Jan. 14, 1941. O. M. DITZEL ET AL 2,228,301

TUBE DRAWING METHOD AND APPARATUS

Filed Aug. 22, 1939

Fig. 1.

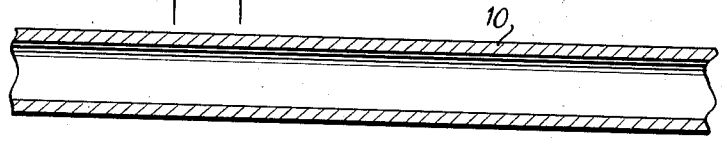


Fig. 2.

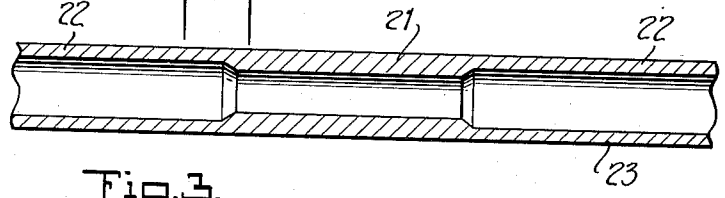


Fig. 3.

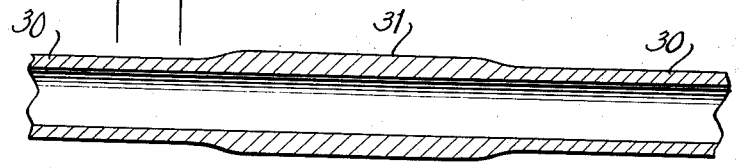


Fig. 4.

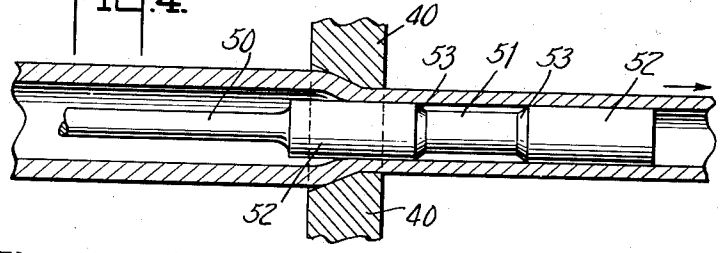


Fig. 5.

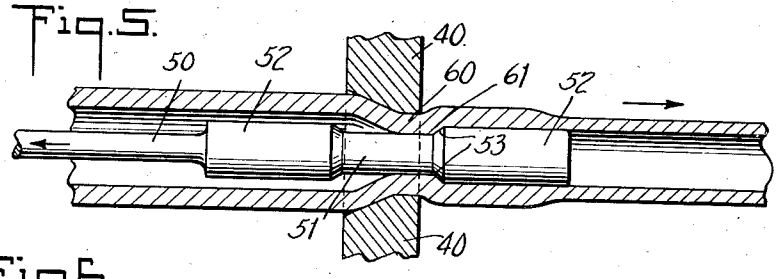
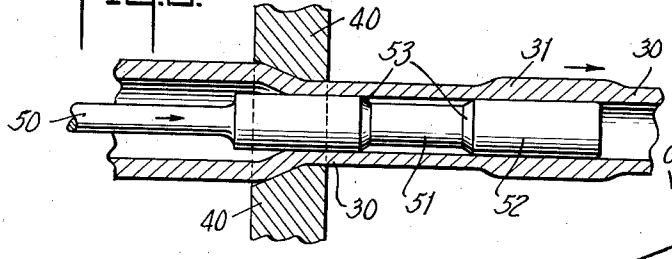


Fig. 6.



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UNITED STATES PATENT OFFICE

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TUBE DRAWING METHOD AND APPARATUS

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Application August 22, 1939, Serial No. 291,288

6 Claims. (Cl. 205—8)

This invention relates to a method of manufacturing tubes of uniform internal diameter and varying outside diameters.

The principal object of this invention is to provide a method of drawing in a continuous operation a tube of multiple wall thickness and to provide apparatus for use in the carrying out of the new method.

The foregoing and other features of our invention will now be described in connection with the accompanying drawing forming part of this specification in which we have represented our apparatus and diagrammatically illustrated our method in its preferred form after which we shall point more particularly in the claims those features which we believe to be new and of our own joint invention.

In the drawing:

Figure 1 is a longitudinal section of a tube of uniform wall thickness.

Figure 2 is a longitudinal section of a tube of uniform outside diameter with a mid section having a thickened wall.

Figure 3 is a longitudinal section of a tube of uniform inside diameter and having a mid section with thickened wall.

Figure 4 is a section through a die and plug during the drawing of the front end of a tube similar to that shown in Figure 3.

Figure 5 is a section similar to that shown in Figure 4 showing the relative position of the plug and die when forming the mid section thickened wall of our tube.

Figure 6 is a section similar to that shown in Figure 4 showing the relative position of the plug and die during the drawing of the last end of the tube shown in Figure 3.

Tubes with thickened mid-section may be made by drawing a tube 10 through dies by well known methods to have the shape shown in Figure 2 which has a thickened wall 21 in a central portion with two end portions 22 of a thinner wall section. This tube has a uniform outer diameter 23.

To form this tube into the one shown in Figure 3 the inner diameter is made uniform by drawing a sizing plug through the tube forcing the thickened portion 31 to the outer side of the tube as shown. While this may be done in several separate operations, the cost of so doing is excessive so that we have devised a method of drawing the tube in a continuous operation at a greatly reduced cost.

To successfully practice this new method it is necessary to provide a drawing plug of special shape. Figures 4, 5 and 6 illustrate three steps in the continuous operation in the drawing of our tube. We provide a die 40 and a drawing plug 50. This plug is formed with a small central portion 51 with an enlarged portion 52 on each end, and a gentle taper 53 from the small diameter to the large diameter of the plug. In the drawing the taper 53 is exaggerated for the purpose of clearness.

The first stages of the continuous drawing show the plug 50 and the die 40 in their relative position shown in Figure 4. The tube is drawn and as long as the position of the die and plug is held constant the tube drawn has a uniform outside and uniform inside diameter as will be readily understood.

When the position of the plug 50 is moved to that shown in Figure 5 the inside diameter of the tube drawn is reduced at the point 60 but the outside diameter of the tube remains constant thereby furnishing a thickness of wall extending inside the tube comparable to that shown in Figure 2, but when the tube arrives at the point 61 where the thickened portion on the inside rides on 53 of the plug 50, the thickened portion is forced outwardly and the inside diameter of the tube being drawn is made uniform with the thickened wall at this mid section. The plug is then advanced again to the position shown in Figure 6 and the tube rear end 30 is finished exactly the same as the forward end 30. This method produces a tube like that shown in Figure 3 with a continuous movement of the tube and a single operation saving much money in the cost of handling.

We wish it distinctly understood that our drawing plug and its method of use is in the form in which we desire to construct and use it and that changes or variations may be made as may be convenient or desirable without departing from the salient features of our invention and we therefore intend the following claims to cover such modifications as naturally fall within the lines of invention.

We claim:

1. A method of drawing a tube of uniform inside diameter with multiple wall thickness comprising the steps of forming the tube with uniform outer diameter and an intermediate portion of greater wall thickness than the wall thickness of the ends, expanding the intermediate portion so that the inside diameter of the tube is uniform in diameter said steps being performed in a continuous operation while the tube is traveling in but one direction.

2. A method of drawing a tube of uniform inside diameter with multiple wall thickness comprising the steps of forming the tube with uniform outer diameter and a mid section having a reduced inside diameter expanding the reduced portion to a uniform inside diameter said steps being performed in a continuous operation while the tube is traveling in but one direction.

3. A method of drawing a tube of uniform inside diameter with multiple wall thickness comprising the steps of forming the tube with uniform outer diameter with a section having a reduced inside diameter, expanding the reduced portion to a uniform inside diameter throughout the length of the tube, said steps being performed in a continuous operation while the tube is traveling in but one direction.

4. A method of drawing a tube of uniform inside diameter with a plurality of sections in which the wall thicknesses are thicker than the rest of the tube, comprising the steps of forming the tube with uniform outside diameter with a plurality of sections having reduced inside diameter, expanding the reduced portions to a uniform inside diameter throughout the length of the tube, said steps being performed in a continuous operation while the tube is traveling in but one direction.

5. An apparatus for forming a tube of uniform inside diameter with a mid section of increased wall thickness in combination a die and plug, said plug having a reduced central portion and tapering gradually to an enlarged portion on each end of the plug, means to hold the plug in fixed relative position to the die, and to move the plug so that it is in a different fixed position relative to the die.

6. An apparatus for forming a tube of uniform inside diameter with a section of increased wall thickness in combination, a die and cooperating plug, a portion of its length being smaller in diameter, means to hold the plug in a fixed relation to the die during the forming of the tube with the thinner wall, and a different relative position during the forming of the tube with the heavier wall thickness.

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