Sept. 27, 1966 F. KLUMPP, JR 3,275,423

GROUNDING PIN

Filed Dec. 27, 1963

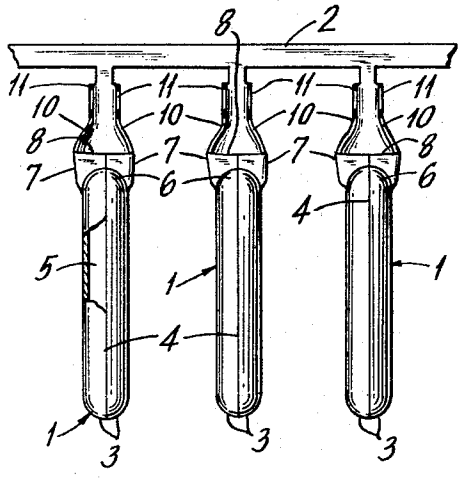


FIG. 1

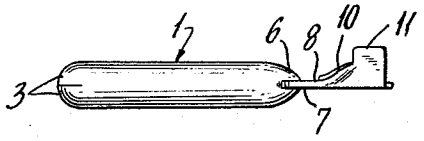


FIG. 2

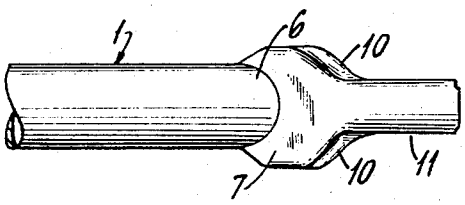


FIG. 3

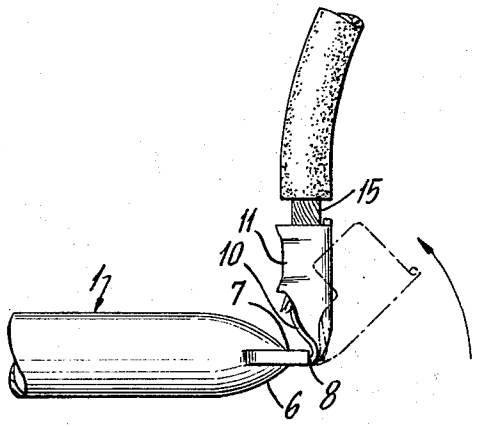


FIG. 6

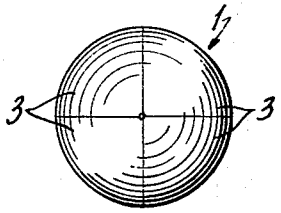


FIG. 4

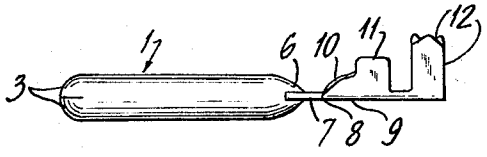


FIG. 5

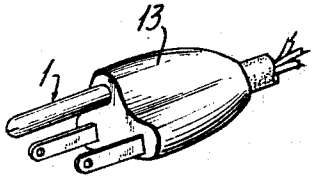


FIG. 7

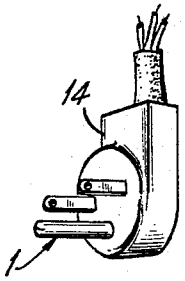


FIG. 8

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GROUNDING PIN

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9 Claims. (Cl. 29—183)

The present invention relates to an improved grounding pin.

Modern electrical needs have demanded electrical contacts to be available for a new and ever increasing and changing variety of electrical plugs and connectors. The increased use of electricity such as for air conditioning, washing machines, other electrical appliances and power tools has made essential the use of grounding pins in contact plugs in the home and in industry. The electrical plugs themselves, into which the grounding pins or in which round electrical pins are used, are constantly changing.

Most changes are dictated by the needs of speed in automation and economy by way of use of less material or time saving in idle machine time during work setups.

It has been found advantageous to provide electrical contacts on stamping strips which can be fed into crimping machines which automatically crimp wires to pins and sever them from a stamping strip. Wires thus crimped are then often placed in molds about which are cast plastic plugs.

It has been found economical to stamp round pins from sheets of metal and hold in strip form as distinguished from forming pins from solid metal rods. In the molding of such hollow pins into plugs, it has been found necessary that the pin be tightly enclosed and undeformed since the hot molding plastic under molding pressure easily enters such opening, oftentimes deforming the pin, fouling its electrical characteristics or fouling the mold with plastic, thus requiring costly cleaning and time consuming work before a mold can be reused.

Plugs themselves are molded with the interest of economy of material and maximum electrical safety. There are generally two types of plugs into which round pins are used, the straight through, wherein the wires pass through the plug on the same plane as the round pins and right angle plugs where the wires are placed at a right angle to the pins.

In the past it has been necessary to provide different round pins for each type plug since the crimp portion of pin in a right angle plug had to be short, the alternatives being a bulkier plug, with material sufficiently covering the length of the pin with the crimp, a plug with wires near the surface of the plastic or sometimes exposed or even meeting these objections, a crimped wire had to be bent at 90 degrees to pass through a right angle plug thus straining the wire or the crimp. Bending the crimp of pins of the past either before or after crimping has not proved satisfactory, especially with the heavier pin or pin when used with heavier gauge wire, since the hollow pins tended to open or crack with unpleasant consequences in use or in the molding process.

The solution in the past was to provide separate round pins for straight through plugs and for right angle plugs and even these pins had many disadvantages such as structural weakness, reduced conducting area, or limitations on secondary insulation crimps.

According to the present invention, a simple, easy to manufacture round hollow pin is provided, adapted to be strip stamped and crimped at a straight angle or up to a right angle as required by the need for use of the pin.

Although such novel feature or features believed to be characteristic of the invention and are pointed out in the claims, the invention and the manner in which it may be carried out, may be further understood by reference to the description following and the accompanying drawings.

FIG. 1 is a stamping strip showing several round pins of the present invention.

FIG. 2 is a side elevation of a round pin of the present invention.

FIG. 3 is a partial plan view of a round pin of the present invention.

FIG. 4 is an end view of a round pin of the present invention.

FIG. 5 is a side elevation of a round pin of the present invention with an insulation crimp.

FIG. 6 is a right angle crimp of a round pin of the present invention.

FIG. 7 is a conventional straight through plug with a round pin of the present invention.

FIG. 8 is a conventional right angle plug with a round pin of the present invention.

Referring now to the figures in greater detail, where like reference numbers denote like parts in the various figures.

The round pin **1** as shown in FIG. 1 is attached to a stamping slip **2** for machine feeding into a crimping machine (not shown) and may be manufactured substantially as shown in U.S. Patent No. 2,861,324.

The pin **1** is stamped from a single piece of metal and as shown in FIG. 4 may have arcuate end pieces **3** tightly joined forming a firm end. A single central seam **4** tightly closes the edges of the single piece of metal from which the round pin **1** is stamped. Transverse grooves or operation holes (not shown) may of course be provided. Insofar as utility in molding is concerned, it is preferable that the seam area exposed to hot plastic and pressure be tight to prevent entry of plastic into the hollow **5** of the pin; see the cut away in FIG. 1.

The hollow **5** is enclosed by the closure of the end pieces **3** and the pin end **6** from which extend the folded over shoulders **7** which terminate on a line **8**. Extending on the opposite side of the pin **1** is a flat portion **9** from which the sides **10**, which may be tapered, and the crimping arms **11**. Insulation crimping arms **12** as shown in FIG. 5 may also be provided and extend from the flat portion **9**.

In crimping a wire to the round pin **1**, a wire may be crimped and the pin **1** severed from the stamping strip **2** in a machine and used as part of a straight through plug **13** as shown in FIG. 7.

The same round pin **1** may be crimped and severed and the crimp bent to a right angle as shown in FIG. 6, the bend being along line **8**. The pin of FIG. 5, of course, could be crimped and bent in the same manner, grasping the insulation with arms **12** and used in a straight through plug **13** or a right angle plug **14** as shown in FIG. 8. The ultimate position of the crimp, whether straight or angulated, is a matter of choice determined by the crimping die selected.

It has been found that the bend for the right angle crimp can be made without tearing the metal of the flat portion **9** or opening the seam **4**. The pin **1** with a bent crimp is strong and has a thorough grip of the wire **15** without the exposure of loose ends or weakening of the integral pin.

In the past the metal for the right angle crimp has usually been punched out from the flat portion, thus not only weakening the crimp but increasing the electrical resistance of the pin by reducing the conducting area between the pin and the crimped wire. The metal provided in pins of the past to close the end of the pin, to protect against entry of molding plastic has also oftentimes punched out the single thickness of metal, serving to

weaken the pin and/or reduce the conducting area to the crimped wire.

An additional insulation crimp on right angle plug pins of the past has been difficult to properly provide without sacrifice of strength, conductivity or economy of the round pin.

The crimping and bending may be done in a single stamping operation or in progressive steps in a die wherein the contact is placed in a crimping die; the wire to be crimped is placed within the crimping arms of the contact and the wire is crimped and either in that stamping step or a successive stamping step or steps, is bent to the desired angle.

The flat line formed by the end of the double fold of metal forming the shoulders 7 provides the axis about which the angular bend is formed.

The terms and expressions which are employed are used as terms of description, it is recognized, though, that various modifications are possible within the scope of the invention claimed.

Having thus described certain forms of the invention in some detail, what is claimed is:

1. A round hollow electrical contact pin end portion comprising a pair of folded metal shoulders forming a line, and a back portion extending beyond said line, said back portion including means adapted to be crimped to wire.

2. A hollow electrical contact pin end portion comprising a pair of folded metal shoulders forming a line, and a back portion extending beyond said line, said back portion including means adapted to be crimped to wire and insulation crimping means.

3. A round hollow electrical contact pin end portion comprising a first folded metal shoulder, a second folded metal shoulder, said first shoulder forming a line, and a back portion extending beyond said line, said back portion including means adapted to be crimped to wire.

4. A round hollow electrical contact pin comprising a closed end portion, a portion of said pin away from said end portion enclosing the hollow of said pin including a pair of folded metal shoulders forming a line, a back portion extending beyond said line, and said back portion including means adapted to be crimped to wire.

5. A round hollow electrical contact pin comprising a rounded end portion formed from arcuate end faces, a portion of said pin away from said end portion enclosing the hollow of said pin including a pair of folded metal shoulders forming a line, a back portion extending beyond said line, and said back portion including means adapted to be crimped to wire.

6. An electrical conductor stamping strip including a plurality of round hollow electrical contact pins each comprising a closed end portion, a portion of said pin away from said end portion enclosing the hollow of said pin including a pair of folded metal shoulders forming a line, a back portion extending beyond said line, and said back portion including means adapted to be crimped to wire.

7. A round hollow electrical contact pin comprising a closed end portion, a portion of said pin away from said end portion enclosing the hollow of said pin including a pair of folded metal shoulders forming a line, a back portion extending beyond said line, and said back portion including means adapted to be crimped to wire and means adapted to be crimped to insulation.

8. A round hollow electrical contact pin comprising a closed end portion, a closed central seam along said hollow a portion of said pin away from said end portion enclosing the hollow of said pin including a pair of folded metal shoulders including the end of said seam and forming a line, a back portion extending beyond said line, and said back portion including means adapted to be crimped to wire.

9. A round hollow electrical contact pin comprising a closed end portion, a portion of said pin away from said end portion enclosing the hollow of said pin including a pair of folded metal shoulders forming a line, a back portion extending beyond said line, and said back portion including tapering sides and means adapted to be crimped to wire extending beyond said sides.

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