L. C. STUKENBORG.

TUBING.

APPLICATION FILED APR. 20, 1918.

1,343,236. **Patented June 15, 1920.**

Fig. 1.

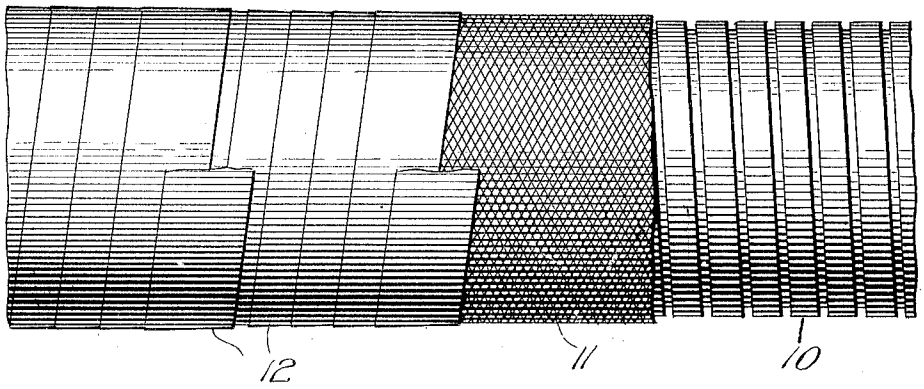


Fig. 3.

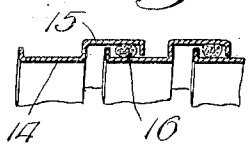
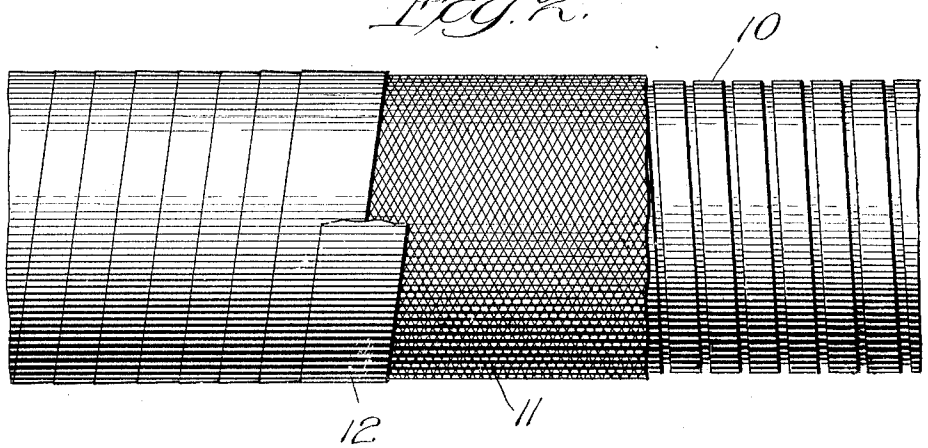


Fig. 2.



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TUBING.

1,343,236. Specification of Letters Patent. Patented June 15, 1920.

Application filed April 20, 1918. Serial No. 229,689.

To all whom it may concern:

Be it known that I, LOUIS CARROLL STUKENBORG, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Tubing; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in flexible tubing, and refers more specifically to a novel tubing structure constructed and arranged for pneumatic or other uses, in such a way that the compound wall of the tubing prevents leakage of air therethrough, while at the same time the wall structure permits a wide range of flexibility of the tubing, enables the tubing to be made relatively light and also prevents oxidation of the metal element of the tube.

One of the uses of my novel tubing is to provide a conduit between the picker mechanism of a cotton picker and a suction device, such as a fan, to effect movement of the picked cotton backwardly from the picker mechanism to a receiving basket, such as is shown in my prior United States Letters Patent Number 1,264,575, issued on the 30th day of April, 1918.

Figure 1 is a length of tubing partially stripped to show the foundation and covering elements.

Fig. 2 is a similar view showing a modified structure.

Fig. 3 is a sectional detail illustrating the metal foundation of the tubing.

The tubing comprises an inner layer or foundation member 10, an intermediate pliable layer 11, and an external air proof layer 12.

The foundation element of the tubing is a spirally wound wire made of metal or other suitable rigid and durable material. It may be of any suitable form desired. As herein shown, and preferably, it has the specific form illustrated in Fig. 3, wherein the cross section of the spiral embraces two members 14 and 15 raised one out of the plane of the other and flanged so that the member 14 constitutes the bottom of a groove facing one direction, while the member 15 constitutes the bottom of a groove facing in the other direction. The flanged and grooved portions of the wire are interlocked in the manner shown in Fig. 3, and, preferably, a packing strip 16 is inserted in the opposing grooves.

The layer 11 is made of a loosely woven fabric, such, for instance, as a cotton fabric, to produce an envelop that fits snugly over the foundation element 10 of the tubing. This layer is not impregnated with air-proofing material, but should retain a loose, fairly open texture, so as not to prevent free flexure of the tubing.

The outer layer 12 consists preferably of a braid known as adhesive tape which is wound spirally about the intermediate layer or envelop 11. It is overlapped at its edges so that each layer of the tape adheres partially to the intermediate layer or envelop 11 and partially to a neighboring layer of tape.

As shown in Fig. 1, two separate layers of tape are wound on the intermediate layer 11, said separate layers being wound in the same direction, and arranged so that the outer layer bridges over the joints between the inner or first applied layer. In Fig. 2, but a single layer of taping is employed.

The tubing produced in accordance with the invention may be used under high vacuum or air pressure without leakage of air through the walls thereof, and, at the same time, is very flexible so that a tool or implement applied to the end of the tube may be freely directed without hindrance, due to an inflexible tubing.

An advantage of the construction, in addition to its increased flexibility and non-leaking qualities, is the economy of the tubing, both with respect to the material used and to the mode of manufacturing or assembling the tubing, no vulcanizing operation being required. The adhesive tape used may be of any well known commercial character of taping, and is preferably of that type in which the adhesive material is not required to be moistened when applying the tape.

By reason of the loose texture of the intermediate envelop or layer 11, the inner or foundation layer of wire is free to move relatively to said intermediate envelop or layer; and the pasting of the adhesive taping over the intermediate layer does not have the effect to stiffen the tubing in the

same manner as though the adhesive taping or layer were applied directly to the inner or foundation layer, or in the same manner as though a relatively stiff or inflexible envelop were applied immediately upon the foundation or spiral wire layer. In other words, the intermediate layer becomes, in a sense, a floating layer with respect to the foundation or wire layer. Therefore, a tube of considerable diameter and large carrying capacity may be produced with ample flexibility. The outer layer, by reason of its relative elasticity does not greatly stiffen the tube. By reason of the adhesion of the outer layer it clings to the intermediate layer or envelop so as to always maintain a non-leakable layer. When the outer layer is made of relative taping, as herein shown, said layer may be readily and economically replaced if it should become injured. The construction also permits the tubing to be made with a wire of small gage as compared to ordinary flexible tubing, thereby reducing the cost of the tubing and likewise reducing its weight. Moreover, the construction protects the metal element 10 of the tubing from oxidation and thereby materially increases the life thereof.

The structure of the tubing may be somewhat varied within the spirit and scope of the claims hereto appended. For instance, the outer layer or sheath, consisting as herein shown of spirally wound adhesive tape, may take other forms which produce the desired non-leaking characteristics, while avoiding unduly stiffening the structure. Moreover, the tubing may be used for other purposes, as, for instance, conduit for electrical conductors, and in the latter use the foundation layer may, if desired, be made of a non-conducting, flexible material.

I claim as my invention:—

1. A tubing for the purpose set forth, comprising an inner flexible foundation layer, an intermediate layer surrounding but not adhered to the foundation layer, and an external impervious layer applied over and adhered to the intermediate layer.

2. A tubing for the purpose set forth, comprising an inner flexible foundation layer unattached to the foundation layer, a relatively loose woven intermediate layer, and an external air proof layer applied over and adhered to the intermediate layer.

3. A tubing for the purpose set forth, comprising an inner flexible foundation layer, a relatively loose woven intermediate layer applied over and not adhered to the foundation layer, and an external air proof layer of marginally overlapping adhesive taping spirally applied to the intermediate layer.

4. A tubing for the purpose set forth, comprising an inner spirally wound foundation layer, a loosely woven intermediate layer surrounding and unattached to the foundation layer, and an external layer applied over and adhered to the intermediate layer.

5. A tubing for the purpose set forth, comprising an inner flexible foundation layer, a loosely woven intermediate layer surrounding and unattached to the foundation layer, and an external layer of adhesive taping spirally applied to the intermediate layer.

6. A tubing for the purpose set forth, comprising an inner spiral foundation layer, a relatively loose woven intermediate layer and an outer layer of adhesive taping spirally applied to the intermediate layer, with adjacent spirals overlapping.

7. A tubing for the purpose set forth, comprising an inner flexible foundation layer, a relatively loose woven intermediate layer, and an outer layer comprising adhesive taping spirally applied to the intermediate layer, with adjacent spirals overlapping, and a second outer taping layer applied over the first taping layer with the taping of the outer layer spanning joints of the taping of the inner layer.

In testimony whereof I claim the foregoing as my invention, I hereunto append my signature at Chicago, Illinois, this fifteenth day of April, 1918.

LOUIS CARROLL STUKENBORG.