Oct. 17, 1967 G. B. MARKS 3,347,976

TERMINAL SHEATH

Filed Oct. 23, 1965

FIG. 1.

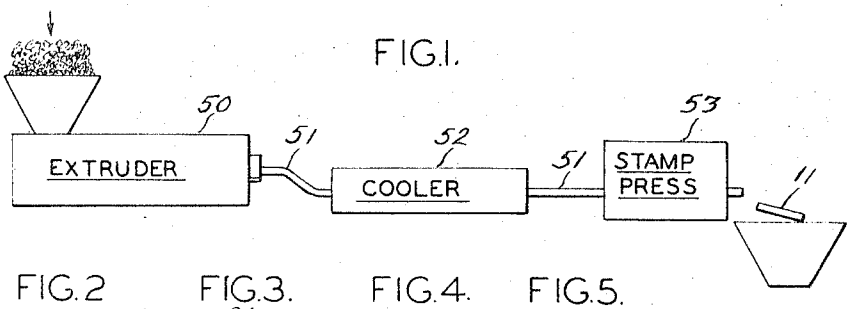


FIG. 2

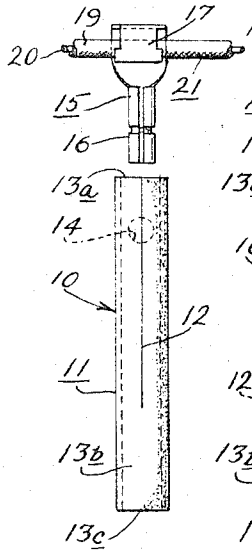


FIG. 3.

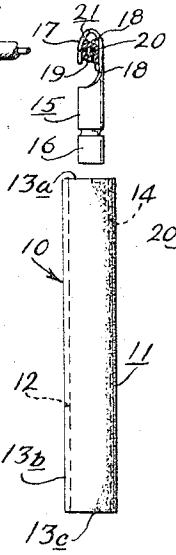


FIG. 4.

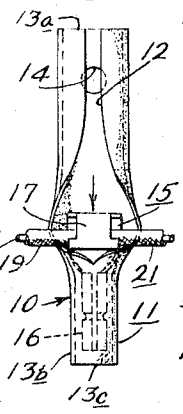


FIG. 5.

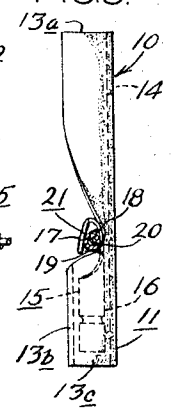


FIG. 6.

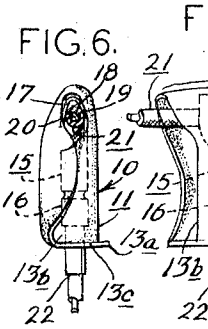


FIG. 7.

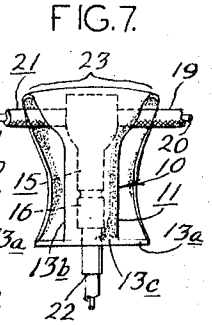


FIG. 8.

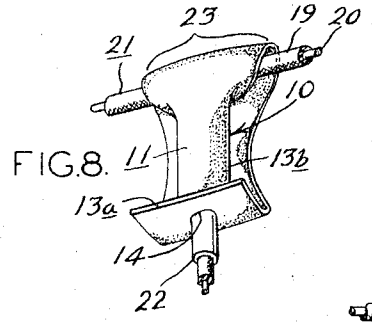


FIG. 11.

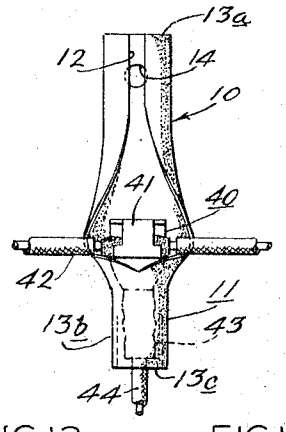


FIG. 9.

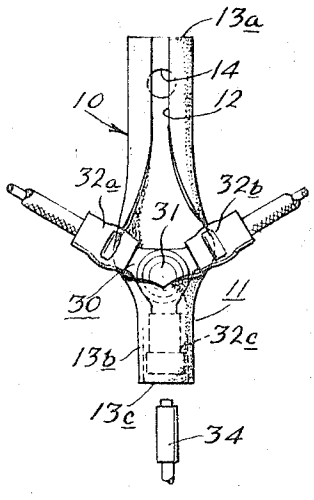


FIG. 10.

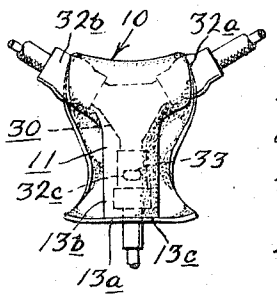


FIG. 12.

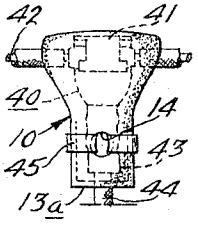
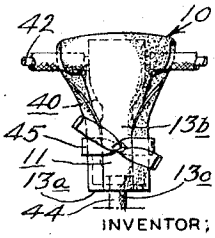


FIG. 13.



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TERMINAL SHEATH

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10 Claims. (Cl. 174—71)

ABSTRACT OF THE DISCLOSURE

A sheath, and sheath and terminal combination for insulating a junction where two or more conductive elements may be connected. The sheath includes an open-ended tube having a slit extending longitudinally from one open end of the tube, less than the length of the tube and greater than the length of a portion of the terminal to be housed interiorly of the unslit portion of the tube. Closely adjacent the slit end of the tube is an aperture which is circumferentially positioned substantially opposite the slit, the slit portion of the tube adapted to be opened for placement in circumferential overlapping relation with the portion of the tube which houses the one portion of the terminal.

The present invention relates to a novel insulator, and more particularly to an insulator for use in conjunction with terminals or connectors having at least one tubular and exposed metal portion for receiving a wire therein.

Insulation piercing terminals having bullet type receptacles and three-way or Y connector terminals are well known in the art, but have one common disadvantage. This disadvantage manifests itself when the terminal is provided with no other support save its connecting wires and actually becomes dangerous, because of the possibility of shorting against adjacent metallic wall portions, when utilized in motor vehicles or the like which undergo road vibrations. Typically, a common practice when making wire connections to terminals such as above described, as to wrap insulating tape around the exposed portion of the terminal to thus prevent shorts against adjacent metallic objects.

For example, the common three-way terminal (sometimes called a three-way or Y connector), which provides for crimp connection thereto of three wires, is utilized in truck bodies to provide connectors from the electrical supply system to cab lights, tail lights or the like. Conventionally, as the electrical source is located in or adjacent to the engine in the forward part of the cab of the truck, wires must be extended through the cab and back through the body or truck trailer and thereafter through the three-way terminal connecting lights or the like. It has been the practice in the industry to wrap the three-way terminal with insulating tape to prevent inadvertent contact of the terminal with the chassis or body which usually acts as a common ground return for the electrical supply source. In this manner shorts are hopefully prevented. In practice, however, six months to a year later the tape works itself loose due to variations in weather conditions, vibrations, etc., unwraps from the terminal and thus exposes it to the afore-mentioned shorting conditions.

As is well known the insulation piercing terminal having a bullet type receptacle is conventionally used on a wiring rig when it is desired to make contact and tap off current from a common wire. For example the U-Haul-It type trailer connection for rear lights on the trailer is made to the tail lights of the vehicle to which it is attached. However, U-Haul-It does provide an insulator comprising an injection molded tubular portion fittable over the bullet type receptacle and having an eye adjacent one end thereof which permits wrapping the insulator over the

insulating piercing portion and connecting it to a button integrally formed by the injection molding process on the body of the tubular portion. It has been found, however, that changes in humidity and temperature as well as vibrations cause these insulators to unwrap from around the insulation piercing portion of the terminal, and the terminal is liable to short upon continued vibration occurring.

In view of the above it is a principal object of the present invention to provide an insulator which permits of sure insulation between the terminal and adjacent bodies.

Another object of the present invention is to provide an insulator especially adapted for its safety qualities in its ability to maintain the desired insulation regardless of interfering influences such as moisture and weather conditions under which the expansion and contraction of the cover or sheath components in time cause loosening and displacement.

Another object of the present invention is to provide an insulator which is inherently relatively immune to vibrations which may occur in motor vehicles, machines, buildings, and the like.

Still another object of the present invention is to provide an insulator which is constructed in such a simple and novel manner as to permit quick and easy application of the same to a terminal while permitting manufacture of the same at relatively low costs.

Other objects and a fuller understanding of the invention may be had by referring to the following specification and claims taken in conjunction with the accompanying drawing in which:

FIG. 1 is a schematic view illustrating the novel process by which the insulator of the present invention is manufactured;

FIGS. 2 and 3 are front and side views of an insulator manufactured in accordance with the method illustrated in FIG. 1 and showing as an example a typical insulation piercing terminal to which the insulator may be applied;

FIGS. 4 and 5 are front and side views respectively of the position of the terminal positioned in the insulator shown in FIGS. 2 and 3;

FIGS. 6 and 7 are side and front views respectively illustrating the terminal in its secured position enclosed by the insulator;

FIG. 8 is a perspective view of the insulator and terminal illustrated in FIGS. 6 and 7;

FIG. 9 is a front view similar to FIG. 4 but illustrating a connector of a different type in the insulator shown in FIGS. 2–8;

FIG. 10 illustrates the insulator and connector shown in FIG. 9 wherein the insulator encloses the connector;

FIG. 11 is a front view of another connector type having wires soldered thereto and positioned in an insulator such as illustrated in FIG. 2; and

FIGS. 12 and 13 are front and rear views of the insulator secured to the terminal shown in FIG. 11.

Referring now to the drawing, and especially FIG. 2 thereof, a novel insulator **10** for a terminal **15** having at least one tubular portion **16** for the receipt, and in the illustrative instance, connection to a first conductive element such as a wire. In the present instance, the terminal **15** is of the insulation piercing type having what is commonly known in the art as a bullet type receptacle which corresponds to the tubular portion **16**. The insulation piercing portion **17** of the terminal **15** is U-shaped in construction and contains teeth **18** internally of the U in order to pierce the insulation **19** whereby contact with a wire **20** of a cable or the like is effected.

In accordance with the invention, the insulator **10** comprises an open ended tube **11** having means defiining a slit **12** extending longitudinally from one end **13***a* thereof, and a portion **13***b* at the other end **13***c* thereof

to receive the tubular or bullet receptacle portion **16** of the terminal **15**. Adjacent the end of the tube **13***a* and axially spaced therefrom is an aperture **14**, circumferentially spaced approximately 180° from the slit **12**. The end of the tube associated with the slit **12** is adapted to be placed in circumferential overlapping relation with the other end **13***b* of the tube.

With the type of terminal **15** as heretofore described, it is necessary that the insulator **10** cover both the insulation piercing portion **17** and the tubular or bullet receptacle portion **16** of the terminal. To this end, and in order to provide easy connection of the insulator so that it will not work free upon vibrations or the like occurring, the insulating material of which the insulator **10** is composed is a flexible material and by providing a slit **12** of a length in excess of one-half of the length of the tube, the tube **11** is foldable transverse to its axis in order that the aperture may be aligned axially of the other end **13***c* of the tube. Thus upon insertion of the terminal **15** into the portion **13***b* of the insulator, as illustrated in FIGS. 4 and 5, and folding of the end **13***a* of the tube **11** whereby the aperture **14** is in axial alignment with the one end **13***c*, the insertion of a wire **22** or the like through the aperture **14** into the tubular portion **16** of the terminal **15** secures the insulator as well as the wire **22** to the terminal **15**. (See FIGS. 6, 7, and 8.)

As is evident from FIGS. 7 and 8, folding the end **13***a* of the tube associated with the slit **12** permits the full unfolded width **23** to overlap the insulation piercing portion **17** of the terminal **15**. In addition, the natural tendency of the slitted portion of the tube to maintain its tubular form provides a circumferential overlap of the other end **13***b*.

Another connector or conventional terminal **30** is illustrated in FIGSS. 9 and 10 for use in conjunction with an insulator **10** such as heretofore described. In the illustrated instance, the terminal **30** is a three-ring terminal locked together at its center by a rivet or the like **31**, which terminal is sometimes referred to as a three-way or Y connector. The terminal **30**, like the terminal **15**, is a standard electrical hardware item which is used principally to tap a power or current source to two or more branches. The terminal contains three connectors **32***a*–**32***c*, each of which normally has its own insulating sleeve circumscribing the portion of the connector to which a wire is connected, in the present instance by crimping, as at **33**. As illustrated in FIG. 9, the portion **13***b* of the insulator **10** is placed over one of the connectors, **32***c* in the present instance, and the end of the tube **11** having the aperture **14** therein is folded transverse to the axis of the tube so as to align the aperture with the terminal end **13***c* of the tube **11**. Thereafter a wire **34** is inserted through the aperture **14** into the connector **32***c* and the connector **32***c* is crimped through the insulator. (See FIG. 10.)

In certain instances it may be desirable to provide a soldered connection between a wire or a pair of wires and the source wire, and as the portion **13***b* adapted to receive the receptacle with the terminal covers the same, as in previous embodiments, it is impossible to solder with the portion **13***b* in place. In accordance with another feature of the invention, auxiliary means must be provided to operate in conjunction with the aperture **14** of the tube **10** to secure the portion of the tube associated with the aperture, in circumferential overlapping relation with respect to the portion **13***b* when the connector is mounted therein. To this end, a terminal **40** of a type similar to the terminal **15** above described, is illustrated as having a first portion **41** soldered to a wire **42**. As shown in FIG. 11 the terminal **40** has a receptacle portion **43** adapted for receipt and soldering thereto of another wire **44**.

As may be seen, because the portion **13***b* of the tube **11** circumscribes the portion **43** of the terminal **40**, it is necessary that the insulator **10** be slipped over the wire **44**, the wire soldered to the portion **43** of the terminal **40**, and thereafter the insulator slipped over the portion

43. In the embodiment illustrated in FIGS. 11–13, the portion of the tube having an aperture **14** therein is then placed in circumferential overlapping relation with the portion **13***b* of the tube. It is a simple matter to insert the terminal end of a length of flexible material such as wire or the like **45**, which wire is looped around the portion **13***b*, through the aperture **14**, back around the outer covering associated with the aperture, and twist the wire so as to form a quick, easy and holdfast connection of the insulator to the connector.

It should be recognized that the wire **45** could be integral with the portion **13***b* of the tube **11**, and connected to the same side of the tube as the aperture **14**. In this manner an insulator **10** could be constructed specifically and specially for connections wherein the wires are to be soldered or welded directly to the terminal.

As stated above, the insulating material is preferably a flexible material such as rubber or any of the well known flexible plastics. However, the most economical method of manufacturing the insulator is to use a plastic material having insulating qualities, such as polyvinyl chloride, heat the plastic and extrude it in tubular form as in the extruder **50** illustrated in FIG. 1. As the continuous length of tube **51** leaves the extruder it is in an extremely pliable and soft state which necessitates cooling of the same, as in the cooler **52**, and thereafter it is only necessary to provide a stamping operation as by a stamp press **53** having dies therein which cut the tube **51** into the correct length, slit the tube **11** longitudinally thereof from one end thereof and punch an aperture **14** therein. It should be recognized that the cutting step, the slitting step and the punching step may be accomplished in one operation.

Thus the present invention provides a novel insulator and a unique method for using and manufacturing the same which will permit of a sure and complete insulation between the terminal encompassed thereby and adjacent surfaces.

Although the invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the method of operation, details of construction and the combination and arrangement of parts may be made without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. An insulator for a terminal, said terminal having at least one portion for connecting a wire thereto, said insulator comprising: an open ended tube having means defining a slit extending longitudinally from one end thereof, and a circumferentially closed portion adapted to receive said portion of said terminal, said slit length less than the tube length and greater than the length of said portion of said terminal to be enclosed by said circumferentially closed portion of said tube, at least one aperture in the wall of said tube adjacent to and spaced from said one end, said aperture circumferentially positioned substantially opposite said means defining a slit, said one end adapted to be placed in circumferential overlapping relation with said circumferentially closed portion of said tube.

2. An insulator in accordance with claim **1** wherein said insulating material comprises a flexible thermoplastic material.

3. An insulator in accordance with claim **2** wherein said tube, when embracing a terminal, has a fold transverse to its longitudinal axis whereby said aperture may be aligned axially of said other end.

4. An insulator in accordance with claim **1** wherein said slit extends from said one end at least one-half of the length of said tube.

5. An insulator for a terminal having a tubular receptacle for receiving a connector or the like therein, and at least one other portion transverse to the receptacle

for receiving a wire and the like therein, said insulator comprising an open ended tube of flexible insulating material having means defining a slit extending longitudinally from one of said open ends at least one half of its length but less than its full length, and an aperture in said tube adjacent to and spaced from said one open end, said aperture having a circumferential position substantially opposite said means defining a slit, said receptacle portion of said terminal fittable in the non-slitted portion of said tube whereby said slitted portion of said tube may be folded transverse of its longitudinal axis over said one other portion of said terminal and said aperture aligned axially of said receptacle to permit entry therein of a connector.

6. A sheath for a terminal having at least one projection, said sheath comprising: an open ended tube having means defining a slit extending longitudinally from one end thereof, and a circumferentially closed tubular portion to receive said projection of said terminal, said slit having a length less than the tube length and greater than the length of said projection receivable by said circumferentially closed portion; means defining at least one aperture in the wall of said tube adjacent to and spaced from said one end, said aperture circumferentially positioned substantially opposite said means defining a slit, said one end adapted to be positioned in circumferential overlapping relation with said tubular portion of said tube.

7. A sheath for a terminal in accordance with claim 13 including means connecting said means defining an aperture to said tubular portion.

8. A terminal and sheath combination, comprising: a terminal having at least one tubular projecting portion for connection to a first conductive element, and a second portion for permitting at least a second conductive element to be connected transversely thereto; an open ended tube having means defining a slit extending longitudinally from one end of said tube, and having a circumferentially

closed portion circumscribing said tubular projecting portion of said terminal; said slit length less than the length of the tube and greater than the tubular projecting portion of said terminal; means defining at least one aperture in the wall of said tube adjacent to and spaced from said one end, said aperture circumferentially positioned substantially opposite said means defining a slit; said one end being in circumferential overlapping relation with said circumferentially closed portion of said tube; and means connecting said means defining an aperture to said circumferentially closed portion.

9. A terminal and sheath combination in accordance with claim 8 wherein said aperture is aligned axially of the tubular projecting portion of said terminal, and including said first conductive element, said first conductive element extending through said aperture into said tubular projecting portion thereby forming said connecting means.

10. A terminal and sheath combination in accordance with claim 8 wherein said connecting means includes a length of flexible material having terminal ends extending through said aperture and wrapped around the exterior of said slit portion of said tube connecting said slit portion to said circumferentially closed portion of said tube.

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LARAMIE E. ASKIN, *Primary Examiner.*