No. 626,858. Patented June 13, 1899.

A. A. CHILSON.

LEATHER SPLITTING MACHINE.

(Application filed Dec. 15, 1898.)

(No Model.) 3 Sheets—Sheet 1.

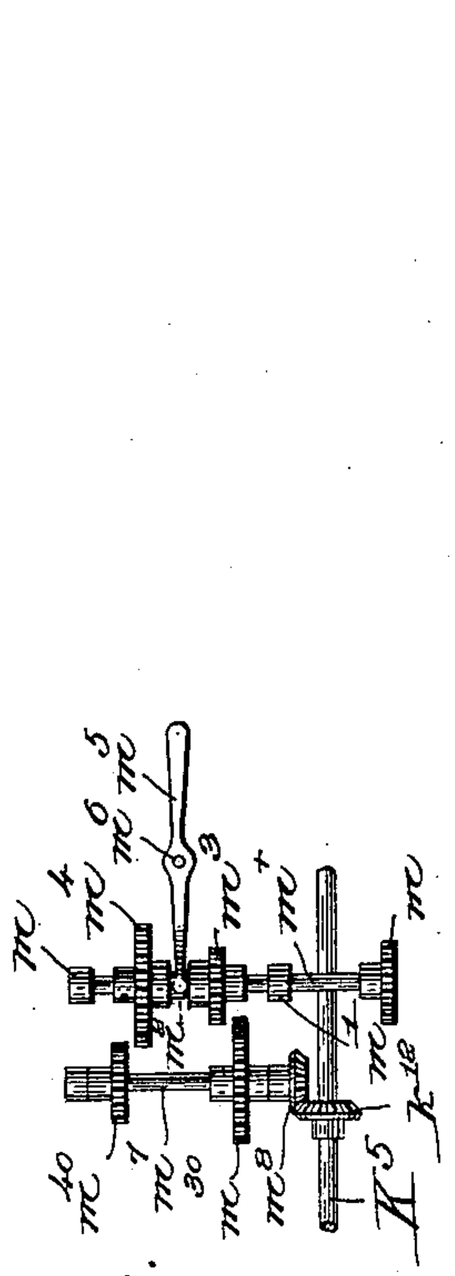

Fig. 3.

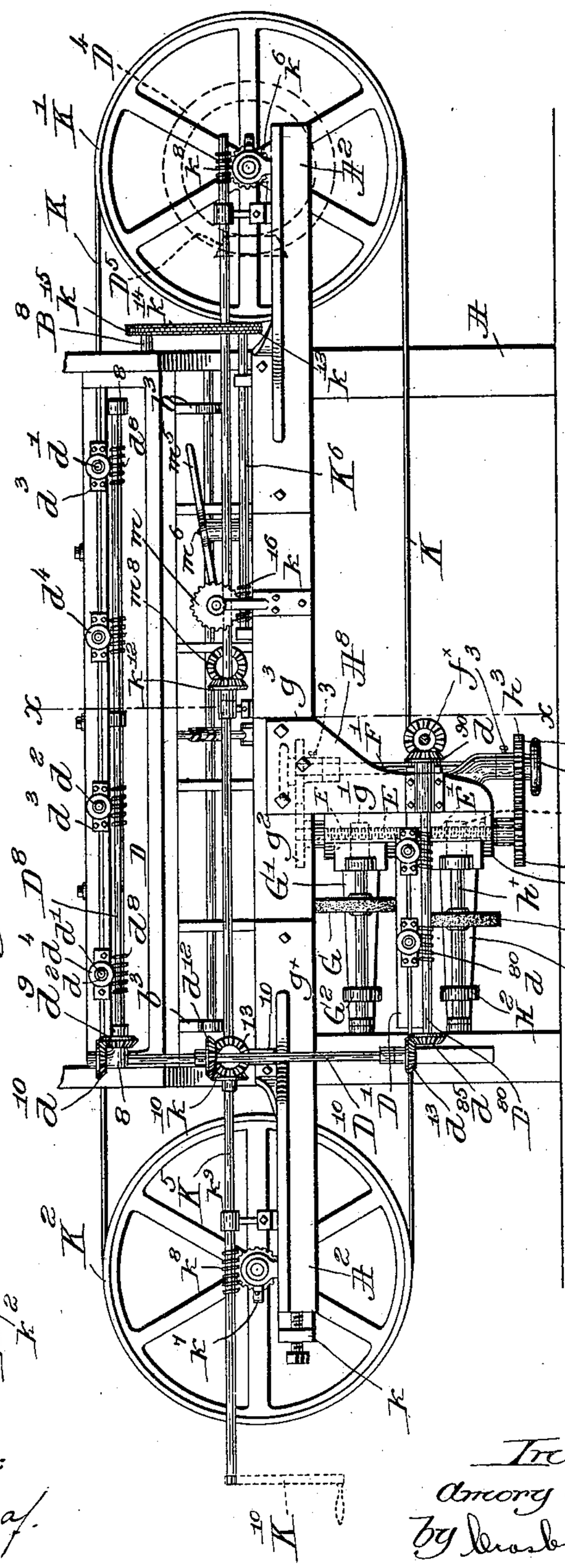

Fig. 1.

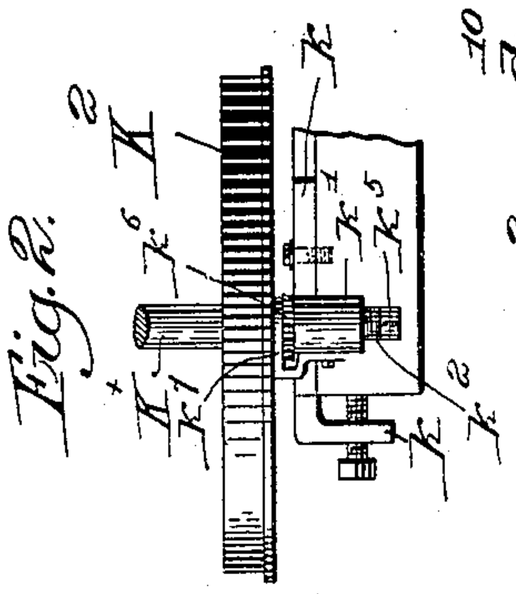

Fig. 2.

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Fig. 4.

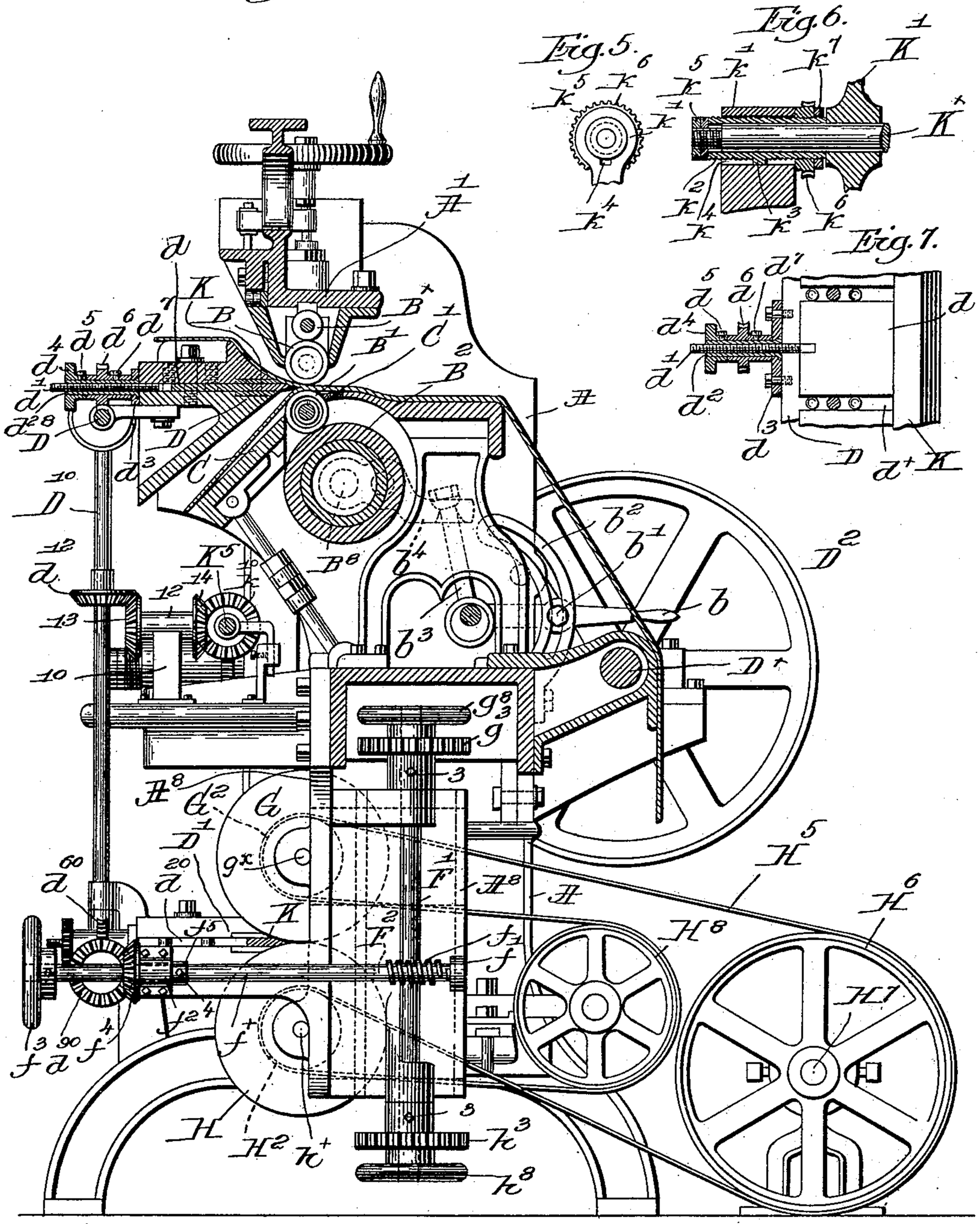

Fig. 5.

Fig. 6.

Fig. 7.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 8.

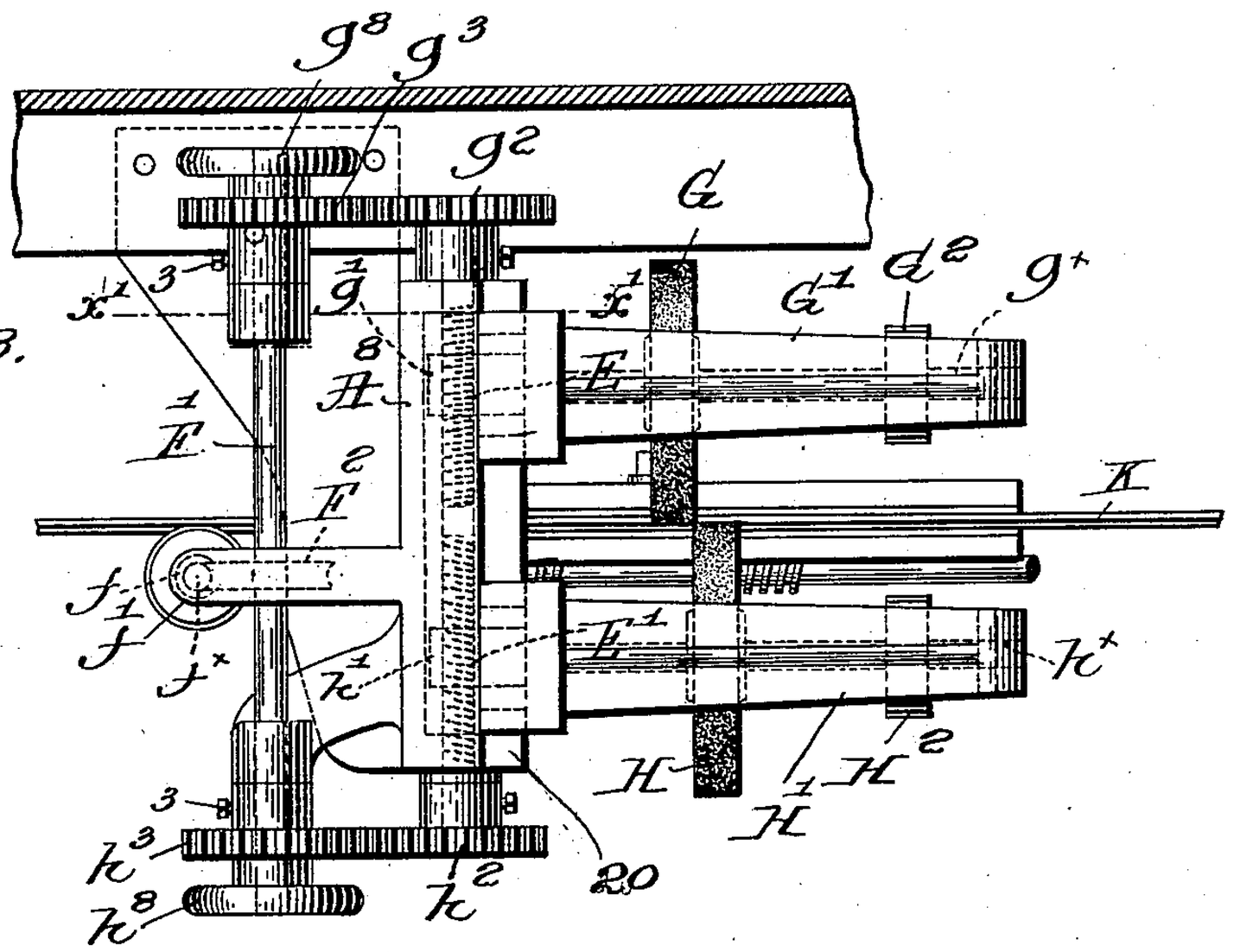
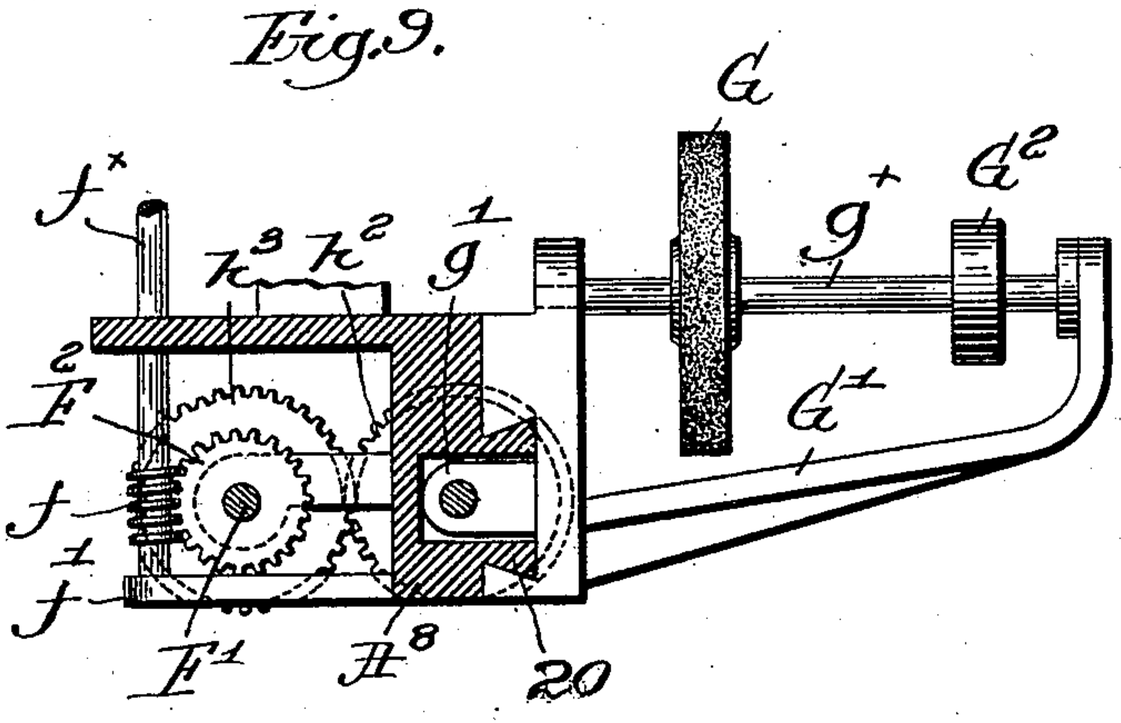


Fig. 9.



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UNITED STATES PATENT OFFICE.

AMORY A. CHILSON, OF SALEM, MASSACHUSETTS.

LEATHER-SPLITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 626,858, dated June 13, 1899.

Application filed December 15, 1898. Serial No. 699,347. (No model.)

To all whom it may concern:

Be it known that I, AMORY A. CHILSON, of Salem, county of Essex, State of Massachusetts, have invented an Improvement in Leather-Splitting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to machines for splitting leather; and it has for its object the production of a machine so constructed that great uniformity in the product will be attained, with increased life of the knife and grinding mechanism and a much higher efficiency of the machine as a whole.

In the splitting-machines in use the belt-knife is set up from time to time as the edge is ground back, and the grinding apparatus must be constantly attended to to attain in even a small degree proper grinding of the knife without improper waste of either the knife or the grinders, and even with highly-skilled labor and constant attention there is very considerable variation in the product, with consequent decrease in its value. Such variations in the work are in the main due to variations in the knife-edge, either as regards its position relative to the feed-rolls or its bevel, and to the improper operation of the grinding-rolls, for it is absolutely necessary, in order to produce uniform work, that the knife be maintained sharp continuously, with its edge on the same bevel, to thus avoid raising or lowering the edge, and the latter should travel within a very small fraction of an inch in the same path, the less the deviation therefrom the better.

Heretofore the knife has been set from time to time by adjusting the supporting-wheels, and while the grinders are supposed to act on the knife when the machine is running, such action is very variable, beginning with very heavy grinding when the rolls are first set up and rapidly diminishing in force and effect as the grinding proceeds. All of these adjustments have been made by hand, causing loss of time and decreased output and requiring the highest class of skilled labor to produce good work, the most careful adjustment frequently failing in its object.

In my present invention I have provided means for automatically setting up the knife to maintain its edge in proper position compensating for the grinding back of the edge, the knife being also maintained in proper relative position to the grinding-rolls, and as the latter wear away or become reduced in diameter I have provided means for automatically moving the rolls toward each other to compensate for such wear, whereby the proper bevel of the edge of the knife is preserved throughout the life of the latter.

While in my invention I am enabled to at any time vary the grinding action of the rolls, such action will be uniform for any given adjustment, thus overcoming the gradually-decreasing action of the grinding-rolls now common.

The various novel features of my invention will be hereinafter described in the specification and particularly pointed out in the claims.

Figure 1 is a front elevation of a sufficient portion of a belt-knife leather-splitting machine to be understood with one embodiment of my invention applied thereto. Fig. 2 is a top or plan view of one of the knife-carrying wheels and its bearing. Fig. 3 is a like view of a portion of the gearing shown in Fig. 1 to more clearly show the variable-speed device to be described. Fig. 4 is an enlarged transverse sectional view of the machine, taken on the line x x, Fig. 1, looking toward the left and showing some parts not illustrated in Fig. 1. Fig. 5 is an end elevation, and Fig. 6 a longitudinal sectional view, of one of the knife-wheel shafts, its bearing, and the means for setting up the knife. Fig. 7 is an enlarged plan view, partly in section, of one of the back plates and the setting-up mechanism therefor. Fig. 8 is an enlarged detail, in rear elevation, of the mechanism for setting up the grinders; and Fig. 9 is a horizontal sectional detail of said mechanism, taken on the line x' x', Fig. 8.

The main frame A of the machine, the beam A′, the gage-roll B, the sectional ring-roll B′, the rubber roll B^2, supporting the sectional roll, the backing-roll $B^\times$ over the gage-roll, said rolls B, B′, and B^2 being rotated by usual gearing at the end of the machine and not shown, the front and back ring-plates C and C′, the bed D to support the knife K and the back plates, the lower bed D′ to support the knife while being

ground, the main driving-shaft $D^{\times}$, and its belt-pulley D^2 may be and are all of well-known or usual construction in such machines—such, for instance, substantially as shown in United States Patent No. 596,440, dated December 28, 1897.

A hand-lever b, Fig. 4, supported by a bolt b' in a segmentally-slotted arm b^2, rigidly attached to the main frame, is eccentrically connected by a link b^3 with an arm b^4, the latter being connected with the shaft of the rubber roll B^2, by means of which mechanism the said roll may be thrown into position to adjust the ring-roll B' in usual manner.

The endless-band knife K is supported and moved by the flanged carrier-wheels K' K^2, Fig. 1, of usual construction; but in my invention the said wheels are adjusted in a novel manner, the lateral extensions A^2 of the main frame carrying the bearings for the said wheels. The bearings are alike for each wheel; but that one for the wheel K^2, which is an idler-wheel, is mounted on an adjustable stand k, Figs. 1 and 2, suitably attached in usual manner to one of the extensions A^2 in order to provide means for maintaining the band-knife under proper tension. Each bearing k' (see Figs. 2, 5, and 6) is bored to receive loosely an exteriorly-threaded sleeve k^2, in which is rotatably mounted the shaft $K^{\times}$ of the adjacent carrying-wheel, said sleeve having an external fin or lug k^3 to travel in a slot or groove k^4 in the bearing to permit longitudinal movement of the sleeve, while preventing its rotation. The sleeve is longitudinally movable with the wheel-shaft as it is held in place between the wheel-hub and suitable check-nuts k^5 on the end of the shaft. A worm-wheel k^6, having an internally-threaded hub, is mounted on and in engagement with the threaded sleeve between the bearing k' and an arm k^7, secured to or forming part of the bearing and interposed between the wheel-hub and the worm-gear to prevent longitudinal movement of the latter relatively to the shaft.

From the foregoing it will be obvious that rotation of the worm-gear k^6 will effect longitudinal movement of the sleeve and shaft to thereby move the knife-wheel in the direction of the length of its shaft. The shaft of the knife-wheel K' is provided, as shown by dotted lines, Fig. 1, with a bevel-gear D^4, which is in mesh with another bevel-gear D^5, fast on the driving-shaft $D^{\times}$, to thus positively rotate the wheel K' and drive the knife.

The two worm-gears k^6 are engaged by worms k^8 on a long setting-up shaft K^5, Fig. 1, mounted in suitable bearings k^9 on the frame and having fast upon it bevel-gears k^{10} k^{12}.

A counter-shaft K^6 has fast upon it a sprocket-wheel k^{13}, connected by a suitable chain k^{14} with a smaller sprocket-wheel k^{15} on the shaft B^8 of the rubber roll, whereby the counter-shaft is continuously driven during the operation of the machine, but at a low rate of speed, said counter-shaft carrying a worm k^{16} in engagement with a worm-wheel m on a transverse shaft $m^{\times}$, supported in suitable bearings m' on the frame, (see Fig. 3,) the shaft $m^{\times}$ having splined upon it a grooved hub m^2, which in the present instance of my invention has secured to or forming part of it small and large spur-gears m^3 m^4, respectively, movable longitudinally of the shaft by means of a suitable hand-lever m^5, fulcrumed at m^6 on the frame. (See Fig. 1.) The spur-gears m^3 m^4 are adapted to be brought in engagement singly with a large and a small gear m^{30} m^{40}, respectively, each fast on a short shaft m^7 to rotate the latter at different speeds, said short shaft having fast upon its outer end a bevel-gear m^8 in mesh with the bevel-gear k^{12} on the setting-up shaft K^5.

By means of the mechanism so far described it will be obvious that when the machine is running the setting-up shaft K^5 will be rotated, but at a very low speed, by or through the connections described between it and the shaft B^8, the latter being rotated in usual manner, and said shaft in turn will, through the worms k^8 and worm-gears k^6, operate to gradually move the knife-wheels rearwardly to constantly move the knife-edge toward or to substantially maintain it in a single path of travel, bearing a fixed relation to the gage and ring rolls.

The bed D is socketed, as at $d^{\times}$, Fig. 7, four of such sockets being provided in the machine herein illustrated at right angles to the travel of the knife and to receive each a sliding back plate d, bearing at its inner edge against the back of the knife, each plate being provided with a rigidly-attached and outwardly-extended screw-stud d', which passes through an interiorly-threaded sleeve d^2, enlarged at its inner end and rotatably mounted in a supporting-plate d^3, suitably secured to the outer face of the bed D. A thumb-nut d^4 is normally secured to the outer end of the sleeve d^2 by a set-screw d^5, and between said thumb-nut and the plate d^3 is interposed the hub of a worm-gear d^6, the latter being also normally secured to and to rotate with the sleeve by a suitable set-screw d^7, so that rotation of the worm-gear will rotate the sleeve and thereby move the threaded stud d' longitudinally to move the back plate toward or away from the back of the knife. By loosening the set-screw d^7 the back plate can be moved in or out rapidly by means of the thumb-nut d^4. The several adjusting-gears d^6 of the back plates are in mesh with worms d^8 on a back-plate-controlling shaft D^8, suitably mounted in bearings 8, Fig. 1, and having an attached bevel-gear d^9 in mesh with a like gear d^{10}, fast on a vertical shaft D^{10}, supported at one end of the frame, said vertical shaft having secured to it bevel-gears d^{12} and d^{13}.

As best shown in Fig. 4, a bracket 10 on the main frame has a sleeve-like bearing 12 for a short shaft, to the ends of which beyond the

bearing are secured bevel-gears 13 and 14 in mesh, respectively, with the bevel-gear d^{12} of the intermediate shaft D^{10} and the bevel-gear k^{10} of the setting-up shaft K^5, the rotation of the latter thus imparting rotative movement to the intermediate shaft D^{10}, which in turn operates to drive the back-plate-controlling shaft D^8.

It will be obvious from the foregoing that as the knife-wheels K' K^2 are set up by the mechanism described the back plates also will be correspondingly set up, so that the support which these plates provide for the back of the knife will be moved forward to support the back of the knife as the latter is set up, and it is to be understood that this setting-up operation, while of course slow and only sufficient to compensate for the grinding away of the edge of the knife, is continuous and automatic.

By disconnecting the variable-speed mechanism shown in Fig. 3 from the gears on the short shaft m^7, the parts being shown in said figure in disconnected position, the back plates and knife-wheels may be readily returned to starting position to receive a new knife or for any other purpose by means of a crank-arm K^{10}, (shown in dotted lines, Fig. 1,) adapted to be attached to the end of the setting-up shaft K^5 when it is desired to more rapidly adjust the knife.

It sometimes happens that the edge of the knife will be turned or broken by encountering some obstruction in the leather, such as a nail or pebble, and in such case it is necessary to grind down the edge until such fault is remedied, and during such grinding in order to hasten the operation the knife can be set up more rapidly by hand.

The lower bed D' is herein shown as provided with back plates d^{20}, two in number, constructed and operated precisely as are the back plates d described, said lower back plates being operated by worm-gears d^{60} (see Fig. 4) in engagement with worms d^{80} on an actuating-shaft D^{80}, carried by a depending bracket A^8, secured to the front of the frame, said shaft D^{80} having fast upon it a bevel-gear d^{85} in engagement with a gear D^{13} on the intermediate shaft D^{10}, by which the worm-shaft is driven, so that the lower back plates d^{20} will be set up against the back of the knife to set the latter up to the action of the grinding mechanism to be described.

The upper and lower grinding-rolls G H, of usual construction, are mounted, respectively, on shafts $g^{\times} h^{\times}$, supported in bearings in arms G' H', dovetailed to slide vertically on a suitable guideway 20 on the bracket A^8, (best shown in Figs. 8 and 9,) said arms having threaded lugs g' h', (see dotted lines, Figs. 1 and 8, and in plan, Fig. 9,) which engage, respectively, oppositely-threaded shafts E and E', suitably supported in bearings in the bracket A^8 and having fast at their upper and lower ends, respectively, spur-gears g^2 h^2. These spur-gears in turn are respectively in mesh with gears g^3 h^3, normally rigidly secured by set-screws 3 to an upright shaft F', provided with a worm-gear F^2 (see Figs. 8 and 9) in mesh with a worm f on a horizontal shaft $f^{\times}$, mounted in bearings f' f^2 on an arm of the bracket A^8 and provided at its outer end with a hand-wheel f^3, (see Fig. 4,) said hand-wheel being omitted in Figs. 1 and 8. A bevel-gear f^4 has an elongated hub f^5, extended through the bearing f^2, said hub being secured by a set-screw 4 to the worm-shaft $f^{\times}$. The bevel-gear f^4 meshes with a similar gear d^{90} on the shaft D^{80}, from which latter shaft the worm-shaft $f^{\times}$ is driven. The grinder-roll shafts $g^{\times} h^{\times}$ are rotated by means of a belt H^5 from a pulley H^6 on a suitably-driven counter-shaft H^7, the belt passing around suitable pulleys G^2 H^2 (see dotted lines, Fig. 4, and full lines, Fig. 1) on the grinder-roll shafts and over an idler-pulley H^8, such driving mechanism for the grinder-rolls being of substantially usual construction. Inasmuch as the grinders wear away and become reduced in diameter as they act upon the knife to grind the edge thereof and maintain it sharp it is necessary to provide means for adjusting the grinder-rolls and moving them toward each other to compensate for such wear. In machines as at present constructed this adjustment is effected by hand, the rolls being set up to bear with considerable force upon the knife-blade at first, and as the grinding progresses the grinding action decreases in effect, so that a careful operator must be continually setting up or adjusting the grinder-rolls.

In my present invention I provide means for uniformly and constantly moving the grinder-rolls toward each other to compensate for wear, and I also thereby attain a uniformity of action of the grinder-rolls upon the knife.

As has been described, the worm-shaft $f^{\times}$ is rotated by or through the shaft D^{80}, and through the worm f and worm-gear F^2 the vertical shaft F' is rotated very slowly, this shaft in turn rotating in unison the oppositely-threaded shafts E E' by means of the spur-gears g^3 g^2 h^3 h^2. Such rotation of the threaded shaft operates through the threaded portions g' h' of the grinder-roll-supporting arms G' H' to move the latter toward each other, and thereby constantly and uniformly move the grinders toward and to act with a uniform and constant effect upon the knife, it being remembered that the latter is set up constantly and uniformly to the action of the grinders by means of the lower back plates d^{20}.

It is desirable to adjust the pressure of the grinder-rolls upon the knife, and this is readily effected by releasing the set-screw 4, thus disconnecting the shaft $f^{\times}$ from its actuating-shaft D^{80} and turning said worm-shaft $f^{\times}$ in one or the other direction by means of the hand-wheel f^3 to either increase or decrease the pressure of the grinder-rolls upon the knife, and when the desired pressure is

secured the set-screw 4 is tightened and the rolls will operate with the adjusted force upon the knife.

It is necessary to sometimes vary the relative positions of the grinder-rolls as regards the knife to vary the bevel of the knife-edge, and to accomplish this the gears g^3 and h^3 are secured to their common shaft F′ by the set-screws 3. By loosening one or the other of said set-screws and turning the shaft F′ the other gear will operate to rotate its corresponding screw-threaded shaft E or E′, as the case may be, to raise or lower the grinder-roll controlled thereby. When one roll has been set in the requisite position, the loose gear on the shaft F′ is tightened thereupon and the other gear loosened, so that the other grinder-roll may be set by rotation of the shaft $f^\times$, and after the second grinder-roll has been positioned the spur-gear is tightened on the shaft F′. To more readily and rapidly accomplish this adjustment without having recourse to the shaft $f^\times$, I provide hand-wheels g^8 and h^8, preferably secured to or forming part of the hubs of the gears g^3 h^3, respectively, and then by loosening the desired gear it can be rotated by its hand-wheel independent of the shaft F′ to thereby raise or lower its corresponding grinder-roll. Obviously this latter mode of adjustment is more rapid than by the slow motion derived from rotation of the shaft $f^\times$ and transmission by the worm f and worm-gear F to the shaft F′. Either form of adjustment, however, may be employed to attain the desired result.

The various gears, worms, and worm-gears and the threaded sleeves employed by me are so calculated as to set up the different parts of the apparatus at the proper speed to accomplish the desired result, it being obvious that the setting up of the knife by means of the knife-wheels and back plates and the adjustment of the grinder-rolls for wear will be very slow, only sufficient to maintain the traveling edge of the knife in substantially the same path and to move the grinder-rolls toward the knife at the rate of wear of said rolls.

My invention is not restricted to the precise construction and arrangement of parts herein shown, for so far as I am aware it is broadly new to provide means for automatically setting up the knife in a machine of the class described and to adjust the grinding-rolls for wear.

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

1. In a leather-splitting machine, the endless, traveling knife, supporting means therefor, and automatic means to set the knife up and thereby maintain its edge substantially in a fixed path of movement, substantially as described.

2. In a leather-splitting machine, an endless, traveling knife, carrying-wheels therefor, back plates against which the back of the knife travels, and means to automatically move said wheels and back plates to set the knife up and thereby maintain its edge substantially in a fixed path of movement, substantially as described.

3. In a leather-splitting machine, an endless, traveling knife, carrying-wheels therefor, bearings in which the wheel-journals are longitudinally movable, back plates against which the back of the knife travels, and continuously-operating means having connections between it and the wheel-journals and the back plates, to automatically move the journals and back plates in unison and thereby set up the knife to maintain its edge in substantially a fixed path of movement, substantially as described.

4. In a leather-splitting machine, an endless, traveling knife, supports therefor, grinder-rolls to sharpen the knife-edge, upper and lower back plates against which the back of the knife travels, and means to simultaneously set up the back plates to thereby maintain the edge of the knife in substantially a fixed path of travel and in position to be ground, substantially as described.

5. In a leather-splitting machine, an endless, traveling knife, supports therefor, grinder-rolls to sharpen the knife-edge, upper and lower back plates against which the back of the knife travels, and means to simultaneously set up the back plates to thereby maintain the edge of the knife in substantially a fixed path of travel and in position to be ground, combined with means to automatically set up the grinder-rolls to act upon the knife with uniform action, substantially as described.

6. In a leather-splitting machine, an endless, traveling knife, grinder-rolls to maintain the edge of the knife sharpened, and means to automatically set up the knife to maintain its edge in substantially a fixed path of travel and to simultaneously set up the grinder-rolls to act upon the knife with uniform pressure, substantially as described.

7. In a leather-splitting machine, the endless, traveling knife, supporting means therefor, two grinder-rolls, to act on opposite sides of the knife, and means to automatically set up the said rolls simultaneously to operate continuously and with substantially uniform action upon the knife, substantially as described.

8. In a leather-splitting machine, the endless, traveling knife, supporting means therefor, grinder-rolls to act upon the knife, and means to automatically set up the knife and thereby maintain its edge in substantially a fixed path of movement, substantially as described.

9. In a leather-splitting machine, the endless, traveling knife, supporting means therefor, grinder-rolls to act upon the knife and maintain the edge sharp, means to automatically set up said rolls to compensate for wear,

and means to adjust said rolls to vary the pressure thereof upon the knife, substantially as described.

10. In a leather-splitting machine, the endless, traveling knife, supporting means therefor, grinder-rolls to act upon the knife and maintain the edge sharp, means to automatically set up said rolls to compensate for wear, and manually-controlled devices to raise or lower said rolls independently, relatively to the knife, substantially as described.

11. In a leather-splitting machine, an endless, traveling knife, supporting means therefor, grinder-rolls to act upon the knife and maintain the edge sharp, means to automatically set up said rolls to compensate for wear, manually-actuated means to adjust the rolls to vary the grinding action, and devices to independently vary the position of the rolls relative to the knife.

12. In a leather-splitting machine, an endless, traveling knife, means to automatically set the knife up to maintain its edge in substantially a fixed path of movement, an actuating-shaft for said means, and variable-speed mechanism intermediate said means and the actuating-shaft, substantially as described.

13. In a leather-splitting machine, an endless, traveling knife, knife-carrying wheels, means to move said wheels laterally, back plates for the knife, means to set the back plates up, connections between said wheel moving and setting-up means, to operate the same in unison, detachably-connected mechanism to automatically actuate said means, and a manually-operated device to operate said means when said actuating mechanism is disconnected, substantially as described.

14. In a leather-splitting machine, an endless, traveling knife, carrying-wheels therefor having journals longitudinally movable in their bearings, means, including worm-gears and worms, to move said journals longitudinally in unison, and mechanism, including variable-speed devices, to actuate said means, substantially as described.

15. In a leather-splitting machine, an endless, traveling knife, a plurality of back plates to set up the knife, a common actuator to adjust the back plates, connections between them and the actuator, and manually-controlled means to adjust the back plates independently.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AMORY A. CHILSON.

Witnesses:
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