Dec. 29, 1936. N. H. JACK 2,066,201

METAL SHIELDED WIRE

Filed April 8, 1936

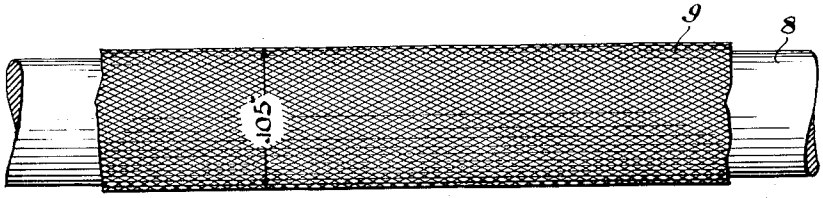


Fig. 1.

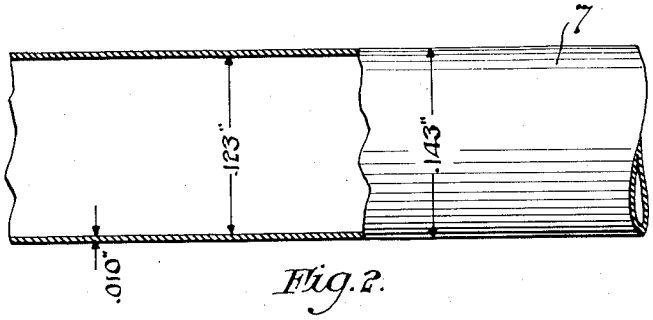


Fig. 2.

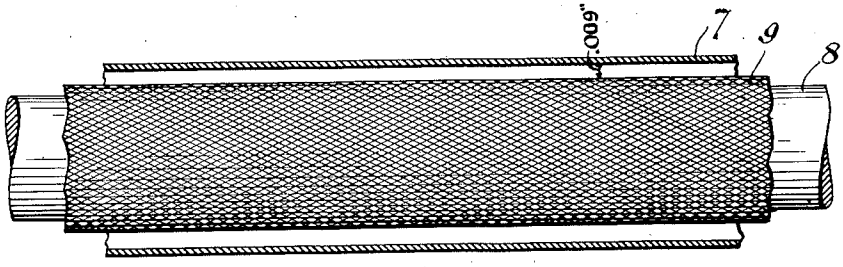


Fig. 3.

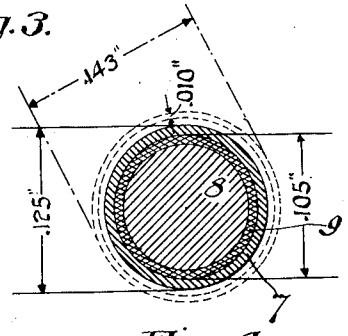


Fig. 4.

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METAL SHIELDED WIRE

Norman H. Jack, Philadelphia, Pa.

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5 Claims. (Cl. 205—18)

My invention relates to metal shielded wire, and comprises an improved product and method of producing the same.

The object is to provide an improved construction, made in a simple and inexpensive way, which shall have accurate dimensions as to its several parts, which shall be extremely soft and pliable and which shall retain the relative positions and characteristics of its components, no matter how the construction may be bent or distorted in using or applying the same.

The invention is adapted to constructions embodying wires and rods, with or without insulations, of varying dimensions.

The invention is especially adapted to the use of seamless aluminum and copper tubing as the shield for the wire and its insulating envelope.

Referring to the drawing which illustrates merely by way of example suitable means for effecting the invention.

Fig. 1 is a fragmentary elevation of the insulated wire.

Figure 2 is a similar elevation, with part broken away, of the enveloping tube before drawing.

Fig. 3 is a similar longitudinal section of the parts assembled before drawing.

Fig. 4 is a cross-section of the completed product.

The drawing, showing the example to be described, is on a greatly enlarged scale.

Similar numerals refer to similar parts throughout the several views.

As an example of my method and of the resulting product, it will be understood that the finished product is to have an outside diameter of .125" (⅛"). The thickness of the wall of the tube .010". The wire is a rubber and fabric insulated fixture wire, about .105" in diameter.

The first step is to produce a seamless tube 7, preferably of aluminum or copper, with outside diameter of about .143" with the wall .010" thick. The tube is then annealed to render it as soft as possible. The tube should then be cut to proper length. This length should be such that, when drawn over the wire to finished size, that is, to .125" outside diameter, it will be drawn to the desired length of the finished product. The length should then be passed through a straightening machine. The inside diameter of the tube should then be approximately .123" which will give a clearance for a wire 8, with outside diameter of .105", of about .009" which will be a close movable fit of the wire in the tube before drawing. After the straightening operation, the wire 8 is cut to proper length, one end is tapered, and the length of wire is pushed, tapered end first, through the length of tube, until the said tapered end protrudes slightly through the far end of the tube. This end of the tube with the tapered end of the wire is then operated upon by a tagging machine to provide a taper of the tube-end surrounding the tapered wire-end.

The tube is then passed through a suitable drawing die, in size .132", and after this, through a suitable finishing die, size .125". By the last drawing operation, the tube 7 is drawn tightly over the wire 8 without disturbing the rubber and braided cotton insulation 9, when such insulation is used. When the tube, with the wire therein, is drawn down to an outside diameter of .125" the inside diameter of the tube will be slightly less than .105" so that the tube will be brought into tight engagement with the wire or rod. Where insulation is included, the tube will cause a compression of the insulation, so that the several elements tend to assume a single composite structure, with the component parts in substantially fixed relationship.

Now the result of this method is this:—

The tube, having an inside diameter just sufficient to permit the pushing of the insulated wire into it, is annealed to its softest possible state, whereupon, after the insertion of the wire therein, the tube is drawn to an outside diameter of .125". This results in the inner diameter of the tube becoming slightly less than .105". This causes a compression of the insulation by the tube, as above stated. While at the same time the amount of drawing of the tube (which may be in stages), is so slight that the softness of the metal of the tube is barely, if at all, affected.

In this way is secured the chief requisite of the finished product, that is, extreme pliability, without relative disturbance of the components.

When, for instance, it is desired to provide such metal shield for very fine wire with silk insulation, it is necessary to take extra precautions and to use more exacting methods. For example, it is found desirable to run a smooth stiff steel wire through the tube before introducing the insulated wire. This operation removes small sunken and uneven spots in the tube and facilitates the entry of the insulated wire.

It will also be necessary in some cases to use a stiff, long wire needle to thread very fine insulated wire into the tube. In some cases a lubricant will be found useful; where oil cannot

be used, talcum powder for example will be useful.

With very fine wires the drawing is preferably accomplished in easy stages, about .005" to each "sink" through especially made drawing dies.

No heat is applied during any stages of the drawing.

What I claim is:—

1. The method of producing a metal shielded wire of maximum pliability, by utilizing a metal tube of outside diameter greater than that required of the finished product, and with inside diameter barely sufficient to permit the introduction of the wire into the tube, which consists in first softening the metal of the tube to the greatest possible degree, by annealing, then introducing the wire into the tube and then drawing the tube upon the wire until its outside diameter is reduced to that predetermined for the finished product without appreciably hardening the metal of the tube.

2. The method of producing a metal shielded wire of maximum pliability, by utilizing a metal tube of outside diameter greater than that required of the finished product, and with inside diameter barely sufficient to permit the introduction of the wire into the tube, which consists in first softening the metal of the tube to the greatest possible degree, by annealing, then introducing the wire into the tube and then drawing, in a plurality of stage drawings, the tube upon the wire until its outside diameter is reduced to that predetermined for the finished product said drawing being so slight that the softness of the metal in the tube is preserved.

3. The method of producing a metal shielded insulated wire of maximum pliability, by utilizing a metal tube of outside diameter greater than that required of the finished product, and with inside diameter barely sufficient to permit the introduction of the insulated wire into the tube, then softening the metal of the tube to the greatest possible degree, by annealing, then introducing the wire into the tube and then drawing the tube upon the wire until its outside diameter is reduced to that predetermined for the finished product while preserving the softness of the metal due to the annealing.

4. A pliable metal shielded wire comprising a metal tube softened to the greatest possible degree by annealing, and a wire enclosed within the tube under substantial pressure exerted thereon by the surrounding wall of said tube due to slight drawing of the tube upon the wire without appreciably hardening the metal.

5. A pliable metal shielded wire comprising a metal tube softened to the greatest possible degree by annealing, and a wire enclosed within the tube under substantial pressure exerted thereon by the surrounding wall of said tube due to such slight drawing of the tube upon the wire that the pliability of the product is preserved.

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