Aug. 9, 1955 J. E. FAY 2,714,864

MECHANISM FOR FORMING A HELICALLY WOUND TUBE

Original Filed April 23, 1948

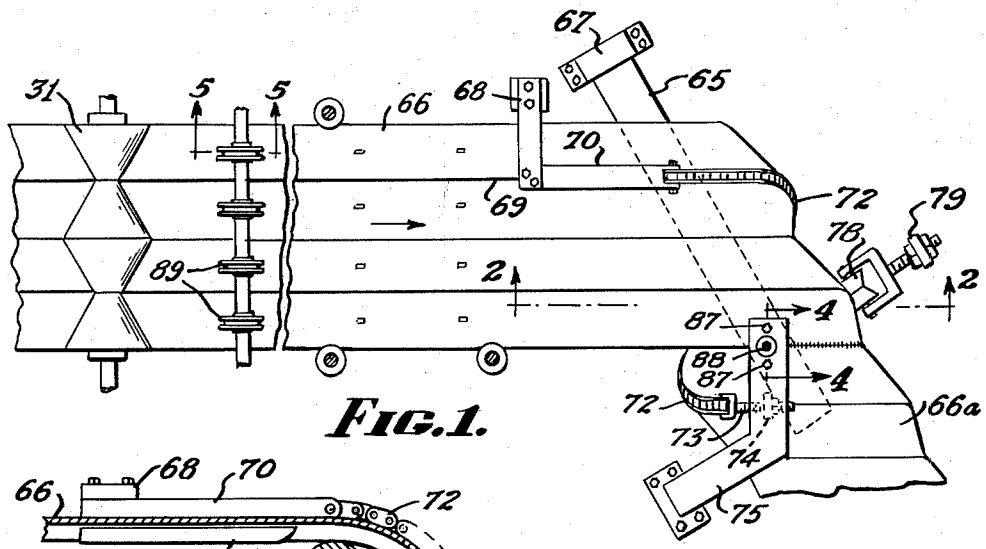


FIG. 1.

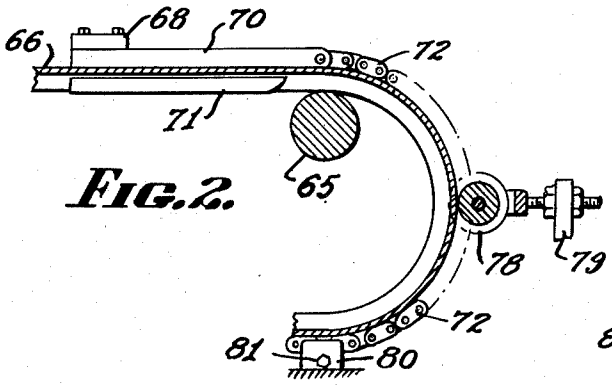


FIG. 2.

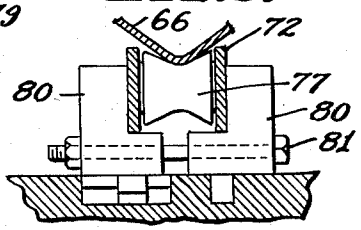


FIG. 3.

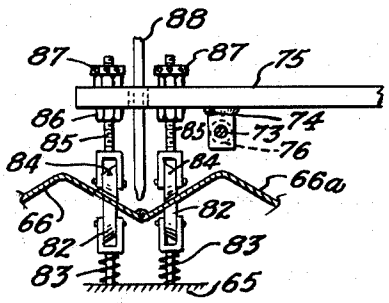


FIG. 4.

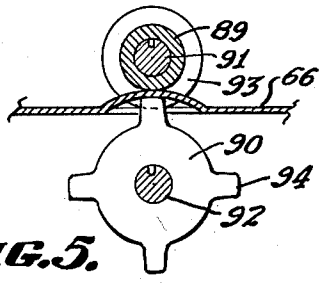


FIG. 5.

INVENTOR.
JAMES E. FAY,
BY Allen & Allen
ATTORNEYS.

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MECHANISM FOR FORMING A HELICALLY WOUND TUBE

James E. Fay, Middletown, Ohio, assignor to Armco Steel Corporation, Middletown, Ohio, a corporation of Ohio

Original application April 23, 1948, Serial No. 22,786, now Patent No. 2,649,888, dated August 25, 1953. Divided and this application November 30, 1951, Serial No. 259,041

2 Claims. (Cl. 113—35)

This invention relates to a mechanism for corrugating strips of material and forming the same into tubes.

This application is a division of my copending application Serial No. 22,786, filed April 23, 1948, now Patent No. 2,649,888. That application contains a full disclosure of the corrugating mechanism, and claims covering said mechanism. The corrugating mechanism, will therefore not be described herein, except as may be necessary to an understanding of the tube forming mechanism.

One object of the invention is to provide the tube forming mechanism with means for moving the adjacent edges of the spiral strip to relative positions in which they may be united one with the other.

A further object of the invention is to provide a combined corrugating mechanism and tube forming mechanism with means interposed between said mechanisms for perforating the corrugated strip

Other objects of the invention may appear as the mechanism is described in detail.

In the accompanying drawing,

Figure 1 is a plan view of a tube forming mechanism showing the discharge end of the corrugating mechanism of my said copending application.

Figure 2 is a cross sectional view taken on the line 2—2 of Figure 1.

Figure 3 is a detail view of the chain clamping device, showing the chain in section.

Figure 4 is a cross sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a cross sectional view taken on the line 5—5 of Figure 1.

Corrugated strips or sheets are frequently utilized in the manufacture of spirally wound tubing and I have disclosed in the present application a tube forming device which receives the corrugated sheet directly from the corrugating mechanism (which may be the mechanism of my said copending case), winds the same into a spiral tube and welds the joints of the tube. As shown in Figs. 1 to 4 this device comprises a mandrel **65** extending obliquely to the path of the corrugated sheet **66** as the latter passes beyond the feeding out rolls **31** of the corrugating mechanism. The mandrel is rigidly supported at one end only, as by an upright standard **67**, at one side of the path of said strip of material, and the other end of the mandrel extends beyond the other side of the strip **66** and is unsupported and unobstructed so that the strip may be wound about the same to form the tube. A supporting member or bracket **68** is mounted at that side of the path of said strip which is adjacent the standard **67** and extends inwardly above the strip, in the present instance to a position above the apex of that corrugation which is adjacent the mandrel support, as shown at **69**. Supported by this bracket **68** are vertically spaced guide members **70** and **71** arranged to receive the strip **66** between them. A flexible guide element, such as a chain **72**, is connected at one end with a fixed support above the mandrel and near that edge of the strip adjacent

the mandrel support, in the present instance the chain is anchored on the forward edge of the upper guide member **70** and extends forwardly and downwardly therefrom to a position a substantial distance below the mandrel, and then laterally and rearwardly toward the other side of the strip and then upwardly and forwardly and this end of the chain is firmly anchored in a position beyond and spaced from that edge of the path of the strip **66** which is adjacent the unobstructed end of the mandrel. Preferably the last mentioned end of the chain, while rigidly anchored, is adjustable lengthwise of the path of the strip. In the present instance the end of the chain is secured to a screw threaded member **73** which extends through an apertured lug **74** on a fixed standard **75** and is retained thereon by a nut **76**. As the corrugated strip moves forwardly it passes beyond the guide members **70** and **71** and engages the downwardly extending part of the chain **72** which deflects the same downwardly and laterally and causes that edge portion thereof which is engaged by the chain to follow the chain and to be thus wound spirally about the mandrel **65**. In the present instance the links of the chain **72** have mounted between them a series of rollers **77**, the rollers having a peripheral shape corresponding approximately to the apex portion of the corrugation and adapted to receive the latter. Thus as the strip is forced along the chain, by the feeding rolls **31**, the apex **69** of the corrugation, or other part of the edge portion of the strip which is in contact with the chain, is caused to follow the chain so that the adjacent edge of the strip, as it turns about the mandrel, is at all times spaced a uniform distance from the chain and as a spiral convolution of the strip approaches completion that edge thereof which was originally adjacent the mandrel support **67** is moved to a position beyond the opposite edge of a succeeding portion of the strip and extends along the close to the last mentioned edge so as to form a section of a spiral tube. A guide roller **78** mounted on a fixed but adjustable support **79** bears against the downwardly extending portion of the apex of a corrugation adjacent that edge of the strip opposite the mandrel support and thus causes that edge portion of the strip to move in proper relation to the first mentioned edge portion thereof. The intermediate portion of the chain **72** is anchored to a fixed support arranged below the mandrel to retain the chain positively in a position to impart the proper initial spiral movement to the strip, the point at which the chain is anchored depending in part at least upon the diameter of the tube which is to be formed. The chain may be anchored in any suitable way but in the present instance there is mounted on a fixed support below the mandrel a clamping device comprising relatively movable parts **80** adapted to receive a pair of links of the chain **72** between them and to be clamped tightly against the same by a bolt **81**. There is usually more or less camber in a strip of material of this kind and as a result the adjacent edges of the spirally wound portion of the strip and of that portion thereof which has not yet been wound are not uniformly spaced one from the other and are likely to be so displaced with relation one to the other that it is not possible to unite the same, by welding or otherwise, so as to form a continuous tube. I have therefore provided a device by which the adjacent edges may be maintained in such relative positions that they can be united. As shown in Fig. 4 the device comprises two pairs of rollers engaging respectively the edge portion of the body of the strip **66** and of the spiral portion of the strip, as shown at **66*a***. Each pair of rollers includes a lower roller **82** pressed upwardly against the edge portion of one part of the strip by a spring **83** and an upper roller **84** engaging the upper surface of the edge portion of the strip **66** and adjustably connected with a fixed support, such as a laterally extending portion of

the standard **75**. In the present instance the rollers **84** are rotatably connected with yokes having screw threaded shanks **85** to extend through openings in the standard **75** and are movable vertically with relation to the latter by nuts **86** and **87** mounted thereon. Thus by adjusting the rollers in accordance with variations in the camber of the strip the adjacent edge portions thereof can be maintained in such positions that they may be united by welding. The welding may be effected in any suitable manner, as by an electric welding mechanism including an electrode **88**, and the welding may be continuous so that the completed tube moves lengthwise beyond the end of the mandrel and may be severed into lengths as desired.

It is often desirable that spiral tubing of this type shall be provided with perforations in at least one side thereof to permit drainage. Heretofore such perforations have been formed in the finished pipe or tubing and that procedure is slow and expensive. In the present mechanism I have provided means whereby the perforations may be formed in the corrugated strip as it passed from the corrugating mechanism to the tube forming mechanism in the manner that involves very little expense. For that purpose I have provided a series of cutting devices spaced across the width of the strip and adapted to form perforations therein at longitudinally spaced intervals. As here shown each device comprises an upper rotatable member **89** and a lower rotatable member **90**, the members being mounted respectively on shafts **91** and **92** which may be driven from any suitable source of power such as the source from which the feeding out rolls **31** are driven. The upper member **89** is provided with a circumferential groove **93** and the lower member is provided with a plurality of radially extending cutting elements or fingers **94** of an axial width just slightly less than the width of the groove **93** in the member **89**. As the corrugated strip **66** moves between the members **89** and **90** the member **89** rolls on the surface thereof and the perforating fingers **94** of the member **90** will successively engage the lower surface of the strip in line with the groove **93** and slit the material of the strip on the lines of contact of each finger with the strip along the side walls of the groove **93** and as the severing action continues the finger forces that part of the strip which lies between the slits into the groove such a distance that it will be spaced from the surface of the strip and will

thus permit the passage of liquid through the perforations, but will tend to prevent the clogging of the aperture.

While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications thereof may occur to a person skilled in the art.

Having now fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a mechanism for forming helically wound tubes, means for moving a corrugated strip of material in a predetermined planar path, an undersize bending mandrel disposed at an angle to the axis of said path, said mandrel being rigidly supported at one end and free at its other end, a first fixed supporting means above said mandrel and above said strip adjacent an edge thereof, a second fixed supporting means similarly positioned at a point axially displaced along said mandrel toward its free end by a distance corresponding to the pitch of the helix, a chain secured at one end to said first fixed supporting means, extending helically around said mandrel and spaced therefrom, and adjustably secured to said second fixed supporting means, fixed grooved means slidingly engaging said chain at the bottom of the helix to hold the same against lateral movement, a buttress roll arranged to bear against the outside of the strip at a point substantially 90° in rotation from the beginning of the helix and adjacent the edge of the strip opposite the said chain.

2. The structure of claim 1, wherein a welding instrumentality is secured to said second fixed supporting means, said welding instrumentality performing a helical weld as the strip is formed into a tube.

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