

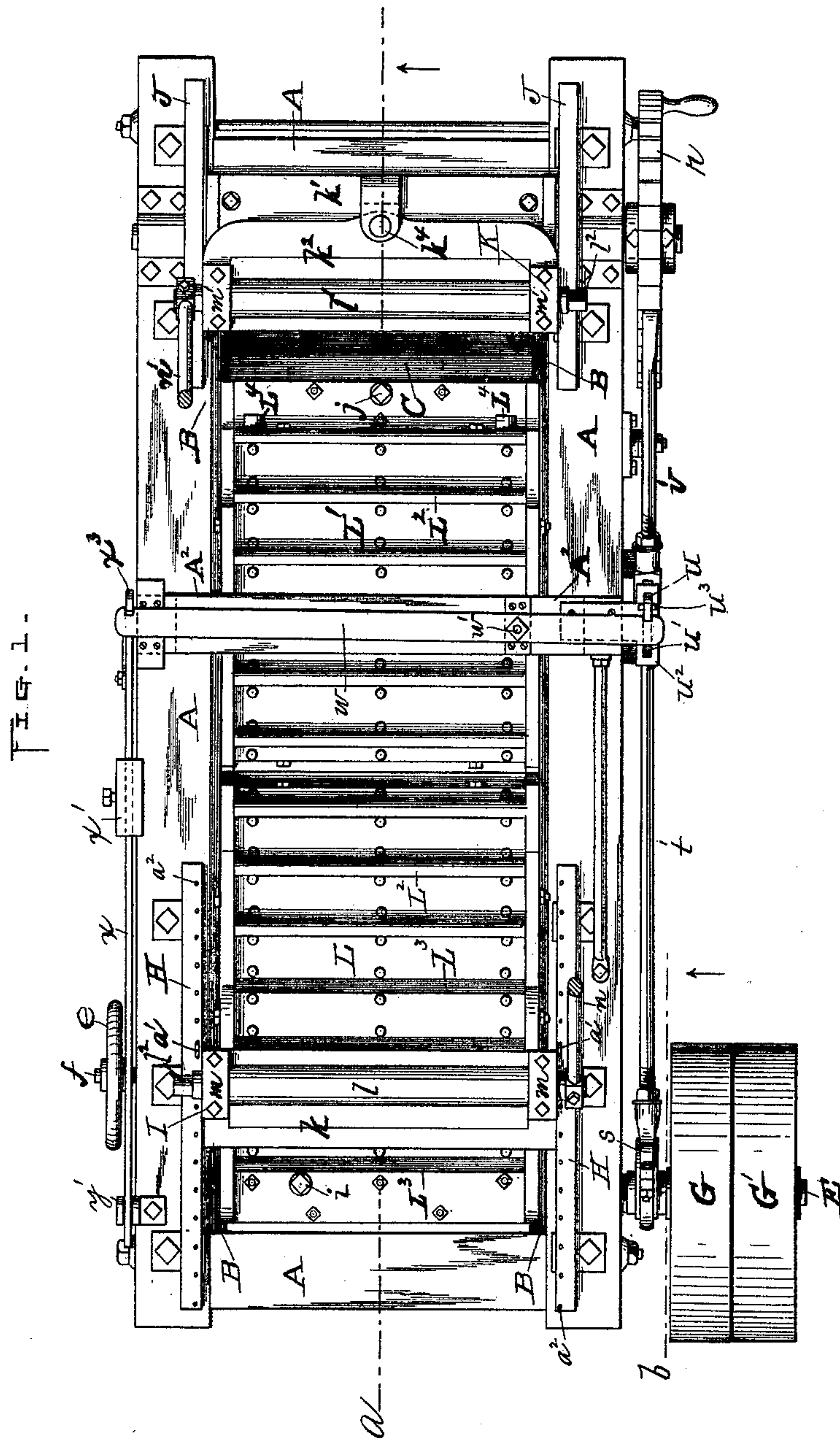
(No Model.)

3 Sheets—Sheet 1.

B. P. BRADFORD.  
LEATHER STRETCHING MACHINE.

No. 414,283.

Patented Nov. 5, 1889.



Witnesses;

Walter B. Nourse.

Lucius W. Briggs.

Inventor;

Benjamin P. Bradford

By A. A. Barker Atty.

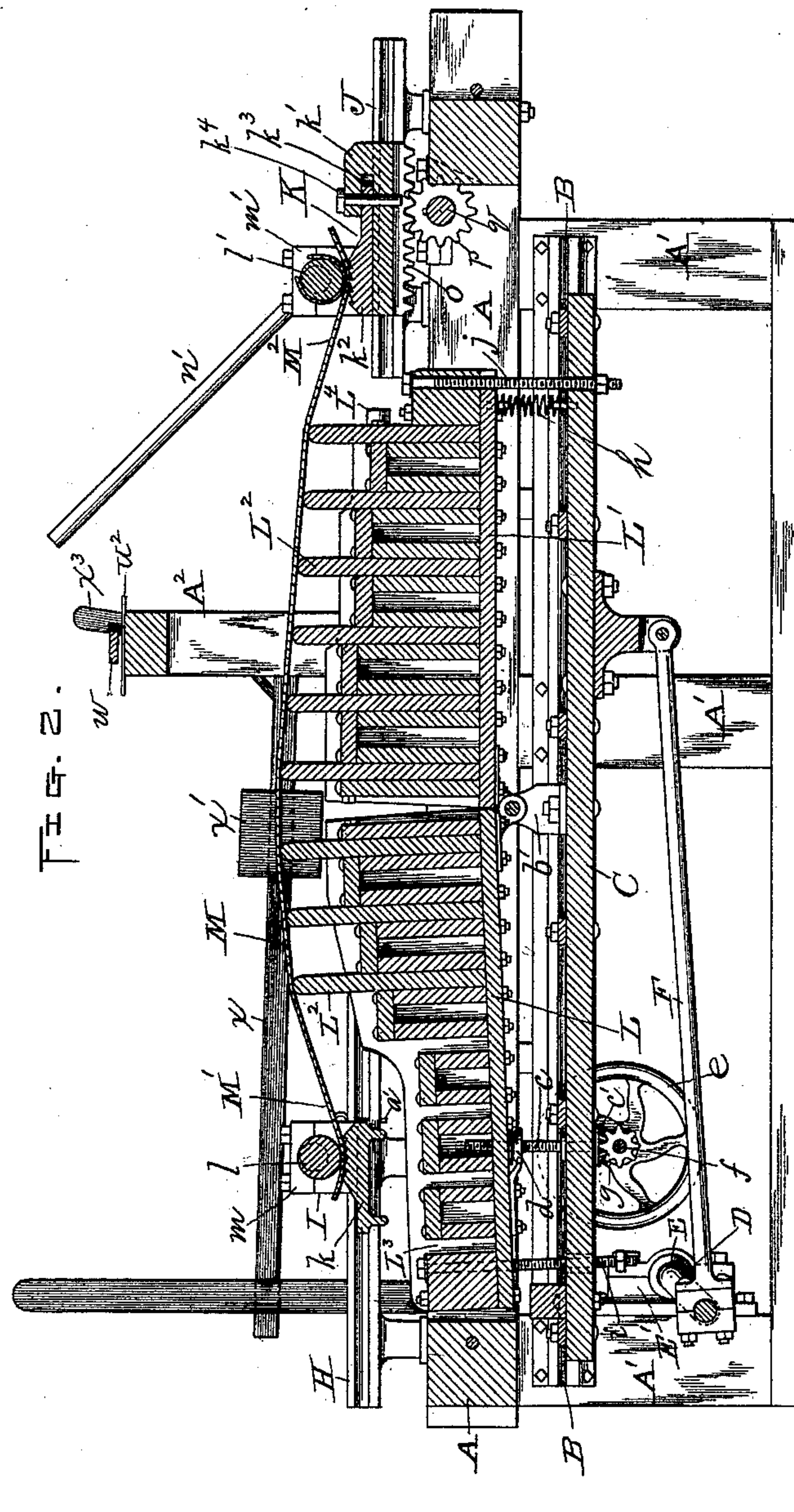
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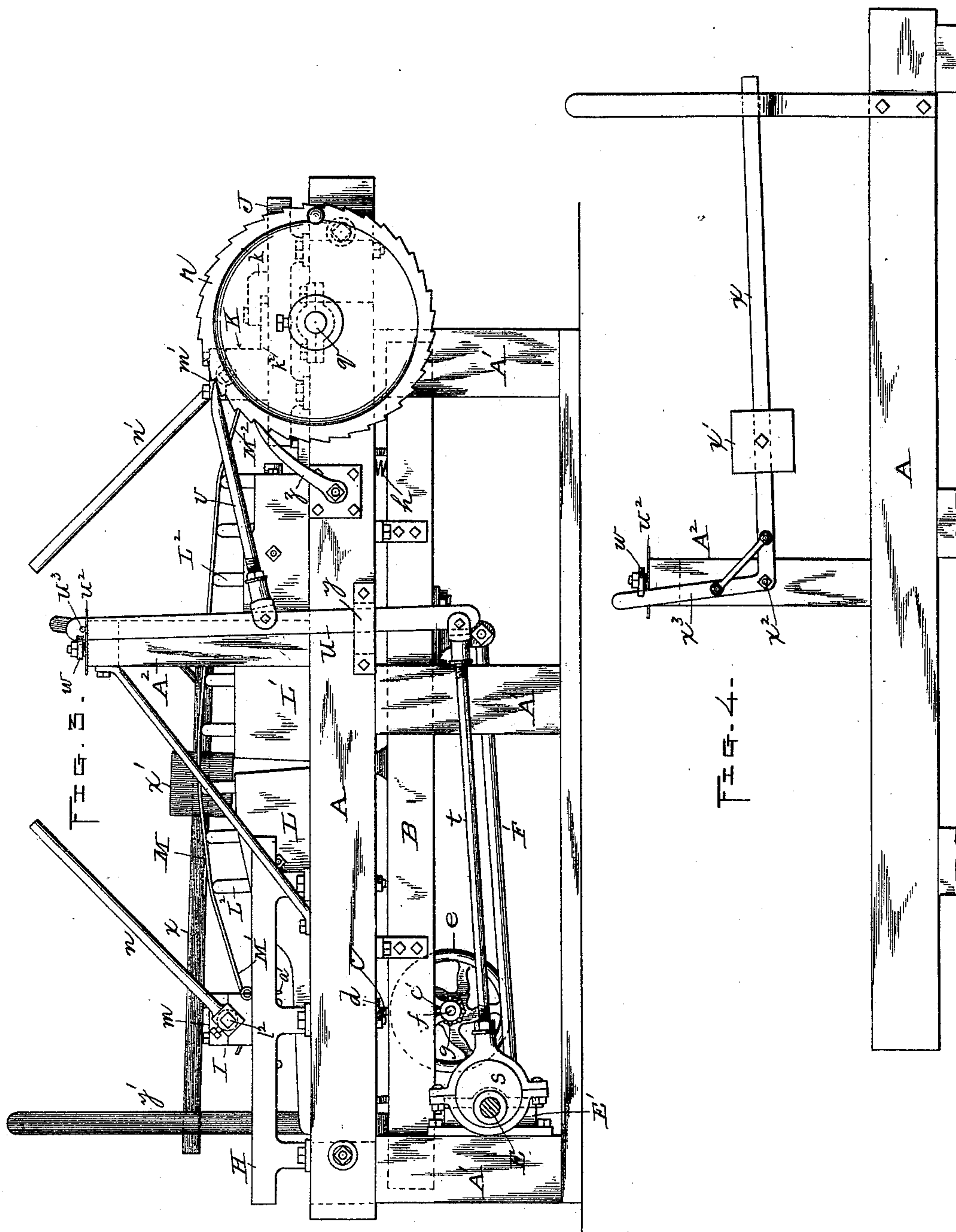
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# UNITED STATES PATENT OFFICE.

BENJAMIN P. BRADFORD, OF WORCESTER, MASSACHUSETTS.

## LEATHER-STRETCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 414,283, dated November 5, 1889.

Application filed July 18, 1889. Serial No. 317,917. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN P. BRADFORD, of the city and county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Leather-Stretching Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 represents a top or plan view of a leather-stretching machine embodying my improvements. Fig. 2 is a central vertical longitudinal section thereof, taken on line *a a*, Fig. 1, looking in the direction indicated by the arrow. Fig. 3 is a view taken through the main shaft, as indicated by line *b*, showing the side of the whole machine beyond said line; and Fig. 4 represents so much of the opposite side of the machine as is necessary to illustrate that portion of the mechanism for regulating or governing the stretching capacity of said machine which comes upon said opposite side of the machine.

The object of my invention is to produce a machine whereby leather, more particularly for belting, may be racked or rubbed and stretched by automatic mechanism in the most perfect manner and at the least possible expense; and it consists of a machine having adjustable reciprocating racking-frames adapted to rub longitudinally upon the under side of the leather to stretch the same, of adjustable means for holding the ends of said leather while being thus rubbed or racked, and automatic mechanism for taking up the slack as fast as the leather is stretched, as will be hereinafter more fully set forth.

In order that others skilled in the art to which my invention appertains may better understand the nature and purpose thereof, I will now proceed to describe it more in detail.

In the drawings, the parts marked A represent the main frame or bed, having the supporting-legs or standards A' and the upright frames A<sup>2</sup>. Just under the bed, inside of the legs and at each side of the machine, are arranged and secured the guideways or tracks B B, in which the carriage C is fitted to slide forward and back with longitudinal reciprocating movements, being thus oper-

ated by a crank D on the main shaft E through the connecting-rod F, pivoted at one end to said crank and at its other end to the slide-carriage. (See Fig. 2.) The main shaft E is fitted to turn in suitable stationary bearings E', and is provided with the usual tight and loose pulleys G G', which may in practice be connected, as ordinarily, with suitable driving mechanism. (Not shown.)

Above bed A, at each side of the rear of the machine, are arranged and secured the longitudinal guideways or tracks H H, in which the carriage I is fitted to slide, as required, to adjust the same forward and back. It may be held against longitudinal movement toward the front end of the machine, for the purpose hereinafter described, by means of vertical holding-pins *a'*, which may be passed down in front of the carriage through suitable openings *a''* in the guideways or tracks. (See Fig. 1.) Although I prefer this mode of fastening in practice, I do not limit myself thereto. At the forward end of the machine are similarly arranged and secured the longitudinal guideways or tracks J J, for the carriage K to slide in, as and for the purpose hereinafter described.

Upon the reciprocating carriage C, first referred to, are mounted the racking-frames L L', both pivoted at their inner ends to a rigid bearing *b'*, extending up from about the center of the carriage. The outer end of the frame L is provided with means whereby said end may be raised and lowered conveniently, while the outer end of the frame L' is provided with means for producing a constant upward pressure. By this arrangement the rear end of the racking-frame may be adjusted to the required elevations for treating different lengths of leather, and a constant yielding pressure is produced at the front end of said leather in stretching the same, as hereinafter and more fully specified. In this instance I have shown the outer end of the frame L as being thus elevated and lowered by means of vertical screw-rods *c*, arranged to turn in fixed nuts *d* on the frame and in suitable bearings in carriage C and operated by a hand-wheel *e* on the horizontal rod *f* through said rod *f*, bevel-gears *g*, also on said rod *f*, and bevel-gears *c'* on screw-rods *c*, the rod *f* being fitted to turn in suitable bearings



formed upon or secured to carriage C. The yielding-spring movement is produced by interposing spiral springs  $h$  between the under side of the frame and the top of carriage C.

5 The number of said screw-rods  $c$  and spiral springs  $h$  is immaterial. Two of each, one on each side of the machine, are preferably employed in practice. The upward movements of the outer ends of both frames  $L L'$

10 are controlled within proper limits by means of the vertical guide-rods  $i j$ , fitted tight in the frames and loose in the carriage C, so as to permit of the free vertical action of the ends of said frames, and at the same time

15 control their upward movements, as aforesaid. Each frame  $L L'$  is provided with a series of vertical transverse racking or rubbing blades  $L^2$ , fitted in vertical transverse slots  $L^3$ , formed in the upper sides thereof. In practice they

20 are preferably made of hard wood and rounded at their upper edges, those at the rear outer end of the frame  $L$  being, in practice, fitted sufficiently loose to admit of their easy removal to adjust the machine to different

25 lengths of leather—as, for instance, if a shorter length than the last one is to be treated, one or more of said blades are removed, as required, to properly operate upon the bottom thereof, and for a longer length

30 one or more would be added instead of removed.

The ends  $M' M^2$  of the leather  $M$  (see Figs. 1 and 2) are held in the slides or carriages  $I$  and  $K$ , between the beds  $k k'$  and the eccentric-rods  $l l'$  thereof, the tops of said beds being preferably corrugated transversely to facilitate holding said leather from pulling out. The eccentric-rods are fitted to turn in suitable bearings  $m m'$  and are provided with

40 crank-levers  $n n'$ , adapted to fit over the square ends  $l^2$  thereof, and whereby they may be turned to clamp or release the leather, as required. The clamp for holding the front end  $M^2$  of the leather is arranged to swivel,

45 so as to automatically adapt itself to any inequalities in the leather in the stretching operation, thereby evenly stretching the same and preventing the tearing thereof at such places as will not stretch equally with the

50 other portions. Said result is effected by making the bed in two parts  $k' k^2$ , the bottom of the upper part  $k^2$  coming above the level of the guideways or tracks  $J$ , so as to swing around freely. The bottom part  $k'$  slides in

55 the track, and the upper part, which carries the eccentric-rod  $l'$  and its bearings, is pivoted at its front end in a horizontal slot  $k^3$  to a pivot-bolt  $k^4$ , passed vertically through the parts, as is shown in Figs. 1 and 2. By this

60 construction it is obvious that the clamp may freely swing laterally to accomplish the desired result.

The various parts of the machine hereinbefore described constitute the mechanism

65 for holding the leather in position and for racking or rubbing the bottom thereof to stretch the same.

I will now describe the mechanism for taking up the slack produced by said stretching operation.

Upon the bottom of the bed  $k'$  of slide or carriage  $K$  are formed or secured one or more short longitudinal toothed racks  $o$ . In practice two are preferably employed, one at each side of the machine. Said racks  $o$  engage

75 with pinions  $p$ , secured to a horizontal transverse shaft  $q$ , arranged under the same and fitted to turn in suitable bearings in the main frame or bed  $A$ . To one end of said shaft  $q$ , outside of the main frame, is secured a large

80 ratchet-wheel  $r$ , whereby the shaft may be turned to operate the slide or carriage  $K$  forward and back through the pinions and racks, as hereinafter more fully specified. Said

85 ratchet-wheel is in turn operated by power transmitted from the main driving-shaft  $E$  (which operates the main slide or carriage  $C$ , as previously specified) through the eccentric  $s$  on said main shaft, connecting-rod

90  $t$ , swinging arm  $u$ , pawl  $v$ , pivoted lever  $w$ , and weighted lever  $x$ . The eccentric-rod  $t$  is pivoted to the lower end of swinging arm  $u$ , and the upper end of the arm fits in a longitudinal vertical slot  $u'$ , formed in a horizontal

95 plate  $u^2$ , secured to the upright portion  $A^2$  of frame  $A$ . The arm is suspended on a transverse pin or lug  $u^3$ , projecting out from either side thereof and resting upon the top of the supporting-plate, thus permitting said

100 upper end of the arm to move freely back and forth in the slot  $u'$ , above referred to. A constant forward pressure is imparted thereto by the weight  $x'$  through its lever  $x$  and

105 pivoted lever  $w$ , the weighted lever being pivoted to the upright frame  $A^2$  at  $x^2$  and pivoted with a lateral arm  $x^3$ , whose outer end bears against the back side of one end of said

110 pivoted lever  $w$ , while the opposite end of the latter bears against the back side of the upper end of the swinging arm  $u$ , as is fully shown in the drawings. The pawl  $v$  is pivoted at one end to the swinging arm, about mid-

115 way between its ends, and its other or free end is adapted to engage with the teeth of the ratchet-wheel  $r$ , as is shown in Fig. 3. The lower end of the swinging arm and the outer end of the weighted lever are kept in their proper

120 positions in operation by the guides  $y$  and  $y'$ , respectively. The lever  $w$  is pivoted at  $w'$  to the top of frame  $A^2$ . By thus constructing the take-up mechanism it is obvious that a

125 constant as well as a yielding forward pressure is imparted against the upper end of the swinging arm. In practice said pressure is made sufficient by varying the size and position of the weight  $x'$  to hold the upper

130 end of the arm without yielding up to a certain point in the stretching operation, the bearing at said upper end acting in this case as a pivot, while the lower end thereof is swung forward and back by the action of the eccentric on the main shaft through the connections previously described. Each forward movement of the arm causes the pawl to



move the ratchet-wheel one notch forward, and in consequence the carriage or slide K is also moved forward through the connections previously described, thereby keeping the leather taut as fast as it is stretched. The ratchet-wheel and other parts are held against back motion, after having been thus moved forward, by a lock-lever *z*, pivoted to the main frame and engaging with the teeth of the ratchet-wheel, as is shown in Fig. 3.

Although in practice I prefer the construction of the various parts as herein set forth, it will be understood that modifications in the shape of said parts, such as would ordinarily be required under different circumstances, may be made without departing from the principle of my invention.

The operation of applying a piece of leather and stretching the same by means of my improved machine is, in brief, as follows: The carriage K is first moved back nearly or quite up to the frame L', and the required number of racking or rubbing blades are applied or removed to or from frame L, according to the length of the piece of leather to be operated upon. The ends of said leather are then clamped in the slides or carriages I K, with the carriage I locked against forward movement and the rear end of frame L properly adjusted vertically, as previously described, after which the machine may be started up in the usual way, thereby causing the racking or rubbing frames to be operated forward and back longitudinally with short and quick reciprocating movements to rack or rub the under side of the leather fastened over the same, and also to feed forward the slide or carriage K, thus stretching said leather, and at the same time taking up the slack resulting from such stretching, the feed movement causing the leather to be always drawn taut and in a measure assisting in the stretching operation.

In starting up the machine the first forward movement of the reciprocating frames causes the bumpers L' (preferably of rubber) on the front end of frame L' to strike carriage K and at once move it into position for work, thus obviating any loss of time in commencing the stretching operation. Up to the proper stretching limit of the leather the swinging arm *u*, previously described, simply works back and forth from its top pivot like a clock-pendulum; but, after having been stretched to its full extent or as much as required, the pressure of the pawl against the ratchet-wheel to turn the latter being greater than the resisting power exerted by the weight *x'*, said weight is elevated by the force of the eccentric *s* and the resistance of the ratchet-wheel against the pawl, thus causing the upper end of the swinging arm to be forced back and the pawl to operate without further turning the ratchet-wheel. Consequently the leather is also not further stretched. It will thus be observed that the weight *x'* acts as a governor on the machine to limit its power of

stretching the leather, and it will also be apparent that by changing the size and position of said weight the stretching capacity thereof may be varied at will and adjusted to a nicety.

After the leather has been stretched as far as permitted by the aforesaid governing mechanism, the machine, although allowed to continue in operation, has no effect upon the leather, as will be seen. No damage to either the machine or leather is therefore incurred if said machine is not at once stopped upon the completion of the stretching operation.

Said machine is strong and effective in use and may be conveniently operated, thus enabling one workman to tend several machines at the same time.

A superior quality of leather is produced, as the whole surface is evenly operated upon and stretched, and, furthermore, the saving in labor and production is materially increased over the old form of leather-stretching machines.

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

1. In a leather-stretching machine, the combination, with a horizontal carriage fitted to slide in longitudinal stationary guideways or tracks and operated with reciprocating movements by connection with a crank or eccentric on the main drive-shaft, of two racking or rubbing frames arranged above said carriage and both pivoted at their inner ends thereto, the outer end of one frame having means whereby it may be adjusted vertically and the outer end of the other frame provided with means for exerting a constant upward-yielding pressure thereon, both frames being also provided with a series of transverse racking or rubbing blades fitted in suitable slots in the upper sides thereof and with means for controlling their upward movements, substantially as set forth.

2. In a leather-stretching machine, horizontal racking or rubbing frames having adjustable and spring-yielding ends, substantially as described, provided with a series of vertical transverse blades in their upper sides, and having longitudinal reciprocating movements against the under side of the leather, substantially as and for the purpose set forth.

3. In a leather-stretching machine, a horizontal supporting-carriage arranged under the bed of said machine and having reciprocating movements in longitudinal stationary guideways or tracks, and racking or rubbing frames mounted on said carriage, constructed substantially as specified, in combination with an adjustable clamp fitted to slide in longitudinal tracks at each side of the rear of the machine and provided with means for holding the same in position, and a slide-clamp fitted to work in longitudinal tracks at each side of the front of the machine, having means connected therewith and with the driving mechanism for automatically moving said clamp



forward with short intermittent movements, substantially as and for the purpose set forth.

4. In a leather-stretching machine, the combination of carriage C, fitted to slide horizontally in the longitudinal guideways or tracks B B, and having reciprocating movements imparted thereto from crank E on the main shaft through the connecting-rod F, with the frames L L', arranged above said carriage C, both pivoted at their inner ends thereto and provided with a series of transverse vertical racking or rubbing blades L<sup>2</sup>, the rear end of frame L being also provided with means for controlling its upward movements and for adjusting said frame vertically, and the forward end of frame L' being provided with means for producing an upward-yielding pressure as well as for controlling the upward movements thereof, substantially as and for the purpose set forth.

5. In a leather-stretching machine, the combination of the horizontal longitudinally-reciprocating carriage C with the frame L, pivoted at its inner end to said carriage and having means at its outer rear end for adjusting the height thereof and for controlling its upward movements, substantially as and for the purpose set forth.

6. In a leather-stretching machine, the combination of the horizontal longitudinally-reciprocating carriage C with the frame L', pivoted at its inner end to said carriage and having means at its outer forward end for producing an upward-yielding pressure and for controlling its upward movements, substantially as and for the purpose set forth.

7. In a leather-stretching machine, the combination of the longitudinal guideways or tracks H H, arranged above the bed A at each side of the rear of the machine, with the slide or carriage I, fitted to slide therein and having means for holding it from moving toward the front end of the machine, said slide consisting of the bottom bed-piece k, the eccentric-rod l, and bearings for said rod to turn in, substantially as and for the purpose set forth.

8. In a leather-stretching machine, the longitudinal guideways or tracks J J, arranged above the bed A at each side of the front end of the machine, the slide or carriage K, fitted to slide therein and comprising the bed-piece k', having the longitudinal toothed

racks upon the under side thereof, the swivel k<sup>2</sup>, arranged above and pivoted at its front end to said bed-piece, the eccentric-rod l', and bearings for said rod, in combination with the pinions p, horizontal transverse shaft q, and ratchet-wheel r, substantially as and for the purpose set forth.

9. In a leather-stretching machine, the combination, with the toothed racks of carriage K, of pinions p, horizontal transverse shaft q, and ratchet-wheel r, substantially as set forth.

10. In a leather-stretching machine, the combination of slide or carriage K, provided with a clamp device, substantially as described, with the ratchet-wheel r, lock-lever z, swinging arm u, eccentric s, and the various connections and supports whereby short intermittent forward movements are imparted to said slide or carriage K, substantially as set forth.

11. In a leather-stretching machine, the combination of slide or carriage K, provided with a clamp device, substantially as described, with the ratchet-wheel r, lock-lever z, swinging arm u, eccentric s, pivoted lever w, weighted lever x, and the various connections and supports whereby short intermittent forward movements are imparted to said slide or carriage K and the stretching capacity of the machine controlled, substantially as set forth.

12. In a leather-stretching machine, the ratchet-wheel r, provided with a lock-lever z, in combination with the pawl v, swinging arm u, suspended at its upper end from a fixed bearing, connecting-rod t, eccentric s, main shaft E, and suitable supports and guides, substantially as and for the purpose set forth.

13. In a leather-stretching machine, the ratchet-wheel r, provided with the lock-lever z, in combination with the pawl v, swinging arm u, suspended from a fixed bearing at its upper end, eccentric-rod t, eccentric s, main shaft E, pivoted lever w, weighted lever x, and suitable supports and guides, substantially as and for the purpose set forth.

BENJAMIN P. BRADFORD.

Witnesses:

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