

Jan. 31, 1939.

A. J. BERG ET AL

2,145,244

PROCESS OF MAKING REINFORCED TUBES OR PIPES

Filed Feb. 14, 1936

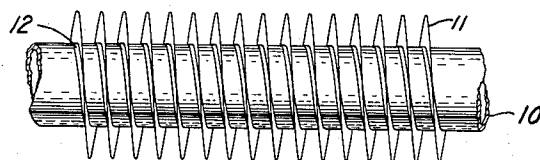


FIG. 1

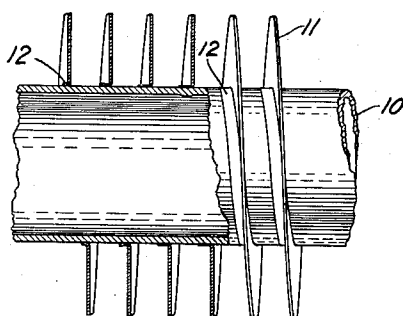


FIG. 2

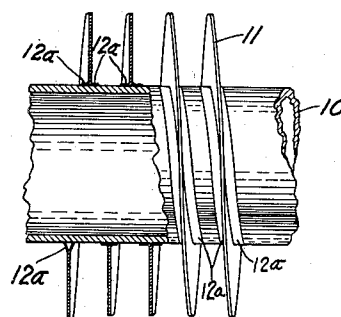


FIG. 3

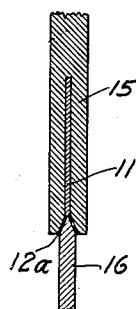


FIG. 4

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2,145,244

PROCESS OF MAKING REINFORCED TUBES
OR PIPESAlfred J. Berg and John O. Huse, United States
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Application February 14, 1936, Serial No. 63,896

1 Claim. (Cl. 29—157.3)

(Granted under the act of March 3, 1883, as
amended April 30, 1928; 370 O. G. 757)

Our invention relates to a reinforced pipe or tube and the method of producing the same.

The object of our invention is to provide a reinforced pipe or tube with a reinforcement which shall not impair in any respect the strength, resistance to pressure, corrosion and other deterioration that may be encountered in use, and which will increase the efficiency of the pipe or tube to which the same may be applied and at a moderate cost of production.

The further object of our invention is to provide the reinforcement of such character and structure that the same may conform to the foregoing objects.

A further object of our invention is to provide a process for the convenient commercial economical production of the reinforced pipe or tube in accordance with our invention, and which method may be practiced by hand or by any of a number of different machines with or without substantial modification.

Further objects will become apparent from familiarity with the specification.

In the drawing in which like characters of reference indicate the same parts,

Fig. 1 is a plan view of a portion of a tube constructed in accordance with our invention;

Fig. 2 is a magnified cross-sectional view of a portion of our reinforced tube;

Fig. 3 is a view similar to Fig. 2 but showing a foot in both sides of the reinforcing strip at its inner edge.

Fig. 4 is an illustration in central vertical sectional elevation of a means for performing the act of splitting the edge of the reinforcing strip adjacent to the pipe or tube.

In the drawing, 10 represents the pipe, tube, or other hollow body to be reinforced, and 11 represents the reinforcing strip. The reinforcing strip is formed usually from a flat thin wide strip of metal whose edge adjacent the pipe or tube is slightly turned over to form a shoulder in contact with the exterior surface of the tube. Such turned over edge is at its end secured to the surface of the tube by solder to a slight extent. The amount turned over at the inner edge of the fin is but a very small portion of the width of the initial flat reinforcing strip. This bent over shoulder is progressively formed on the inner edge of the reinforcing strip 11 simultaneously with and in advance of the point where the flat fin 11 is progressively bent about the tube or other hollow member. This bent over portion of the reinforcing strip precludes the wrinkling of the reinforcing strip at its inner

edge as it is being coiled about the pipe or tube, and further tends to reduce the liability of the formation of such wrinkles by slightly reducing the internal diameter of the bent or formed reinforcing strip; stiffens the inner edge of the reinforcing strip so as to tend to preclude the formation of wrinkles therein by reason of and during the bending operation and requires, for the avoidance of such wrinkles, that the neutral axis of the reinforcing strip while the same is being formed about the pipe or tube shall be located longitudinally close to the bent portion 12 of said strip 11. Relative to said neutral axis there will occur in strip 11, while the same is being formed about the pipe or tube, a compression strain in the metal of this strip 11 toward the surface of the tube 10 from said neutral axis, while there will likewise occur in the metal of the strip 11 an elongation or stretching stress between said neutral axis and the outer edge of the formed or bent strip 11. This bent over shoulder 12 may be formed by at least one pair of rollers through which said edge of strip 11 is passed progressively adjacent to and while being wound upon the outer surface of pipe or tube 10. The pipe or tube 10 is not thinned or weakened by having formed therein any groove in which an edge of strip 11 may be inserted and progressively wound therein and the wall of the pipe or tube 10 is not otherwise weakened. In the coiling or bending of strip 11 about the pipe or tube 10 the bent edge or shoulder 12 of strip 11 has a substantial tendency to induce the bending or winding of the strip 11 upright. However, some relatively slight lateral support is required for at least the outer edge of strip 11 at least at the point where it is being progressively bent or coiled about the pipe or tube 10. The shoulder 12 of strip 11 enables such reinforcement to be coiled about a relatively thin walled tube 10 without distorting or weakening such wall by the act of reinforcing such pipe or tube.

At a point preferably beyond the point where the strip 11 is being progressively bent the shoulder 12 is rolled or thinned slightly and at least a portion of its area in contact with the tube 10 is depressed slightly into the outer surface of the thin wall of the pipe or tube 10 in order to secure the strip 11 to the wall of the pipe or tube 10 by an interrupted or continuous line of such depression or interlocking of the metal of the strip and the tube together extending parallel with the strip 11 and within the area of the shoulder 12.

Instead of forming the shoulder 12 solely upon

one side of the strip 11 while the same is being formed or bent about the tube 10, shoulders 12a may be formed on opposite sides of the inner edge of strip 11. One convenient and inexpensive manner of forming said opposite extending shoulders 12a being shown in Fig. 4 in which the straight strip 11 is passed through a block or roller 15 having a slot extending therethrough provided with a flaring outer edge, and into which flaring edge enters the bifurcating edge of a knife or roller 16 which bifurcates the adjacent edge of strip 11 without the loss of any metal content of the portion of the strip 11 which is so bifurcated. This operation is performed preferably continuously with and in advance of the coiling of this strip about the tube. The force required to coil the strip about the tube will spread said bifurcation and laterally extend the shoulders 12a from opposite sides of strip 11 during the coiling of strip 11 about the tube. This lateral extending of shoulders 12a, while the strip 11 is being pressed toward the body portion 10 exerts an abrading action upon and along the outer surface of the body portion in contact with the separated split edges of the shoulders 12a. This abrading action affords a very efficient heat and cold exchange between the body portion 10 and the split surfaces of the shoulders or feet 12a of the strip 11 by providing a firm contact between clean metal freed from oxide or other accumulated matter, as well as avoids the possibility of inviting corrosion between the thus contacted surfaces. At a point subsequent to but continuous with the bending of the strip 11 about the tube the shoulders 12a are rolled or otherwise formed into the desired shape and preferably as a part of said shaping or rolling at least a small portion of the surfaces of shoulders 12a is depressed beneath the exterior surface of pipe or tube 10 to secure the strip to the tube by the interlocking together of portions of the metal of each of these secured parts in a course substantially continuous along the line of contact between said parts.

From the foregoing, those skilled in the art will be enabled to readily make the thus described reinforced pipe and to understand and practice the method of making the same, by hand, as well as by a number of different machines with or without substantial modification after becoming familiar with the foregoing.

It will be understood from the foregoing that a very efficient reinforced pipe or tube is readily produced in accordance with our invention of

the requisite strength and yet substantially lesser weight and cost more advantageously than has been possible to obtain with prior constructions.

It will be furthermore understood that the inherent advantages of the reinforced pipe or tube constructed in accordance with our invention is peculiarly adapted to be very advantageously employed for any purpose for which reinforced pipe or tubes may be employed as well as for the exchanging of heat and cold, among other uses. In such latter use the contact between the exterior and normal surface of the pipe or tube and the inner surface of the shoulder 12, as well as shoulders 12a, afford a very efficient heat and cold exchange between the tube 10 and strip 11; that the rolling and securing by said interlocking of the metal of the shoulder or shoulders and of the tube increases the rate of heat and cold exchange between the tube and the strip by increasing the density of the metal in the original of the surface of the parts in contact; that it provides a securement without any open joint in which dust, sediment or other non-conducting matter may be deposited to impair the rate of heat or cold exchange between the parts thus secured together, as well as avoids the possibility of inviting corrosion.

This invention may be made and used by or for the Government of the United States for governmental purposes without the payment of any royalty therefor.

Having now so fully described our invention that others may therefrom make and use the same, what we claim is:—

The method of making a heat exchanging element comprising the steps of splitting and partially spreading one edge of a thin rib, disposing said rib along a surface of the thin walled body portion of the element with said split edge of the rib in contact with the surface of the body portion, pressing the rib toward and along said body portion with its split spread edges laterally abrading the surface of the body portion as the same are further spread by said pressing, and simultaneously placing the outer and inner portions of said rib respectively under tensional and compressional stresses, slightly thinning said split edges and further spreading the same, and pressing a minor portion of said thinned edges beneath the normal surface of the thin walled body portion.

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