Feb. 9, 1971 R. W. MERRY 3,562,698

ELECTRICAL CONTACT

Filed Feb. 27, 1969

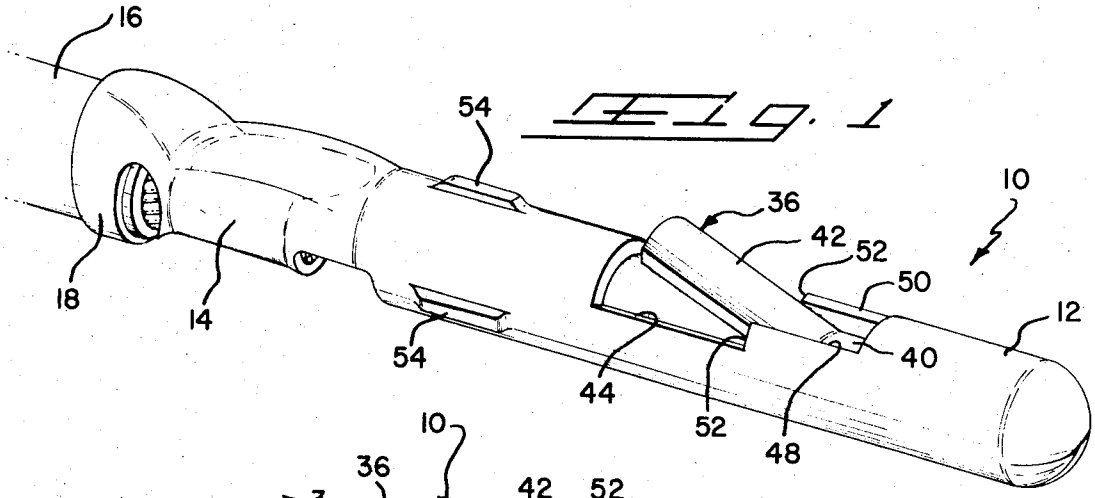

Fig. 1

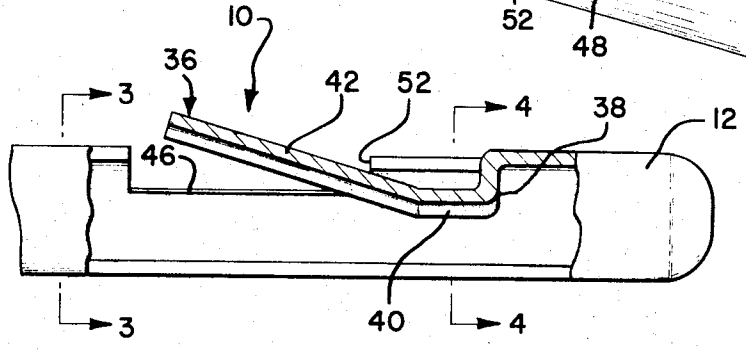

Fig. 2

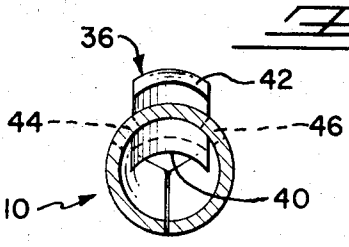

Fig. 3

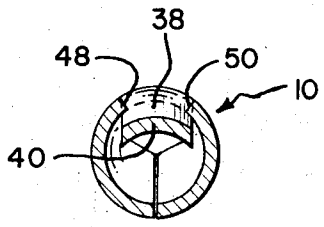

Fig. 4

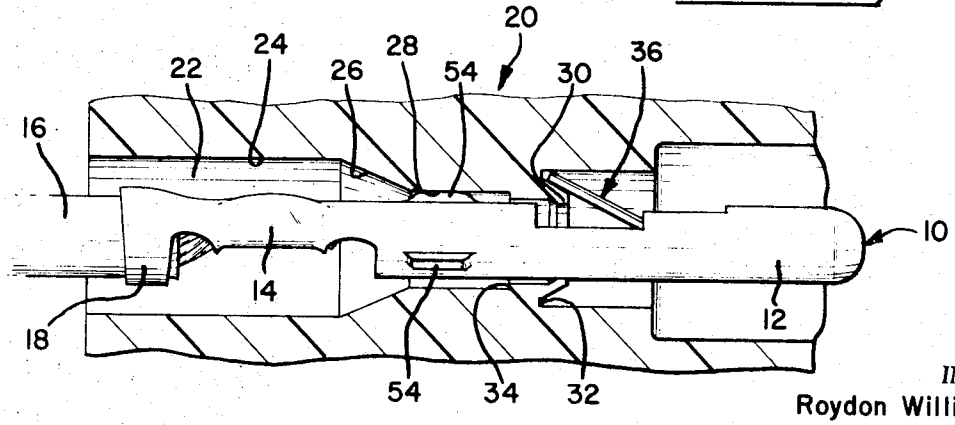

Fig. 5

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ELECTRICAL CONTACT

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U.S. Cl. 339—217 2 Claims

ABSTRACT OF THE DISCLOSURE

An electrical contact terminal having a forward mating portion and a rearward conductor attaching portion. A lance is struck from the mating portion for securing said terminal within an insulating housing, said lance being disposed partially within the confines of the terminal mating portion to provide strength and protection for the lance.

This invention relates to electrical contact terminals and more particularly to an improved configuration for a lance means for retaining the terminal within the cavity of an insulating housing.

Electrical terminals of the prior art contain various teachings of lance configuartions for retaining terminals within insulating members. The primary considerations in the design of retaining lances are that they have sufficient strength to withstand normal pull out requirements and that they be sufficiently protected to minimize the possibiilty of being over-stressed during handling of the terminal prior to insertion within a housing. It is this latter design consideration which has caused the majority of the problems with the prior art devices.

It is therefore the principle object of this invention to provide an electrical terminal with an improved lance configuration.

Another object of this invention is to provide a lance which yields a low insertion force and yet provides a high retention force.

An additional object is to provide a lance which has its bend points disposed within the terminal periphery to thereby protect the lance against being over-stressed.

An additional object is to provide an improved terminal having spaced ribs for stabilizing the terminal and for limiting insertion of the terminal into a housing.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, in which like reference numerals refer to like part:

FIG. 1 is a perspective view showing an electrical contact terminal embodying the teachings of this invention;

FIG. 2 is a side elevational view partly in section showing details of the terminal lance configuration;

FIG. 3 is a cross-sectional view taken along the line 3—3 of FIG. 2;

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 2; and

FIG. 5 is a side elevational view partly in section showing the terminal disposed within a cavity in an insulating housing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The 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 is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is 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.

With reference now to FIG. 1 there is shown an electrical contact terminal indicated generally at **10** and constituting a preferred embodiment of the present invention. The terminal has a forward portion **12** of generally cylindrical configuration and adapted to mate with a corresponding female receptacle in a manner well known in the art. The rearward portion of terminal **10** has ferrule means **14** for permitting the terminal to be crimped or otherwise secured to the wires of an electrical conductor **16**. Additional ferrule means **18** are provided on terminal **10** for crimping to the insulation surrounding the electrical conductor **16**.

Terminal **10** is formed from a suitable conductive material such as brass or the like and is adapted to be positioned within an insulating housing **20** (see FIG. 5) formed of nylon or other suitable material. Housing **20** is provided with a cavity **22** for receiving the electrical terminal in position to be mated with a corresponding connector. Cavity **22** has a first large diameter **24** into which the terminal enters and the cavity is then constricted along the inclined surface **26** to a smaller diameter **28**. Forwardly of the section **28** there is located an annular shoulder **30** having a recessed portion **32** and a rearward face **34**. The shoulder **30** serves to axially position terminal **10** within the cavity in a manner to be described.

A lance means **36** is struck from the cylindrical portion of the terminal and is formed in a unique manner to provide the desired strength and protective characteristics discussed above. Lance **36** has a first portion **38** bent inwardly from cylindrical portion **12** at approximately right angles thereto and further has a second portion **40** which extends within the confines of cylindrical portion **12** and is disposed generally parallel to the longitudinal axis of terminal **10**. Portion **40** extends for a relatively short distance and subsequently leads into a third portion **42** of the lance which extends at an acute angle to the longitudinal axis of the terminal and has its free end located externally of the cylindrical portion. Portions **40** and **42** of the lance are of generally arcuate cross-sectional configuration to add strength to the lance and to conform to the shape of shoulder **30** of the insulating housing.

When lance **36** is struck from the contact terminal there are additional areas **44** and **46** removed from the portion **12** to provide adequate clearance for the lance to insure free movement thereof. However, there is no clearance portions provided in the area of portion **12** which generally corresponds to the first and second portions **38** and **40** respectively of the lance. The edges **48** and **50** of the cylindrical portion are the edges produced as a result of the stamping cut made to produce the lance **36**. Upon forming the cylindrical portion **12** the edges **48** and **50** undergo a slight rotative movement to thereby cause an interference between these edges and the lance with the result that the lance is restrained by these edges from moving outwardly of the terminal body. In addition, the rearward face **52** of the edges **48** and **50** serve as a backup member for the lance **36** when force is applied to the terminal in an effort to back the terminal out of housing **20**. Therefore, the face **52** will contact the lance means along its side portions to add additional strength to the lance.

The rearward portion of cylinder **12** is provided with a plurality of ribs **54** which extend in an axial direction and which cooperate with the portion **28** of the housing cavity to thereby act as stabilizers for the terminal to insure that the terminal is properly positioned to mate with its corresponding connector. There are preferably three

such stabilizing ribs **54** located 120 degrees apart around the circumference of the terminal.

In FIG. 5 the terminal is shown fully seated within the housing cavity. Movement of the cavity in the insertion direction (to the right in FIG. 5) is limited by the stabilizing ribs **54** engaging the rearward face **34** of the shoulder **30**. If force is applied to the terminal in an effort to back the terminal out of the cavity the lance **36** will seat within the annular recess **32** and will prevent withdrawal of the terminal within the normal industry limits for extraction forces. Lance means **36** can be seen to be of considerable length due to its unique configuration and this length enables the lance to be deflected inwardly upon insertion of the terminal into the housing and the insertion forces are kept at an extremely low value due to the ease with which the free end of the lance can move in an inward direction. Inward movement of the lance is caused by the lance engaging the portions **26** and **28** of the housing cavity during which the lance will be deflected inwardly until the terminal is fully inserted so that the lance can clear the forward most portion of shoulder **30**. Lance **36** does not pivot about any one point but rather has a compound motion caused by deflection about each of the various bend points of the lance. The ability of the lance to pivot about more than one point further insures that the lance will not be accidently over-stressed due to mishandling prior to assembly within a housing. In addition, the lateral edges **48** and **50** of the terminal protect the lance in the area about which the lance pivots and this also serves to minimize the danger of over-stressing the lance.

It can be seen that the terminal of this invention incorporates a lance of unique configuration which achieves the objects listed above in a simple and inexpensive manner.

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 offered by way of illustration only.

I claim:

1. In an electrical contact terminal having a forward generally cylindrical portion for engaging a mating part and a rearward portion for securing said terminal to an electrical conductor, the improvement comprising lance means for retaining said terminal within a cavity in an insulating housing, said lance means being struck from said generally cylindrical portion and having a first portion extending inwardly from said cylindrical portion, said first portion being secured to said cylindrical portion, said lance means further having a second portion adjacent said first portion and extending generally parallel to the longitudinal axis of said cylindrical portion, said second portion having its lateral edges overlapped by edges of said cylindrical portion created by the striking of said lance means to limit the outward movement thereof, said lance means further having a third portion adjacent said second portion and extending at an angle of between 10 and 30 degrees relative to said longitudinal axis whereby said third portion is disposed at least in part externally of said cylindrical portion for engaging a cooperating surface on an insulating housing.

2. An electrical contact terminal as set forth in claim **1** wherein said lance means is of arcuate cross-sectional configuration.

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339—256