

April 27, 1948.

R. A. HECHT

2,440,270

ELECTRICAL CONNECTOR

Filed July 3, 1946

2 Sheets-Sheet 1

FIG. 1

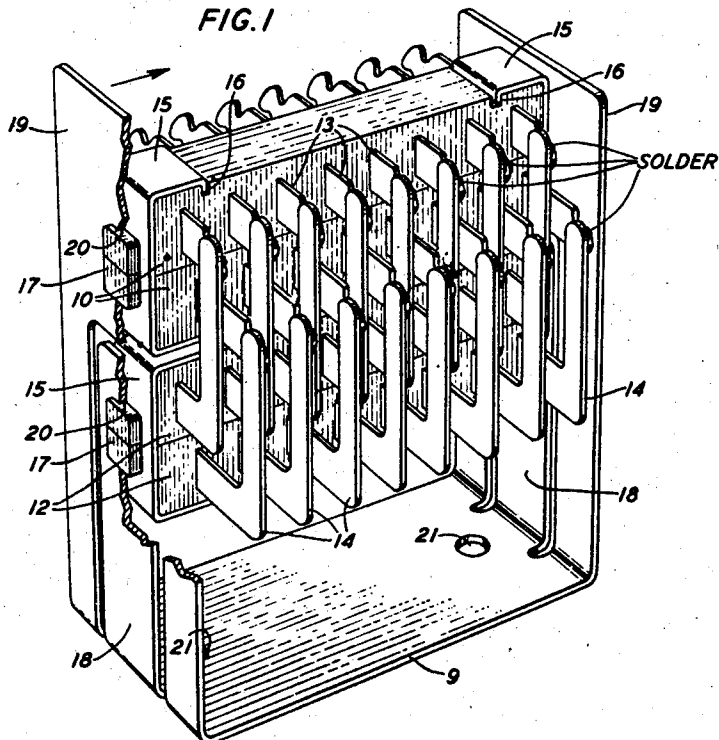


FIG. 3

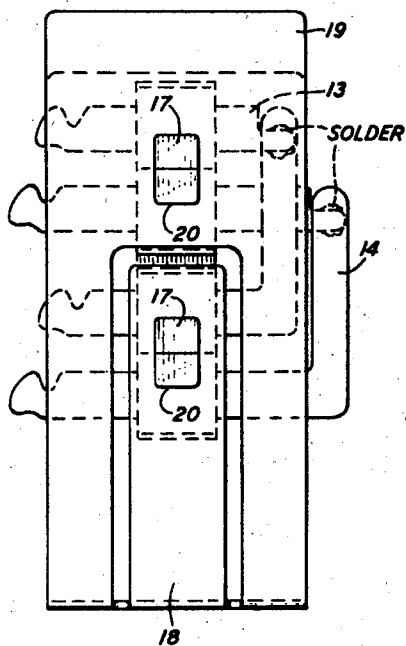
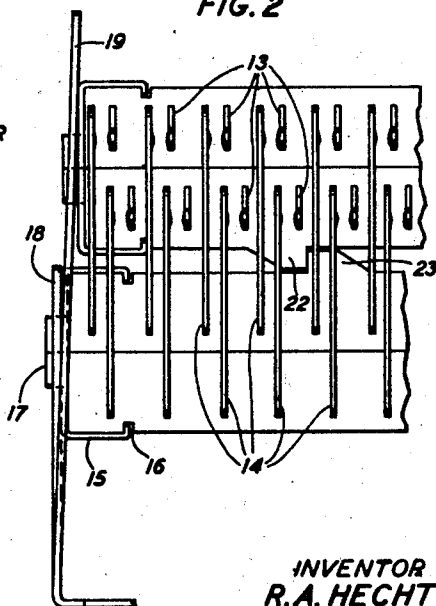


FIG. 2



INVENTOR
R. A. HECHT
BY
G. F. Kane
ATTORNEY

April 27, 1948.

R. A. HECHT

2,440,270

ELECTRICAL CONNECTOR

Filed July 3, 1946

2 Sheets-Sheet 2

FIG. 4

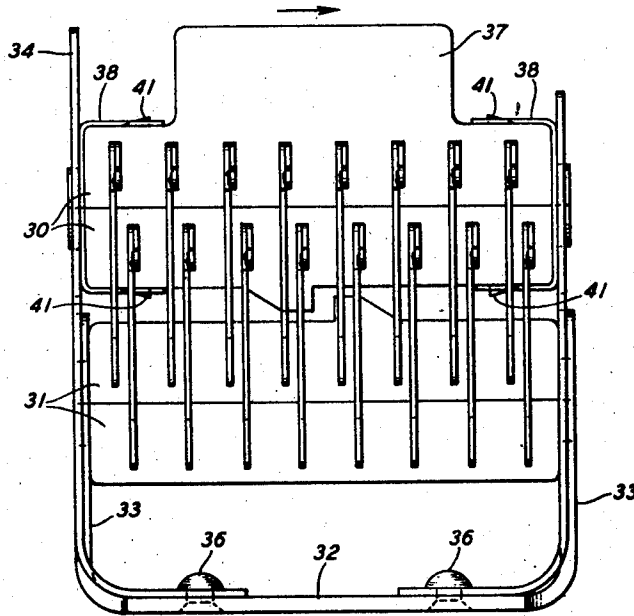
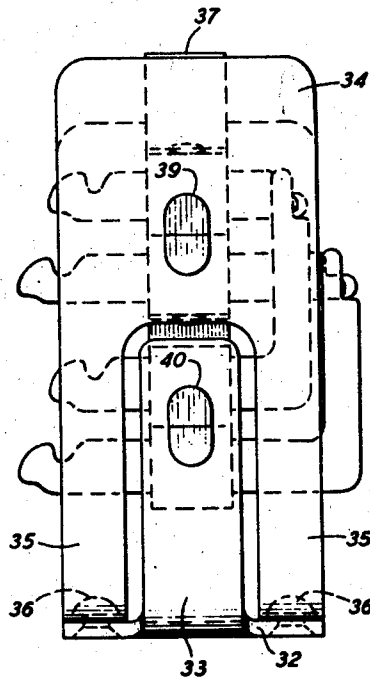


FIG. 5



INVENTOR
R.A. HECHT
BY
A. J. Kane
ATTORNEY

UNITED STATES PATENT OFFICE

2,440,270

ELECTRICAL CONNECTOR

Rudolph A. Hecht, Teaneck, N. J., assignor to
Bell Telephone Laboratories, Incorporated,
New York, N. Y., a corporation of New York

Application July 3, 1946, Serial No. 681,202

13 Claims. (Cl. 173—328)

1

This invention relates to electrical connectors and particularly to terminal strips consisting of two cooperating terminal units which are arranged for quick separation.

In the field of electrical wiring the terminal strip plays a well known role. Its basic purpose is to facilitate the making and breaking of connections between a plurality of electric circuits and to otherwise simplify the electrical connections of equipment involving a great number of conductors. The conventional type of terminal strip comprises a plurality of terminals rigidly mounted on an insulating block so as to extend therefrom in opposite directions, each terminating at each end in a conventional design of terminal tab to which wiring connections are made. While this type of terminal strip serves its purpose it does not provide the quick separable feature of connectors of the jack and plug type which is desirable in cases where the connector is to be used with equipment constructed on a unit type basis.

The jack and plug type connector, though facilitating the quick removal, or substitution of equipment units from, and in an electrical system, is, in general, characterized by a sliding type of contact which is subject to failure due to opens and high resistance contacts caused by the collection thereon of dust and dirt. In a copending application, Serial No. 657,172, filed March 26, 1946, there is disclosed an electrical connector which embodies the desirable quick separation feature of the jack and plug type connector and, at the same time, precludes the possibility of contact failure. The connector of that application comprises two cooperating terminal units, the corresponding terminal elements of which are soldered together under tension. By virtue of the soldered connections contact failures are eliminated. To separate the two terminal units of this connector the solder is fused by the application of a hot soldering iron to the points of connection between the various contact members whereupon the terminal elements spring apart and permit the quick removal of one, or both of the terminal units.

The object of this invention is to provide an improved electrical connector of the type disclosed in the above-identified copending application.

The connector of the present application comprises two independent terminal units mounted in such a manner on a unitary supporting bracket as to be longitudinally displaceable relative to one another so as to tension the contact springs

2

of one unit with respect to the contact springs of the other unit. The corresponding contact springs of the two units are soldered together at their points of contact while in their normal untensioned condition so that when the units are relatively displaced, the springs thereof are placed under relative tension and automatically separate when a hot soldering iron is applied to the soldered connections and the solder fuses. When the force applied to relatively displace the two units is removed subsequent to the fusing of the solder, the contact springs resume their normal untensioned condition without adhering to each other thus rendering possible the disengagement of one unit from the other.

An auxiliary feature of the invention resides in the use of mutually engageable stops on the two terminal units whereby the extent to which the units may be relatively displaced is maintained within predetermined limits.

The connector of this invention will be better understood from the following detailed description when read in connection with the accompanying drawings, in which:

Fig. 1 is an enlarged perspective view of a two-part terminal strip embodying the features of this invention. In this view the two terminal units are illustrated in their normal positions;

Fig. 2 is a fragmentary front view of the connector shown in Fig. 1. In this view the upper terminal unit is shown longitudinally displaced relative to the lower terminal unit and illustrates the spring separation caused by this displacement after the solder has been fused;

Fig. 3 is a side view of the connector shown in Fig. 1;

Fig. 4 is a front view of a connector illustrating a preferred embodiment of the invention; and

Fig. 5 is a side view of the connector shown in Fig. 4.

Referring particularly, at this time, to Figs. 1, 2 and 3 the connector disclosed therein comprises essentially an upper terminal unit 10, a lower terminal unit 12 and a substantially U-shaped supporting bracket, or carrier 9. As illustrated, each of the terminal units 10 and 12 comprises two blocks of insulating material arranged in superposed contiguous association. Obviously, instead of using two such blocks a single molded block may be employed. Each insulating block of the unit 10 has molded therein a plurality of contact springs 13 which may be of any conventional design and which as illustrated, project in either direction at right angles to the longitudinal axis of the insulating blocks. The

3

contact springs 13 of the two blocks of the unit 10 are arranged vertically, in staggered relation and horizontally, in alignment.

Each of the insulating blocks of the lower terminal unit 12 similarly carries a plurality of contact springs 14 which are L-shaped in design with the forward legs thereof extending vertically. The springs of the two insulating blocks of terminal unit 12 are also arranged vertically, in staggered relation and in horizontal alignment. Corresponding forward ends of all contact springs are tinned in preparation for the reception of solder.

Each pair of insulating blocks of each terminal unit 10 and 12 are clamped together at their ends by means of a U-shaped clamping bracket 15 the ends of whose inwardly projecting arms are bent over and fit into suitable slots 16 in the blocks. Each insulating block 10 and 12 is provided at each end with an embossing 17 which passes through suitable apertures in the clamps 15.

The supporting bracket, or carrier 9 is a U-shaped sheet metal member whose opposite vertical sides are stamped, or otherwise formed into two legs 18 and 19. The two legs 18 and 19 of each side of the bracket 9 occupy the same vertical plane, the leg 18 being substantially rectangular in shape and the leg 19 having an inverted U-shaped formation and arranged in telescopic relation to the leg 18. By virtue of the structural design of the bracket legs, legs 19 are relatively flexible whereas the legs 18 are comparatively rigid. Each of the legs 18 and 19 is provided with a slot, or aperture 20 which accommodates one of the embossings 17 of the molded blocks 10 and 12. The base of the U-shaped bracket 9 is provided with holes such as 21 which accommodate screws or their equivalent, by means of which the bracket may be fixed to a support.

To assemble the connector just described, the clamps 15 are slipped over the ends of the molded blocks 10 and 12 so that the embossings 17 protrude through suitable apertures in the clamps. The turned-in edges of the clamping brackets 15 slide in the slots 16 in the insulating blocks. The horizontally projecting portions of each of the brackets 15 are pretensioned towards each other so that they firmly grip the insulating blocks. The protruding embossings 17 of the insulating blocks 10 and 12 are then fitted into their corresponding apertures 20 in the supporting legs 18 and 19 of the bracket 9. When the upper and lower terminal units 10 and 12 are positioned on the bracket 9 the contact ends of the springs 13 of the upper unit, which are tinned, make surface engagement with the pretinned contact ends of corresponding springs 14 of the lower unit. These contacting points are then soldered together. In this normal condition of the connector the contact springs 13 and 14 are untensioned.

When it is desirable to effect the separation of the soldered contact springs, pressure is manually applied to the left leg 19 (viewing Fig. 1) in the direction of the arrow. The two oppositely disposed legs 19 and the terminal unit 10 supported thereby are thus moved to the right until the stop 22 (Fig. 2) on the underside of the upper unit engages the stop 23 on the upper face of the lower unit. Due to the relative rigidity of the bracket arms 18 the lower terminal unit 12 experiences little, if any movement when the bracket arms 19 are flexed as described. When

4

the stops 22 and 23 are in engagement the positions of the two terminal units 10 and 12 are as shown in Fig. 2. However, at this time the contact springs are soldered together so that the vertically extending portions of the spring 14 of the lower terminal unit will be flexed slightly to the right having been pulled into this position by the movement of the upper unit to the right. The springs 13 of the upper unit being heavier and shorter than those of the lower unit do not experience any flexing due to the displacement of the upper unit. The contact springs 13 and 14 will, therefore, be placed under relative tension at their solder points of contact so that when a hot soldering iron is applied to the solder at these points and the solder fuses, the springs will separate and resume their normal untensioned conditions. The relative positions of the contact springs under this condition are shown in Fig. 2. When the fused solder solidifies on the spring ends after the springs have become separated the pressure on the left bracket leg 19 may be released whereupon the legs 19 and the terminal unit 10 return to their normal untensioned positions.

It will be observed that while the connector of this invention is in use, the soldered connections between corresponding springs 13 and 14 of the terminal units 10 and 12 are not under tension.

In the preferred embodiment of the invention illustrated in Figs. 4 and 5, the support for the terminal units 30 and 31 is constructed of three independent elements. One of these elements consists of a base portion 32 having two vertically extending legs 33 between which the lower terminal unit 31 is supported. The other two elements are substantially inverted U-shaped and each comprises a horizontal bridging piece 34 and two vertically depending legs 35. The ends of the legs 35 are bent inwardly and are secured to the base 32 by means of rivets, or screws 36. The material of which the base 32 and legs 33 are constructed is considerably heavier than the material of which the cross-piece 34 and legs 35 are constructed thus giving greater rigidity to the lower terminal unit 31 which is mounted on the legs 33. Thus any tendency the lower terminal unit may have to follow the upper terminal unit when the latter is manually moved to the right in the connector shown in Figs. 1, 2 and 3 is removed.

The insulating block of the upper terminal unit is provided with an upwardly projecting hand grip 37 by means of which the said terminal unit may be manually displaced relative to the lower terminal unit. Also, each of the upper and lower arms of the clamping brackets 38 is provided with a hole which accommodates a surface boss 41 near each end of the insulating blocks of the two terminal units whereby the clamps are fixedly positioned on the blocks. If desirable, the insulators of each unit may be molded as a single block, in which case the end clamps would not be required. The blocks themselves would be provided, in this case, with end projections which would fit into the apertures 39 and 40 in the supporting legs.

Except for the details described above, the connector shown in Figs. 4 and 5 is identical to the connector shown in Figs. 1, 2 and 3.

What is claimed is:

1. An electrical connector comprising a pair of terminal units each having a plurality of contact springs, corresponding springs of said units having terminal ends mechanically connected to-

gether by fusible solder, and independently flexible supports for each of said units whereby said units may be relatively displaced to relatively tension the contact springs thereof at their soldered terminal ends.

2. An electrical connector comprising a pair of terminal units each having a plurality of contact springs, corresponding springs of said units having terminal ends electrically connected together by fusible solder, and means for mounting said units in superposed spaced relation comprising a substantially inflexible support for one of said units and a support of greater flexibility for the other of said units whereby said units may be displaced relative to one another to relatively tension the contact springs thereof at their soldered terminal ends.

3. The combination in an electrical connector of a carrier comprising a base, a pair of oppositely disposed substantially rigid supports extending vertically from said base, a pair of oppositely disposed flexible supports extending vertically from said base, a terminal unit removably mounted between said first pair of supports, a terminal unit removably mounted between said second pair of supports, contact springs carried by each of said terminal units, and means comprising fusible solder joining the contact ends of corresponding contact springs of said terminal units.

4. The combination in an electrical connector as defined in the preceding claim and in which the said pairs of oppositely disposed supports are formed integrally with the base.

5. The combination in an electrical connector of a first and a second terminal unit each having a plurality of contact springs, corresponding springs of said units having their contact ends electrically connected together by fusible solder, and a carrier for said units comprising a base, a pair of substantially inflexible arms extending from said base and supporting said first unit in superposed spaced relation to said base, and a pair of flexible arms extending from said base and supporting said second unit in superposed spaced relation to said first unit whereby said second unit may be displaced relative to said first unit to relatively tension the contact springs of said units at their soldered contact ends.

6. An electrical connector comprising a pair of terminal units each having a plurality of contact springs, corresponding springs of said units having terminal ends electrically connected together by fusible solder, independently flexible supports for each of said units whereby said units may be displaced to relatively tension the contact springs thereof at their soldered terminal ends, and means for limiting the relative displacement of said units.

7. The combination in an electrical connector of a first and a second terminal unit each comprising an insulating block carrying a plurality of contact springs, corresponding springs of said units having their contact ends electrically connected together by fusible solder, and a carrier for said units comprising a base, a pair of substantially rigid arms extending from said base and supporting said first terminal unit in superposed spaced relation to said base and a pair of flexible arms extending from said base and supporting said second unit in superposed spaced relation to said first unit whereby said second unit may be displaced relative to said first unit to relatively tension the contact springs of said units at their soldered contact ends, and means for limiting the relative dis-

placement of said units comprising mutually engageable stop members on juxtaposed faces of said insulating blocks.

8. A two part electrical connector comprising a support having flexible arms, terminal units mountable between said arms, each unit comprising a plurality of contact springs, the contact springs of one of said units being connected to the contact springs of the other unit by fusible solder when said units are mounted between the arms of said support, and said springs being tensionable in a manner tending to disengage them when pressure is applied to one of the flexible arms of said support whereby said springs become disengaged when the solder is fused.

9. An electrical connector comprising, in combination, terminal units each having a plurality of contact springs, the contacting ends thereof being held in permanent engagement by fusible solder, and a flexible support for each of said units, one of said supports being movable relative to the other support in a direction such as to tend to separate the contacting ends of said springs, thereby rendering said springs automatically separable upon the fusing of said solder.

10. An electrical connector comprising, in combination, terminal units each having a plurality of contact springs, fusible means permanently maintaining the contact springs of one of said units in untensioned electrical engagement with the contact springs of the other of said units, and independent supports for said units, said supports being relatively movable in a direction such as to tension the springs of one of said units relative to the springs of the other unit whereby said springs automatically separate upon the fusing of said fusible means.

11. An electrical connector comprising, in combination, terminal units each having a plurality of contact springs held in permanent untensioned engagement by fusible solder and a unitary support for said connector comprising a U-shaped stamping each of the opposite side walls of which comprises two independently flexible arms, and means for mounting each of said units between a different pair of oppositely disposed flexible arms of said support whereby said units are relatively movable in a direction such as to tension the springs of one thereof relative to the springs of the other to render said springs automatically separable upon the fusing of said solder.

12. A two part electrical connector comprising a support having oppositely disposed pairs of flexible arms, terminal units each comprising a plurality of contact springs, and means supporting each of said units between a different pair of oppositely disposed flexible arms of said support, the contact springs of said units being held in engagement by fusible solder and the arms of one of said pairs being flexible upon the application of pressure thereto in a direction, relative to the arms of the other pair, such as to tend to effect the separation of said springs whereby said springs automatically separate upon the fusing of said solder.

13. An electrical connector comprising a pair of terminal units each having a plurality of contact springs, corresponding springs of said units having terminal ends permanently connected together by fusible solder, and relatively movable supports for each of said units whereby said units may be relatively displaced to tension the contact springs thereof at their soldered terminal ends.

RUDOLPH A. HECHT.