(No Model.)

J. T. WARING.

Machinery for Felting Hat Bodies, &c.

No. 231,873. **Patented Aug. 31, 1880.**

Fig. 1.

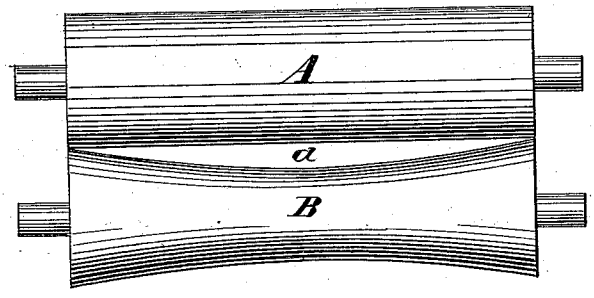
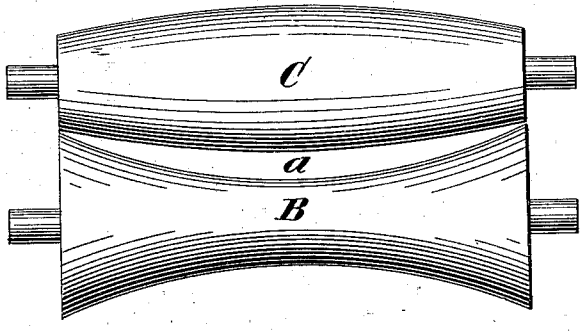


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN T. WARING, OF BOSTON, MASSACHUSETTS.

MACHINERY FOR FELTING HAT-BODIES, &c.

SPECIFICATION forming part of Letters Patent No. 231,873, dated August 31, 1880.

Application filed July 26, 1880. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. WARING, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Machinery for Felting Hat-Bodies and other Articles, (Case G,) of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to that class of felting-machine, or, as it is commonly termed, "sizing-machine," for felting hat-bodies or other articles, the principal elements of which are a series of rollers having parallel or nearly parallel axes, and between and lengthwise of which a roll of hat-bodies or other articles in a sizing-cloth is placed and subjected to a rolling and pressing operation.

In Letters Patent of the United States No. 228,704, granted to me June 8, 1880, I have described and represented in such a machine a series of rollers having concave or taper longitudinal profiles, whereby there is formed between the said rollers, for the reception of the roll of hat-bodies or other articles, a cavity or pocket, which is larger at or near the middle of the length of the rollers and tapers toward its ends.

I have now discovered that approximately the same kind of cavity between the rollers, and the advantages resulting from such form of cavity, may be obtained by making some of the rollers of the series in the machine concave or tapering from the ends toward the middle of their length, and others with straight or even slightly-convex profiles; and this invention consists in the combination, in such a machine, of rollers with concave longitudinal profiles and rollers with straight or convex longitudinal profiles.

As a machine embodying this invention may, except as to the forms of some of its rollers, resemble either the machines represented and described in my above-mentioned Letters Patent or the roller-machines of the same class previously used with only cylindrical rollers, I do not consider it necessary in this specification to represent or particularly describe any parts of a machine but the rollers.

Figure 1 in the drawings represents a longitudinal view of one roller, A, of cylindrical form, or having a straight longitudinal profile, and one roller, B, having a concave longitudinal profile, arranged to work together; and Fig. 2 represents a similar view of one roller, B, of concave longitudinal profile, and one roller, C, of convex longitudinal profile, arranged to work together.

It will be seen that the cavity *a*, formed between either of these combinations of rollers, is larger at the middle of the length of the rollers and tapers toward the ends thereof; but it must be observed that the degree of convexity of convex profile must be less than the degree of concavity of the concave profile, in order to give the requisite form to the cavity *a*, hereinbefore described.

The machine containing such rollers may have two or more rollers of concave longitudinal profile and one or more of straight or convex longitudinal profile, or may have two or more rollers of straight or convex longitudinal profile and one or more of concave longitudinal profile.

Any one or more of the several rollers of a series of three or more of the rollers may be concave and the other or others straight or convex without regard to their position in the series.

One or more rollers of straight profile and one or more of convex profile may be used with one or more of concave profile.

The several rollers may rotate at the same or at different velocities.

The several rollers of either form may be either smooth or constructed with ribs, lags, knobs, or other protuberances on their peripheries.

The concavity of profile in the concave rollers may be formed in any of the ways described in my aforesaid Letters Patent.

The convexity of profile in the convex rollers may be produced in the bodies of the rollers, or by making their lags, ribs, or protuberances of a shape to produce such convexity.

I consider, in this combination of rollers of concave and straight or convex profile, the straight and convex rollers to be the equivalents of each other, provided the relative convexity and concavity when convex rollers are

used is such as to produce between the associated rollers a cavity, *a*, larger at or near the middle of the length of the rollers and tapering toward the ends thereof.

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

The combination, in a machine for sizing or felting hat-bodies or other articles, of rollers of concave and rollers of straight or convex longitudinal profile, substantially as herein described, for the purpose set forth.

JOHN T. WARING.

Witnesses:
ARTHUR B. WARING,
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