M. D. Whipple.

Felting Mach.

No. 84,599. Patented Dec. 1, 1868.

Fig: 1.

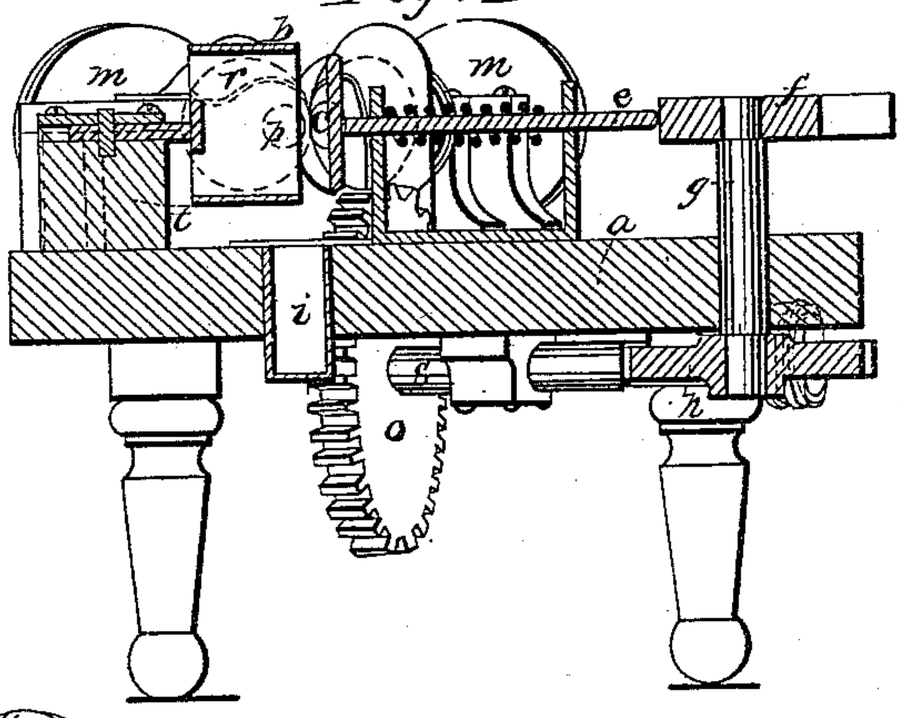


Fig: 3.

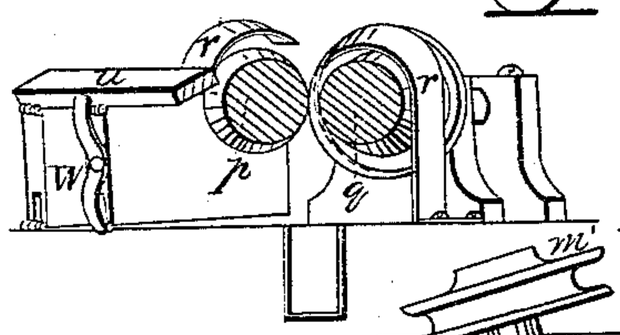
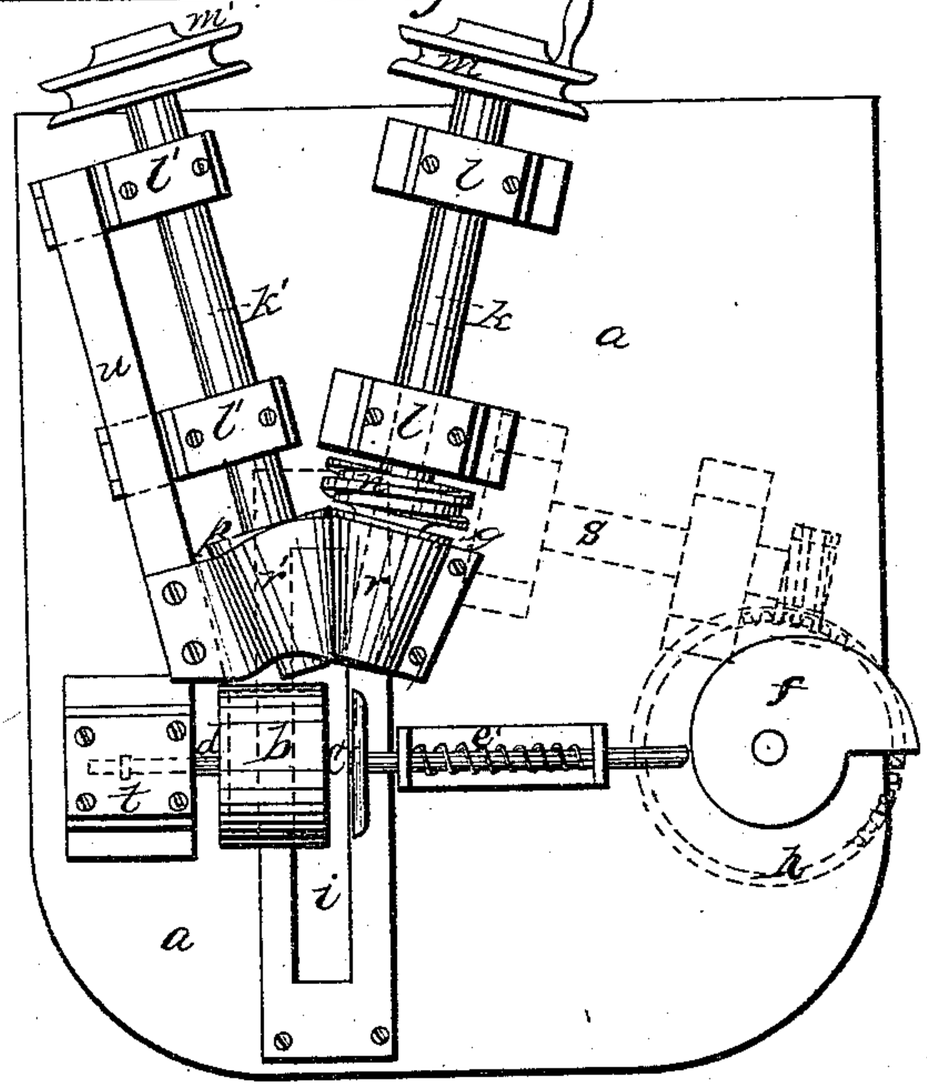


Fig: 2.



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MILTON D. WHIPPLE, OF CAMBRIDGE, MASSACHUSETTS.

Letters Patent No. 84,599, *dated December* 1, 1868.

IMPROVEMENT IN FELTING HATS.

The Schedule referred to in these Letters Patent and making part of the same.

Be it known that I, MILTON D. WHIPPLE, of Cambridge, in the county of Middlesex, and State of Massachusetts, have invented a new and improved Machine for Felting Hats in shape, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents an elevation and vertical cross-section of a machine in which my invention is embodied.

Figure 2 is a plan view of the same, showing the entire mechanism of its structure.

Figure 3 is a partial end elevation, showing the rollers and manipulators only, other parts having been removed.

The object of my invention is to form a hat in proper shape during the process of felting, transforming through its agency a circular disk of any felting-substance into a hat of the desired shape, and of well-combined and condensed material.

The invention consists in a combination of mechanism by which a circular disk of felting-material, properly placed in the machine, is made to revolve, a portion of it always being immersed in a liquid employed in felting, as it revolves, and its middle part being, by a uniform but slow motion of a disk, to be described, forced into a shaping-mould or cylinder, while the outer part of the same felt-disk passes between two condensing-rollers and two manipulators, which, in combination with the rollers, imbricate and compact together the felting-fibres, at the same time preventing the formation of folds or wrinkles in the material as it is forced into the mouth of the mould for the crown of the hat. The whole may be actuated by a single driving-pulley.

My invention also consists in an arrangement of springs by which the manipulation of the felt is rendered efficient, and the tearing of the material prevented. It also makes the removal of the hat, when formed, immediate and easy.

My invention may be applied to the manufacture of hats from any felting-material, while the combination for manipulating and condensing the felt may be employed in the shaping of any felted article.

Referring to the drawings, *a* is a horizontal platform or table, to which all the remaining parts of the machine are attached.

The table *a* is pierced by a tub or bath, *i*, which contains a suitable liquid, through which the felt-disk is made to pass during the formation of the hat.

A standard, *t*, attached to the table *a*, has, at its top, a box with a long bearing, in which the stem, *d*, of the mould *b* revolves, while longitudinal motion is prevented by a small rectangular thread about the stem *d*, as often employed for the same purpose.

The crown-mould *b* is a hollow cylinder, attached to the stem *d* by a diametral bar across across the end adjacent to the standard *t*. The other end of the mould *b* is open, and the whole turns with perfect freedom around the axis of figure of the cylinder.

c is a circular disk, attached, at its centre, to the end of a light bar, *e*.

The diameter of the disk *c* is less than the same internal dimension of the mould *b*, and its office is to gradually press into the mould *b* the disk of felt, thus forming the crown of a hat.

The bar *e* passes through opposite bearings in two upright standards, connected together by a horizontal band, by which they are attached to the table *a*, and as one piece, designated by the letter *e'*.

Between the standards, *e'*, a spiral spring surrounds the stem *e*, by means of a pin, which passes through the stem *e*, and projects upon both sides of it. This spring is compressed when the disk *c* is made to enter the mould *b*.

A horizontal cam is attached to the top of a vertical shaft, *g*.

The end of the stem *e* is kept in contact with the edge of the cam *f* by the spring just described.

The radii of the cam *f*, measured from the axis of the vertical shaft *g*, increase uniformly in length, as the cam advances, three hundred and sixty degrees around the axis *g*. The longest and shortest radii lie in the same line. This allows the quick return of the disk *c* when it has reached the limit of its course. The least radius is sufficiently short to allow the disk *c* to withdraw from the mouth of the mould *b*, leaving a sufficient interval between itself and said mould *b* for the introduction of the circular disk of felt before referred to.

The difference in length between the longest and shortest radii is a little greater than the depth of the crown of the hat to be formed.

The vertical shaft *g* is sustained in its position by a bearing or box secured to the table *a*.

Beneath the table, and upon the lower end of this shaft *g*, is a spur-wheel, *h*, to which motion is communicated by a worm-wheel attached to the extremity of a horizontal shaft, *s*, which has attached, at its other end, a spur-wheel, *o*.

The shaft *s* is secured in its position by two boxes attached to the under side of the table *a*.

The upper part of the spur-wheel *o* projects above the table *a*, and engages with a worm, *u*, upon the shaft *k*.

The shaft *k* is supported by two standards, *l*, attached to the table *a*.

Upon the end of the shaft *k* furthest from the disk *c* is affixed a pulley, *m*, by which the whole machine may be actuated.

Another shaft, *k'*, rests within two standards, *l'*, being at an equal height with the shaft *k*, above the table *a*.

The angle included between the two shafts *k* and *k'* is twice the angle of slope of the similar conical rollers *p* and *q*, attached to the adjacent ends of the shafts *k* and *k'*.

The two standards *r* are attached to the table *a* by

hinged joints at the external edge of their bases. These joints permit the standards *l'*, with the associated shaft *k'* and roller *p*, to be turned over and back, thus removing the roller *p*, attached to the shaft *k'*, from its combination with the roller *q* upon the shaft *k*.

Upon the outer end of the shaft *k'* is a pulley, *m'*, by which motion may be communicated to the shaft *k'* and the roller *p*, if desired.

The rollers *q* and *p* are equal truncated cones attached to the shafts *k* and *k'*, as specified, and arranged in sufficiently close association with each other to condense the annular external part of the felt disk, which is made to pass between them during the action of the machine.

The line of contact of the rollers *p* and *q* is at right angles to the direction of the stem *d*, attached to the mould *b*.

Above the two conical rollers *p* and *q* are two elastic manipulators, *r* and *r'*, curved, each parallel to the conical roller with which it is associated.

The manipulator *r* is attached by its foot directly to the table *a*.

The manipulator *r'* is attached, as shown in fig. 2, to a bar, *u*. The bar *u* is fastened by hinges upon its under side to the two standards *l'*.

A spring, *w*, shown in fig. 3, attached to one of the standards *l'*, presses against the back of the bar *u* and maintains the manipulator *r'* in its primary position by affording elastic resistance to its displacement.

The manipulators *r* and *r'*, when they approach each other and the line of contact of the rollers *p* and *q*, have straight, smooth edges, parallel to the same line of contact. Between these edges or faces the felt is received from the rollers *r* and *r'*. These edges, in virtue of their own elasticity and that of the spring *w*, have a continuous vibrating motion, while the felting-material is in contact with them, and moving at a uniform rate between them. This vibrating motion causes them to work over or combine and involve together the fibres of the felt, at the same time keeping in proper shape that part of the felt-disk about to be drawn into the mould *b*.

The roller *r* has right-handed rotation, as we look toward it from the disk *c*.

By the combination of worms and spur-wheels with the cam *f*, before described, the progressive motion of the disk *c* is made very slow, while the speed of the rollers *r* and *r'* is considerable. This enables the felt-disk to be shaped and condensed thoroughly, while it is gradually fed into the mould *b*. Friction between the felting-piece and the roller *r'* may be relied upon to give motion to that roller, but an equable, uniform motion of the two rollers is better secured by causing the pulley *m'*, as well as the pulley *m*, to be moved directly by the external power.

To shape a hat, a circular disk of any felting-material is taken, moistened with a suitable liquid, such as is contained in the bath *i*, and placed between the disk *c* and the mouth of the mould *b*, while that part of the felt-disk beyond the edge of the mould *b*, and adjacent to the rollers *p* and *q* and the manipulators *r* and *r'*, is placed between them, the roller *p*, with its shaft *k'*, being turned one side for that purpose, as permitted by an arrangement before specified. The machine is then set in motion by the pulleys *m* and *m'*, the cam *f* revolves slowly, the disk *c* advances within the mould *b* and the rollers *p* and *q*, and the manipulators *r* and *r'* shape and condense the annular portion of the felt-disk, which passes between them, and is in part drawn within the mould *b*.

When the cam *f* has performed exactly one revolution, the stem *e*, with the attached disk *c*, is permitted, by the cam *f*, and forced by the then compressed spiral spring, (contained, about the stem *e*, between the two standards *e'*,) to return to its primary position.

The mould *b* turns freely with the felting-material therein contained.

The roller *p* and the manipulator *r'* having been turned one side, permit the instant removal of the hat already formed, and its immediate replacement by a new disk of felt.

The rapidity of the process and the well-compacted texture of the product are especial advantages of my invention. No part of the machine is liable to require frequent adjustment or repairs.

Working models of the machine have produced small hats possessing the qualities above set forth.

The employment of my invention, by greatly diminishing the time, labor, and amount of manual skill at present required in this branch of industry, would greatly increase the producing-power of the capital at present invested. Moreover, the articles produced would be superior to those now manufactured.

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

1. The process herein described of forming hats, by felting the same into proper shape from a flat circular piece of suitable material, by a continuous automatic operation, substantially as set forth.

2. The combination of the manipulators *r r'* with the conical rollers, as and for the purpose described.

3. The combination, with the conical rollers, of the mould *b* and movable disk *c*, substantially as and for the purpose set forth.

4. The combination of the disk *c*, rod *e*, and spring *e'* with the cam *f*, substantially as and for the purpose described.

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

MILTON D. WHIPPLE.

Witnesses:

J. H. ADAMS,

EDW'D F. ADAMS.