

(No Model.)

T. R. ALMOND.  
FLEXIBLE TUBE.

No. 434,748.

Patented Aug. 19, 1890.

Fig. 1.

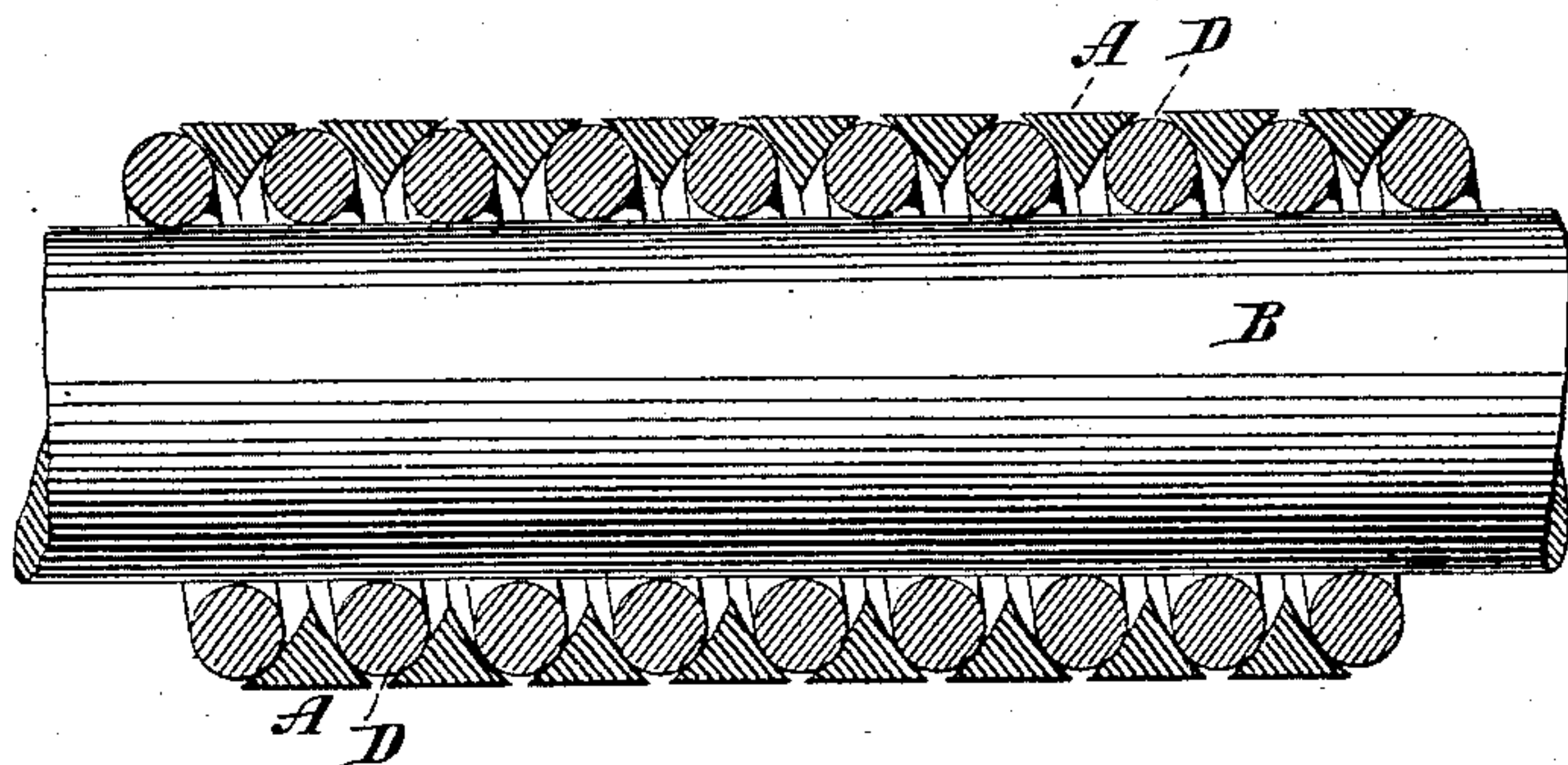


Fig. 2.

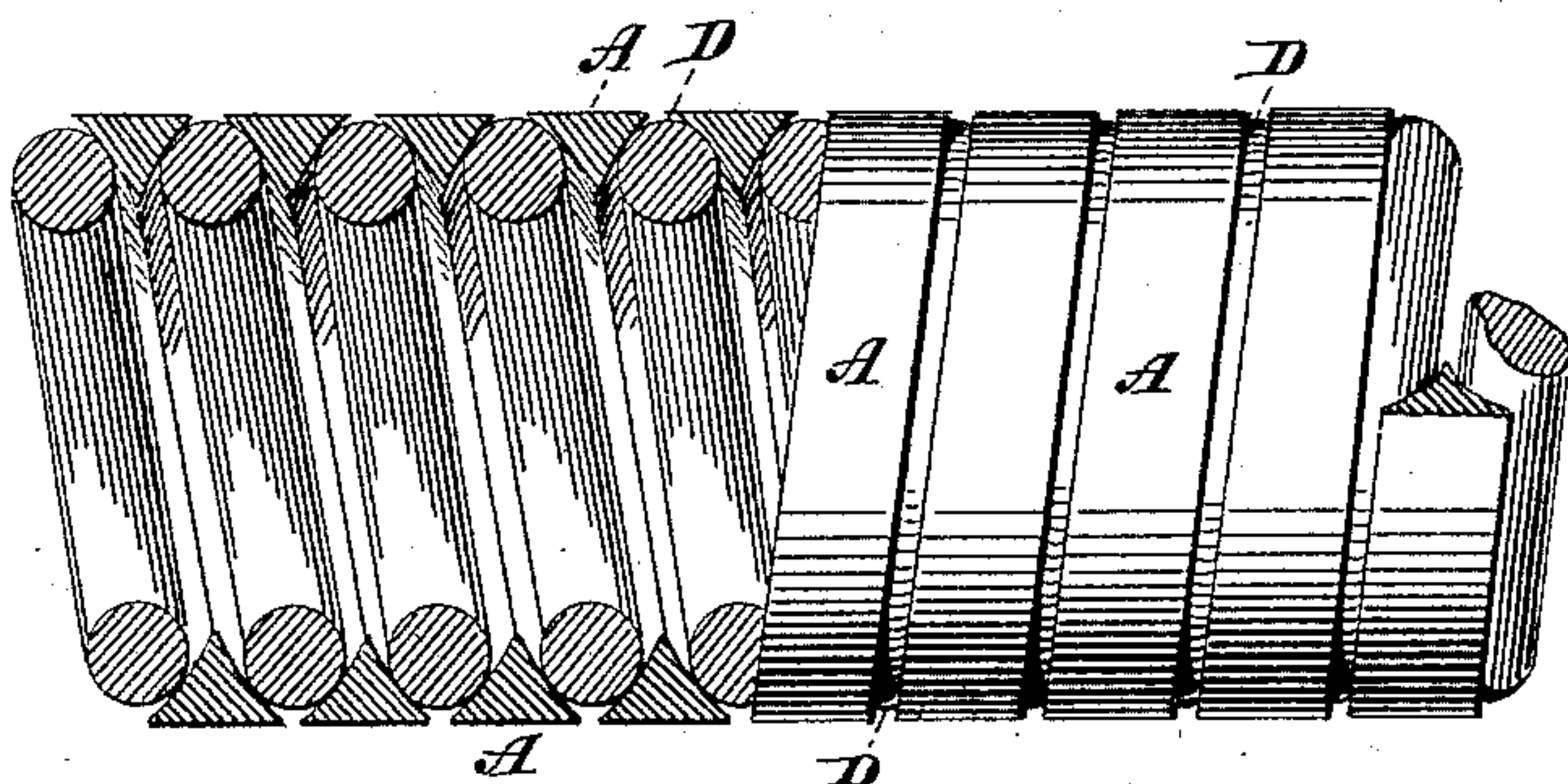


Fig. 3.

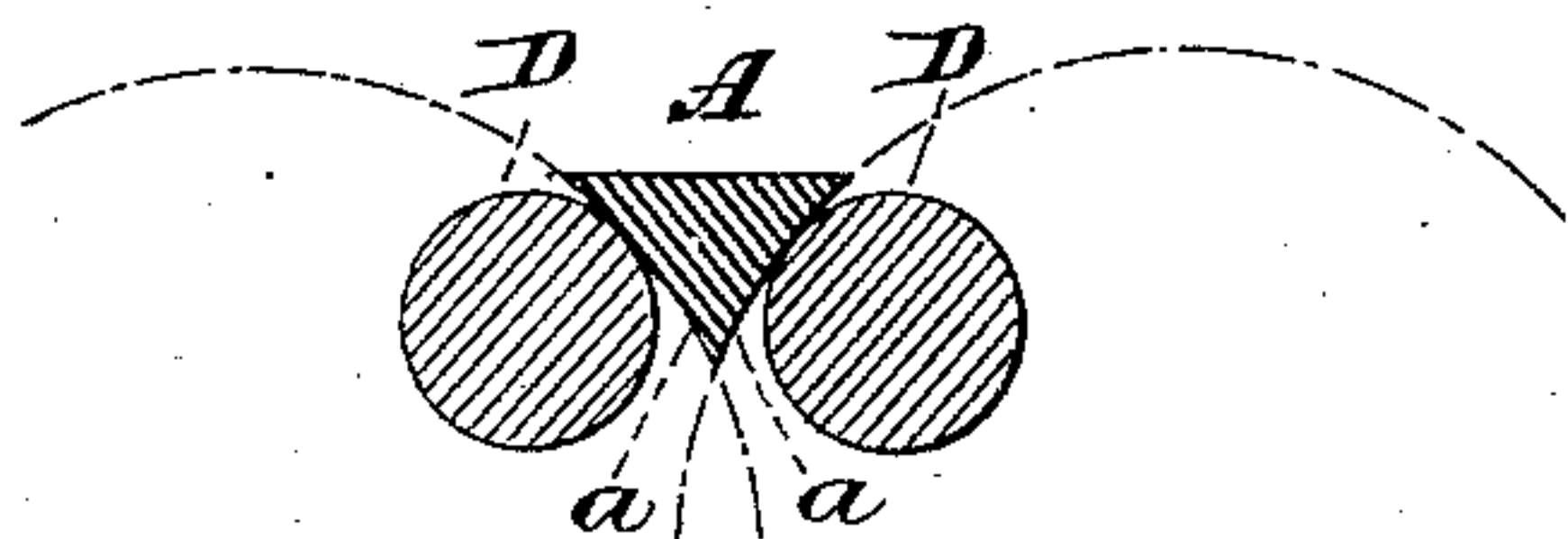
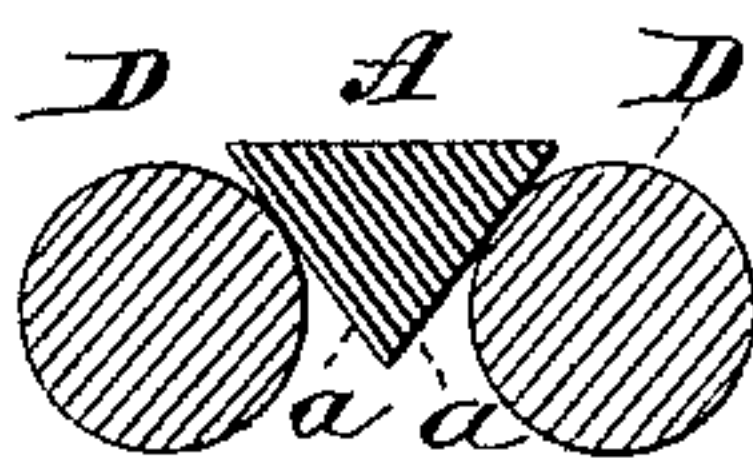


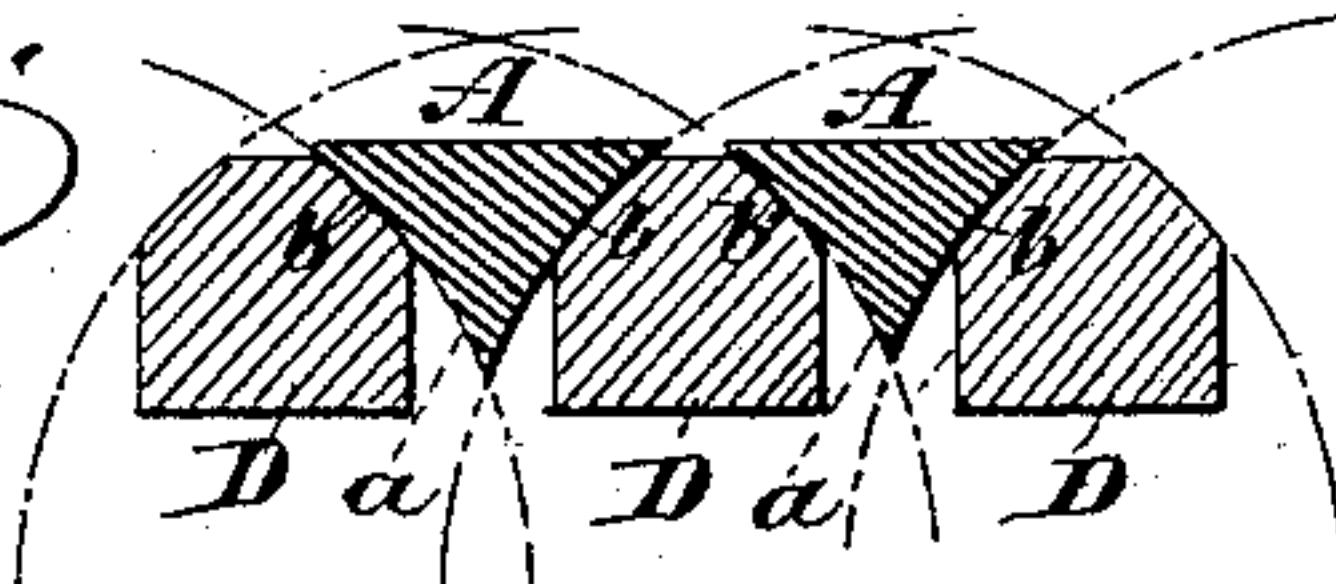
Fig. 4.



WITNESSES:

*Gustave Dietrich.*  
*William Goebel.*

Fig. 5.



INVENTOR

*Thomas R. Almond*

BY *Briesen Thum*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

THOMAS R. ALMOND, OF NEW YORK, N. Y.

## FLEXIBLE TUBE.

**SPECIFICATION** forming part of Letters Patent No. 434,748, dated August 19, 1890.

Application filed April 24, 1890. Serial No. 349,253. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS R. ALMOND, a resident of the city, county, and State of New York, have invented an Improved Flexible Tube, of which the following is a specification.

This invention relates to improvements on the flexible tube for which Letters Patent of the United States No. 424,044 were granted to me March 25, 1890.

The invention consists, mainly, in combining a coil of triangular cross-section with an inner coil, between the convolutions of which the triangular windings of the outer coil are forced, all as hereinafter more fully described.

The invention also consists in concaving the faces of said triangular coil; also in combining therewith peculiar shapes of the inner coil, as hereinafter specified.

In the drawings, Figure 1 represents a longitudinal central section of a flexible tube made according to this invention, showing it on a mandrel. Fig. 2 is a similar view on a larger scale of said tube partly in face view. Figs. 3, 4, and 5 are sectional diagrams showing different forms of parts.

In my Letters Patent No. 424,044, I show a flexible tube composed mainly of two coils of wire, one of which is placed around a mandrel, the other being forced into the interstices between the convolutions of the first coil, so as finally to enter between the convolutions of the first coil and reach contact with the mandrel. This arrangement is departed from in the present instance in that I use an outer coil A of triangular cross-section, which outer coil I force between the convolutions of the inner coil D while the same bears on the mandrel B, so that thus the tapering or wedge-like edges of the outer coil A will serve to at all times keep the convolutions of the inner coil D under tension, seeking to spread them apart, where otherwise they would tend to approach one another. By imparting to the outer coil A this triangular form I obtain the additional advantage of securing a larger contact-face than is obtained by the cylindrical wire shown in my former patent and of insuring a more perfect closure while the flexible pipe is bent.

The triangle of the outer coil A may be equilateral and straight-sided, as in Fig. 4; but I much prefer to make the contact-faces *a a*, which butt against the coil D, of concave form, the curvature being on a circle of which the center lies in the axis of the mandrel B. This curved or concaved triangle in contact with the inner coil D is shown in Fig. 3 and has the advantage of giving a still greater contact-face and of producing a tighter joint when the tube is bent; but Fig. 5 shows a still better form in that the inner coil D has contact-faces *b* on the same curve as the contact-faces *a* of the concave triangles A.

One way of making this improved tube is to first place around a mandrel B the coil D and then to force between the convolutions of that coil the triangular coil A, so that the wedge-like convolutions of this coil A will enter between the convolutions of the coil D, tending to spread them apart, and insuring therefore a tight joint, which will be maintained tight even when the tube is bent to a reasonable degree. In using the tube the mandrel is of course removed.

What I claim, and desire to secure by Letters Patent, is—

1. The flexible tube composed of an inner coil combined with the outer coil A, of triangular cross-section, whose convolutions are interposed between the convolutions of the inner coil, substantially as herein shown and described.

2. The flexible tube composed of the inner coil D, combined with the outer coil A, of triangular cross-section, having concave faces *a*, the coil D having curved faces *b* corresponding to the concave faces *a* of the coil A, the convolutions of the coil A being interposed between the convolutions of the coil D, so that the concave faces *a a* are in contact with the convex-faces *b*, substantially as herein shown and described.

THOMAS R. ALMOND.

Witnesses:

HARRY M. TURK,  
LIVINGSTON EMERY.