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A. CROSSLEY ET AL

2,740,316

TUBULAR FABRIC

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Fig.1.

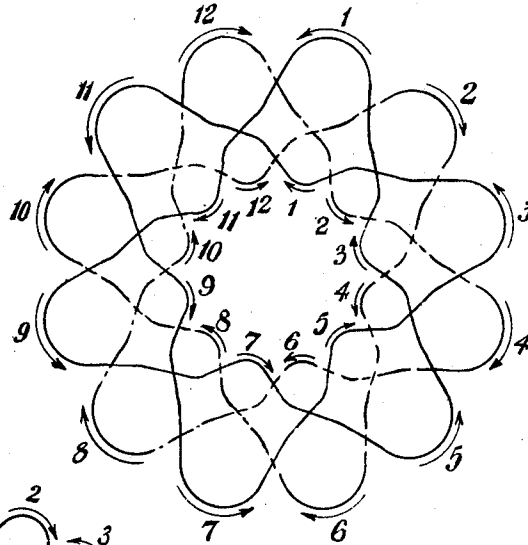


Fig.2.

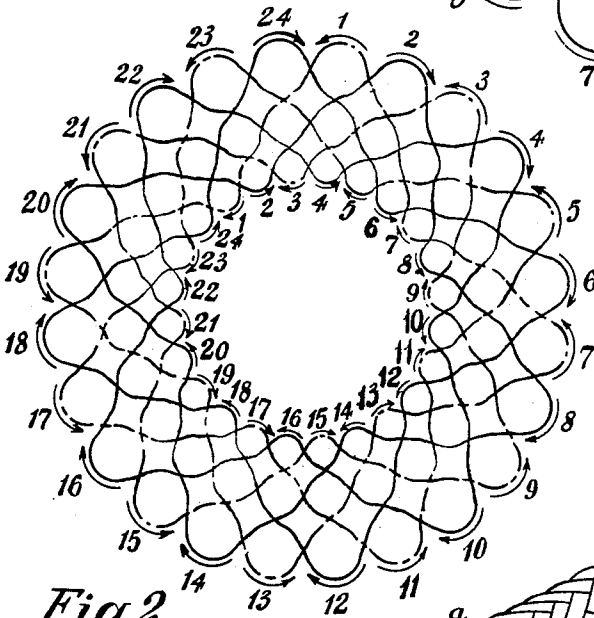
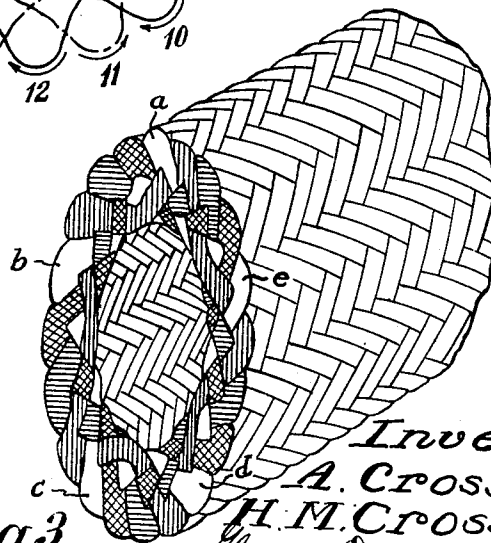


Fig.3.



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TUBULAR FABRIC

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4 Claims. (Cl. 37—9)

The object of the present invention is to produce a circular or tubular braided fabric which has considerable resistance to internal stress by reason of its girder-like trellis construction. The fabric may be made of textile yarn or wire and for convenience we will refer to the material as strands.

The present invention is fully disclosed by the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a diagrammatic showing of the weave of a tube made in accordance with the present invention;

Fig. 2 is a diagrammatic showing similar to Fig. 1 showing a more complicated exemplification of the invention; and

Fig. 3 is a perspective view of a piece of woven tubing made in accordance with the present invention.

The invention consists in a circular or tubular braided fabric comprising a number of strands, each of which in advancing along the tube axis in a spiral path comes successively to the external and to the internal face of the tube six or more even number of times in each complete turn of the tube and in each travel, from one face to the other, crosses at least two strands which have been laid when advancing in the opposite direction around the tube to the strand under consideration and also crosses at least one strand which has been laid when advancing in the same direction around the tube as the strand under consideration, the latter crossing in alternation strands advancing in the opposite direction and strands advancing in the same direction around the tube as in plain braiding.

The invention further comprises a circular or tubular braided fabric as aforesaid in which there are at least four strands in each track between any successive positions at which the track emerges at the external face of the tube and each strand crosses as in plain braiding at least three strands between the points at which it emerges at the internal and external faces of the fabric.

In one example of tubular fabric in accordance with this invention, there are twelve separate paths of strands appearing in the external face of the tube and twelve separate paths of strands appearing in the internal face of the tube in each complete turn of the tube. While twelve paths show on the internal and external faces of the tube in each complete turn of the tube there are four tracks only in which the strands are laid, each track passing successively to the internal and external faces and emerging three times at both faces. There are 48 individual strands symmetrically braided in the tube so that there are twelve strands in each of the four tracks and four strands in any one track between any two successive positions where the track comes to the outside of the tube. The circular direction in which the strands are laid in the tube alternate around the tube and one strand in passing from the external face to the internal face or vice versa crosses three strands, two laid while travelling in one direction around the tube and the other whilst travelling in the other direction around the tube. It will

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be appreciated that the strands as the tube is formed advance along the tube axis in a spiral or helical path.

Figure 1 shows diagrammatically the general pattern of our improved tubular fabric as just described where there are 12 separate paths of strands appearing at the external and the internal face of the tube in each complete turn thereof, and where each strand in passing to the internal or the external face crosses three strands, two laid whilst travelling in one direction around the tube and the other while travelling in the other direction around the tube. It will be seen that there are four tracks, each of which appears three times at the external and three times at the internal face of the tube. Thus one track appears at the external face at the numbers 1, 9 and 5 and at the internal face at 11, 7 and 3.

In another example, there may be 24 separate paths of strands appearing on the external and the internal faces of the tube in each complete turn of the tube and each strand may cross five strands in passing from the external to the internal face and vice versa and such five strands will be laid in alternating circular directions in the tube. One track comes to the external face of the tube at four places and at the same number of places at the internal face.

Figure 2 shows diagrammatically the general pattern of our improved tubular fabric where 24 separate paths of strands appear at the external and the internal face of the tube, and where each strand in passing to the external or internal face crosses five strands, three laid while travelling in one direction around the tube and the other two while travelling in the other direction around the tube. There are in all six separate tracks for strands and each track appears four times at the external and the internal face of the tube for each turn of the latter. Thus one track appears on the external face at the numerals 1, 19, 13 and 7 and on the internal face at the same numerals 1, 19, 13 and 7.

It will be appreciated that in the manufacture of the improved tubular fabric upon a braiding machine, the latter has to have 2 or more circles of gears and the spindles (having the strands of material thereon) continuously pass one half in one circular direction and the other half in the other circular direction, the spindles travelling in one direction alternating with those travelling in the other direction. The spindles travel to the internal face of the tube and then to the external face around the two or more circles of gears. A number of spindles travel in each track. In producing the fabric described with reference to Figure 1, there are 12 spindles in each complete track. In producing the fabric described with reference to Figure 2, there may be 24 spindles in each track.

Figure 3 is a pictorial form of illustration of a tubular fabric having 20 separate paths of strands at both the inner and external faces for one turn of the tube, and with each strand in passing to the internal or the external face crossing three strands, two laid while travelling in one direction around the tube and the other which alternates with the two, while travelling in the other direction around the tube. The several strands are represented by different shadings. There are four continuous tracks each containing twenty strands in each turn of the tube, each track appearing five times at the outer and five times at the inner face of the tube. This is clearly shown by the plain or unhatched strand which comes to the outer surface of the tubular fabric of Fig. 3 at five points, *a*, *b*, *c*, *d* and *e*, and to the inner surface of five points. The braid of Fig. 3 is similar to the braid of Fig. 1 as to depth but includes more paths.

Tubular fabric in accordance with this invention has a thicker wall of more closely interlocked strands than has heretofore been produced. It can advantageously be em-

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ployed for the manufacture of high pressure hose which is at present being made with one or more single circular braids, but where several braids are employed these are unconnected with each other and therefore cannot have the resistance to internal stress obtained by the use of tubular fabrics in accordance with this invention. Single braids have the further disadvantage that they tend to alter in length when internal pressure is applied, which is a serious matter in the case of high pressure hose. Our improved hose due to its girder like trellis construction has a very much less tendency to alter dimensionally under internal pressure. Fabric of this kind can also be braided for the production of cables, the manufacture of braided packings, cords and ropes, where its resistance to external wear and erosion is very much greater than can be obtained by applying one or more conventional braids.

What we claim is:

1. A circular or tubular braided fabric comprising a number of strands, each of which in advancing along the tube axis in a spiral path comes successively to the external and to the internal face of the tube an even number of and at least six times in each complete turn of the tube and in each travel from one face to the other crosses strands which have been laid when advancing in the opposite direction around the tube to the strand under consideration and also crosses one or more strands which have been laid when advancing in the same direction

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around the tube as the strand under consideration, the latter crossing in alternation strands advancing in the opposite direction and strands advancing in the same direction around the tube.

2. The improved circular or tubular braided fabric as claimed in claim 1 in which each strand in advancing along the tube axis in a spiral path comes successively to the external and to the internal face of the tube at various equidistant places, the number of which on each face is at least eight but is divisible by four.

3. The improved circular or tubular braided fabric as claimed in claim 1, in which there are at least four strands in each path between any successive positions at which the path emerges at the external face of the tube.

4. A tubular braided fabric in which alternate strands from which the tube is braided follow paths around the tube in opposite directions as they proceed along the braid, characterized in that each strand in following its own path alternately crosses over a strand following a path in the opposite direction and under a strand following a path in the same direction in a manner similar to plain braiding.

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