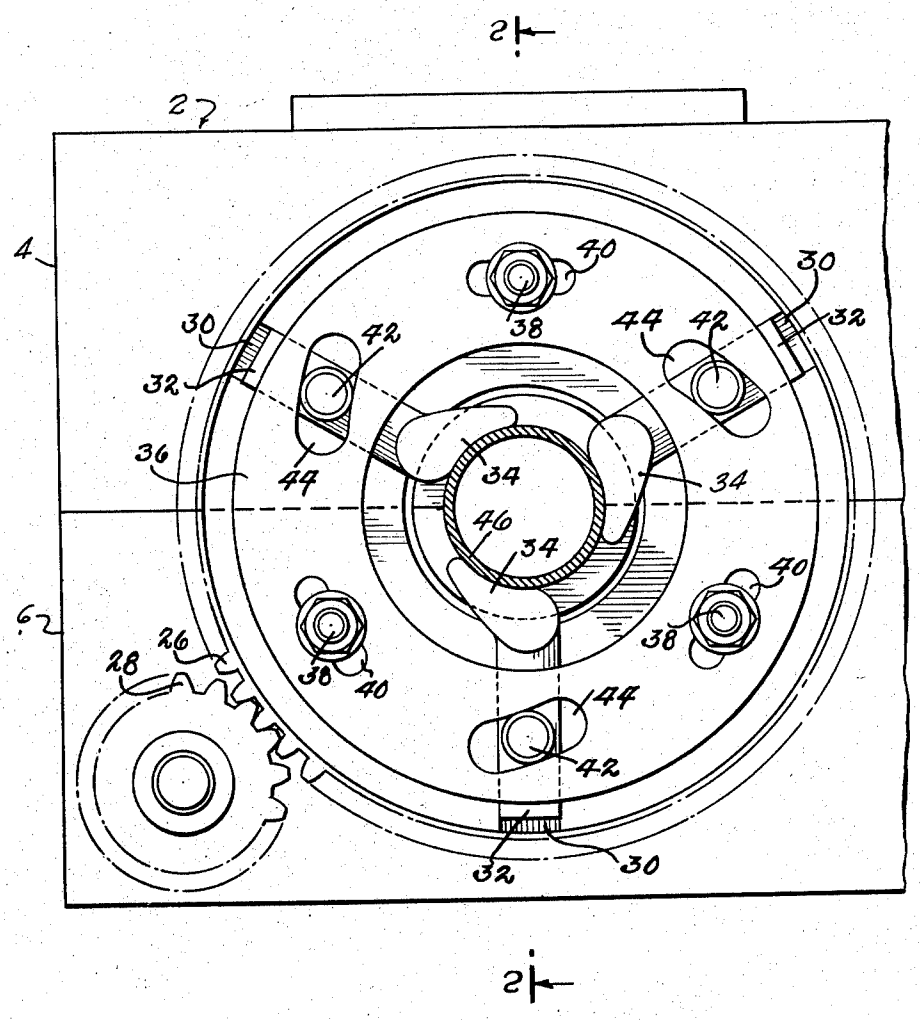
May 19, 1959 A. LATIN ET AL 2,887,222

EXTRUSION APPARATUS FOR SHEATHING ELECTRIC CABLES

Filed March 23, 1956 2 Sheets-Sheet 1

Fig. 1.

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2 Sheets-Sheet 2

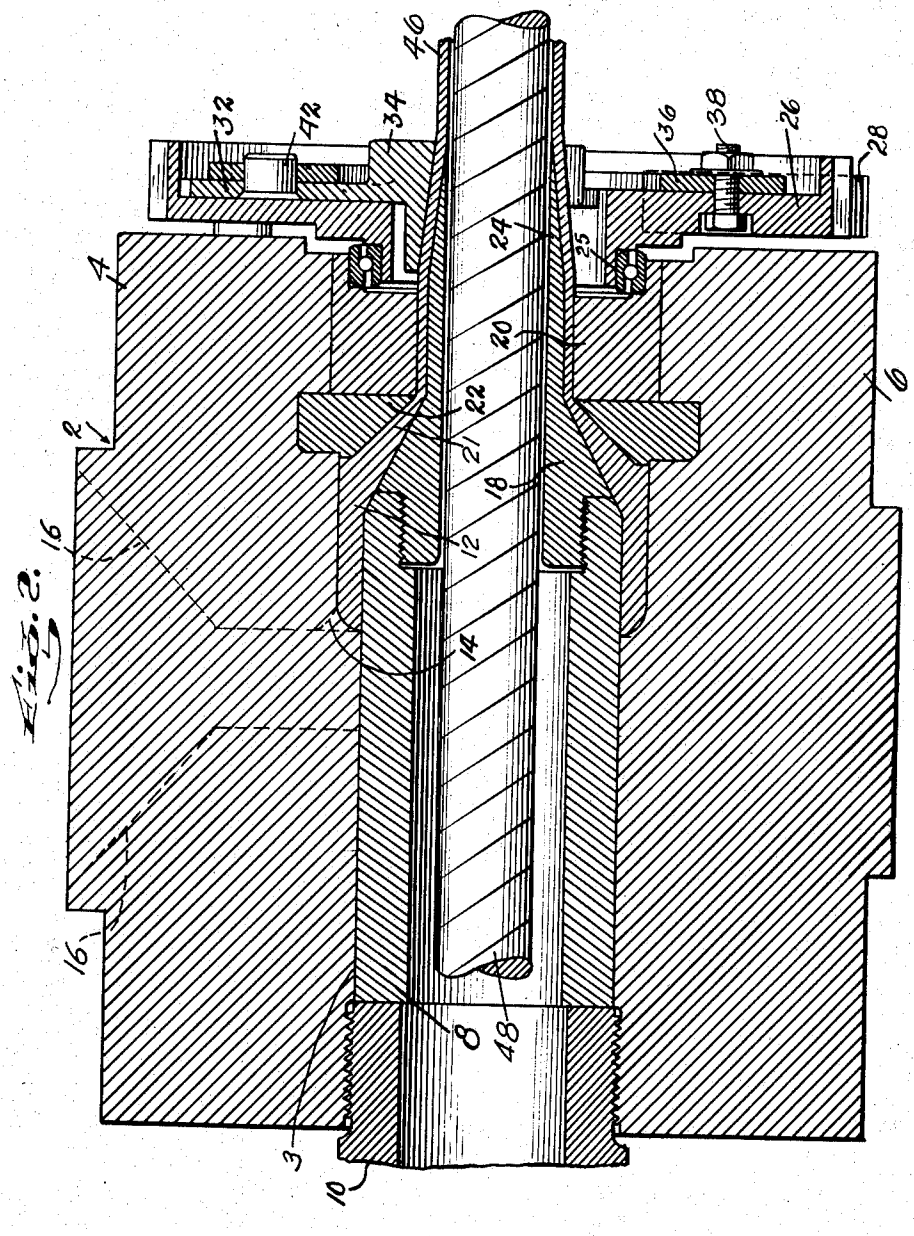


Fig. 2.

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# EXTRUSION APPARATUS FOR SHEATHING ELECTRIC CABLES

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2 Claims. (Cl. 207—4)

This invention relates to the sheathing of electric cables by extrusion, namely, by converting a mass of metal in a plastic state into an elongated body of the required cross-sectional shape by forcing the plastic metal through an appropriately shaped orifice.

In producing sheaths by conventional equipment it has been found difficult to maintain the wall thickness of the sheath constant within very close limits at all points around the sheath circumference and at all points along its length. Accordingly, the practice has been to produce a sheath whose average wall thickness is considerably above that of the minimum permissible wall thickness. This practice is safe but is extravagant of material.

The present invention enables a cable sheath to be produced by extrusion and having a wall thickness which is constant within fine limits, thereby enabling economies in material to be effected.

By the present invention we provide for extruding a metal cable sheath in the form of a metal tube, and then simultaneously operating upon the internal and external surfaces of each elemental length of the advancing tube, to displace metal, in a direction having a substantial circumferential component, from elemental areas of wall the thickness of which is materially greater than the desired thickness to elemental areas of wall of a thickness materially less than the desired thickness. In this way inequalities in the wall thickness of the elemental length are substantially reduced, and the wall of the sheath is caused to assume a thickness which is, within close limits, constant throughout the circumference.

When desired, the circumferential displacement of the metal may be followed by a reducing process, to reduce the sheath to the size required for the finished sheath.

In general, our improved apparatus comprises metal extrusion apparatus having a circular inner die and a circular outer die, which cooperate to form an annular extrusion orifice for the formation of a metal tube. The inner die projects beyond the outer die to provide an internal gauging member, and cooperating with this internal gauging member is an external gauge, comprising a plurality of shoes carried by a rotatable disc mounted in the front end of the extrusion press. As the disc is rotated, the shoes will displace metal from elemental areas of wall of which the thickness is materially greater than the desired thickness to elemental areas of sheath wall of a thickness materially less than the desired thickness.

In the accompanying drawings,

Fig. 1 is an end elevational view of an embodiment of our invention; and

Fig. 2 is a section on the line 2—2 of Fig. 1.

Referring to the drawings in detail, the die box 2 comprises upper and lower parts 4 and 6, making joint in a horizontal plane. The contiguous faces of these parts are recessed, and the recesses cooperate to form an axial or through-bore 3. Within this bore, toward the rear or left-hand end of the bore as viewed in Fig. 2, is positioned a tubular mandrel or point holder 8, held in



place by a tubular nut or tubular, externally threaded plug 10.

At the front end of the mandrel 8, viz., the right-hand end as viewed in Fig. 2, the through-bore is enlarged to form between the mandrel and the wall of the through-bore 3 an annular forming chamber 12, into which a passage 14 leads from an opening 16 in the upper face of the die box.

Threaded into the inner end of the mandrel 8 is a tubular inner die 18. This die 18 is externally conical. Cooperating with the inner die 18 is a tubular outer die 20, pressed into the front end of the through-bore 3. Set into the die box parts 4 and 6 immediately behind the outer die 20 is a masking ring 22, the rear or inner face of this ring being conical. The two die members and the masking ring 22 form an annular extrusion orifice, the area 21 of which between the masking ring 22 and the inner die 18 has a converging cross-section.

The inner die 18 extends forwardly or outwardly of the die box beyond the outer die 20, as shown at 24. The surface of this extension is conical, and the extension constitutes an internal gauging member.

Rotatably mounted at the front end of die box 2 in bearings 25 in the front face of the outer die or matrix 20 is a centrally apertured, shoe-carrying disc 26, having a toothed rim and driven by a pinion 28.

In the front face of the disc 26 are three radially extending grooves 30, spaced 120° apart, each groove receiving a radially extending shank 32 of a shoe or external gauging member 34, these shoes overlying and cooperating with the conical surface of the internal gauging member 24, as illustrated in Fig. 2.

The shoe shanks 32 are held slidably in the grooves 30 by a cover plate 36, which is clamped to the disc 26 by stud bolts 38, which pass through circumferentially extending slots 40 in the cover plate, so that the cover plate is capable of being angularly adjusted relative to the disc to an extent determined by the length of the slots.

Each shoe shank 32 carries a stud 42, which projects through an arcuate slot 44 in the cover plate. These slots 44 do not extend circumferentially with respect to the disc 26 and its cover plate 36 but lie at a small angle to the circumferential, so that, as the cover plate is rotated relatively to the disc, the radial positions of the three shoes are adjusted simultaneously and, to the same extent, in inward or outward directions, depending upon the direction of rotation of the cover plate relative to the disc.

It will be apparent from all of the foregoing that, as a sheath, such as 46, is being extruded upon a cable body 48, we operate upon the internal and external surfaces of the same simultaneously through the medium of the internal gauging member and the external gauging members provided by the shoes 34, to displace metal, in a direction having a substantial circumferential component, from elemental areas of sheath wall of which the thickness is materially greater than the desired thickness to elemental areas of sheath wall the thickness of which is materially less than the desired thickness.

This application is a continuation-in-part of our copending application Serial No. 289,618, filed May 23, 1952, now Patent No. 2,751,077, dated June 19, 1956.

What we claim is:

1. Extrusion apparatus for sheathing electric cables, said apparatus comprising, in combination, a metal extrusion die box provided with an axial through-bore; a tubular mandrel mounted in said through-bore; a tubular nut threaded in the rear end of said bore for holding said mandrel in place; an inner tubular die threaded into the inner end of said mandrel; an outer tubular die member pressed into the forward end of said through-bore, where-

by the two die members provide an annular extrusion orifice concentric with said through-bore for the formation of a sheath about a cable core passing through the through-bore, the said inner die projecting forwardly beyond said outer die member, the projecting portion of the inner die having a conical exterior and constituting an inner gauge; a disc at the front end of the die box provided with a central aperture coaxial with the die box through-bore; a plurality of radial slots in the outer face of said disc; a plurality of work-engaging shoes, each provided with a radially extending shank which lies in the said disc slots; a cover plate for said disc having a central aperture coaxial with said disc aperture, said plate overlying the shoe shanks and being bolted to the disc; a stud carried by each shoe shank, said cover plate being provided with slots each of which receives a shank stud, said shoes providing outer gauging means cooperating with the inner gauge, and the shank studs and their receiving slots holding the shoes against radial movement in their shank-receiving slots; and means for rotating said disc, shoes, and cover plate as a unit about the axis of the die box through-bore.

2. Extrusion apparatus for sheathing electric cables, said apparatus comprising, in combination, a metal extrusion die box provided with an axial through-bore; a tubular mandrel mounted in said through-bore; a tubular nut threaded in the rear end of said bore for holding said mandrel in place; an inner tubular die threaded into the inner end of said mandrel; an outer tubular die member pressed into the forward end of said through-bore, whereby the two die members provide an annular extrusion orifice concentric with said through-bore for the formation of a sheath about a cable core passing through the through-bore, the said inner die projecting forwardly beyond said outer die member, the projecting portion of the inner die having a conical exterior and constituting an inner gauge; a disc at the front end of the die box provided with a central aperture coaxial with the die box through-bore; a plurality of radial slots in the outer face of said disc; a plurality of work-engaging shoes, each provided with a radially extending shank which lies in the said disc slots; a cover plate for said disc overlying the shoe shanks and having a central aperture coaxial with said disc aperture; a plurality of arcuate slots through said cover plate, said slots being concentric with the said cover plate aperture; bolts extending through said slots for bolting the cover plate and disc to each other, said cover-plate slots being elongated whereby, upon loosening of said bolts, the cover plate may be adjusted angularly relatively to said disc; a stud carried by each shoe shank; elongated arcuate slots through said cover plate, each slot receiving a shank stud, and said slots extending at an angle to the circumference of said disc and cover plate whereby, upon angular adjustment of the cover plate, the said shoes will be shifted radially of the disc and cover plate; and means for rotating the disc, shoes, and cover plate as a unit about the axis of the die box through-bore.




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