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[33] **Italy**
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[56]

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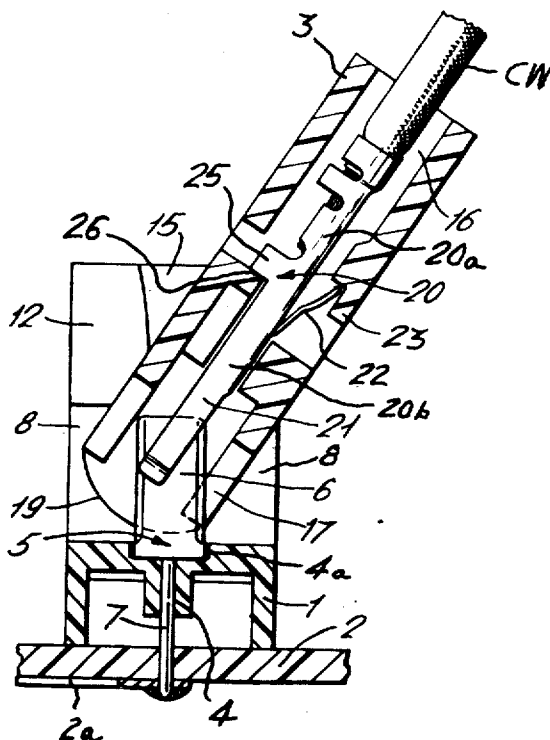
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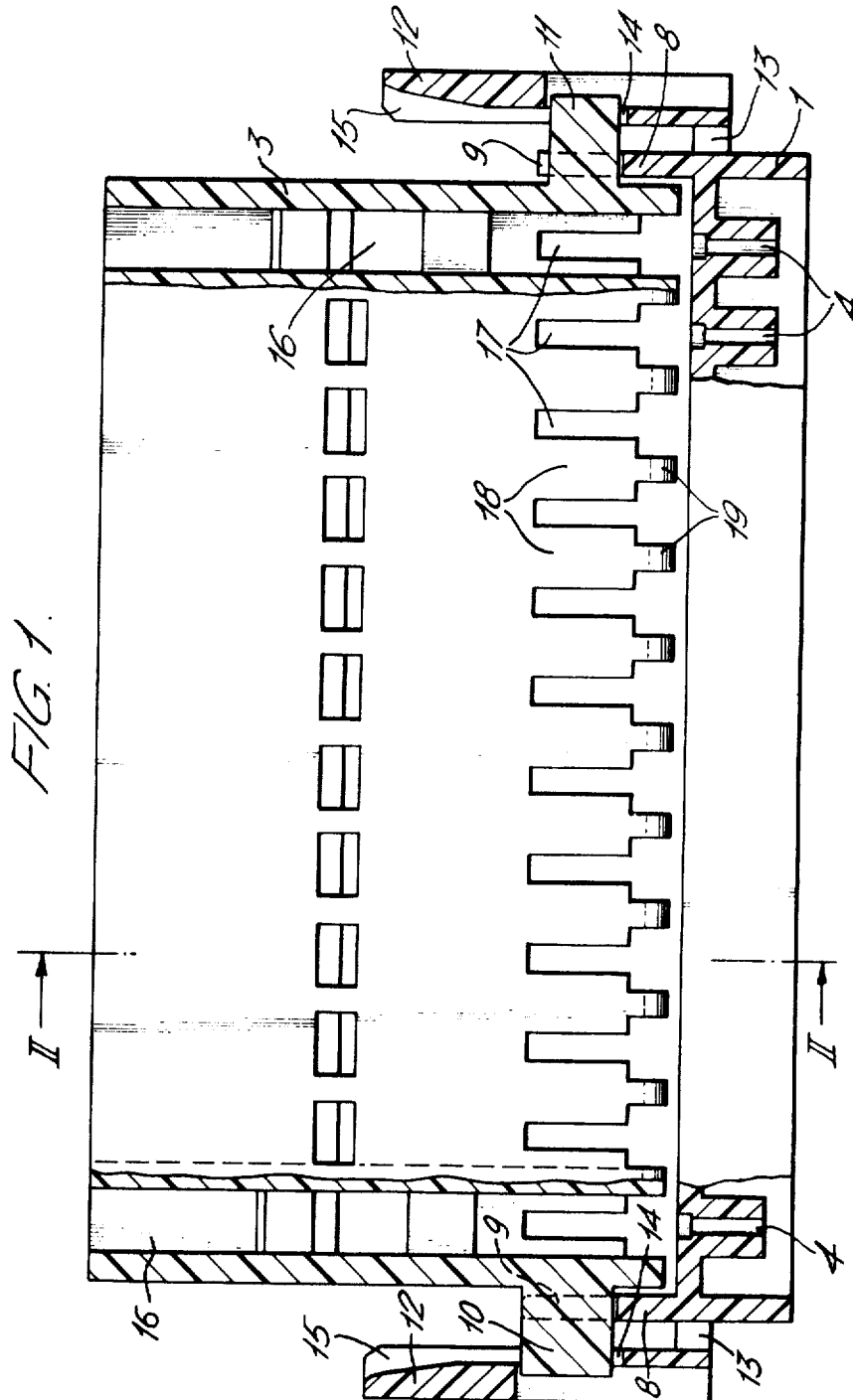
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[54] CONNECTOR HOUSING ASSEMBLIES 9 Claims, 5 Drawing Figs.

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ABSTRACT: A two-part connector for making multiple connection to a printed circuit panel has one part mounted in trunnions and with fork leaf contacts engaging tabs of the other part so that the two parts may be rotated, relatively, in the manner of a hinge to vary the cable leadout angle. The two parts may be mated or disengaged over a wide range of relative orientation and facilitate connections to spaced boards of a stack or in low access space.

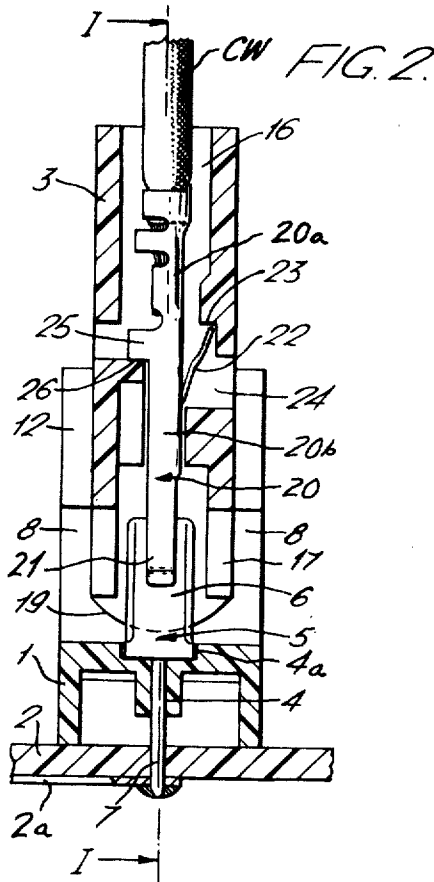
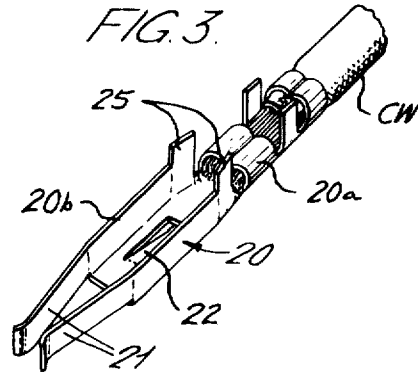
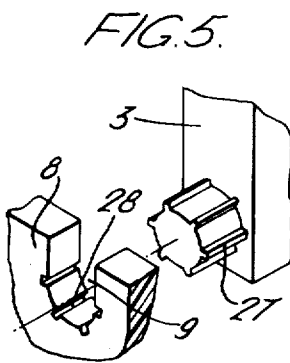
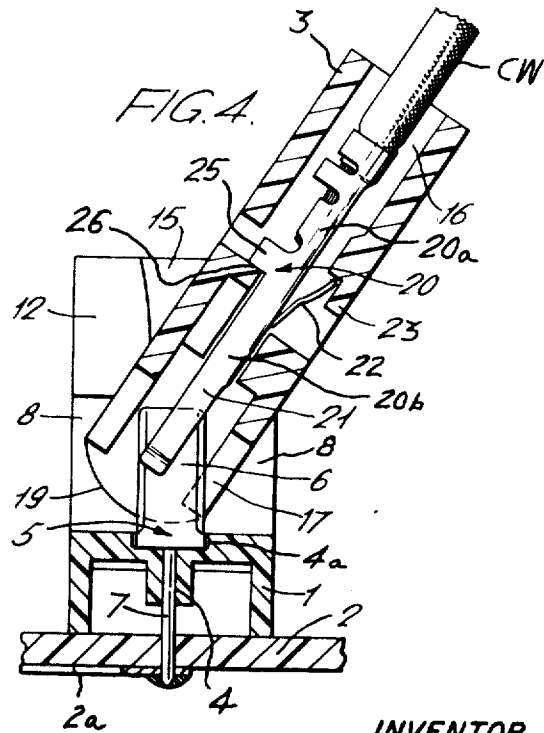




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CONNECTOR HOUSING ASSEMBLIES

This invention relates to an electrical contact housing assembly.

Contact housing assemblies are known which comprise a pair of mating housing parts arranged for mating or disengagement by relative movement in a rectilinear fashion. Normally, electrical contacts received within the housing parts and their associated wiring extend in the same direction as the relative movement. This, in some instances, presents difficulty where, for example, due to limited access space it is desirable for the wiring to extend from the contact housing assembly in a different direction. To this end it had been proposed to lead the wiring from a contact housing assembly at an inclination to the mating direction through a lateral aperture in the contact housing assembly. This requires different housing parts or special adapters for each contact application requiring a different angle of wiring leadout. Furthermore, difficulty in assembly of the contacts and wiring in a contact housing part may be presented because of the inclination of the wiring leadout direction to the mating direction.

There are situations where the use of a mating contact housing assembly is rendered difficult due to lack of access space for mating or disengaging the housing parts when assembled in apparatus, for example in the confined space between spaced circuitry panels.

According to an object of the present invention, an electrical contact housing assembly comprises two housing parts of electrically insulating material each adapted to receive an electrical contact, the housing parts each having complementary means for releasably connecting the parts together such that one housing part can be rotated to different angular positions relative to the other housing part, the electrical contacts, when operatively received within the housing parts, engaging when the housing parts are connected together.

Another object is that preferably one of the housing parts has a trunnion engageable with a complementary bearing on the other housing part, the trunnion and bearing having a common axis about which the two housing parts can be positioned at different angular orientations.

A further object is that in one embodiment, the contact of one housing part is a flat tab arranged to be slidably received between the arms of a complementary fork contact of the other housing part.

An additional object is that suitably, the one housing part has a pair of axially aligned trunnions releasably engageable with complementary bearings of the other housing part.

A still further object is that the bearing or bearings may have axially extending keyways for engaging complementary splines on the trunnions whereby the contacts may be secured in a number of different positions of relative orientation corresponding to engagement of the splines with different keyways.

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.

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

FIG. 1 is a partly sectional side elevational view taken on line 1—1 of FIG. 2 of an electrical contact housing assembly according to the invention with the electrical contacts removed;

FIG. 2 is a transverse sectional view taken on line 2—2 of FIG. 1 of the housing assembly with contacts in position and mounted on a printed circuit board;

FIG. 3 is a perspective view of a receptacle contact for the housing assembly of FIGS. 1 and 2;

FIG. 4 is a transverse sectional view similar to that of FIG. 2 but with the housing parts at a different relative orientation; and

FIG. 5 is a fragmentary perspective view of part of a modified contact housing part.

As shown in FIGS. 1 and 2, an electrical contact housing assembly comprises a first housing part 1 for mounting on a printed circuit board 2 and a second mating housing part 3 for releasable engagement with the housing part 1 and arranged to be positioned at different relative positions of orientation. The housing parts 1 and 3 are suitably molded from resilient plastic insulating material, and the lower housing part 1 comprises a generally rectangular block formed with a longitudinally spaced series of cavities 4 each receiving a lower post portion 7 of a tab contact 5. As seen in FIG. 2, each tab contact comprises an upper tab portion 6 and the lower post portion 7, the post portion 7 being a force fit in a complementary cavity 4 and the lower end of the tab portion 6 seating in a complementary slot 4a at the upper end of the cavity 4. The tab portion 6 extends with its major width transversely of the length of the housing part 1 and projects upwardly. The post portion 7 projects below the housing part 1 for connection by flow soldering as shown in FIG. 2, to a conductor 2a at the lower side of a printed circuit board 2, the housing part 1 being mounted on the upper side of the board 2.

The housing part 1 is formed at its ends with flangelike upper projections 8 between which the housing part 3 is received. The projections 8 are formed at the upper edges with U-shaped concave recesses defining bearings 9 for supporting complementary trunnions 10,11 of the housing part 3. Outwardly of the projections 8, the housing 1 is integrally formed with upstanding arms 12, secured to respective ends of the housing at their lower ends by standoff projections 13 so that the arms are pivotable about their lower ends by resilient bending of the projections 13. The arms 12 are formed with respective apertures 14, axially aligned, for receiving and engaging the upper sides of the trunnions 10,11 and holding them down in the bearing recesses. The trunnions 10,11 are of different diameter and the complementary bearings 9 and apertures 14 are also differently sized in similar manner so that the housing part 1 can only receive the trunnions of the housing part 3 in one of the two possible positions thereby providing a polarizing feature to assure that housing parts 1 and 3 are properly connected. Above the apertures 14, the arms are formed on their sides facing bearings 9 with slots 15 which decrease in depth downwardly (as seen in FIG. 1). These slots serve as guides when inserting the trunnions 10,11 to mate the housing parts, as will be described and they have widths to accommodate trunnions 10,11.

The upper housing part 3 comprises a generally rectangular insulating block formed with a plurality of contact-receiving cavities 16 at positions corresponding to the cavities 4 of housing part 1. The cavities 16 are open at upper and lower sides of the housing part 3 and at the lower side the cavities 16 open into respective slots 17 extending transversely through the housing part 3 between opposite sides for passage of complementary tabs 6 on relative rotation of the housing parts 1 and 3 as will be described. The housing parts between slots 17 define ribs 18 which at their lower edges 19 are formed in arcuate convex manner about the axis of the trunnions 10,11 which project from opposite ends of the housing 3.

The contacts 20 for the housing 3 are formed, as seen in FIGS. 2 and 3, with a crimping part 20a for connection to a conductor wire CW and from which extends a channel-shaped transition part 20b. Opposite sides 21 of the part 20b extend forwardly in convergent manner for receiving a tab portion 6 between them. Free ends of the sides 21 are turned out to facilitate registering the contact 20 with its complementary

tab portion 6. The floor of the channel part 20b is formed with a rearwardly and outwardly inclined latch detent 22 arranged to engage a shoulder 23 in the housing cavity 16 to resist outward withdrawal of the contact as seen in FIG. 2. The latch detent 22 is accessible through a port 24 for release purposes. Opposite the detent 22, the sides of the part 20b are formed with ears 25 engaging a shoulder 26 of the housing cavity 16 for limiting insertion of the contact 20 into its cavity 16. As seen in FIG. 2, the contact arms 21 extend into the slot 17 at the lower end of the cavity 16 for embracing the complementary tab portion 6 disposed in the slot 17.

In assembling the housing parts 1 and 3 together, the trunnions 10 and 11 of housing part 3 are registered with the upper ends of slots 15 of the arms 12. The housing part 3 may be in any position of orientation relative to housing part 1 so far as rotation about the trunnion axis is concerned within approximately 180°. The housing part 3 is urged towards part 1 to force the trunnions 10,11 down the associated slots 15. The arms 12 are cammed outwardly by action of the ends of the trunnions 10,11 on the inclined floors of the slots 15. When the trunnions 10,11 register with the complementary bearings 9, the ends of the trunnions register with apertures 14 of the arms 12, thus releasing the arms 12 from the camming pressure. The arms 12 spring inwards by relaxation of resilient deflection resulting from the camming action and register the apertures 14 with end portions of the trunnions to hold the trunnions down in the bearings 9 and the housing parts 1 and 3 together.

The upper sides of apertures 14 are suitably arranged to hold the trunnions 10,11 in their bearings 9 under pressure so that the housing parts 1 and 3 are held in relative orientation by high frictional forces which, while permitting manual variation of the orientation, do not normally require additional means for holding the housing parts in position. The contact areas between the ends of the contact arms 21 and the tab portions 6 of the mating contacts are suitably disposed below the trunnion axis, so that on relative rotation about the trunnion axis, for example between the FIG. 2 and the FIG. 4 conditions, the ends of the contact arms 21 effect arcuate movement along sides of the tab portions 6 to effect contact wiping.

If more secure holding of position of the housing parts is required, the trunnions are suitably splined as shown in FIG. 5 at 27 with complementary keyways 28 in the bearing 9, so that on engagement of keyways 28 with the splines 27, the housing parts 1 and 3 are securely held in a particular orientation.

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 contact housing assembly comprising two housing parts of electrically insulating material each adapted

to receive an electrical contact, the contact of one housing part being a flat tab arranged to be slidably received between the arms of a complementary fork contact of the other housing part, complementary means provided on said housing parts for releasably connecting the housing parts together such that one housing part can be rotated to different angular positions relative to the other housing part so that the electrical contacts, when operatively received within the housing parts, become electrically engaged when the housing parts are connected together, the electrical contact of each housing part being rotatable with its housing part relative to the electrical contact of the other housing part, the axis about which the electrical contacts are relatively rotatable corresponding to the axis about which the two housing parts can be positioned.

2. An assembly as claimed in claim 1, in which said complementary means is defined by one of the housing parts having a trunnion engageable with a complementary bearing on the other housing part, the trunnion and bearing having a common axis about which the two housing parts can be positioned at different angular orientations relative to each other.

3. An assembly as claimed in claim 1, in which said complementary means is defined by one housing part having a pair of axially aligned bearings for receiving complementary trunnions of the other housing part.

4. An assembly as claimed in claim 3, in which one trunnion and its associated bearing are of substantially different diameter from that of the other trunnion and bearing.

5. An assembly as claimed in claim 3, in which each trunnion and its associated bearing have complementary splines and keyways.

6. An electrical connector housing assembly comprising first and second housing parts, the first part having a plurality of contacts in a row releasably engageable with a row of complementary contacts in the second part, one of the parts having a trunnion releasably engaging a bearing on the other part for relative rotation of the housing parts about an axis extending longitudinally of the contact rows, a contact in one part comprising a tab slidably engaging between the arms of a fork contact in the other part, the tab and fork contacts being arranged to permit relative rotation about the axis by sliding of the tab between the fork arms and a contact area between the tab and fork arms being spaced from the axis so that contact surface wiping is effected on the relative rotation.

7. An assembly as claimed in claim 6, in which the one housing part has a pair of trunnions engaging respective bearings in the other part, the trunnions and bearings defining a common axis of rotation.

8. An assembly as claimed in claim 7, in which one trunnion and its associated bearing are of substantially different diameter from that of the other trunnion and bearing.

9. An assembly as claimed in claim 7, in which each trunnion and its associated bearing have complementary splines and keyways.