

July 5, 1949.

C. S. COLE

2,475,012

WOVEN TUBULAR FABRIC

Filed Oct. 11, 1947

2 Sheets-Sheet 1

Fig. 1

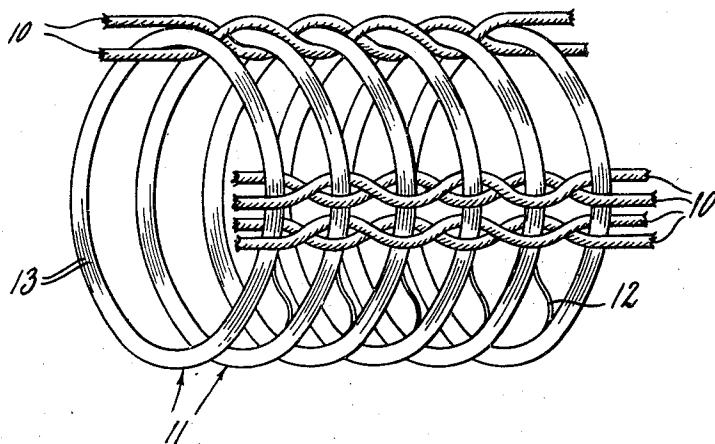
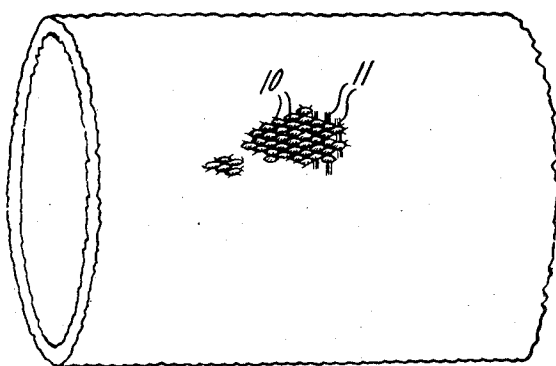


Fig. 2



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Fig. 3

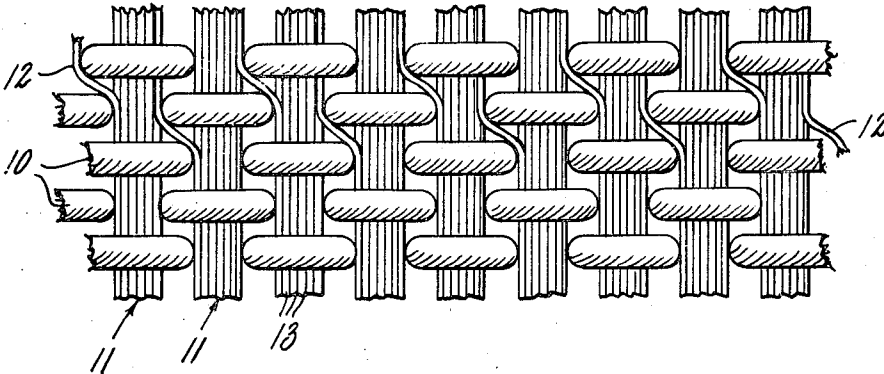


Fig. 4

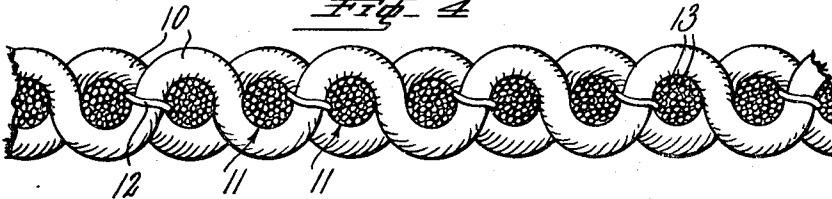


Fig. 5

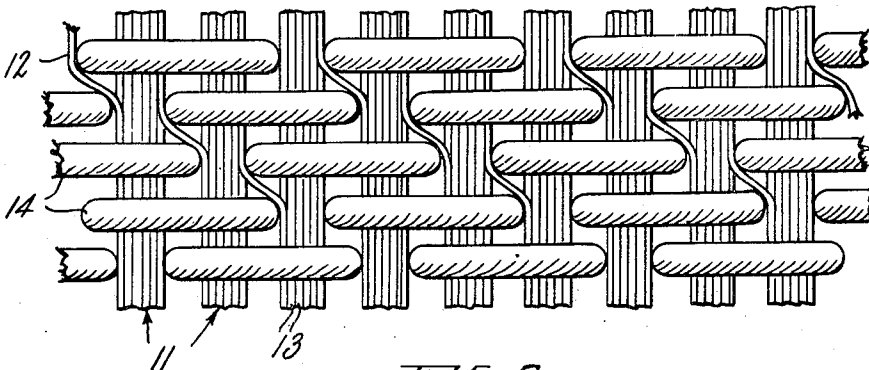
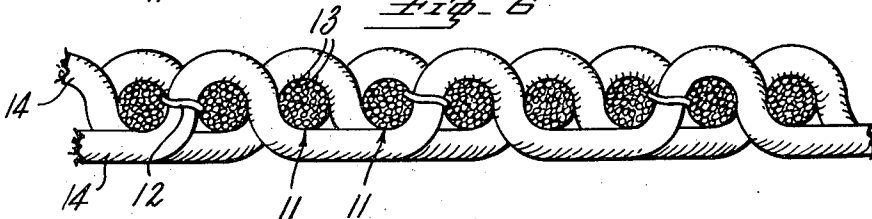


Fig. 6



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WOVEN TUBULAR FABRIC

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Application October 11, 1947, Serial No. 779,244

3 Claims. (Cl. 139—388)

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This invention relates to woven tubular fabrics and more particularly to woven tubular hose such as fire hose or other types of hose capable of withstanding high internal pressure.

Woven tubular fabrics formed of longitudinally extending warp threads interwoven with helically disposed weft threads have been manufactured for years, but the pitch of the weft threads causes the hose made of such woven fabric to twist upon itself and otherwise distort when subjected to high internal pressure. Such twisting of the hose as the pressure therein increases is highly objectionable and various attempts have been made to overcome this difficulty. The usual way of preventing such a hose from twisting under high internal pressure is to employ a ply construction in which one ply of the hose is provided with wefts that extend helically in one direction and the other ply is woven with wefts that extend helically in the opposite direction. Such a hose having an inner ply and an outer ply is expensive to manufacture.

The present invention contemplates a novel woven tubular fabric in which the warp strands are disposed substantially as heretofore, but the weft strands instead of being disposed helically in the tubular fabric as heretofore, are so disposed in the fabric that they form weft rings in which each ring is made up of a plurality of circular weft coils laid side by side in the same shed of the fabric. These weft rings in the fabric are disposed at right angles to the longitudinal axis of the tubular fabric and have no pitch. Therefore the novel hose of the present invention has practically no tendency to twist upon itself or elongate as the internal pressure therein increases. It will therefore be seen that by employing the construction of the present invention it is possible to produce a single ply woven tubular fabric which will be approximately as well balanced and as free from tendencies to twist and elongate under internal pressure as are the two ply tubular fabrics employed heretofore to prevent such distortion.

The tubular fabric contemplated by the present invention can be woven on a circular loom such as employed heretofore and provided with shed forming mechanism that operates in advance of the revolving shuttle, but it will be necessary to modify the operation of such loom and particularly to control the formation of the shed so that the shuttle or shuttles will lay a number of circular weft coils in the same shed, and will then shift the shed so that a similar ring of circular weft coils will be laid in an adjacent

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shed. In this way one weft ring after another may be formed as the loom operates and the successive rings will be connected by a weft strand or weft strands extending laterally from one ring to another.

A loom which is peculiarly well adapted to weave the fabric of the present invention is disclosed and claimed in my application Serial No. 779,243, filed October 11, 1947, for Circular loom and method of operating same.

The above and other features of the present invention will be further understood from the following description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a more or less diagrammatic view of a tubular fabric woven in accordance with the present invention, the distance between the threads being shown exaggerated.

Fig. 2 is a perspective view of a short length of woven tubular fabric constructed in accordance with the present invention.

Fig. 3 is an enlarged plan view of the fabric of Fig. 2 and in which the warps form a plain weave.

Fig. 4 is a longitudinal sectional view of the fabric of Fig. 3 showing the weft coils in section.

Fig. 5 is a view similar to Fig. 3 except that the warps of Fig. 5 have a twill weave; and

Fig. 6 is a longitudinal sectional view of the fabric of Fig. 5.

In Figs. 1 to 4 inclusive of the drawings the warp threads 10 are arranged in a plain weave known as one up and one down. So far as these warp threads are concerned they may be arranged in accordance with various known types of weaves.

The novel feature of the woven tubular fabric contemplated by the present invention resides in the construction whereby the fabric does not have the usual helically disposed weft threads, but in place thereof has weft rings 11 disposed in the sheds formed by the warp threads. Each of these rings 11 is formed of a plurality of circular weft coils produced by laying two or more coils of a weft strand side by side in the same shed, and by then extending a short length of this weft strand laterally from one weft ring to the next as indicated by 12. Each weft ring 11 is made up of two or more weft coils 13 and these rings 11 are shown in the drawings as made up of a dozen or more weft coils.

The construction shown in Figs. 5 and 6 of the drawing is substantially the same as in Figs. 1 to 4 inclusive, except that the warp threads 14 of Figs. 5 and 6 are disposed to form a twill weave of the construction known as two up one down.

The different fabric constructions illustrated in the drawing are produced by a loom using a single shuttle and operated so that this shuttle will lay a number of circular weft coils 13 in the same shed, and then start operating in the next shed. The shuttle may operate to lay a single strand of yarn, or it may lay two or more strands side by side in the form of a non twisted ply construction to form the weft coils 13 and connecting or transfer strand 12.

It is also possible to weave the fabric of the present invention on a loom employing two or more shuttles. In this case, for a two shuttle loom, there would be two distinct strands one forming one set of coils and the other another set of coils to produce a weft ring 11, and there would be two connecting or transfer strands 12 extending from one ring 11 to the next in spaced relation to each other. If three shuttles are used there will be three of these distinct strands making up the coils of a ring 11 and the transfer strands 12.

The finished woven fabric looks very much like the ordinary tubular fabric woven of heavy warp and weft threads, when viewed from the exterior of the tube as shown in Fig. 2, but a close examination of the finished fabric will show that the wefts are not disposed helically in the fabric as is usual but form distinct rings that are disposed at right angles to the longitudinal axis of the tubular fabric. This construction is believed to be new, and since the weft of the present fabric is not disposed helically in the fabric, the fabric herein disclosed will have a less tendency to turn upon itself and twist out of a straight line when subjected to a high internal pressure than will a single ply fabric of the same weight but con-

structed in accordance with the prior practice. Furthermore since each circular weft ring 11 is formed of a number of circular weft coils 13 each ring will offer high resistance to expansion of the tubular fabric under internal pressure.

It will therefore be seen that a woven tubular fabric constructed in accordance with the present invention is well adapted to cope with high internal pressures.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A woven tubular fabric formed of warp strands interwoven with successive weft rings, each ring comprising a plurality of circular weft coils laid side by side in the same shed and connected by the weft strand to other similar weft rings in adjacent sheds.

2. A woven tubular fabric that will not twist when subjected to high internal pressure and which is formed of warp strands interwoven with successive weft rings disposed at right angles to the tube axis, each ring comprising a plurality of circular weft coils laid side by side in the same shed and connected by a short length of weft strand that extends laterally to a weft ring in an adjacent shed.

3. A seamless woven tubular hose formed of warp strands interwoven with successive weft rings disposed at right angles to the axis of the hose, each ring comprising a plurality of circular weft coils laid side by side in the same shed and connected by the weft strand that forms such ring to other weft rings in adjacent sheds.

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No references cited.