

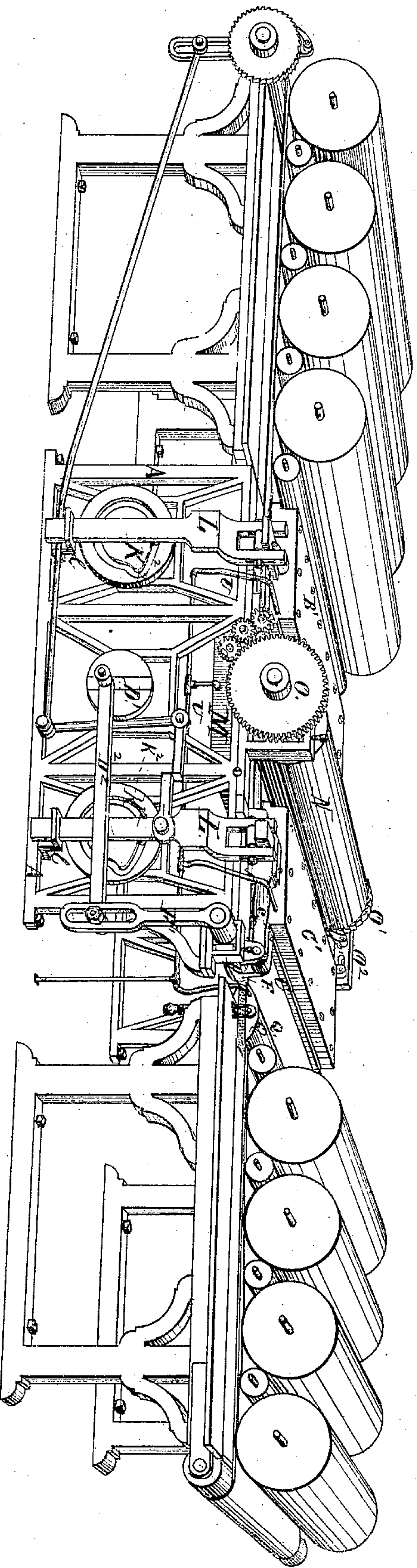
Sheet 1

*Calvin P. Ladd. Imp<sup>t</sup> in Felt<sup>g</sup> Machines.*

110574

PATENTED DEC 27 1870

*Fig. 1.*



*Witnesses.*

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*by his Attorney*

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Fig. 2.

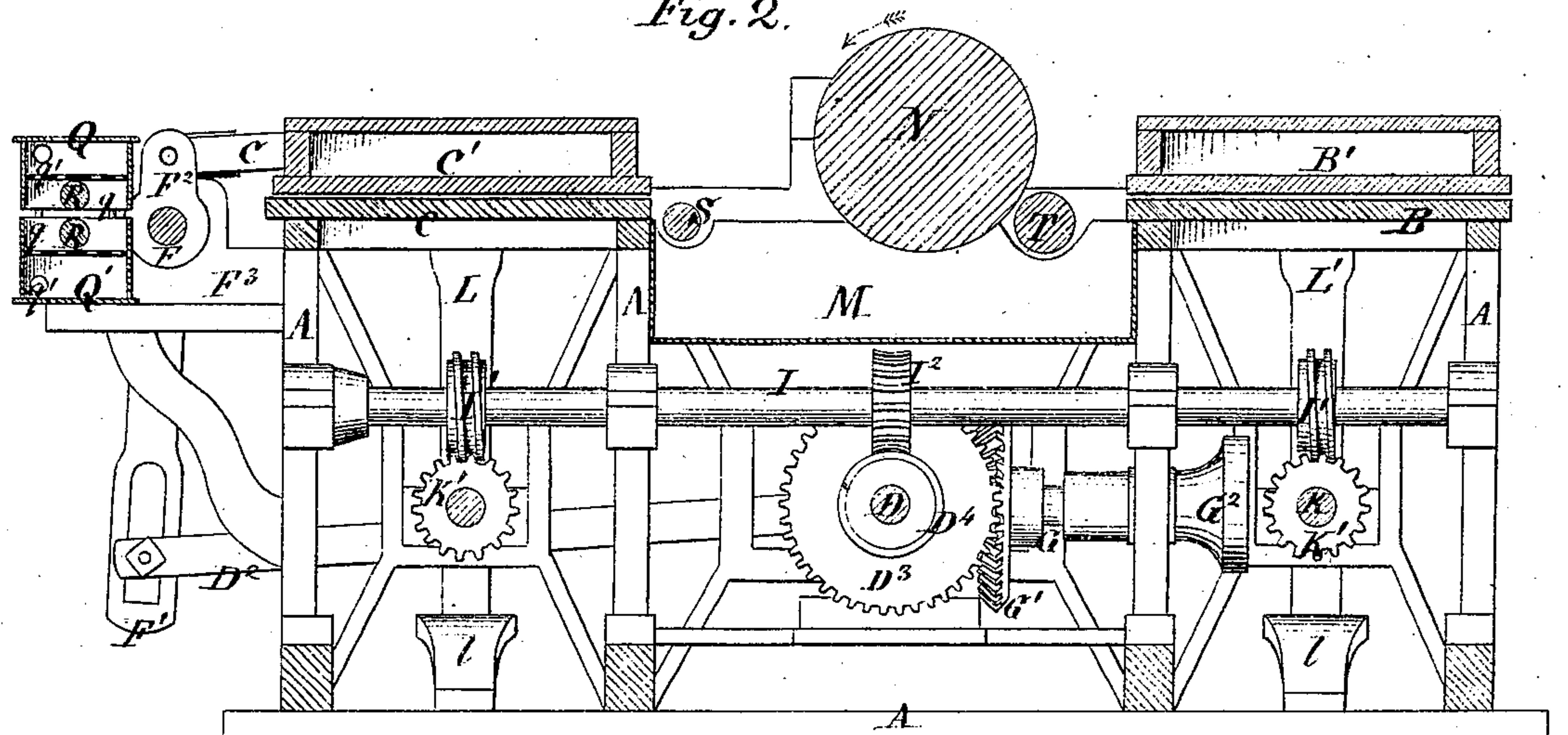
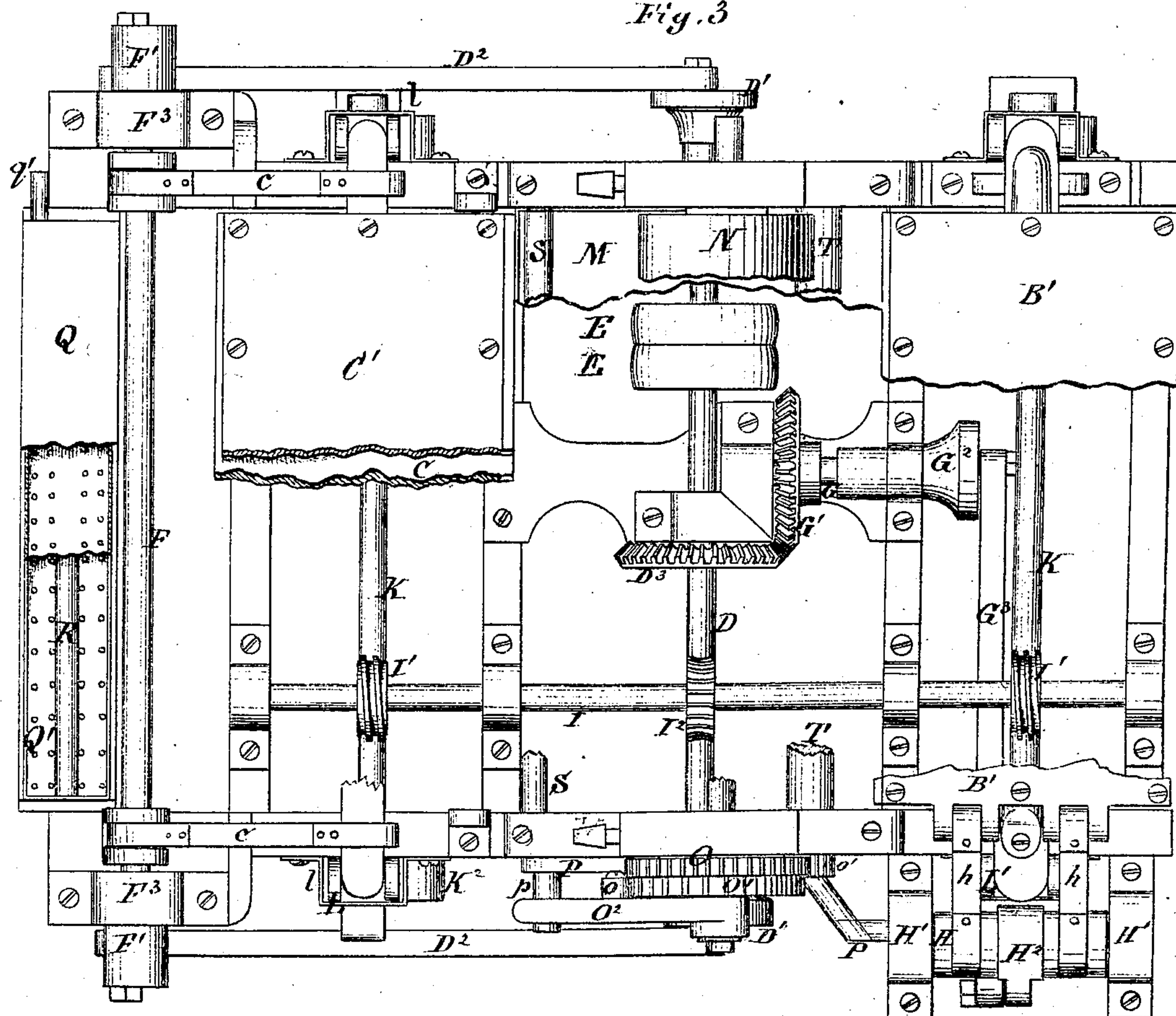


Fig. 3



Witnesses

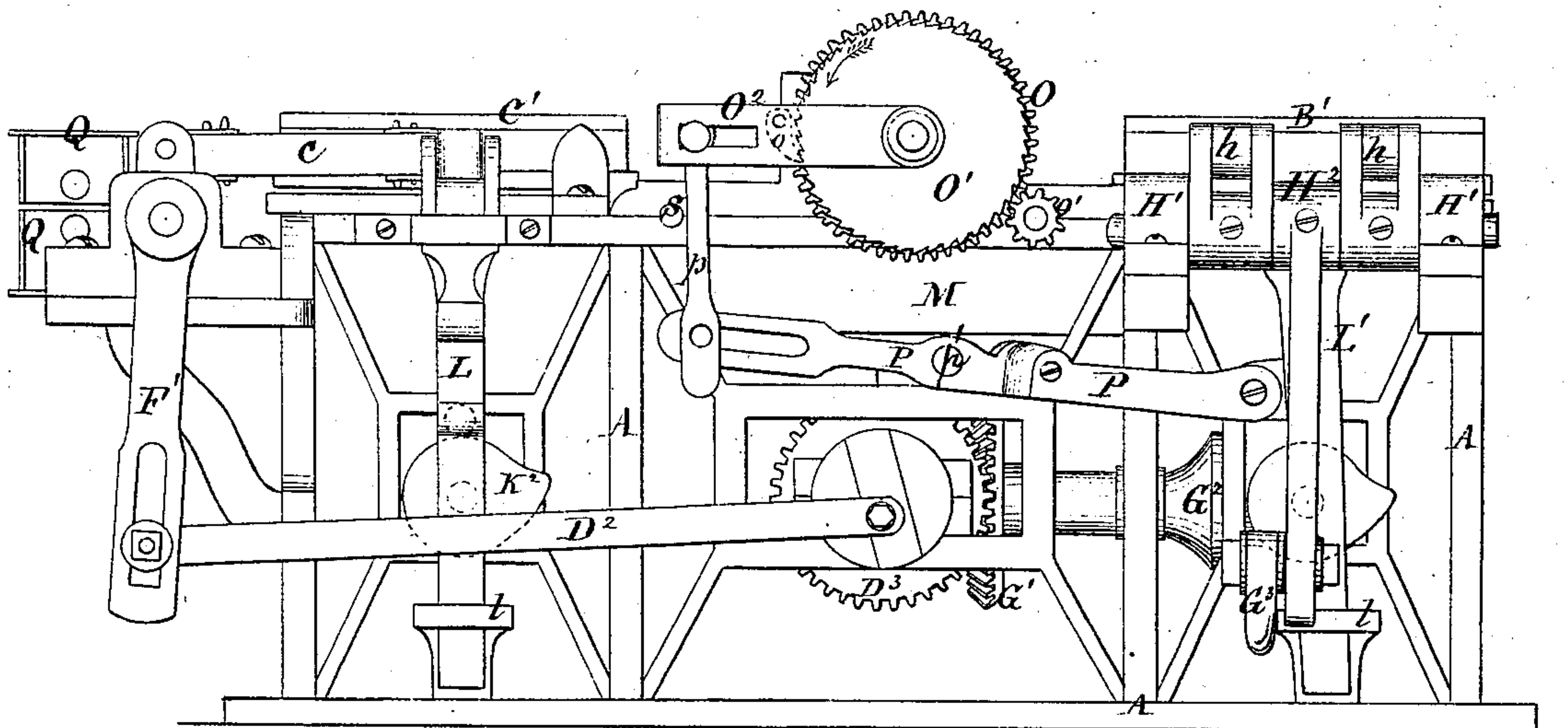


Calvin P. Ladd.

Imp<sup>t</sup> in Felling Machines.

Sheet 3.

Fig. 4.



# UNITED STATES PATENT OFFICE.

CALVIN P. LADD, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND JAMES T. SANFORD, OF SAME PLACE.

## IMPROVEMENT IN FELTING-MACHINES.

Specification forming part of Letters Patent No. 110,571, dated December 27, 1870.

*To all whom it may concern:*

Be it known that I, CALVIN P. LADD, of the city, county, and State of New York, have invented certain new and useful Improvements in Felting-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of my improved machine. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a plan or top view, with portions of the steam-box, the felting-tables, the solution-vat, the revolving drum, and the squeezing-rolls broken away to show the mechanism for operating the felters; and Fig. 4 is a side elevation, showing the mode of actuating the drum and squeezing-rollers, this view being taken from the side of the machine opposite to that shown in Fig. 1.

The first part of the invention consists in combining with the two felters a pan or vat located between them and filled with a suitable solution (preferably a hot one) through which the bat must pass as it is being transferred from one felter to the other.

The second part of my invention relates to the combination, with first felter, of a double steam-box, either with or without a pair of compressing-rollers, for the purpose of suitably preparing the bat for the action of the felter through which it is to pass.

The invention further consists in a number of new features of construction of the mechanism for operating the machine, whereby the movements of the different parts are made to automatically co-operate with each other in such manner as to render it very effective in producing a bat of uniform quality, and one which cannot be readily disintegrated.

In the drawings, A A represent the frame-work upon which the working parts of the machine are mounted.

B B' and C C' are two felters mounted upon frame A, one at each end, B and C being the tables or rubber-beds, and B' C' being the platens or felting-plates. Beds B C are rigidly secured to the frame-work A, the platens B' C' having a rapid horizontal vibratory motion imparted to them by means of the devices which I will now describe.

D is a main driving-shaft mounted in suitable bearings in frame A.

E E are band-wheels on shaft D, one of these wheels being keyed to said shaft, while the other is hung loosely for the purpose of allowing the belt to run without carrying the machine when desired.

D' (see Fig. 3) are crank-wheels keyed to each end of shaft D.

D<sup>2</sup> are pitman-rods connecting crank-wheels D' with pendent lever-arms F' of rock-shaft F. Rock-shaft F is supported in boxes or bearings F<sup>3</sup>, and provided with two other short crank-arms, F<sup>2</sup>, (shown plainly in Fig. 2,) which are connected with platen C' by means of pitman-rod c. It will be readily seen that these devices will, when shaft D is driven by a belt, give to platen C' a reciprocating motion, this reciprocation being longitudinally or lengthwise of the machine.

G is a counter-shaft driven by bevel-gear wheel G' from bevel-wheel D<sup>3</sup> on shaft D.

G<sup>2</sup> is a crank-wheel on one end of shaft G.

H is a short rock-shaft mounted in bearings H' on frame A, and provided with a pendent arm, H<sup>1</sup> (shown in Fig. 4,) and corresponding to lever-arms F' of rock-shaft F. Rock-shaft H is also provided with one or more upright arms which are connected with platen B' by pitman rod or rods h. (See Fig. 3.) Arm H<sup>2</sup> is connected with crank-wheel G<sup>2</sup> by pitman G<sup>3</sup>. Thus it will be seen that by the revolution of shaft D a vibratory motion is imparted to platen B'; but in this case the line of reciprocation is crosswise of the frame A and at right angles to that of platen C'. The lower ends of lever or crank arms F' H<sup>2</sup> are slotted, and pitman-rods D<sup>2</sup> G<sup>3</sup> are connected with them by movable wrists, in order that the throw of the platens may be regulated at will.

I is a horizontal shaft located just above shaft D. Upon this shaft are secured two screw-threads or worms, I' I', one near each end, and near its center is a worm-cogged wheel, I<sup>2</sup>, driven by a screw, D<sup>4</sup>, upon shaft D. This screw is shown in Fig. 2, but cannot be seen in Fig. 3, because it is hidden by shaft I.

K K are two shafts running transversely of the machine just below shaft I, in about the same horizontal plane with main driving-shaft D and counter-shaft G, as seen in Fig. 2. Each of shafts K is provided with a worm-cogged wheel, K', which engages with screw I'. (See



Fig. 2.) Wheels  $K'$  are not seen in Fig. 3, being hidden by shaft I. The ends of shafts  $K$  project beyond the sides of frame A, and are provided at each end with cams  $K^2$ . (Shown in Figs. 1 and 4.)

$L L'$  are cam-rods sliding vertically in ways or straps  $l$ . The lifting-rods  $L L'$  are provided upon their inner sides with short stud-arms, (shown at  $l'$ , Fig. 1,) which engage with and are operated by cams  $K^2$ . By preference I provide each of the studs  $l'$  with a friction-roller. The upper ends of the cam-rods are connected with platens  $B' C'$ , through arms formed upon or attached to said platens, or in any other convenient or desired manner. There should be a little play either at the point where the cam-rods are joined to the platens or else between the rods and their supporting-straps or ways, to allow for the vibration of the platens. By preference I make the upper ends of the lifting-rods forked, and in the fork I secure a pin or roller, upon which the arm from the platen may rest, this pin or roller being adjustable vertically in the fork, so that through them the height of the platen relative to the rubber-bed may be adjusted.

At the central part of the machine there is a tank or vat,  $M$ , Fig. 2, of the same length as the felters and occupying the space which intervenes between them. This tank is intended to contain either hot water or one of the solutions in use among manufacturers of felted goods.

$N$  is a drum, of the same length as the inside diameter of vat  $M$ . The axle of this drum projects beyond the side of the frame A, and has keyed upon one end of it the spur-wheel  $O$  and ratchet-wheel  $O'$ , Fig. 4.

$O^2$  is an arm pivoted upon the axle of drum  $N$ , and carrying a pawl,  $o$ , which engages with ratchet-wheel  $O'$ . Arm  $O^2$  is operated by lever  $P$ , with which it is connected by link  $p$ , lever  $P$  being pivoted to the frame at  $p'$  and operated by cam-rod  $L'$ , each rising and falling movement of said rod giving to the drum an impulse in the direction indicated by the arrow in Figs. 1 and 4, as will be readily understood by examining the relation of these parts, as shown in Fig. 4.

$Q Q'$  is a steam-box located in front of the first filter, substantially in the position shown in the drawings. It is made in two parts secured together in any suitable manner, preferably by dowels, as shown at  $q$ , Fig. 2. Each of these parts is provided with a perforated or reticulated diaphragm, through which the steam, which is admitted by pipes  $q'$ , is permitted to come into contact with the bat as it is passing through the box.

$R R$  are rollers placed lengthwise of box  $Q Q'$ , for the purpose of compressing the bat to a proper thickness before it is submitted to the action of the felter  $C C'$ .

$S$  is a guide-roller placed in the rear of felting-table  $C C'$ , for the purpose of receiving the bat and conducting it to the vat  $M$ , without

allowing it to be bent at too abrupt an angle after leaving the felter.

$T$  is a squeezing-roller driven from drum  $N$  by spur-wheel  $O$  and pinion  $o''$ , for the purpose of pressing out the solution in which the bat has been immersed after leaving the first felter drum  $N$ , being made adjustable relative to roller  $T$  by means of set-screw  $N'$ , and the sliding boxes  $n$ , in which roller  $N$  is mounted, as shown in Fig. 3. In practice I prefer to use two or more, even three, smaller squeeze-rollers, substantially under the arrangement shown in Fig. 1, and I may adopt the system of gearing shown in that figure for driving them, or any other which may be rendered necessary.

In Fig. 1 I have shown a feeding-table for the bat before it is felted, and a receiving-table at the other end of the machine, and have shown a lever operated by one of the lifting-rods for actuating the roller by which the felt and felting-sheets are drawn or carried, it being of course understood that the machine is provided with an endless felting sheet or cloth, as is used in this class of machines.

$U U$ , Fig. 1, are steam-pipes, by means of which steam is conveyed to the steam-box  $Q Q'$ , to the platens or rubber-beds, or both, and to the vat, through which it may be carried in a coil or worm, when preferred.

In operating my machine a rapid motion is communicated to main driving-shaft  $D$ , through pulley  $E$ , by a belt driven from any convenient power. This gives a corresponding rapid vibration to the felters. The bat, being first passed through steam-box  $Q Q'$ , where it is subjected to the action of steam of such temperature as the kind and condition of the bat may require, is now placed between rubber-bed  $C$  and platen  $C'$ . Here it remains, and is acted upon until fed forward as follows: Each revolution of shaft  $D$  and screw  $D^1$  carries worm-wheel  $I^2$  forward one cog, and one complete revolution of wheel  $I^2$ , shaft  $I$ , and screws  $I^1$  carries worm-wheels  $K'$ , shafts  $K$ , and cams  $K^2$  forward one cog. As the cams revolve, they lift cam-rods  $L L'$  and platens  $B' C'$ , thereby releasing the felt and allowing it to be fed forward. The felt is carried through the vat and past the squeezing-roller  $T$  by means of pawl  $o$ , which is operated by lever  $P$ , this lever being attached to cam-rod  $L'$ , so that the rising and falling movements of said rod will actuate the pawl, as before described. It will be observed that this feeding takes place at the same time that the platens are lifted.

In case the kind or condition of the bat will permit, I dispense with the compressing-rollers  $R R$ , and do not wish to be confined to them, used in connection with the steam-box, unless it is necessary, as their function is different from and independent of the box, and they are only placed within it to economize room.

It is well known that in the old process of



felting by hand the operator used to roll the bat in a suitable sheet and knit the fibers by a rapid vibratory motion imparted by his hands. During the operation it was his custom to unroll the bat, immerse it in hot water, or a hot solution, turn the bat a quarter of the way around relatively to the sheet, and complete the felting by means of a vibration at about right angles to the first motion, and my machine is intended to manipulate the fiber in substantially the same manner.

It will be seen that Fig. 1 is a reverse view of the machine from that given in Figs. 2, 3, and 4, and that the bat is moved from right to left instead of from left to right, as in the other figures; also, that the feeding-ratchet is on the other end of drum N.

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

1. In a felting-machine, the double steam-box Q Q', either with or without the compressing-rollers R R, in combination with the first felting-table, substantially as and for the purpose set forth.

2. The drum N, squeezing-roller T', and vat M, in combination with the two felters B B', C C', these parts being arranged for joint operation, substantially as described.

3. The cams K, cam-rods L L', and operating devices, in combination with platens B C, drum N, squeezing-roller T, and connecting devices, substantially as set forth.

CALVIN P. LADD.

Witnesses:

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HORACE A. MILLER.