A preloaded contact and latchable housing assembly including electrical contacts having one end which is adapted to be inserted within a P.C. board for wirewrapping connections, while the other end is substantially U-shaped and includes leaf-spring type contact members which are adapted to be inserted within housing apertures. The housing includes means for automatically biasing the leaf-spring members apart when the same are inserted within the housing whereupon a resilient receptacle is formed for mating contact members which may also be inserted into the housing, and includes other means for automatically interlocking with projections disposed upon the leaf-spring contact members whereby the contact members and the housing may be integrally interlockingly engaged. The upper extremities of the contact members are curved outwardly so as to provide a funneled entrance upon the receptacle for the mating contacts, and the housing apertures are of such width as to prevent the insertion of a mating contact which will tend to overstress the resilient contact members.

5 Claims, 8 Drawing Figures
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PRELOADED CONTACT AND LATCHABLE HOUSING ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field Of The Invention

The present invention relates generally to electrical contacts and housing therefor, and more particularly to a housing which automatically preloads the electrical contact members upon insertion of the same within the housing so as to facilitate the reception of other mating contacts into the housing and which also includes means for engaging projecting portions upon the contact members whereby the contact members and the housing are automatically interlocked together.

2. Description Of The Prior Art

Although a multitude of electrical contacts and housings therefor are of course well-known, there is a substantial need for example, for electrical contacts which may be simply and economically produced. Conventional operations, such as stamping and forming, may of course be utilized, but usually the performance of several stamping and forming operations are required and the resulting complex contacts are not readily adaptable to the rapid handling techniques employed in forming contact housing assemblies.

Concomitantly, there is also a substantial need for electrical contact housings which facilitate the installation of electrical contacts therewithin such that the contact housing assemblies are immediately adapted for the reception of mating contact members so as to complete and further associated electronic circuitry. In conventional housings for example, in forming electrical contact receptacles, movable cam or other sliding means are employed which serve to bias resilient contact members into the appropriate positions. In addition, separate fastening means are required to retain the relative positions of the housing and the contact members so as to prevent a deterioration of the electrical connection between the mating contact members. Aside from the additional time required to perform these operations, structural fatigue and breakdown often occur in such assemblies due to the fact that the biasing means, for example, may wear out the resilient contact members, the result being the loss of positive electrical connections.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an improved simple electrical contact which may be simply and economically manufactured.

Another object of the present invention is to provide an improved electrical contact which may be rapidly inserted and automatically secured within a contact housing.

Still another object of the present invention is to provide an improved electrical contact which facilitates the rapid connection with mating contact members.

Yet another object of the present invention is to provide an improved electrical contact which positively grasps mating contact members so as to insure the electrical connection therebetween.

A further object of the present invention is to provide an improved electrical contact housing which is simple in structure and is simple and economical to produce.

A yet further object of the present invention is to provide an improved electrical contact housing which automatically preloads electrical contact members, so as to adapt the same for mating contact with other contact members, without any moving components.

A still further object of the present invention is to provide an improved electrical contact housing which automatically preloads electrical contact members and which includes means to prevent the overstressing of such contact members.

A yet further object of the present invention is to provide an improved electrical contact housing which automatically secures electrical contact members therewithin without the use of separate fastening components.

The foregoing objects are achieved according to this invention through the provision of a preloaded contact and latchable housing assembly having leaf-spring type electrical contact members which together form a substantially U-shaped portion and inclined surface means within the housing which serves to bias the contact members apart when the same are inserted within the housing whereupon a resilient U-shaped receptacle is formed which is adapted to immediately receive mating contact members, which may be, for example, blade contacts. The upper extremities of the contact members are curved outwardly so as to provide a funneled entrance upon the receptacle for the mating contact members, and the housing and contact members further include recess means and projecting ear means, respectively, which automatically interlock upon insertion of the members within the housing so as to lockingly engage the housing and contact members relative to one another. Appropriate apertures are of course provided within the housing so as to afford access for the mating contacts to the contact receptacle, the width of the apertures serving to prevent the insertion of a mating contact which will tend to over stressing the resilient contact members.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features, and attendant advantages of the present invention will be more fully appreciated as the same becomes better understood from the following detailed description when considered in connection with the accompanying drawings, in which like reference characters designate like or corresponding parts throughout the several views, and wherein:

FIG. 1 is a perspective view of the electrical contacts constructed according to the present invention and showing the same mounted within a P.C. board and prior to insertion within the contact housing;

FIG. 2 is a partial plan view of the electrical contacts constructed according to the present invention and showing the same mounted to a carrier strip subsequent to the stamping operations utilized for manufacturing the contacts;

FIG. 3 is a sectional view of the electrical contacts constructed according to the present invention and showing the same mounted within a P.C. board and prior to insertion within the contact housing;

FIG. 4 is a partial plan view of the contact housing constructed according to the present invention;

FIG. 5 is a partial perspective view of the contact housing constructed according to the present invention;

FIG. 6 is a section view showing the entire assembly of the P.C. board, electrical contacts, and the contact housing;

FIG. 7 is a section view along line 7—7 of FIG. 4; and
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FIG. 8 is a perspective view showing the entire assembly of the P.C. board, electrical contacts, and the contact housing.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly to FIGS. 1, 2 and 3 thereof, there is shown a plurality of electrical contacts, generally indicated by the reference character 10, the dependent ends of which form elongated posts 12 which are adapted for wire-wrapping or any other type of point-to-point wiring connections. The posts 12 may be respectively inserted through a plurality of bores 14 formed within a P.C. board 16, and the contacts 10 are further provided with tapered ear members 18 which extend outwardly from the upper portions of posts 12, the lateral expanse of which is greater than the diameter of the bores 14 whereby the lower planar surfaces 19 of ears 18 abut the upper surface 20 of P.C. board 16 thereby limiting the depth to which the contacts may be inserted within board 16. In addition, there is integrally disposed upon the upper portion of each post 12 a bifurcated section which serves to form a pair of leaf-spring type contact members 22 and 24.

In manufacturing the electrical contacts of the present invention a suitable metal sheet may be subjected to several stamping operations whereby a serial array of contacts 10, including post members 12 and contact members 22 and 24, as well as a carrier strip 26 may be simply and economically produced, the strip 26 being integrally connected to contact members 22 by means of dependent leg members 28, as specifically shown in FIG. 2. Since the stamped structures are simple and integral requiring no folding parts, they may be placed in a very close spatial relationship so as to facilitate storage. For example, the carrier strip 26, along with contacts 10, may be rolled upon a spool, not shown, and may also be provided with a plurality of apertures 30 which are adapted to cooperate, in sprocket wheel fashion, with pins provided upon appropriate automatic machinery, also not shown, which serves to unwind the strip and contacts from the storage spool when it is desired to insert the contacts within P.C. board 16.

Subsequent to the completion of the stamping operations, the contact assemblies may be subjected to a forming operation whereupon each of the contact members 22 and 24 is caused to attain a substantially sinusoidal configuration while the laterally offset contact members together are caused to form a substantially U-shaped contact portion, as specifically shown in FIG. 3. The contacts may all be simultaneously inserted and secured within P.C. board 16, either by mechanical, soldering, or force fitting means, while still attached to carrier strip 26, as specifically shown in FIG. 1, and in order to facilitate removal of strip 26 subsequent to the insertion of the contacts within the board, the integral connection between contact member 22 and dependent leg member 28 may be scored or perforated, as shown at 32 in FIGS. 1 and 2.

Referring now to FIGS. 4–8, there is shown a rectangular dielectric housing, generally indicated by the reference character 34, which may be mounted upon contacts 10 subsequent to the insertion of the contacts within P.C. board 16. The housing includes a plurality of substantially rectangular longitudinal apertures 36 extending therethrough, each of which is adapted to receive therein one of the contacts 10 which may be inserted through a lower funneled entrance 37 associated with each aperture. The sidewalls defining each of the apertures include diatomically opposed inclined surfaces 38, only one of which is shown in the drawings, which serve to abut the upper outwardly curved portions 40 of each of the contact members 22 and 24 as the housing is inserted over the contacts, whereby the leaf-spring type contact members are biased apart in cantilever fashion so as to diverge from the position shown in FIG. 3 to that position shown in FIG. 6. In order to retain the contact members in their biased positions, longitudinally extending undercut slotted portions 42 are also provided within the sidewalls contiguous to surfaces 38.

The contact members thus serve to form a receptacle therebetween for blade contacts, not shown, which may be inserted through the end of the apertures 36 opposite to that end through which the contacts 10 were inserted, for mating with members 22 and 24. As shown in FIG. 6, the contact members 22 and 24 are prestressed or preloaded by the inclined surfaces 38 to an extent such that the smallest distance between parallel planes tangent to the interior surfaces of the members, as shown at 44, is slightly less than the thickness of the contact blades to be inserted therebetween, such pre-stressing or preloading thereby enabling the contact blades to be easily and quickly inserted, and yet facilitating positive electrical contact between the contact members and blades due to the fact that the contact members retain their inherent resiliency as the stress imparted thereto does not exceed the elastic limit of the contact member material, the contact members thus being capable of further divergence as the contact blades are in fact inserted therebetween.

In addition to serving as a means which aids in the preloading of the contact members, the curved portions 40 of the members 22 and 24 also serve to provide a funneled entrance for the guidance of the contact blades as the same are inserted between the contact members. Furthermore, in order to insure that the entrance of the contact blades into the receptacle between the contact members is unimpeded, the tips 46 of curved portions 40 are housed within the undercut slotted portions 42, and consequently, upon being inserted, the blades are caused to engage the smooth, curved surface portions 40.

Similarly, in order to prevent the contact members from becoming overstressed or overloaded by the insertion of the contact blades, i.e., stressed beyond the elastic limit of the contact member material whereupon the inherent resiliency within the members is lost, the structure of the housing apertures 36 is such that the sidewalls defining the apertures serve as positive stop means which engage the corresponding surfaces of the contact blades as the same are inserted within the apertures whereupon the maximum amount to which the contact members 22 and 24 may be is fixed by the insertion of the contact blades, and consequently the maximum separation which may occur between the members at the normally narrowest separation points 44, is dictated by the width of the apertures 36 which of course dictate the maximum width of the blades which may be inserted therewithin. In this manner then, the housing 34 serves to facilitate the entrance of the
contact blades into the receptacle formed by the contact members 22 and 24, and more importantly, provides a means which protects the contact members from becoming overstressed due to excessive bending of the same.

Still referring to FIGS. 4-8 it will be apparent that one pair of housing apertures which are in a diametrically opposed relationship may include substantially rectangular relieved areas 48 such that the overall configuration of such housing apertures 50 is substantially Z-shaped, as opposed to the substantially rectangular configuration of the remaining apertures. The sidewalls defining these apertures 50 also differ from the sidewalls defining apertures 36 in that in lieu of undercut slotted portions 42, there are provided, at the upper terminal portions of surfaces 38 and adjacent relieved areas 48, recessed portions 52. Consequently, when the particular contact members, inserted within apertures 50 so as to engage inclined surfaces 38 and be biased apart thereby, reach the upper terminal portion of surfaces 38 and pass therebeyond, such contact members, due to their inherent resiliency, will snap back toward their original unbiased positions, whereby ear-type projections 54, which extend laterally outward from curved portions 40 of the contact members, will engage recessed portions 52 and be retained therein. The sidewalls of apertures 50 are of course further provided with longitudinally extending portions 56, disposed upon the opposite side of recessed portions 52 as is inclined surfaces 38, whereby the contact members are prevented from fully attaining their original unbiased positions, and consequently, as the contact members remain preloaded to some degree, insertion of blade contacts therebetweens is still facilitated.

In this manner then, due to the interengagement between the contact member ear portions 54 and the recessed housing portions 52, the housing 34 may be automatically interlocked upon the P.C. board-contact assembly. When it is desired to remove housing 34, a thin prying tool, such as for example, a screwdriver blade or the like, may be inserted within the inner portion of the relieved areas 48 so as to outwardly bias the contact members and thereby remove the same from the recessed portions 52.

Although the housing 34 is shown, such as for example, in FIGS. 6 and 8, as being supported upon the upper surface 20 of P.C. board 16, the housing need not engage board 16 in order to be secured relative thereto as the housing can be supported by interengagement between the upper extremities 46 of the contact members and the overhanging member 58 of undercut portion 42, and also through the interlocking assembly of projections 54 and recessed portions 52. It is a further possibility that the entire assembly be constructed such that the housing 34 is supported upon the upper planar surfaces 60 of ear members 18.

Thus it may be seen that the preloaded contact housing assembly of the present invention has important advantages over the known prior art structures in that the contact members may be simply and economically produced and assembled within a housing having a unique structure which automatically separates and preloads the contact members whereupon the assembly facilitates the reception of other mating contact members therewithin so as to complete various associated electronic circuitry. The preloading of the contact members also serves to resiliently bias the same so as to ensure positive electrical contact between such contact members and the mating contact members, and the contact housing is further provided with means which engages projection means disposed upon the contact members whereby the housing and the contact members are automatically locked relative to one another.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is to be understood therefore that within the scope of the appended claims, the present invention may be practiced otherwise than as specifically described herein.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A connector comprising: a terminal having a post portion integral with a bifurcated section defining a pair of resilient leaf spring contacts pivotable by resilient cantilever deflection in mutually exclusive planes of pivotable motion, said leaf spring contacts having laterally opposed contact making surfaces which together define a receptacle having a given width, a housing having interior sidewalls defining an opening receiving said leaf spring contacts, first opposing sidewalls of said opening spaced apart by a distance slightly greater than said given width and having respective undercut and respectively oppositely inclined sidewall portions camming corresponding leaf spring contacts resiliently in cantilever deflection and in opposite directions within said mutually exclusive planes of pivotable motion, said leaf spring contacts having means in engagement with said undercut sidewall portions for maintaining said leaf spring contacts in oppositely deflected positions to define a receptacle extending therebetween, second opposing sidewalls of said opening being initially in spaced relationship from said leaf spring contacts, said leaf spring contacts being further resiliently pivotable by resilient cantilever deflection in said opposite directions to enlarge said receptacle for receipt of a male terminal therein, and said leaf spring contacts being engageable against said second opposite sidewalls of said opening to limit said resilient cantilever deflection in said opposite directions.

2. A connector comprising: a terminal having a post portion integral with a bifurcated section defining a pair of resilient leaf spring contacts pivotable by resilient cantilever deflection in mutually exclusive planes of pivotable motion, a housing having interior sidewalls defining an opening receiving said leaf spring contacts, first opposing sidewalls of said opening having respective undercut sidewall portions camming corresponding leaf spring contacts resiliently in cantilever deflection and in opposite directions within said mutually exclusive planes of pivotable motion, said leaf spring contacts being maintained by engagement with said undercut sidewall portions in oppositely deflected positions to define a receptacle extending therebetween, second opposing sidewalls of said opening being initially in spaced relationship from said leaf spring contacts,
said leaf spring contacts being further resiliently pivotable by resilient cantilever deflection in said opposite directions to enlarge said receptacle for receipt of a male terminal therein, and said leaf contacts being engageable against said second opposite sidewalls of said opening to limit said resilient cantilever deflection in said opposite directions, each leaf spring contact has a projecting ear, and said undercut portions each includes a recessed portion retaining a corresponding projecting ear therein, thereby locking said housing to a corresponding leaf spring contact.

3. The structure as recited in claim 1, wherein, the free ends of said leaf spring contacts are curved outwardly in opposite directions defining a funneled entrance to said receptacle.

4. The structure as recited in claim 1, wherein, said terminal includes means for engaging and lockingly retaining said housing on said terminal.

5. The structure as recited in claim 1, wherein, said undercut portions include corresponding inclined cam surfaces which resiliently cam corresponding leaf spring contacts, in resilient cantilever deflection, and said undercut portions include corresponding surfaces longitudinal with the opening and continuous with corresponding inclined cam surfaces, said longitudinal surfaces being engageable on corresponding leaf spring contacts for maintaining said corresponding leaf spring contacts in said oppositely deflected positions.

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