electrical connector comprising a dielectric carrier member having parallel channels extending along one surface and wherein another channel is provided in said one surface between said first-mentioned channels, at least one side of said channels having inwardly directed projections overlying bottom surfaces of said channels, said carrier member having holes extending through the bottom surfaces of channels and spaced therealong, pin receptacle means having pin sections disposed in frictional engagement with walls of said holes and extending outwardly beyond another surface of said carrier member, receptacle sections secured within said pin sections and having an entrance thereto adjacent a mouth of said pin sections, and ear means at said mouths of said pin sections which extend toward said channel sides and are located underneath said projections so that said projections maintain said pin receptacle means in position in said holes.

2. An electrical connector according to claim 1 wherein projection means extend outwardly from said another surface.

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