(Specimens.)

B. L. STOWE.

TUBULAR WOVEN FABRIC.

No. 486,620. Patented Nov. 22, 1892.

fig. 1.

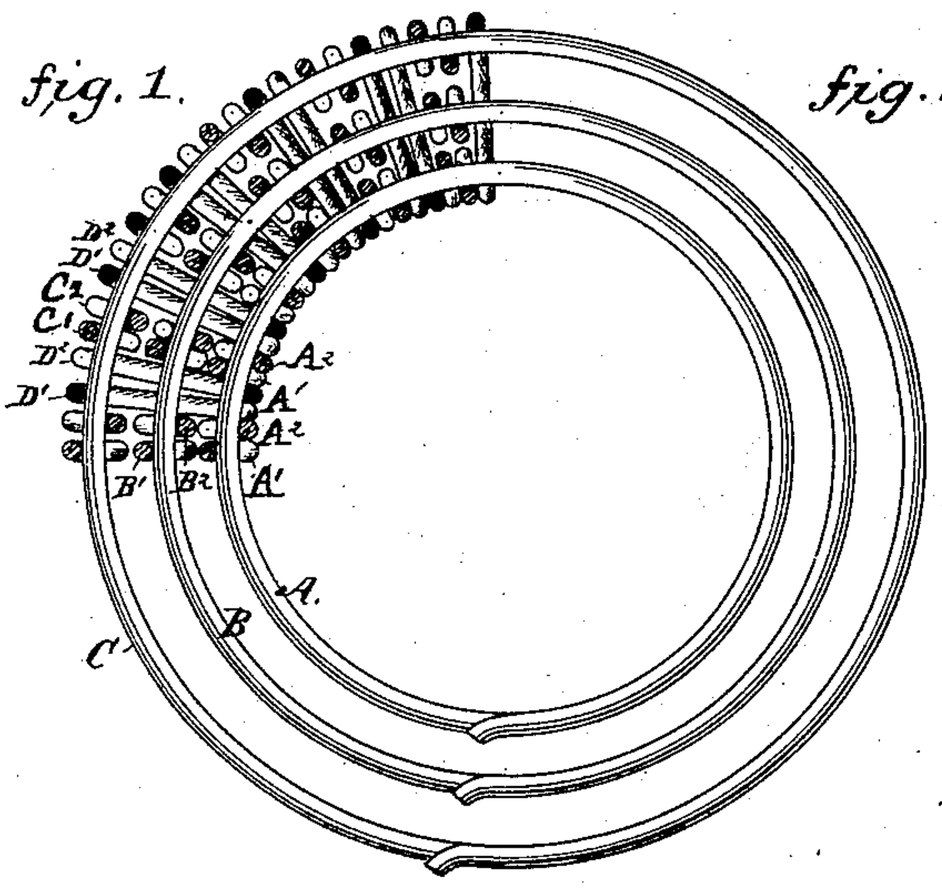


fig. 2.

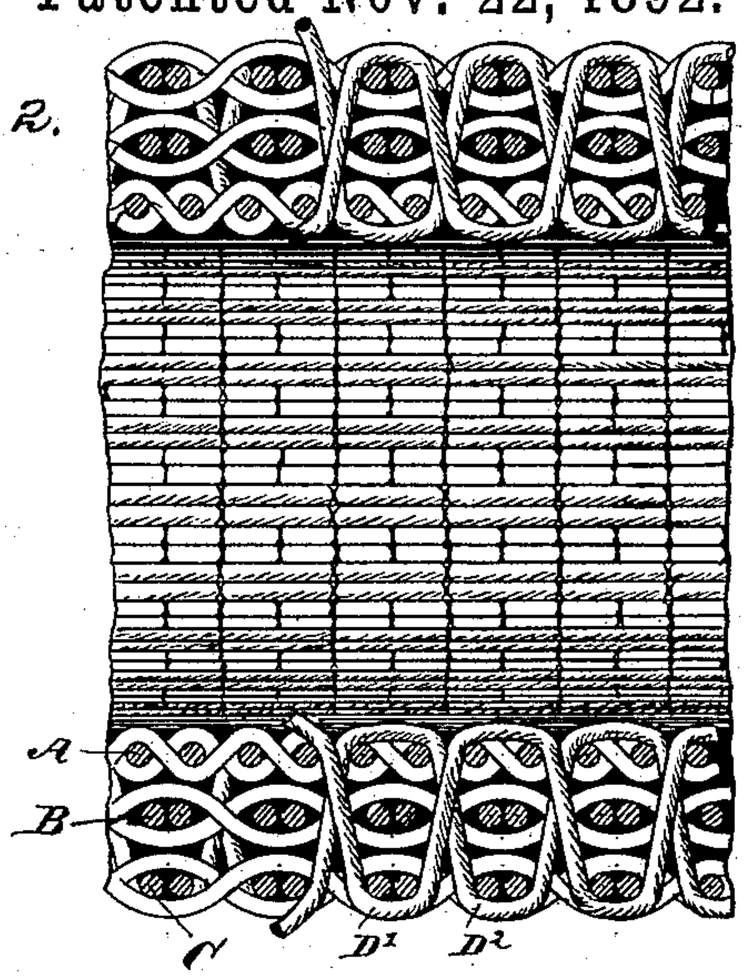


fig. 3.

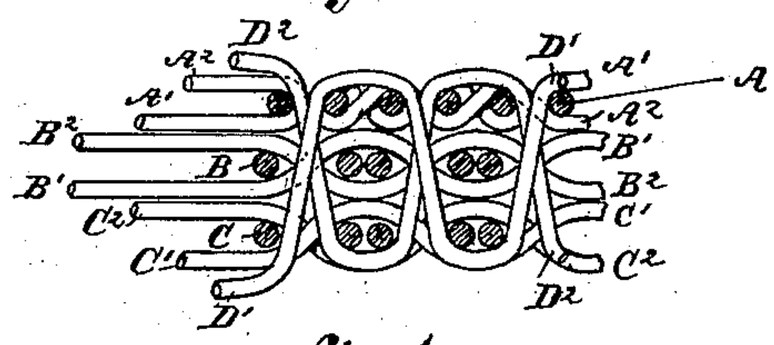


fig. 4.

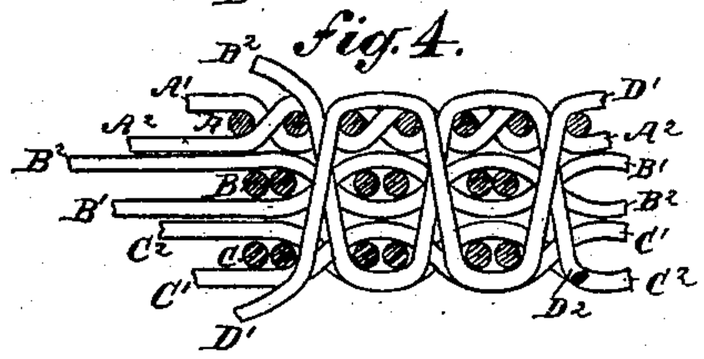


fig. 5.

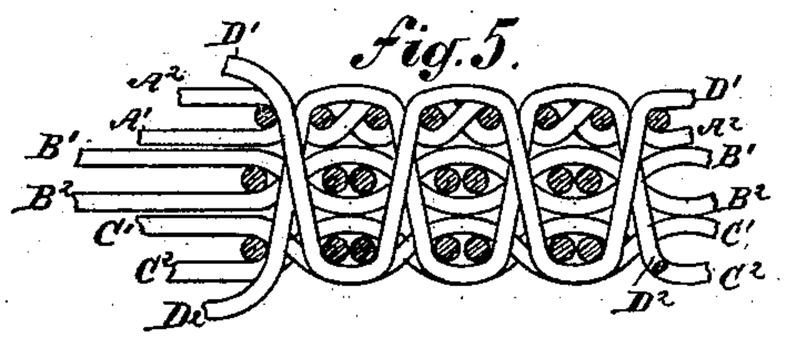
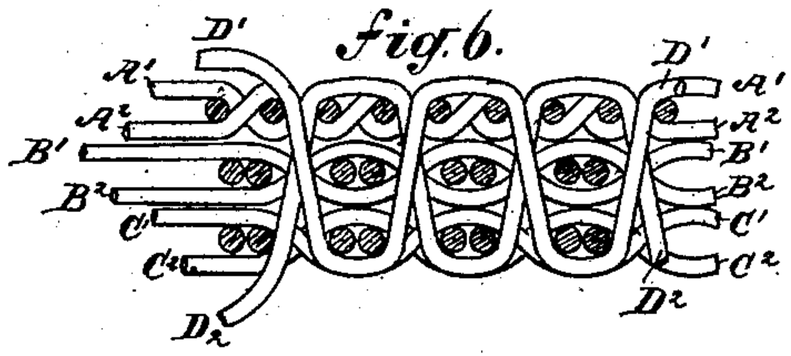


fig. 6.



Witnesses:

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Frederick A. Stowe.

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UNITED STATES PATENT OFFICE.

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TUBULAR WOVEN FABRIC.

SPECIFICATION forming part of Letters Patent No. 486,620, dated November 22, 1892.

Application filed December 15, 1884. Renewed January 18, 1890. Serial No. 337,378. (Specimens.)

To all whom it may concern:

Be it known that I, BENJAMIN L. STOWE, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Tubular Woven Fabrics, of which the following is a specification.

My invention has reference to tubular multiply woven fabrics, and especially to fabrics of this kind which are designed to be used for fire-hose or hydraulic hose, and it is an improvement upon the invention described in Letters Patent No. 161,272, dated March 11, 1875, reissued December 19, 1876, No. 7,442.

Heretofore in weaving multiply hose it has been difficult to produce as smooth and compact an interior surface as was frequently desirable without making the hose too hard and rigid for convenience in handling.

The object of my improvement is to obviate this difficulty, and this result I attain by making the plies of varying closeness of texture, so that while the tubular fabric retains the desired impermeability it may as a whole be flexible and free from the excessive stiffness which has characterized it when wet. The preferred way of obtaining a tubular multiply woven fabric of this kind is to so weave the fabric that there will be two or more picks of weaving in the interior ply to one in each of the other plies. By "picks of weaving" I intend the crossings of the warps between adjacent weft-threads. Such a fabric is illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section, and Fig. 2 is a longitudinal section, of a three-ply hose embodying the improvement. In Fig. 1 a portion only of the warp-threads are shown, the large circles representing the weft-threads and the small circles the ends of the warp-threads. Figs. 3, 4, 5, and 6 are diagrams illustrating the successive stages in the process of weaving the article.

The hose represented can be readily woven upon the loom referred to in the above-cited Letters Patent, with such obvious modification of the jacks or warp-operating mechanism as will operate the warp-strands of the several plies in the required manner.

In the drawings the plies are lettered A B C. C′ C^2 are the warps of the exterior or C ply. B′ B^2 are the warps of the middle or B ply, and A′ A^2 are the warps of the interior or A ply.

D′ D^2 are the binder-warps.

The small circles in Figs. 2 to 6 indicate the weft-threads. The fabric is one in which there are two picks of weaving in the interior ply A to one in each of the others B C. Such a fabric requires two revolutions of the loom to produce two picks of the A ply and one pick each of the B and C plies, and this arrangement, as shown, gives two crossings of warps in each of the latter plies to one in the A ply. The successive stages of weaving are illustrated in Figs. 3 to 6, beginning with Fig. 3, having reference to the left-hand end of all the figures. In Fig. 3 a pick has been partly formed and a weft laid in each one of the plies. In Fig. 4 the pick of the A ply has been completed and a second weft-thread laid, while in plies B C a second weft-thread has been laid in the still-uncompleted picks. In Fig. 5 the second pick in ply A is finished at the same time with the first picks in plies B C, and the first weft-threads are laid for succeeding picks in each of the plies. Fig. 6 represents the continuation of forming these succeeding picks, which is similar to that already described with reference to Fig. 4.

I have described the preferred construction of hose or multiply tubular fabric; but obviously it is only a matter of mechanical detail to so arrange the loom as to lay any desired number of wefts—whether one or more—to each of the plies. The improvement also is applicable to any multiply tubular woven fabric adapted to be used for hydraulic or other purposes, of any number of plies, and whether or not a separate weft is used for each ply and whether produced upon a circular loom or in an expanded form upon a straight loom.

Generally I prefer to weave the inner ply closer than the others; but it may sometimes be desirable to weave one of the others close instead, or even to weave all of the plies of different degrees of closeness. If the close inner ply is woven of flax or similar material and the outer plies are woven loosely of cotton or other fibrous material, the tubular fabric so produced may be used for hydraulic or other purposes without a rubber lining. If

wire be inserted in part as weft, then such hose may be employed for suction purposes.

I have described what I believe to be the best method of accomplishing the object in view. The same result, however, may measurably be arrived at by increasing the number or amount of warps in one ply beyond that in the others, in this way securing a closer fabric in one ply than in another.

One or more plies of my improved tubular fabric may have warps of wire with or without wefts of the same material in case it should be desired to produce a very firm fabric.

I do not here claim, specifically, fabric hose having a close inner linen ply surrounded by a looser outer ply of cotton, the construction being such that the hose is made water-tight without the employment of a rubber lining, for this I have made the subject of a separate application for Letters Patent of even date herewith, bearing Serial No. 150,430, and renewed under Serial No. 337,385.

What I claim as new and of my own invention is—

A multiply tubular woven fabric in which one or more of the inner plies have a greater number of picks or crossing of warps than the others, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 8th day of December, 1884.

BENJAMIN L. STOWE.

Witnesses:

HENRY EICHLINGER,

M. BAILEY.