(No Model.)

J. T. WARING.

Art of and Apparatus for Felting Hat Bodies, &c.

No. 227,332. **Patented May 4, 1880.**

Fig. 1.

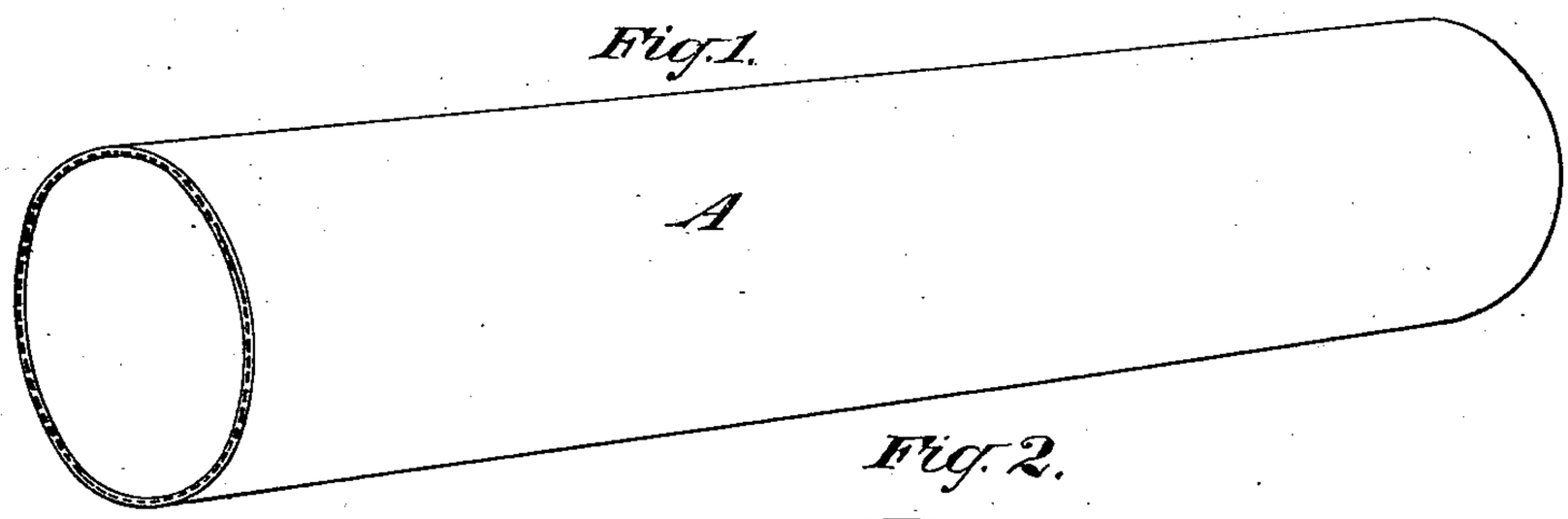


Fig. 2.

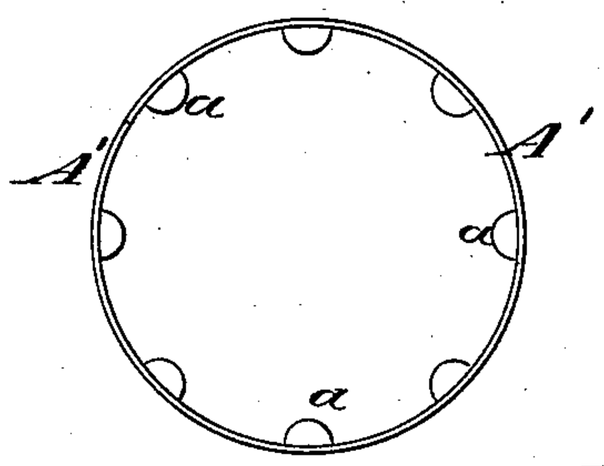


Fig. 3.

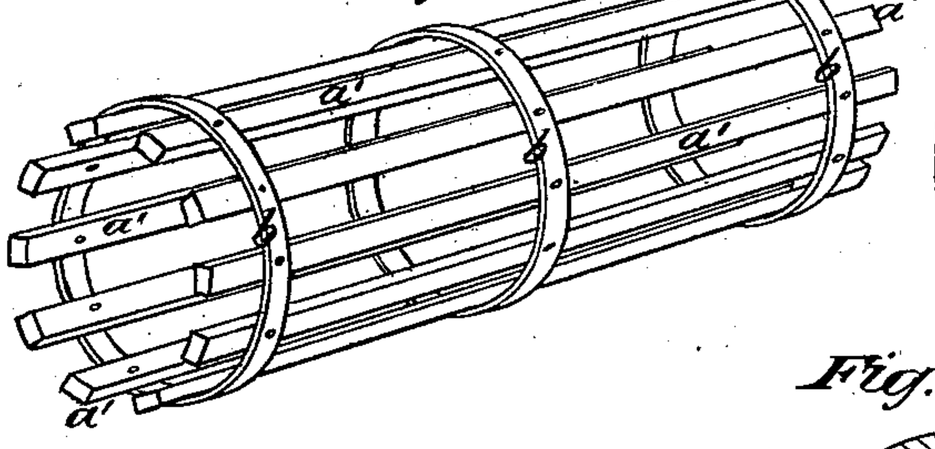


Fig. 4.

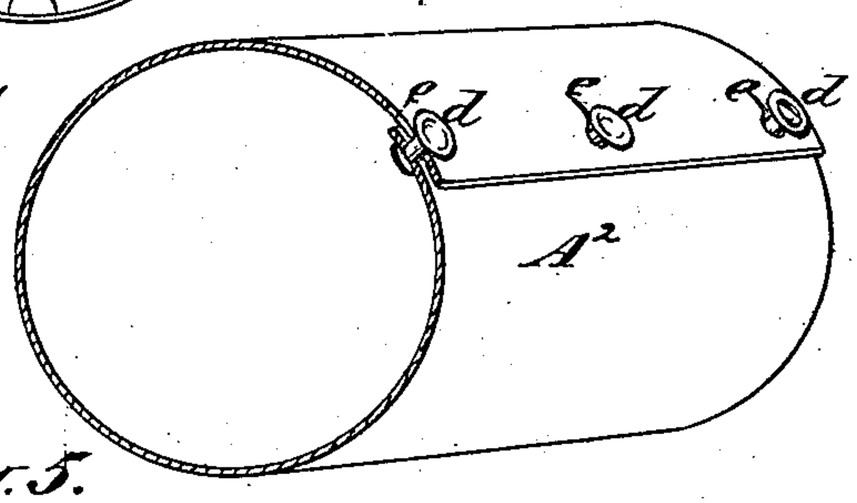
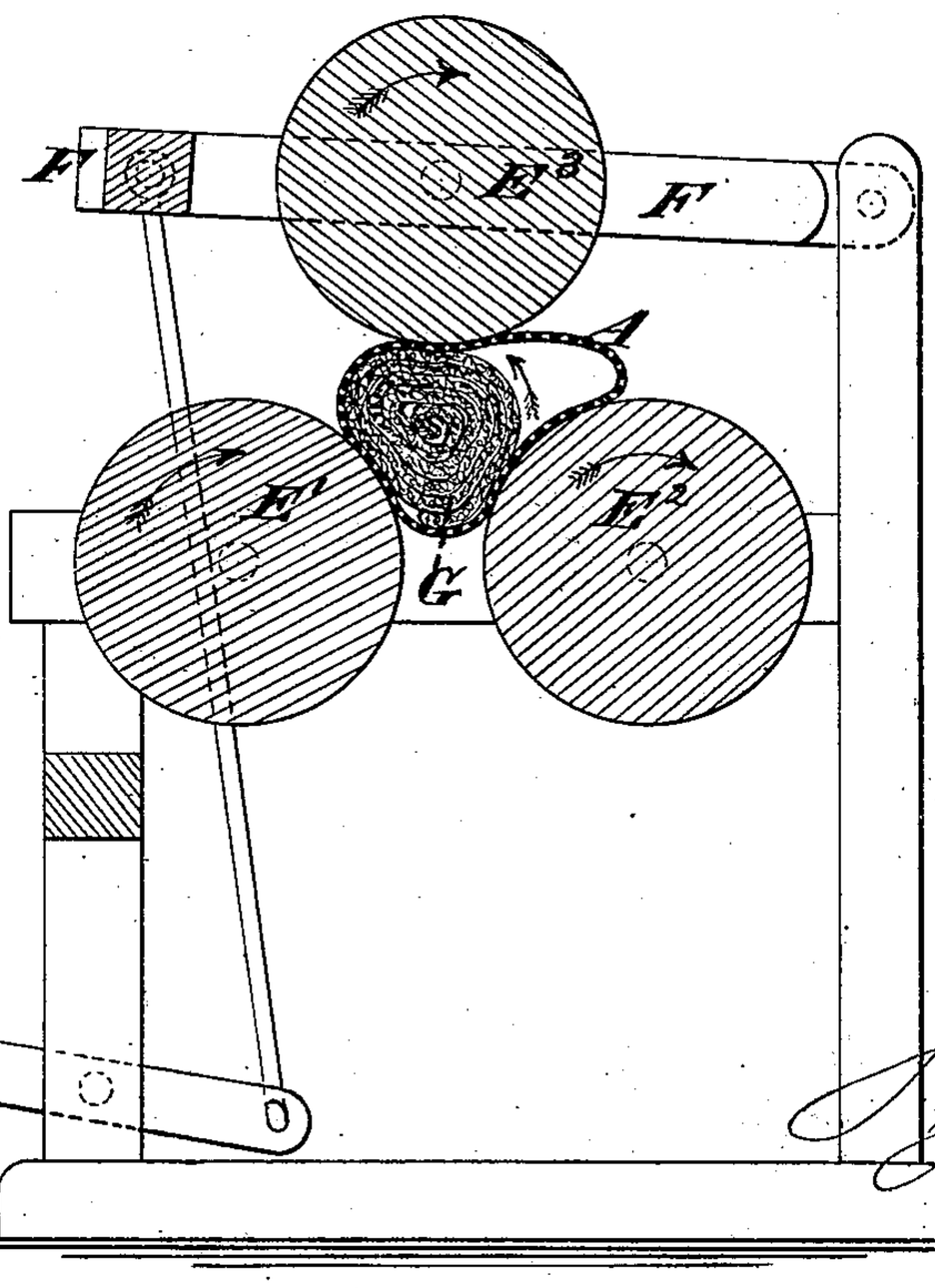


Fig. 5.



Witnesses
John Becker
Fred'k Haynes

Inventor
John T. Waring
by his Attorneys
Brown & Brown

UNITED STATES PATENT OFFICE.

JOHN T. WARING, OF BOSTON, MASSACHUSETTS.

ART OF AND APPARATUS FOR FELTING HAT-BODIES, &c.

SPECIFICATION forming part of Letters Patent No. 227,332, dated May 4, 1880.

Application filed March 23, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. WARING, of the city of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in the Art of and Apparatus for Felting Hat-Bodies and other Articles, of which the following is a specification.

This invention is more particularly intended to be used in the final stage or stages of the felting process known as "second sizing" and "knocking up," and to perform what is commonly known as "glove-work;" but it may be used in earlier stages of the felting process.

It consists, principally, in subjecting the hat-bodies or other articles to be felted, in a wet or moistened state, to a rolling and pressing operation in a tube, which is flexible or capable of changing the form of its transverse section.

It also consists in a "sizing-cloth" constructed of tubular form. This flexible tube or tubular sizing-cloth may be made of a woven fibrous fabric or of india-rubber or other material. It may have a smooth surface, or be provided internally with projections, or have an uneven internal surface, or be composed of a series of parallel rods or slats held together in tubular form by bands of flexible material.

The desired operation may be performed in such a tube by rolling it by hand, as in the hand process of sizing hat-bodies in an ordinary sizing-cloth, or by subjecting the tube with the contained hat-bodies to a rolling and compressing operation between rollers, to which rotary motion is given by suitable means; and one feature of my invention consists in the combination of such a tube or tubular sizing-cloth with a system of rollers, by which it is rolled and pressed.

The essential characteristic of the felting operation performed in the flexible tube or tubular sizing-cloth as distinguished from that performed in a sizing-cloth of the ordinary kind, which is rolled up around the hat-bodies or articles to be felted, is that it does not tighten upon the articles and so bind and confine them as to interfere with the "working" which is necessary to felting, but retains its normal inner circumference, and has always room left within it for working.

Figure 1 represents a perspective view of a tubular sizing-cloth or flexible "sizing-tube" consisting of a piece of ordinary woven tubular fabric, A, of cotton or other fibrous material, such as is commonly used for hose. Such a tube for sizing hat-bodies may be about eighteen inches long and about four inches internal diameter.

Fig. 2 is a transverse section of such a tube or tubular cloth, A′, having slats *a a* arranged longitudinally within it, and secured to its inner surface at suitable intervals apart. Instead of such slats, the tube may be provided with internal projections in the form of knobs, bosses, or buttons. The slats, knobs, bosses, or buttons may be made of wood or other material, and be secured to the cloth by sewing, riveting, or otherwise. The tube, either made smooth, as shown in Fig. 1, or with internal projections, as shown in Fig. 2, may be made of india-rubber or india-rubber cloth. If made of india-rubber, the slats or other internal projections may be formed of the same material.

Fig. 3 is a perspective view of a modification of the tubular sizing-cloth, consisting of a tube composed of a series of slats, a' a', arranged parallel with each other and united by bands *b b*, of india-rubber or other flexible material.

Fig. 4 is a perspective view of a sizing-tube or tubular sizing-cloth, A^2, which is not woven or originally manufactured in tubular form, but composed of a piece of cloth having buttons *d d* and button-holes *e e* at opposite edges, and having said edges brought together and buttoned. This is shown as a substitute for the tube A, having, when a roll of hat-bodies is placed in it, the same characteristic which distinguishes the said tube A from an ordinary sizing-cloth—viz., an internal diameter which does not contract upon the roll.

Fig. 5 is a transverse sectional view of a felting-machine of a kind used in "sizing" hat-bodies, its principal elements consisting of three rollers, E′ E^2 E^3, of wood or other material, which have rotary motion imparted to them, as shown by the arrows marked upon them, the upper roller, E^3, being arranged in a hinged frame, F, to which is connected a treadle, H, and which permits pressure to be produced upon the said roller.

A sizing-tube or tubular sizing-cloth, A, is

shown in this machine containing a roll of hat-bodies, G. As hereinbefore mentioned, such a tube or tubular apron as I have herein described, with a roll of hat-bodies in it, may be manipulated by hand in the same way as an ordinary sizing-cloth. It may be worked by any other suitable means; but after practical test I prefer to use it in a machine such as herein just above described.

The hat-bodies, (from two to six in number, according to the caliber of the tube—about four in a tube of the size hereinabove specified,) having been moistened with hot water, or such liquor as is used for felting, are rolled up, not very tightly, and placed in the tube, which is then placed in the machine and subjected to the rolling operation produced by the rollers E' E^2 E^3. As the rolling proceeds and the bodies shrink, the tube does not, like an ordinary felting-cloth, contract upon them and keep rolling them tighter and tighter until they become a hard mass, and so impede the working of the felt; but it remains slack in the form substantially as shown in Fig. 5, and so leaves room for the working of the felt.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An improvement in the art of felting hat-bodies, consisting in placing such articles, in a moistened state, within a flexible tube, and subjecting the said tube to a rolling and compressing operation, substantially as herein described.

2. A sizing-cloth for felting hat-bodies or other articles constructed of tubular form, substantially as herein described.

3. A sizing-cloth for felting hat-bodies or other articles, consisting of a flexible tube having internal projections or an uneven internal surface, substantially as herein described.

4. The combination of the tubular sizing-cloth A and a series of rollers, B B C, substantially as herein described.

JOHN T. WARING.

Witnesses:
FREDK. HAYNES,
A. C. WEBB.