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Sheet 1

C. Mossant.

Felting Mach.

No 78,991. Patented June 16 1868.

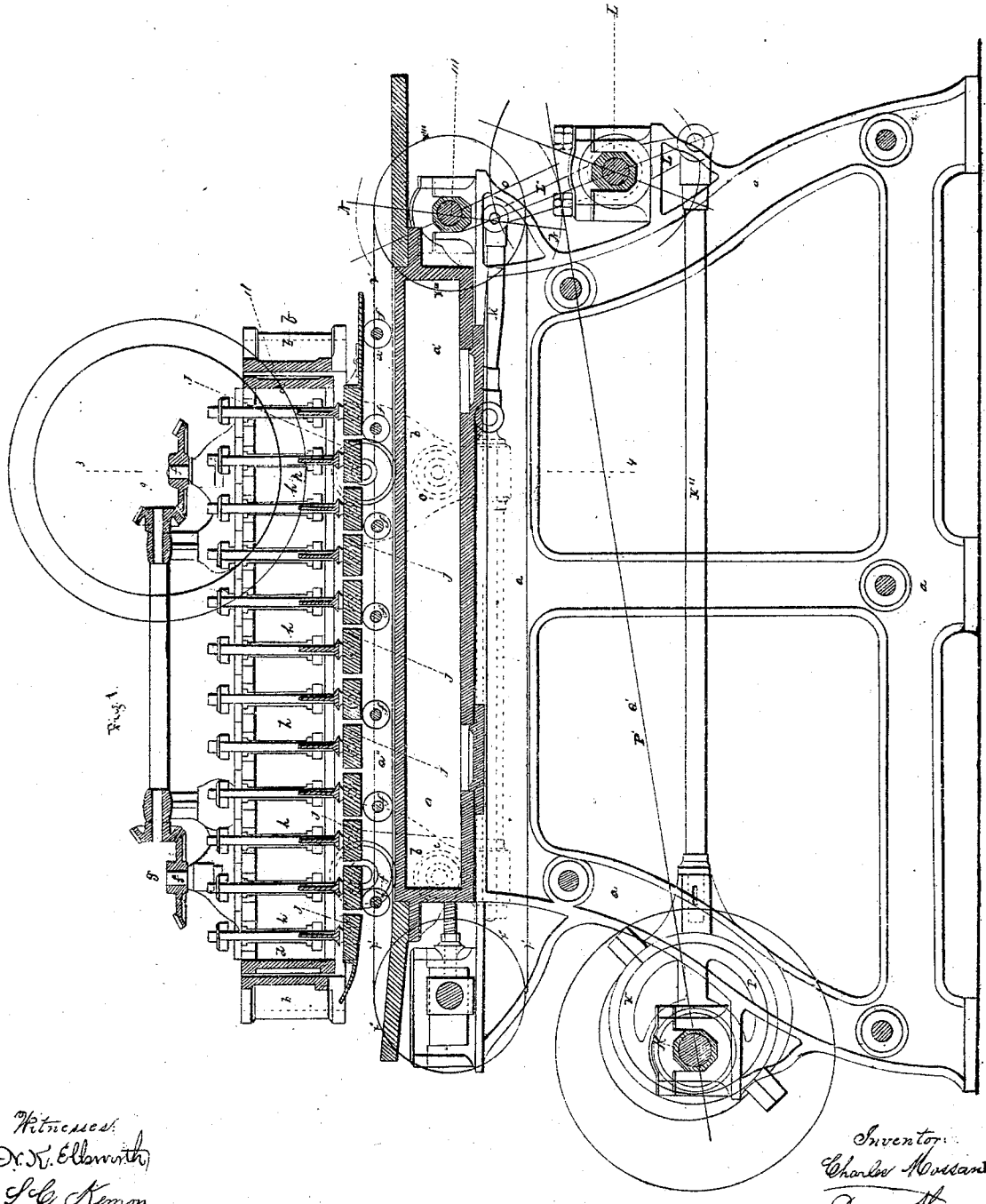


Fig. 1.

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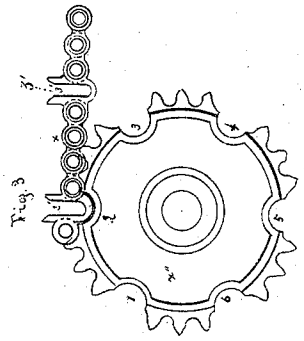


Fig. 3

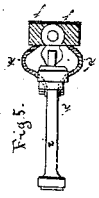


Fig. 5.

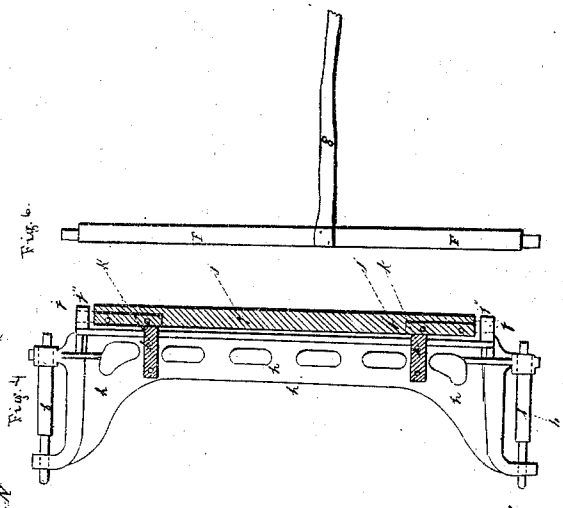


Fig. 4

Fig. 6.

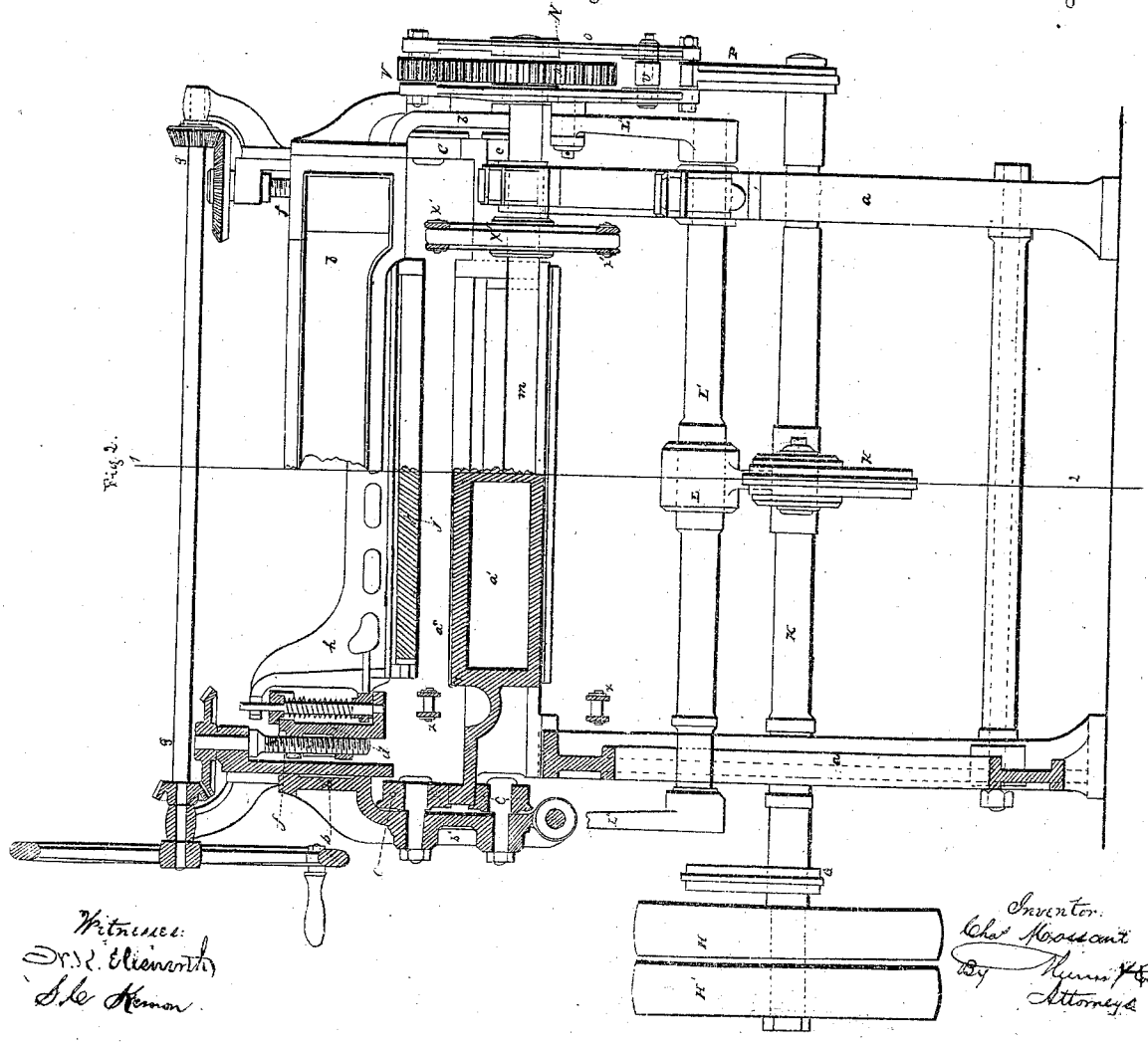


Fig. 2.

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CHARLES MOSSANT, OF BOURG DU PÉAGE, FRANCE.

Letters Patent No. 78,991, *dated June* 16, 1868.

IMPROVEMENT IN FELTING-MACHINES.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that I, CHARLES MOSSANT, of Bourg du Péage, France, have invented a new and useful Improvement in Hat and Web-Felting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional side elevation of the machine.

Figure 2 is an end elevation of the machine, showing the upper and left-hand part in section, through the line 3–4, fig. 1.

Figure 3 is a detail section of the chain and wheel.

Figure 4 is a detail side view, showing the felting-plate and board.

Figure 5 is an end view of the same.

Figure 6 is a detail view of one of the rollers upon which the hat-cones are rolled.

Similar letters of reference indicate corresponding parts.

This invention refers to a new construction of felting-machine, which is applicable to and particularly designed for the felting of hat-forms or cones, but which can be effectively applied to the felting of wool in one continuous web or band, or similar articles.

In the manufacture of hats, a loose woollen webbing, called a cone, shaped as its name imports, is the first form of the hat.

This is made by hand or suitable machinery, and is in an unfelted state.

The felting of these cones is what my machine is designed to accomplish, by a peculiar combination of a rolling motion and a to-and-fro or progressive and retrogressive longitudinal motion; and the machine is so constructed that the progressive motion will be in excess of the retrogressive motion, whereby the cone or web will pass through and be delivered out of the machine, to be again entered at the point from whence it was started, to undergo a second or third time the felting action of the machine, as will be more fully set forth.

In the drawings, *a* is the general frame of the machine, consisting of uprights of any suitable form, supporting a cast-iron hollow bed or box, *a'*.

The upper surface of this hollow bed is sheathed with a lead coating, *a''*, for the purpose of protecting the bed from the corrosive action of the acidulated water used thereon.

On this lead surface the felting is effected by the action of certain other parts, to be described.

The lead surface is heated by conduction from the hollow bed, with which it is in close contact, and the latter is heated by steam, admitted within its cavity by any suitable pipe from beneath, leading to a steam-generator.

x x' is an endless chain, of peculiar construction as to some of its links.

There are two of such chains, each of which is borne and actuated by toothed wheels, in the manner shown in the red outlines, *x'' x'''*, (fig. 1.)

A detail view of the chain and a wheel is shown at fig. 3, in which figure the holes 1, 2, 3, &c., are intended to admit the peculiar links 2', 3', &c.

These links, as shown, have a notch, for receiving the reduced circular ends of the bronze or wooden roller, shown at 7, (fig. 6.)

On these rollers the loosely-webbed cones are rolled, and the former placed in the said notches of the chain, which thus supplies a journal for their rolling motion.

The endless chains, thus supplied with rollers, operate with a continuous forward motion, but the successive forward motions being greater than the successive backward motions, the rollers and their cones finally issue at the opposite end of the machine to which they were entered, when they are taken out and replaced in the chain just entering under the rubbing-platen, and so are made to pass through a number of times, if requisite.

The rubbing-platen will be hereinafter described.

I will at present proceed to set forth the mechanism producing the motion of the chain and its rollers.

Were the roller-chains provided with a simple longitudinal movement, and equal in opposite directions, the cone-bearing rollers would remain under the rubbing-platen an indefinite time, and would have to be removed by stopping the machine.

Now, in order to obtain their automatic delivery from the machine, the two chain-wheels, x''', at the end of the machine opposite the driving-shaft k', are rigidly keyed on a shaft, m, which also carries a ratchet-wheel, N.

This shaft is shown partially in fig. 2, and in section in the centre of the red circle x''', fig. 1.

The ratchet-wheel is indicated in blue at fig. 1, and shown in edge view at fig. 2.

It is keyed on to the shaft exterior to the frame of the machine, and receives an intermittent motion from the ratchet V of the lever o, which latter is made in two parts, and joined above and below the ratchet-wheel by cross-pieces, thus enclosing the latter.

This lever-frame has for its centre of oscillation the shaft of the ratchet-wheel on which it is hung.

The lower end of this lever-frame connects with a rod, P′ Q′, which latter is connected with the hoop of an eccentric, mounted on the main driving-shaft, K′, of the machine.

On the upper cross-piece of the lever-frame is a pawl, V, by which a forward movement of the roller-bearing chains is obtained at each revolution of the driving-pulley H.

H′ is the loose pulley.

The three eccentrics P, Q, and K, are shown in fig. 2, with their hoops and connecting-rods removed, the same being sufficiently shown or indicated in fig. 1.

The rubbing-platen, which is composed of various subordinate parts, to be described hereafter, is provided with a to-and-fro movement, obtained from the driving-shaft through a central eccentric, K, keyed on the same, and connected by the rod K″ to the central arm L, on the shaft L′, which latter has at each end an arm, L″, which, by the rod M, is connected to the uprights b', attached to the rubbing-platen.

In fig. 1, this eccentric-rod is shown at K″, while the rod that connects the ratchet-lever with its eccentric, P, is indicated by the blue line P′ Q′, fig. 1.

This line also indicates the rod of an eccentric, Q, on the driving-shaft, the said eccentric having the same diameter and eccentricity as the other, and actuates a friction-lever mounted on the same shaft as the ratchet-lever, for a purpose to be shown.

By the connections above described, the platen is provided with a to-and-fro motion, and the chain with a continuous motion made up of intermittent finite distances, due to the actuation of the ratchet, but owing to the fact that the rubbing-platen bears upon the cone-rollers set in the chains beneath, and consequently rolls them backward and forward on the bed of the machine, in the to-and-fro motion of the said platen, the actual progression achieved by the chain-bearing rollers is only the distance by which the travel induced by the ratchet exceeds the backward motion of the platen.

Thus the actual gain of the chain-bearing roller is the difference of the two motions.

The successive finite distances of movement will hereafter be alluded to simply as the "travel," when referring to the movement of the platen, the roller-bearing chains, the ratchet-lever or the friction-lever, now about to be described.

At the opposite end of the driving-shaft, from the eccentric, P, is another eccentric, Q, operating a friction-lever, which has its centre of motion on the same shaft as the ratchet-wheel N.

The eye of this lever fits with close friction-contact on a boss keyed on the shaft, and this friction is sufficient to give the roller-chains a certain travel.

Another travel of the roller-chains is produced by the to-and-fro motion of the rubbing-platen, which acts to revolve the cone-rollers, and thus move them and the chains, as hereinbefore mentioned.

The friction-lever, by means of its eccentric, Q, imparts to the roller-chains a to-and-fro travel of equal lengths.

The ratchet-lever imparts a forward travel only to the roller-chains, but this travel is greater than the travel imparted by the friction-lever and platen, whereby the roller-chains progress forward by a small distance at each revolution of the eccentric, P.

This excess in practice is from a quarter to a half inch, and is regulated by shortening the ratchet-lever by means of a sliding cross-head, working in slots in the lever-frame, as shown at U, fig. 2. This cross-head is connected to the rod of the eccentric, P.

Thus, in the forward travel of the platen, it imparts a travel to the roller-chains, which forward action is accompanied and assisted by the forward travel of the friction-lever, and also by the forward travel of the ratchet-wheel lever; and the travel of the ratchet-lever being made greater than the travel of the platen, the roller-chains gain a forward differential of travel at each revolution of the driving-shaft, which differential is equal to the fraction of the travel by which the chain-wheel travel exceeds the platen-travel.

In the backward travel of the platen, the chains and rollers are returned a certain travel by the action of the platen upon the rollers, precisely as in the forward travel, for the pawl V slips on the ratchet-wheel, and the friction-lever slips on its bosses till the backward travel is complete, and the forward commences when the pawl catches on the ratchet-wheel to impart its travel to the roller-chains; and there being no contrary resistance, the friction-lever acts to assist the forward movement.

Thus the rolling of the hat-cones is accomplished, and their final delivery from the machine insured, after they have undergone a definite rolling and felting action.

The office of the friction-lever is to insure the backward travel of the roller, chains, and cones, and prevent them from stopping on their way during the backward travel of the platen, in case the latter did not carry the cones and chains along with it.

The rubbing-platen consists of an outside frame, *b*, mounted on rollers, *c*, which travel along the edges of the hollow bed *a'*, as shown in fig. 2.

These rollers are mounted on the inner sides of vertical arms, *b'*, which are attached rigidly to the outer frame *b* of the platen.

The backward and forward travel of the platen is produced by means of an eccentric, K, on the driving-shaft and its connections, as before described, so that when the driving-shaft is revolved the platen partakes of a reciprocating motion.

The inner frame *d* of the platen (containing the felting-frames to be hereafter described) is made to move up and down within the outer frame *b* by means of four screws, *f*, operated by a system of bevel-gearing, which connects them all together.

A crank-wheel, mounted on a shaft, *g*, simultaneously operates these bevel-gears, and raises or lowers the frame *d*.

In this frame are fitted a number of cast-iron plates, *h*, as shown in figs. 4 and 5.

These plates are provided at their lower edges with wooden felting-surfaces, *j*, which act to roll to and fro the hat-cones on the rollers on the chains underneath.

In these plates *h* is the cast-iron body, having two lateral projections, in which are holes, the vertical spindles *l* passing through said holes.

These spindles are fixed in the frame *d*, as shown in fig. 2, and surrounded by helical springs, which provide a tension to actuate the felting-boards *j* upon the hat-cones.

j is the felting-board, of wood, striated or corrugated on its surface of contact with the hat-cones.

These felting-boards have bronze bearings, *j*, at each end, which fit in the journals *j''*, and are thus provided an oscillating motion independent of the vertical motion which is produced by the compression of springs, before described.

k are other springs, attached as shown, for holding the felting-boards in a horizontal position, and permitting the certain supple motion favorable to the felting of the wool.

The felting-board, thus hung, when meeting with a hat-cone (rolled up on its roller, and a little higher than the felting-boards are to be set,) impinges on the same with its forward edge, and rises on its vertical spindles *l*, thus softening its contact with the hat-cone.

The springs *k* allow the felting-board to yield somewhat laterally as well, and this, in connection with its vertical yielding, produces an elastic supple action which, with the striated surface, before mentioned, conduces to the proper felting of the wool.

When any felting-board is leaving the hat-cone the rearward one of the springs *k* bears down the board as it is borne off the hat-cone, thus continuing the supple pressure upon the latter as it grazes clear of it.

A similar action of the boards ensues in the backward travel of the platen.

A tank for hot acidulated water (not shown in the drawing) is placed above the machine.

This water is led down by a pipe and conveyed upon the surface of the bed on which the hat-cones are being felted.

Another pipe, provided with a stop-cock, leads from the upper part of the tank, or any other steam-generator, and conveys steam to the cavity *a'* of the cast-iron bed, thereby heating the bed.

From the foregoing it will be seen that the felting operation is produced by the combined action of heat, acidulated water-pressure, and a peculiar to-and-fro and vertical motion of the felting-boards.

Another means of obtaining these motions, and which form parts of this application, is set forth in the following:

The cone-rollers I use consist of a wooden cylindrical rod, as shown at F, fig. 6, to which is attached a flax, wool, or cotton band, 8, by which the hat-cone is bound to the roller.

The hat-cone is laid on the band, spread out on a surface, and the cone and band rolled up around the roller.

The hat-cones on the rollers are then placed in the machine by setting the ends of the rollers in the notches in the chain-links, or in the notches of the hollow screw-bearings for the screw modification, described also, and submitted to the felting-action.

The advantages peculiar to the continuously-acting felting-machine, above described, are set forth in the following:

First, simplicity of construction.

Second, compactness of compass.

Third, minimum power required to operate it.

Fourth, the hat-cones moistened by the acidulated water, and heated, are immediately replaced again in the machine on their issue therefrom, so that they have not time to cool. Thus a saving of heat and time is effected.

Fifth, one attendant only is required to each machine.

Sixth, the regularity of the felting-operation, whereby a softer and firmer felt is produced than can be attained by hand-labor or other machines heretofore in use.

I claim as new, and desire to secure by Letters Patent—

1. The hollow bed *a'*, in combination with the reciprocating platen, having vertically-sliding plates, *i*, and the endless chains *x*, bearing the cone-rollers *f*, substantially as described for the purpose specified.

2. The felting-plates *h*, having attached thereto, by springs *k*, the laterally-yielding felting-strips *j*, substantially as shown and described, and for the purpose specified.

3. The roller-carrying chains, constructed as described, with open links for the purpose of providing bearings for the cone-rollers, substantially as herein set forth.

4. Imparting a to-and-fro travel to the rubbing-platen, the cone-rollers *f*, and hollow chains *x*, with a proportionately small excess of forward progression of the roller-chains, by means of the eccentrics P Q K, and their connecting-rods, the crank-shaft *l'*, and connecting-rods M, the friction-lever, and the pawl-lever *o*, pawl *v*, and ratchet-wheel N, all combined and arranged to operate in the manner herein shown and described.

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