

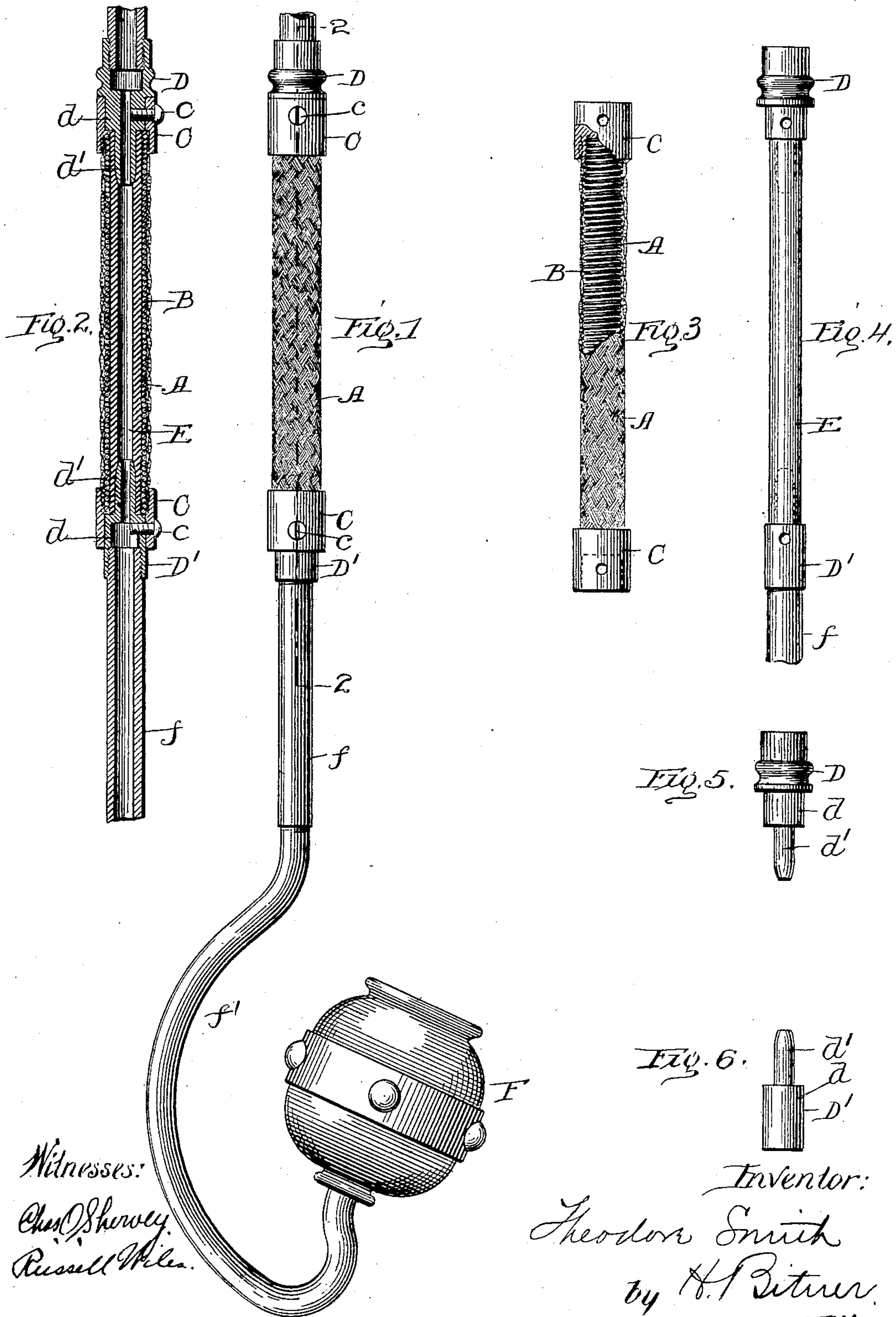
No. 762,954.

PATENTED JUNE 21, 1904.

T. SMITH.  
FLEXIBLE METALLIC COVERED TUBING.

APPLICATION FILED MAY 28, 1903.

NO MODEL.



Witnesses:  
Chas. Shorley.  
Russell Miles.

Inventor:  
Theodor Smith  
by H. P. Bitter.  
Atty.



# UNITED STATES PATENT OFFICE.

THEODORE SMITH, OF CHICAGO, ILLINOIS.

## FLEXIBLE METALLIC-COVERED TUBING.

SPECIFICATION forming part of Letters Patent No. 762,954, dated June 21, 1904.

Application filed May 28, 1903. Serial No. 159,087. (No model.)

*To all whom it may concern:*

Be it known that I, THEODORE SMITH, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Armor for Tubing and the Like, of which the following is a specification.

My invention relates to certain new and useful improvements in armor for tubing and the like; and its object is to produce a device which can be used as an armor for rubber tubing in connection, for instance, with drop-lights or cigar-lighters, but which can be used, if desired, in other connections.

To these and certain minor ends my invention consists in certain novel features of construction, which are clearly illustrated in the accompanying drawings and described in the following specification.

In the aforesaid drawings, Figure 1 is an elevation of a cigar-lighter, showing a section provided with my improved armor in use. Fig. 2 is a section in the line 2 2 of Fig. 1. Fig. 3 is an elevation of the armor, a certain portion being cut away to show the interior construction, the tube being elongated to its fullest extent. Fig. 4 is an elevation of the inner gas-conducting tube and the nipples by which it is secured in place. Fig. 5 is an elevation of one of the nipples removed from the device, and Fig. 6 is an elevation of the other nipple.

Referring now to the drawings, A is the outer casing of my improved armor, which is preferably of woven-wire fabric, as shown in the drawings. The strands of the preferred fabric are spirally disposed and of a rather steep pitch. Within this casing A is a lining B, preferably of coiled wire, these two casings together forming an armor which is substantially non-elastic. Each of the two parts of the casing alone is extremely elastic; but the outer one can only stretch by decreasing its diameter, while the inner one stretches without substantially decreasing its diameter. Inasmuch as the lining B tightly fits the interior of the woven-wire casing A, it is impossible for the outer casing to decrease its diameter to any extent, and therefore it cannot stretch.

The two together, therefore, are substantially

inelastic, but evidently highly flexible. The armor in the structure herein shown is provided at its ends with cylindrical tips C C, preferably soldered to both layers of the armor and adapted to receive nipples D D'. As far as any essential features are concerned the two nipples are similar; but the nipple D is shown as provided with an ornamental bead, which is not present on the nipple D'. Each nipple has a portion  $d$ , adapted to enter the counter-sunk portion of the tips C, and an elongated perforated point  $d'$ , the purpose of which will presently be apparent. Both nipples are screw-threaded, the nipple D being adapted to be screwed upon the gas pipe or fixture, while the nipple D' may be used to receive the tube  $f$  of the cigar-lighter proper, F, as shown in the drawings. Tapped radial perforations are provided in each nipple, by which it can be held fixedly in place in the tip by screws  $c$  passing through suitable perforations in the tips C and into the nipples.

E is a rubber tube which lies within the metallic armor and is slipped over the points  $d' d'$  on the two nipples and tightly fit the same. The rubber tube E is of such length that when in its normal condition it is as long or slightly longer than the distance between the enlarged portions  $d d$  of the nipples when in place with the armor stretched as much as it can be.

In assembling the entire structure one end of the rubber tube is fitted on one of the nipples, and the tube is then passed through the armor-tube. The second nipple is then inserted in the rubber tube and pushed into place in the corresponding tip C, the two nipples being secured in position by the screws  $c$ . The rubber tube is then kept under continuous compression and has no tendency whatever to be forced or pulled off the nipples.

The advantages of this structure will be quite obvious. The disadvantages of the ordinary rubber tubing or woven tubing for conducting gas are well known. Rubber, after a comparatively short space of time, deteriorates with the ordinary rough handling and permits the gas to escape. The so-called "flexible metallic tubing" also deteriorates quickly and is very expensive, and when once worn out it must be entirely replaced, which is nat-



urally a matter of some expense. My improved tubing has all the advantages of both forms of tubing. This metallic armor is practically indestructible, and it is so constructed  
 5 that it cannot be bent sharply to permit any sharp bends in the rubber tube which would strain the same. Furthermore, it is so much shorter than is the rubber tube that no longitudinal strain can fall upon the same. Consequently rubber tubing, which is admittedly  
 10 the best and most effective flexible conductor for gas when not exposed to rough handling, is perfectly protected from all injurious influences, and consequently attains its maximum  
 15 life. The armor does not have to be made gas-tight at all, and so can be used after metallic tubing would have begun to leak. When the rubber tube is worn out, however, as it must be sooner or later, another section of  
 20 tubing can be put in its place at a cost of a few cents and with no trouble but the removal and replacing of two small screws.

It will be evident that my improved armor can be used with rubber tube within it, as in  
 25 the structure herein illustrated and described, or it can be used as a covering for any other flexible devices—as, for instance, electric cord—and I therefore do not intend to limit myself to its use in the particular connection  
 30 herein set forth. It will be evident also that considerable variation in the construction of

the armor is possible, and I therefore do not intend to limit myself to this particular form herein set forth.

I claim as new and desire to secure by Letters Patent— 35

1. A tubular armor consisting of an outer layer which decreases its diameter when longitudinally elongated, and a coiled inner layer and an inner layer comprising a coil of a rigid  
 40 material.

2. A tubular armor consisting of an outer layer which decreases its diameter when longitudinally elongated, and an inner layer of coiled wire. 45

3. A tubular armor consisting of an outer layer of woven-wire fabric with spirally-disposed strands, and an inner layer of coiled wire.

4. A tubular armor, consisting of two elastic layers, the outer of which contracts its diameter more when stretched than does the inner one. 50

In witness whereof I have signed the above application for Letters Patent, at Chicago, in  
 55 the county of Cook and State of Illinois, this 20th day of May, A. D. 1903.

THEODORE SMITH.

Witnesses:

CHAS. O. SHERVEY,  
 RUSSELL WILES.