

March 26, 1968

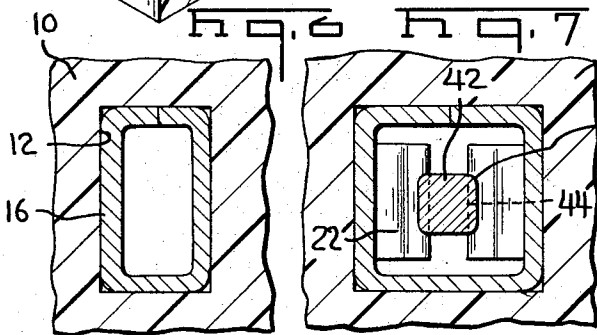
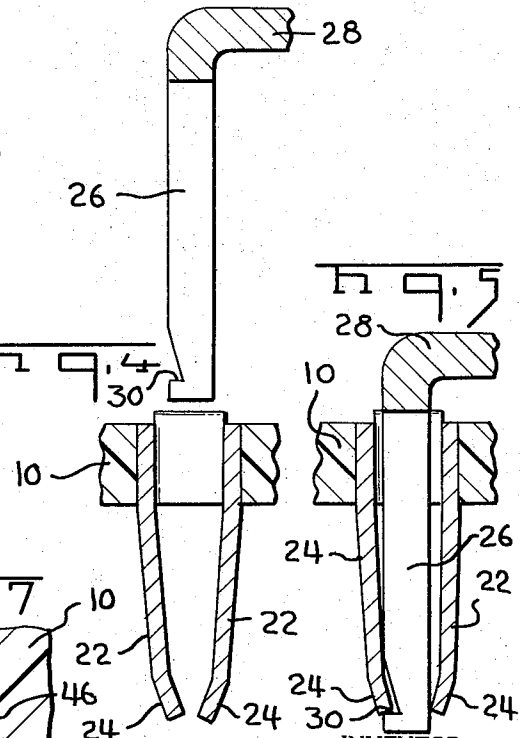
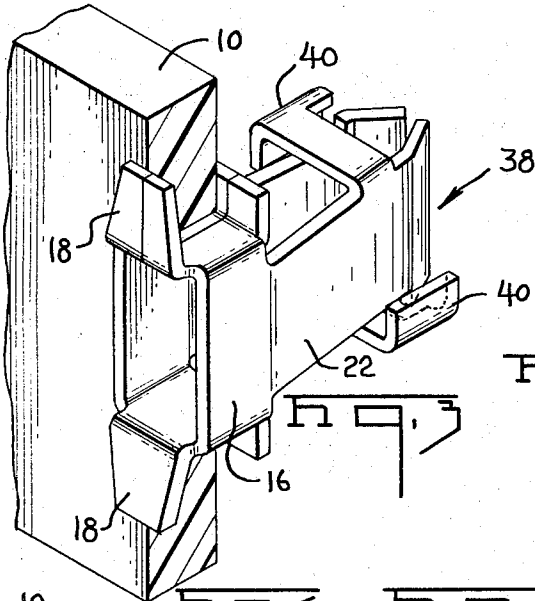
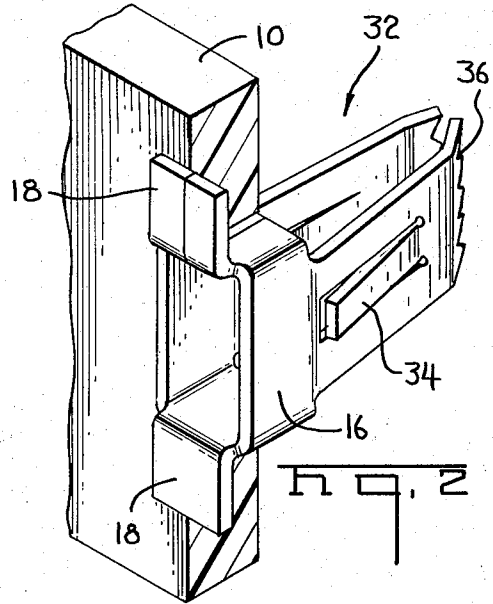
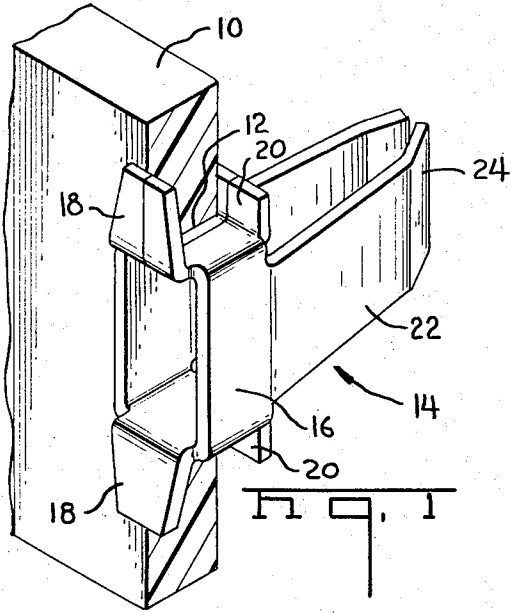
D. R. COLDREN ET AL

3,374,979

FASTENER

Filed Dec. 10, 1965

2 Sheets-Sheet 1



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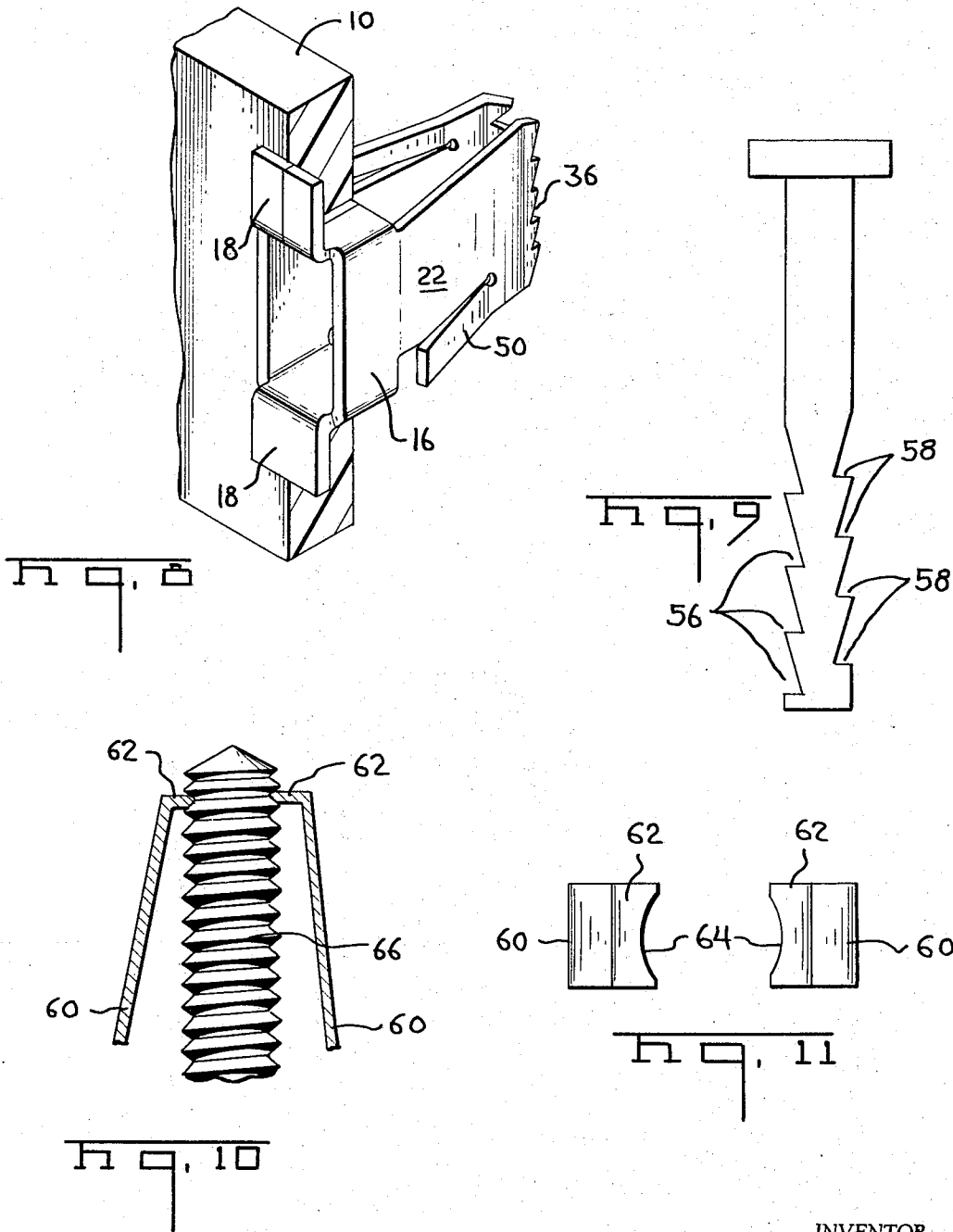
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FASTENER

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ABSTRACT OF THE DISCLOSURE

A fastener is disclosed for electrically grounding and mechanically fastening a printed circuit board to a chassis or the like. Various types of inserts are provided for mating with a spring-arm receptacle. The receptacle is secured to a board member by flanges or lances. Ears are provided for preventing overstressing of the arms of the receptacle.

It is an object of the present invention to provide a means for rapidly connecting a printed circuit board to a chassis.

A further object is to provide a means which will ground the printed circuit board to the chassis.

A further object is to provide a fastening means which is of rigid construction and yet is relatively inexpensive to produce.

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 purpose 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, in which like reference numerals refer to like parts:

FIGURE 1 is a perspective view of one embodiment of the present invention;

FIGURE 2 is a perspective view of an alternative form of the present invention;

FIGURE 3 is a perspective view of still another form of the invention;

FIGURE 4 is a cross-sectional view of a tab and fastener prior to engagement;

FIGURE 5 is a cross-sectional view of a tab and fastener in their engaged position;

FIGURE 6 is a cross-sectional view showing a fastener mounted within a printed circuit board;

FIGURE 7 is a cross-sectional view similar to FIGURE 6 showing an alternative configuration of the fastener;

FIGURE 8 is a perspective view of an alternative form of the invention;

FIGURE 9 is a view showing a modified form of tab;

FIGURE 10 is a view partly in section of still another form of the invention; and

FIGURE 11 is a view looking in the direction of the arrows 11-11 in FIGURE 10.

With reference to FIGURE 1 there is shown a printed circuit board 10 having a generally rectangular aperture 12 for receiving a fastener indicated generally at 14. The fastener 14 has a strap portion 16 which fits snugly within aperture 12 and is retained therein by means of two pairs of flanges 18 and 20, the said flanges grasping opposite side walls of the board 10. The flanges 18 are electrically connected to suitable conductors on board 10 by means of dip soldering. Extending from strap portions 16 are a

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pair of arms 22 having inwardly turned ends 24. The fastener 14 is preferably made out of steel but may be made of any material which has sufficient resiliency to give spring characteristics to the arms 22.

Fastener 14 is shown in FIGURE 4 about to receive a tab member 26 which may be struck from a suitable metallic chassis 28. The tab 26 is provided with an indented portion 30 adjacent the end thereof. In use when a chassis is to be secured to a printed circuit board the tab 26 is passed through the strap portion 16 of fastener 14 and between the arms 22 thereof. When the tab is fully seated the indented portion 30 will cooperate with the ends 24 of arms 22 to form a locking means to thereby prevent the subsequent separation of the board member from the chassis. The tab can be seen in its seated position in FIGURE 5. It will be noted that during insertion of tab 26 the end thereof will spring the arms 22 outwardly prior to the seating of one of the arms into the indented portion 30.

It can be seen at this point that fastener 14 and tab 26 provide a means for mechanically connecting a printed circuit board to a chassis. It is also obvious that an electrical ground for the printed circuit board has been provided, the electrical path being through the fastener 14 and tab 26 into the metal chassis 28. Although fastener 14 has been illustrated in conjunction with a printed circuit board and chassis it is to be understood that this is a preferred use but not the only use of the fastener of the present invention. It is contemplated that the fastener and tab arrangement of the present invention may be used for installing door panels in automobiles, assembling office furniture, installing ceiling and wall panels, and assembling many other everyday products.

In FIGURE 2 there is shown a fastener 32 which is similar to fastener 14 but varies therefrom in certain details to be described. The flanges 20 of fastener 14 have been deleted in fastener 32 to thereby permit the fastener to be inserted through the aperture 12 in printed circuit board 10 without the necessity of a subsequent forming operation. To retain the fastener 32 in position there is provided a pair of lances 34 struck from the pair of arms 22, the said lances cooperating with the back side of board 10, as seen in FIGURE 2, to thereby serve the same function as the previously described flanges 20. As also seen in FIGURE 2 the ends 24 of arms 22 have been provided with a serrated surface indicated at 36. It has been found that the serrated surface at the ends of the arms 22 provides better electrical characteristics than does the flat surface as shown in FIGURE 1. It is obvious however that the fastener 14 may also be provided with a serrated surface at the ends of the arms 22 and likewise the fastener 32 may be provided with a flat surface in place of the serrations in those instances of use where electrical characteristics are of little or no importance. In FIGURE 3 there is shown a fastener 38 which is identical to fastener 14 with the exception that a pair of legs 40 extend from the arms 22 and overlie the opposite arm to which the leg is attached. These legs 40 limit the outward movement of the arms 22 and thereby prevent the overstressing of the arms.

In those applications where only a single fastener and tab are employed it may be often desirable to provide for the quick disconnect of the assembled parts. This may be achieved, with reference to FIGURE 7, by replacing the rectangular strap portion 16 and aperture 12 with corresponding parts having a generally square configuration. The tab 42 is provided with indented portions 44 on opposite edges thereof for cooperation with the arms 22 of the fastener. When it is desired to disconnect the tab from the fastener all that is required is to rotate the tab 90 degrees whereby the arms 22 would be in engagement with the smooth side edges of the tab to

thereby permit the easy withdrawal of the tab from the fastener. If desired the corners of the tab 42 may be rounded as indicated at 46 to facilitate the rotation of the tab.

In FIGURE 8 there is shown a fastener 48 which is similar to the fastener 32 of FIGURE 2 with the exception that lance 50 is struck from the sides of the arms of the fastener rather than the center of the arms. The lance design of FIGURE 8 is advantageous in those situations where a very small fastener is used and a lance in the center of the arms would severely reduce the strength of the arms. Also by placing the lance at the sides of the arms the lances are more free to move relative to the arms with no problem of binding. The purpose of the lances 50 is the same as that of the lances 34 previously described.

The tab 26 described in connection with FIGURES 4 and 5 is integral with one of the parts to be connected, i.e. the chassis 28. However the fastening concept of the present invention may be employed for joining two members wherein the tab is a separate element. In FIGURE 9 there is shown a tab 52 which may be employed with any of the previously described fasteners. The tab 52 has an enlarged head 54 for limiting the insertion of the tab into the member to be connected. A plurality of indents 56 and 58 are formed in opposite sides of the tab, the indents 58 being offset from the indents 56. With this configuration the tab may be inserted into a fastener such as 48 and the plural indents permit the tab to connect members of various thicknesses.

In FIGURES 10 and 11 there is shown a modified fastening arrangement. The arms 60, similar to the arms 22 previously described, are provided with portions 62, adjacent their free ends, which extend at generally right angles to the longitudinal extent of the fastener. The portions 62 have semi-circular recesses 64 formed therein for receiving a threaded member 66, the member 66 replacing the indented tabs of the previous embodiments.

It can thus be seen that a fastener has been provided which achieves the objects of the invention. The fastener is extremely versatile in that it has possible use in many applications requiring the joining together of two members.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is of-

ferred by way of illustration only. The actual scope of the invention is intended to be defined in the following claims when viewed in their proper perspective against the prior art.

What is claimed is:

1. A device for connecting a first member to a second member comprising a fastener extending through an aperture in said first member, means to secure said fastener to said first member, said fastener comprising a pair of arms fixed at one end and converging toward each other adjacent their free ends, tab means associated with said second member and adapted to mate with the arms of said fastener, and a pair of legs extending from said arms, each said leg overlying the opposite arm to which said leg is attached to thereby limit the outward movement of said arms and thus prevent the overstressing thereof.

2. A fastener comprising a strap portion for insertion in an aperture in a mounting member, flange means extending from a first side of said strap portion for limiting insertion of said fastener into said mounting member, a pair of arms extending from a second side of said strap portion, said arms converging toward each other adjacent their free ends, and lance means disposed in said arms and cooperating with said flange means for retaining said fastener in position in said mounting member, said lance means being struck from said arms and having an edge coincident with a side edge of said arms, whereby said lance means are disposed along an edge of said arms to permit free movement of said lance means.

3. A fastener as set forth in claim 2 further comprising serrations located at the free ends of said arms for producing a high-pressure contact area.

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