

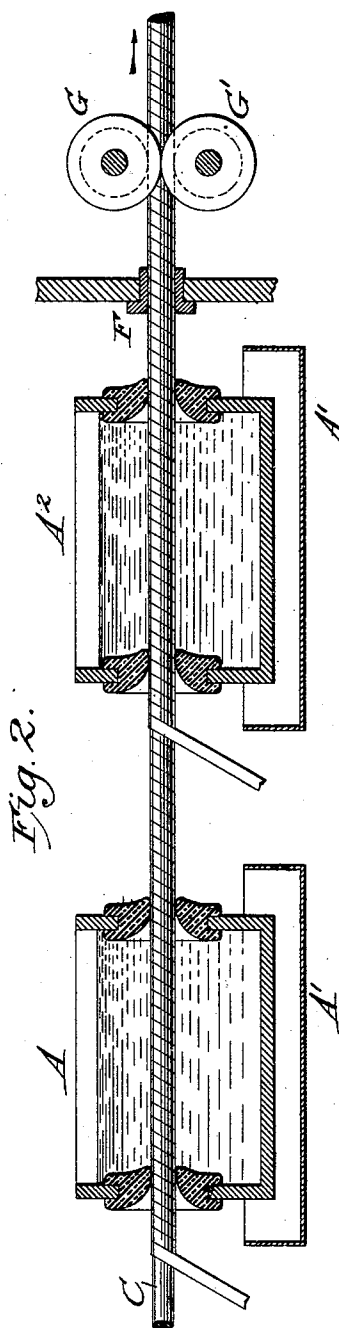
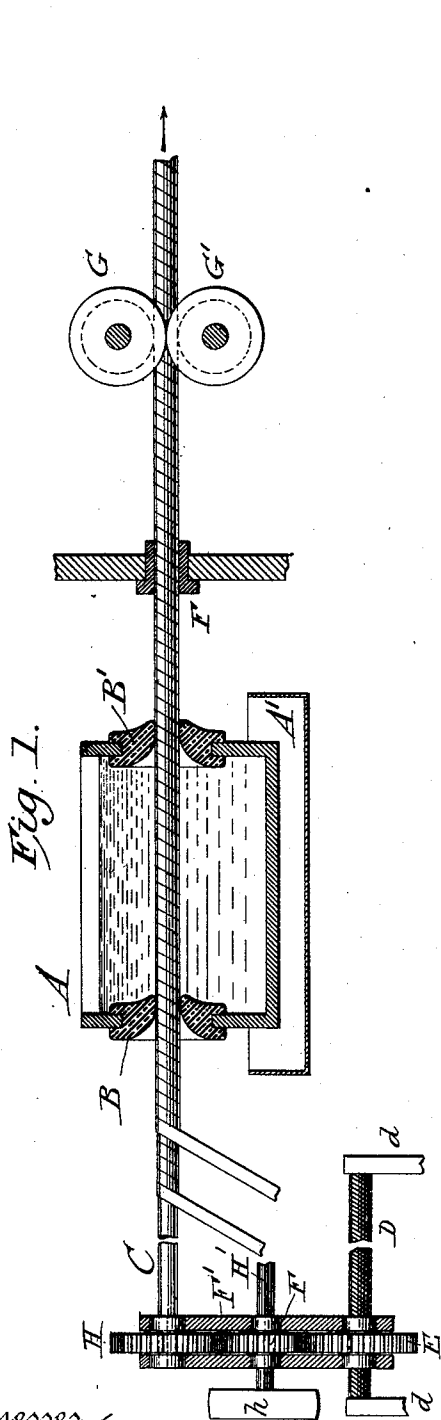
(No Model.)

R. P. FRIST.

ART OF AND APPARATUS FOR MAKING PARCHMENTIZED FIBER TUBES.

No. 479,263.

Patented July 19, 1892.



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT PORTER FRIST, OF WILMINGTON, DELAWARE, ASSIGNOR TO THE
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ART OF AND APPARATUS FOR MAKING PARCHMENTIZED-FIBER TUBES.

SPECIFICATION forming part of Letters Patent No. 479,263, dated July 19, 1892.

Application filed November 23, 1891. Serial No. 412,843. (No model.)

To all whom it may concern:

Be it known that I, ROBERT PORTER FRIST, a citizen of the United States, residing at Wilmington, in the county of New Castle and State of Delaware, have invented certain new and useful Improvements in the Art of and Apparatus for Making Parchmentized, Vulcanized, or Hard Fiber Tubes, of which art and apparatus the following is a specification.

Heretofore tubes of the character described have been made of paper wound on a mandrel after having been treated in a chemical or transforming bath and while moist. I have encountered some difficulty in making spirally-wound tubing in this manner, owing to the liability of the moist paper to break under the strain incident to the winding.

The object of my invention is to obviate this and other practical difficulties encountered in the manufacture of such fiber tubing, which end I attain by winding strips of dry untreated paper of requisite width spirally in tubular form, with closely abutting or overlapping edges, and then immersing or submerging the paper tube thus formed in a chemical transforming-bath of suitable well-known constituents—such, for instance, as chloride of zinc. This immersion of the paper in the transforming-bath may be done in various ways, either as the strip is being wound into tubular form or successively as each layer is applied.

The accompanying drawings respectively represent vertical longitudinal central sections through so much of two different forms of apparatus adapted for carrying out my invention as is necessary to illustrate the subject-matter claimed.

Figure 1 shows the transforming bath or fluid as contained in a tank A, provided at each end with an elastic packing-ring or annular gate B B', through which a mandrel C passes below the normal level of the transforming-bath. Strips or ribbons of dry paper of suitable width and constitution are wound spirally upon the mandrel at a proper angle to form a tube, with closely abutting or overlapping edges.

There are various ways in which the mandrel may be rotated and fed forward. The

mechanism shown for this purpose consists of a stationary screw-shaft D, mounted in standards *d* and carrying a gear-wheel E, which as it rotates moves longitudinally on the shaft. The wheel E gears with a cog-wheel F, mounted in a frame F', which also carries a cog-wheel H, to which the mandrel is secured. The wheel F has a square bore, through which a square shaft H', carrying a pulley *h*, extends. When the pulley is revolved, a rotary motion is given to the wheels F, E, and H and to the mandrel, and a forward movement of all the wheels and the frame is effected. The operation of the mechanism is obvious, and needs no further description.

The organization shown is such that the mandrel is simultaneously rotated and fed forward endwise through the tank. The strips are wound on the mandrel outside the tank, and they are fed forward thereon and therewith through the elastic packing-rings or annular entrance-gates B and out through the discharge-gates B', the gates yielding sufficiently to permit their passage. Any leakage of the bath through these gates is caught in a drip-pan A'. After traversing the bath the mandrel, with the tube thereon, goes through an eye or ring F or passes between pressing-rolls G G', having semicircularly-grooved peripheries, which compress and consolidate the tube, which is afterward treated and finished in well-known ways.

Fig. 2 shows an apparatus substantially similar to that delineated in Fig. 1, except that the tanks are duplicated and a single layer is wound upon the mandrel, passed through the first bath A, an additional strip then wound upon this treated strip, and the whole then passed through the second bath A² and then through the eye and rollers, as above described.

Like parts are correspondingly lettered in both figures.

The apparatus, unless otherwise indicated, being of usual approved construction and operation, needs no detailed description.

The operation of the apparatus will readily be understood from the foregoing description.

Another application filed simultaneously herewith by Charles G. Rupert and myself,

Serial No. 412,855, shows methods of forming parchmentized-fiber tubes by pouring, forcing, rolling, or brushing the transforming fluid thereon, in contradistinction to immersing them therein, as herein claimed.

I do not therefore claim herein any process not involving immersing or submerging the tubes in the bath or transforming fluid.

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

1. The hereinbefore - described improvement in the art of making parchmentized-fiber tubes, which improvement consists in winding a strip of dry or untreated paper spirally into tubular form, with closely adjacent edges, converting the tube into parchmentized fiber by passing it as fast as formed through a transforming bath, and then consolidating the tube thus formed and treated into a homogeneous fabric by pressure.

2. The hereinbefore - described improvement in the art of making parchmentized-fiber tubes, which improvement consists in winding a strip of dry or untreated paper spirally into tubular form, with closely abutting or overlapping edges, immersing the tube thus formed in a transforming-bath, winding a second strip of dry or untreated paper on the treated tube, and passing both the treated and untreated layers or convolutions through a second transforming-bath.

3. The combination, substantially as hereinbefore set forth, of a tank for containing a transforming-bath, a mandrel, means for revolving it below the surface of the transforming-bath, for traversing it endwise therethrough, for winding a strip of dry or untreated paper thereon, and for carrying its convolutions through the bath to be acted upon thereby as fast as formed, and means for consolidating the transformed fabric into a homogeneous structure.

4. The combination, substantially as hereinbefore set forth, of a series of transforming-baths, a mandrel, means for rotating and

traversing it endwise through the baths and for winding a strip of dry or untreated paper thereon and for passing it through one of the baths, and means for winding a second strip upon the first after passing through the first bath and for passing both strips through the succeeding bath, for the purposes described.

5. The combination, substantially as hereinbefore set forth, of a transforming tank or bath, a mandrel, means for rotating it, for winding a strip thereon, and for moving both the mandrel and strip endwise through the bath, and gates or valves through which the shaft, with the strip wound thereon, passes to subject it to the action of the bath.

6. The combination, substantially as hereinbefore set forth, of a transforming tank or bath, a rotating mandrel movable endwise therethrough, elastic or yielding gates in the tank, through which the mandrel passes, together with the paper wound thereon, and means, such as eyes or grooved rollers, for consolidating the tube as it emerges from the bath.

7. The combination, substantially as hereinbefore set forth, of a series of a transforming tanks or baths, a rotating mandrel movable endwise therethrough, elastic or yielding gates in the tanks through which the mandrel passes, together with the paper wound thereon, and means, such as eyes or grooved rollers, for consolidating the tube as it emerges from the bath, whereby a strip of dry or untreated paper may be wound upon the mandrel, passed through the bath, successive strips or layers of untreated paper wound thereon, and the whole passed through another bath and consolidated after emerging therefrom.

In testimony whereof I have hereunto subscribed my name.

ROBERT PORTER FRIST.

Witnesses:

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