Nov. 3, 1959 A. JACKSON ET AL 2,911,612

PRINTED CIRCUIT CONTACT RECEPTACLES

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Fig. 1.

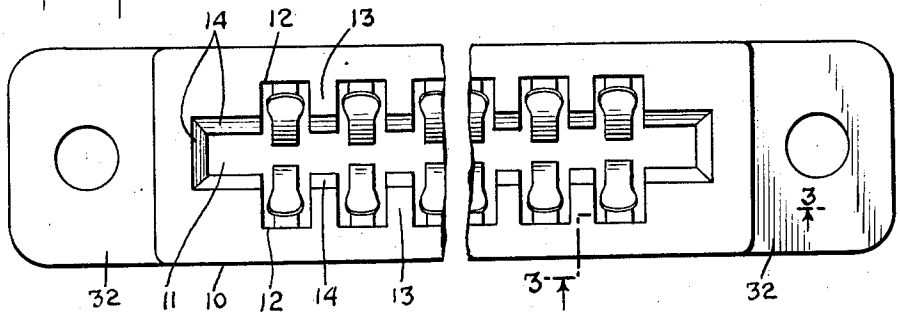


Fig. 2.

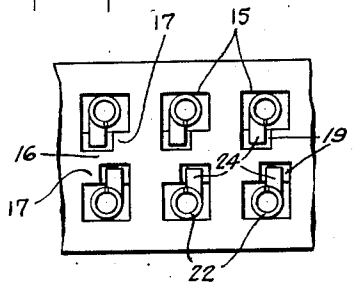


Fig. 3.

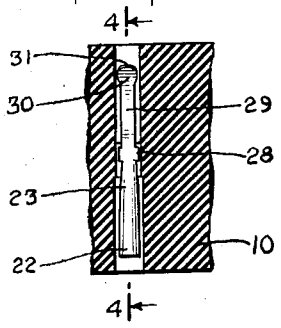


Fig. 4.

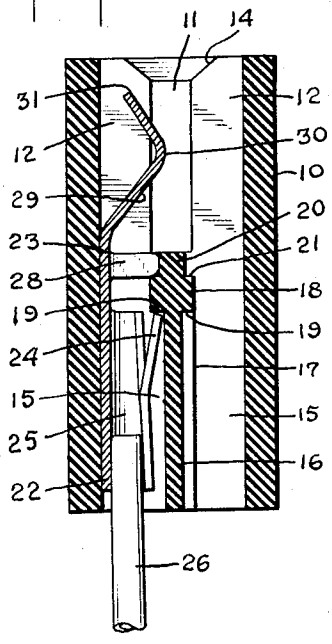
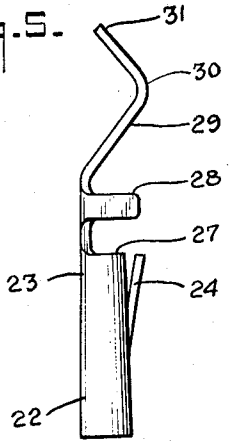


Fig. 5.



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PRINTED CIRCUIT CONTACT RECEPTACLES

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7 Claims. (Cl. 339—176)

This invention relates to receptacles for use in conjunction with what are known as printed circuit connectors. More particularly, the invention deals with a receptacle and connector construction, wherein the receptacle is made sufficiently deep to completely house the connectors, thereby establishing contact of circuit wires with the connectors within the body portion of the insulator receptacle.

Still more particularly, the invention deals with a structure of the character described, wherein means is provided in the receptacle and on the respective contacts for retaining the contacts in predetermined fixed position within the receptacle while, at the same time, facilitating detachable mounting of the contacts with the receptacle.

Further, the invention deals with a novel form of contact, including a conical spring sleeve coupling portion, with which the circuit wires are adapted to be coupled within boundaries of the receptacle.

The novel features of the invention will be best understood from the following description, when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed and, in which, the separate parts are designated by suitable reference characters in each of the views and, in which:

Fig. 1 is a broken plan view of a receptacle made according to our invention, illustrating a series of contacts therein and omitting part of the background showing.

Fig. 2 is a bottom plan view of a small portion of the receptacle showing the lower openings.

Fig. 3 is a partial section through a receptacle, substantially on the line 3—3 of Fig. 1 on a reduced scale.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3 on an enlarged scale, also indicating a circuit wire coupled with a contact; and

Fig. 5 is a side view of one of the contacts detached.

In practice, we provide an elongated receptacle 10 of any suitable insulating material, preferably moulded plastic, which is moulded to form a longitudinal channel 11 opening through the upper surface of the connector for reception of a printed circuit connector having contacts on opposed surfaces thereof for engagement with contacts arranged on opposed sides of the channel 11, as partially indicated in Fig. 1 of the drawing.

The channel 11 has opposed recesses 12, which are sub-divided by intermediate rib portions 13; the walls of the channel 11, including the rib portions 13, are beveled, as seen at 14, for guidance of a printed circuit connector into the channel 11. The recesses 12 extend into openings or apertures 15 at the lower portion of the connector, the latter being divided by a central partition wall 16, which wall is of the irregular cross-sectional contour, as noted in Fig. 2 of the drawing. The irregularity of the wall 16 forms, in the apertures 15, corner portions 17 which are oppositely arranged on opposed apertures, so as to strengthen the central portion of the connector as much as possible.

At the upper portion of the partition wall 16 is a longitudinal central wall portion 18, which is enlarged with respect to the partition 16 proper to form shoulders 19. At the top of the wall 18 is a reduced raised wall portion 20, which forms other stop shoulders 21. It will be apparent, however, that the thickness, or transverse dimensions, of the wall 18 is such as to provide clear passage of the lower split tubular portion 22 of a contact 23 upwardly through the apertures 15, as well as the recesses 12, or downwardly therethrough in the assemblage of the contacts with the receptacle.

One of the contacts 23 is shown in detail in Fig. 5 of the drawing and also in sectional detail in Fig. 4. The lower tubular portion 22 is in the form of a split tube, having the split substantially centrally of the tube so as to dispose an offset spring catch 24 at one side of the tube 22. It will be noted that the tube 22 is combed upwardly to a slight extent as to provide therein a conical bore 25, into which a circuit wire 26 can be forcibly moved in establishing a firm and positive electrical connection with the contact. It will be understood that, as the wire 26 is moved upwardly, the split conical tube is sprung outwardly. The wire 26, at any time, can be forcibly withdrawn from the contact.

It will be apparent, from the foregoing description, that the contact 23 is made from a single sheet of metal, which is die cut and then shaped to form the lower, conical, tubular end 22, as well as the other parts of the contact, as now described.

The contact, adjacent the upper contracted end 27 of the tube 22, has a pair of stop arms 28, which are arranged in substantially parallel relationship to each other and these arms are adapted to seat upon the shoulders 21 in checking downward assemblage movement of the contact with the receptacle.

Extending upwardly from the arms 28, the contact has a spring contact member 29, the member including a rounded central portion 30, which normally extends into the channel 11, as clearly noted in Fig. 4 of the drawing, with the free end 31 of the contact arranged in the recess 12, but in spaced relation to the outer wall of the recess. It will, thus, be seen that, upon insertion of a printed circuit connector into the channel 11, this connector is free to pass over the rounded portion 30, in which operation, the spring member 29 is flexed outwardly, sufficient clearance being provided for movement of the end 31 outwardly, thus establishing a firm contact engagement with a circuit on the surface of the printed connector. Inward movement of the printed connector is checked by the extension 20.

By reason of the fact that the spring catches 24 are located at one side of the tubular portion 22, in arranging the contacts in the opposed recesses, these spring catches will be in opposite relationship to each other and will clear the corner portions 17, as diagrammatically indicated in Fig. 2 of the drawing.

As above stated, in assembling a contact with the receptacle, the contact is moved downwardly through a recess 12. The tubular portion 20 then passes, at one side of the wall 18, and down into the aperture 15 and this downward movement is checked by the arms 28 striking the shoulder 21. At this instant, the spring catch 24 springs outwardly into engagement with the shoulder 19, as clearly noted in Fig. 4 of the drawing. With the contact in this position, a circuit wire, such as 26, can then be forcibly moved into engagement with the conical tube 22 of the contact, in the manner diagrammatically shown in Fig. 4 of the drawing. It will, thus, be seen that the electrical connection with the contact is established within boundaries of the receptacle. If, at any time, it is desirable to detach a contact, a thin rod or tool can be inserted in the aperture 15 to engage the spring catch 24

and force this catch out of engagement with the shoulder **19**; whereupon, the contact can be withdrawn from the receptacle through the top thereof. This is desirable from a standpoint of changing receptacles, particularly in positioning contacts in different recesses or apertures of the receptacle, so as to match or fit circuit printings of printed circuit connectors of any type or kind. In other words, the spring contacts of the receptacles can be changed from time to time for the purposes defined.

For simplification of the illustration, part of the background showing of the receptacle in Fig. 1 has been omitted for sake of clarity, as the actual structure of the central partition, including the walls **18** and **20**, is noted in the cross-sectional view of Fig. 4.

For purposes of description, the receptacle may be said to comprise a body of insulating material, having opposed chambers opening through upper and lower ends of the body, the chambers being divided by ribs longitudinally of the receptacle and by the longitudinal channel **11** at the upper portion of the receptacle and, further, defined by the partition **16** and walls **18** and **20** at the lower and central portion of the receptacle, the wall **18** having shoulders checking movement of contacts in both directions vertically in said chambers.

Considering Fig. 1 of the drawing, it will be noted that end portions of the receptacle have reduced apertured flanges **32** for mounting of the receptacle in connection with a suitable support.

Having fully described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally spaced opposed chambers extending through the receptacle and opening through upper and lower surfaces of said body, the chambers being divided longitudinally of the receptacle by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall extending to the bottom of the receptacle and terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, said enlarged wall portion forming upper and lower stop shoulders exposed to opposed chambers of the receptacle and spaced from outer walls of said chambers, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into the channel at the upper portion of the receptacle, means including a yieldable catch for engaging the shoulders of said enlarged wall portion to retain the spring contacts against displacement from the receptacle, that part of the contact disposed in the lower portion of the chamber having means of which said yieldable catch constitutes a part, within boundaries of the receptacle, for establishing firm electrical contact engagement with a circuit wire coupled therewith, said last named means comprising a split tube, and said yieldable catch being integral with said split tube.

2. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally spaced opposed chambers extending through the receptacle and opening through upper and lower surfaces of said body, the chambers being divided longitudinally of the receptacle by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall extending to the bottom of the receptacle and terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, said enlarged wall portion forming upper and lower stop shoulders exposed to opposed chambers of the receptacle and spaced from outer walls of said chambers, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into the channel at the upper portion of the receptacle, means including a yieldable catch for engaging the shoulders of said enlarged wall portion to retain the spring contacts against displacement from the receptacle, that part of the contact disposed in the lower portion of the chamber having means of which said yieldable catch constitutes a part, within boundaries of the receptacle, for establishing firm electrical contact engagement with a circuit wire coupled therewith, said last named means comprising a split tube, and said split tube being conical in form.

3. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally spaced opposed chambers opening through upper and lower surfaces of said body, the chambers being divided longitudinally of the receptacle by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, said enlarged wall portion forming upper and lower stop shoulders exposed to opposed chambers of the receptacle, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into the channel at the upper portion of the receptacle, that part of the contact disposed in the lower portion of the chamber having means within boundaries of the receptacle, for establishing firm electrical contact engagement with a circuit wire coupled therewith, said last named means comprising a split tube, said split tube being conical in form, said split tube having a yieldable catch for engaging the lower shoulder of the central wall to retain the spring contact against displacement from the receptacle in one direction, and a pair of arms on the central portion of the contacts engaging the upper shoulder of the central wall in retaining the contacts against displacement from the receptacle in the opposite direction.

4. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally spaced opposed chambers opening through upper and lower surfaces of said body, the chambers being divided longitudinally of the receptacle by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, said enlarged wall portion forming upper and lower stop shoulders exposed to opposed chambers of the receptacle, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into the channel at the upper portion of the receptacle, that part of the contact disposed in the lower portion of the chamber having means within boundaries of the receptacle, for establishing firm electrical contact engagement with a circuit wire coupled therewith, said last named means comprising a split tube, said split tube being conical in form, said split tube having a yieldable catch for engaging the lower shoulder of the central wall to retain the spring contact against displacement from the receptacle in one direction, a pair of arms on the central portion of the contacts engaging the upper shoulder of the central wall in retaining the contacts against displacement from the receptacle in the opposite direction, and the diameter of the split tube portion being such as to facilitate insertion and removal

of the spring contact with respect to a chamber of the receptacle.

5. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally spaced opposed chambers opening through upper and lower surfaces of said body, the chambers being divided longitudinally of the receptacle by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, said enlarged wall portion forming upper and lower stop shoulders exposed to opposed chambers of the receptacle, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into the channel at the upper portion of the receptacle, that part of the contact disposed in the lower portion of the chamber having means within boundaries of the receptacle, for establishing firm electrical contact engagement with a circuit wire coupled therewith, said last named means comprising a split tube, said split tube being conical in form, said split tube having a yieldable catch for engaging the lower shoulder of the central wall to retain the spring contact against displacement from the receptacle in one direction, a pair of arms on the central portion of the contacts engaging the upper shoulder of the central wall in retaining the contacts against displacement from the receptacle in the opposite direction, the diameter of the split tube portion being such as to facilitate insertion and removal of the spring contact with respect to a chamber of the receptacle, and the lower portion of each chamber being sufficiently large to receive a tool to force the spring catch into inoperative position with respect to its engaged shoulder in removal of the contact from the receptacle.

6. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally spaced opposed chambers opening through upper and lower surfaces of said body, the chambers being divided longitudinally of the receptacle by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, said enlarged wall portion forming upper and lower stop shoulders exposed to opposed chambers of the receptacle, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into the channel at the upper portion of the receptacle, that part of the contact disposed in the lower portion of the chamber having means within boundaries of the receptacle, for establishing firm electrical contact engagement with a circuit wire coupled therewith, said last named means comprising a split tube, said split tube being conical in form, said split tube having a yieldable catch for engaging the lower shoulder of the central wall to retain the spring contact against displacement from the receptacle in one direction, a pair of arms on the central portion of the contacts engaging the upper shoulder of the central wall in retaining the contacts against displacement from the receptacle in the opposite direction, the diameter of the split tube portion being such as to facilitate insertion and removal of the spring contact with respect to a chamber of the receptacle, the lower portion of each chamber being sufficiently large to receive a tool to force the spring catch into inoperative position with respect to its engaged shoulder in removal of the contact from the receptacle, and that part of the spring contacts extending into the channel of the receptacle being rounded.

7. A contact receptacle for use in connection with printed circuit connectors, said receptacle comprising an elongated body of insulating material, the body having longitudinally alined and spaced opposed chambers extending through the receptacle and opening through upper and lower surfaces of said body, the chambers being divided longitudinally by longitudinally spaced ribs, the chambers, at the upper portion of the receptacle, being divided by a longitudinal channel exposed to all of said upper chambers, into which a printed circuit connector is adapted to be placed, the lower portion of the chambers being divided by a partition wall extending to the bottom of the receptacle and terminating at its upper end in an enlarged wall portion disposed centrally of the receptacle, thereby forming upper and lower chambers of substantially the same depth, said enlarged wall portion forming upper and lower stop shoulders exposed to the upper and lower chambers of the receptacle and spaced from outer walls of said chambers, spring contacts adapted to be mounted in said chambers, said contacts having spring contact ends extending into said channel, means, including a yieldable catch, for engaging the shoulders of said enlarged wall portion to retain the spring contacts against displacement from the receptacle, and that part of the contact, disposed in the lower portion of the chamber, having means within boundaries of the receptacle, of which said yieldable catch constitutes a part, for establishing firm electrical contact engagement with a circuit wire coupled therewith.

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