No. 789,826. PATENTED MAY 16, 1905.

E. K. WARREN.

STIFFENING MATERIAL.

APPLICATION FILED FEB. 20, 1901.

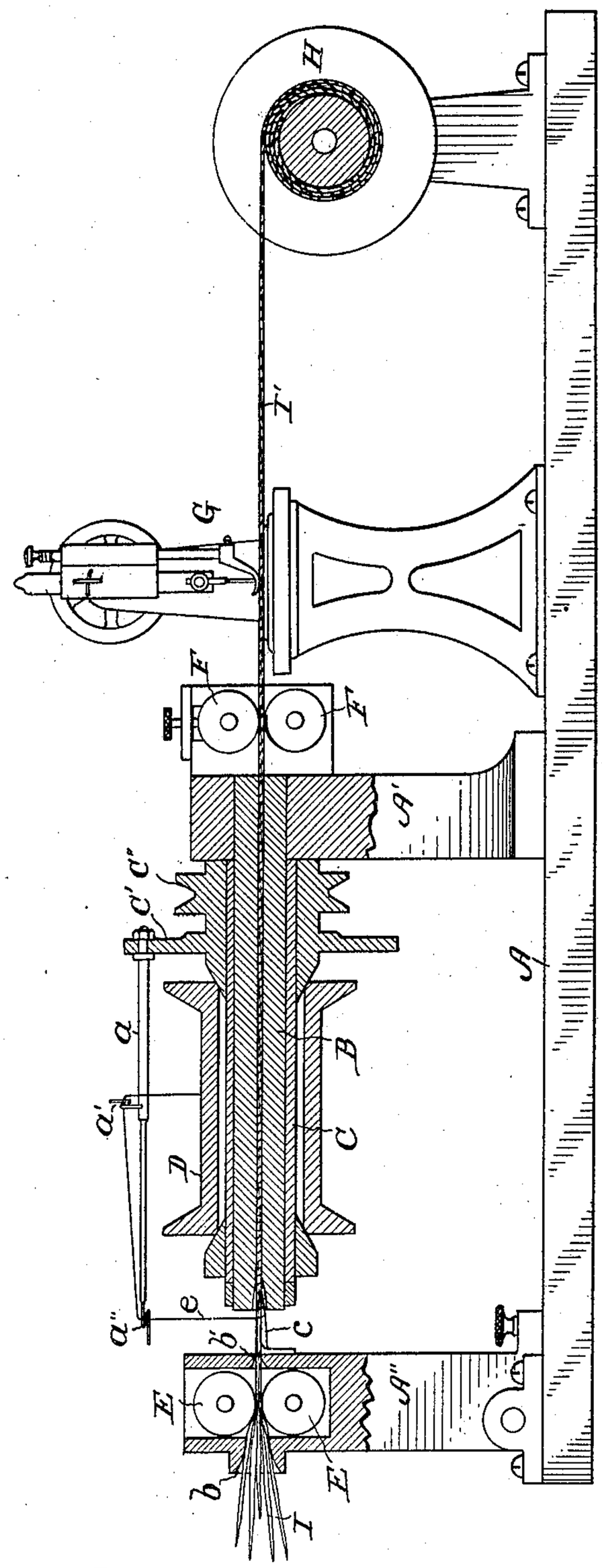

Fig. 1.

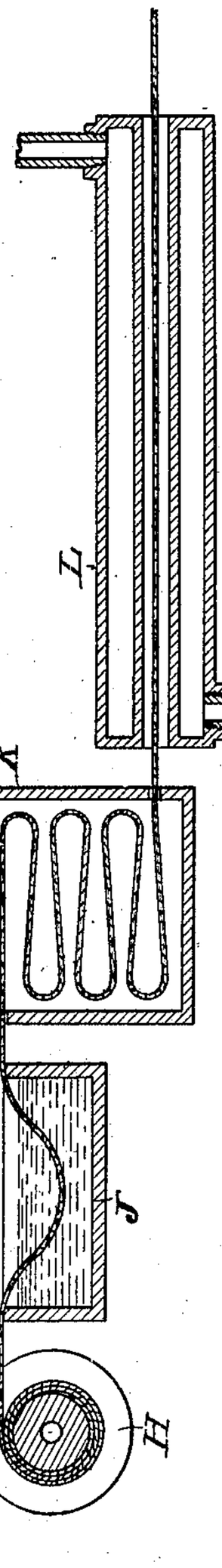

Fig. 2.

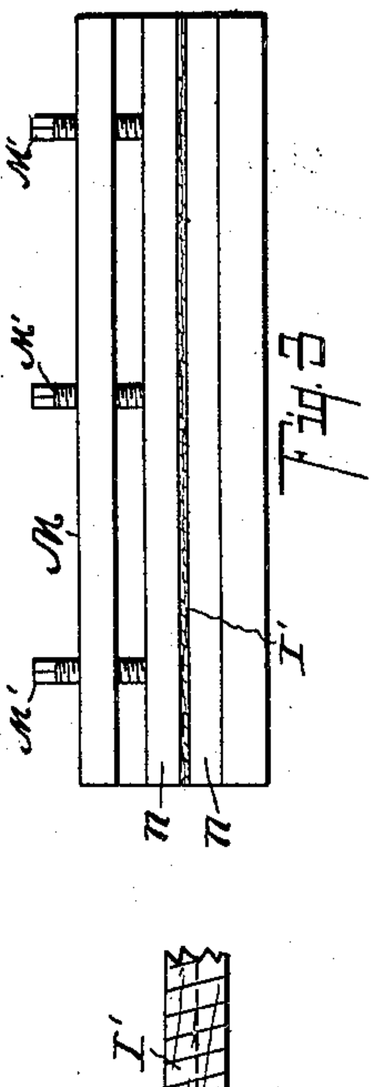

Fig. 3.

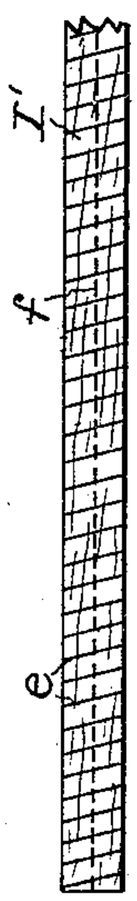

Fig. 4.

Witnesses:
D. Eldred Wood
Otis A. Earl

Inventor,
Edward K. Warren
By Fred L. Chappell
Att'y.

No. 789,826. Patented May 16, 1905.

UNITED STATES PATENT OFFICE.

EDWARD K. WARREN, OF THREEOAKS, MICHIGAN.

STIFFENING MATERIAL.

SPECIFICATION forming part of Letters Patent No. 789,826, dated May 16, 1905.

Application filed February 20, 1901. Serial No. 48,042.

To all whom it may concern:

Be it known that I, EDWARD K. WARREN, a citizen of the United States, residing at the village of Threeoaks, in the county of Berrien and State of Michigan, have invented certain new and useful Improvements in Stiffening Material and Processes of Making the Same, of which the following is a specification.

This invention relates to an improved method or process of manufacturing flat blades from stiffening fiber and to the product. A part of the process relates particularly to the manufacture of such blades from the fibered quill portion of feathers.

The objects of the invention are, first, to produce a flat blade in which a minimum amount of wrapping material is employed; second, to produce a flat blade from quill fiber which shall be substantially pure quill substance and of any required dimensions.

Further objects of the invention will appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in this specification.

The invention is clearly defined and pointed out in the claims. Machines and devices by which my improved process is carried out appear clearly in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a detail vertical longitudinal sectional view through a machine by means of which I preferably accomplish the first portion of my improved process. Fig. 2 indicates diagrammatically the apparatus for treating the blade after the fibers have been properly assembled into a blade. Fig. 3 indicates diagrammatically a press for the final finishing of the blade. Fig. 4 is a detail view of the blade, showing its external appearance when completed.

In the drawings similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A is the base of a machine by which the first portion of the process is accomplished. A′ A″ are brackets which carry the feed devices. E E are feed-rolls. *b* is the circular throat for delivering fiber to the same. I is the fiber as it is delivered into the throat. *b′* is the rectangular or oblong throat leading from the feed-rolls. *c* is a blade for supporting the fiber and receiving the wrapping-thread *e*. B is the spindle of the winder having a rectangular axial passage. C is the sleeve which carries the spool of thread D. Disk C′ with its finger *a* and guides *a′ a″* deliver thread from the spool of the winder. C″ is the driving-pulley. F F′ are compression-rolls; G, the sewing-machine; H, the reel.

When the blade has been wound in the flat form, as shown, the fiber is a good deal exposed, owing to the small amount of wrapping-thread around the same. I take the reel H, having the flattened blade I′ thereon, and pass the blade therefrom through a bath J, containing a suitable sizing which may be any suitable adhesive material, as glue, which should be quite thin, as very little of it is needed on the blade. The blade is then passed through a drying-box K and then through a steam-heating apparatus L, this sizing-box, drying-box, and steam-heating apparatus being the same as shown in patent issued to myself and J. H. Holden, May 12, 1896, No. 559,827. The blade is heated until it becomes soft and pliable and slightly adhesive, and while still thus heated, so that the fibers are soft and the sizing thereon is thoroughly softened, it is passed into a press, where a heavy dead pressure is brought to bear, which owing to the thoroughly softened condition of the fiber flattens the blade thin and even and forces the small amount of thread into the fiber and the whole is compacted and the fibers intermesh and adhere to each other. It is allowed to cool in the press, so that the fibers will not be moved on each other and will properly adhere to each other, owing to the glue or adhesive matter developed from the quill fiber by the heating or from the sizing thereon. This heavy continuous pressure holds the fibers exactly in position until the sizing sets and produces a smooth flat blade of very superior quality which apparently does not depend on the wrapping-thread for retaining it in position, but the fibers adhere to each other, making a blade that is substantially as continuous and perfect as a

piece of whalebone, though made of much more substantial, firm, and elastic fiber. I have shown the press for use in this connection as a screw-press. Any press could be employed for the purpose, and there has been devised by some of my coworkers a press for accomplishing this treatment of the blades continuously. I have shown a machine and apparatus for accomplishing this result, but it is obvious that it could be accomplished by hand, though of course not so expeditiously. A bundle of fiber could be loosely wound by hand, then flattened, and a row of stitches made by hand or by a machine longitudinally therethrough, which would compress the wrapping-thread and secure the proper formation of the blade with the requisite economy of material. When the blade is made up in this way, it can of course be applied to all of the uses and accomplish all of the functions of a stiffening-blade made in any other way.

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

1. A blade made up of quill fiber retained in a bundle by a wrapping-thread compressed by a longitudinal row of stitches, the fibers being compacted and cemented together, as specified.

2. A blade made up of fiber retained in a bundle by a wrapping-thread compressed by a longitudinal row of stitches.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

EDWARD K. WARREN. [L. S.]

Witnesses:
MORRIS G. MCGAWN,
MARY A. DAVIDSON.