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W. K. HERBST ET AL

SOLIDIFIED SEAM TUBE

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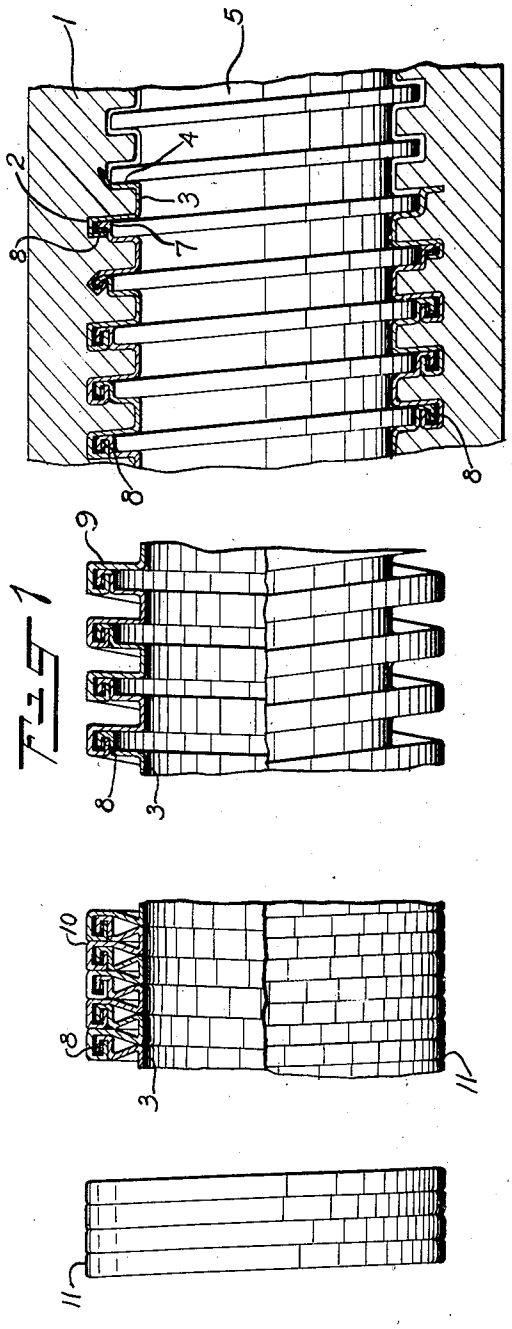


Fig 1

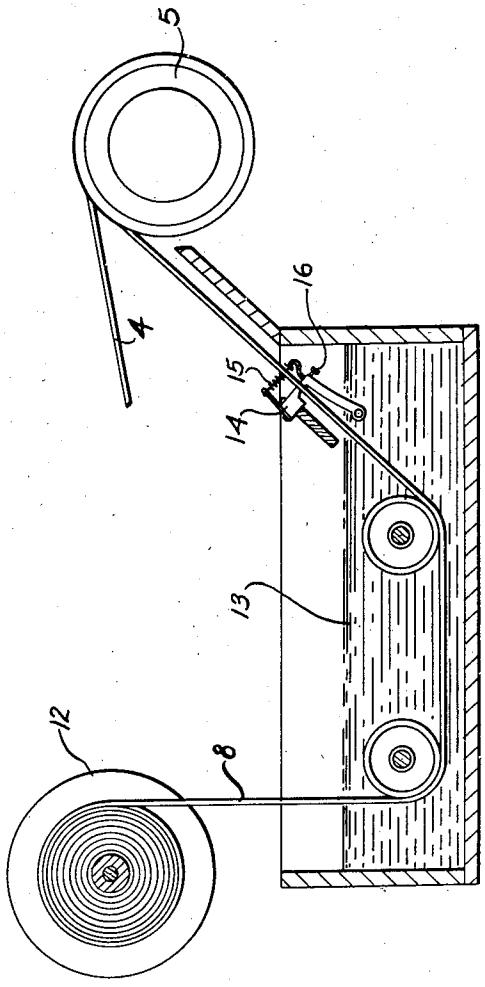


Fig 2

R. H. Stone and W. K. Herbst INVENTOR

BY

Thomas Howe ATTORNEY

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UNITED STATES PATENT OFFICE.

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SOLIDIFIED-SEAM TUBE.

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This invention relates to tubes formed by the seaming of parts together as, for instance, where the tube is formed from a helically disposed strip having the edges of adjacent convolutions folded together.

The main object of the invention is to solidify the joints or seams of tubes whereby those joints may be made more fixed and durable. The invention is especially applicable to those flexible tubes formed from a helically disposed strip and having the edges of adjacent convolutions interfolded into fixed relation, the flexibility of the tube being provided by a groove lengthwise of the strip forming a corrugation, the sides of which move toward or away from each other to permit flexure of the tube. The invention may, however, have other applications.

Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawings which illustrate the invention—

Fig. 1 is a view partly in section and partly in side elevation showing a tube embodying the invention and a portion of a machine by which it may be formed; and

Fig. 2 is an end elevation of a tube in process of formation from a strip, with the means for applying the solidifying material shown in section, this view being on a smaller scale.

Referring to the drawings, the tube may be formed from a strip by the same method and apparatus as shown and described in the Patent No. 1,198,392 to Louis H. Brinkman patented September 12, 1916, except that some of the clearances may be required to be modified to accommodate the solidifying material. The solidifying material comprises a substance which is applied to the seam in a fluid state and later coagulates or hardens so as to solidify the joint. This solidifying substance is carried into the joint by means of a strip, thread or cord to which the fluid material has been applied and which is carried thereby into the seam, the thread and its carried substance being fed into the joint at an appropriate stage in the manufacture of the tube. As the metal strip of which the tube is formed is fed into the forming die 1 it is of a cross section including the curled-over portion 2, the central longitudinal groove 3 and the right-hand portion 4 (Fig. 1). As the strip progresses about the die the portion 4 will, after one revolution, be bent into the right-angled section as shown at 7. A portion of this right-angled section is embraced by the curled-over edge 2 of the succeeding convolution which is being fed into the die and as this curled-over portion is fed in there is fed in with it a thread or strip 8 of suitable material, preferably fibrous, so that it will the more readily carry solidifying substance with it. This thread carrying the solidifying material will enter in between the radial portion of the right-angled section as shown at 7 and the left hand side of the curled-over portion as shown.

As the mandrel 5 revolves and draws the metal strip of which the tube is formed into the forming die, the thread 8, being gripped between the portions of the metal strip as described will be drawn in with it so that there will be a continuous application to the joint, as it is made, of the solidifying substance. From the point where the thread and solidifying material enter the forming die as described, the engaging portions of adjacent convolutions of the metal strip will be carried forward, as the machine operates, through the various channels of the die until, as the tube leaves the die, it will have a joint as shown in cross section at 9. The thread will remain in the joint between radially displaced layers thereof and the fluid substance carried in by the thread will fill all the clearances between the parts of the joint and when hardened will solidify the joint thereby rendering it immovable. The amount of fluid substance carried in by the thread should be so regulated that it will be proper to suitably fill the clearances in the joint.

The tube as delivered by the die may be compressed longitudinally so that the sides of the walls of the central longitudinal groove in the strip will be reflexed, a section of the tube so operated upon being shown at 10, the exterior of the tube being as shown at 11.

The details of the machine and of the formation of the tube need not be gone into further here as they are described in great detail in the patent above referred to.

Enough has been disclosed herein to enable those skilled in the art to suitably incorporate the solidifying material in the joint.

The carrying thread 8 for the solidifying compound is drawn from a reel 12 whence it passes through a bath 13 of the fluid solidifying compound and thence through a wiper 14, for wiping superfluous solidifying substance from the thread, and thence into the tube as described. It will be observed that the wiper 14 comprises a pair of jaws drawn towards each other by means of a spring 15, their approach toward each other, and hence the gap between them being regulated by a screw 16 in one of the jaws and bearing against the face of the other of the jaws thereby forming an adjustable stop mounted in one of the jaws and coming against the face of the other. It is apparent that the smaller the clearance the more solidifying material will be wiped off the thread and consequently less carried into the joint. The amount of this material carried in may be increased by adjusting the screw 16 to form a greater clearance between the jaws so that less material will be wiped from the thread.

The solidifying compound may be any of suitable characteristics to accomplish the results desired as indicated, and which will withstand the usage of the tube as to temperature and other conditions. A very satisfactory solidifying compound of which to make the bath 13 and which is carried into the joint as described may be formed of the following materials and proportions: litharge 1 part by volume, sodium silicate 2 parts by volume.

The litharge makes a good binder while the sodium silicate is strongly adherent to the metal.

While the invention has been illustrated in what is considered its best application it may have other embodiments without departing from its spirit and is not therefore limited to the structures shown in the drawings.

What we claim is:

1. A flexible tube formed of a helically disposed strip, said strip having a longitudinal fold or groove adapted, in the completed tube, to form a corrugation to provide flexibility by relative movement of the corrugation sides, the edges of adjacent convolutions of said strip being interfolded to form a joint and a solidifying substance in said joint introduced therein as a fluid and hardened in the joint for rendering said joint immovable.

2. A flexible tube formed of a helically disposed strip, said strip having a longitudinal fold or groove adapted, in the completed tube, to form a corrugation to provide flexibility by relative movement of the corrugation sides, the edges of adjacent convolutions of said strip being interfolded to form a joint and a solidifying substance in said joint introduced therein as a fluid and hardened in the joint for rendering said joint immovable, and a thread by which said substance is carried into said joint embedded in the said substance hardened therein.

3. The method of forming a flexible tube which consists in helically coiling a strip, forming therein a longitudinal fold or groove forming in the completed tube a corrugation providing flexibility by relative movement of its sides, interfolding the edges of adjacent convolutions of the said helically disposed strip to seam the convolutions together and introducing into the seam as it is formed a liquid substance which substantially fills the joint and subsequently solidifies, whereby the joint is rendered immovable.

In testimony whereof we have signed this specification this sixth day of June, 1924.

WILLIAM K. HERBST.
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