(No Model.) 3 Sheets—Sheet 1.

J. A. SAFFORD.

LEATHER SPLITTING MACHINE.

No. 477,462. Patented June 21, 1892.

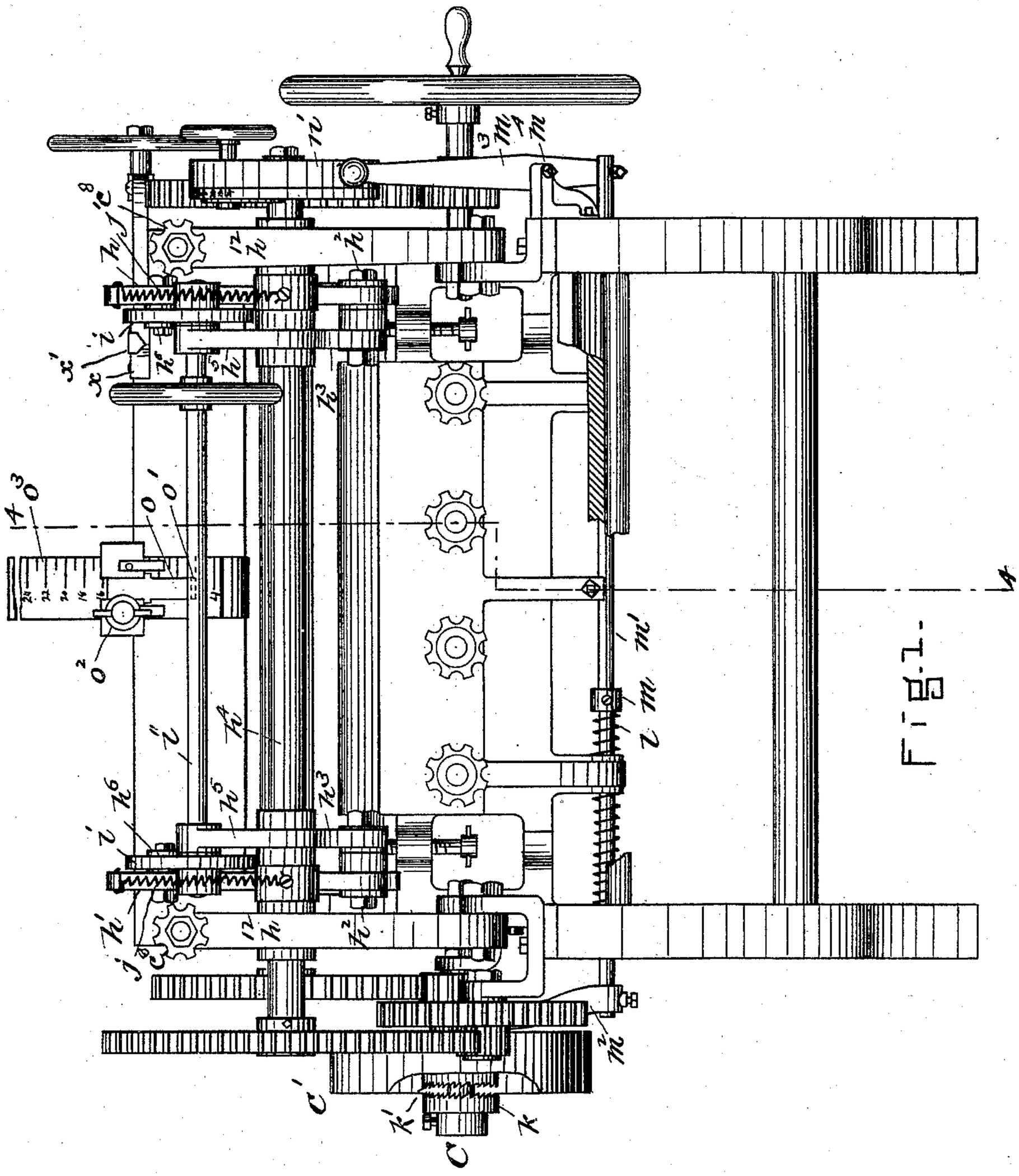

FIG. 1.

WITNESSES.
A. D. Harrison.
D. C. McShane.

INVENTOR.
Joseph A. Safford.
by
Wight, Brown & Crosby.
" Attys.

(No Model.) 3 Sheets—Sheet 2.

J. A. SAFFORD.

LEATHER SPLITTING MACHINE.

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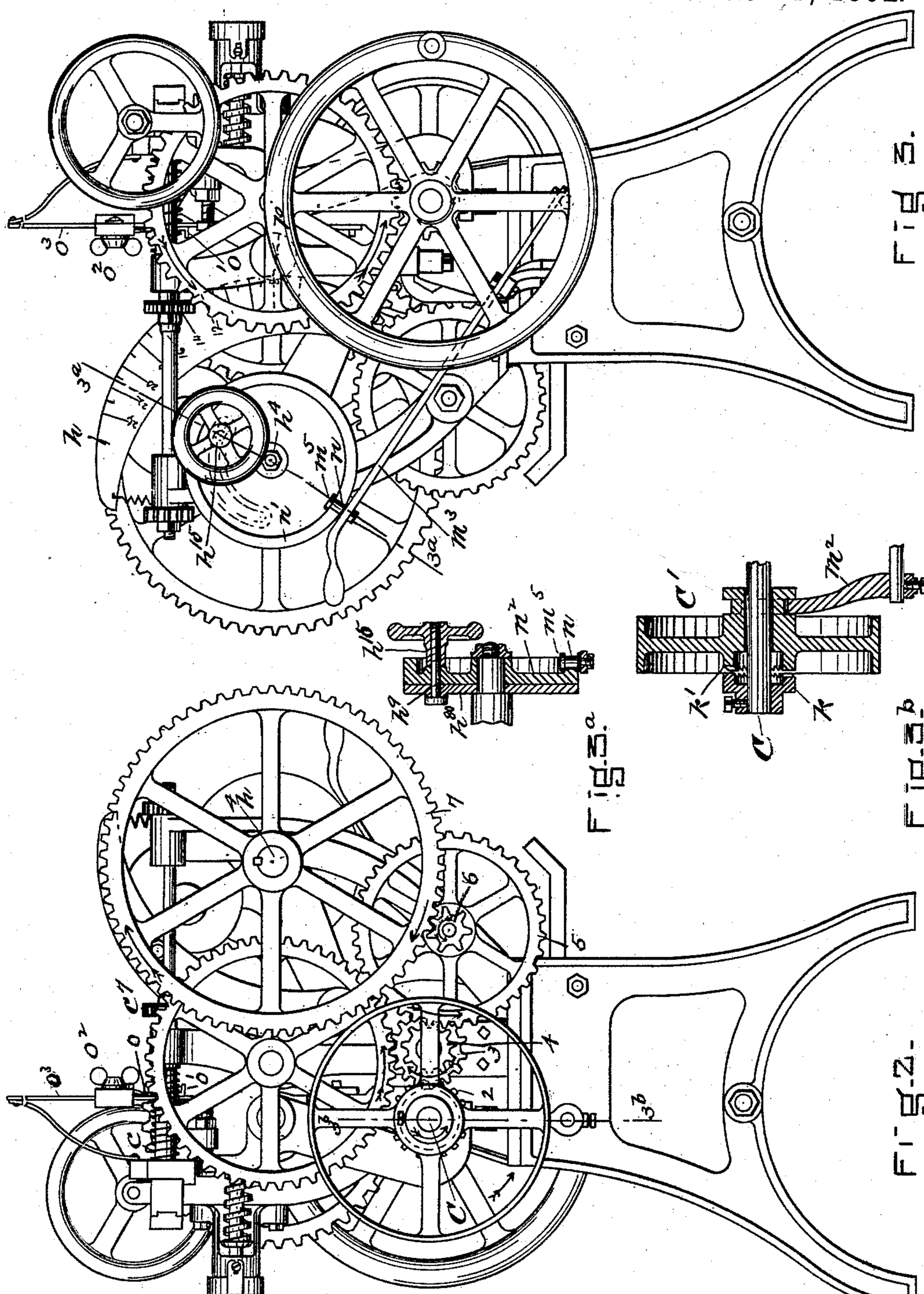

FIG. 1.

FIG. 1a.

FIG. 1b.

FIG. 2.

WITNESSES.

A. D. Harrison

B. A. McShane.

INVENTOR.

Joseph A. Safford.

by Wright, Brown & Crossley, Atty's.

(No Model.)

3 Sheets—Sheet 3.

J. A. SAFFORD.

LEATHER SPLITTING MACHINE.

No. 477,462. Patented June 21, 1892.

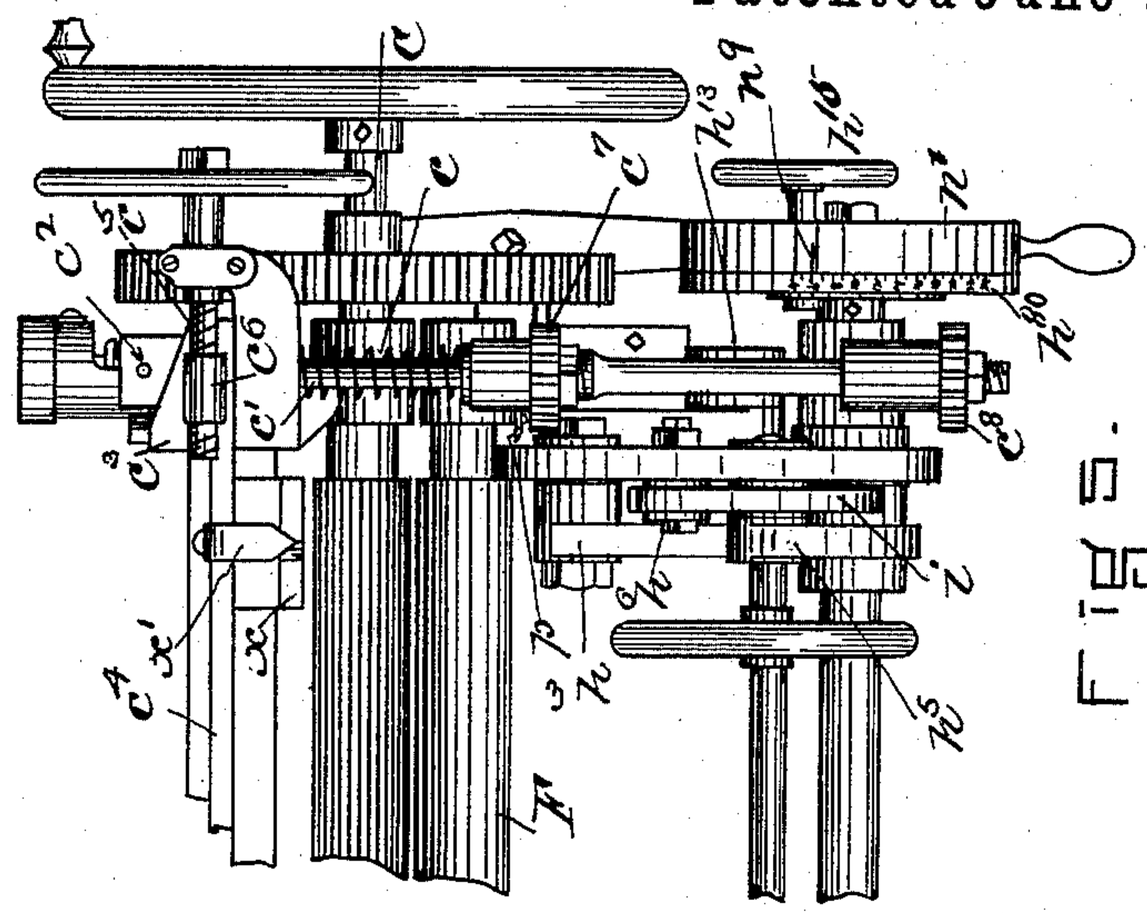

FIG 5.

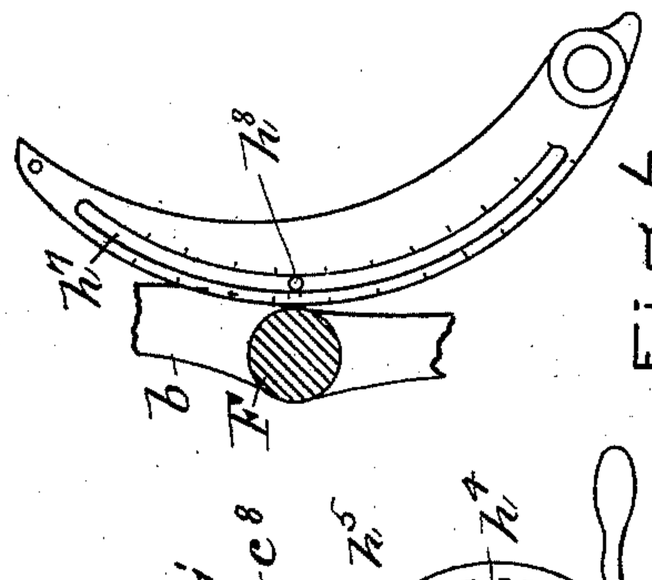

FIG 6.

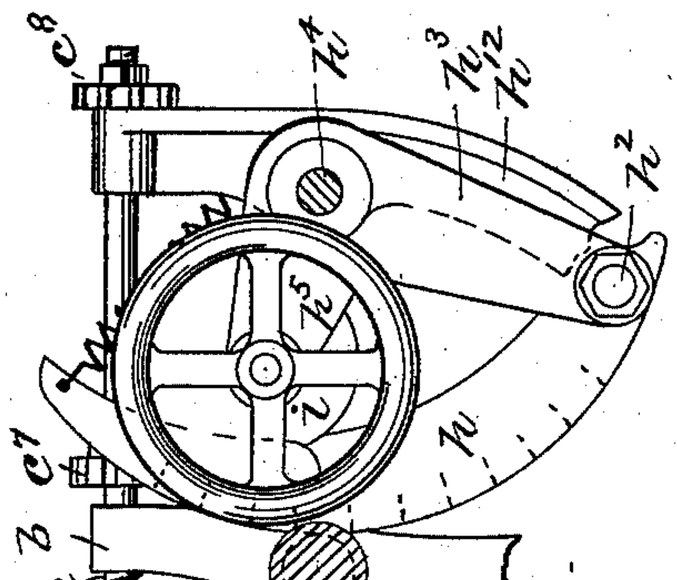

FIG 4a.

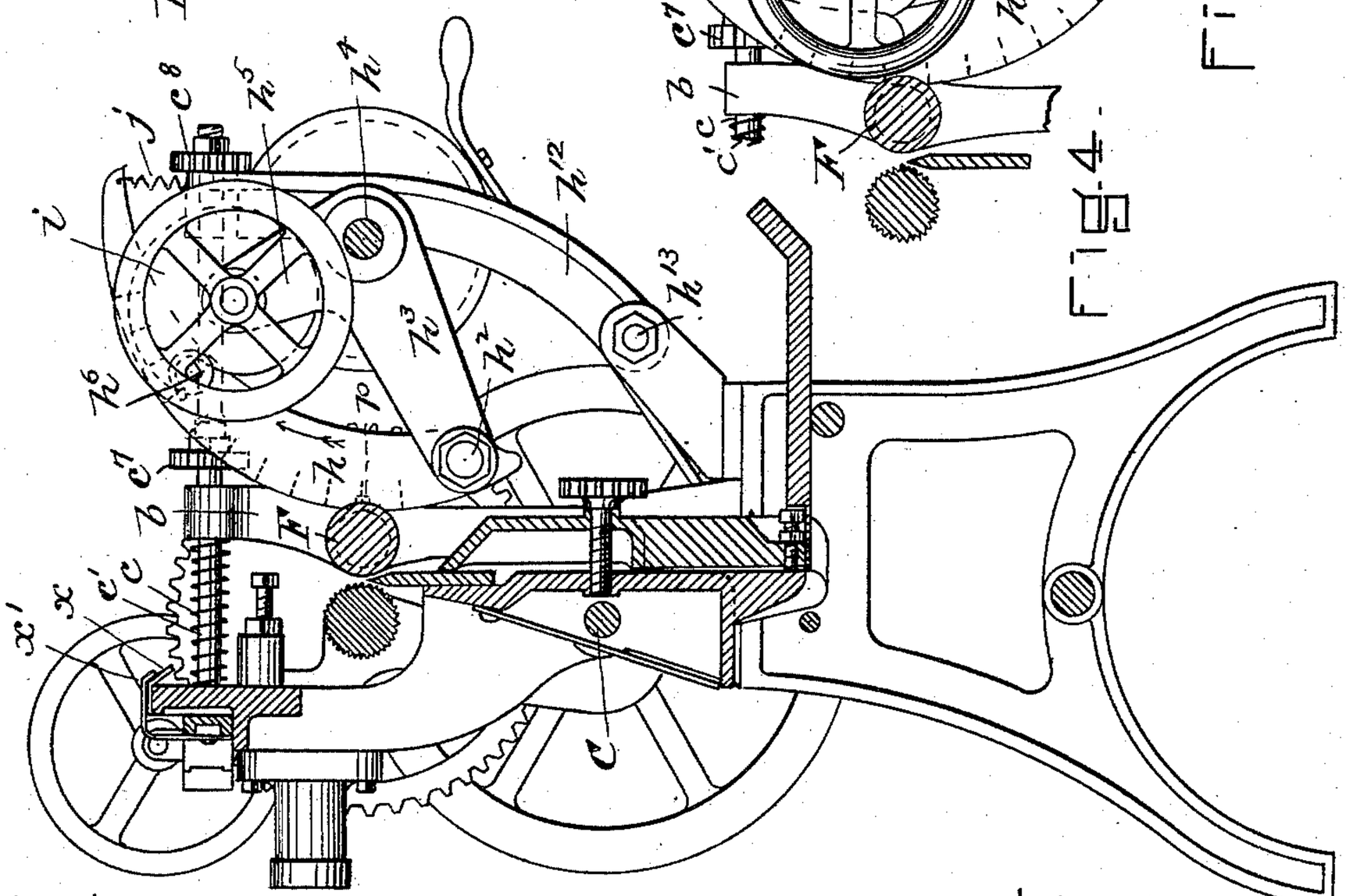

FIG 4.

WITNESSES.
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Attys.

UNITED STATES PATENT OFFICE.

JOSEPH A. SAFFORD, OF MALDEN, MASSACHUSETTS.

LEATHER-SPLITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 477,462, dated June 21, 1892.

Application filed September 21, 1891. Serial No. 406,390. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. SAFFORD, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Leather Splitting or Skiving Machines, of which the following is a specification.

This invention relates to that class of leather-splitting machines in which a stationary splitting-knife is employed in co-operation with an adjustable feed-roll and an adjustable gage-roll, said rolls presenting the leather to the splitting-knife, while the gage-roll determines the thickness of the piece of leather by governing the amount cut or split from it by the knife. A type of leather-splitting machine of this class is shown in Letters Patent No. 305,240, granted to me September 16, 1884.

The present invention has for its object to provide an improvement in leather-splitting machines of the type above referred to, whereby the gage-roll may be automatically moved relatively to the knife and feed-roll to give regular or predetermined variations of thicknest to the leather being split whenever the uses to which the leather is to be put require such variations, and particularly to enable the gage-roll to be automatically moved gradually and at the uniform rate toward the knife and feed-roll while the leather is being presented to the knife, so that as the cut progresses it will gradually decrease the thickness of the strip or piece of leather and form a scarfed or tapered surface thereon.

The invention also has for its object to enable the length of the scarfed or tapered surface and the thickness of its end without regard to the thickness of the piece of leather being skived to be accurately determined before the cutting operation.

My invention consists in the improvements which I will now proceed to describe and claim.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of a leather splitting or scarfing machine embodying my invention. Fig. 2 represents an end elevation of the machine. Fig. 3 represents an elevation at the opposite end. Fig. 3^a represents a sectional view on line 3^a 3^a, Fig. 3, and Fig. 3^b represents a section on line 3^b 3^b, Fig. 2. Fig. 4 represents a section on line 4 4, Fig. 1. Fig. 4^a represents a similar section showing a different stage of the operation. Fig. 5 represents a top view of the machine. Fig. 6 represents a modification.

The same letters of reference indicate the same parts in all the figures.

In the drawings, A represents the main frame of the machine, having suitable bearings in which is mounted the driving-shaft C.

E represents the feed-roll, and F the gage-roll, said rolls being positively rotated in opposite directions by suitable gearing communicating motion from the driving-shaft.

D represents the knife, which is detachably secured to the frame and is located in the usual relation to the rolls E F. Said rolls have journals, which are mounted in swinging arms or levers *a a b b*, the arms *a a* supporting the roll E, while the arms *b b* support the roll F, said arms being pivoted at their ends to the supporting-frame of the machine, as shown in said patent. The rolls E and F are adjustable with relation to the knife, as shown in said patent, and the means for adjusting and holding the feed-roll may be the same as shown in said patent, or any other suitable means may be employed for this purpose, my present invention relating particularly to the automatic movement of the gage-roll relatively to the feed-roll and knife, as hereinafter described.

Between the upper ends of the arms *b b* and the fixed portion of the supporting-frame are interposed springs *c c*, which are of sufficient strength and exert force in the proper direction to normally force the gage-roll F away from the feed-roll E, said springs being here shown as mounted on rods *c'*, which are movable on guiding-orifices in the supporting-frame and passing through enlarged openings in the swinging ends of the arms *b b*. The rods pass through the supporting-frame, and to their ends which project at the rear side of said frame are affixed heads c^2, formed to bear against wedges c^3, affixed to a bar c^4, which is parallel with the feed and gage rolls, and is movable lengthwise by means of a screw c^5, engaged with a threaded eye in an ear c^6, affixed to said bar, an unthreaded part of the screw being journaled in a bearing on the supporting-frame. The rods *c'* have collars or

shoulders c^7 affixed to them at the front sides of the arms $b\,b$, said collars limiting the movement of the arms $b\,b$ and gage-roll F away from the knife. The rods c' are extended forward from the arms $b\,b$ and pass through the upper ends of arms h^{12}, the lower ends of which are pivoted at h^{13} to ears on the supporting-frame, said arms h^{12} supporting the shaft h^4, which carries the cams $h\,h'$, hereinafter described, that automatically move the gage-roll during the leather-cutting operation, the rods c', having collars c^8, bearing on the outer sides of the arms h^{12} and limiting the outward movement of said arms. It will be seen that when the bar c^4 and its wedges c^3 are moved in one direction the rods c' will be moved inwardly or toward the rear of the machine, (which is at the left, as viewed in Figs. 2 and 4,) thus forcing the arms b and gage-roll F toward the knife, the arms h^{12} and the cams supported thereby being correspondingly moved by the collars c^8. When the bar c^4 and its wedges are moved in the opposite direction, the spring c move the arms b and gage-roll F outwardly or away from the knife, the rods c' being correspondingly moved outwardly, so that their collars c^8 permit the outward movement of the arms h^{12}.

The movements given to the gage-roll by the means above described are for the purpose of determining the limit of the movement of the gage-roll toward the knife by the cams, and the thickness of the end of the piece of leather scarfed or tapered by the operation of the machine, as presently described, the thickness of the scarfed end that will be produced by a given adjustment of the bar c^4 and wedges c^3 being indicated by a graduated scale on a plate x, affixed to the supporting-frame, and a pointer x', affixed to the bar c^4, and projecting over said plate.

The cams $h\,h'$, which automatically change the position of the gage-roll during the cutting operation, are here shown as curved or segmental arms, which are mounted so that their convex edges are eccentric to the axis on which they move. Said cams are connected by bolts or pivots $h^2\,h^2$ with arms $h^3\,h^3$, affixed to the shaft h^4. The cams $h\,h'$ are adapted to swing on their pivots h^2 toward and from the gage-roll and they are arranged to bear on portions of the gage-roll at the ends of the operative surface thereof, so that they support the gage-roll against the pressure exerted by the springs c on the arms b. The swinging ends of the cams $h\,h'$ are adjustably supported by means of cams $i\,i$, affixed to a shaft i', which is journaled in bearings in arms h^5, affixed to the shaft h^4, said arms h^5 being here shown as integral with the arms h^3.

The gage-roll-supporting cams $h\,h'$ are provided with studs or projections h^6, which bear upon the perimeters of the adjusting-cams i i. By rotating the shaft i' the adjusting-cams $i\,i$ will be caused to swing the gage-roll-supporting cams $h\,h'$ toward or from the knife, the cams $h\,h'$ being held in yielding contact with the perimeters of the cams i by means of springs $j\,j$. The object of the adjusting-cams $i\,i$ is to enable the cams $h\,h'$ to be quickly moved before the cutting operation, so as to quickly adjust the gage-roll to the thickness of the piece of leather interposed between it and the feed-roll, the arrangement of the cams $i\,i$ with relation to the studs h^6, which bear upon them, being such that the pressure exerted by said studs upon the perimeters of the cams i cannot displace or rotate the latter. Hence they firmly support the cams $h\,h'$.

The shaft h^4 is rotated by power communicated from the driving-shaft C through suitable gearing, such as that shown in Fig. 2, said gearing comprising a pinion 2 on the driving-shaft, a pinion 3 meshing with the pinion 2 and mounted on a stud or bearing affixed to the supporting-frame, a smaller pinion 4, affixed to the pinion 3, a gear 5, meshing with the pinion 4, a pinion 6, affixed to the gear 5, and a gear 7, affixed to the shaft h^4 and meshing with the pinion 6. The described arrangement of gearing imparts a slow rotation to the shaft h^4 and causes it to move the cams $h\,h'$ slowly in the direction indicated by the arrow in Fig. 4. I do not limit myself to this particular arrangement of gearing, however, but may rotate the shaft h^4 by any other suitable means. When the adjusting-cams i are turned to the position shown in Fig. 4, so that the studs h^6 bear on the portions of the cams i having the shortest radius, the cams $h\,h$ are at the outward limit of their movement. When, however, the cams i are turned so as to throw the swinging ends of the cams $h\,h'$ away from the shaft h^4 the said cams are forced inwardly against the gage-roll and caused to move the latter toward the knife.

In operating the machine, as here shown, the cams $h\,h'$ are moved to position to permit the gage-roll to separate from the knife, as shown in Fig. 4^a, far enough to permit the easy insertion of the piece of leather between the knife and gage-roll, the adjusting-cams i being turned after the leather is inserted sufficiently to cause the cams $h\,h'$ to press the gage-roll firmly against the leather. The feed and gage rolls are then set in motion, and at the same time the shaft h^4 is rotated in the direction required to move the cams $h\,h'$ upwardly and force the gage-roll toward the knife during the cutting operation. A gradual decrease in the thickness of the leather is thus caused, the cut commencing where the leather is at its full thickness and gradually tapering or skiving the piece toward the end thereof, the thickness of the end being determined by the adjustment of the rods $c'\,c'$, the collars c^8 on the outer ends of the latter rods governing the inward throw of the cams $h\,h'$ by limiting the outward movement of the arms h^{12} supporting said cams, thus limiting the movement of the gage-roll by said cams toward the knife.

If desired, the gage-roll-adjusting cams may be constructed to move the gage-roll positively away from the knife as well as toward it, in which case the springs *c c* would not be required. This result may be accomplished in various ways—such as by providing the cams *h h'* with slots h^7, engaging studs or rolls h^8, secured to and projecting from the arms *b*, which support the gage-roll F, as shown in Fig. 6.

I prefer to provide the machine with an automatic stop-motion, which arrests the rotation of the feed-roll, the gage-roll, and the shaft h^4, with its cams *h h'*, after the cams have performed their allotted work in moving the gage-roll, so that after the gage-roll has been moved to vary the thickness of the piece of leather being operated upon the machine will be stopped in position to start another piece with the gage-roll in position to repeat the preceding operation.

The stop-motion shown in the present case is constructed as follows: The driving-shaft C has a clutch *k* affixed to it, said clutch being formed to engage a corresponding clutch *k'* on the loose driving-pulley C' on the shaft C. Said pulley is laterally movable on the shaft to throw its clutch *k'* into and out of engagement with the clutch *k*, and is normally held in the position shown in Fig. 1 with its clutch disconnected from the clutch *k* by means of a spring *l*, interposed between the supporting-frame and a collar on a shipper-bar *m'*, which slides in bearings on the supporting-frame. On one end of said bar is an arm m^2, the forked upper end of which engages a groove in the hub of the pulley C', as shown in Fig. 3^b. To the opposite end of the shipper-bar is pivotally connected a lever m^3, which is pivoted at m^4 to an ear on the supporting-frame. One end of the lever m^3 is provided with a trundle roll or stud m^5, which is formed to enter a slot or recess *n* in the flange *n'* of a disk affixed to the shaft h^4. When the slot *n* coincides with the roll m^5, said roll is permitted to enter the slot, the spring *l* acting to press the roll against the edge of the flange *n'*. When the flange *n'* is turned so that its slot *n* does not coincide with the roll m^5, said roll necessarily bears against the edge of the flange, so that the lever m^3, shipper-bar *m'*, and pulley C' are held, with the clutch *k'*, engaged with the clutch *k*, the pulley C' being thus caused to rotate the driving-shaft and parts driven thereby. It will be seen, therefore, that when the shaft h^4 reaches a given point in its rotation the driving-pulley is disconnected from the driving-shaft, and the operation of the machine is stopped. I do not limit myself to this particular form of automatic stop mechanism, but may use any other suitable form of mechanism, whereby the operation of the machine may be automatically stopped at a predetermined point until again started by the operator.

When the machine is employed for the purpose of producing a gradual scarfed or tapered surface on a piece of leather, I employ means for predetermining the length of said tapered surface, said means constituting an important feature of my invention.

In carrying out this part of my invention I provide a vertically-movable gage *o*, which is located above the knife and determines the distance of the end of the piece of leather inserted between the gage-roll and knife from the edge of the knife before the cutting operation. Said gage is preferably a metal plate *o*, having its lower end bent outwardly to form a lip *o'*. The plate *o* is secured by means of a clamping-screw o^2 to a vertical plate o^3, attached in any suitable way to the supporting-frame of the machine and provided with numbered marks or graduations constituting a scale, as shown in Fig. 1, said marks indicating by their coincidence with any suitable part of the gage the distance of the lip *o'* from the cutting-edge of the knife. For example, if it is desired to commence the formation of the tapered surface on the leather at a distance of six inches from the end of the piece the gage *o* is moved until it coincides with the graduation numbered "6" on the plate o^3, thus indicating that the lip *o'* is six inches from the cutting-edge of the knife.

The cam *h* is provided with numbered marks or graduations (shown in Fig. 3) corresponding to those on the plate o^3, said graduations constituting a scale which co-operates with a pointer *p*, (shown in full lines in Fig. 5 and in dotted lines in Figs. 3 and 4,) said pointer being affixed to one of the arms *b*, supporting the gage-roll, or it may be attached to the supporting-frame and located at the same height as the cutting-edge of the knife. The pointer *p* co-operates with the numbered graduations on the cam *h* in indicating the distance between the cutting-edge of the knife and the point on said cam at which the cam, in moving as indicated in Fig. 4, ceases to impart lateral motion to the gage-roll. I am thus enabled to adjust the cams *h h'* so that the movement of the gage-roll toward the knife will stop at the same time that the end of the piece of leather reaches the knife. It will be seen, therefore, that when the gage *o'* is adjusted at, say, six inches above the knife, the adjustment of the cams *h h'* being such that the graduation numbered "6" coincides with the pointer *p*, the movement of the gage-roll toward the knife will cease when the end of the piece of leather has moved downwardly six inches from the gage *o'* and has therefore reached the knife. The length of the taper or inclination of the surface formed on the leather by the knife while the gage-roll is moving toward it may thus be accurately determined. As already described, the thickness of the reduced end of the piece is determined by the adjustment of the rods *c' c'*. Hence I am

enabled to taper a piece of leather so that the end of the taper will have any desired thickness or be reduced to a feather-edge.

I have also provided means for adjusting the point in the movement of the cams *h h'*, at which the driving-shaft of the machine is automatically disconnected from the driving-pulley C', so that whatever may be the adjustment of the cams *h h'* the machines will not stop until after said cams have ceased to move the gage-roll. To this end, I make the slotted flange *n'* adjustable on the shaft h^4 by forming it on a disk n^2, adapted to turn freely thereon, said shaft having affixed to it a disk h^{80}, (see Fig. 3^a,) against which the disk n^2 bears. The disk h^{80} is provided with a segmental slot h^{10}, (shown in dotted lines in Fig. 3,) through which passes a bolt h^9, said bolt passing through a hole closely fitting it in the disk n^2. A nut h^{15} is screwed onto the bolt h^9 and co-operates therewith in clamping the disk n^2 to the disk h^{80}. On the periphery of the disk h^{80} are a series of numbered graduations, (see Fig. 5,) which constitute a scale co-operating with a mark n^9 or other indicator on the flange *n'*. The said scale on the disk h^{80} is devised so that by setting the flange *n'* with its mark n^9 corresponding with the numbers on the plate o^3 and cam *h*, which are set on the accompanying indicators, the automatic stop-motion will act after the cams *h h'* have performed their alotted work and not before.

It will be seen that the sliding gage *o* and graduated plate o^3 constitute an indicator to determine the distance between the cutting-edge of the knife and the end of a piece of leather presented to the knife, while the marks and graduations on the cam *h* and the pointer *p*, co-operating therewith, constitute an indicator to determine the extent of movement imparted to the gage-roll from the beginning to the end of the operation.

I do not limit myself to the described construction of the indicating devices, but may use any other construction or arrangement that will accomplish the ends desired. I may also use either of said indicators without the other, although the usefulness of each is greatly increased by the employment of the other. Hence I prefer their conjoint use.

I claim—

1. In a leather-splitting machine, the combination, with a fixed knife, a feed-roll, a gage-roll, which is movable toward and from the knife and feed-roll, of springs arranged to normally move the gage-roll away from the knife and feed-roll, a cam or cams supporting the gage-roll against the pressure of said springs, and mechanism for automatically moving said cams to vary the position of the gage-roll during the cutting operation, as set forth.

2. In a leather-splitting machine, the combination, with a fixed knife, a feed-roll, a gage-roll which is movable toward and from the knife and feed-roll, of an automatically-operated cam or cams moved by the power of the machine and governing the position of the gage-roll and mechanism, substantially as described, for automatically stopping the operation of the machine when the cam reaches a given point in its movement, as set forth.

3. In a leather-splitting machine, the combination of a fixed knife, a feed-roll and a gage-roll supported by swinging arms which are movable toward and from the feed-roll, a shaft geared to the driving-shaft of the machine and mounted in swinging arms which permit said shaft to move toward and from the gage-roll and knife, automatically-moved cams supported by said shaft and adapted to move the gage-roll laterally during the cutting operation, and means for adjusting the cam-shaft-carrying arms to determine the limit of the movement imparted by the cams to the gage-roll toward the knife and the thickness of the reduced end of the piece of leather, as set forth.

4. In a leather-splitting machine, the combination of a fixed knife, a feed-roll and a gage-roll supported by swinging arms which are movable toward and from the feed-roll, a shaft geared to the driving-shaft of the machine and mounted in swinging arms which permit said shaft to move toward and from the gage-roll and knife, automatically-moved cams supported by said shaft and adapted to move the gage-roll laterally during the cutting operation, rods connecting the cam-shaft-carrying arms with the frame of the machine, and means for adjusting said rods to determine the movement of the gage-roll toward the knife by the cams, as set forth.

5. In a leather-splitting machine, the combination of a fixed knife, a feed-roll, a gage-roll which is movable toward and from the knife, a shaft geared to the driving-shaft of the machine, automatically-moved cams pivotally connected to supports on said shaft and arranged to govern the position of the gage-roll, and means for adjusting said cams, as set forth.

6. In a leather-splitting machine, the combination of a fixed knife, a feed-roll, a gage-roll which is movable toward and from the knife, a shaft geared to the driving-shaft of the machine, automatically-moved cams pivotally connected to supports on said shaft and arranged to govern the position of the gage-roll, and rotary adjusting-cams carried by supports on said shaft and having their perimeters arranged to support the gage-roll-governing cams, as set forth.

7. In a leather-splitting machine, the combination, with a fixed knife, a feed-roll, a gage-roll movable toward and from the knife and feed-roll, and cams automatically moved by the power of the machine and arranged to govern the position of the gage-roll, of an indicator adapted to indicate the distance between the cutting-edge of the knife and the end of a piece of leather presented to the knife, as set forth.

8. In a leather-splitting machine, the combi-

nation, with a fixed knife, a feed-roll, a gage-roll movable toward and from the knife and feed-roll, and cams automatically moved by the power of the machine and arranged to govern the position of the gage-roll, of an indicator adapted to determine the extent of movement imparted by the cams to the gage-roll, as set forth.

9. In a leather-splitting machine, the combination, with a fixed knife, a feed-roll, a gage-roll movable toward and from the knife and feed-roll, and adjustable cams automatically moved by the power of the machine and arranged to govern the position of the gage-roll, of an indicator to determine the distance between the cutting-edge of the knife and the end of a piece of leather presented to the knife, and another indicator to determine the extent of movement imparted to the gage-roll by said cams, as set forth.

10. In a leather-splitting machine, the combination, with the knife, the feed-roll, the gage-roll movable toward and from the knife and adjustable cams adapted to vary the position of the gage-roll during the operation of the machine, of means for determining the length of the skived or tapered surface produced on a piece of leather, said means comprising a gage adjustable toward and from the knife and adapted to determine the distance of the end of a piece of leather from the cutting-edge of the knife, and an indicator adapted to indicate the starting position of said cams to give the desired length of tapered surface, said gage denoting the proper position of the end of the piece for a tapered surface of a given length, while the indicator denotes the proper position of the cams to produce a tapered surface of the length required by the position of the end of the piece, as set forth.

11. In a leather-splitting machine, the combination, with the knife, the feed-roll, the gage-roll movable toward and from the knife, and the adjustable cams *h h'*, adapted to vary the position of the gage-roll during the operation of the machine, of an indicator comprising a graduated scale on one of said cams and a pointer affixed to a suitable support, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of September, A. D. 1891.

JOSEPH A. SAFFORD.

Witnesses:
A. D. HARRISON,
EWING W. HAMLEN.