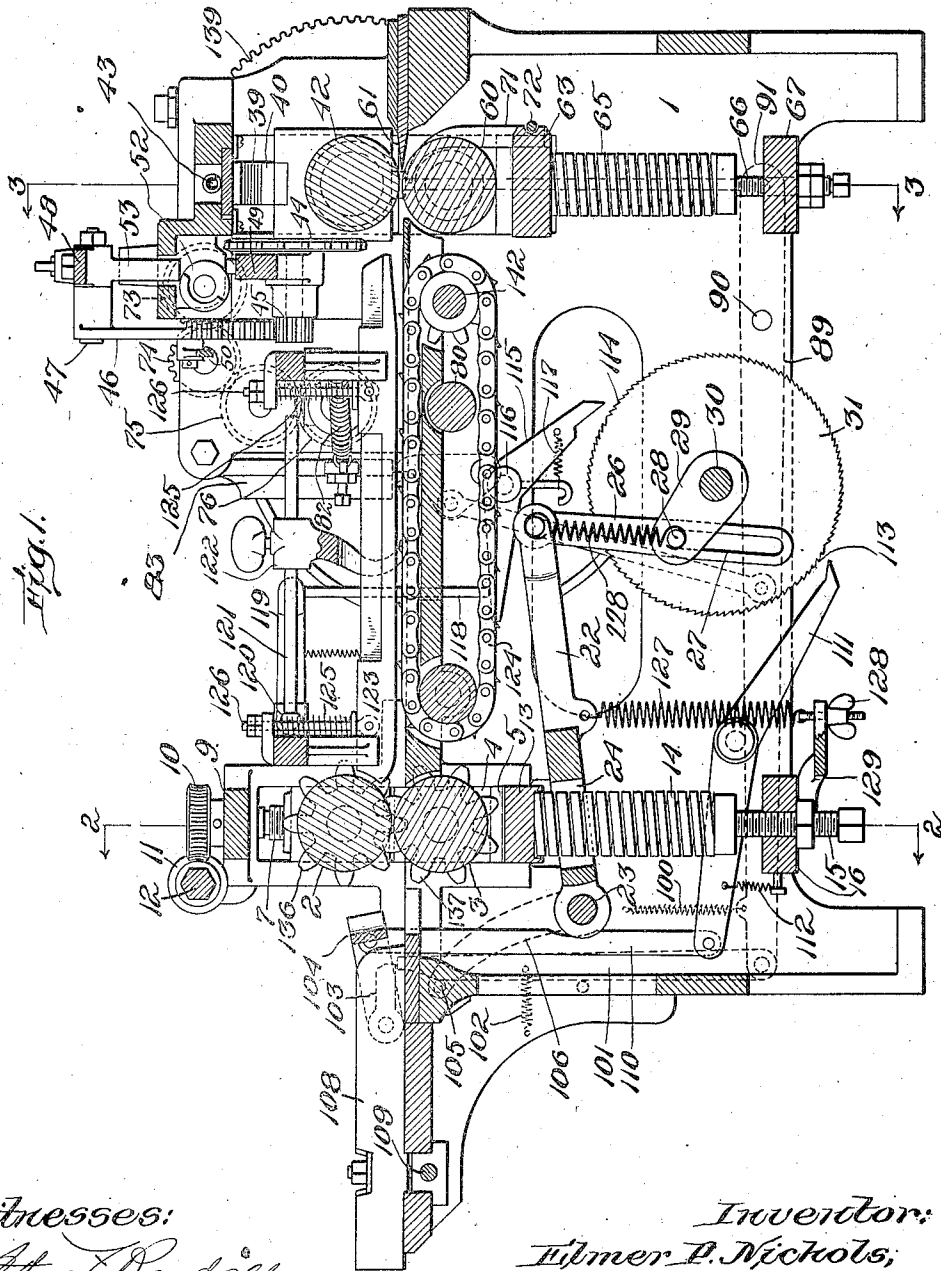


E. P. NICHOLS.
LEATHER EVENING AND GRADING MACHINE.
APPLICATION FILED FEB. 27, 1908.

1,057,358.

Patented Mar. 25, 1913.

5 SHEETS—SHEET 1.



Witnesses:
Arthur C. Randall
Edward Maxwell

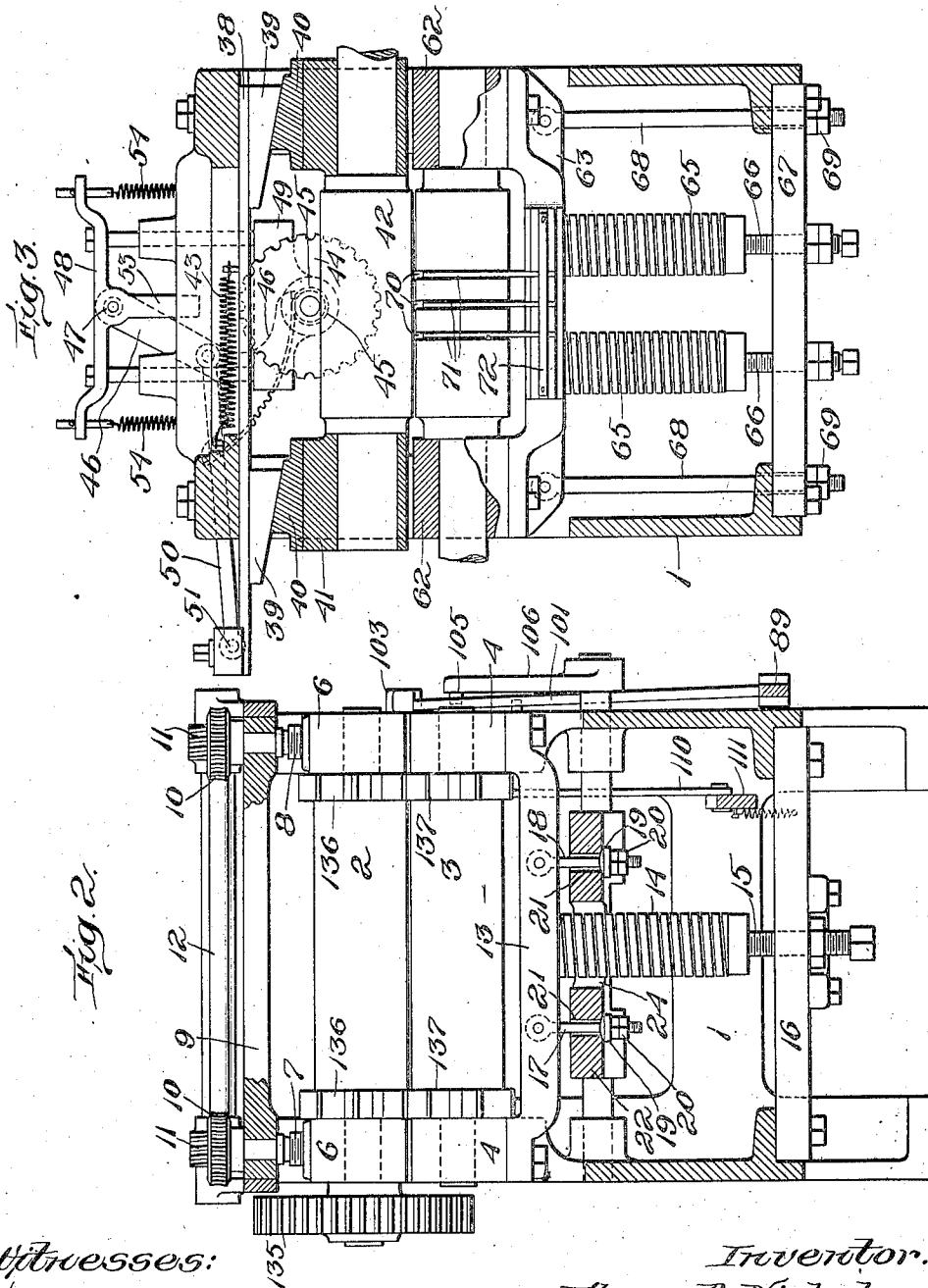
Inventor:
Elmer P. Nichols
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5 SHEETS—SHEET 2.



Witnesses:
J. C. Bowser.
Edward Maxwell

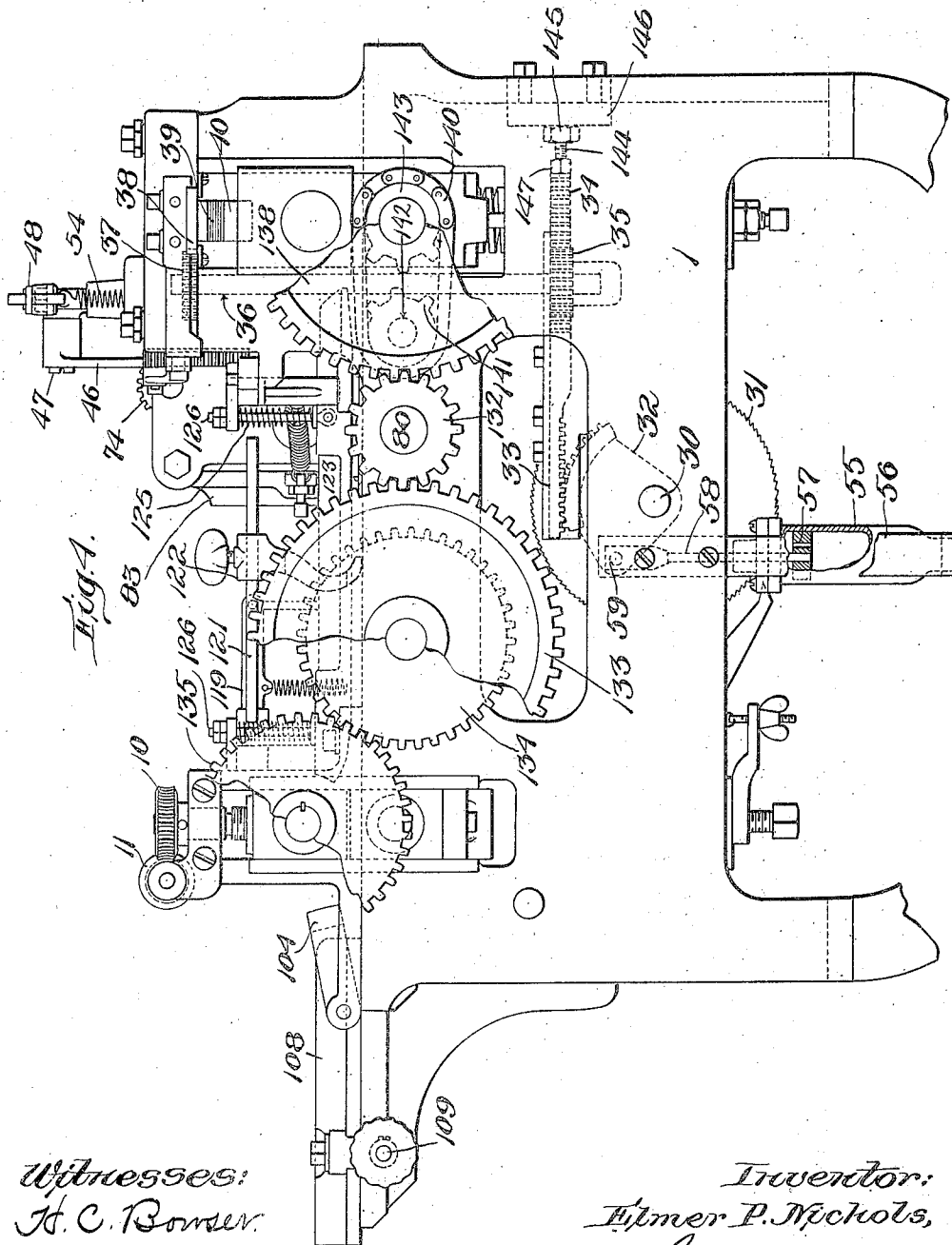
Inventor:
Elmer P. Nichols,
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5 SHEETS—SHEET 3.

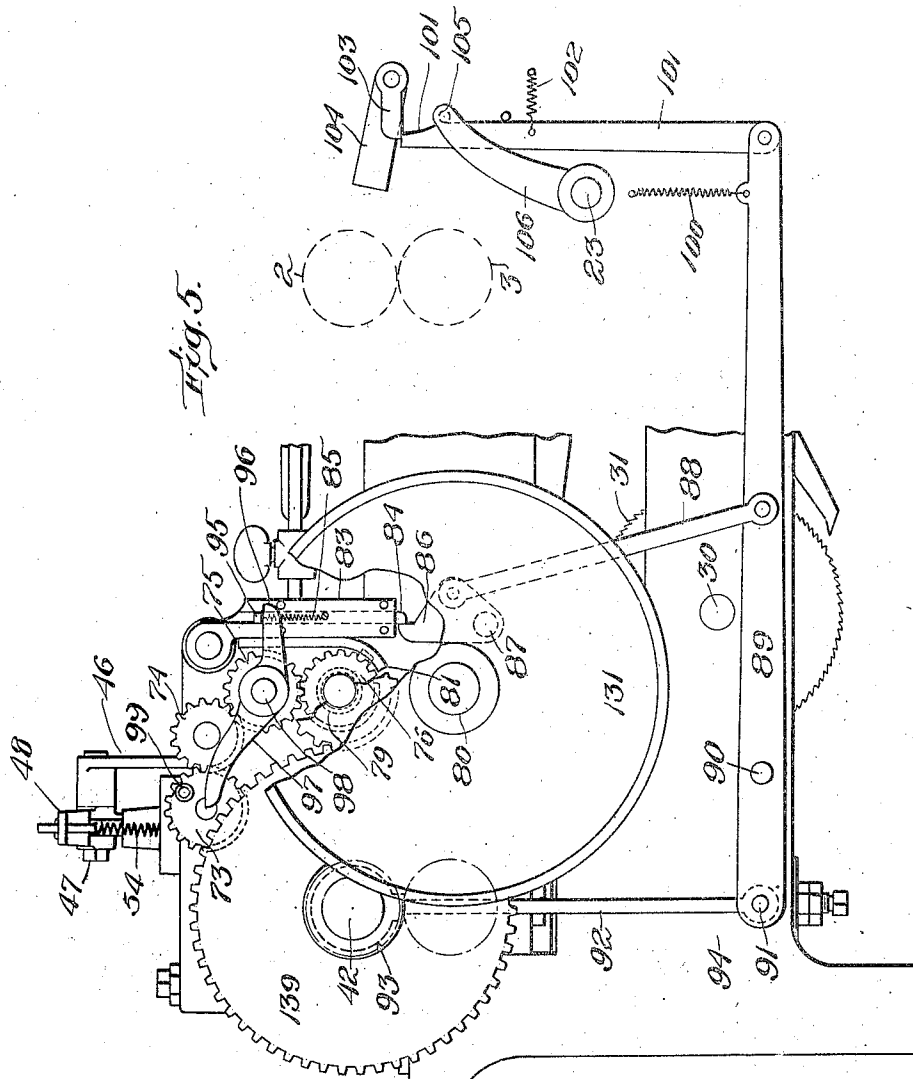


Witnesses:
H. C. Bowser.
Edward Maxwell

Inventor:
Elmer P. Nichols,
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Atty.

1,057,358.

5 SHEETS—SHEET 4.



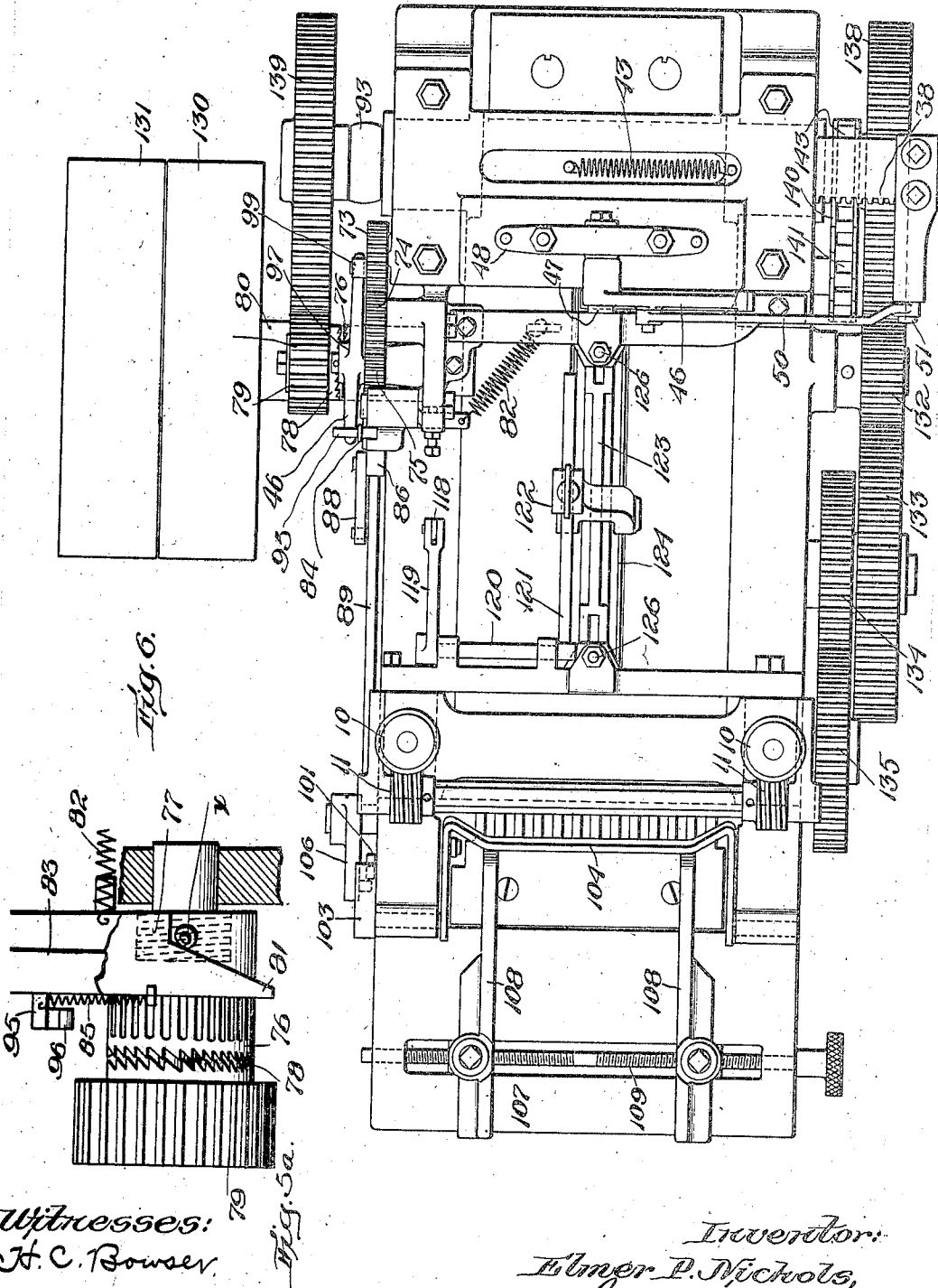
Inventor:
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Att'y.

E. P. NICHOLS.
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6 SHEETS—SHEET 5.



Witnesses:
H. C. Bowser
Edward Maxwell

Inventor:
Elmer P. Nichols,
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Atty.

UNITED STATES PATENT OFFICE.

ELMER P. NICHOLS, OF MANCHESTER, NEW HAMPSHIRE, ASSIGNOR TO LACENE MANUFACTURING COMPANY, OF MANCHESTER, NEW HAMPSHIRE, A CORPORATION OF MAINE.

LEATHER EVENING AND GRADING MACHINE.

1,057,358.

Specification of Letters Patent.

Patented Mar. 25, 1913.

Application filed February 27, 1908. Serial No. 418,008.

To all whom it may concern:

Be it known that I, ELMER P. NICHOLS, a citizen of the United States, residing at Manchester, in the county of Hillsboro and State of New Hampshire, have invented an Improvement in Leather Evening and Grading Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention relates to evening and grading machines, whose purpose, use, and general construction are set forth at length in my Reissue Patent No. 12,288 and later Patents No. 841,809 and No. 1,009,988. The work required of this kind of machine is exceedingly exacting, as sole leather and the like is very costly and therefore it becomes particularly important that no more leather should be removed than necessary and yet that all the uneven leather should be removed so far as necessary to produce perfect results. In my previous machines it has been found that when run at high speed the momentum of the parts has occasioned a liability to make false moves to some extent, and the pressure and movement of certain parts of the machine have tended to compress soft stock, resulting in skiving more leather from the stock than necessary or marking the stock to a thinner grade than it should be marked, and also imperfect skiving has occasionally resulted. Accordingly my present machine aims to obviate all the above mentioned difficulties and to gain still greater precision of movement, accuracy of results and delicacy of operation.

In the first place in my present machine the feeling mechanism or measuring devices operate against the underside of the stock, which is always the uneven side, *i. e.*, the upper side of the stock on which the grade mark is stamped is the grain side and is usually smooth and flat, whereas the underside or flesh side contains the unevennesses and hence I have arranged the feeling mechanism to engage the under side of the stock. A further reason for this, and resulting advantage, is that thereby the weight of the feeler mechanism is taken off from the stock, so that in case the latter is soft stock there is no tendency to compress the stock and hence much more delicate and accurate re-

sults are secured. As further conducing to this end, my present mechanism positively feeds the stock by direct feeding engagement with both its top and bottom at the critical point or region where the feeling or measuring is taking place, thereby avoiding the use of feed points at said critical region (as in my previous machines), which tended to hold up very heavy stock and cause imperfect results, and which in the machine of my application Ser. No. 237,587 filed April 27, 1905, since become Patent No. 1,046,213, in the case of soft and light stocks, caused a hard drag or frictional resistance against the top of the stock, compressing the stock and thereby improperly reducing its thickness at the moment of feeling or measuring the same and roughening the flesh side of the stock.

My invention not only includes the arrangement of the feeler mechanism to engage the under side of the stock, but a further novel feature consists of a central spring arranged to give perfect balance of feeler engagement. To secure still further delicacy and accuracy of movement, my invention provides that the movement of the mechanism at the front of the machine shall be largely independent of the movement at the back of the machine, in that the feeler mechanism, *i. e.*, the under roll, etc., are automatically restored to work-receiving position as soon as the work has been measured, said restoring of these parts being independent of the movement of the grading mechanism at the rear end of the machine, *i. e.*, the stamp, locking wheel, setting and skiving mechanisms, etc., which are left undisturbed until the work has been grade-marked and skived, whereupon they also are restored to their original positions. By this means the movements of the machine are sub-divided, relieving the rear part of the machine of the strains and work caused in my previous machines by the fact that all the parts were directly and continuously connected so that they transmitted and received strains throughout the train of mechanism. For instance, the strain produced by the tension spring in my last mentioned patent is done away with in my present machine, and instead of said arrangement of spring I have provided the central balancing spring above mentioned, which is now independent

in the sense that it does not transmit any strain-producing movement to the rest of the mechanism.

A further important feature of my present invention relates to the skiving mechanism. Skiving knives (and this statement holds good for all skiving machines), are apt to draw down the leather and dig into the stock as the latter is held against them, especially if the knife is set too far back, and accordingly I have obviated this tendency by locating the pressure springs directly under the work instead of at the ends of the pressure roll. By setting these springs in so that they come directly under the work instead of under the journal bearing they keep the pressure roll invariably against the stock irrespective of varying widths of stock, or in other words the springs tend to tip the rolls on a shorter fulcrum, one spring operating to rock the roll on the work against the influence of the other spring with such a short intervening space that the roll is necessarily maintained in engagement with the stock.

In my previous machines there has been a tendency for the stamping mechanism to be moved by momentum farther than it should be, and sometimes to chatter or make a series of false moves, and occasionally the entire marking mechanism has shown a tendency to repeat the marks a number of times on a given piece, and accordingly I regard as an important feature of the present machine the provision of a check, preferably consisting of a dash pot and connection for preventing said chattering and false moves, and an automatically tripped latch or releasing mechanism rendering it impossible for the die to repeat a mark after it has once grade-marked the stock. Also I have provided a particularly compact set of locking parts, whereby practically all lost motion is avoided as compared with my previous machines. A table is also provided with long feed guides for compelling successive pieces of stock to feed in exactly the same path. The regulator which regulates the proportionate amount of skivings removed from the stock with relation to the determinations of the feeler mechanism, is located at the front end of the machine where it is under the direct and instant control of the operator as he stands feeding the stock to the machine, and is made more positive than in my previous machines and of such a construction that there is no lost motion or possibility of unsteadiness.

In the accompanying drawings, I have shown a preferred embodiment of my invention, but as I regard the latter as broadly novel in many of the individual respects above pointed out, I wish it understood that this is a preferred construc-

tion only and that the range of equivalents includes a wide variety of mechanical embodiments and different combinations, arrangements and constructional details, as will be more apparent from the appended claims, taken in connection with the following description and said drawings.

In the drawings, Figure 1 is a central, longitudinal vertical sectional view of the machine; Figs. 2 and 3 are vertical cross-sectional views taken respectively on the lines 2—2 and 3—3 Fig. 1; Fig. 4 is a right-hand side elevation of the machine; Fig. 5 is a similar left-hand side elevation of the machine; Fig. 5^a is a fragmentary view in front elevation of a detail of the clutch mechanism for operating the marker; and Fig. 6 is a top plan view thereof.

The machine operates on the same general plan as is more fully set forth in my above mentioned patents, and, therefore, I will confine myself herein more directly to the constructional details thereof, without entering upon a general explanation of evening and grading leather.

My object is, as before, to classify the leather pieces automatically in response to the determinations of the feeler means, and accordingly these determinations are transmitted to leather-engaging means which acts upon the leather-pieces to render the grade subsequently recognizable in some definite way, said way preferably consisting, as before, of either stamping a grade mark on the leather, or skiving off the surplus leather so as to reduce the piece to the given grade-thickness, or both.

The machine in general consists of much the same parts and general organization as my above mentioned patents, particularly No. 1,046,213, said parts however, being arranged and coördinated quite differently, as previously explained.

Mounted in the frame 1 at the ingoing end of the machine are upper and lower feed rolls 2, 3, the latter constituting a feeler roll or leather-detecting device (for detecting thin spots, *i. e.* portions or places sufficiently thinner than an adjacent place of the stock to permit relative movement of the rolls 2 and 3 toward each other at that spot,) and being mounted in vertical movable bearings 4 at its opposite ends guided in ways 5 in the frame, and the former roll 2 having its journals 6 normally stationary or fixed but adjustable at its opposite ends by any suitable means, as by threaded bolts 7, 8, free to rotate, but immovable lengthwise, in a frame head 9, said adjusting bolts having worm ends 10 at their upper ends engaged by worms 11 fast on the opposite ends of a transverse angular hand adjusting shaft 12 made angular to be readily grasped for turning by hand. The top roll 2 is preferably plain or smooth, and the bottom roll slightly

corrugated or scored. The vertically movable roll 3 which constitutes the main feeler device or engaging portion of the feeler mechanism is connected by any suitable means to the transmitting mechanism for transmitting the varying thicknesses detected by the feeler mechanism, said means being herein shown, and preferably consisting of, a bridge or yoke 13 bolted at its opposite ends to the adjacent journal bearings 4 of the roll and normally held upward by a heavy central equalizer spring 14; capable of delicate adjustment by means of a bolt 15 operating through a fixed portion 16 of the main frame of the machine, whereby the roll 3 may be given exactly the right pressure, and no more, necessary for accomplishing the most effective thickness-detecting results. As already pointed out, the arrangement and location of the feeler mechanism to engage the flesh side or bottom side of the stock instead of engaging the top as heretofore, may be mentioned as the most important feature of my invention. And the next important feature of my invention is the equalizer spring 14, located centrally for maintaining the feeler roll 3 in perfect balance as it engages the stock, said centrally mounted spring 14 being independent of all the rest of the mechanism, *i. e.* it is mounted directly on the frame of the machine and transmits its pressure directly to the roll 3, and therefore does not bring any strains or wear upon any portion of the train of transmitting mechanism. The latter consists of depending feeler-posts or detector rods 17, 18 having heads 19 delicately adjustable by nuts 20 on the ends of said posts, said posts passing through slots or holes 21 in a relatively heavy transmission lever 22, herein shown as pivotally mounted at 23 in the frame of the machine. Another species of this headed feeler-post and lever arrangement for enabling the detecting mechanism to do its measuring by operating against the under side or flesh side of the stock as distinguished from the upper side or grain side of the stock is disclosed in my copending application Serial No. 225,224, filed July 9, 1906, which, however, is restricted to grade marking and does not include the automatic evening or skiving feature of the grading, and hence the broad or generic claims to said two species are in the present application. The lever 22 is apertured at 24 for the unrestricted passage of the spring 14 and provided at its free end see Fig. 1 with a pivoted depending arm 26 slotted at 27 and normally engaging at the upper end of said slot a pin 28 of a rocker arm 29 fast on a shaft 30 journaled to freely rotate in the frame of the machine. A spring 228 tends always to hold the arm or crank 29 upward with the pin 28 in the upper end of the slot of the lever 22. Fast

on said shaft 30 is a wheel 31 and pinion, or rather sector, 32, the former constituting part of the locking means for locking the gage adjuster mechanism and the latter engaging a rack 33 whose opposite end 34 serves to rotate a pinion 35 which operates the die or grade-marking mechanism and sets the skiving mechanism substantially as shown and claimed in my above mentioned Patent No. 1,046,213. The pinion 35 is fast on a shaft 36 provided with a pinion 37 engaging a rack bar 38 provided with wedges or inclines 39 cooperating with opposite inclines or wedges 40 on the upper sides of the journal boxes 41 of the gage roll or pressure device 42 and acting as stop-means for positively limiting the upward movement of said pressure device 42. A spring 43 connected at one end to the bar 38 and at the other end to a stationary part prevents back play.

The marking roll or die 44 carries a pinion 45 in mesh with a toothed sector 46 mounted to swing from a pivot 47 in the cross bar 48 of the head 49 which carries the marking die or roll, said toothed sector being swung by an arm 50 pivoted at 51 to the outer end of the rack 38, and said head 49 raised by a cam 52 engaging a plunger 53 depending from the cross bar 48, which is held under constant downward tendency by springs 54; all as in my above mentioned Patent No. 1,046,213. This mechanism, however, as just described, has proved in practice liable to error, as the necessarily sudden movements due to the rapid passing of a piece of stock in engagement with the feeler mechanism has caused the swinging sector 46 and rotary die 44 to tend to vibrate or chatter and rebound more or less, so that it has been liable to make false marks, and accordingly I have succeeded in entirely preventing this uncertainty and liability to error, and yet without decreasing the speed of the machine and the rapidity of its execution, simply by introducing an oil check or friction retarding device 55. Any of the well known friction retarding devices may be employed for this purpose, my invention, so far as this detail is concerned, not residing in the kind of friction device employed, but in providing means for insuring that, notwithstanding the suddenness of positive movement and the resulting momentum of the swinging and rotating parts of the marking mechanism, the latter shall stop precisely at the point corresponding to the determination of the feeler mechanism and shall be accurate, definite and certain notwithstanding the delicacy and exceedingly small differences of thickness determined and marked. The oil check 55 consists of a closed cylinder 56 containing a piston 57 and piston rod 58 whose upper end is pivoted at 59 to the sector 32. A quarter-iron, half-iron, and in fact even

a whole iron or still coarser measurement of leather is nevertheless such a slight difference in thickness (an iron being one forty-eighth of an inch) that, in order clearly to stamp the successive grade marks distinctly from each other on the leather pieces, I have constructed the grade-marking mechanism so as to amplify the movement of the marker to such an extent that, notwithstanding the exceedingly slight movement at the feeler mechanism end of the machine, the grade marker will be compelled to move for each increment of measurement a sufficiently great distance to make certain that the correct mark and no other will be imparted to the leather and not a portion of two marks or possibly of three marks, and this taken in connection with the practical necessity of running my machine at high speed in order to accomplish the work which is required of it according to the usual shoe factory practice, and the necessarily strong and therefore somewhat heavy construction of the movable parts, originally made it exceedingly difficult to obtain accuracy of marking, as incorrectness would result at times in apparently inexplicable ways, which proved practically insurmountable until I discovered that these errors were due, not to incorrectness of mechanism, but mainly to the give or yield and spring of the metal under the exceedingly sudden starting and stopping movements to which the moving parts are subjected in the practical running of the machine. I make this explanation because I wish it understood that my invention does not reside in providing a dash pot as such, but in discovering the cause of the previous uncertainties and errors in the grade-marking results of the machine, and in discovering that said uncertainties and errors could be entirely eliminated simply by interposing a strong friction device in the train of transmission mechanism adjacent the grading end of the machine, operating to absorb and take up the sudden shock and thereby prevent transmitting it to the marking wheel. As the ratchet wheel 31 is suddenly moved contra-clockwise by its pull in response to the changing position of the feeler mechanism, the shaft 30 and sector 32 are given a corresponding sudden impulse which is received and held against modification by the firm frictional resistance of the friction device 55-58 so that, notwithstanding the momentum of the swinging sector 46, rotary marking wheel or die 44, and the return influence of the spring 43 and influence of the spring 127, etc., the various parts of the grading mechanism simply move forward the exact distance required by said forward movement of the ratchet wheel 31 and not the slightest distance more, so that when the marking die or wheel is tripped, the required die number is in truly vertical position and

not an adjacent improper die number, and what is of still greater consequence, the die wheel is still and not imperceptibly chattering or trembling with a rotary vibration as before.

The lower roll 60 which serves to hold up the stock against the gage roll 42 to be skived by the skiving knife 61 is also mounted in sliding bearings 62 and is yieldingly supported as in my previous machine, but instead of being supported by springs located at the ends of the roll under the journal bearings thereof, I secure to said journal bearings a yoke 63 which extends beneath the roll 60, and mount the supporting springs 65 much closer together than before, as clearly shown in Fig. 3, said springs engaging said yoke as nearly as practicable beneath the path where the edges of the work will pass when traveling between the two rolls, the lower ends of the springs being supported adjustably in any suitable manner, as by bolts 66 adjustable in a cross bar 67 fast on the frame of the machine, and the opposite ends of the yoke and hence of the roll 60 being adjustably limited in their upward movement by bolts or links 68 passing through said cross bar, beneath which are nuts 69. By having the springs 65 thus located under the work, they always keep the roll against the stock even though the variations in relative thickness between the opposite edges of the stock should be extreme. The great importance and value of this part of my invention will be better understood if it is borne in mind that by this means the liability of improper skiving and the frequent destruction of the expensive sole leather by the skiving knife is absolutely prevented. When the leather is not held tightly at all places throughout its width against the gage roll 42 the skiving knife tends, especially when it is set too far back, to draw down the slack leather away from the roll 42 as far as it can, thereby making false cuts or gouging out the leather. When the springs 65 are placed wide apart, as beneath the journal bearings 62, the entrance of stock with a thick edge operates to depress that end of the roll by swinging it on the remote spring support at the opposite end as a fulcrum or center, with the result that the divergence or angle of the lower roll with reference to the upper roll is exceedingly slight, inasmuch as it extends from the extreme journal end of spring support to the thick edge of the supposed piece of stock, whereas when the spring is brought inwardly according to my present invention, approximately beneath the opposite edge of the stock, the pivotal movement or deflection of the lower roll takes place, not from the extreme journal end, but from the nearer position of the spring and hence has a shorter radius, and therefore the lower roll, when thus deflected

by the thick edge of the stock, is bound to be pressed upwardly with equal pressure against the opposite thin edge of said stock. The result is that the upper skin side of the stock is held pressed firmly flat against the gage roll 42 irrespective of whether the differences in relative thickness of its two edges is extreme or not, and the skiving knife therefore cannot possibly draw down the leather at the thin edge and gouge it out as heretofore. From a practical standpoint this change of location of the springs has been demonstrated to be an exceedingly important and valuable feature of the present machine, as it effectually prevents improper skiving. It is to be borne in mind that the object of this portion of my machine is not so much simply to skive the leather as it is to skive it even, *i. e.*, its function as an evening machine is to make the leather absolutely even with reference to a definite control, and hence the evening means or evening mechanism, where that term is used in the claims, is to be understood as requiring not merely a knife or other form of cutter for cutting away the surplus leather, and means for holding the leather against said knife or cutter, but means for definitely controlling or limiting the position of the leather to an unchangeable distance from the knife while it is being cut. In the particular embodiment of the invention in the machine of the drawings, this definitely limiting holding mechanism therefore includes the cam stops or stepped wedges 39, 40. These stepped wedges or inclines are responsive to the feeler mechanism for their adjustment. I prefer to interpose, between these limiting elements of the evening mechanism and the cutting element of said evening mechanism, the pressure roll or gage roll, which, being freely movable within the limits set by the limiting wedges or inclines, applies a uniform pressure to the leather and accomplishes the various additional functions of operating the gate, tripping the marking portion of the grading mechanism, and preventing the accidental escape of stock from the machine without being graded in some way. The evening mechanism (which constitutes one form of the grading mechanism, the other form being the marking mechanism) therefore, in the preferred embodiment of the machine of the drawings, includes the knife, gage roll, and limiting wedges or cam stops mentioned. To prevent the skivings following the roll 60 I have provided grooves 70 in the roll 60, in which stripping fingers 71 extend from the rear face of the yoke 63 to which they are clamped by a bar 72.

Referring again to the grade-marking mechanism, the cam 52 is positively rotated by a train of gears 73, 74, 75, 76, the latter being in the form of a spring clutch nor-

mally impelled by a spring 77 to engage the clutch end 78 of a pinion 79 directly driven by the main shaft 80, said clutch gear 76 being normally restrained by a pivoted cam plate or combined stop device and restraining device 81 held by a spring 82, all as in my last mentioned patent, but in the machine of my said patent, I have found in practice that there is a tendency of the die to repeat its grade marking on the same piece of stock, due to the failure of the cam plate 81 to retract the clutch gear 76 at the proper moment, and accordingly in my present machine I have arranged a different mechanism for effectually stopping or preventing the die from improperly repeating its grading. The cam plate 81 has a forward portion 83 in which slides a latch 84 normally held downward by a spring 85 in position to be engaged by a dog 86 pivoted at 87 to the frame and actuated by a link 88 extending upward from a bar 89 pivoted at 90 to the side of the frame and connected at 91 to a rod 92 having a strap 93 around the journal end of the upper roll 42. The latch 84 is outwardly bent at its upper end 95 to overhang the projecting end or finger 96 of a lever 97 pivoted at 98 and extending in position to be tripped by a pin 99 projecting from the pinion 73 which operates the die-actuating cam 52. By this mechanism, whenever the gage roll 42 is raised by the passage of a piece of stock, the dog 86 instantly swings the cam plate 81 out of restraining engagement with the radially projecting roll *x* of the clutch gear 76, thereby permitting the spring 77 to throw in the clutch and hence permitting the train of gears 76, 75, 74, 73 to actuate the marking die for one marking, but as the gear 73 makes one revolution, as required for said one marking, its pin 99 causes the lever 97 to raise the latch 84 out of engagement with the dog 86, with the result that instantly the cam plate or stop device 81 is retracted by its spring 82, and the clutch gear is restored to inoperative position so that the die wheel 44 cannot operate a second time for the same piece of stock. The marker *per se* has been divided out, to be claimed in a divisional application.

The bar 89 is normally counterbalanced by a spring 100 and its forward end carries a pivoted lifting rod 101 normally held forward by a spring 102 in lifting engagement beneath a crank 103 for holding the gate 104 raised or open which controls the feeding of the stock to the machine. This said gate is lifted to permit the entrance of a fresh piece of stock each time that the graded piece of stock passes from beneath the roll 42, the previous raising of the roll 42 by the outgoing stock having rocked lever 89 so as to lower rod 101 whose spring

102 has thereupon pulled the rod 101 forward beneath the end of crank 103, ready for said lifting operation. The gate is caused to fall each time that a piece of stock enters between the feeding rolls 2, 3, by the retraction or moving backward of the lifting rod 101 by the engagement with its upper end of a pin 105 projecting from an arm 106 extending upward from the transmission lever 22, it being remembered that the latter is depressed each time a piece of stock enters the machine and moves downward the roll 3 and feeler posts or detector rods 17, 18 away from the roll 2. In front of the gate I have placed a longer feed table than before, as herein indicated at 107, and have provided opposite length guides 108 simultaneously adjusted toward and from each other by a right and left threaded screw 109 in order that the stock may always be entered straight into the machine and all the pieces in the same path. By this means uniformity of grading with relation to the edges of the stock is secured by passing the edges of successive pieces always over the feeler mechanism in precisely the same relation to the center thereof. In my before mentioned Patent No. 1,046,213, means for centering the stock was provided, but in spite of said means the stock could swing around and vary its position, and hence vary the grading to some extent, whereas by having the elongated parallel guides and extended table the feeding is compelled to be central over the entire length of each piece of stock. Pivoted to the gate 104 is a link 110 for operating a locking dog 111 normally held down by a spring 112, and operating, when the gate 104 falls, to engage the teeth 113 and thereby lock the locking wheel 31 so as to prevent further transmission of thinness measurement as determined by the feeler mechanism. The oppositely extending teeth 114 of the ratchet wheel 31 are located to be engaged by a pawl 115 pivoted at 116 and normally moved into engaging position by a spring 117 when released by a rod 118 extending from an arm 119 projecting rigidly from a shaft 120 at whose opposite end is a rod 121 on which is adjustably mounted a foot or shoe 122 to be engaged by the forward end of the stock as it is fed through the machine, said engagement with the forward end of the stock serving to rock the shaft 120, raising the rod 118 so as to release the pawl 115 and cause its lower end to engage the teeth 114 of the ratchet wheel 31 and thereafter permit said locking wheel to be moved by the transmission lever 22 only in a direction corresponding to successive increments of thinness detected by the feeler mechanism. The position of said shoe or foot 122 thus determines the given point in the length of the stock from which the feeler

mechanism shall begin to be operative. I omit herein an exhaustive explanation of these functions, as said explanation is found fully set forth in my above mentioned patents. A shoe or presser plate 123 cooperates with a feed chain 124 in facilitating the feeding of the stock from the feeler feed rolls to the gage roll and skiving mechanism, being held yieldingly by springs 125 and bolts 126 at its opposite ends. The transmission plate 22 is delicately adjusted by a spring 127 and thumb screw 128 in the end of a bracket 129 mounted for convenience on the lower end of the screw 15. Because of the slotted construction 27 and the arrangement of the adjacent parts of the transmission mechanism, it will be seen that as soon as a piece of stock has passed out of engagement with the lower feed roll or feeler device 3, said roll and its connected parts are at once automatically restored by the spring 14 to work-receiving position, but the grade-setting mechanism is maintained set by the ratchet wheel 31 acting as a locking wheel until the work has been grade-marked and skived, whereupon these parts are automatically restored to normal position. In other words, as soon as the stock has been measured or its relative thickness and thinness determined by the feeler mechanism, said feeler mechanism is automatically restored to normal position independently of the grade-marking and skiving mechanisms, which remain set until they in turn have performed their functions. By thus rendering, to a degree, these various mechanisms independent of each other, and sub-dividing the movements of the machine, the gage roll and the rest of the grading mechanism at the rear end of the machine is relieved of the strain or undue work brought upon it by the mechanism of my former machines, and particularly of my before mentioned Patent No. 1,046,213, in which the tension spring at the front end of the machine held all the parts under continuous tension from the entrance of the stock into the machine until it left the machine. In my present invention, the corresponding spring 14 is independent of the rest of the mechanism, so far as transmitting thereto any strains is concerned, and the forward portion of said remaining mechanism is not required to remain under strain after the performance of its functions, but is restored to normal position before that portion of said remaining mechanism which is at the rear end of the machine has finished performing its functions. This provision conduces materially to the delicacy and accuracy of grading.

The machine is controlled through fast and loose pulleys 130, 131 on the main shaft 80 from which a train of gears 132, 133, 134, 135, 136, 137 positively drives the feed

rolls 2, 3, the gears 136, 137 having specially formed long teeth, see Fig. 1, in order to permit of the relative vertical movement of said rolls without interfering with the positive and even driving movement. The under roll 60 is positively driven by a gear 138 in mesh with the gear 132, and the gage roll 42 is driven by a gear 139 in mesh with the gear 79, and the driving chain 124 is driven by a sprocket chain 140 passing over a sprocket wheel 141 on the rear driving shaft 142 of said sprocket chain 124, and over a sprocket wheel 143 on the shaft of the lower roll 60.

A further feature of importance resides in providing additional means for materially decreasing the pressure on the stock when it is first put into the machine and for decreasing the resistance of the initial movements of the grading mechanism, said means, although capable of various embodiments, being herein shown as consisting of a bolt 144 held by a check nut 145 adjustable in a cross piece 146 at the rear end of the machine in line with the rear end of the rack bar 34 so that the head 147 of said bolt positively limits the rearward movement of said rack bar, see Fig. 4. By this means, in addition to the other functions just mentioned, the parts of the machine may be set so as to prevent grading below any desired minimum measurement. By screwing the bolt outward or forward the rack bar is prevented from moving sufficiently rearward when the machine is at rest to permit the cam stops or stepped inclines, 39, 40, coming in contact, and hence, the latter being out of contact when the stock is put in the machine, the initial starting movement is free and without the drag and tendency to stick or cling to each other which would be the case if said inclines were left in contact with each other.

The operation of the machine has already been quite fully set forth, and may be briefly summarized as follows: The gate 104 being in its normal upraised position, the operator inserts the leather piece between the positioning devices or length guides 108 so that its leading end will engage between the rolls 2, 3. This operates to separate the rolls, *i. e.* to lower the feeler roll 3 and thereby permit the lever 22, under the influence of its spring 127, to rotate the ratchet wheel 31 clockwise a distance corresponding with the extent to which the leather piece has thus separated the rolls 2 and 3. The leather piece is fed rearward in the machine by the rolls 2, 3, and as its leading end strikes the trip or foot 122, the latter is raised, and thereby, through the parts 121, 120, 119, 118, 115, and 117, brings the pawl 115 into engagement with the teeth 114 of the ratchet wheel 31 (which, as just pointed out, has already been turned sufficiently therefor by

the entrance of the stock between the rolls 2, 3). As the leather piece now continues to travel rearward between said rolls, if a thicker spot is met with, the rolls separate but without influencing the ratchet wheel 31, inasmuch as the pawl 115 and teeth 114 prevent any movement in this direction, *i. e.* in response to increases in thickness. If, on the other hand, a thin spot is met with, the lever 22 is instantly pulled upwardly by whichever feeler post 17, 18 is vertically beneath said thin spot, and the ratchet wheel 31 is correspondingly rotated contra-clockwise the distance of one or more teeth as required for properly measuring said thin spot. When the leather piece has traveled its length into the machine, thereby permitting the gate 104 to fall, the latter, through the connection 110, causes the pawl 111 to engage the locking teeth 113 of the ratchet wheel 31 in opposition to the engagement of the teeth 114 by the pawl 115, so that said ratchet wheel cannot thereafter move in either direction until after the leather piece has been marked. Meanwhile the contra-clockwise turning of the ratchet wheel 31, as it has successively taken up or measured the successive increments of thinness of the leather piece, has correspondingly set the evening and marking mechanisms through the train of parts 30, 32, 33, 34, 35, 36, 37, 38, 39, 50, 46, and 45. When the leading end of the leather piece reaches the rolls 42, 60, it enters between them and instantly raises the roll 42, thereby, through the parts 93, 92, 89, 88, and 86, disengaging the cam plate 81 from the roll *a* of the clutch gear 76 whose spring 77 then instantly slides said gear to the left, Fig. 5^a, into driven engagement with the member 78 of the gear 79. This causes the train of gears 76, 75, 74, and 73 to rotate, the latter serving to rotate the lifter cam 52 over to the left Fig. 1, thereby releasing the plunger 53 of the head 49, which instantly falls under the influence of the springs 54, and is instantly raised by the engagement of the lifter cam 52 with the lower end of the plunger 53. But in the instant that the head 49 fell, it thereby caused the marking wheel 41 to mark the top side of the leather piece with the grade mark to which said marking wheel had been set (just prior to the skiving of the leather piece by the knife 61). The marker is instantly raised and stopped by its actuating mechanism, including the roll or pin 99, which engages the left hand end of the lever 97, Fig. 5, and thereby raises the overhanging end 95 of the latch 84 out of engagement with the dog 86 so as to permit the spring 82 to swing the cam plate 81 back into engaging relation with the clutch member 76, which cam plate serves to retract the clutch member and stop further movement of the actuating mech-

anism of the marker. The leather piece now continues on through and out of the machine. As it escapes from beneath the roll 42, the latter falls and thereby restores the dog 86 to the position shown in Fig. 5 and also raises the gate 104 to permit another leather piece to be fed into the machine. Thus all the feeling operations take place on the under side of the stock which is thereafter skived, and the marking takes place on the top of the stock or grain side. The weight of the feeler mechanism is removed from the stock and extreme delicacy provided by the counterbalancing mechanism. The two rolls 2, 3 also cooperate to feed the stock by direct engagement and positive rotation on its top and bottom sides coincident with the point of feeling engagement. And by having those portions of the transmitting mechanism which are at the front of the machine capable of operating separately from those portions at the back of the machine, greater delicacy is secured, the former being automatically restored to work-receiving position as soon as the work has been measured and prior to the stamping and skiving of the same, whereby the movements of the machine and the strains of their weight and momentum, etc., are subdivided so that no one part has to bear the entire strain. Besides the foregoing features of advantage, I regard as likewise important the provision of the pressure springs directly under the work at the point of skiving and the provision of means for preventing chattering and false movements and means for preventing lost motion or uncertainty of transmission, and so likewise the provision of the regulator 12 at the extreme front of the machine.

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

1. In a machine of the kind described, selective means for determining the thinnest of a number of thin spots in a given area of a leather piece, including feeler mechanism located to engage said piece on its under side.

2. In a machine of the kind described, grading mechanism containing means capable of being set, including means engaging the top side of a piece of stock, thinness determining mechanism, including feeler means movably mounted to engage the under side of said piece of stock, and intervening mechanism for setting said grading mechanism in accordance with the determination selected from among a number of the feeling operations of said feeler mechanism.

3. A machine of the kind described, comprising mechanism for grading the leather, said mechanism including a part having a regulated movement, automatic means for regulating the movement of said part ac-

cording to the thickness of the leather being graded, said automatic means including a stepped wedge whose inclined surface is movable into position between said part and the supporting frame thereof, and means in position beneath the plane of the leather when being graded to engage the under side of said leather, responsive to unevennesses in the leather, for governing the position of said wedge.

4. In a machine of the kind described, positively driven upper and lower feed rolls, one of said rolls being independently movable at its opposite ends toward and from the other to constitute a feeler device, and feeler-determination-transmission means connected to said movable roll at a plurality of separated places and responsive to said independent movements of the opposite ends of said roll to transmit the feeling determinations of said feeler device.

5. In a machine of the kind described, positively driven upper and lower feed rolls, the lower of said rolls being independently movable at its opposite ends toward and from the other to constitute a feeler device, and feeler-determination-transmission means connected to said movable roll at a plurality of separated places and responsive to said independent movements of the opposite ends of said roll to transmit the feeling determinations of said feeler device.

6. In a machine of the kind described, grading mechanism located at the rear end of the machine, feeler mechanism located at the front end of the machine, and intervening mechanism for connecting the other two mechanisms and feeding the stock, the mechanism at the front end including positively driven upper and lower feed rolls for positively feeding the stock by direct feeding engagement with both its top and bottom, said rolls being located to engage the stock at the critical point where the feeling or measuring is taking place.

7. In a machine of the kind described, grading mechanism located at the rear end of the machine, feeler mechanism located at the front end of the machine, and intervening mechanism for connecting the other two mechanisms and feeding the stock, the mechanism at the front end including positively driven upper and lower feed rolls for positively feeding the stock by direct feeding engagement with both its top and bottom, said rolls being located to engage the stock at the critical point, where the feeling or measuring is taking place, and said intervening mechanism including a longitudinally movable feed device operating to engage the stock as it passes from between said feed rolls and to move said stock rearwardly toward the grading mechanism.

8. In a machine of the kind described, selective means for determining the thin-

nest of a number of thin spots in a given area of a leather piece, including engaging means to engage the top side of said leather piece, means for supporting said engaging means positively independently of the leather piece, whereby the weight thereof is prevented from coming on the leather piece when the leather is in the machine, movable means located to engage said leather piece on its under side, said movable means being responsive to the varying thicknesses of the leather piece, grading mechanism, and means to set said grading mechanism to grade the leather piece in accordance with said thinnest spot felt of by the feeler mechanism.

9. In a machine of the kind described, selective means for determining the thinnest of a number of thin spots in a given area of a leather piece, grading mechanism responsive to said selective means for grading the stock, and means to prevent the grading of the stock below a predetermined minimum measurement.

10. In a machine of the kind described, means to engage one side of a piece of stock, transversely extending feeler means to engage the opposite side of the piece of stock, transmitting mechanism to transmit the feeling determinations of said feeler means for a useful purpose, and a pressure balancing spring engaging the center of said feeler means to press the same toward the stock, said spring being mounted independently of said transmitting mechanism.

11. In a machine of the kind described, feeler mechanism located to engage and feel of the under side of a piece of stock, including upwardly pressing spring counterbalancing means, and transmitting mechanism to transmit the feeling determinations of said feeler mechanism for a useful purpose.

12. In a machine of the kind described, a yieldingly mounted feeler roll engaging the under side of a piece of stock, transmitting mechanism for transmitting the determinations of said roll, and a pressure spring mounted independently of said transmitting mechanism pressing upwardly on said roll.

13. In a machine of the kind described, a yieldingly mounted feeler roll, a bridge extending lengthwise of said roll and bearing on the opposite ends thereof, a pressure spring bearing against the middle of said bridge to hold said roll against the stock, and means for usefully transmitting the feeling determinations of the feeler roll.

14. In a machine of the kind described, feeler mechanism, grading mechanism, and means actuated by the feeler mechanism for transmitting the determinations of the feeler mechanism to a part of the grading mechanism and correspondingly moving said part, including mechanism permitting the auto-

matic restoration of the feeler mechanism to normal position while still maintaining the grading mechanism set to operate on the stock.

15. In a machine of the kind described, mechanism to detect a thin place in a leather piece, grading mechanism, connecting mechanism between the detecting mechanism and grading mechanism responsive to the detecting mechanism and actuated thereby, and means permitting the dissimultaneous restoration of the detecting mechanism and the grading mechanism to their normal operative positions.

16. In a machine of the kind described, means to detect a thin place in a leather piece, grading mechanism, setting means for setting said grading mechanism in accordance with the determinations of said detecting means and actuated by and in connection with said detecting means, including means for locking said grading mechanism as set but permitting the automatic restoration of the detecting means to normal position.

17. In a machine of the kind described, means to feel a thin place in a leather piece, grading mechanism, and intervening mechanism for transmitting to the grading mechanism the determinations of said detecting mechanism, including locking means for locking said grading mechanism, and a pin and transversely moving slotted lever connection compelling said transmission when moving to transmit said determinations but being without effect when moving in the opposite direction.

18. In a machine of the kind described, means to detect a thin place in a leather piece, grading mechanism, setting means to set said grading mechanism in accordance with the determinations of said detecting means, and momentum-retarding means to prevent the rebound of said grading mechanism when set by said setting mechanism.

19. In a machine of the kind described, means to detect a thin place in a leather piece, grading mechanism, setting means to set said grading mechanism in accordance with the determinations of said detecting means, and a dash pot to prevent false moves of said setting mechanism and grading mechanism.

20. In a machine of the kind described, grading mechanism, feeler mechanism for controlling said grading mechanism with reference to the stock felt of, and a regulator, located at the front of the machine in position for direct and instant control by the operator when he is in position to feed the stock to the machine, for regulating at the front of the machine the predetermined difference desired in actual thickness of stock from that determined by the grading mechanism under the said control of the feeler mechanism.

21. In a machine of the kind described, grading mechanism, feeler mechanism for controlling said grading mechanism with reference to the stock felt of, and a regulator, located at the front of the machine, including an angular hand adjusting shaft extending transversely across the front of the machine in position to be grasped by the operator when he is in position to feed the stock to the machine; for regulating at the front of the machine the predetermined difference desired in actual thickness of stock from that determined by the grading mechanism under the said control of the feeler mechanism.

22. In a machine of the kind described, grading mechanism, including a skiving knife, feeler mechanism for controlling said grading mechanism with reference to the stock felt of, and a regulator, located at the front of the machine, for regulating the proportionate amount of skivings removed from the stock with relation to the determinations of the feeler mechanism.

23. In a machine of the kind described, means to engage one side of a piece of stock, feeler mechanism to engage the opposite side of the piece of stock, grading mechanism responsive to said feeler mechanism including means to select one only of a number of feeling movements, and a regulator operating directly on said engaging means to adjust said engaging means to vary the thickness of the stock with reference to which the feeler mechanism operates.

24. In a machine of the kind described, opposite feed rolls to receive between them a piece of stock, one of said feed rolls being freely movable independently at its opposite ends to constitute a feeler device, grading mechanism responsive to said movements to grade the piece, and regulating means operating directly on the other of said feed rolls to adjust it at will toward and from the feeler roll for varying the thickness of the stock with reference to which the feeling takes place.

25. In a machine of the kind described, opposite feed rolls to receive between them a piece of stock, one of said feed rolls being freely movable independently at its opposite ends to constitute a feeler device, grading mechanism responsive to said movements, and adjusting screws located respectively at the opposite ends of the other of said feed rolls for moving said roll bodily in parallelism to itself, said screws being provided with worm wheels, and a regulator bar fixedly mounted in the frame of the machine and provided at its opposite ends with worms for simultaneously rotating said worm wheel.

26. In a machine of the kind described, thinness determining means, grading mechanism responsive thereto, and intervening

transmitting mechanism, including a locking wheel, pawls to engage and lock said wheel on its opposite sides, tripping means at the ingoing end of the machine actuated by the passage of the rear end of a piece of stock to said thinness determining means to actuate one of said pawls, and tripping means in the path of the front end of said stock to actuate the other of said pawls.

27. In a machine of the kind described, thinness determining means, grading mechanism responsive thereto, and intervening transmitting mechanism, including a locking wheel, tripping means to lock the same, a segmental rack movable with said wheel, a rack bar engaging said rack, and setting means operated by said rack to set said grading means.

28. In a machine of the kind described, feeler mechanism to engage a piece of stock and determine its thin places with reference to its longitudinal edges, and guiding means commensurate with the length of the stock for supporting and guiding the stock at its edges and directing it in actual alignment with and at the center of said feeler mechanism.

29. In a machine of the kind described, grading mechanism, including a skiving knife, a gage member for determining the thickness to which the stock is to be skived, an opposite pressure member for holding the stock firmly against said gage member, and opposite pressure springs located inwardly from the opposite ends of said pressure member respectively between the middle thereof and the adjacent end substantially the distance apart of the width of a usual shoe-sole and in approximately vertical alignment with the edges of the stock being skived.

30. In a machine of the kind described, a vertically movable gage roll, a cooperating skiving knife, an opposite pressure roll, intermediate compression springs located respectively between the middle and the adjacent end of said pressure roll, feeler mechanism, and automatically adjustable means for said gage roll controlled by said feeler mechanism.

31. In a machine of the kind described, a vertically movable gage roll, a cooperating skiving knife, an opposite pressure roll, intermediate compression springs located respectively between the middle and the adjacent end of said pressure roll, a feed-controlling gate for controlling the entrance of stock to the machine, feeler mechanism adjacent said gate for determining thin places in the stock, a rocking lever extending lengthwise of the machine connected to said gage roll at one end and provided with a trip at its other end for opening said gate,

and connections with said feeler mechanism for effecting the closing of said gate.

32. In a machine of the class described, the combination of adjustable receiving rollers, a cutter, adjustable regulating rollers co-operating with the cutter, and means separate from the regulating rollers controlled by the adjustment of one of the receiving rollers for limiting the adjustment of one of the regulating rollers.

33. In a machine of the class described, the combination of adjustable receiving rollers, a cutter, adjustable regulating rollers co-operating with the cutter, an adjustable stop, and means whereby the insertion of the material to be cut between the receiving rollers will set the stop to limit the adjustment of one of the regulating rollers.

34. A machine of the kind described, comprising mechanism for grading the leather, said mechanism including a part having a regulated movement, automatic means for regulating the movement of said part according to the thickness of the leather being fed, and including coöperating stepped wedges relatively movable into coöperative position between said part and the supporting frame, and means correlated with the frame and the wedges for preventing said wedges from coming together when at rest and stock is not being graded.

35. In a machine of the class described, the combination of grading mechanism, including an adjustable stop for regulating said grading, means responsive to the thickness of the material to be graded for setting said stop, and means for maintaining said stop out of contact with the stopped part of the machine when at rest, whereby the starting adjustment of said stop is not hindered by such contact.

36. In a machine of the class described, the combination of grading mechanism, including an adjustable stop and movable means stopped thereby for regulating said grading, means responsive to the thickness of the material to be graded for setting said stop, and adjustable means for maintaining said stop and said movable means normally out of contact with each other.

37. In a machine of the class described, the combination of pressure-applying feeler mechanism for engaging the stock under pressure, grading mechanism for grading the stock according to the thinnest portion so pressed, and means coöperating with said feeler mechanism for increasing the pressure on the stock after the stock is first engaged by the feeler mechanism.

38. A machine of the class described, having, in combination, a support against which a piece of stock may be pressed, a plurality of detectors, means for causing said stock to be gripped between said detectors and sup-

port with an increasing pressure, and grading means for grading the stock according to the thickness of the thinnest portion so gripped.

39. In a machine of the class described, the combination of pressure-applying feeler mechanism for engaging the stock under pressure, grading mechanism, mechanism for transmitting the determinations of said feeler mechanism to said grading mechanism, said transmitting mechanism operating to increase said pressure on the stock when a leather piece is being felt of by said feeler mechanism, and means for relieving said feeler mechanism of said increased pressure when the stock is first engaged by the feeler mechanism.

40. In a machine of the class described, the combination of a pair of receiving rollers, one of which is movably supported, a cutter, a pair of regulating rollers, one of which is movably supported, a stop, an operative connection between the stop and the movably supported receiving roller, whereby the insertion of the material between the receiving rollers will set the stop, and means operatively related to the movably supported regulating roller and adapted to engage the stop as the material passes between the regulating rollers to limit the movement of said regulating roller.

41. In a machine of the class described, the combination of a pair of receiving rollers, one of which is movably supported, a cutter, a pair of regulating rollers, one of which is movably supported, a graduated stop, an operative connection between the stop and the movably supported receiving roller whereby the insertion of the material between the receiving rollers will set the stop, and means operatively related to the movably supported regulating roller and adapted to engage the stop as the material passes between the regulating rollers to limit the movement of said regulating roller.

42. In a machine of the class described, the combination of receiving rollers, one of which is adjustable, a cutter, movably supported regulating rollers coöperating with the cutter, said receiving and regulating rollers being spaced from each other, means for directing the material from the receiving to the regulating rollers, and means independent of the regulating rollers whereby the thickness of the material inserted between the receiving rollers will, (by means of the said adjustment of the receiving roller) correspondingly limit the adjustment of one of the regulating rollers.

43. In a machine of the class described, the combination of a pair of receiving rollers, one of which is movably supported, a cutter, regulating rollers coöperating with the cutter, one of which is movably sup-

ported, a stop, a yielding connection between the movably supported receiving roller and the stop, said stop being adapted to be set by the insertion of the material between the receiving rollers, and means operatively related to the movably supported regulating roller adapted to engage the stop when said roller is adjusted by the passage of the material between said regulating rollers.

19. 44. In a machine of the class described, the combination of receiving rollers, one of which is movably supported, a cutter, regulating rollers, one of which is also movably supported, the adjustment of said receiving roller being regulated by the thickness of the material inserted, and means operated by said adjustment for correspondingly limiting the adjustment of the movably supported regulating roller.

20 45. In a machine of the class described, the combination of receiving rollers, one of which is adjustably supported, a cutter, regulating rollers, one of which is also adjustably supported, a graduated stop, means operatively related to the adjustable regulating roller adapted to engage the stop for limiting the adjustment of said roller, means operatively related to the stop and the adjustable receiving roller for automatically

varying the position of the stop when the last said roller is adjusted by the insertion of the material, and means for permitting an independent adjustment of the receiving roller after the regulating roller has been adjusted.

35 46. In a machine of the kind described, means against which a piece of stock may be gripped, opposite detecting means cooperating therewith to grip a piece of stock which is to be graded, including a plurality of 40 feeler-posts having separate individual movement in the direction of said first-mentioned means, grading means, and connections between said grading means and said posts for setting said grading means with 45 reference to the latter, including a device in which the posts are freely movable in a direction away from said first mentioned means and whose position is controlled and determined by that post which is nearest 50 said first mentioned means.

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

ELMER P. NICHOLS.

Witnesses:

PERCY E. BRIDGES,
SUSIE A. FRANCIS.