

Nov. 24, 1953

O. A. McNAMEE
EXTRUDING APPARATUS

2,659,932

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-2 Sheets-Sheet 1

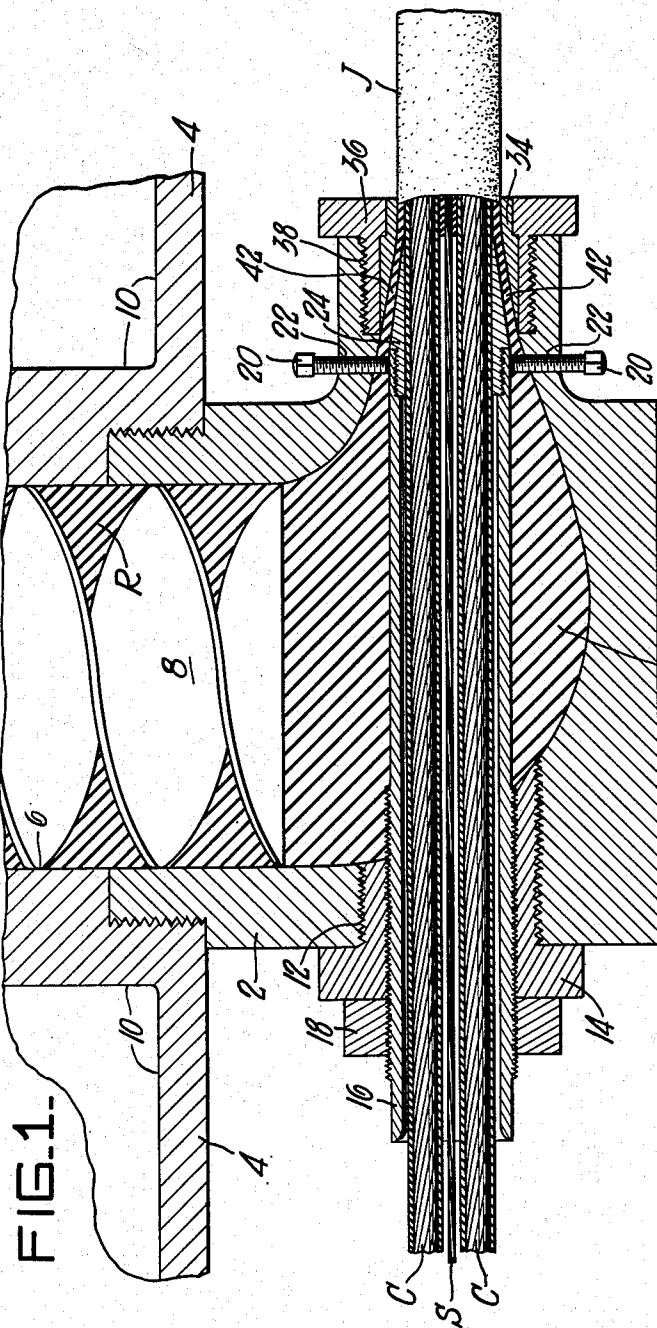


FIG. 1-

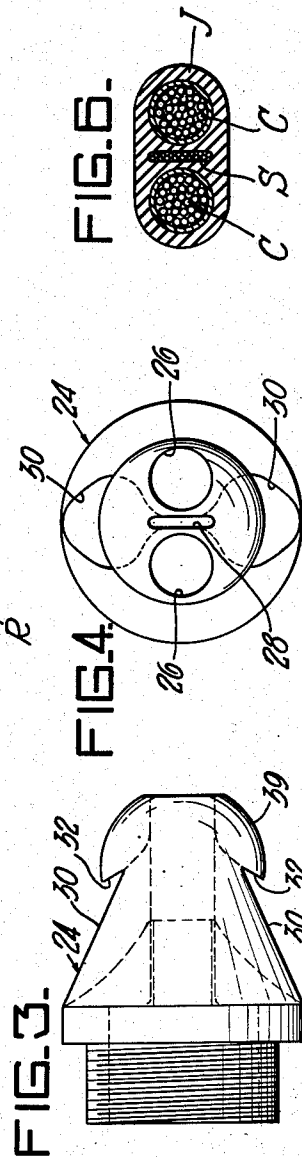


FIG. 3-

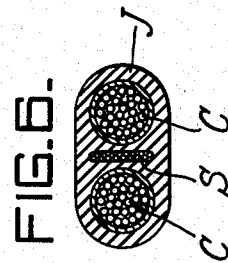


FIG. 4-

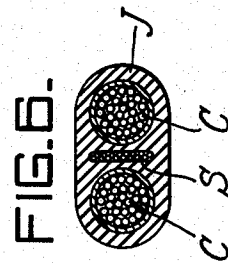


FIG. 5-

Inventor:
OWEN A. McNAMEE,
by: Donald G. Dalton
his Attorney.

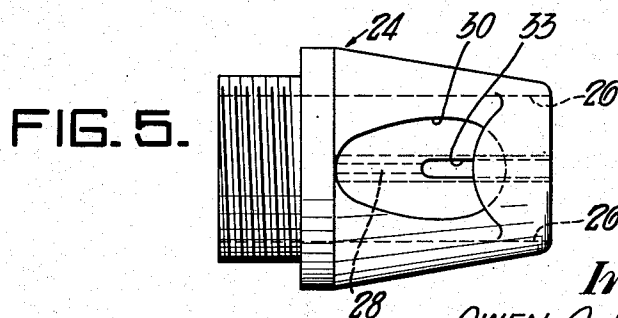
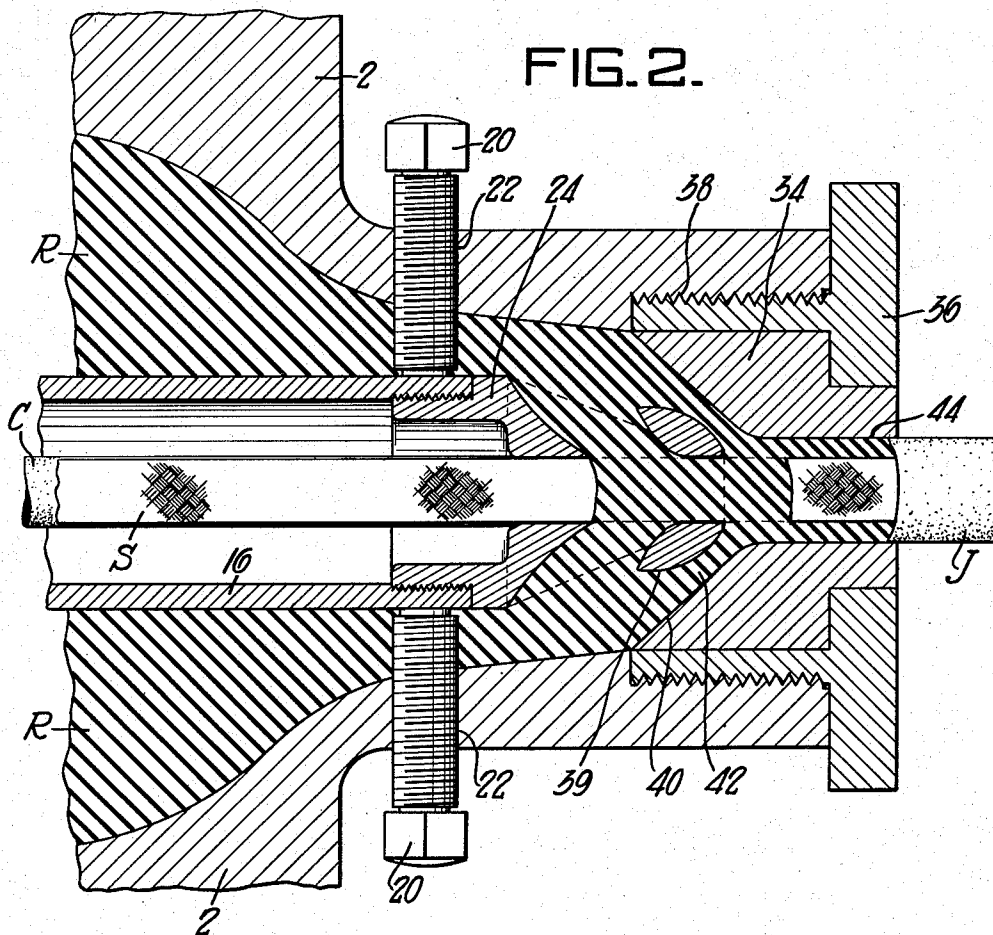
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28 *Inventor:*
OWEN A. McNAMEE,
by: Donald G. Dalton
his Attorney.

UNITED STATES PATENT OFFICE

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EXTRUDING APPARATUS

Owen A. McNamee, Worcester, Mass., assignor to
United States Steel Corporation, a corporation
of New Jersey

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4 Claims. (Cl. 18-13)

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This invention relates to extruding apparatus and more particularly to apparatus for extruding an insulating jacket around a multiple conductor electric cable. The usual manner of extruding insulating material around a multiple conductor cable is to pass the conductors axially through a male die which is positioned in front of a female die. The insulating material, such as rubber, flows around the outside of the male die between the male die and the female die and then around the conductors. As the cable conductors are pulled through the machine the insulating material is applied thereto with the thickness of the coating being determined by the axial opening in the female die. In order to effectively fill the valleys between conductors with insulating material, it is necessary to use high pressure to force the compound into the valleys. It has also been attempted to use female dies having a relatively long length of land, but in neither case has the results been satisfactory. In certain types of twin conductor type cables it is desired to extrude a bridge wall between the two parallel conductors at the same time the jacket is extruded around the conductors. Some of these flat twin cables also contain a flexible bare ground strand or conductor which is placed between the insulated conductors. It is desirable to extrude a bridge wall between the insulated conductors with the ground strand being embedded therein. The normal tuber pressure used with the standard extrusion dies is not sufficient to form the desired bridge wall and as the result the completed cable is not completely satisfactory for various reasons.

It is an object of my invention to provide apparatus which will enable insulating material to be effectively extruded into the valleys between conductors at the same time the jacket is being extruded around the conductors.

Another object is to provide apparatus which will enable insulating material to be extruded between a pair of conductors and around a ground strand located between the pair of conductors.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a sectional view showing an extrusion machine with conductors therein being covered with rubber;

Figure 2 is a sectional view of the exit end of the machine of Figure 1, taken at right angles to Figure 1;

Figure 3 is an elevation of my improved male die shown in the same position as in Figure 2;

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Figure 4 is a view of the exit end of the die of Figure 3;

Figure 5 is an elevation of the male die taken at right angles to Figure 3; and

Figure 6 is a cross sectional view of a completed cable.

Referring more particularly to the drawings the reference numeral 2 indicates an extruding head attached to an extruding machine 4. A bore 6 is provided in the extruding machine and head for receiving a feed screw 8. A chamber 10 surrounds the bore 6 and is provided with either heating or cooling means as required in order to have the insulating material R at the right temperature for extruding. The head 2 is provided with a threaded bore 12 arranged at right angles to the bore 6 for receiving a bushing 14. A male die holder 16 is threaded into the bushing 14 and is held in adjusted longitudinal position by means of a check nut 18. The die holder 16 is held in centered position by means of four adjusting screws 20 which are threaded into threaded openings 22 in the extrusion head 2. A male die 24 is threaded into the die holder 16. The construction of the male die 24 varies according to the design of the cable being made. One particular type of cable is shown in Figure 6 and the construction of the male die 24 will be described for use when making this particular type of cable. This cable consists of a pair of insulated conductors C having a flat substantially rectangular ground strand S located therebetween. A jacket J of the insulating material R surrounds the insulated conductors C. The insulating material R also surrounds the ground strand S and extends into the valleys between the conductors C. The die 24 has two axial openings 26 therethrough, one for supporting and guiding each of the conductors C and an axial opening 28 for the ground strand S. The die 24 has a pair of side openings 30 shaped as shown, one adjacent each side edge of the ground strand S. The openings 30 extend outwardly and rearwardly from the edges of the opening 28. A lip 32 is provided around the outside of the male die adjacent the forward end of the openings 30 to direct the insulating compound R into the die cavity. The openings 30 end in slots 33 at the opening 28. The openings 26 are of substantially uniform cross section throughout their length, but the size of the cross section of opening 28 is increased adjacent the side openings 30 to permit insulating material R to completely surround the strand S. A female die 34 is positioned adjacent the exit end of the die head 2 and is held in

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place by means of a die holder 36 threaded into an opening 38 in the die head 2. The exit end of the male die 24 is rounded at 39 and tapers inwardly toward the exit end. The female die is provided with a similarly tapered portion 40 adjacent its entry end. The female and male dies are spaced apart to provide a side opening or orifice 42 between the portions 39 and 40. The female die 34 is provided with an axial opening 44 having a size and shape substantially the same as that of the finished cable. The die head 2 is provided with an opening 42 of such a size that insulating material R can completely surround the die holder 16.

The operation of my device is as follows:

The cables C and strand S are pulled through the dies 24 and 34 in the usual manner and the screw 8 is rotated to feed insulating material R through the openings 30 and the orifice 42. Insulating material R is extruded around the ground strand S through the opening 28, the exit end of which determines the thickness of insulating material around the strand S. As the conductors C and strand S pass from the exit end of male die 24 insulating material R is extruded around the entire assembly through the orifice 42 and the die opening 44.

In making a twin conductor cable without the ground strand S, the insulating material R will be extruded between the conductors C in the same manner as described above to form the bridge wall. In the same manner the insulating material may be extruded into valleys between conductors in any type of cable.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. Apparatus for extruding an insulating material around a pair of conductors having a substantially rectangular ground strand therebetween to form a cable, which comprises a male die, said male die having two spaced apart substantially circular axial openings therethrough one for each of said conductors and a substantially rectangular axial central opening between the circular openings for receiving the ground strand, said male die having a side opening therein extending outwardly and rearwardly from each side edge of said central opening for receiving insulating material, each of said side openings being disposed at an acute angle to the axial openings in the male die, a female die surrounding the exit end of said male die and spaced therefrom to provide an orifice for the insulating material, said female die having an axial opening therein for receiving the conductors, ground strand and insulating material, said female die extending beyond the exit end of said male die, the exit end of the opening in the female die having a size and shape substantially the same as that of the finished cable, and means for feeding insulating material around said male die from the entry end thereof through said side openings and orifice.

2. Apparatus for extruding an insulating material around a pair of conductors having a substantially rectangular ground strand therebetween to form a cable, which comprises an extruding head having an opening therein for receiving said insulating material and axially aligned threaded openings communicating with said first named opening, an elongated male die

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holder threaded into one of said threaded openings and extending through said first named opening toward the second of said threaded openings, said die holder having an axial opening therein for receiving said conductors and ground strand, a male die supported by the end of said die holder adjacent the second threaded opening, said male die having two spaced apart substantially circular axial openings therethrough one for each of said conductors and a substantially rectangular axial central opening between the circular openings for the ground strand, said male die having a side opening therein extending outwardly and rearwardly from each side edge of said central opening for receiving insulating material, each of said side openings being disposed at an acute angle to the axial openings in the male die, a female die threaded into the second threaded opening, said female die surrounding the exit end of said male die and spaced therefrom to provide an orifice for the insulating material, said female die having an axial opening therein for receiving the conductors, ground strand and insulating material, said female die extending beyond the exit end of said male die, the exit end of the opening in the female die having a size and shape substantially the same as that of the finished cable, and means for feeding insulating material from said first named opening through said side openings and orifice.

3. Apparatus for extruding an insulating material around a multiple conductor cable comprising a male die having an axial opening therein for each of the conductors to guide their passage therethrough, a smaller axial opening between adjacent axial openings, said male die having a side opening therein extending outwardly and rearwardly from each of said smaller openings for receiving insulating material, each of said side openings being disposed at an acute angle to the axial openings in the male die, a female die surrounding the exit end of said male die and spaced therefrom to provide an outwardly and rearwardly extending opening for the insulating material, said female die having an axial opening therein for receiving the multiple conductor cable and insulating material, said female die extending beyond the exit end of said male die, the exit end of the opening in the female die having a size and shape substantially the same as that of the finished cable, and means for feeding insulating material around said male die from the entry end thereof through said outwardly and rearwardly extending openings.

4. Apparatus for extruding an insulating material around a multiple conductor cable comprising an extruding head having an opening therein for receiving said insulating material and axially aligned threaded openings communicating with said first named opening, an elongated male die holder threaded into one of said threaded openings and extending through said first named opening toward the second of said threaded openings, said die holder having an axial opening therein for receiving said conductors, a male die supported by the end of said die holder adjacent the second threaded opening, said male die having an axial opening therein for each of the conductors to guide their passage therethrough and a smaller axial opening between adjacent axial openings, said male die having a side opening therein extending outwardly and rearwardly from each of said smaller openings for receiving

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insulating material, each of said side openings being disposed at an acute angle to the axial openings in the male die, a female die threaded into the second threaded opening, said female die surrounding the exit end of said male die and spaced therefrom to provide an outwardly and rearwardly extending opening for the insulating material, said female die having an axial opening therein for receiving the multiple conductor cable and insulating material, said female die extending beyond the exit end of said male die, the exit end of the opening in the female die having a size and shape substantially the same as that of the finished cable, and means for feeding insulating material from said first named opening through said side openings and orifice.

OWEN A. McNAMEE.

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