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PROTECTED COLLAPSIBLE TUBING

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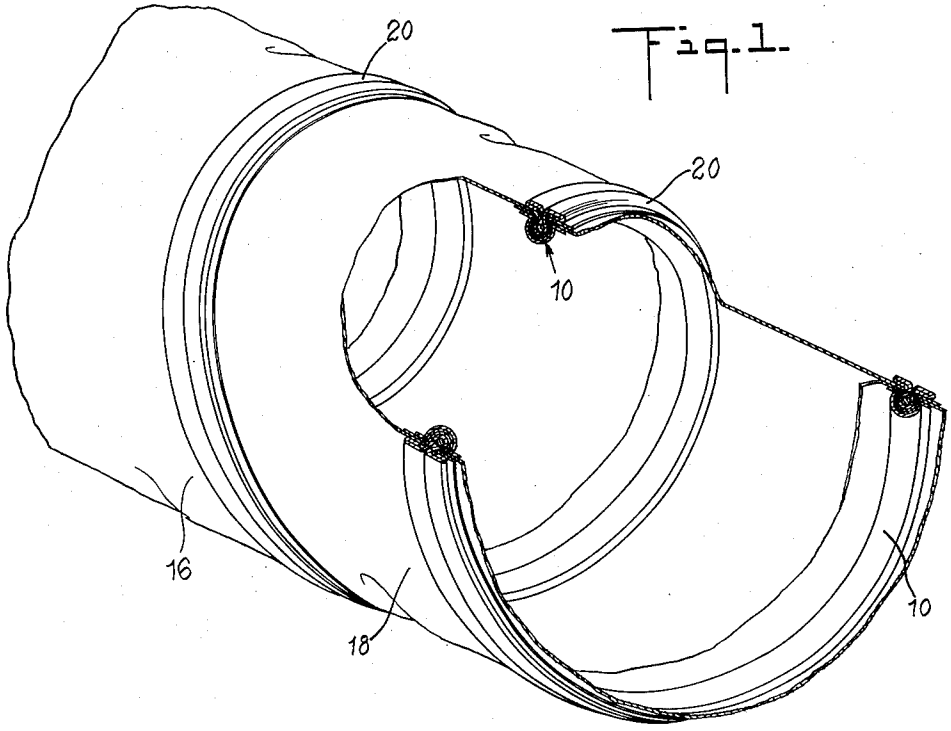


Fig. 1.

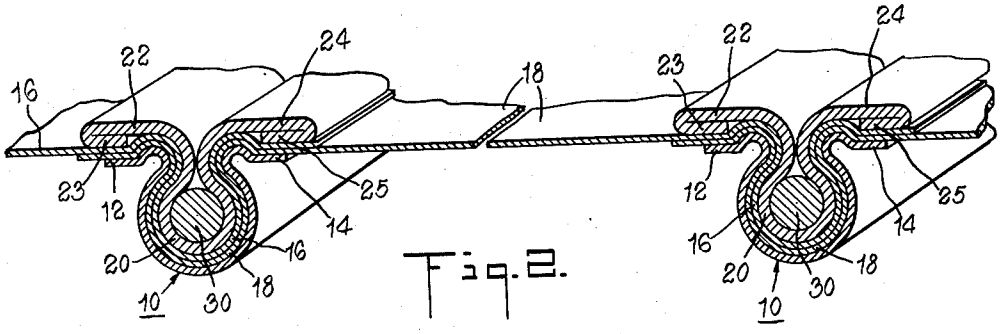


Fig. 2.



Fig. 3.

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PROTECTED COLLAPSIBLE TUBING

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7 Claims. (Cl. 138—53)

This invention relates to improvements in collapsible tubing and more particularly it relates to collapsible tubing formed of metallic or other relatively stiff and springy forming and supporting strips wound in a helical spiral and between the convolutions of which is a strip of fabric, plastic or other flexible material.

Tubing of this sort as heretofore formed has sometimes been made of a trough-shaped metallic helical-spiral strip, in the trough of which overlapping edges of a spirally wound fabric strip was pushed by a continuous wire, the wire and strip being interlocked in the trough by the edges of the metal strip being pressed together. An example of that sort of tubing is disclosed in the A. E. Chernack Patent 2,337,373 dated December 21, 1943, and owned by the assignee of this application.

Tubing of that patent sometimes would wear at the point where the fabric joined the metal spiral strip. The ability of the fabric to move and flex freely at that place and also abrasion of the fabric as that portion of it in front of or next to the spiral strip rubbed against rough surfaces fostered wearing of that portion.

Therefore, it is an object of this invention to provide a new tubing construction which will overcome the tendency of the flexible strip to wear in the manner and at the place indicated.

Another object is to provide a new tubing construction which, while overcoming the aforesaid defects, will not require more than three elements.

Another object is to provide a new tubing construction wherein the third element is formed to cooperate with the flexible strip and the helical-spiral forming-strip (*a*) during manufacture of the tube to cause inter-engagement of the latter two and, (*b*) in the final product to overcome the aforesaid wearing defects.

Other objects and advantages of the invention will appear as it is described in connection with the accompanying drawing.

In the drawing:

Figure 1 is a perspective view partly broken away and partly in section of tubing embodying the invention.

Figure 2 is an enlarged detailed view showing, in longitudinal section, two convolutions of the tubing of Figure 1.

Figure 3 is a fragmentary view showing in section two overlapping edges of adjacent convolutions of the flexible strip before being combined with the metallic strip.

Referring to the drawing, the tubing comprises a helical strip 10 of metal, such as soft steel or the like, or other suitable resilient material which can be bent in the helical form and is resilient enough for compression and expansion like a spring while yet being stiff enough to constitute and to maintain the tube permanently in tubular form. The strip 10 is bent into channel or U-shaped cross-section and has the top edges of its side portions bent oppositely outward forming wings 12 and 14.

In the trough between the wings 12 and 14, overlapping edge portions of adjacent convolutions 16 and 18 of a

helically wound strip of flexible material are pressed in such a way that both edges of the portion of the strip are extended over one edge of the metal strip 10 and down into the trough and up and out over the opposite edge. The flexible strip constitutes a cover for the tube and may be of treated or untreated fabric, plastic or other flexible material.

To hold the fabric in the trough and also to protect the fabric where it engages the wings 12 and 14 of the strip 10, a channel or U-shaped strip 20 has its channel portion lying in the trough of the strip 10 upon the overlapping edges of the fabric strip. The strip 20 may be of the same or different material than the strip 10. Preferably it will be of material which is easily bent and formed into the desired shape. The edges of the side portion of the protective strip 20 are bent oppositely outward forming wings 22 and 24 which lie upon the fabric which in turn lies upon the wings 12 and 14 of the strip 10.

In order to lock the inter-engaging portions of the several strips, the mouth of the U-shaped portion of the strips 10 and 20 may be pressed closed. Also the edges of the wings 22 and 24 are reversely bent to lie on the outer surfaces of the flexible strip. This provides a smooth marginal edge on the strip 20; and simultaneously it more firmly holds the fabric between the wings of the strips 10 and 20 because the inner wings 12 and 14 press the fabric against the folded edges 23 and 25 of the wings 22 and 24.

Because of the cover provided by the securing and protective strip 20 over the flexible strip where the latter joins the forming strip 10, the flexible strip is protected against wear at that point. Thus flexing is prevented at that point and abrasive action cannot occur when the tubing is moved over a rough surface or over relatively smooth surfaces which in time would tend to wear the fabric in the same way as a rough surface.

If it is desired to provide tubing of stiffer nature or more resistant to bending or flexing axially than tubing having only the forming and the protective strips, an additional element may be provided such as the spring wire 30. This wire may be inserted in the trough of the protective strip 20 during the formation of the tubing. Generally this stiffening wire will not be needed when the forming strip 10 is made of soft steel or like springy material. Nevertheless, the wire may be desirable in some tubing constructions when the forming strip 10 has a lesser springiness or is made of material which while flexible is not sufficiently springy to provide the desired ability of the tubing to return to fully expanded form free of outside compressive forces.

The element 30 may also be used in non-springy or non-metallic form in case it is desired to make use of its binding action alone.

Many modifications within the scope of the invention will occur to those skilled in the art. Therefore, the invention is not limited to the precise configuration and formation illustrated and described.

What is claimed is:

1. Tubing comprising an inner strip of trough-shaped cross section wound in a spiral, a spirally wound covering strip, said covering strip having adjacent edges overlapping along said spirally wound inner strip, and a spirally wound protective strip of trough-shaped cross section securing said overlapped edges in said spirally wound inner strip and having outer edge portions oppositely extending to protect said covering strip in the area over the edges of said spirally wound inner strip.

2. Collapsible tubing comprising an inner strip of resilient material which is trough-shaped in cross section

and wound in a spiral, a spirally wound flexible covering strip, said covering strip having adjacent edges overlapping along said spirally wound inner strip, and a spirally wound protective strip of trough-shaped cross section securing said overlapped edges in said spirally wound inner strip and having outer edge portions oppositely extending to protect said covering strip in the area over the edges of said spirally wound inner strip.

3. Tubing comprising an inner strip of trough-shaped cross section wound in a spiral, a spirally wound covering strip, said covering strip having adjacent edges overlapping along said spirally wound inner strip, and a spirally wound protective strip of trough-shaped cross section securing said overlapped edges in said spirally wound inner strip and having outer edge portions oppositely extending to protect said covering strip in the area over the edges of said spirally wound inner strip, said protective strip having said outer edge portions reversely bent inwardly to provide a smooth marginal edge and a firmer grip of said overlapping edges between said spirally wound inner and said protective strips.

4. Collapsible tubing comprising an inner strip of resilient material which is trough-shaped in cross section and wound in a spiral, a spirally wound flexible covering strip, said covering strip having adjacent edges overlapping along said spirally wound inner strip, and a spirally

wound protective strip of trough-shaped cross section securing said overlapped edges in said spirally wound inner strip and having outer edge portions oppositely extending to protect said covering strip in the area over the edges of said spirally wound inner strip, said protective strip having said outer edge portions reversely bent inwardly to provide a smooth marginal edge and a firmer grip of said overlapping edges between said spirally wound inner and said protective strips.

5. Tubing as claimed in claim 4 having a binding means securing said overlapped edges and protective strip in the trough of said spirally wound inner strip.

6. Tubing as claimed in claim 1 having a binding means securing said overlapped edges and protective strip in the trough of said spirally wound inner strip.

7. Tubing as claimed in claim 6 wherein the covering strip is of flexible material and the binding means is of resilient material permitting collapse and tending to restore the tubing to full length.

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