ELECTRICAL CONNECTOR FOR A PRINTED CIRCUIT BOARD

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ABSTRACT
Contacts are normally secured in housings by resilient latches formed on the contacts or on the housings. The invention provides a housing with an integral hinged flap having a shoulder for engagement behind a contact in the housing. The flap is movable to withdraw the shoulder for release of the contact and is releasably engageable with the housing to secure the contact against withdrawal.

3 Claims, 7 Drawing Figures
This invention relates to electrical connector assemblies comprising a housing of insulating material releasably containing a contact terminating a wire lead. The invention is also concerned with housings for such assemblies and is useful, for example, in printed circuit edge connectors.

Generally, contacts are releasably secured into respective cavities of the housing by resilient latches formed on the contacts engaging respective shoulders in the housing cavities. Less commonly, the housing may be formed integrally with a latch projecting from a side of the cavity to engage a shoulder of the contact. In some other arrangements the housing is formed of two parts releasably secured together, for example by a clamping screw. One of the parts closes a side of each of the contact cavities to hold the contact in position. In some applications none of these types of housing have been found completely satisfactory and it is an object of the present invention to provide an assembly including a housing in relation to which contacts may be inserted or withdrawn with facility.

An electrical connector assembly according to the present invention comprises a housing having a cavity open at opposite ends and containing a contact engaging a shoulder at a forward open end of the cavity to resist forward movement, and a shoulder at the rear of the cavity to resist rearward movement, the shoulder at one end being formed on a flap integral with the housing at a hinge, the flap being movable about the hinge to move the shoulder at the one end to a position clear of the cavity to admit withdrawal of the contact, the flap being releasably engageable with the housing to hold the shoulder in contact engaging position. The invention also includes a housing formed of resilient insulating material and having a cavity open at opposite ends for receiving a contact, the cavity having shoulders at forward and rearward ends projecting laterally into the cavity for engaging forward and rearward contact projections to hold the contact against forward and rearward movement, one of the shoulders being formed on a flap integrally formed with the housing at a hinge, the flap being movable about the hinge to move the shoulder at the one end to a position clear of the cavity to admit withdrawal or insertion of the contact, the flap being releasably engageable with the housing with the shoulder of the flap projecting into the cavity.

Suitably the shoulder formed on the flap is disposed adjacent the hinge and a portion of the flap on a side of the shoulder remote from the hinge provides a finger piece for hingedly moving the flap. Preferably the flap is at the rear of the cavity, at the end for leading out a wire from the contact. Sides of the flap are suitably arranged to snap-fit in recesses at opposite side portions of the housing, and in a multiple contact assembly, a single flap may be provided for a plurality of cavities.

The invention will now be described, by way of example, with reference to the accompanying partly diagrammatic drawings, in which:

FIG. 1 is a sectional elevation of a printed circuit edge connector housing according to the invention, with a contact shown in phantom, and taken on line 1—1 of FIG. 2 but to an enlarged scale; FIG. 2 is an end view of the housing of FIG. 1 from the righthand end of that Figure; FIG. 3 is a plan view of the housing of FIG. 1; FIG. 4 is an end view of the housing taken from the lefthand end of FIG. 1; FIG. 5 is a sectional elevation taken on the line 5—5 of FIG. 3; FIG. 6 is a fragmentary view of a part of a printed circuit board with which the connector assembly of FIGS. 1 to 5 may be used; and FIG. 7 is a perspective view of a contact of the assembly of FIG. 1.

The connector housing of FIGS. 1 to 5 comprises a slab-like block 1 of resilient insulating material such as nylon formed with six parallel contact cavities 2 separated by walls 3. The cavities 2 are open at forward and rearward ends 4, 5, the forward opening being a slot 6 of reduced height compared with that of the housing 1, and the opening 5 extending through the height of the housing 1 between upper and lower walls 7, 8. The slot 6 extends into the walls 3 initially in convergent manner and then in parallel sided manner to an inner end 9 at each of the walls 3. The end 9 is disposed inwardly from the forward end 4 by an amount less than half of the width of the housing 1, as seen in FIG. 1. As seen most clearly in FIG. 4, the slot 6 does not penetrate the opposite sidewalls 10 of the housing. The slot 6 is disposed closer to the lower wall 8 than to the upper wall 7 of the housing, and the cavity dividing walls 3 are formed above the slot with upwardly facing shoulders 11. The shoulders 11 extend rearwardly from the forward wall parallel to the slot 6 and at the inner end 9, the shoulders 11 are inclined downwardly and then rearwardly in parallel manner but closer to the level of the slot 6.

The thicker portions of walls 3 defined by shoulders 11 terminate rearwardly of the slot inner ends 9 and closer to the rearward than the forward end of the housing at an upright shoulder portion 12 extending to the lower wall 8. At the juncture of shoulder 12 with wall 8, the housing 1 is formed with a hinged flap 13 secured to the wall 8 by an integral hinge 14 extending, as seen in FIGS. 2 and 4, substantially throughout the housing width. In its closed condition the flap 13 as shown in full lines in FIG. 1, forms a continuation of the wall 8, but it is movable clockwise to the broken line position shown in FIG. 1, to extend outwardly substantially at right angles to the wall 8 on a side remote from wall 7. Suitably the flap 13 is moulded in the broken line position. The flap 13 is formed with a plurality of tongues 15 each respective to a contact cavity 2. The tongues 15 are a sliding fit between the appropriate cavity walls 3 and project to a height generally level with the foremost portions of shoulders 11. Each tongue 15 has a forward surface perpendicular to the flap 13 and to the wall 8 when the flap is in its closed condition and a rear surface inclined downwardly and rearwardly to the flap 13. At its rear end the flap 13 is formed on its upper side with a plurality of shallow projections 16 arranged to locate between appropriate cavity sidewalls 3, as seen in FIG. 2. The outer sides of outermost projections 16 are formed with latching ears 17 engaging complementary recesses formed in the outer side walls 10 of the housing in a snap fit. The ears 17 are engageable or releasable by flexure of sidewall parts around the recesses.

Each of the cavities 2 at its forward end is formed internally in the upper wall 7 with a small protruberance
ene of the channel sides 26 of the different contacts to resist rearward withdrawal of the contacts. Movement of the lid from the contact engaging position is resisted by latching engagement of the flap ears 17 with the complementary recesses of the sidewalls 10.

On release of the lid 13 from the full line to the broken line condition of FIG. 1, the contacts 30 may be withdrawn from the housing.

Springs portions 44 of each of the contacts 30 project into the slot 6, as seen in broken lines in FIG. 1, so that on insertion of a board edge into the slot 6, spring portions 44 engage a side of the board and are flexed upwardly, as seen in FIG. 1.

Suitably, the printed circuit board is formed as shown in FIG. 6 with a pair of spaced parallel slots 50, 51 extending generally perpendicular to an edge of the board on opposite sides of a group of six conductive strips, the slots 50, 51 are of different widths corresponding to the housing wall parts 24, 25 so that the housing can only be assembled to the board in one sense of polarization. In addition, an aperture 52 is formed, slightly offset from the center of the space between slots 50, 51 and corresponding in position to the offset latch tongue 22 of the latch arm 20. On assembly of the housing to the board, the latch tongue 22 engages aperture 52 and releasably secures the housing to the board against pull-out forces.

In the housing of the invention, contacts connected to relatively stiff harness wires, as might be expected in automotive applications, can relatively easily be manually assembled into or withdrawn from the housing.

I claim:

1. An electrical connector comprising a housing having a plurality of cavities separated by walls, each cavity being open at opposite ends and having a shoulder at a forward open end of the cavity, the housing further having an integral flap at a rearward open end of the cavities, the flap having a hinge extending transversely to the cavities, a plurality of tongues formed on the flap, said tongues being disposed generally normally of the flap and corresponding in number to the cavities, each tongue being spaced from its adjacent tongue by a distance greater than the width of the walls separating the cavities, said flap being movable about said hinge between a first position whereat the tongues are clear of the cavities to permit entry and withdrawal of contacts from the rearward end of the cavities, and a second position whereat each tongue is disposed in its respective cavity to prevent entry and withdrawal of contacts from the rearward end of the cavities.

2. An electrical connector as set forth in claim 1 further comprising an electrical contact disposed in each cavity and restrained against forward movement by said shoulder.

3. An electrical connector as set forth in claim 1 further comprising means for retaining said flap in the said second position.