

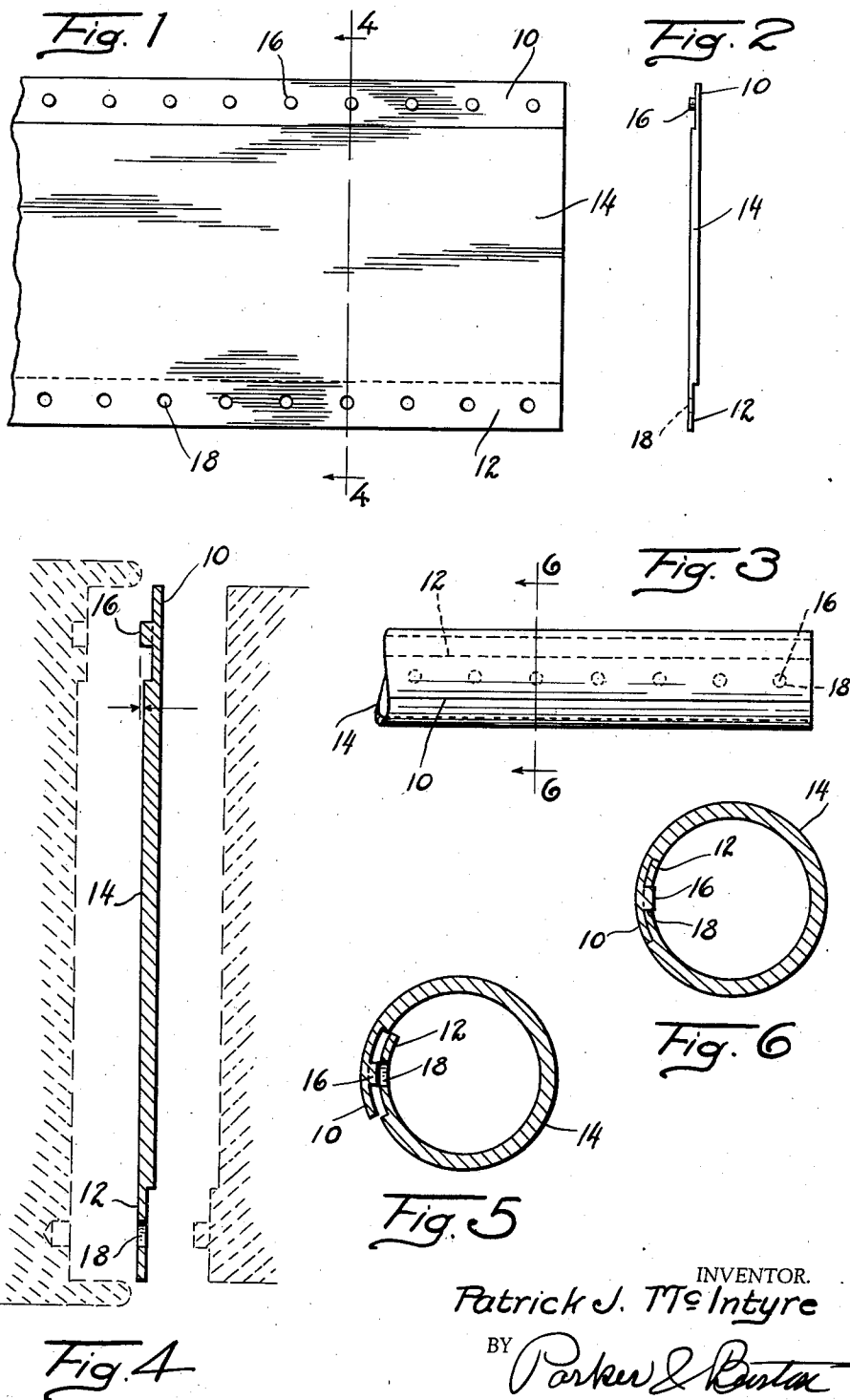
Aug. 27, 1935.

P. J. McINTYRE
METHOD OF MAKING TUBING

2,012,889

Filed Feb. 6, 1931

2 Sheets-Sheet 1



INVENTOR.
Patrick J. McIntyre

BY *Parker & Benten*
ATTORNEYS.

Aug. 27, 1935.

P. J. McINTYRE

2,012,889

METHOD OF MAKING TUBING

Filed Feb. 6, 1931

2 Sheets-Sheet 2

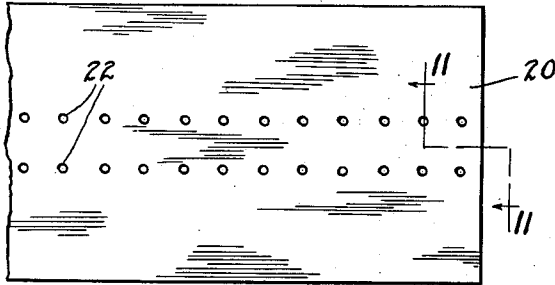


Fig. 7

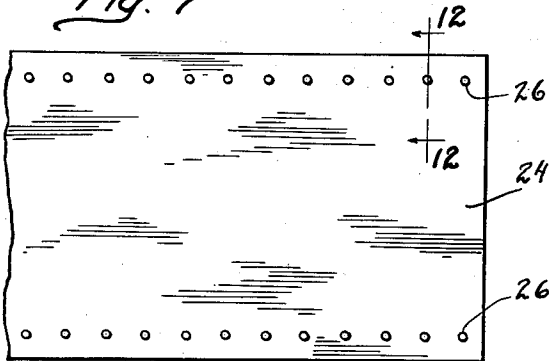


Fig. 8

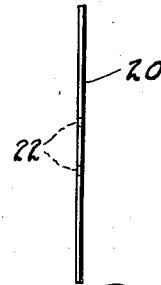


Fig. 9

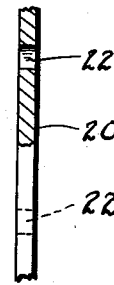


Fig. 11

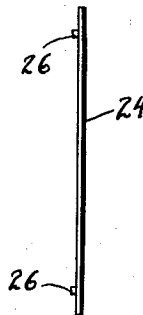


Fig. 10

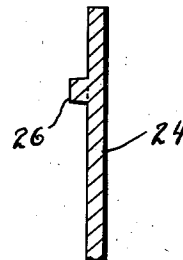


Fig. 12

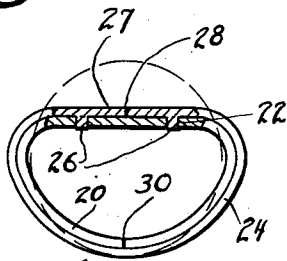


Fig. 14

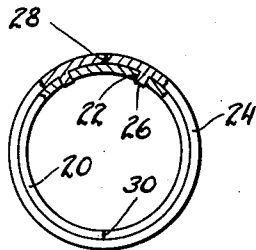


Fig. 15

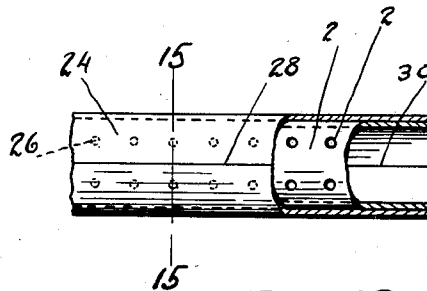


Fig. 13

INVENTOR.
Patrick J. McIntyre

BY *Parker & Cantor*

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,012,889

METHOD OF MAKING TUBING

Patrick J. McIntyre, Detroit, Mich.

Application February 6, 1931, Serial No. 513,979

6 Claims. (Cl. 29—156)

My invention relates to tubes and has particular reference to the formation of tubing, both double and single, which may be used in conjunction with oil and gasoline lines, plumbing fixtures, and the like.

An object of my invention is to so form a strip of material having the desired physical characteristics that it may be rolled into tube formation and provided with a strong leak proof fluid seal with a minimum of labor and expense.

Another object of my invention resides in the particular formation of the strip of material from which the tubing is rolled whereby, without necessitating the expense involved in butt welded or seamless tubing, a tube having a smooth interior and exterior surface which permits internal or external threading may be obtained.

Still another object of my invention is to provide means initially integral with a strip adapted to form a single tube whereby the line of joinder may be riveted, or press fitted, at spaced apart intervals along its length.

A highly important characteristic is the formation of a sheet metal tube quickly and inexpensively which is smooth inside and out, is very strong and has a tight joint throughout its length.

A further object of my invention is to provide a double walled tube, each wall consisting of a strip of material rolled into tubular form, the abutting edges of each strip being in staggered relation to one another and the walls riveted together to form a tight fluid seal. Each of the strips utilized in forming the double walled tube being constructed in a particular manner whereby a minimum of expense is required in the formation of the strip and a minimum of time is required to form the tube from the two strips, at the same time producing an efficient, strong tube having a smooth interior and exterior surface to permit the spinning of a thread.

Various other objects and meritorious features of my invention will be apparent from the following description taken in conjunction with the drawings wherein like numerals refer to like parts throughout the several figures and wherein:

Fig. 1 is a plan view of an improved strip, adapted for single tubing,

Fig. 2 is an end elevation thereof,

Fig. 3 is an elevation of the finished single tube, Fig. 4 is an enlarged section through the unrolled strip of Fig. 1,

Fig. 5 illustrates one step in the procedure of rolling the single tube,

Fig. 6 is a section along 6—6 of Fig. 3,

Fig. 7 is a plan of one component strip utilized in forming the double tube,

Fig. 8 is a similar view of the other component strip,

Figs. 9 and 10 are end elevations respectively of the strips,

Fig. 11 is a section through 11—11 of Fig. 7,

Fig. 12 is a section through 12—12 of Fig. 8,

Fig. 13 is an elevation, partly broken away and in section, of a completed double tube,

Fig. 14 illustrates one step in the formation of the double tube, and

Fig. 15 is an end elevation of the finished tube.

Where single walled tubing is desired, the material from which the strip is formed is preferably of greater thickness than that of the metal in the finished tube. This is for the purpose of allowing for the rolling down of the edge portions of the strip and the setting up of the pin formation whereby the riveted line of joinder is obtained. The strip is preferably hot tinned on both sides, or hot coated with soft solder, so called, prior to the initial operation. It is then stamped or rolled into the structure illustrated in Figs. 1, 2 and 4, wherein the edge portions 10 and 12 of the strip 14 are cut away to a depth substantially one-half the thickness of the finished tube.

At spaced apart intervals along one edge projections, or studs, 16 are formed and at corresponding intervals along the opposite edge apertures 18 are formed. The particular shape of these protuberances and the corresponding apertures along the opposite edge is more or less immaterial so long as certain cooperating features are present.

As will be noted more clearly from Fig. 4, each of the projections 16 extends somewhat beyond the face of strip 14. This is for a purpose to be brought out more clearly hereinafter as is the fact that each of the apertures 18 is slightly oversized in relation to the projection 16.

The strip having been rough formed in any desired manner as heretofore indicated the strip may be passed through a set of rolls which perfect the shape of the pin or projection 16, and the apertures 18 may be punched at this time. The strip is now ready for the forming rolls wherein the strip is rolled about a supporting mandrel inside the tube and the cut away edge portions are forced into overlapping relation as clearly indicated in Fig. 5. These overlapping edge portions of the strip are then pressed together in such a way that the projections 16

enter the apertures 18. The oversize of the apertures 18 is for the purpose of permitting free entrance of the projections 16 at this stage of the operation and the fact that the said projection 16 extends outwardly beyond the surface of the strip provides an extra modicum of metal which is spread outwardly in all directions by the pressure exerted in the rolling operation after the projections have entered the apertures, whereby a tight press fit or riveted effect is obtained. As clearly indicated, the cut away edge portions interengage with one another in such a way that the interior and exterior surfaces of the finished tube are both smooth.

The tube may then be heated to melt the tin or solder with which the strip has been initially coated for the purpose of sweating or soldering the tube. The tube having been heated, liquid flux of chloride of zinc, or some other non-corrosive flux, is dripped upon the tube for the purpose of quickening the flow of solder. The tube may then be passed through sizing rolls for the purpose of pressing, sizing, and cooling the tube. The tube is then complete and ready to be cut into desired lengths.

Very much the same procedure is followed in forming a double walled tube in accordance with my invention, the chief distinction residing in the fact that there is no necessity in this operation of cutting away the edge portions of the strips. A strip of material 20 is provided with two rows of longitudinally spaced apart apertures 22, these apertures preferably being located in the central part of the strip, substantially equidistant from the edges thereof. The other wall is formed from a strip 24 which is provided adjacent each edge thereof with a row of spaced apart projections, or pins 26.

For purposes of illustration I have shown the strips 20 and 24 as forming the inner and outer walls of the double tube but it will be apparent that this relationship may be reversed, the essential feature being that the strip forming the outer wall must be somewhat wider than the other strip and the pins 26 and apertures 22 must be so located in each strip that they will overlap one another when each strip is rolled. As clearly illustrated in Fig. 12 each of the pins 26 is slightly tapered to facilitate its entrance into a corresponding aperture 22.

To facilitate the actual formation of the tubing from the strips hitherto described they are first rolled into the position indicated in Fig. 14 wherein the apertures 22 and pins 26 lie in a substantially horizontal plane, as indicated at 27, thus facilitating the entrance of the pin into the apertures without loss of time and without the binding which might result from forcing the said pins through the apertures if the normal curvature of the tube is maintained.

The final operation consists in running the formation illustrated in Fig. 14 through rolls which force the flattened out portion 27 into its arcuate form. This operation necessarily results in a tightening of the pins within the apertures and the pressure exerted on each side of the pins by the rolls produces a riveted action whereby the inner and outer walls are securely clamped together.

As hitherto stated, it is immaterial whether the inner tube is provided with pins which extend through apertures in the outer tube or whether the structure is as illustrated in the drawings. The formation of the structure and the resulting structure itself will be substantially

the same. While it is preferable that the lines of joiner, or the seams, 28 and 30 of the outer and inner tubes shall be diametrically opposed to one another, it will suffice if they are staggered to any desired extent.

While I have illustrated a particular modification of my invention, various other structures will be apparent to those skilled in the art and for that reason I intend to limit myself only within the scope of the appended claims.

What I claim:

1. A method of forming a double tube comprising forming a strip with a pair of longitudinally spaced apart rows of apertures, providing a second strip with projections extending along each edge thereof and spaced apart to correspond with the spacing between said apertures, placing the strips in overlapping relation with respect to one another, rolling both of the strips together so that one strip forms the outer wall of a tube and the other forms the inner wall, forcing each row of projections through a corresponding row of apertures, and applying pressure to each side of said projections to secure a riveting action.

2. In the method of forming double walled tubing wherein projections on one wall interlock with apertures in the other, the steps of flattening out the tube walls adjacent the points of interlock to more readily insert the projections and subsequently rolling the portion into tubular form.

3. A method of forming a double walled tubing comprising forming a metal strip with longitudinally spaced rows of apertures, providing a second metal strip with longitudinally spaced projections corresponding with the spacing between said apertures, rolling both of the metal strips together into tubular formation, while maintaining those portions of the strips having the projections and apertures in substantially flattened condition during the rolling operation, forcing each row of projections through the corresponding row of apertures during the flattened condition, and subsequently rolling the strips into cylindrical form.

4. A method of forming a double walled tubing comprising forming a metal strip with spaced apertures, providing a second metal strip with projections spaced at intervals corresponding with the spacing between said apertures, rolling both of said strips together into tubular formation at the same time permitting that portion of the tube containing the apertures and projections to remain in a substantially flattened condition, forcing said projections into said apertures while said portion is in flattened condition, and subsequently rolling the tube into cylindrical formation.

5. A method of forming a double walled tubing which comprises inserting interlocking elements in the form of spaced apart apertures in a strip of metal, providing a second strip of metal with interlocking elements in the form of projections at spaced apart intervals corresponding with the spacing between said apertures, placing the metal strips in such a position with respect to one another that the apertures will appear opposite the projections upon rolling both of said strips together into tubular formation, rolling both of said strips together into a tubular formation, forcing each of said projections through its corresponding aperture, and applying pressure to each side of said projections to secure a riveting action, the interlocking elements in one strip of metal being disposed adjacent to a longitudinal

margin thereof while the interlocking elements in the other strip of metal are disposed substantially midway between the longitudinal margins of the strip.

- 5 6. In the method of forming double walled tubing wherein projections on one wall interlock with apertures in the other, the steps of flattening out the tube adjacent the points of interlock

to more readily insert the projections, and subsequently subjecting the flattened tube to a rolling operation to shape the tube into a cylindrical formation, the latter rolling operation producing a riveting action on the protrusions in their apertures to interlockingly secure the walls of the tube together. 5

PATRICK J. MCINTYRE.