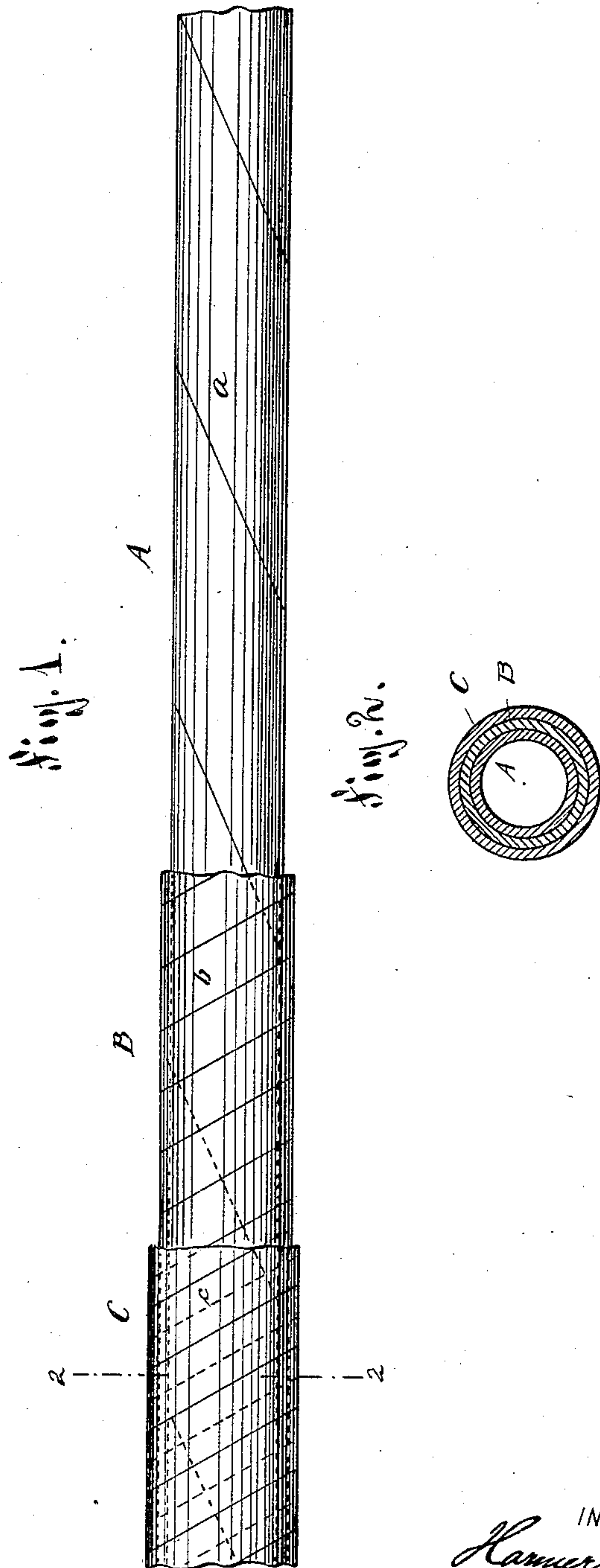


(No Model.)

H. DENNEY.  
TUBE.

No. 444,233.

Patented Jan. 6, 1891.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

HARMER DENNEY, OF BROOKLYN, NEW YORK.

## TUBE.

SPECIFICATION forming part of Letters Patent No. 444,233, dated January 6, 1891.

Application filed October 17, 1890. Serial No. 368,461. (No model.)

*To all whom it may concern:*

Be it known that I, HARMER DENNEY, a citizen of the United States, and a resident of Brooklyn, in the county Kings, State of New York, have invented certain new and useful Improvements in Tubes, of which the following is a specification.

This invention relates to an improved tube made of paper, and which is to be treated with material rendering it fire and water proof, or to be treated in any other suitable manner.

The invention consists of a papertube composed of a core formed of a strip of paper wound spirally with a great pitch, and on said core are applied two successive coverings or layers, also formed of paper strips wound spirally, but with much less pitch than the core, the spiral forming the core running in one direction and the spiral of the coverings running in the opposite direction.

In the accompanying drawings, Figure 1 is a view of a piece of my improved tube, parts of the two covering-layers being removed. Fig. 2 is a cross-sectional view on the line 2-2, Fig. 1.

Similar letters of reference indicate corresponding parts.

The core A of the tube is formed of a strip *a* of paper, which is wound spirally on a suitable mandrel or analogous device, so as to have very great pitch. Upon said spirally-wound core two covering-layers B and C are formed successively, said covering-layers B and C being each formed of strips *b* and *c*, respectively, both wound spirally in the same direction, the direction in which the said covering-strips *b* and *c* are wound being the reverse of the direction in which the core-strip *a* is wound. The strips *b* and *c* are provided with paste or cement before being wound upon the core, so as to firmly adhere to the same and to each other. By forming the core of the spirally-wound strip the rigidity of

the same is materially increased and its strength is made uniform, for the reason that the seam of the core runs spirally in the same in contradistinction to paper tubes made heretofore in which the core was made by bending a strip of paper transversely to form a tube having a longitudinal seam. A core having a longitudinal seam is always weakest along the longitudinal line of the seam, and, furthermore, it is very difficult to form a tube the cross-section of which is a perfectly-true circle, provided the tube has a longitudinal seam. By making the core of a spirally-wound strip the cross-section of all parts of the core will be a perfect and true circle, and each part of said core will be able to resist pressure equally and uniformly. By making the core with a long spiral—that is, a spiral of great pitch—the strength and rigidity of the tube are increased, as the long spiral presents greater resistance against bending or shearing strains, and the shorter spirals of the covering-layers securely bend and hold together the long spirals of the core.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

A tube composed of a core formed of a paper strip wound spirally with great pitch and one or more covering-layers formed of paper strips wound spirally with less pitch on the spirally-wound core, the direction of the winding of the covering-layers being the reverse of the direction of the winding of the core, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HARMER DENNEY.

Witnesses:

OSCAR F. GUNZ,  
MARTIN PETRY.