G. HOLDEN.

METHOD OF MAKING METALLIC TUBE JOINTS.

APPLICATION FILED JAN. 13, 1914.

1,168,885.

Patented Jan. 18, 1916.

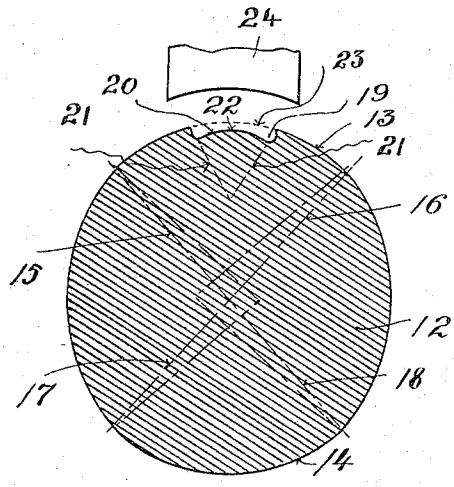


Fig. 1.

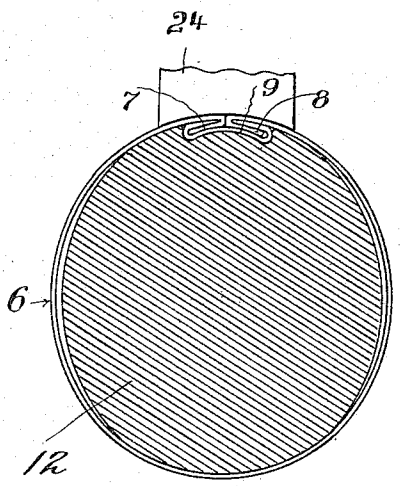


Fig. 3.

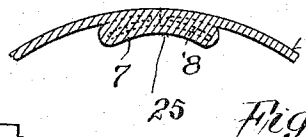


Fig. 5.

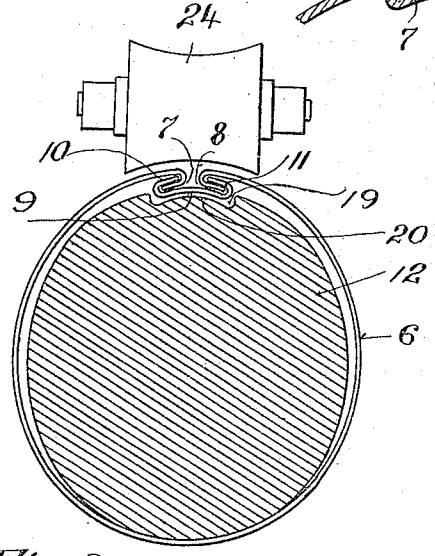


Fig. 2.

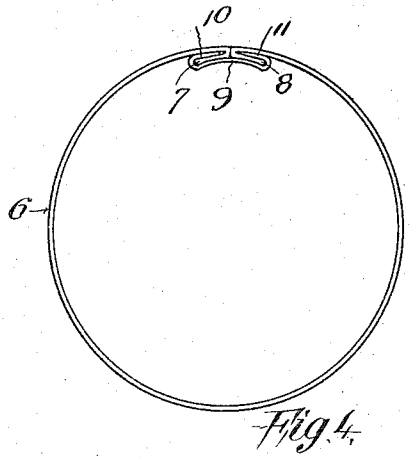


Fig. 4.

Witnesses:

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METHOD OF MAKING METALLIC TUBE-JOINTS.

1,168,885. Specification of Letters Patent. Patented Jan. 18, 1916.

Application filed January 13, 1914. Serial No. 811,836.

To all whom it may concern:

Be it known that I, GEORGE HOLDEN, a citizen of the United States, residing at Flushing, in the county of Queens, State of New York, have made a certain new and useful Invention in Methods of Making Metallic Tube-Joints, of which the following is a specification.

The invention relates to the method of making metallic tube joints.

The object of the invention is to provide a simple, efficient and economical method of making metallic tube joints.

The invention consists substantially in the mode of operation, all as will be more fully hereinafter set forth, as shown in the accompanying drawing, and finally pointed out in the appended claims.

In the accompanying drawing:—Figure 1 is a view in transverse section of a form of die and presser roll employed in carrying out the principles of my invention. Fig. 2 is a similar view showing the application to the die of a metallic split tube and a seam or joint insert therefor preparatory to the application of pressure to complete the joint. Fig. 3 is a view similar to Fig. 2 showing the form assumed by the same joint upon application of pressure. Fig. 4 is an end view of a metallic tube having a seam joint constructed according to and embodying the principles of my invention. Fig. 5 is a broken view in transverse section through the seam joint.

In carrying out my invention I bend or fold the longitudinal edges of a split metal tube, respectively in opposite directions away from each other and I form an insert or auxiliary seam piece with its longitudinal edges bent respectively toward each other to produce a channel formation the bent edges of the split tube being received in the side or edge channels of the auxiliary piece. I then apply pressure to the joint thus formed and in such manner as to force or crowd the metal constituting the engaged portions of the tube edges and the auxiliary strip into substantially an integral mass, and at the same time crowding the metal laterally toward the center line of the joint, thus forming a perfect joint for the split tube, and a joint that is strong and durable. The tube may be cylindrical or of any other desired shape in cross section.

In the drawing 6 designates the cylindrical metal tube which is longitudinally split. The longitudinal edges 7, 8 of the split tube are then bent respectively in opposite directions with reference to each other and preferably, though not necessarily, toward the interior of the tube. I then take an auxiliary strip 9 of metal and bend the side edges 10, 11 thereof toward each other and in opposite directions respectively with reference to the bent edges 7, 8 of the split tube. The extra strip is then applied in such relation or slipped over the bent edges 7, 8 in such manner as to cause the bent edges 10, 11 of the strip to embrace and engage over the bent edges 7, 8 of the tube. With the seam thus preliminarily formed, pressure is applied thereto in such manner as to not only compress the component parts thereof into a substantially solid mass of metal but also in such manner as to crowd or force the metal of the auxiliary strip and of the tube edges laterally toward the center line of the joint. One method of accomplishing this is to employ a mandrel or die 12, preferably but not necessarily of oval shape in cross section and over which the tube with the seam parts thereof arranged as above indicated is slipped endwise. In the form shown the mandrel or die has the portions of the peripheral surface thereof indicated at 13 and 14 Fig. 1, and lying between the radii indicated at 15, 16, and 17, 18 respectively of circular contour in cross section, the center of the curvature being concentric with the geometric axis of the mandrel. The die or mandrel is formed with a seat or recess indicated at 19 to receive the preliminarily formed seam.

One of the important features of my invention, whereby I am enabled to accomplish my objects and purposes in carrying out the principles of my invention resides in the peculiar shape and contour of the die seat or recess 19. This feature is the curved surface indicated at 20 and the feature of peculiarity thereof is that the arc of curvature of this surface is eccentric to the arc of curvature of the peripheral surface 13 of the die, that is to say, the arc of curvature of the surface 20 is struck from a center, as indicated by the dotted lines 21 in Fig. 1, which is eccentric with reference to the geometric axis of the die, and preferably having a radius of less length than that of the circular portion 13 of the die. Another fea-

ture is that the space at the transverse center of the curved surface 20 as indicated at 22 in Fig. 1 between said curved surface and the line 23 which represents the continuation of the circular peripheral surface of the die is less than the combined thicknesses of the lapped portions of the joint. The result is, that when pressure is applied, by roller 24 or otherwise in a direction normal to the line of the seam, as indicated in the drawing to complete the formation of the joint, the metal forming the auxiliary strip and its over turned edges, as well as the engaging parts of the turned over edges of the tube, are thereby pressed into a substantially integral mass. Under the pressure thus applied in a direction normal to the line of the seam the metal of the parts forming the joint while being pressed into an integral mass is forced into the corner pockets of the recess or seat 19 until said corner pockets become filled whereupon, by reason of the eccentric surface 20, a continued application of the pressure in a direction normal to the line of the seam produces a pressure upon the mass of the metal of the joint which is applied in a direction laterally toward the line of the seam and from opposite sides thereof, whereby the metal is crowded laterally toward the longitudinal center line of the joint so as to fill up completely the space between the overturned edges of the split in the tube. As indicated in Figs. 4 and 5 the curvature indicated at 25 in the finished article is of less radius than the curvature of the interior surface of the tube.

It will be understood that the crowding of the metal toward the center line of the seam is secured, as above described, by a secondary pressure which is applied to the metal by reason of the peculiar conformation of the seat or recess into which the metal is forced by the crushing pressure exerted by the member 24, and that this secondary pressure is directed toward the center line of the seam, and while I will call this a lateral pressure or crowding action exerted upon the metal, I wish thereby, in the broadest interpretation thereof to distinguish from the normally applied primary or crushing pressure of the member 24.

In the manner above described, I secure a solid integral joint which is strong and durable. Metal tubes having longitudinal seam joints formed and constructed as above described are well adapted for use in the construction of various articles.

Having now set forth the object and nature of my invention and the method of carrying the same into operation, what I claim as new and useful and of my own invention and desire to secure by Letters Patent of the United States is:

1. The method of forming seam joints for metallic tubes which consists in bending the edges of the tube in opposite directions away from each other and applying thereto an auxiliary strip having its longitudinal edges oppositely bent toward each other and engaging over the bent edges of the tube, and then compressing the metal of the component parts of the resulting seam joint into a substantially integral mass toward the center line of the joint in directions normal to and also from the laterally opposite sides of said line.

2. The method of forming seam joints for metallic tubes which consists in bending the edges of the tube seam in opposite directions from each other and applying an auxiliary strip with oppositely turned flanges in embracing relation with respect to the bent edges of the tube, and then applying pressure to the assembled components of the joint in a direction toward and normal to the line of the seam and also from the laterally opposite sides of and toward the seam line, thereby compressing the metal of the component parts of the joint into a substantially integral mass.

3. The method of forming seam joints for metallic tubes which consists in bending the edges of the tube seam in opposite directions from each other and applying an auxiliary metal strip with oppositely turned flanges in embracing relation with respect to the bent edges of the tube, then applying pressure to the assembled components of the joint in a direction toward and normal to the line of the seam, and unyieldingly resisting such pressure, and also applying pressure toward the line of the seam from the laterally opposite sides thereof, whereby the metal of the component parts of the joint is compressed into a substantially integral mass.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this 6th day of January, A. D. 1914.

GEORGE HOLDEN.

Witnesses:
W. A. DARBY,
G. A. MCGRATH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."