Nov. 20, 1956 W. G. SCHINSKE ET AL 2,771,588

PROD CONSTRUCTION FOR VOLTAGE TESTERS AND THE LIKE

Filed Aug. 24, 1953

Fig. 2

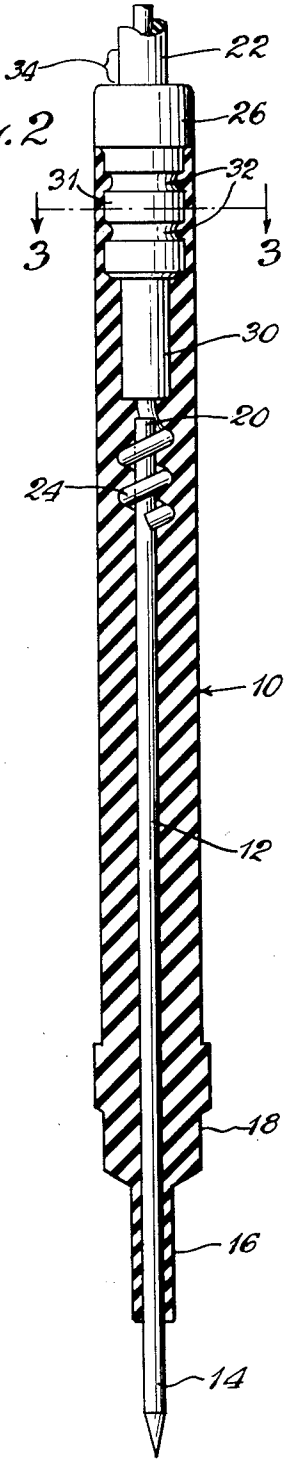


Fig. 1

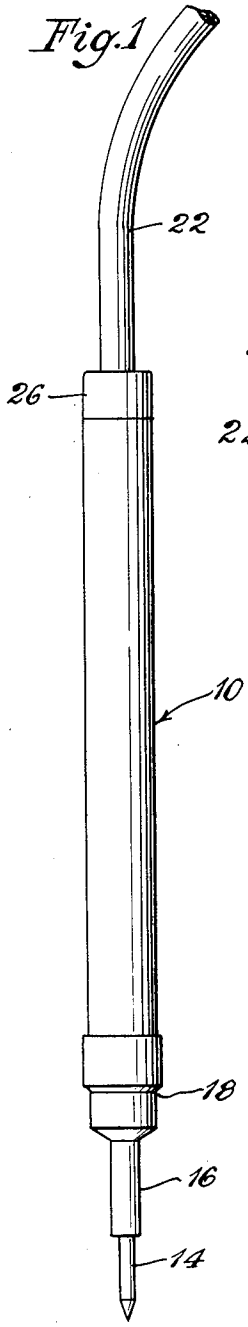
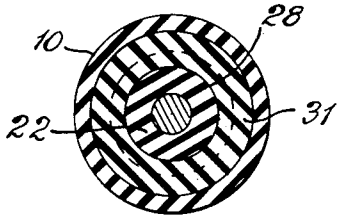


Fig. 3



Inventors
William G. Schinske
Len B. Mitchell
by Parker & Carter
Attorneys

United States Patent Office 2,771,588 Patented Nov. 20, 1956

2,771,588

PROD CONSTRUCTION FOR VOLTAGE TESTERS AND THE LIKE

William G. Schinske and Len B. Mitchell, Sycamore, Ill., assignors to Ideal Industries, Inc., Sycamore, Ill., a corporation of Delaware

Application August 24, 1953, Serial No. 376,056

3 Claims. (Cl. 339—102)

This invention resides in the field of electric contact prod structures and is an improvement on prior such structures used to establish contact between any type of electric testing instrument and a source of electric current. Such devices are generally composed of a meter in an instrument housing with two or more flexible leads extending therefrom with manually manipulatable prod handle structures on the ends, each handle having exposed pointed metal prods for contacting leads, sockets or the like. For a device of this nature, reference is made generally to U. S. Patent No. 1,970,232.

One of the primary objects of our invention is a molded electric contact prod handle structure made of an insulating material which can be easily and efficiently manipulated by hand.

Another object of our invention is a prod handle structure of the above type which is constructed and adapted so that strain placed on the insulated lead through manipulation of the prod handle will be applied to the cord and relieved from the wire.

Another object of our invention is a prod handle structure of the above type with means incorporated therein so that the insulation of the lead will not be reduced in cross section and made brittle during the molding process.

Another object of our invention is a method of molding a prod handle of the above type so as to prevent a breakdown of the dielectric properties of the body of the molded prod handle.

Other objects will appear from time to time in the ensuing specification and claims in which:

Figure 1 is a plan view of our molded prod handle structure and a portion of the insulated wire to which it is connected;

Figure 2 is a cross section, on an enlarged scale, of the prod handle structure shown in Figure 1; and

Figure 3 is a sectional view along line 3—3 of Figure 2.

In Figure 1, our prod handle structure is composed of a body portion, indicated generally at **10**, which is made of an insulating material, such as rubber or the like. An elongated metal prod or spike **12** is generally centrally disposed in the body portion, as shown in Figure 2, and it has an exposed pointed contacting prod portion **14** at one end. The end of the body portion adjacent the pointed contacting prod portion **14** is reduced in cross section so as to form a sleeve portion **16**. The section of the body portion joining the sleeve portion **16** and the main body portion **10** may be of any general configuration and we have shown it as having various cross sections and tapered portions as indicated generally at **18**. The inner end **20** of the elongated metal prod is connected to an insulated electric wire **22** which has its inner end stripped of insulation to expose a contact portion **24**. This portion is wound around the inner end **20** of the prod and is secured thereto in any suitable manner, such as by soldering, brazing or the like.

A plug insert **26** having a generally cylindrical configuration is slipped over the end of the insulated wire

22, the insulated wire being pushed through a central bore **28** in the plug. The plug insert is positioned with a portion **30** of the insulation of the wire extending beyond its inner end.

The prod structure is formed in the following manner: The insulation is stripped from the end of the insulated wire so that a substantial portion of bare wire extends beyond the end of the insulation. The plug insert **26** is slipped over the end of the insulated wire and is positioned approximately an inch beyond the end of the insulation, as shown in Figure 2. The stripped end **24** is then twisted around or otherwise suitably connected to the inner end **20** of the elongated metal prod **12** and is secured thereto in any suitable manner. A piece of natural or synthetic rubber tubing is then slipped over the elongated metal prod until it contacts the plug insert **26**. This piece of tubing is a moldable insulating material. Although uncured, natural or synthetic rubber works very well. The tubing has a slight excess of material so that after the prod handle is formed a slight "flash" portion will appear along the sides. With the tubing in position over the elongated metal prod, the assembly is put between a pair of dies having suitably shaped cavities. The plug insert **26** closes one end of the cavity. The dies then compress the piece of tube, and heat is applied so that the material of the tubing will flow in and around prod structure, and the plug insert **26** with the exterior of the tube assuming the shape of the die cavity, this being the configuration shown in the drawings. The excess of material is squeezed between the parting line of the dies. The plug insert prevents this excess material from flowing past that end of the dies and contacting the insulation of the wire. The inner end **31** of the plug insert is reduced in diameter and has two or more ring grooves **32** so that the moldable material will interlock therewith and form a tight moisture-proof connection.

Thus the body portion of the handle structure is molded around the stripped end of the insulated wire with the pointed end of the elongated metal prod exposed from the opposite end; and a rigid mechanical, as well as a moisture-proof connection, is formed between the molded body portion **10**, the insulated wire **22**, and the plug insert **26**.

The use of the plug insert **26** prevents the molding material from directly contacting the insulation on the flexible lead beyond the handle structure. We have found that the portion of the insulated wire directly adjacent the upper end of the prod structure, designated generally at **34**, is subjected to continuous bending and flexing, and in a prod structure of this nature the insulation of the wire at the point **34** will quickly break down and rupture if it is subjected to the heat and pressure of the molds and the molding material during the molding operation. The presence of the plug insert **26** prevents this, as the hot molding material and the hot dies do not contact the insulation on the wire at any point beyond the inner edge of the plug insert, as shown in Figure 2. The portion **30** of the insulated wire extending below the plug insert in Figure 2 will be contacted by the hot molding material and it may become brittle. It will not lose its insulating characteristics and the brittleness acquired during the molding process is unimportant because this portion of the insulated wire is not subjected to continual flexing.

The portion of the insulated wire inside the bore **28** of the plug insert is not directly subjected to the heat and pressure during the mold process and it will not become brittle but will retain the majority of its flexibility. This portion of the insulated wire is also not subjected to continual flexing due to its encasement within the plug insert. The insulation of the wire exterior to

the plug outside of the handle structure will retain its original flexibility, as it has not been subjected to the heat and pressure of the molding process. Therefore, it will not rupture or break down when it is flexed during the rough handling that generally accompanies the use of such a device.

The plug insert **26** is of sufficient length so that it encloses a substantial length of the insulated wire **22**. Thus, this portion of the insulating wire is rigidly held by plug insert and cannot be flexed when the device is handled roughly.

The area or portion **34** can be described as the point of maximum stress concentration and it is important that this point retain its original flexibility. The plug insert, therefore, prevents stretching of this area and it also prevents any reduction in its cross section during the molding operation.

The body portion **10** is connected to the plug insert **26** and the insulated wire **22**; consequently, the plug insert relieves the strain placed on the device during its use. The insert additionally serves to moisture-proof the joint between the insulated wire and the body portion. All stresses placed on the body portion **10** will be applied to the cord and not the wire. Therefore, no tension will be placed on the connection between the stripped end **24** of the insulated wire and the inner end **20** of the elongated metal prod.

While we have shown and described the preferred form of our invention, it should be understood that numerous modifications, alterations, substitutions and changes can be made without departing from its essential theme and we wish that our invention remain unrestricted except by the appended claims.

We claim:

1. In an electric prod structure, an elongated handle composed of an insulating moldable material, an elongated metal spike molded and imbedded in the handle and projecting from one end, a plug insert imbedded in the other end of the handle having a central bore generally aligned with the spike, an insulated lead extending through and conforming generally to the bore of the insert, a portion of the lead being disposed and molded in the handle beyond the insert, the lead having a stripped end

in permanent electrical contact with the spike, the insert having an outer portion with the same general cross section as the handle and an inner portion with a reduced cross section, and a plurality of grooves in the inner portion of the insert in molded interlocking engagement with the handle.

2. In an electric contact, manually manipulatable, prod structure, an elongated handle body formed of a moldable insulating material, an electrical conductive elongated generally pointed metal prod approximately centrally molded in the handle body with its pointed end extended beyond one end of the body, a plug insert in the other end of the handle body, the insert being provided with an approximately centrally disposed bore aligned generally with the metal prod, and an insulated wire extending into and through the bore of the plug insert with a substantial portion extending beyond the inner end of the plug, that portion extending beyond the inner end of the plug insert being molded in the handle body, a portion of the handle body being molded around and overlapping at least a part of the plug insert, the plug insert extending only a short distance beyond the overlapped part of the handle body, the innermost extremity of the wire being stripped of insulation and in permanent electrical association with the metal prod.

3. The structure of claim 2 wherein the plug insert has circular indentations on the surface of the overlapped part with the handle body molded around them to form a tight, moistureproof connection.

References Cited in the file of this patent

UNITED STATES PATENTS

1,970,232	Hady	Aug. 14, 1934
2,091,824	Lewis	Aug. 31, 1937
2,206,714	Benander	July 2, 1940
2,292,236	Martin	Aug. 4, 1942
2,438,350	Reichard	Mar. 23, 1948
2,659,795	Boggs	Nov. 17, 1953
2,668,187	Von Wald	Feb. 2, 1954

FOREIGN PATENTS

153,591	Switzerland	June 16, 1932
509,169	Great Britain	July 12, 1939