H. G. ELLSWORTH.
Felting-Machines.

No. 210,413. Patented Dec. 3, 1878.

Fig. 1

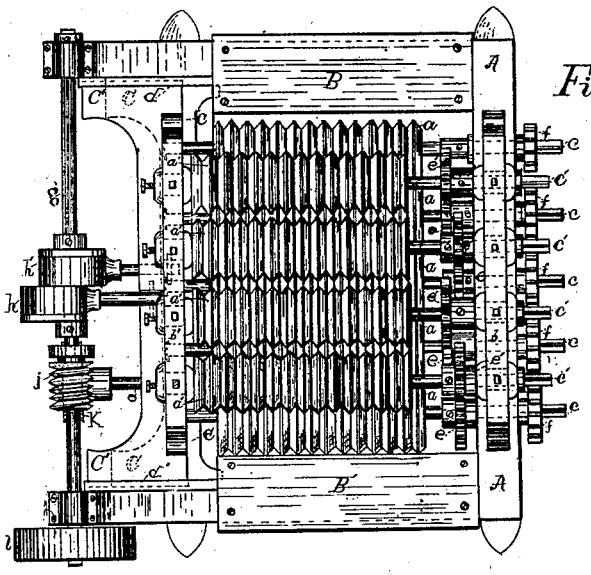


Fig. 2

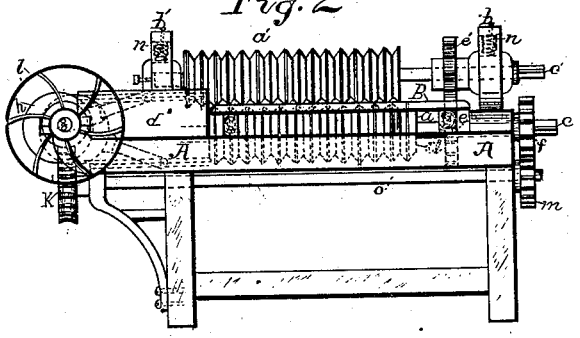
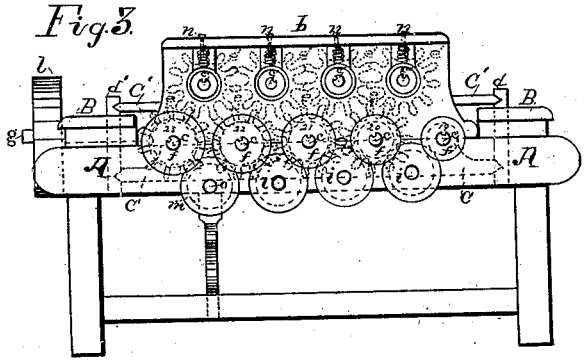


Fig. 3.



Witnesses:
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by
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UNITED STATES PATENT OFFICE.

HENRY G. ELLSWORTH, OF PAINESVILLE, OHIO, ASSIGNOR TO ELIZABETH ELLSWORTH, OF SAME PLACE, AND CHARLES A. AVERY, OF NEW YORK, N. Y.

IMPROVEMENT IN FELTING-MACHINES.

Specification forming part of Letters Patent No. **210,413**, dated December 3, 1878; application filed October 25, 1878.

To all whom it may concern:

Be it known that I, HENRY G. ELLSWORTH, of Painesville, in the county of Lake, State of Ohio, have invented a new and useful Improvement in Felting-Machines, of which the following is a specification:

My invention has for its object the felting of hat-bodies and other material; and consists of a series of vibrating and rotating rolls, said rolls controlled and operated by a variable train of gears.

In the accompanying drawing, in which similar letters of reference indicate like parts, Figure 1 is a plan of the machine embodying my invention; Fig. 2, a side, and Fig. 3 an end, elevation.

A is the frame. B′ B are the tables or guide-boards for the work, for passing it into and receiving it from the rolls.

b′ b are standards for supporting the bearings of the shafts *c′ c*, &c., to which are secured the upper set of rolls, *a′ a′ a′ a′*, which are capable of a vertical adjustment by means of the springs *n* allowing the rolls to accommodate themselves to the different thicknesses of material passing between them.

The standard *b′* is attached to and forms part of the cross-head C′. One end of the shafts *c*, to which are secured the lower set of rolls *a*, also runs in bearings attached to the lower cross-head, C, similar to the upper set.

The vibrating motion is given to the rolls *a′ a* by the eccentrics *h′ h* on the driving-shaft *g*, on one end of which is the driving-pulley *l*. The eccentric *h′* is attached to the upper cross-head, C′, running in the guides *d d*. The eccentric *h* is attached in a similar manner to the lower cross-head, C.

The rotating motion is produced by the worm and worm-gear *j* and *k* on the shafts *g* and *o*.

On the other end of the shaft *o* is the driving-gear *m*, driving the variable train of gears *f* with the intermediates *i*.

On the shafts *c′ c*, and between the standards *b′ b*, are the long-tooth spur-gears *e′ e*, meshing into each other, their long teeth enabling the upper rolls to have a vertical adjustment without interfering with their rotating motion.

The upper and lower shafts, *c′* and *c*, have a free traverse motion through their bearings in the standard *b*, and also through the gears *e′ e f*, to accommodate the vibrating motion of the rolls *a′ a*. Keys are fitted to the said gears and keyways cut in the shafts *c′ c*, to give the rotating motion.

The rolls thus represented are corrugated, but can be made of different shapes that would produce the necessary friction on the material to be felted.

The object of the variable speed produced by the train of gears *f f f f f*, giving to each roll an increase of speed over the one preceding it, causes the work to pass through the rolls perfectly straight, the gears (see Fig. 3) varying from the first gear of twenty-three teeth to nineteen in the last gear. Any rate of speed can, of course, be obtained by varying the teeth in the gears.

The combined vibrating and rotating motion thus described resembles the rubbing, rolling, and kneading process of hand-labor, but producing better, quicker, and more uniform work.

Having thus described my invention, what I claim is—

1. In a machine for felting, the vibrating and rotating rolls *a′ a*, the upper rolls, *a′*, provided with a vertical adjustment by means of the springs *n*, in combination with the spur-gears *e′ e* and variable train of gears *f*, with their intermediates *i*, substantially as described, and for the purpose set forth.

2. The combination of the vibrating and rotating rolls *a′ a* with the cross-heads C′ C, guides *d d*, eccentrics *h′ h*, substantially as described.

HENRY G. ELLSWORTH.

Witnesses:

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