Aug. 25, 1931. L. A. COGSWELL 1,820,010

GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 1

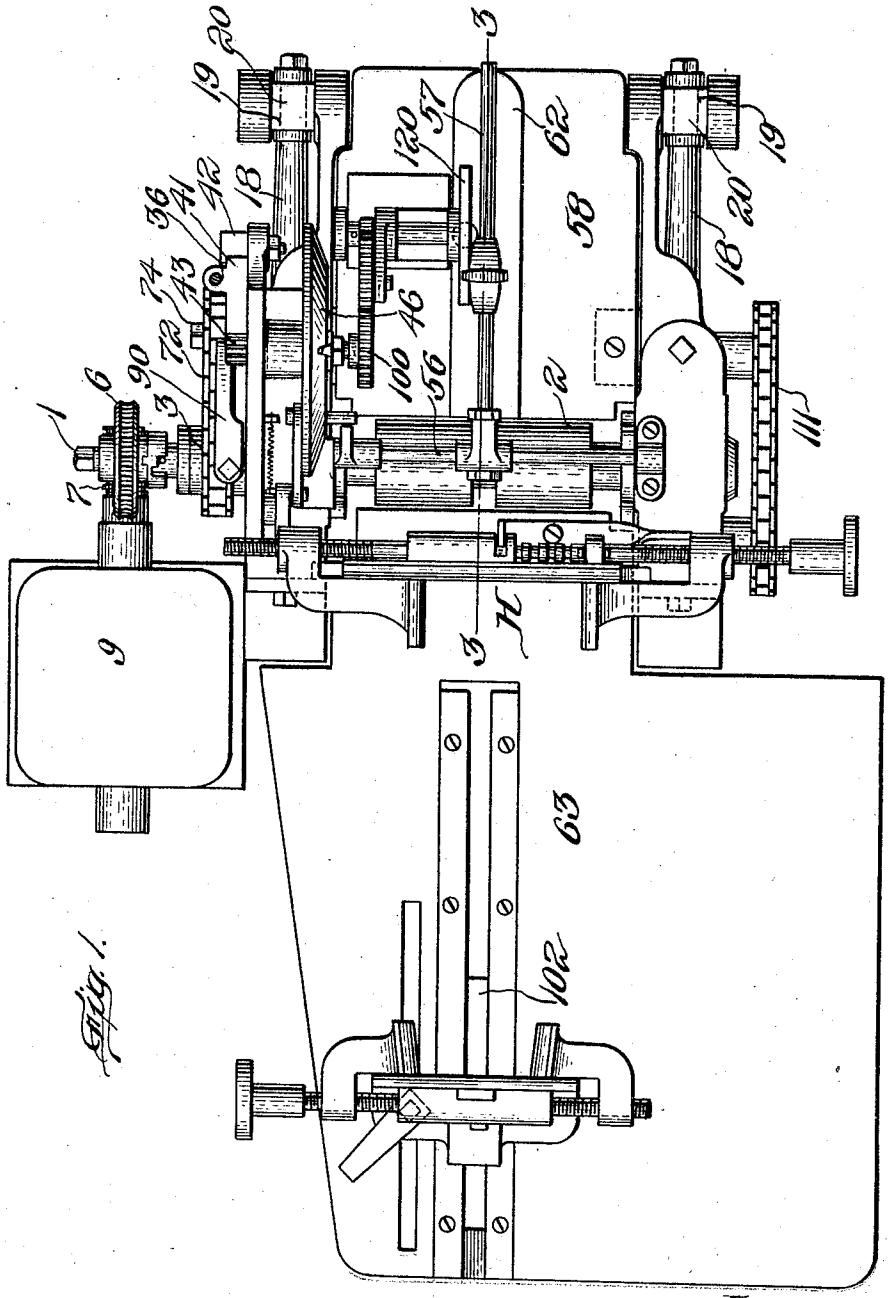


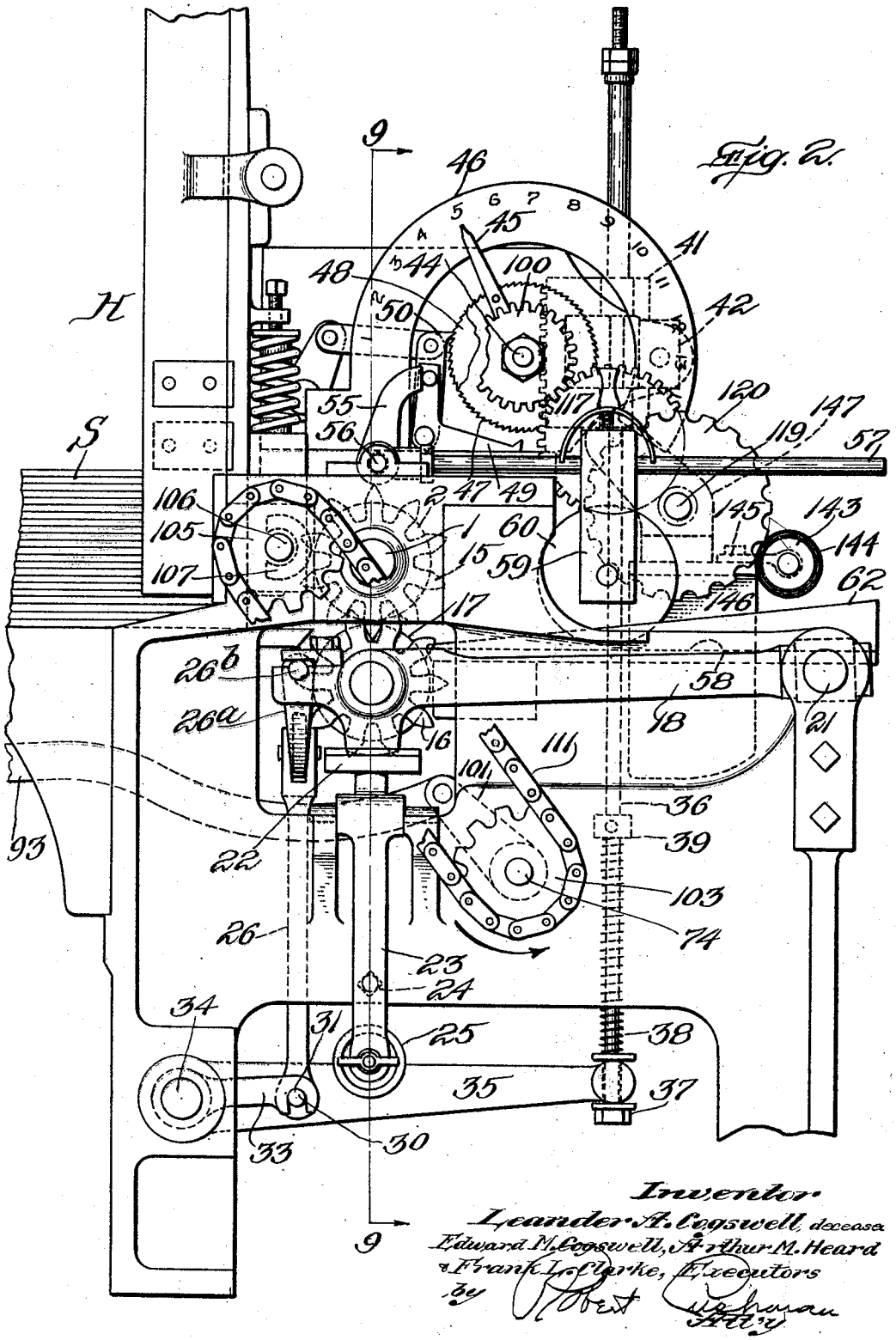
Fig. 1.

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GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 2



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GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 3

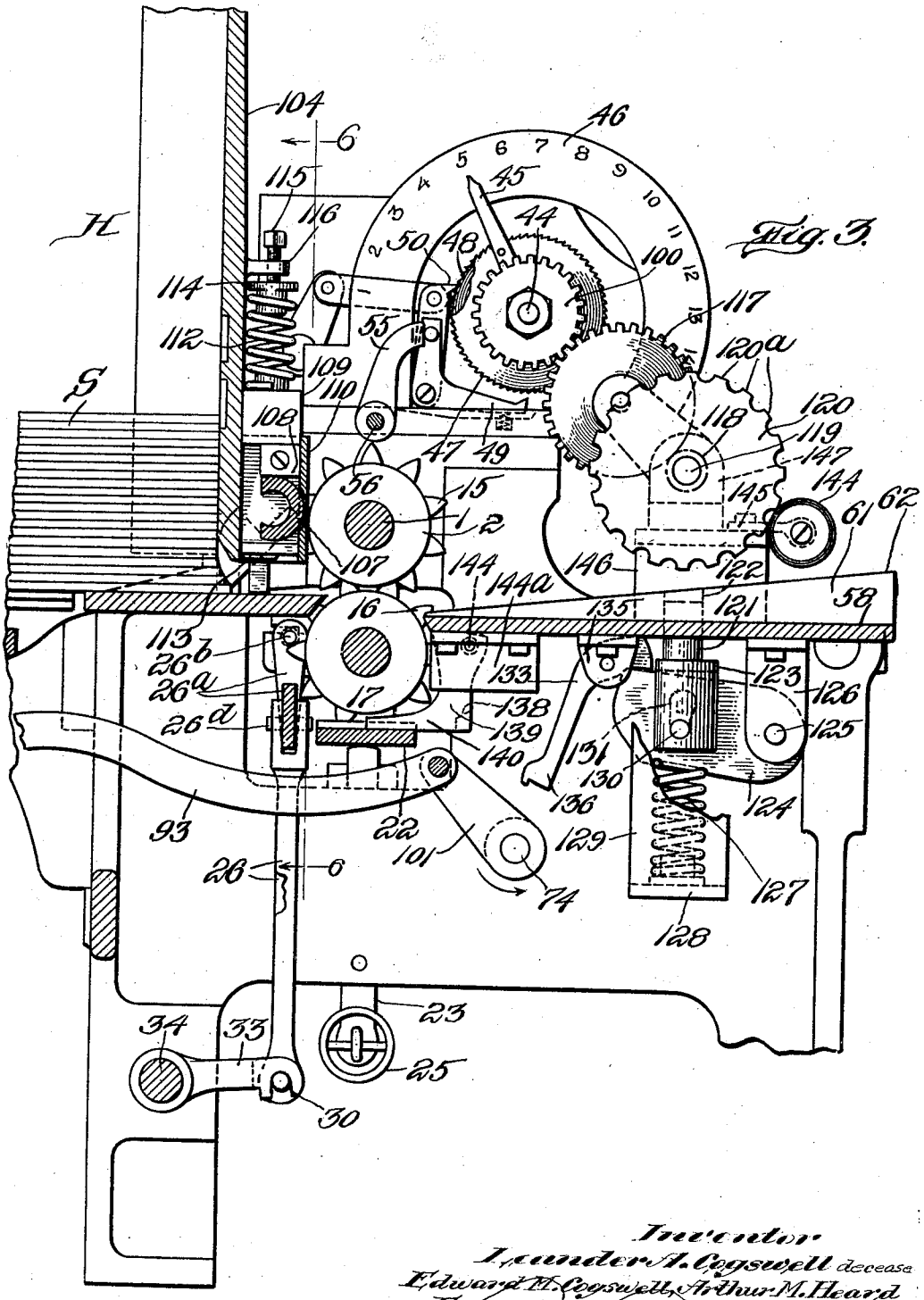


Fig. 3.

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GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 4

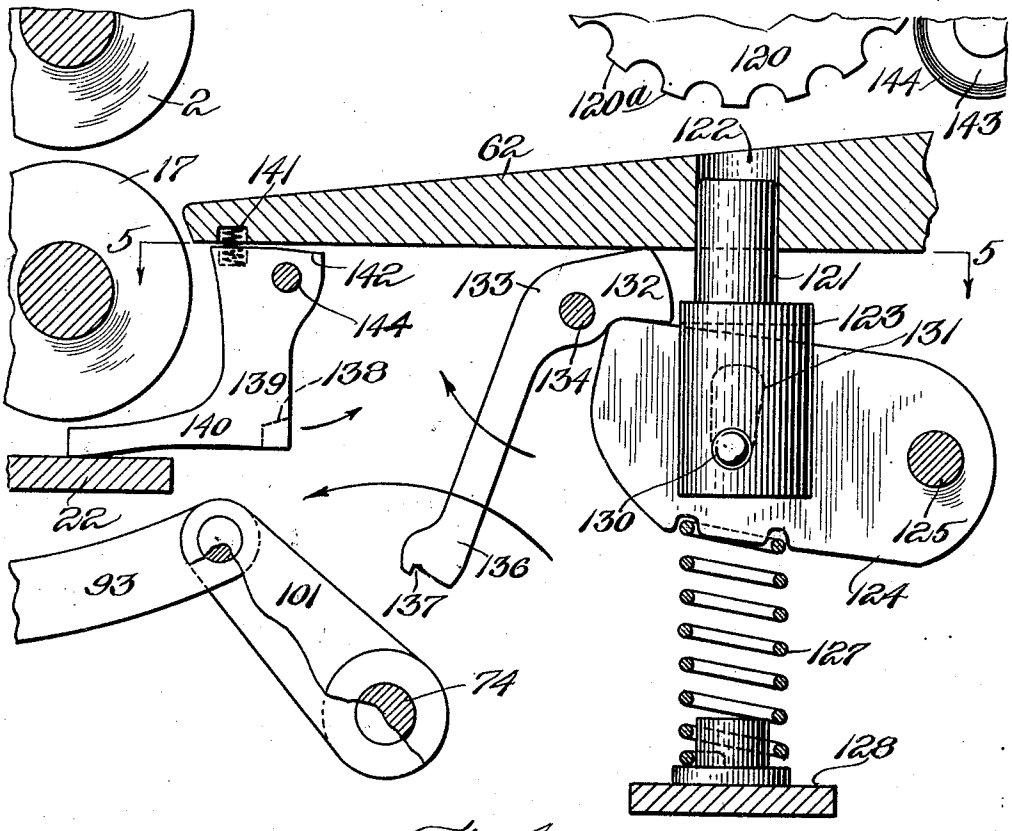
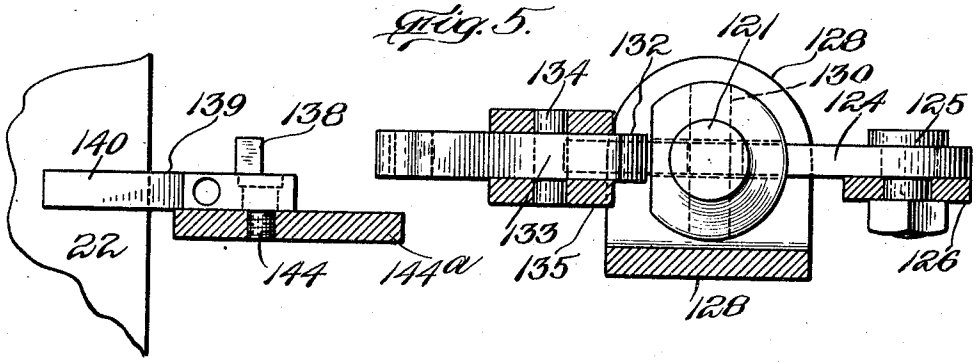


Fig. 4.

Fig. 5.



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Aug. 25, 1931. L. A. COGSWELL 1,820,010

GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 5

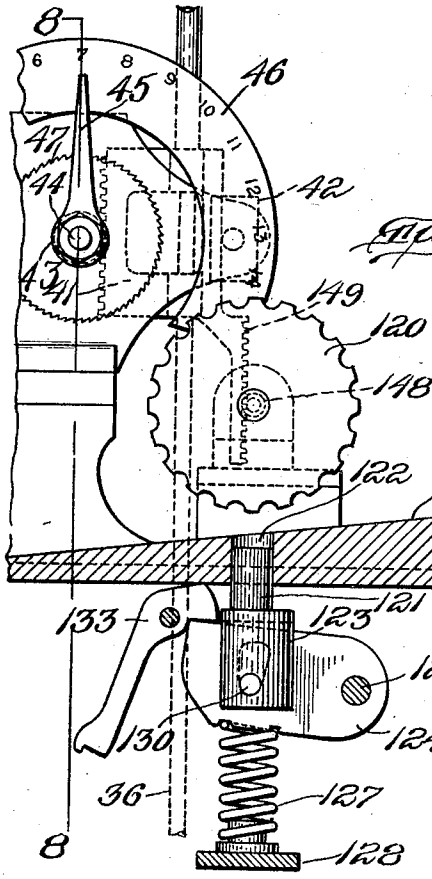


Fig. 7.

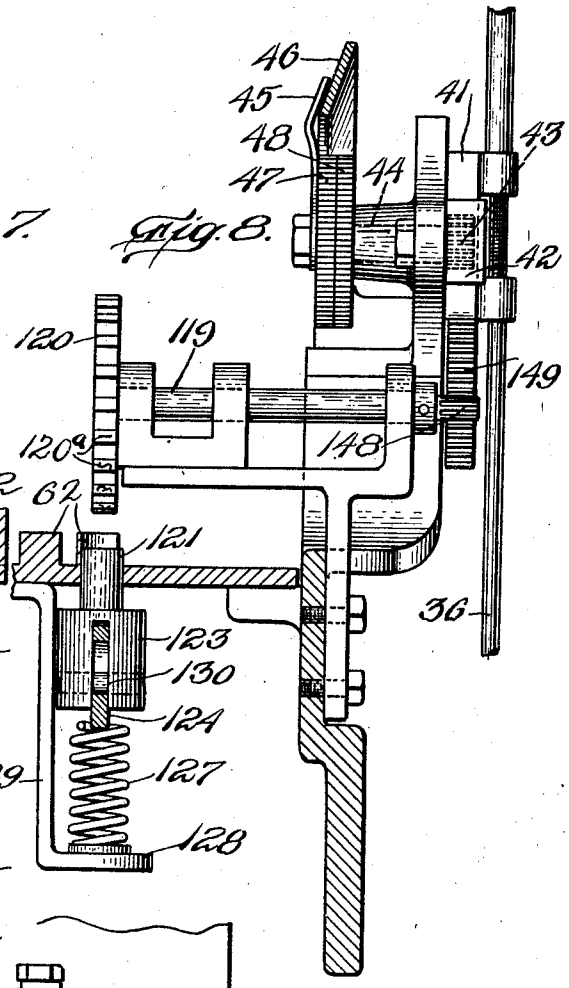


Fig. 8.

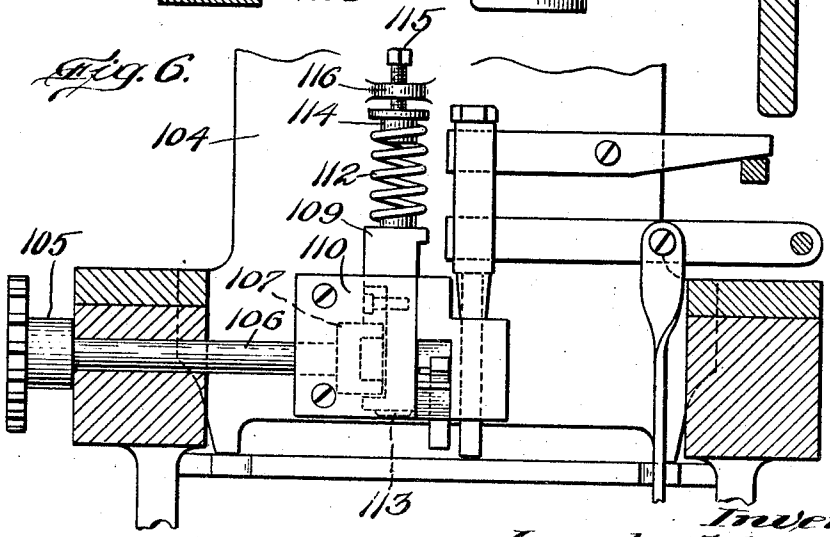


Fig. 6.

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Aug. 25, 1931. L. A. COGSWELL 1,820,010

GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 6

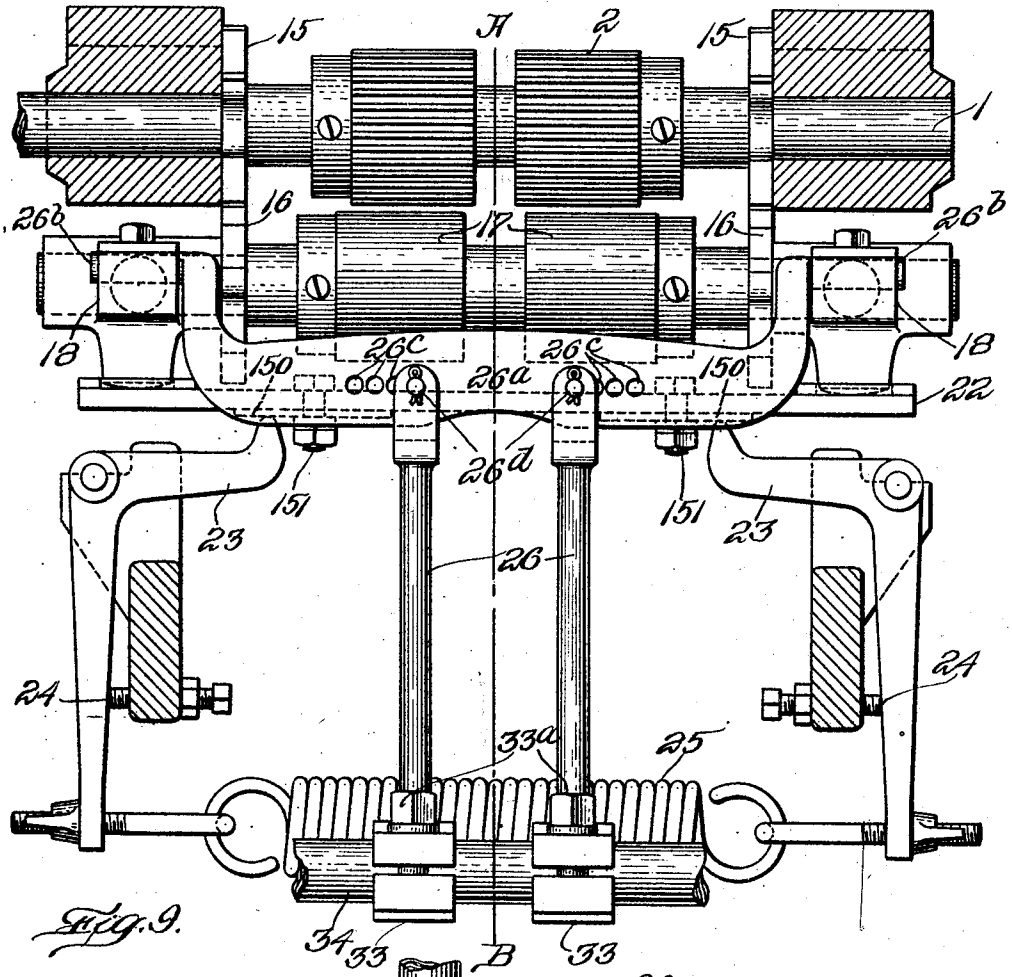


Fig. 9.

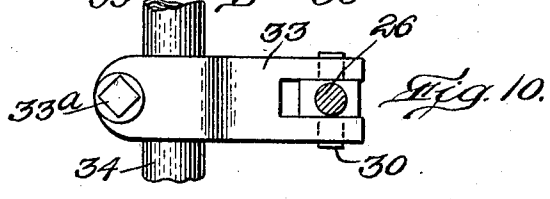


Fig. 10.

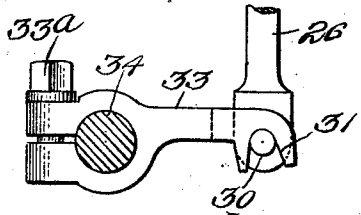


Fig. 11.

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Aug. 25, 1931. L. A. COGSWELL 1,820,010

GRADING MACHINE

Filed Sept. 19, 1928 7 Sheets-Sheet 7

Fig. 12.

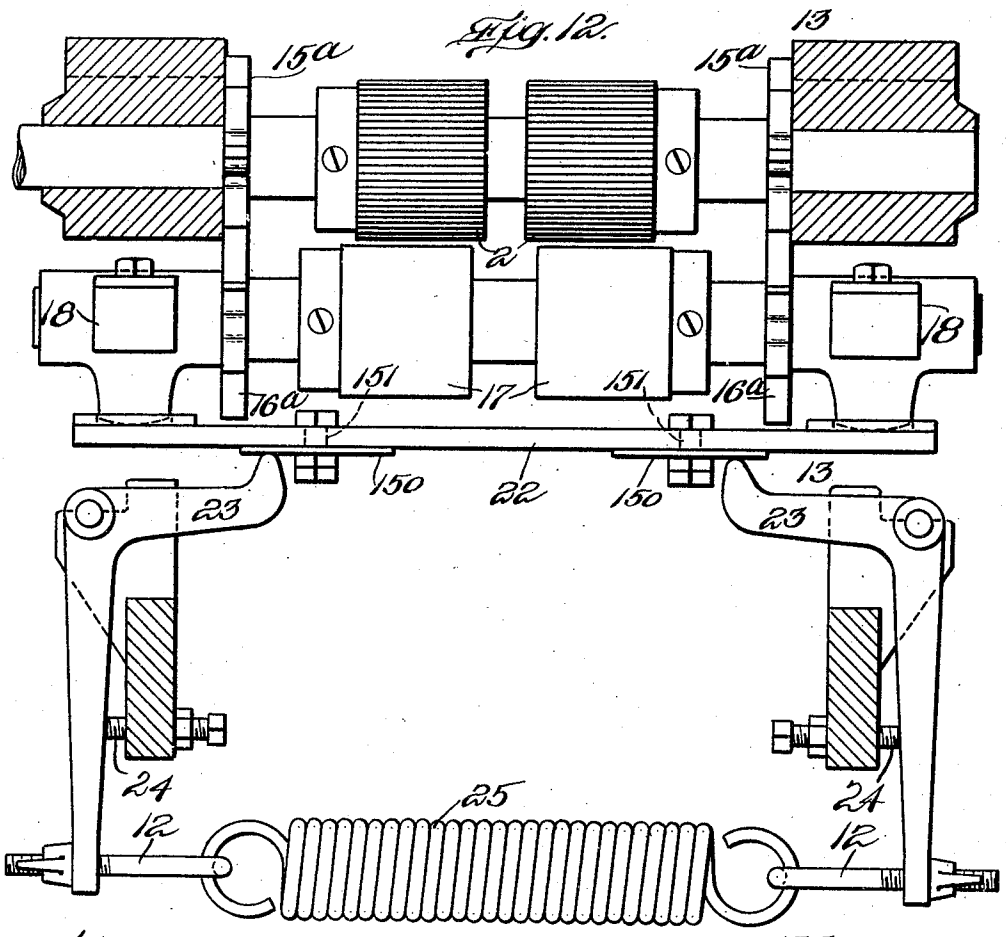


Fig. 13.

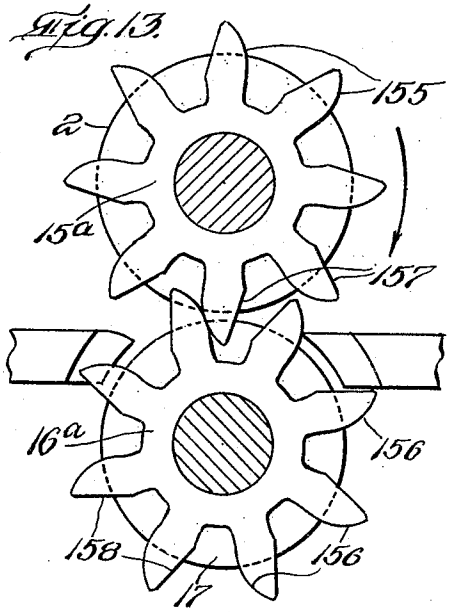
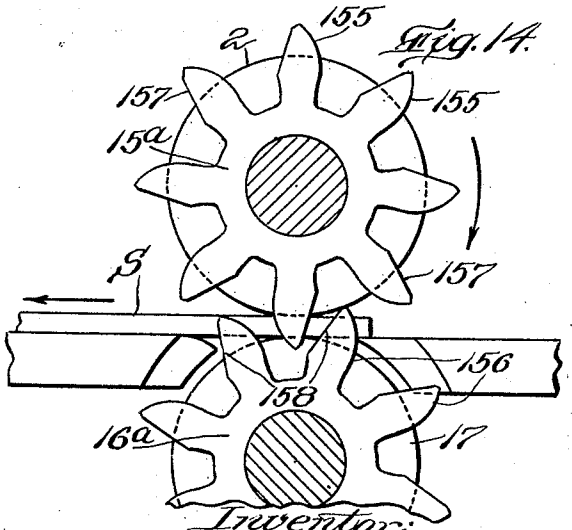


Fig. 14.



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Patented Aug. 25, 1931 1,820,010

UNITED STATES PATENT OFFICE

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GRADING MACHINE

Application filed September 19, 1928. Serial No. 306,978.

This invention relates to grading machines of the kind which grade died-out pieces of leather such as cut soles, taps, heel lifts, counters or other blanks, in accordance with the thickness of the thinnest spot as detected by the detector.

The present machine consists in certain improvements upon grading machines of the kind illustrated in Letters Patent of the United States to Nichols, No. 1,582,140, dated April 27, 1926, and in Letters Patent of the United States to Cogswell No. 1,686,487, issued October 2, 1928, on application Serial No. 176,415, filed March 18, 1927.

In the accompanying drawings, which illustrate a preferred embodiment of the machine,

Fig. 1 is a plan view of the machine;

Fig. 2 is a side elevation of a portion of the machine shown in Fig. 1;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 4 is an enlarged detail showing some of the parts illustrated in Fig. 3;

Fig. 5 is a section on line 5—5 of Fig. 4;

Fig. 6 is a partial section on line 6—6 of Fig. 3;

Fig. 7 is a detail in elevation showing the grade marking device;

Fig. 8 is a section on line 8—8 of Fig. 7;

Fig. 9 is a partial section on line 9—9 of Fig. 2;

Figs. 10 and 11 are details hereinafter described; and

Figs. 12, 13, and 14 illustrate a modification of the feeding and detecting rolls and their gearing shown in Fig. 9.

1 represents the main shaft of the machine which is also the shaft of the upper, fixed, detecting and feeding roll 2.

The shaft 1 has mounted upon and frictionally connected with it a sprocket wheel 3 (Fig. 1) which is connected by a sprocket chain 72 with another sprocket wheel on shaft 74 to drive the shaft 74 in the direction of the arrows in Figs. 2, 3 and 4.

Shaft 1 is driven by a motor 9 which acts through a worm 7 and a worm wheel 6. The motor 9 is mounted upon a bracket fast to the frame of the machine.

The worm wheel 6 is loose on shaft 1 and may be connected to or disconnected from the shaft by the clutch mechanism more fully described in said Patent No. 1,686,487.

Shaft 1 of the upper fixed detecting roll 2 carries gears 15 meshing with gears 16 fast on the shaft of the lower yielding roll 17 so that the two detecting and feeding rolls are continuously rotated when the machine is in operation.

The soles, taps or other blanks S (Fig. 3) which are to be graded are stacked within a hopper or magazine H (Figs. 1, 2 and 3), from which they are automatically fed one at a time to the detecting and feeding rolls 2 and 17.

The lower detecting roll 17 is supported at its ends in bearings at the forward ends of two arms 18 (Figs. 1 and 2), one at each side of the machine, whose rear ends are formed with longitudinal trunnions 19 (Fig. 1) mounted to swivel in bearing blocks 20, each having trunnions 21 (Fig. 2) mounted in bearings on the frame of the machine so as to rock on a transverse axis. This provides a universal joint at the rear end of each arm 18 to accommodate the necessary up and down independent feeling or detecting movements at the opposite ends of the lower roll 17 in response to the unevenness of the blanks as they pass between the detecting rolls.

Connecting the forward ends of the arms 18 is a cross bar 22 (Figs. 2, 3 and 9) pressed strongly upward by two bell-crank levers 23 fulcrumed on the frame of the machine and having their depending arms connected by a spring 25 which is normally under stress, all as more fully shown in said Patent No. 1,686,487. Stop screws 24 (Figs. 2 and 9) on the frame of the machine engage levers 23 to limit the extent of upward movement of the lower detecting roll 17.

Upon the under side of the cross bar 22 are two circular plates or discs 150 of hardened steel against which the ends of levers 23 bear. These bearing discs are each clamped to the cross bar 22 by a central bolt 151 so that as a disc becomes worn a fresh surface may be presented to the lever

23 by a simple rotative adjustment of the disc.

Each arm 18 also has pivotally connected with its forward end one of the two ends of a yoke or cross bar 26^a (Figs. 2, 3 and 9) having trunnions 26^b at its ends which are supported in bearings at the ends of the arms 18. The yoke 26^a has pivotally connected to it the upper ends of two rods 26 by means of pins 26^d, which may be inserted in any of the holes of the two series of holes 26^c provided in the yoke 26^a. The lateral spacing of the two rods 26, and their position below the detecting rolls, may thus be varied. Each rod 26 carries at its lower end a transverse pin 30 which is engaged by a notch or hook 31 of an arm 33, formed with a split hub clamped by means of screw 33^a to a rock shaft 34. Thus the arms 33 may be adjusted on rock shaft 34 to correspond to the lateral adjustment of the rods 26. As the notches 31 engage the tops of the pins 31 and are open at the under side, either rod 26 may move vertically independently of the other in response to tilting movements of the lower detecting roll 17, and any upward movement of either end of the roll 17 in response to a thin spot in the blank being measured will be transmitted to the rock shaft 34 notwithstanding the other edge of the blank may be relatively thick and consequently may not move the other rod 26 to the same extent. It will be understood that when a sole or other blank which is thicker at one side than at the other passes between detecting rolls 2 and 17 the tilting of the roll 17, acting through the free ends of arms 18, will tilt the yoke 26^a to the same extent so that the two rows of holes 26^c will at all times remain parallel to the axis of roll 17; consequently the vertical adjustment of rods 26, effected by the detection of the blank, will correspond to the tilted position of the lower detecting roll 17 occasioned by a transversely uneven blank, and the angular adjustment of the rock shaft 34 will be wholly controlled by the higher of the two rods 26.

The thickness grade of the blanks used in shoemaking, such as soles, is usually measured or detected only along their side margins. For this reason the detecting rolls 2 and 17 are preferably each divided in the middle, and the divided sections are spaced apart, with provision for lateral adjustment, so that the middle region of the blank will not be acted upon by the detecting mechanism, and the rolls may be adjusted to suit blanks of different widths and to vary the width of the margins to be measured. By adjustably connecting the rods 26, 26 to the middle region of the yoke 26^a, instead of to the ends of arms 18, as in said Patent No. 1,686,487, the rods 26, 26 may be placed as nearly as possible in line below the effective pinch of the rolls 2 and 17 where they act on the blanks. Also the lower ends of the rods 26 act directly on the arms 33 and impart to the rock shaft 34 a movement corresponding in degree to the tilting movement of the detecting roll 17 at the effective point where said roll performs its measuring function; instead of transmitting their motion to the rock shaft 34 through the link and cross bar mechanism shown in said Patent No. 1,686,487. This results in greater accuracy in the adjustment of the grading devices which are to be set in accordance with the thinness measurements of the blanks, simplifies the construction, and eliminates several points of friction and wear.

The blanks pass through the machine endwise with the median line of each approximately coinciding with the center line A—B, Fig. 9, of the machine, and the two rods 26 are positioned equidistant from the center line and separated one from the other a distance approximately the same as the average distance between the margins to be measured of blanks of the size to be operated upon. As already explained the parts may be adjusted laterally to suit different runs of blanks of different sizes.

On one side of the machine (Fig. 2) the rock shaft 34 extends outside of the frame and has fastened thereto a relatively long arm 35 whose free end is formed with a vertical hole through which extends the lower end of a rod 36, said rod being provided immediately below the arm 35 with a head 37 in the form of a nut against which said arm 35 is yieldingly held by a spring 38 mounted on rod 36, the upper end of said spring bearing against an abutment collar 39 adjustably secured to the rod 36.

The upper end of the rod 36 extends through and is secured to two lugs projecting from a rack slide 41, which has sliding engagement with a guide block 42, pivotally mounted on the frame of the machine. Said guide block 42 serves to maintain the teeth of rack slide 41 in engagement with a pinion 43 fast on shaft 44 of the visual indicator. The straight rack 41 is more accurate in transmitting the grade detections than the segmented rack shown in said Patent No. 1,686,487 since it acts on a straight line instead of on the arc of a circle. The shaft 44 carries the usual pointer 45 cooperating with an arcuate scale or dial 46 fixed to the frame of the machine. The dial 46 is graduated in "irons" and is traversed by the pointer 45 when the shaft 44 is rotated or rocked. The visual indicator mechanism is substantially as shown and described in said Patent No. 1,686,487 except that the shaft 44 is extended inwardly beyond the two ratchet wheels 47 and 48 to receive upon it a gear 100.

Two ratchet wheels 47 and 48 fixed on shaft 44 cooperate respectively with two pawls 49 and 50 pivoted on the frame of the machine and yieldingly urged by springs toward their ratchet wheels. The pawl 49 cooperates as usual with an arm 55 fast on rock shaft 56 journaled at its ends in bearings on the frame of the machine. Near its middle this rock shaft 56 is provided with the usual rearwardly extending horizontal arm or rod 57 disposed above the work table 58, over which the soles or other blanks are delivered by the feeding and detecting rolls 2 and 17. The arm 57 has adjustably secured to it a depending bracket 59 carrying at its lower end a thin roll or wheel 60 whose lower periphery rests in a groove 61 formed in a narrow elevated runway 62 provided on top of the table 58. The table 58 is horizontal, as usual, but the narrow, grooved runway 62 inclines upwardly and increases in height progressively and uniformly from the detecting rolls rearwardly. As a blank emerges from the detecting rolls 2 and 17 it passes up the runway 62 and underneath the roller 60, thereby raising the latter, and when the blank clears the detecting and feeding rolls it comes to rest on top of the runway 62.

As explained in said Patent No. 1,686,487, when the advance end of a blank passes under and lifts roll 60 it results in setting the pawl 49 and locking the pointer 45 against being thereafter turned to the right to indicate a thicker spot in the blank, but can move only to the left (Figs. 2 and 3) in a direction to indicate the measurement of a thinner spot in the blank. Until the advance end of the blank has reached and lifted roll 60 the indicating mechanism does not preserve any of the grade measurements, but after the blank has reached and lifted roll 60 all that portion of the blank which thereafter passes between the detecting rolls 2 and 17 is measured, but only with reference to successively thinner spots encountered by the detecting rolls, all as more fully explained in said Patent No. 1,686,487.

Hence by setting the roller 60 at the desired distance from the detecting rollers, the grading of the advance end of the blank, such as the heel part of a sole, may be omitted while the rest of the blank, which passes through the detecting rollers after the advance end of the blank has lifted roller 60, will be graded.

As more fully explained in said Patent No. 1,686,487, the driving connection between the continuously driven shaft 1 and the transverse shaft 74, including the chain 72, is controlled by the trip arm 57 and rock shaft 56 to connect or disconnect shaft 74 with the driving shaft 1. The means by which this driving connection is controlled so as to start and stop the rotation of shaft 74 includes an arm 90 fast on one end of the rock shaft 56 outside of the frame of the machine and connected with a clutch mechanism, not shown, by means of which the sprocket wheel on shaft 74, driven by chain 72, is connected with or disconnected from shaft 74. In operation, each time the operator removes from the machine a graded blank, wheel 60 which was resting on the blank drops and operates through arm 57, rock shaft 56 and arm 90 to engage the clutch and cause a single rotation of shaft 74 by which a new blank is fed into the machine. All this is described in greater detail in said Patent No. 1,686,487.

At the middle of shaft 74 is a double arm crank 101, (Figs. 2, 3, and 4) connected by a link 93 with a feed slide 102 (Fig. 1) slidably mounted in a slot provided in a bottom wall or table 63 of the hopper H. Each revolution of the crank shaft 74 imparts one reciprocatory movement to the feed slide 102 thereby feeding forward to the detecting rolls 2 and 17 the lowermost blank S within the hopper H.

At the front side of the machine (Fig. 2) the crank shaft 74 extends to the outside of the frame and has fixed thereto a sprocket wheel 103 connected by a chain 111 with a sprocket wheel 105 fast on the shaft 106 journaled in bearings on the frame of the machine. This shaft 106 extends inwardly from the sprocket wheel 105 to a point near the middle of the machine where it is provided at its inner end with a cam 107 (Figs. 2, 3 and 6) cooperating with a shoulder 108 provided on a plunger 109 mounted to slide vertically within ways provided by a bracket 110 and the hopper wall 104. The shaft 74 is normally at rest and so also is the cam 107, said cam normally occupying the position with relation to the shoulder 108 as is illustrated in Fig. 3. When however the shaft 74 is caused to make one revolution and feed the lowermost sole from the hopper H, the cam 107 is simultaneously rotated and is so timed with respect to the shoulder 108 that when the feeding movement of the shaft 74 is nearly completed, the cam 107 clears the shoulder 108, permitting a spring 112 to throw the plunger 109 sharply downward. Immediately thereafter the cam 107 picks up the plunger 109 and restores it to its uppermost position again, where it dwells until the shaft 74 makes another revolution. On the lower end of plunger 109, there is a die or type 113 which carries a trade mark or other desired inscription and when the plunger 109 delivers a quick, sharp blow against the top of the blank which is being fed into the machine, the die embosses the mark on the blank. This operation of the plunger 109 is preferably effected just be-

fore the shaft 74 completes its movement, but obviously the timing in this respect may be varied as desired by adjusting the shaft 106 and sprocket 105 relatively one to the other. The spring 112 for forcing the plunger downward bears at its lower end against the upper end of the plunger 109 and at its upper end against a thimble 114, which in turn is supported against an adjustable abutment screw 115 mounted in a lug 116 projecting from the wall 104 of the hopper.

As already stated the shaft 44 of the visual indicator extends beyond the ratchet wheels 47 and 48 and has fixed thereon a gear 100. Gear 100 is connected through an intermediate gear 117 to a pinion 118 fast on shaft 119 so that whenever indicator shaft 44 is adjusted by a blank passing between the detector rolls 2 and 17, shaft 119 will also be adjusted. It will be understood that the thinnest spot in a blank as determined by the detector rolls will be visually indicated by the pointer 45 on the dial 46, by the adjustment of the lower detector roll 17 acting through yoke 20, rods 26, arms 33, rock shaft 34, arm 35, rod 36, rack slide 41, pinion 43 and pointer shaft 44. Simultaneously, a corresponding rotative adjustment will be imparted through gears 117 and 118 to shaft 119.

The shaft 119 has fixed to one end thereof a marking or stamping wheel 120 provided upon its periphery with a series of grading types 120a which consist of numerals corresponding to the numerals on the dial 46 of the visual indicator. The angular position of these grade marking characters is such that the distance between two adjacent characters is the same as the angular movement imparted to wheel 120 when the pointer 45 moves from one of the numerals on the dial 46 to the next numeral above or below; that is, when the pointer 45 is positioned at any one of the numerals on dial 46, the corresponding numeral on wheel 120 will at the same time be positioned directly beneath the axis of shaft 119.

A plunger 121, whose upper end slides in a hole 122 provided vertically through the bed plate 58 alongside of the groove 61 of the runway 62, is also positioned directly below the shaft 119 in line with the operative type on stamping wheel 120. The enlarged lower part 123 of the plunger 121 is forked (Fig. 8) and straddles an operating arm 124, herein shown as a vertically disposed plate pivoted at 125 to bracket 126 (Fig. 3) depending from the bed plate or table 58. Beneath the plunger operating arm 124 is a coil spring 127 bearing at its upper end against the arm 124 and at its lower end against a shelf 128 which is a part of bracket 129 secured to and depending from the bed plate 58. A pin 130 extends across the forks of the enlarged part 123 of the plunger, and through a slot 131 formed in the arm 124. Normally this pin 130 rests against the lower end of slot 131.

The free end of arm 124 engages the under side of the tail 132 (Fig. 4) of a lever 133, pivoted at 134 to a bracket 135 depending from the under side of the bed plate 58. The other arm 136 of said lever 133 is provided at its free end with a shoulder 137, which cooperates with a shoulder 138 extending laterally from the trigger 139. This trigger 139 is made with an arm 140 which is normally held against the top of the cross bar 22 by a spring 141, and when there is no blank between the two detecting rolls, the cross bar 22 will occupy an elevated position where it holds the shoulder 138 on trigger 139 out of the path of the shoulder 137 on lever 133. The parts will be in the position shown in the drawings when there is no blank between the detecting rolls.

When the advance end of a forwardly fed blank enters between the detecting rolls 2 and 17, shortly after the start of each rotation imparted to shaft 74, the roll 17 is depressed carrying with it the cross bar 22. This downward movement of cross bar 22 permits the trigger 139 to swing to the right (Fig. 4) under the influence of spring 141, thus bringing the shoulder 138 of the trigger into the path of the end of lever 133. A shoulder 142 at the top of the trigger engages the under side of the bed plate 58 to limit movement of the trigger to the right. This positioning of the trigger 139 occurs near the start of the rotation of the double crank 101 on shaft 74, and as the crank 101 enters the latter part of its rotation it strikes the lower arm 136 of the lever 133 and swings the latter upward into a position where the shoulder 138 is latched beneath the shoulder 137 on lever 133. The movement thus imparted to lever 133 by the crank 101 swings the tail piece 132 downward and depresses the free end of arm 124 so that when the lever 133 is caught and latched by the trigger, the spring 127 is held under compression.

When the rear or following end of the blank emerges from between the feeding and detecting rolls 2 and 17, the latter will rise under the influence of spring 25, carrying with it the cross bar 22 and thereby swinging the trigger 139 to the left and disengaging the shoulder 138 from the shoulder 137 of the lever 133. The trigger 139 is pivoted at 144 on a bracket 144a (Fig. 3) secured to the bed plate 58. As soon as the lever 133 is thus unlatched and disengaged from the trigger the spring 127 is released and projects the plunger 121 upwardly against the under side of the blank which is now on top of the runway 62, thereby driving the top side of the blank sharply against one of the marking types on the

periphery of marking wheel 120. During the first part of this upward movement of the plunger by spring 127 acting through the arm 124, the pin 130 rests against the lower end of slot 131 in arm 124. When the upward movement of arm 124 is arrested by engagement with the tail 132 of the lever 133, which now bears against the under side of the bed plate 58, the slot 131 permits the plunger to continue its upward movement and to strike on the under side of the blank in a manner of a projectile.

Thus it will be seen that the visual indicator and the type wheel are simultaneously and correspondingly adjusted in accordance with the grade of the blank as determined by the detecting rolls, and that when the detecting and measuring operation is completed, the stamping or marking mechanism will be automatically actuated the instant the blank leaves the detecting rolls and comes to rest on the runway 62.

The types on the marking wheel 120 are inked by an inking roll 143 made with a felt covered periphery 144 which has a rolling engagement with the projecting types on the type wheel. The felt cover 144 is saturated with ink, which is transferred to the types 120^a as the type wheel 120 is rotated back and forth in unison with the movements of the pointer 45. The inking roll 143 is journalled on a stud projecting from a bracket 145 secured to a pedestal 146, mounted on the frame of the machine. The pedestal 146 also carries the upwardly extending bracket 147 which provides bearings for the shaft 119 and the trunnion of the intermediate gear 117.

Grading machines equipped for evening or skiving the blanks, have heretofore been provided with marking mechanism for stamping or printing on the blanks their appropriate grade marks, but in such machines the marking mechanism has been directly controlled by the skiving mechanism at the delivery end of the machine, or by a special trip or actuator operated by the blank as it approaches the delivery end of the machine. In the present invention the marking mechanism is automatically controlled and operated from the detecting mechanism, as distinguished from the skiving mechanism or a special additional trip, and the stamping is performed the instant the blank leaves the detecting rolls. This is believed to be new in grading machines and it is within the contemplation of the present invention that the grade marking mechanism above described, actuated from the detecting rolls, may be embodied in other grading machines of this general character for skiving, distributing or otherwise acting upon the blank, as well as in a visual indicating machine, so long as the stamping mechanism is controlled from the detecting rolls independently of other trips or grading devices as the blank passes through the machine. It is also a novel feature of the present invention to utilize the shaft 44 of the visual indicator as the actuator for adjusting or setting the type wheel. This contributes to the simplicity of the structure and makes it possible to operate both the visual indicator and the type wheel from a single member, the rod 36, which is moved in response to the detecting roll 17.

In Figs. 7 and 8 there is shown a modified form of grade marking mechanism wherein the type wheel 120 is fixed to one end of the shaft 119, whose opposite end carries a pinion 148 in mesh with a rack 149 carried by rack slide 41, so that the rack slide 41 operates both the pinion 43 for adjusting the visual indicator and the pinion 148 for adjusting the type wheel.

An important modification illustrated in Figs. 12, 13 and 14 will now be described. In grading machines of this general character, whether visual indicating machines of the kind herein shown, or machines for evening or performing other operations on a measured blank, it has been the practice to make the feeding and detecting rolls 2 and 17 of the same diameter, as best illustrated in Figs. 3 and 9, and to connect them for positive rotation together by ordinary spur gears 15, 16 at each end. Said gears have been of standard involute shape with teeth of sufficient length to remain intermeshed at all times during the movement of separation of the feeding and detecting rolls, whereby the lower or yielding roll is positively driven through said gearing by the upper or fixed roll, which is driven from the main drive shaft. By reason of the constant relative movement between the gears of the two sets during the detecting operation of the machine as the yielding roll moves up and down, there is a constant rubbing engagement between the teeth of the two sets of gears which results in friction, wear and undesirable resistance in the movements of the yielding roll due to the meshing of the gears. The object of the improvement illustrated in Figs. 12, 13 and 14 is to provide a construction in which the lower yielding roll will be driven by the upper fixed roll through the gearing in the usual way when no blank is between the rolls, but in which the instant a blank enters between two rolls, the gears will be automatically disengaged one from the other and will remain disengaged to rotate out of contact with one another during the passage of the blank between the rolls, the lower yielding roll being rotated as an idler roll by direct frictional contact with the passing blank. This leaves the lower yielding roll free to rotate and to move up and down in response to variations in thickness of the blank, without any re-

sistance whatever from the meshing of the gears, immediately after the blank enters the roll, thus affording the yielding roll, which is unimpeded by contact between the gear teeth, greater freedom and delicacy of action in its measuring operation as well as eliminating friction and wear between the gears themselves.

In general, the structure illustrated in Fig. 12 may be identical with that shown in Fig. 9 excepting that the lower yielding roll 17 is slightly smaller in diameter than the upper fixed roll 2, so that when a sole or other blank is passing between the rolls, the lower roll 17 is caused to rotate at an angular speed slightly faster than roll 2. The spur gears 15^a and 16^a correspond respectively to the spur gears 15 and 16 of the other form, but instead of being an ordinary conventional form of gears, they are specially shaped gears as illustrated in Figs. 13 and 14. The front or active faces 155 of the upper or driving gear teeth, considered with reference to the direction of rotation of the gears as indicated by the arrows, are of conventional form and engage the rear or active faces 156 of the lower gear teeth, which are also of conventional form, to drive the lower roll in the usual way when no blank is between the rolls 2 and 17. The rear, inactive faces of the teeth of gears 15^a and the front, inactive faces of the teeth of gears 16^a are cut away or mutilated, as shown respectively at 157 and 158, so as to provide spaces or clearances between the teeth at that side.

Before and at the time when the blank is presented to the feeding and detecting rolls, the two gears of each pair are in intermeshed engagement and the gears 16^a are being driven by the gears 15^a in the usual way, but as soon as the forward end of the blank has entered between the two rolls, the blank is carried forward by the upper roll 2 alone, the slightly smaller lower roll 17 turning over with the movement of the blank but at a slightly greater angular speed than the roll 2. Fig. 13 shows the position of the gears before the blank enters between the rolls or at the instant when the blank enters the nip of the roll. Fig. 14 shows the position of the gears when the blank S is part way through the rolls. From the instant the blank enters between the rolls the teeth of gear 16^a will be moved ahead of the teeth of gear 15^a by reason of the slightly greater speed of the smaller roll 17, so that there will be no engagement between the teeth of the gears 15^a and 16^a during the passage of the blank between the detecting and feeding rolls. This leaves the lower detector roll 17 free to follow the irregularities of the blank without any resistance whatever from the meshing of the gears immediately after the blank enters the rolls. In practice the lower roll may be made about 3/64 of an inch less in diameter than the upper roll 2. This will provide for an increased speed of rotation of the lower gear 16^a appropriate for handling soles or other blanks of usual length without danger of the cut away faces of the teeth of the lower gears 16^a overtaking the cut away faces of the teeth of the upper gears 15^a before the blank is delivered from between the rolls.

Although the operation of the machine has been explained in connection with the foregoing description, it may be briefly summarized as follows:

When the clutch connects the continuously driven shaft 1 to the shaft 74, to impart thereto a single revolution, the lowermost blank S in the magazine H is fed forward by the feed slide 102 to the nip of the feeding and detecting rolls 2, 17. At the proper instant (which may be regulated by adjustment) the trade mark stamp 113 is operated from shaft 74 through sprocket chain 111 to emboss the blank. As the blank passes between the feeding and detecting rolls 2, 17, the lower roll 17, moving up and down in response to any unevenness of the blank, detects or measures the thickness grade of the blank. The yoke 26^a, which is mounted to follow the movements of roll 17, transmits the detecting or measuring motion through the setting mechanism, including the rods 26, the arms 33, the rock shaft 34, the lever 35, the rod 36, the rack 41 and the shaft 44 to the hand 45 on the visual indicator, and also to the type wheel 120, which is connected by gearing to shaft 44, in the form shown in Figs. 1, 2 and 3, or by rack 149 to the rack slide 41, in the form shown in Figs. 7 and 8.

Just before the blank enters the feeding rolls it engages a trip which withdraws pawl 50 from ratchet wheel 48 as more fully described in said Patent No. 1,686,487. Thus during the first part of the travel of the blank through the rolls the indicator hand and the type wheel will remain unlocked and free to move in either direction in response to the detecting roll 17, and the grade measurements will not be preserved on the indicator or type wheel until the advance end of the blank reaches and lifts the trip wheel 60. This permits the blank to be graded at a selected area only, such as the forepart of a sole (the grade of the heel being immaterial in shoemaking), the sole being fed into the machine heel end first. As soon as the blank lifts wheel 60, pawl 49 is engaged with ratchet wheel 46, thereby locking the indicator and type wheel against registering thickness measurements greater than that shown at the moment, but as pawl 50 is still held disengaged by the blank the indicator and type wheel are free to respond to successively thinner spots in the blank, thus

preserving the measurement of the thinnest spot detected and grading the blank according to such thinnest spot. Just before the rear end of the blank passes through the feeding and detecting rolls, it releases the trip which holds pawl 50 clear of ratchet wheel 48 and allows pawl 50 again to engage its ratchet. The indicator and type wheel are now locked by the two pawls 50 and 49 against movement in either direction.

The instant the blank passes out from between rolls 2 and 17, the roll 17, which has been held down by the blank, rises and operates the stamping plunger or striker 121 thus stamping the appropriate grade mark on the blank whose measurement has now been completed. The blank now rests on the runway 62 of table 58 affording the operator time to read the visual indicator in its final, locked position of adjustment, preparatory to sorting it or otherwise disposing of it by hand.

When the operator pulls the blank by hand out from under trip wheel 60, the latter falls into the groove 61, thereby unlocking pawl 49, and automatically engaging the clutch between the driving shaft 1 and shaft 74 and causing the described cycle of operations to be repeated.

Certain parts of the invention are applicable to machines for performing other kinds of grading than visually indicating or marking. The term grading means, as established in this art, is generic and includes many kinds of grading means, such as evening or skiving, visually indicating, marking or stamping, and distributing or sorting devices. Accordingly the expression grading means will be used in the claims in its generic sense, and is not to be construed as limited to any specific kind of grading means unless the context so requires.

Claims:

1. A grading machine comprising a pair of feeding and detecting rolls, one of which is mounted to yield with relation to the other, grading means responsive to said yielding roll, and setting mechanism connecting the yielding roll and the grading mechanism, said setting mechanism including a rock shaft, two arms fixed to the rock shaft, two rods connected at one end to the yielding roll and at the other end directly engaging said arms to adjust the rock shaft in accordance with the movements of the roll, and actuating connections between the rock shaft and the grading means.

2. In a grading machine a pair of yielding, separable, feeding and detecting rolls, one being a driving roll and the other a driven roll, and gears connecting said rolls by which one drives the other when no blank is between the rolls, and the means by which the passage of a blank between the rolls will cause the teeth of the gears to disengage and the yielding rolls to be rotated wholly by the blank.

3. In a grading machine a pair of yielding, separable, feeding and detecting rolls, one being a driving roll and the other a driven roll, and gears connecting said rolls by which one drives the other when no blank is between the rolls, the driven roll being of smaller diameter than the driving roll, whereby it will be rotated by a blank between the rolls at greater angular speed than the driving roll and will cause the teeth of the gears to disengage.

4. In a grading machine a pair of yielding, separable, feeding and detecting rolls, one being a driving roll and the other a driven roll, and gears connecting said rolls by which one drives the other when no blank is between the rolls, the driven roll being of smaller diameter than the driving roll, whereby it will be rotated by a blank between the rolls at greater angular speed than the driving roll and will cause the teeth of the gears to disengage, the spaces between the teeth of each gear being sufficient to prevent the teeth of the more rapidly rotating gear from overtaking the teeth of the more slowly rotating gear while the blank is between the rolls.

5. In a grading machine a pair of yielding, separable, feeding and detecting rolls, one being a driving roll and the other a driven roll, and gears connecting said rolls by which one drives the other when no blank is between the rolls, the driven roll being slightly smaller in diameter than the driving roll whereby it will be rotated by a blank between the rolls at greater angular speed than the driving roll and will cause the teeth of the gears to disengage, each tooth of each gear being cut away or mutilated on its inactive side to provide clearances between the teeth sufficient to prevent the teeth of the more rapidly rotating gear from overtaking the teeth of the more slowly rotating gear while the blank is between the rolls.

6. In a grading machine, detecting means, grade marking mechanism including an adjustable type carrier responsive to said detecting means and a striker, and means controlled by the blank upon its discharge from the detecting means to actuate the striker.

7. In a grading machine, detecting means, grade marking mechanism including an adjustable type carrier responsive to said detecting means and a striker, and means controlled by the detecting means upon the discharge of the blank therefrom to actuate the striker.

8. In a grading machine, detecting means adapted to determine the thickness grades of blanks engaged thereby, grade marking mechanism adjustable in accordance with

said detecting means, and means controlled by the detecting means upon the discharge of the blank therefrom to operate the grade marking mechanism.

9. In a grading machine, detecting means adapted to determine the thickness grades of blanks engaged thereby, grade marking mechanism adjustable in accordance with said detecting means, and means controlled by the detecting means to operate the grade marking mechanism.

10. In a grading machine, a pair of detecting rolls adapted to determine the thickness grades of blanks engaged thereby, one of which yields with relation to the other, grade marking mechanism adjustable in accordance with the yielding detecting roll, and means controlled by said yielding detecting roll upon the discharge of the blank from between said rolls to operate the grade marking mechanism.

11. In a grading machine, a pair of feeding and detecting rolls, one of which yields with relation to the other, grade marking mechanism including an adjustable type wheel responsive to the yielding detecting roll and a striker, and means controlled by the yielding detecting roll upon the discharge of the blank from between said rolls to actuate the striker.

12. In a grading machine, a pair of feeding and detecting rolls, one of which yields with relation to the other, grade marking mechanism including an adjustable type wheel responsive to the yielding detecting roll, a striker cooperating with the type wheel to cause the latter to mark the blanks, a spring for propelling the striker toward the type wheel to force the blank against the latter, means for automatically compressing the spring in timed relation to the passage of each blank through the machine, means for holding the spring in its compressed condition, and means controlled by the yielding detecting roll for releasing the spring to actuate the striker.

13. In a grading machine, a pair of feeding and detecting rolls, one of which yields with relation to the other, grade marking mechanism including an adjustable type wheel responsive to the yielding detecting roll, a striker cooperating with the type wheel to cause the latter to mark the blanks, a lever connected to the striker to initiate the projection thereof but leaving the striker free to complete its stroke by its own momentum, a spring acting on said lever for propelling the striker toward the type wheel to force the blank against the latter, means acting through said lever for automatically compressing the spring in timed relation to the passage of each blank through the machine, means for holding the spring in its compressed condition, and means controlled by the yielding detecting roll for releasing the spring to actuate the striker.

14. A grading machine comprising detecting means, a grade indicator including an adjustable pointer and pointer shaft, setting mechanism whereby the pointer shaft is responsive to the detecting means, marking mechanism including a rotatable type wheel, and actuating connections between the pointer shaft and the type wheel whereby the type wheel is adjusted to correspond to the adjustment of the pointer and pointer shaft.

15. A grading machine comprising detecting means, a grade indicator including an adjustable pointer and pointer shaft, setting mechanism whereby the pointer shaft is responsive to the detecting means, marking mechanism including a rotatable type wheel, and gearing between the pointer shaft and the type wheel whereby the type wheel is adjusted directly by and in accordance with the adjustment of the pointer shaft.

16. In a grading machine, a pair of feeding and detecting rolls, one of which is mounted to yield with relation to the other, a cross bar supporting the bearings of the yielding roll, a pair of spring pressed levers acting upon the cross bar to normally press the yielding roll toward the other roll, and adjustable, wear resisting, bearing plates interposed between said cross bar and levers.

17. In a grading machine, a pair of detecting rolls, automatic feeding mechanism for feeding blanks one at a time to said detecting rolls, a die for marking each blank as it passes through the machine, and means operated by said automatic feeding mechanism for actuating said die.

18. In a grading machine, a pair of detecting rolls, automatic feeding mechanism for feeding blanks one at a time to said detecting rolls, a die located in advance of the detecting rolls for marking each blank as it passes into the detecting rolls, and means operated by said automatic feeding mechanism for actuating said die.

19. A grading machine comprising a pair of feeding and detecting rolls, one of which is mounted to yield with relation to the other, grading means responsive to said yielding roll and setting mechanism for transmitting measurements determined by the detecting rolls to the grading means, gears connecting said feeding and detecting rolls by which the yielding roll is driven by the other when no blank is between the rolls, and means by which the passage of a blank between the rolls will cause the teeth of the gears to disengage and the yielding roll to be rotated wholly by the blanks, whereby the measuring movements of the yielding roll will be transmitted to the grading means uninfluenced by the engagement of the gears.

Signed by us at Manchester, New Hampshire, this 17 day of September, 1928.

EDWARD M. COGSWELL,
ARTHUR M. HEARD,
FRANK L. CLARKE,
Executors of the Will of Leander A. Cogswell, Deceased.