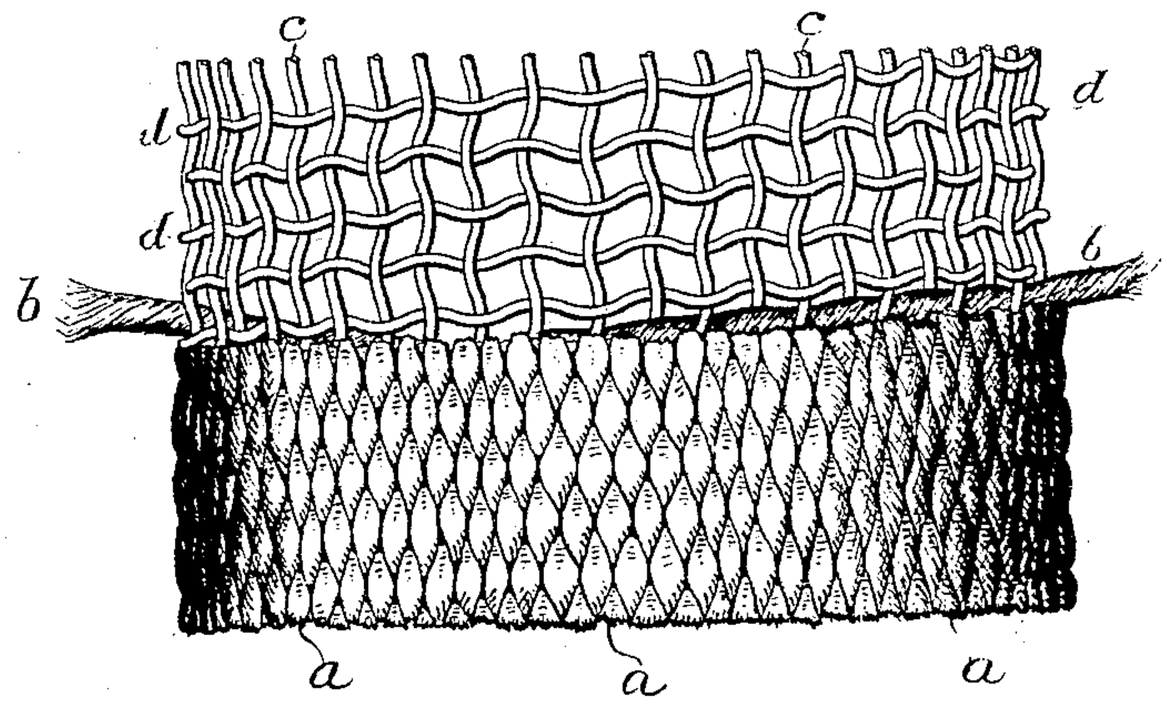
L. ATWOOD.

TUBULAR STRUCTURE.

APPLICATION FILED JUNE 13, 1906.

**910,891.** Patented Jan. 26, 1909

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# UNITED STATES PATENT OFFICE.

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## TUBULAR STRUCTURE.

No. 910,891. Specification of Letters Patent. Patented Jan. 26, 1909.

Application filed June 13, 1906. Serial No. 321,564.

*To all whom it may concern:*

Be it known that I, LEONARD ATWOOD, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Tubular Structures, of which the following is a specification.

My invention relates to flexible tubular structures which can be used for many purposes, viz., as suction or pressure hose, tubular cables for power transmission, and shifting ropes for elevators where it is desired to increase the diameter without increasing the weight of the rope in order to obtain a better gripping surface.

The invention can be used for all purposes where a substantial tubular structure is desired.

The object of my invention is to make a tubular structure of woven fabric having embedded in the wall thereof spirally twisted wire or wires protected on all sides by the woven or braided fabric; such wires being spirally twisted or corrugated previous to the manufacture of the tubular structure.

My invention is fully shown in the accompanying figure of drawing representing a side elevation of a tubular structure made in accordance with my invention, in which two cross-wires are shown forming a mesh; the wires being spirally twisted or corrugated so as to prevent them moving in the fabric.

Referring to the drawing, *a* represents the fibrous warp threads and *b* the fibrous weft threads of the woven or braided fabric, in the body or wall of which is embedded the metallic portion of the structure in the form of the corrugated or twisted wires *c* and *d;* the wires *c* being warp wires, while the wires *d* are weft wires. By using a woven or braided fabric, I am enabled to so incorporate the metal portion of the structure with the fibrous portion as to thoroughly protect such metal portion, and it will be noticed that the fibrous warp and weft threads alternate with the metal warp and weft wires, so that there is a cushion between each convolution of the wires.

The purpose of having both of the wire portions corrugated is that when the two corrugated sections are together in the one structure the wires will not slip, but will retain their position under all conditions.

The wire is preferably of spring metal so that the structure will always assume its normal position.

The hollow tubular structure may have its ends joined to form a ring and can be inflated if desired to be used as a tire for vehicles, or it may be filled with any material, such as compressed wood pulp, sponge, asbestos, or other suitable fiber, to resist compression. It may also be used as a cover to reinforce and increase the strength of rope, or to protect rope from compression or climatic conditions. A section may be closed at both ends so that it will be capable of being floated; the fabric being made waterproof in this instance. It may be used to great advantage as a towing rope for vessels, where it is desired that the rope shall float on the surface of the water rather than sink, which is the case with the ordinary solid towing rope.

I claim:

1. The combination in woven hose and similar tubular structures made of fibrous material, of a wire previously corrugated and woven spirally throughout the wall of the structure and forming one of the wefts of the same, the corrugations of said wire permitting a certain amount of yield and allowing the tube to be expanded when nipples or other attachments are to be secured thereto.

2. A woven tubular structure having fibrous warp and weft threads with longitudinal warp and spiral weft wires crossing each other and forming the wall of the same, both of said wires being corrugated previous to weaving, substantially as and for the purpose set forth.

3. The combination, in woven hose and similar tubular structures, of two sets of wires previously corrugated, one set of wires being woven spirally and the other set being woven longitudinally so as to cross each other, the corrugations permitting a certain amount of yield and allowing the tube to be expanded when nipples or other attachments are to be secured thereto.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

LEONARD ATWOOD.

Witnesses:

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