

(No Model.)

2 Sheets--Sheet 1.

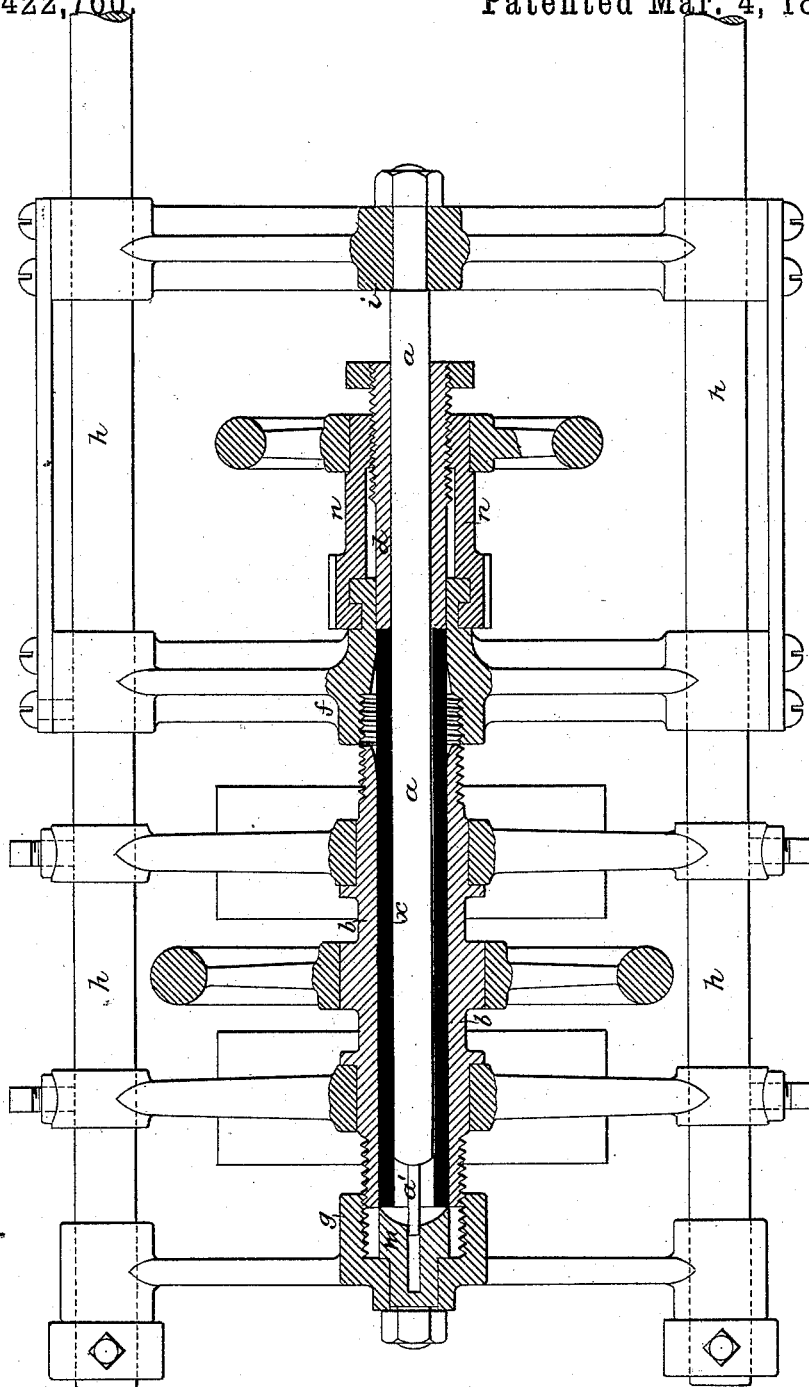
R. P. FRIST.

ARTICLE OF CHEMICALLY TREATED FIBROUS MATERIAL AND MODE  
OF MAKING THE SAME.

No. 422,760.

Patented Mar. 4, 1890.

*F1 C. 1.*



Witnesses:  
*Alex. Barkoff*  
*Hamilton L. Turner.*

Inventor:  
*Robert P. Frist*  
by his Attorneys  
*Hewson & Hewson*

(No Model.)

2 Sheets—Sheet 2.

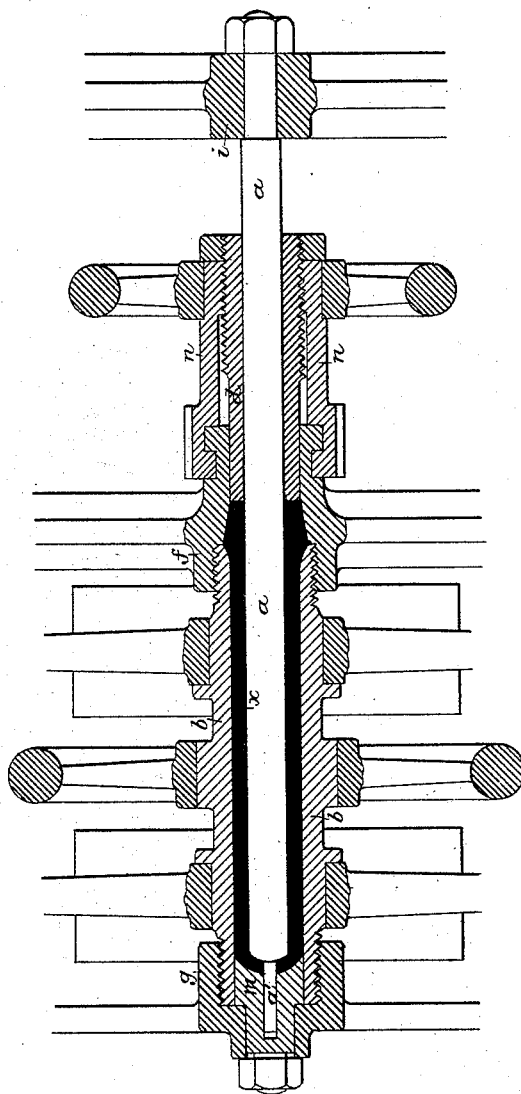
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FIG. 2.



Witnesses:

Alex. Darkoff  
Hamilton D. Turner

Inventor

Robert P. Frist

by his Attorneys

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# UNITED STATES PATENT OFFICE.

ROBERT P. FRIST, OF WILMINGTON, DELAWARE.

ARTICLE OF CHEMICALLY-TREATED FIBROUS MATERIAL AND MODE OF MAKING THE SAME.

SPECIFICATION forming part of Letters Patent No. 422,760, dated March 4, 1890.

Application filed July 29, 1889. Serial No. 319,067. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT P. FRIST, a citizen of the United States, and a resident of Wilmington, New Castle county, Delaware, have invented certain Improvements in Articles of Chemically-Treated Fibrous Material and in the Mode of Making the Same, of which the following is a specification.

The object of my invention is to produce from certain kinds of chemically-treated fibrous materials shaped and seamless articles such as have not hitherto been made from this class of material, and this object I attain in the manner hereinafter set forth.

The material to which my invention is applied consists of paper or like fibrous material passed through a chemical transforming-bath, which effects a molecular change in the material and causes sheets of the same, when superposed and subjected to pressure, to adhere and form a homogeneous body or mass.

The material is usually prepared by passing a continuous sheet of the paper through the chemical transforming-bath, and as it emerges from the same winding it upon a mandrel of circular, square, or other suitable cross-section, the outermost layer being subjected to pressure, so that the successive layers or laminae are caused to properly adhere to each other, the material being subsequently washed to expel the chemical solution, and being used either in tube form or the tube being cut and flattened to form sheets. Material of this character is known in the market under various names, such as "kartavert," "vulcanized fiber," "parchmentized fiber," "leatheroid," &c. I have discovered that such laminated forms of chemically-treated fibrous material can be shaped by a swaging or pressing operation—that is to say, the fiber may be upset by pressure imparted to the same in a direction parallel to the laminae of the tube or sheet, so as to either increase or diminish its cross-sectional area, or the pressure may be caused to bend or fold a projecting portion of a tube or sheet and cause the same to adhere or unite where the folded portions meet or overlap, it being understood that the operation takes place immediately after the formation of the laminated tube or sheet and while it still retains the chemical treating solution, the tube or sheet being consequently of a soft

and pliable character and the laminae still retaining their adherent property.

As an instance of one method of carrying out my invention, I may mention the forming of a bobbin from a tube of chemically-treated fibrous material of the character referred to, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional view of one form of apparatus which may be employed for the formation of the bobbin, and Fig. 2 is a similar view showing some of the parts in a different position.

The tube *x* of the proper length, being applied to a mandrel *a* of the proper diameter for the interior of the desired bobbin, is introduced into an outer case or envelope *b*, shaped to accord internally with the desired external shape of the bobbin. The tube bears at one end against a sleeve *d* on the mandrel *a*, and projects at the other end some distance beyond the mandrel. The opposite ends of the casing *b* are threaded for the reception of nuts *f* and *g*, having arms guided on rods *h*, the arms of the nut *f* being connected to arms on the mandrel-head *i*, and the nut *g* acting upon a plunger *m*, which fits snugly to one end of the casing *b*. On turning the latter the nuts are drawn toward each other, and the tube *x* is compressed between the plunger *m* and the sleeve *d*, so that it is caused to expand and conform to the internal shape or configuration of the casing *b*, while the projecting end of the tube is swaged down over the end of the mandrel, and either entirely closed or forced around a contracted stem *a'*, so as to form an orifice in the top of the bobbin. The sleeve *d* is threaded for adaptation to a nut *n*, swiveled to the nut *f*, so that by turning said nut *n* the sleeve is advanced and the tube *x* is further compressed longitudinally and expanded radially into the nut *f*, which is so shaped internally as to impart the desired conical end to the bobbin. The nuts can then be backed off, the bobbin removed from the mandrel, a new tube applied, and the operations repeated.

My improved swaging process may be applied to the formation from tubes of chemically-treated fiber of bobbins, spools, telephone transmitters or receivers, pipes or tubes with enlarged or contracted ends, umbrella-

stands, battery-cells, door pulls or handles, push-buttons and cases, sliver-cans, and many other articles; or the process may be applied in the manufacture of articles from the material in sheet form instead of in tube form.

After the form has been imparted to the article by swaging, as above described, it is preferable to smooth, compact, or polish the surface of the article, which may be done by rolling it—that is to say, by traversing a roller over the surface of the article while it is properly supported against the pressure of said roller, or by causing the article to pass between rotating rolls having journals turning in fixed bearings.

I am aware that it has been proposed to form by molding articles composed of chemically-treated fibrous pulp; but prior to my invention the laminated forms of chemically-treated fibrous material have not been considered capable of being swaged or upset so as to change the cross-sectional form originally imparted to them.

I therefore claim as my invention and desire to secure by Letters Patent—

1. The mode herein described of producing shaped articles composed of laminated forms of chemically-treated fibrous material, said mode consisting in first subjecting a sheet or sheets of the material to the action of a chemical transforming-bath, producing a laminated body from said chemically-treated sheet or

sheets, and then subjecting these laminae to endwise pressure, whereby said laminae are swaged into the desired form, substantially as specified.

2. The mode herein described of producing shaped articles composed of laminated forms of chemically-treated fibrous material, said mode consisting in first subjecting a sheet or sheets of the material to the action of a chemical transforming-bath, then producing a laminated body from said chemically-treated sheet or sheets, then subjecting these laminae to endwise pressure, whereby said laminae are swaged into the desired form, and then rolling the surface of the material to smooth or compact the same, substantially as specified.

3. Laminated articles of chemically-treated fibrous material having swaged portions in which the laminae are upset or displaced, substantially as specified.

4. Laminated articles of chemically-treated fibrous material having swaged portions in which the laminae are upset or displaced and having a smooth compacted surface, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT P. FRIST.

Witnesses:

JOHN J. GEARY,  
HARRY SMITH.