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2,014,982

METHOD OF MAKING TUBES

Original Filed Feb. 14, 1931

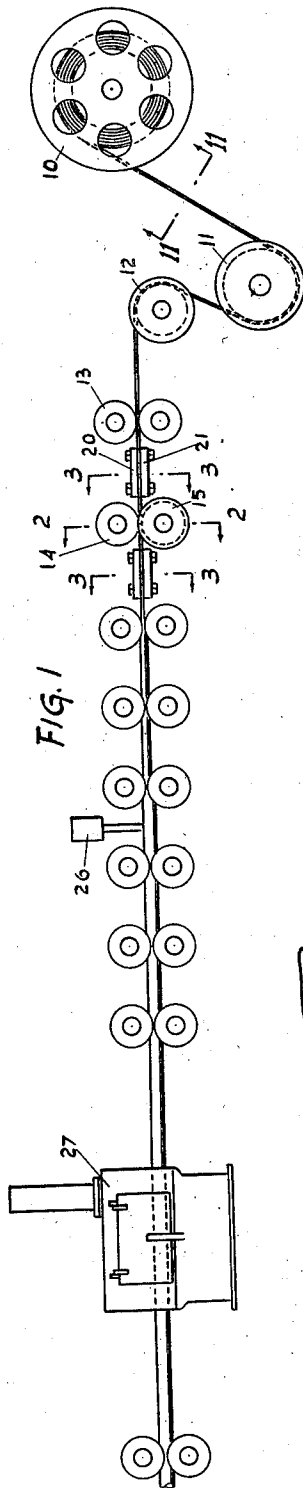


FIG. 1

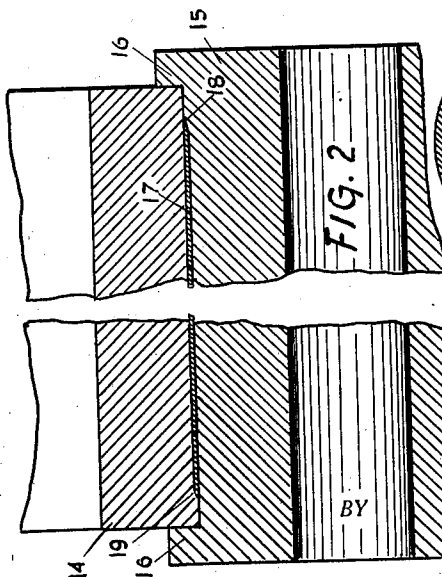


FIG. 2

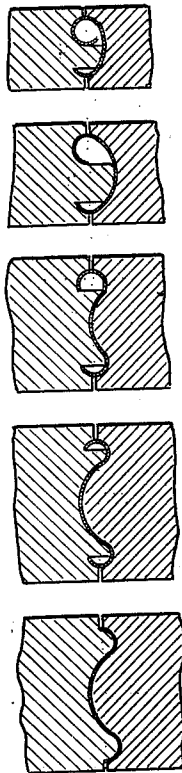


FIG. 3

FIG. 4

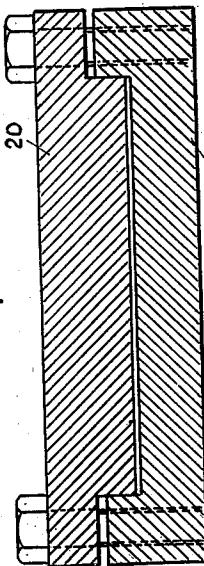


FIG. 5

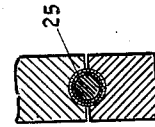


FIG. 6

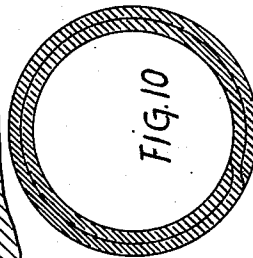


FIG. 7

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METHOD OF MAKING TUBES

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2 Claims. (Cl. 78—94)

This invention relates to a method of making tube. The invention relates particularly to the making of tube of plural ply wall structure; the particular tube is of the type shown and claimed in the H. W. Bundy Patent #1,431,368 of October 10, 1922, such tube being of plural ply wall structure formed from strip stock. More particularly the invention is concerned with an apparatus and method of making such a tube and which involves mechanism and steps for the production of tube of increased strength with particular regards to the seam. In the accompanying drawing:

Fig. 1 is a rather diagrammatical illustration of an apparatus which may be employed.

Fig. 2 is a cross sectional view, enlarged, taken on line 2—2 of Fig. 1, showing rollers for treating the strip preliminary to shaping it into tube.

Fig. 3 is a sectional view taken through guide dies illustrating the construction on lines 3—3 of Fig. 1.

Figs. 4 to 8, inclusive, are cross sectional views taken through progressive forming rollers.

Fig. 9 is a sectional view taken through forming rollers illustrating the completely shaped strip stock.

Fig. 10 is a view of a completed tube.

Fig. 11 is a sectional view taken substantially on line 11—11 of Fig. 1.

The tube as illustrated in Fig. 10 comprises a strip of stock fashioned into hollow cross sectional form with plural ply walls; the inner ply is illustrated at 1, the outer ply at 2. The stock is provided with an offset 3 the configuration of which embodies relatively gentle curves, or in other words, the offset is at a slight angle. The edges of the stock have beveled faces, the edge of the inner ply having its beveled face 4 substantially abutting the offset on the inside thereof while the beveled edge 5 substantially abuts the offset on the outside thereof.

With the ultimate tube structure now in mind the apparatus and method for effecting the same will be readily appreciated from the following description. The strip stock from which the tube is made may be wound upon a reel 10, and as shown in Fig. 11, its edges may be square, or in other words, substantially at right angles to the sides of the strip. The strip may be led over suitable guide rollers 11 and 12 and then into devices involving rollers and the like for working the strip. First, there may be a pair of rollers 13 which aid in passing the strip lengthwise and one or both may be driven. The next set of rollers consists of an upper roller 14 and a lower roller

15 shown in detail in Fig. 2. Preferably one of these rollers is driven while the other may be idle, although both may be driven. These rollers are for the purpose of providing the beveled edges 4 and 5 on the stock. As shown in Fig. 2, the rollers may be arranged so that one fits within the other, the roller 15 having peripheral flanges 16 for this purpose, and they are constructed so as to leave a space or passageway 17 for the stock. Moreover, the rollers are so designed so that the strip in passing through them is provided with its beveled edges. Accordingly, the passageway 17 is restricted at each side as by means of an inclined shoulder 18 on roller 15, and inclined shoulder 19 on roller 14. The overall width of the clearance 17 may be substantially equal to the width of the strip, and as the same passes between the rollers its edges are compressed in such manner that the edges of the stock are angled or provided with what we term herein the beveled faces. The beveling may be effected in other ways such as for example shearing or trimming off some of the metal.

For the purpose of accurately guiding the strip so as to keep it from crowding to one side or the other suitable guide devices are provided preferably one on each side of the bevel-forming rollers. These guide devices may be termed guide dies consisting of upper and lower blocks 20 and 21 arranged to fit as shown in Fig. 3 so as to provide a passageway or slot through which the stock may travel. The strip stock relatively snugly fits into this passageway and is held from shifting sidewise. The die at the outlet side of the bevel-forming rollers may be and advantageously is similar. By thus having guide devices or guide dies, one on each side of the rollers 14 and 15, the stock is held accurately in position so that the beveled formation on the edges of the stock is substantially the same. In other words, the stock is held from crowding to one side which would effect more compression of the metal on one side and less on the other with the result that non-uniformity as between the beveled faces would result.

Following this, the strip passes through a series of forming rollers so that the strip is fashioned into a tube. In Fig. 4 there is shown what may be the first set of forming rolls; Fig. 5 the second set; Fig. 6 the third. Fig. 7 the fourth and Fig. 8 the rolls which effect final tube formation. These figures show the progressive manner in which the strip is rolled into tube. It will be noted that the stock is first fashioned tubular like and that there is an arbor 25 held by means of

of a suitable support 26 around which the stock is fashioned and the final rolls shown in Fig. 9 tightly compress the stock against the arbor thus effecting the offset as it is more or less squeezed between the beveled edges. As the tube moves forward it may then pass through a suitable furnace 27 wherein the tube is finished as by means of being soldered, brazed or welded. In this regard the tube may be finished with ordinary solder such as a lead and tin alloy, or brazed with hard solder, or any other suitable metal or alloy. Likewise, copper may be used for this purpose of uniting the inner and outer plies and securing the beveled edges to the offset. Also it may be stated here that the furnace 27 may be disassociated from the tube forming rolls in some instances where, for example, the forming rolls can turn out tube faster than the same can be handled by the furnace. It will be appreciated that the strip stock may be coated, as for example, with tin where the tube is to be soldered, or it may be coated or plated with copper where a copper welded tube is to be made. Suitable flux may also be provided as meets the needs of the particular tube, or the furnace may, if and when desired, utilize a reducing atmosphere. These things however are aside from the particular invention here claimed and are subject to such use and selection as fits the needs of the particular tube manufactured.

I claim:

1. The method of making tube from flat strip metal stock which consists in continuously moving a flat strip lengthwise while beveling the edges of the strip, fashioning the strip transversely into a multiply tube with the beveled edges overlapping but separated by a portion of intervening ply, forming an offset in said intervening ply at said portion by applying pressure to the beveled edges both inside and outside of the tube whereby the metal of the intervening ply at said portion is shaped to conform to the beveled surfaces and is in intimate contact therewith over substantially their entire extent, and sealing the tube by molten sealing metal.

2. The method of making tube from flat strip metal stock coated with a covering and sealing metal which consists in passing the coated strip lengthwise while compressing the edges of the strip to form bevels, then fashioning the strip transversely into a multiply tube with the beveled edges circumferentially overlapping but separated by a portion of an intervening ply, then subjecting the tube wall to pressure in the outside and supporting the tube from the inside to press the beveled edges against the said portion of the intervening ply to form an offset conforming in shape to said beveled surfaces and in intimate contact therewith, and then subjecting the tube to heat to melt and unite the contacting portions of the coating metal.

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