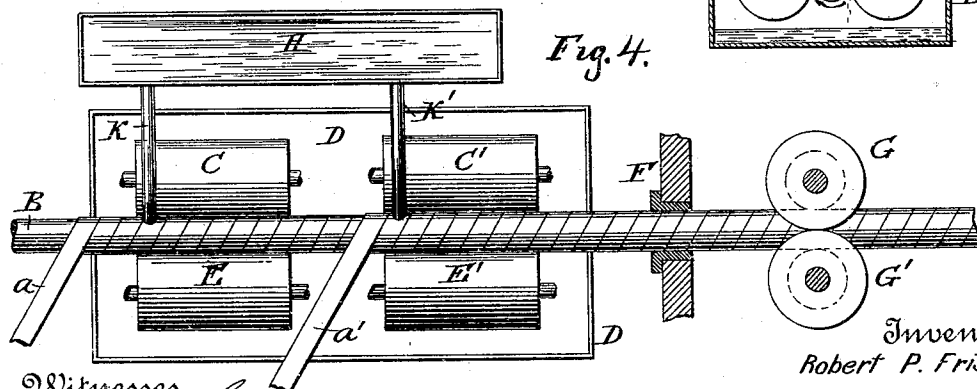
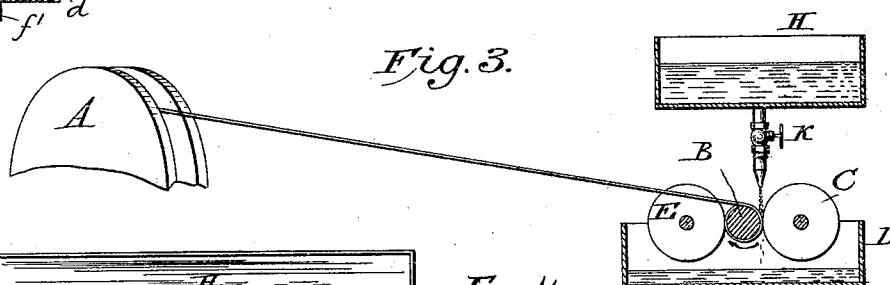
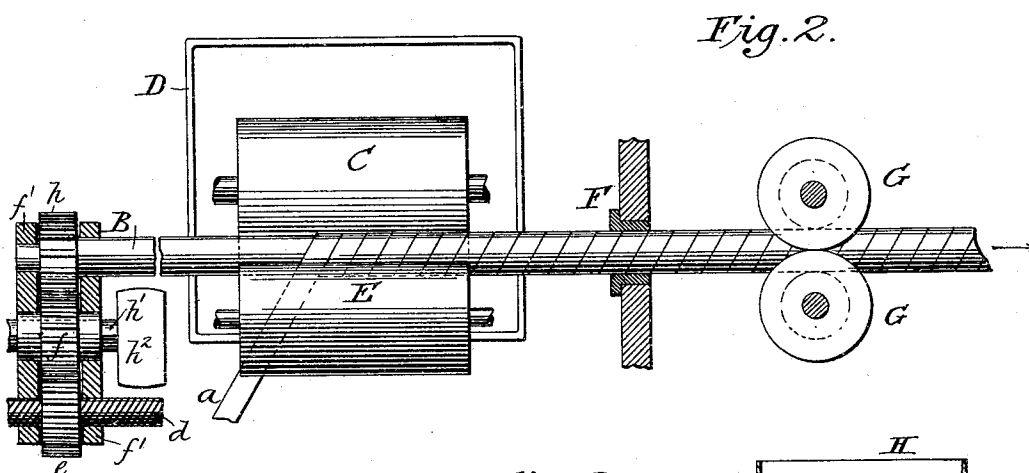
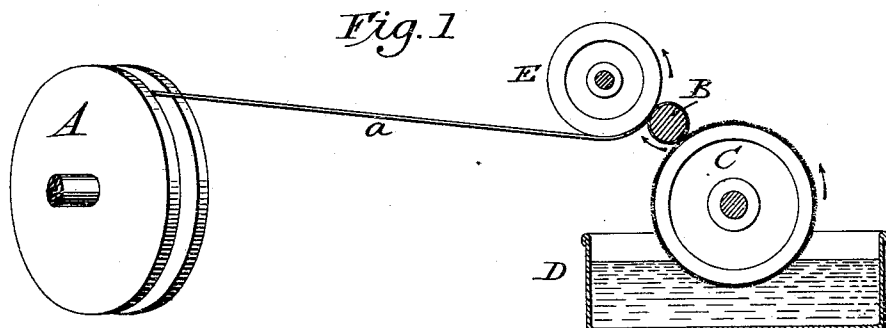


(No Model.)

R. P. FRIST & C. G. RUPERT.
ART OF AND APPARATUS FOR MAKING PARCHMENTIZED FIBER TUBES.
No. 479,264. Patented July 19, 1892.



Witnesses

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UNITED STATES PATENT OFFICE.

ROBERT PORTER FRIST AND CHARLES GIDEON RUPERT, OF WILMINGTON, DELAWARE, ASSIGNORS TO THE DELAWARE HARD FIBRE COMPANY, OF SAME PLACE.

ART OF AND APPARATUS FOR MAKING PARCHMENTIZED-FIBER TUBES.

SPECIFICATION forming part of Letters Patent No. 479,264, dated July 19, 1892.

Application filed November 23, 1891. Serial No. 412,855. (No model.)

To all whom it may concern:

Be it known that we, ROBERT PORTER FRIST and CHARLES GIDEON RUPERT, citizens of the United States, residing at Wilmington, in the county of New Castle and State of Delaware, have jointly invented certain new and useful Improvements in the Art of and Apparatus for Making Parchmentized-Fiber Tubes, of which the following is a specification.

Our invention relates to that class of tubes made from chemically-treated paper known under various names, such as "vulcanized," "parchmentized," or "hard" fiber. Such tubes heretofore have been formed, so far as our knowledge extends, by winding moist-treated strips on a mandrel. This mode of manufacture we have found objectionable to some extent, owing to the liability of the moist paper to break or tear under the strain of winding. The object of our invention is to obviate this difficulty, which end we attain by winding a strip of dry or untreated paper spirally into a tubular form and applying the transforming-fluid thereto without immersing the strip therein, so as to parchmentize the tube during or just after its formation.

The accompanying drawings show two different forms of apparatus for carrying out our invention. The arrows indicate the direction of movement of the various moving parts.

Figure 1 represents a vertical transverse central section through apparatus for applying the chemical or transforming bath to the convolutions of the paper strip by means of a roller, and Fig. 2 represents a plan view of the said apparatus.

A paper strip *a* passes from a spool A around a mandrel B at a suitable angle, to be wound thereon with its edges closely abutting or overlapping as the mandrel is rotated, and at the same time moved longitudinally in the proper direction. (Indicated by the arrows.) Figs. 1 and 2 show a mandrel intended both to rotate continuously and to move steadily endwise in contact with the face of a saturating-roll C, made, preferably, of elastic material, which may be enveloped in a fibrous absorbent covering, such as woolen cloth or other material

capable of resisting the action of the transforming-fluid. This roll C revolves in a tank D, containing a transforming bath of well-known constituents, such as chloride of zinc, &c., in which bath the lower side of this saturating-roll is immersed. A balancing or pressure roll E turns in contact with that side of the mandrel opposite the saturating-roll to counteract its pressure and compress the tube as it is formed. Under this organization each strip and layer of the paper is saturated with the transforming-fluid as soon as it is wound upon the mandrel—that is, as soon as it has passed far enough around it to prevent strain on the treated or saturated portion of the paper. After leaving the rolls the mandrel, with the tube thereon, passes through an eye F or a pair of semicircularly-grooved rolls G G', which consolidate it. The tube is then finished in the usual well-known ways.

Fig. 3 represents a vertical central transverse section, and Fig. 4 a plan of an apparatus adapted to pour the transforming-fluid upon the paper, the corresponding parts being lettered as in the preceding figures.

Figs. 3 and 4 show dry or untreated paper strips *a a'*, passing from a spool or spools A A' around a mandrel B, rotating and moving endwise in contact with the saturating-rolls C C', revolving above a drip-pan D on the opposite side of the mandrel from the pressure-rolls E E'. The fluid drips upon the paper as it is wound upon the mandrel from an elevated reservoir H, provided with a discharge pipe or pipes and suitable stop-cocks K K'.

In practice a separate set of rolls C E C' E' is provided for each strip, as shown, as the walls of the tube vary in thickness according to the number of the plies or layers, and each strip is wound upon the mandrel in advance of its particular set of rolls. The mandrel carries the wound and moistened strips from the rolls through a compressing-eye F or between a pair of semicircularly-grooved rolls G G' to further consolidate the two.

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*, 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
5 secured. The wheel *f* has a square bore, through which a square shaft *h'*, carrying a pulley *h²*, 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
10 movement of all the wheels and the frame is effected. The operation of the mechanism is obvious and needs no further description.

It is obvious that brushes might be substituted for the fibrous covering of the saturating-roll, and that the transforming-fluid, instead of dripping upon the mandrel, as shown
15 in Figs. 3 and 4, from an elevated reservoir, might be forced thereagainst by pressure.

An application filed simultaneously herewith by the aforesaid Robert P. Frist, Serial No. 412,843, describes and claims methods of and apparatus for immersing a paper tube in a transforming bath. We therefore limit our
20 claims herein to pouring or forcing the liquid upon the convolutions of the tube as formed or applying it thereto by a brush or roller, in contradistinction to immersing the tube in a bath.

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

Figs. 3 and 4 show the second strip as wound upon the previously-moistened preceding strip and as being moistened in its turn.

What we claim herein as new and as of our
35 joint invention is—

1. The hereinbefore-described improvement in the art of making parchmented-fibertubes, which improvement consists in winding a strip of dry or untreated paper spirally into tubular form and conveying to the tube an acid or transforming-fluid to convert the paper into
40 parchmented fiber as fast as wound into tubular form.

2. The hereinbefore-described improvement in the art of making parchmented-fibertubes, which improvement consists in successively
45 winding strips of dry or untreated paper spirally into tubular form one upon the other, conveying to each layer of the tube as formed an acid or transforming-fluid to convert it
50 into parchmented fiber, and then consolidating the transformed layers, as described.

3. The combination, substantially as hereinbefore set forth, of a series of saturating-rolls, means for applying a transforming-fluid
55 thereto, a mandrel rotating and moving endwise past these rolls to wind the paper spirally into a tube and feed it past them, balancing or pressure rolls on the opposite side of the mandrel to that of the saturating-rolls,
60 and means, such as eyes or rollers, through or between which the mandrel passes endwise with the saturated tube thereon.

In testimony whereof we have hereunto subscribed our names.

ROBERT PORTER FRIST.

CHARLES GIDEON RUPERT.

Witnesses:

HENRY J. CRIPPEN,

D. B. JONES.