

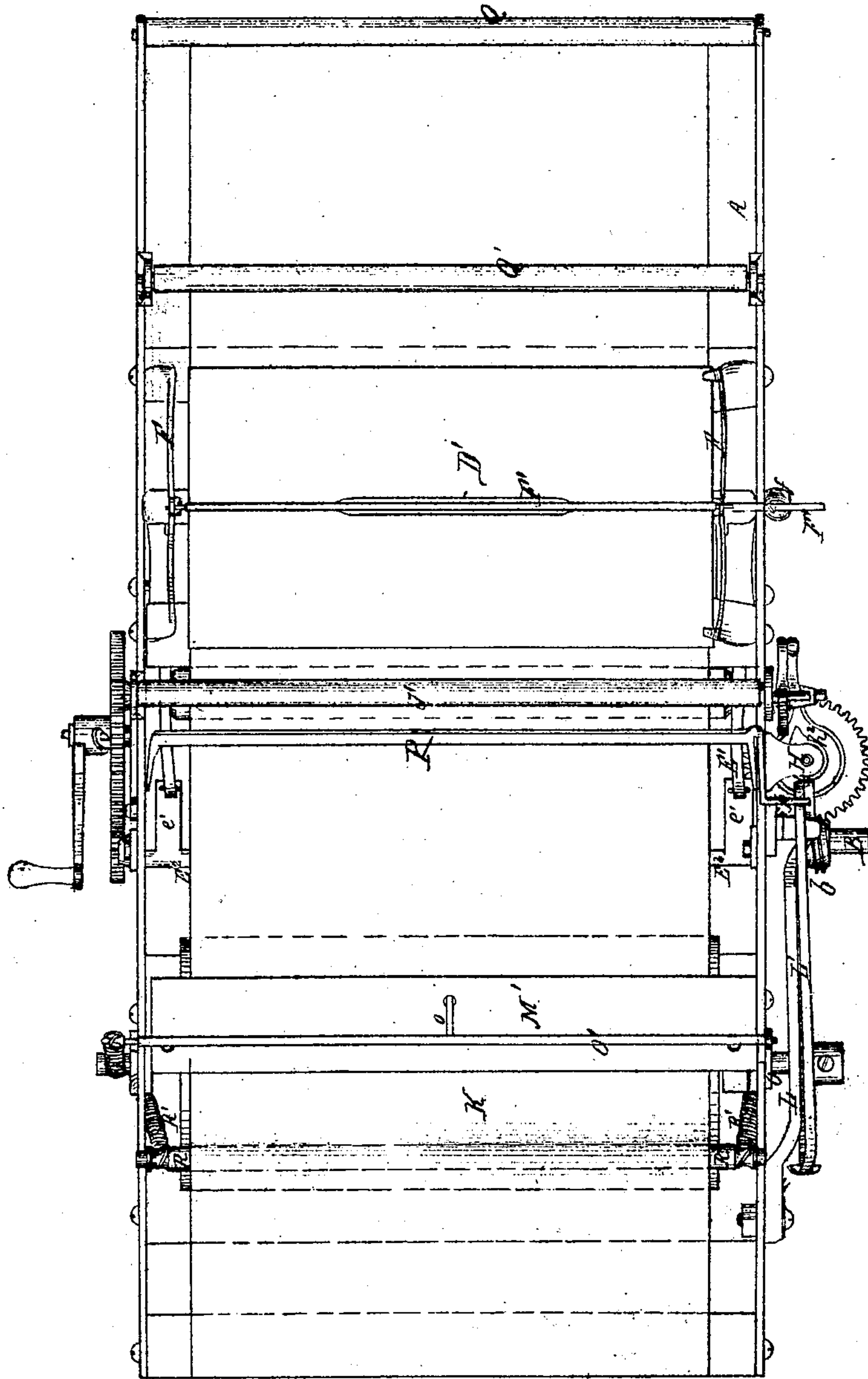
M. J. Whipple,
Felting Machine.

3. Sheets, Sheet 1.

No. 95862.

Patented. Oct. 12. 1869.

Fig. 1.



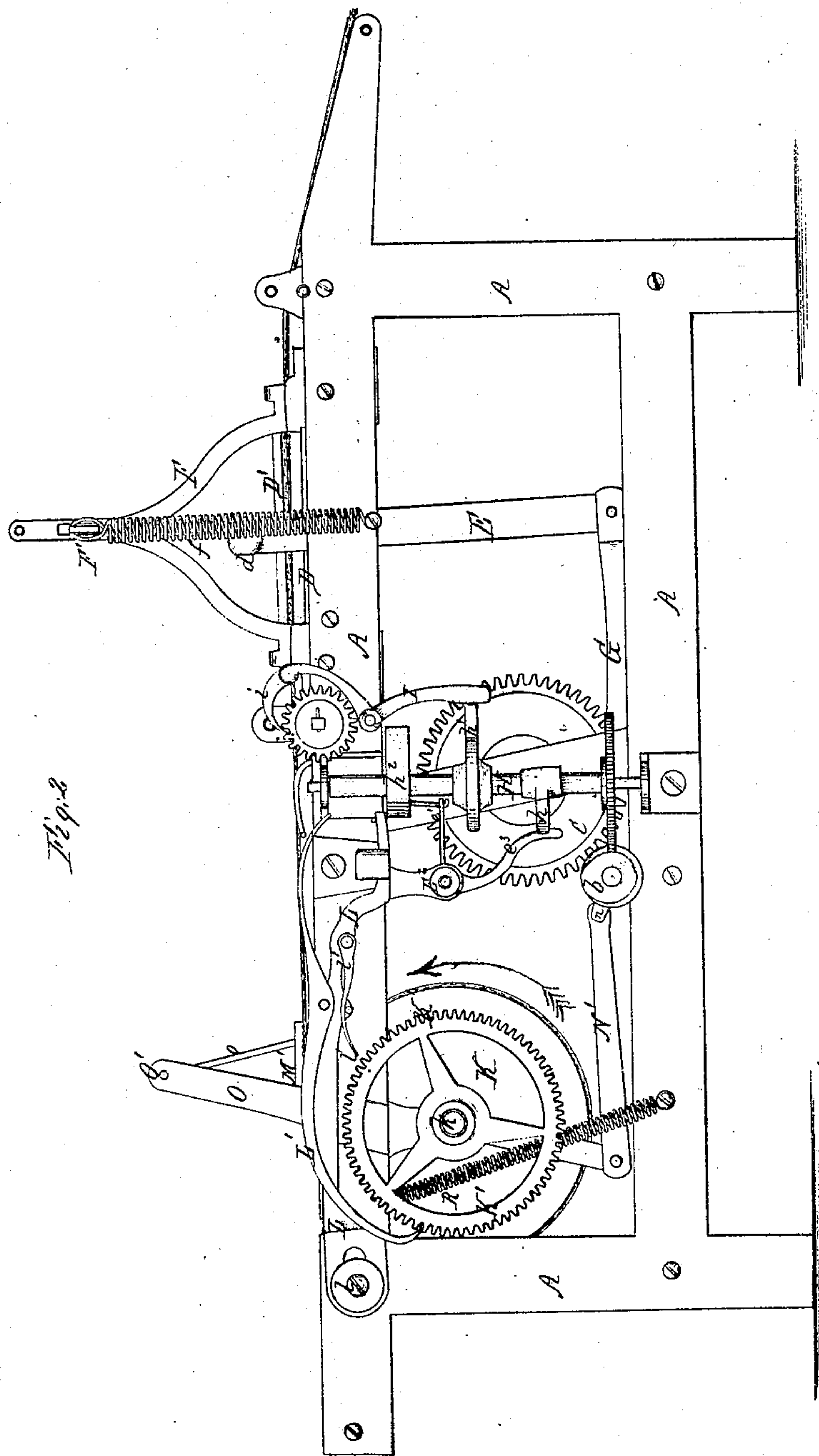
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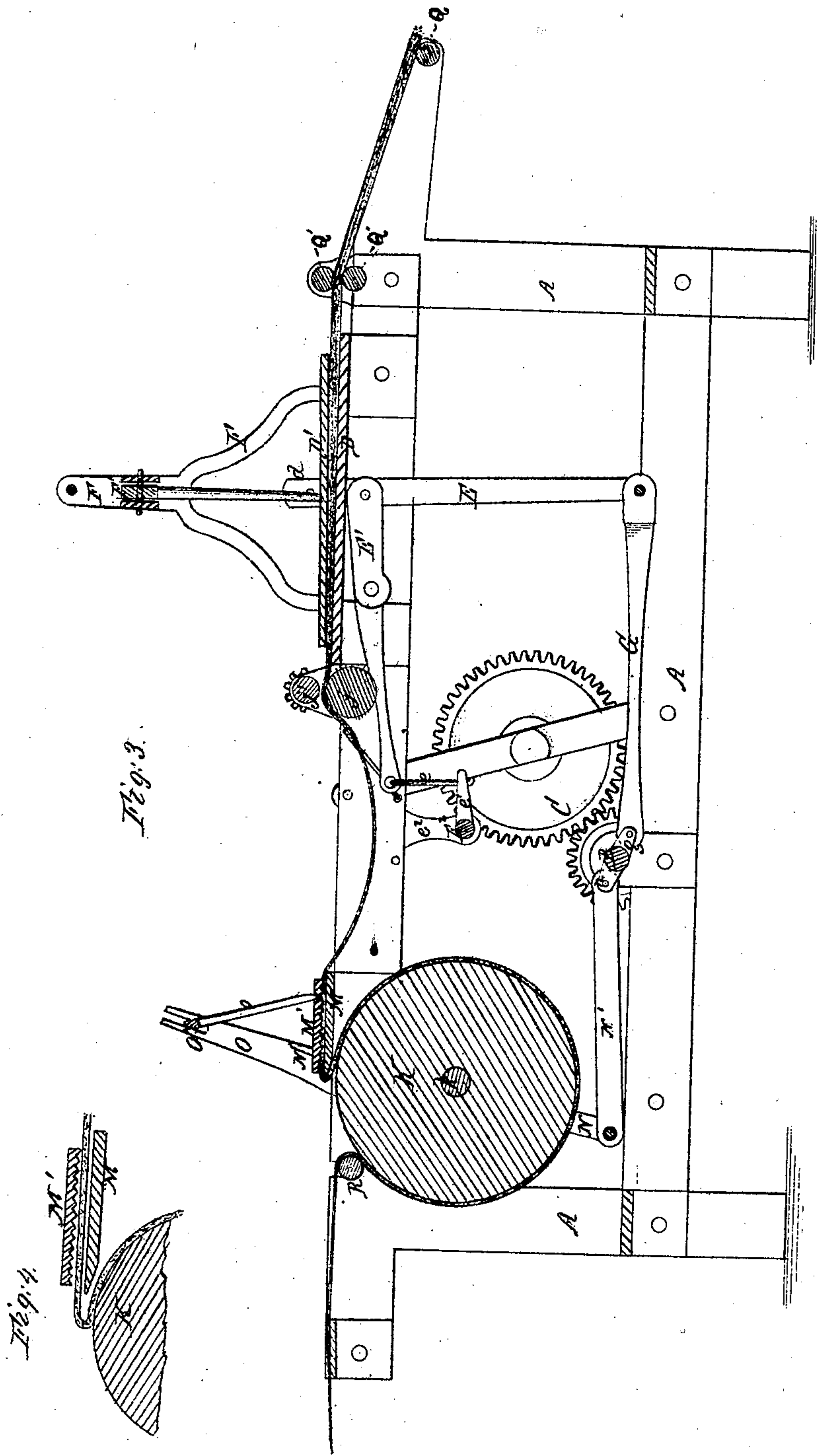


*M. J. Whipple,
Felting Machine.*

3. Sheets, Sheet. 3

No. 95862.

Patented Oct. 12, 1869.



UNITED STATES PATENT OFFICE.

MILTON D. WHIPPLE, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO
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IMPROVEMENT IN MACHINERY FOR THE MANUFACTURE OF FELT.

Specification forming part of Letters Patent No. 95,862, dated October 12, 1869.

To all whom it may concern:

Be it known that I, MILTON D. WHIPPLE, of Cambridge, county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Machinery for the Manufacture of Felt and other Cloths, 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 is a plan or top view of a machine embracing my improvements. Fig. 2 is a side elevation, and Fig. 3 is a longitudinal vertical section, of the same.

Similar letters of reference denote corresponding parts wherever used.

My invention has for its object the fulling of felt-cloth from the bat in such manner as to make the operation continuous, while at the same time the fulling is so effected as to render the cloth firm, soft, and pliable without the necessity of passing it through the usual machinery for fulling and the usual process of tentering after the cloth has been fullled.

The character of the improvement and of the several devices employed for carrying out my invention will be best understood from the following description of the same, with reference to the drawings, in which—

A represents a frame-work of any suitable size and material, in the lower horizontal part of which is mounted a main shaft, B, provided at one end with a pinion, which receives motion from a drive-wheel, C, operated in any desired manner.

On the upper portion of frame A is mounted a perforated bed, D, over which the bat passes, said bed being of a construction corresponding to those now in use, and adapted to let steam on the bat from underneath.

D' is a rubbing-plate, provided at its ends with central upright lugs or ears, *d*, which are pivoted to the upper ends of vibrating arms or levers E, through which a vibratory rubbing movement is imparted to the plate. The levers E are mounted or pivoted in horizontal levers E', which are pivoted in the sides of the frame A. The ends of levers E' (opposite those carrying levers E) are connected by links *e* with arms *e'* of a rock-shaft, E², mounted in pendants *e*², and by the movement of which

rock-shaft E² the levers E and rubbing-plate D' are raised and lowered, as desired, and for a purpose which will be explained hereinafter.

On the sides of the frame A and at the ends of the bed D are uprights F connected at their upper ends by a slotted bar, F', said bar being pivoted at one end and working in a slot in the upright at the other end, said end being further held down in place by means of a coil-spring, *f*, connected with the frame A. The slotted bar F' is provided with pendent rods or fingers, the lower ends of which rest in sockets in the rubbing-plate D', and serve, through the action of the coil-spring *f*, to hold the rubbing-plate D' firmly and evenly down on the bed D, (when not raised therefrom by the action of the rock-shaft E² and levers E', referred to.) The lower ends of levers E are connected by arms G with cranks or eccentrics *g*, (on the driving-shaft B,) by the rotation of which a vibratory rubbing motion is imparted to the rubbing-plate D'. The end of the shaft B (opposite that armed with the pinion) is provided with a worm or screw, *b*, which engages with and drives a worm-wheel keyed to the lower end of an upright shaft, H. Shaft H is armed with cams *h* *h'*, the former of which, *h*, operates an arm, *e*³, (attached to rock-shaft E²,) and serves thereby to raise the rubbing-plate D', through the medium of levers E E', above described, once in each revolution of the shaft H. The cam *h'* operates upon a pivoted lever, I, which actuates a pawl, *i*, at the upper end of said lever, the pawl *i* engaging with and rotating a pair of rollers, *j* *j'*, between which the cloth passes after leaving the bed D and rubbing-plate D'. Said rollers are actuated simultaneously with the raising of the rubbing-plate D', and serve to draw the cloth forward intermittently.

K represents a large drum or roller mounted on bearings in the frame A, and to which an intermittent rotary motion is imparted, as follows:

The shaft H is armed near its upper end with a grooved cam, *h*², in the groove of which a foot or pin attached to one end of a horizontal slide, L, works, the other end of said slide being slotted and working back and forth on a guide-pin or stud attached to the frame at *l*.

L' is a pawl pivoted centrally on the slide

L. The hooked end of said pawl L' engages with a ratchet or toothed wheel, K', which is keyed to the end of and turns the shaft *k* of the drum K. The weight of the hooked end of the pawl L' is slightly greater than that of its other end, so that as the slide L moves away from shaft H, by means of the cam *h*, the pawl L' descends, its hook slipping over the teeth of the wheel K' until the slide L has reached the limit of its throw and begins to move forward or toward the shaft H, when the pawl engages with the ratchet-wheel K' and turns it, together with drum K, in the direction of the arrow, Fig. 2. The slide L is provided with a second pawl, *l'*, the length or position of which is so regulated as to act on wheel K', near the end of the backward throw or movement of slide L, for the purpose of backing the wheel slightly to prevent the cloth being drawn too tight over the edge of the fulling-board, as will be presently explained.

M is a second bed, arranged on the frame A above and slightly in advance of the roller or drum K, with its rear edge overlying or nearly overlying the highest point of the roller or drum K, as represented in Fig. 3.

M' is a rubbing-plate adapted to be operated over the face of the bed M by the following means: The ends of the rubbing-plate M' are perforated or slotted to receive the upper ends of upright pivoted levers N, mounted centrally (of their length) on the shaft of the drum K. The lower ends of levers N are connected by arms N' with cranks *n* on the driving-shaft B, from which a vibratory movement is imparted to levers N and rubbing-plate M'. Uprights O support a yielding rod, O', provided with pendent rod, finger, or fingers *o*, which serve to hold the rubbing-plate M' down upon the bed M with uniform pressure.

P is an angular bail-rod pivoted in the frame A, behind the bed D, or between the beds D and M, arranged in such manner as to rest upon and take up the cloth or the slack between the beds, caused at the time when the cloth is drawn forward from the bed D, in the manner described above. The bail-rod or regulator P is provided with an angular or crank arm, *p*, which projects over the curved tail-extension of the pawl L'. The cloth passes underneath the bail-rod or regulator P, and when there is slack between the beds D and M the rod drops to take up such slack, and in so doing the arm *p* is raised clear of the pawl L', and the latter is left free to operate the drum K to feed the cloth forward to the bed M; but when the slack has been taken up, the tension upon the cloth raises the regulator-rod P, thereby depressing the arm *p*, which acts upon the pawl L' and throws it out of engagement with the wheel K', thus stopping the feed of the cloth to the bed M until the slack in the cloth again drops the rod P and releases the pawl L', to allow it to operate the drum K. The weight of rod P may be regulated to

adapt it to the cloth to be operated upon by any suitable device—as, for example, by providing it with an arm and adjustable weight or weights.

Q Q' are a series of grinding-rollers for conducting the bat to the bed D and rubbing-plate D', and R is a roller arranged in rear of and over the drum K, in front of and over which the cloth passes after leaving the drum, and by means of which the cloth is carried over the surface of said drum to any desired extent of its surface. The roller R is held against the drum K with a yielding pressure by means of springs R', attached to the frame A and to the ends of said roller R. This large feed-roller K may, if desired, be substituted by a feed-belt passing over two small rollers, this arrangement having been found to work well in practice. The direction given to the bat or cloth is shown in Fig. 3 as being over roller Q, between rollers Q' Q', between the bed D and the rubbing-plate D', between the feed-rolls *j j'*, underneath the regulator-rod P, and between the bed M and rubbing-plate M', (passing over the former,) after which it is turned or folded back and passes underneath the bed M and around the feeding-drum K, and in front of and over the roller R, from which it may be removed continuously, cut into pieces of the desired length, or passed thence over one or more beds and rubbing-plates similar to M M', as the character of the work may require. The plate M' may be fluted longitudinally on its under face or covered with a coarse cloth to enable it to seize the cloth and to operate upon it with the proper rubbing movement.

It will be seen from the foregoing description that as soon as the cloth is drawn with sufficient tension between the beds D and M to remove the slack, the latter ceases to take up the cloth, and thereby not only prevents undue strain upon the felted fabric, but serves to form a loop of the cloth behind the rear edge of the bed M, (see Fig. 4,) over which the rubbing-plate M' passes, giving to the loop a rolling and bending motion upon itself, which is found to add very materially to the softness and flexibility of the cloth. This I regard as a very important feature as adding greatly to the softness and flexibility and consequent value of the cloth. The fulling of the cloth is perfectly effected by this bending and rolling process, and at the same time the cloth passing evenly and regularly through such process in the machine, the usual uneven contraction of the fabric, and consequent necessity for "tentoring," is obviated. A certain amount of the rubbing and rolling or bending action produced by the bed M and rubbing-plate M' is essential to the perfect fulling and softening of the cloth, and it is immaterial, except as regards the quantity of material to be operated upon, whether this is done slowly and by a single rubbing and fulling bed, as shown at M, or by a series of such devices through which the cloth may be passed rapidly and

continuously in a manner that will be readily understood. Where the latter arrangement is required, the regulator-rod P or an equivalent device will be required in advance of each bed to prevent undue strain on the material operated upon. Where the rubbing and fulling beds M are multiplied for the purpose of a more rapid manipulation, it will also be found necessary to increase the number of the steaming-beds D. It will of course be understood that prior to subjecting the cloth to the action of the fulling and rubbing devices M and M' it should be well saturated with soap in the usual manner.

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

1. The mode of fulling or contracting and softening cloth by rubbing and bending or looping it back upon itself by means of the bed M, rubbing-plate M', and the feed-wheel or

drum K, or their equivalents, operating substantially as described.

2. The combination of the pawls L' and l' with the ratchet-wheel K' and drum K, for giving to the latter an intermittent feed movement, and at the same time preventing the fabric from being drawn too tightly over the edge of the bed M, as set forth.

3. The pawls L' and l', slide L, and cam h² or its equivalent for operating the ratchet-wheel K' and drum K, as set forth.

4. A regulator-rod, P, or its equivalent, in combination with the mechanism for operating the feed-drum K, for taking up the slack of the cloth and regulating the feed thereof, as set forth.

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