

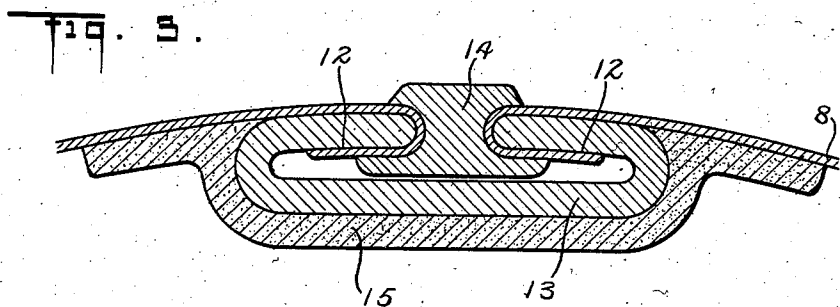
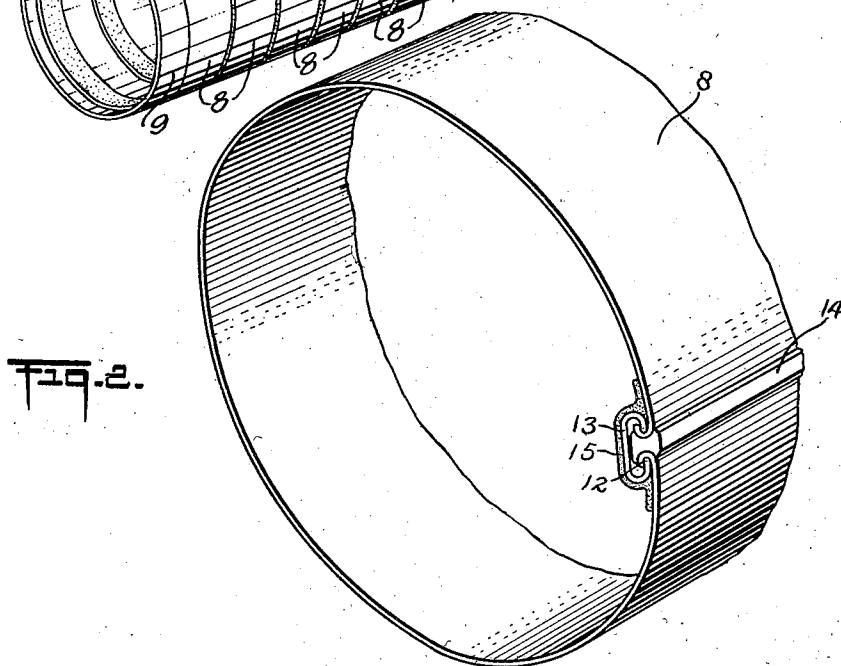
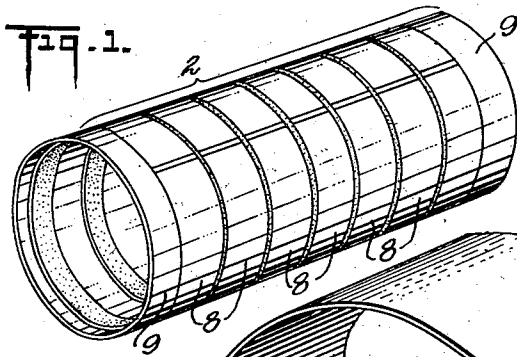
June 10, 1941.

C. FIELD

2,245,102

METHOD OF MANUFACTURING HEAT EXCHANGE APPARATUS

Original Filed Aug. 14, 1931



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UNITED STATES PATENT OFFICE

2,245,102

METHOD OF MANUFACTURING HEAT
EXCHANGE APPARATUSCrosby Field, Brooklyn, N. Y., assignor to Flakice
Corporation, Wilmington, Del., a corporation of
DelawareOriginal application August 14, 1931, Serial No.
557,107. Divided and this application January
22, 1937, Serial No. 121,768

6 Claims. (Cl. 29-156)

This invention pertains to a method of making a flexible cylindrical panel or section particularly adapted for assembling with similar panels or sections to form a flexible cylinder such as is used in an ice making machine described in United States Patent No. 2,005,734, issued June 25, 1935.

An object of the invention is to provide an improved method for manufacturing such a panel.

This application is a division of my copending application Serial No. 557,107, filed August 14, 1931, which has become Patent No. 2,078,938, dated May 4, 1937.

The nature and further objects of the invention will be apparent to those skilled in the art from the following description and accompanying drawings of one illustrative embodiment of the invention.

In the drawings:

Figure 1 is an isometric projection of a flexible cylinder made according to the method of the invention.

Figure 2 is an enlarged isometric view of one of the panels or metal sections of the cylinder and showing the manner in which the ends of the metal sheets are united.

Figure 3 is an enlarged cross-sectional view of the panel showing the manner of uniting the ends of the metal sheets.

This application is directed particularly to a method of manufacturing a flexible cylindrical panel from a thin metal and so constructed as to withstand continuous flexing about its periphery without breaking. Such panels may be joined side by side to form a flexible cylinder such as is used in the ice making machine described in the above mentioned patent.

The details of construction and operation of the machine as a whole are fully described in the co-pending application referred to, reference to which is hereby made, it being sufficient here to say that the flexible cylinder must itself be free from leaks and must be incorporated in the machine in such manner as to prevent the cold brine from leaking out of the cylinder into the water in the tank, and to prevent the water in the tank from entering the cylinder.

When in use the continuous revolving of the cylinder over a deflecting roller causes a continuous flexing of the individual panels comprising the cylinder. This flexing sets up internal stresses in the material of the cylinder, and if these stresses are not properly proportioned during the manufacturing process the panels are likely to break and crack under the strain set up by the flexing.

Referring to Figure 1, the cylinder consists of a plurality of sheets 8 of thin flexible non-corrodible metal, each strip having its ends united and sealed to form one panel of the cylinder, and the several panels being united and sealed at their edges to form the complete cylinder. At each end of the cylinder, flexible aprons 9 are provided for securing the completely assembled cylinder to an end bell and a center ring of an ice making machine of the type shown and described in the aforesaid patents. For a machine having a cylinder 30" in diameter and a deflecting roller of 6" to 8" in diameter, the sheets 8 may be .01" thick. Such thickness may vary under different conditions.

In accordance with the present embodiment chosen to illustrate the invention, sheets of suitable metal, for example, Monel metal, are cut to proper length and width. Each sheet is then rolled to preform the sheet to form a cylinder of a diameter a little less than half of the diameter of the finished cylinder. In this operation the sheet is rolled first from one end and then from the other end. This preforming of the metal sheets greatly reduces the stresses on the sheet when deflected by the deflecting roller and thus increases the fatigue life of the metal. After the preforming operation the ends of each panel are smoothed as with sand paper and bent to form hooks 12, as shown in Figure 3. A suitable clamp strip 13, formed as shown in Figure 3, is now slid into the hooks 12 to hold them in a fixed position. The clamp strip is then locked to the hooks by means of a lock strip 14, formed as shown in Figure 3. The lock strip is preferably forced into position while the joint is immersed in a waterproofing cement, such as Vulcalock. The strips 13 and 14 securely unite the ends of the strip 8 and the cement seals the union. When the cement is dry the endless band of metal is placed in a sanding drum where the areas adjacent the union are sand-papered and cleaned with a solvent such as benzol. Vulcalock cement is then applied to the under side of clamp strip 13 and to the under side of the strip 8 adjacent the union, and a strip of pure gum rubber 15 (about 1/8" thick) is then applied, as shown in Figure 3, to completely seal the union.

A sufficient number of endless metal sheets or sections formed as above described may be assembled to form a complete cylinder for an ice machine in any suitable manner such as that for example described and more particularly claimed in my co-pending application Serial No.

121,769 filed January 22, 1937, now Patent No. 2,210,070, dated Aug. 6, 1940.

While one specific embodiment of the invention has been described with particularity it is to be understood that the invention is not to be limited thereby, but may have numerous other embodiments within the scope of the appended claims.

I claim:

1. A method of making a flexible cylindrical panel which includes the steps of preforming a sheet of thin flexible metal to a natural diameter substantially less than the diameter of the finished cylindrical panel, uniting the ends of said sheet to form a joint while the joined portions are immersed in liquid flexible waterproof cement having the characteristics of Vulcalock, treating the joint thus formed with waterproofing cement and then heat-insulating the joint on the inside of the panel by vulcanizing a layer of insulating material to the portions so treated.

2. A method of making a flexible cylindrical panel from a sheet of thin metal, which includes the steps of rolling the sheet from one end and then from the other end to preform it to a diameter substantially less than the diameter of the finished panel, preforming opposing ends of said sheet, clamping said preformed portions together to form a joint while said joined portions are wet with liquid flexible waterproof cement having the characteristics of Vulcalock, applying waterproofing material to the joint thus formed, and then applying heat-insulating material to the joint and upon said waterproofing material.

3. Method of forming a resiliently flexible metallic cylinder which includes the steps of rolling a resiliently flexible sheet metal strip first from one end and then from the other to reshape the same into a substantially cylindrical convolution with end portions thereof overlapping, bending a portion of each of said ends upon itself to form end hooks, bending lateral edge portions of a seam closing clamp strip to form edge hooks, applying the clamp strip across the ends of said flexible strip to interlock its bent over edge portions with the bent over end portions of the flexible strip, forming a flanged locking bar with lateral grooves defining a web adapted to fit snugly and to substantially fill the space between the opposed convex portions of said end hooks in the finished cylinder, and forcing said locking bar between said convex portions of the end hooks while the latter are interlocked with said edge hooks of the clamp to close the seam or joint extending across the cylinder.

4. Method of forming a resiliently flexible metallic cylinder which includes the steps of rolling a resiliently flexible sheet metal strip to reshape the same into a substantially cylindrical convolution with end portions thereof overlapping, bending a portion of each of said ends upon itself to form end hooks, bending lateral edge portions of a seam closing clamp strip to form edge hooks, applying the clamp strip across the ends of said

flexible strip to interlock its bent over edge portions with the bent over end portions of the flexible strip, forming a flanged locking bar with lateral grooves defining a web adapted to fit snugly and to substantially fill the space between the opposed convex portions of said end hooks in the finished cylinder, and forcing said locking bar between said convex portions of the end hooks while the latter are interlocked with said edge hooks of the clamp to close the seam or joint extending across the cylinder and while the joint forming portions of said flexible strip, said clamp, and the locking bar are wet with liquid vulcalock cement.

5. Method of forming a resiliently flexible metallic cylinder which includes the steps of rolling a resiliently flexible sheet metal strip first from one end and then from the other to reshape the same into a substantially cylindrical convolution with end portions thereof overlapping, bending a portion of each of said ends upon itself to form end hooks, bending lateral edge portions of a seam closing clamp strip to form edge hooks, applying the clamp strip across the ends of said flexible strip to interlock its bent over edge portions with the bent over end portions of the flexible strip, forming a flanged locking bar with lateral grooves defining a web adapted to fit snugly and to substantially fill the space between the opposed convex portions of said end hooks in the finished cylinder, forcing said locking bar between said convex portions of the end hooks while the latter are interlocked with said edge hooks of the clamp to close the seam or joint extending across the cylinder and while the joint forming portions of said flexible strip, said clamp, and the locking bar are wet with liquid vulcalock cement.

6. Method of forming a resiliently flexible metallic cylinder which includes the steps of rolling a resiliently flexible sheet metal strip to reshape the same into a substantially cylindrical convolution with end portions thereof overlapping, bending a portion of each of said ends upon itself to form end hooks, bending lateral edge portions of a seam closing clamp strip to form edge hooks, applying the clamp strip across the ends of said flexible strip to interlock its bent over edge portions with the bent over end portions of the flexible strip, forming a flanged locking bar with lateral grooves defining a web adapted to fit snugly and to substantially fill the space between the opposed convex portions of said end hooks in the finished cylinder, forcing said locking bar between said convex portions of the end hooks while the latter are interlocked with said edge hooks of the clamp to close the seam or joint extending across the cylinder, cleaning surfaces of said clamp and of the flexible strip adjacent thereto exposed within the cylinder, and vulcanizing a layer of rubber upon said cleaned surfaces.

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