

Oct. 29, 1940.

D. PARKS

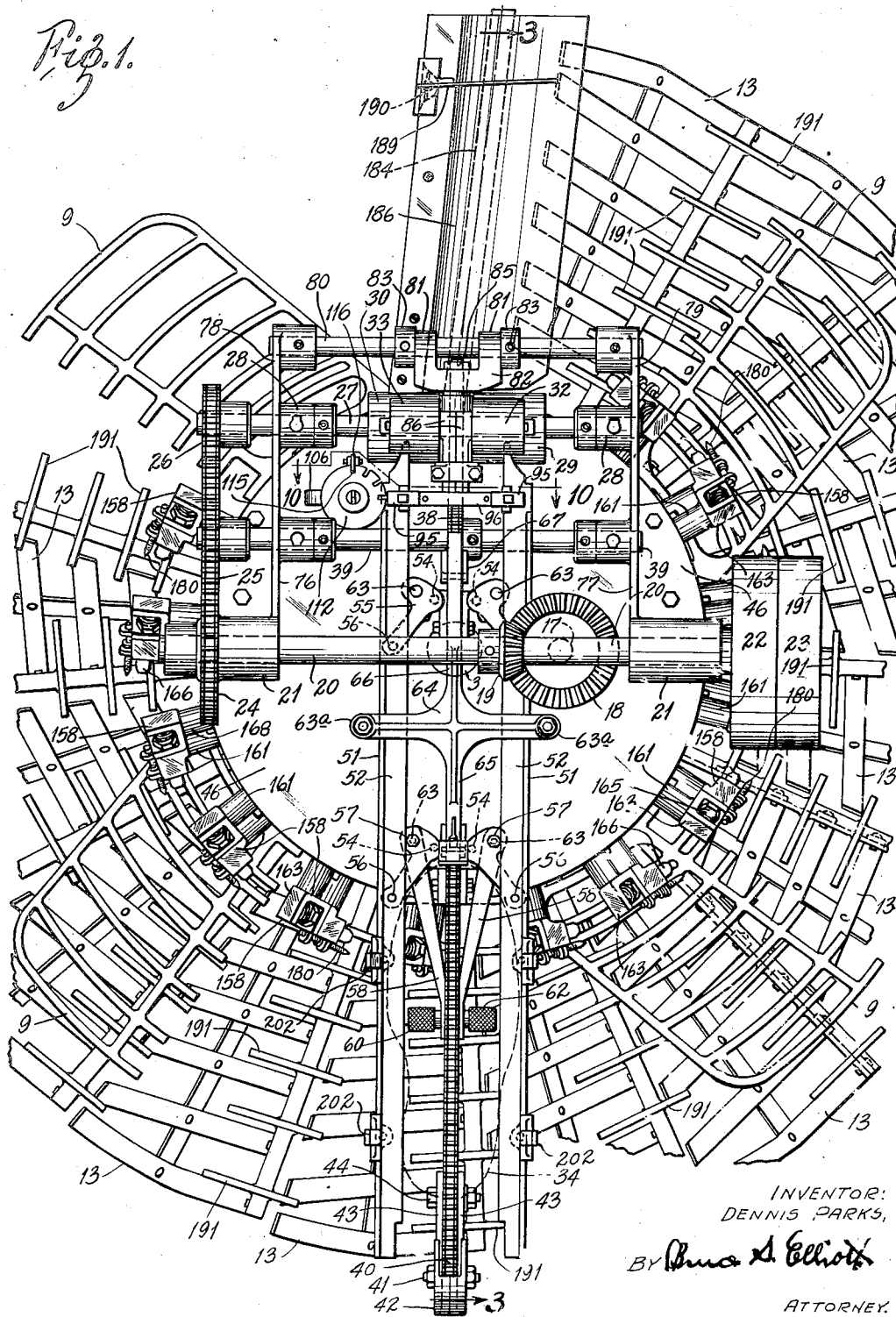
2,219,489

SOLE GRADING MACHINE

Filed May 21, 1938

7 Sheets-Sheet 1

Fig. 1.



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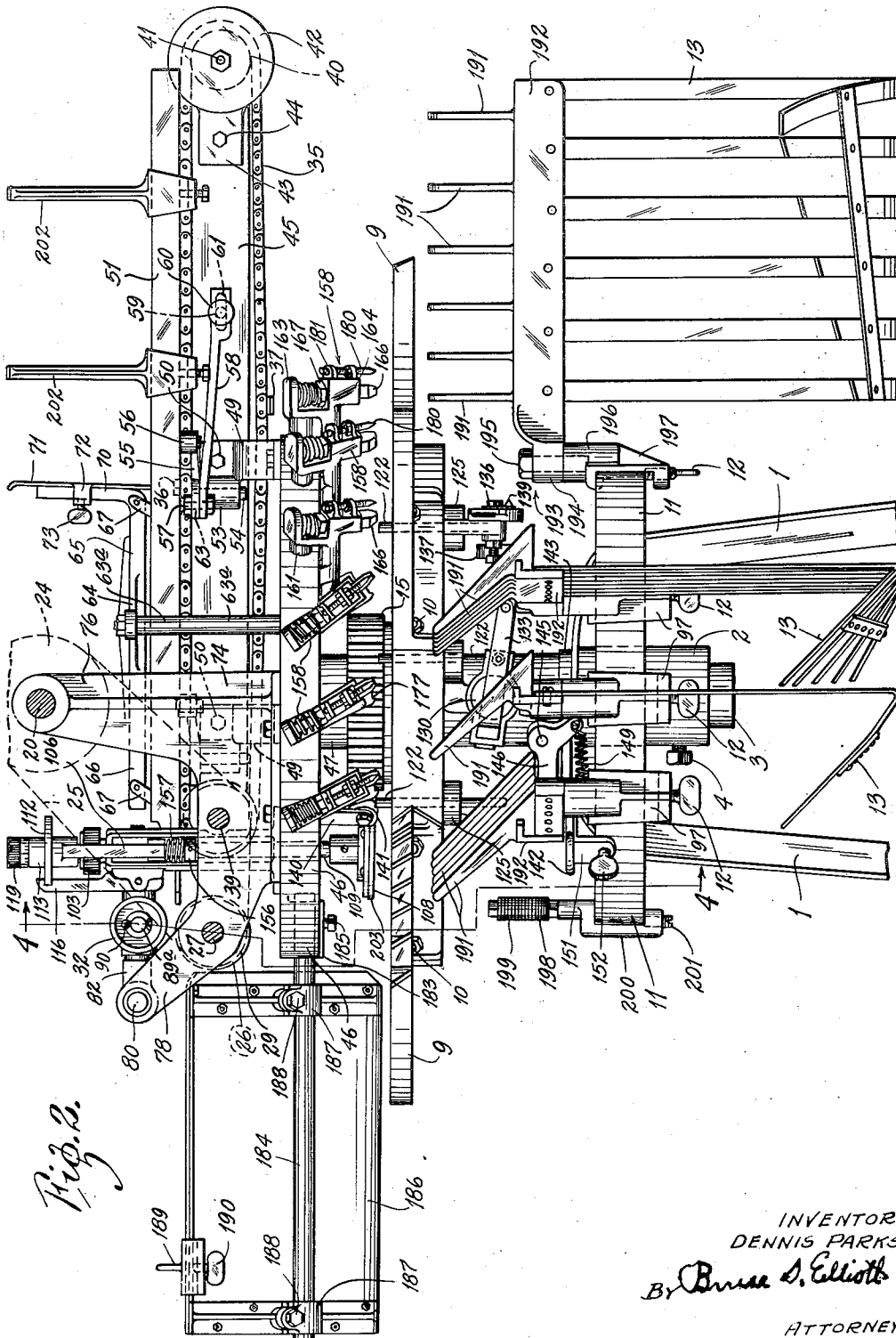
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SOLE GRADING MACHINE

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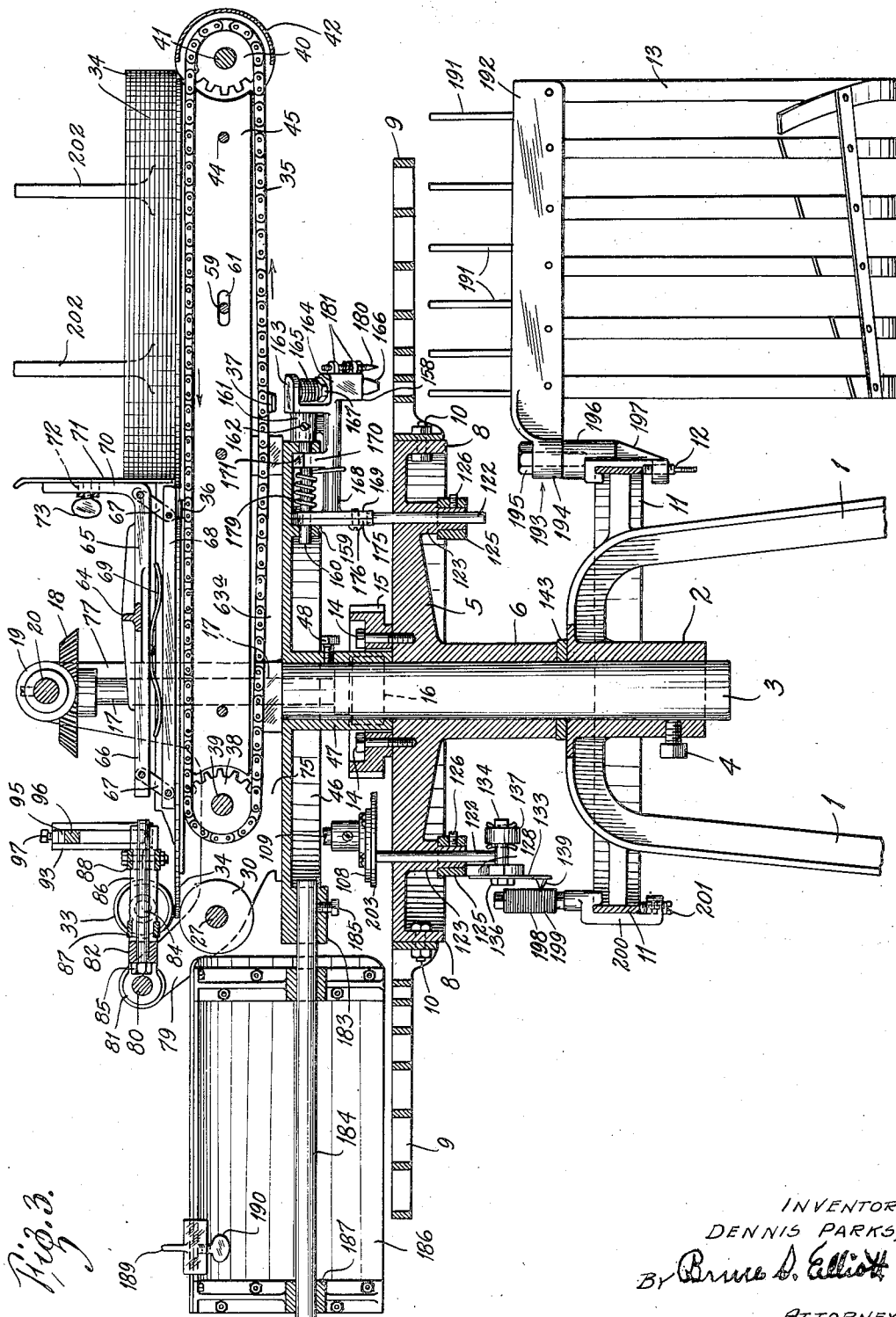


Fig. 3.

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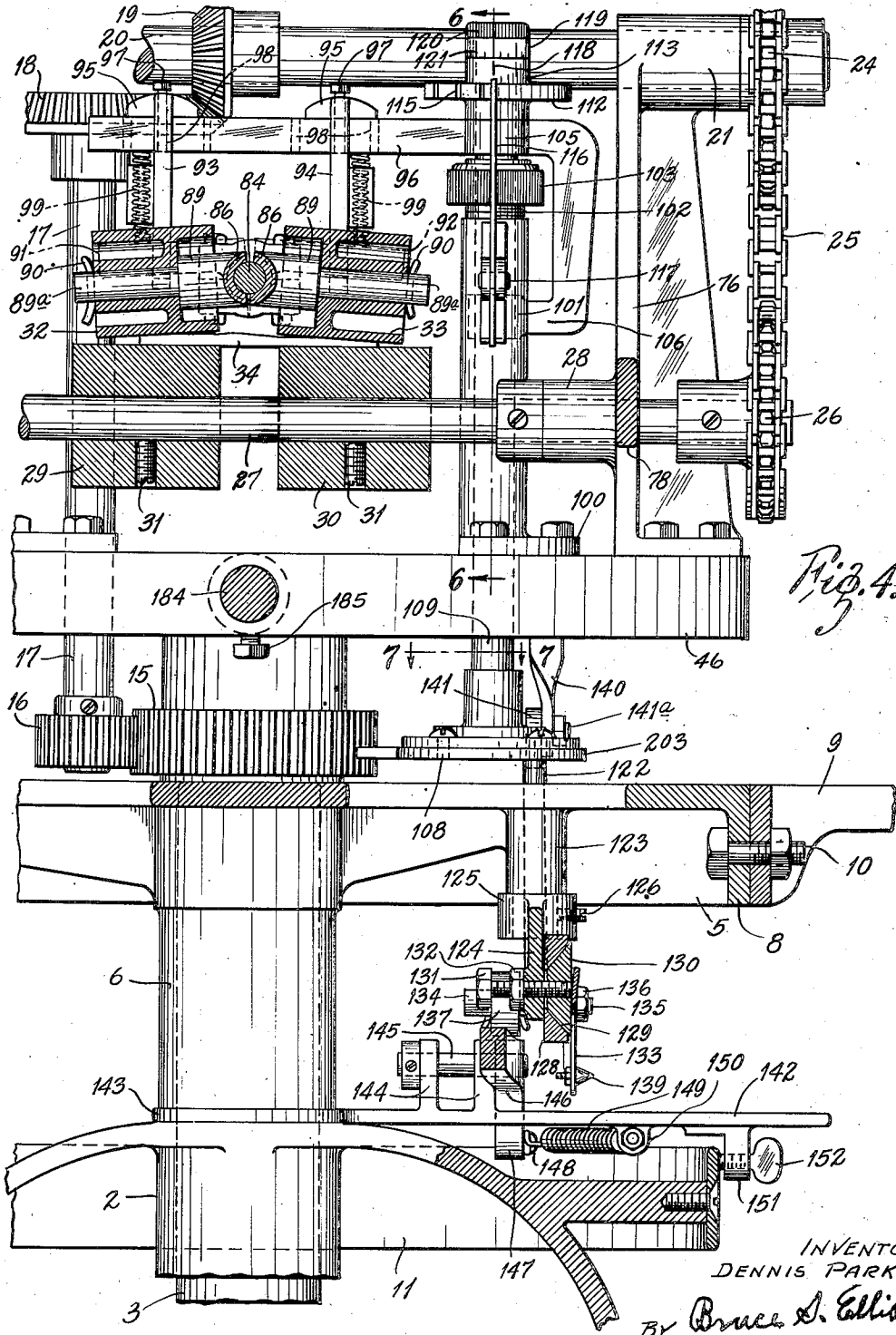
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Fig. 5.

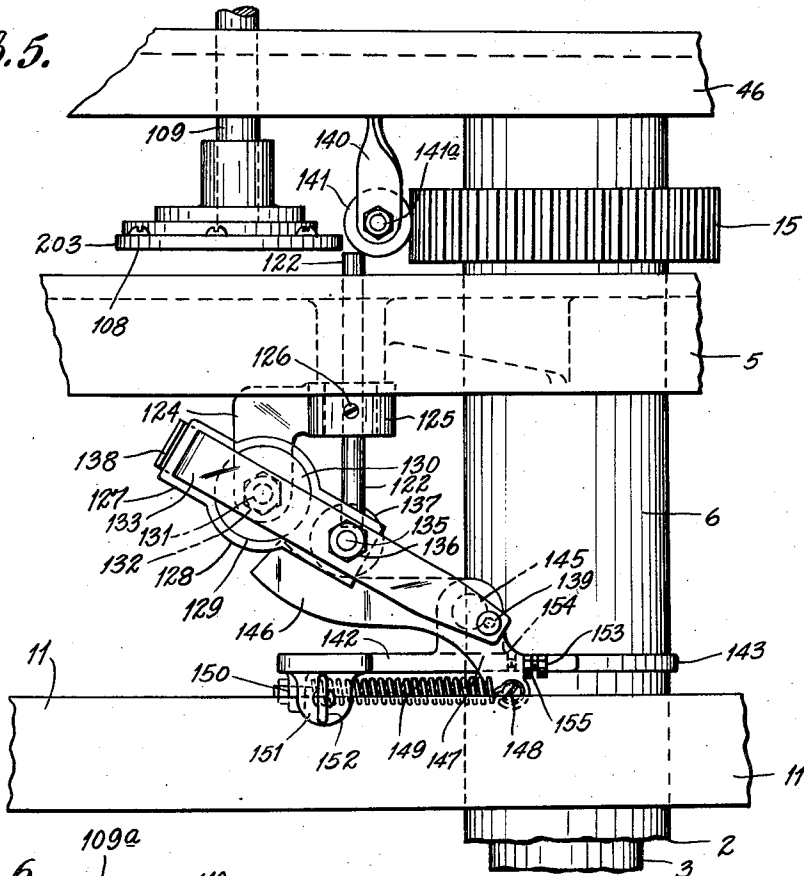
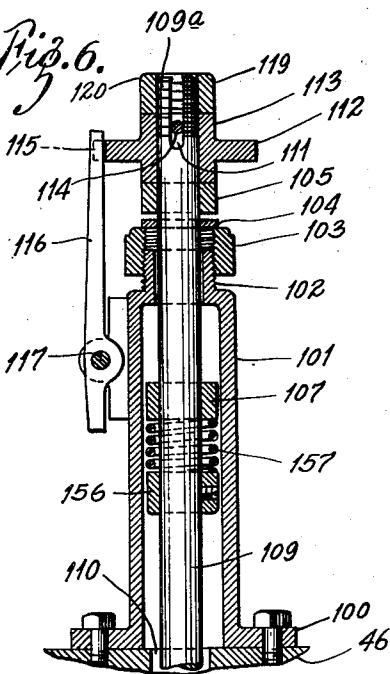
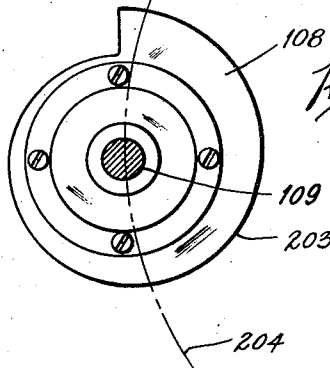


Fig. 6.



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Fig. 8.

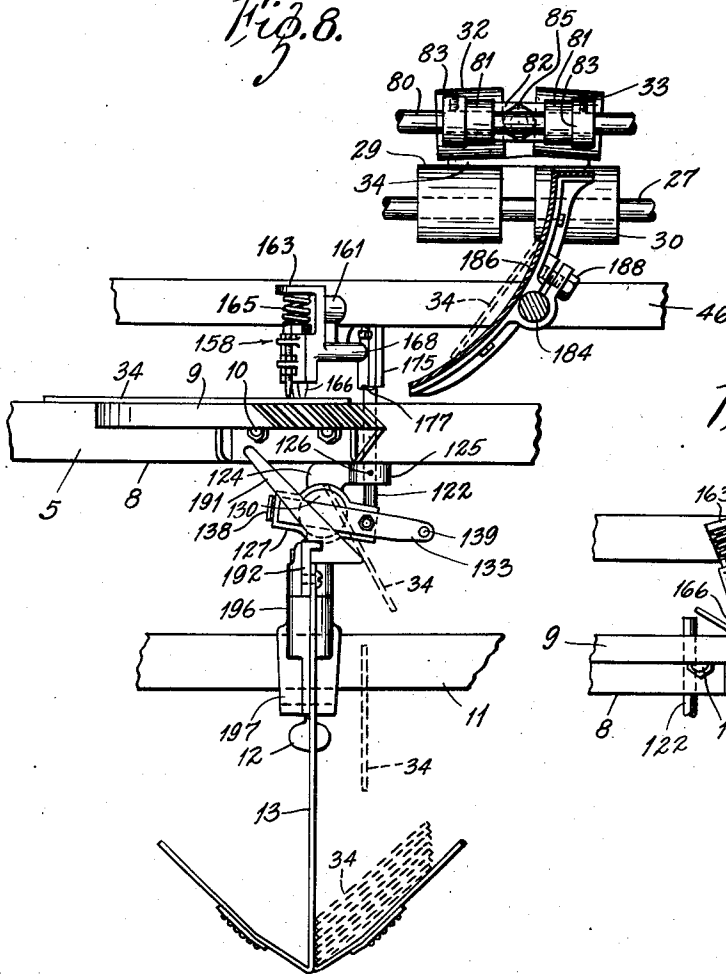


Fig. 9.

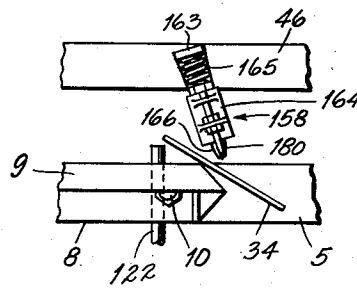
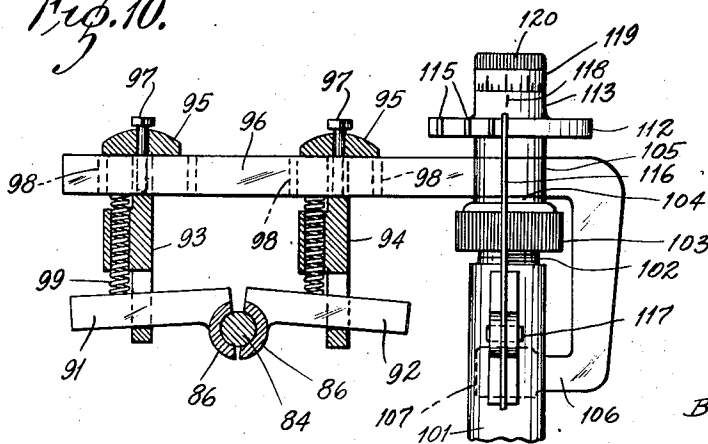


Fig. 10.



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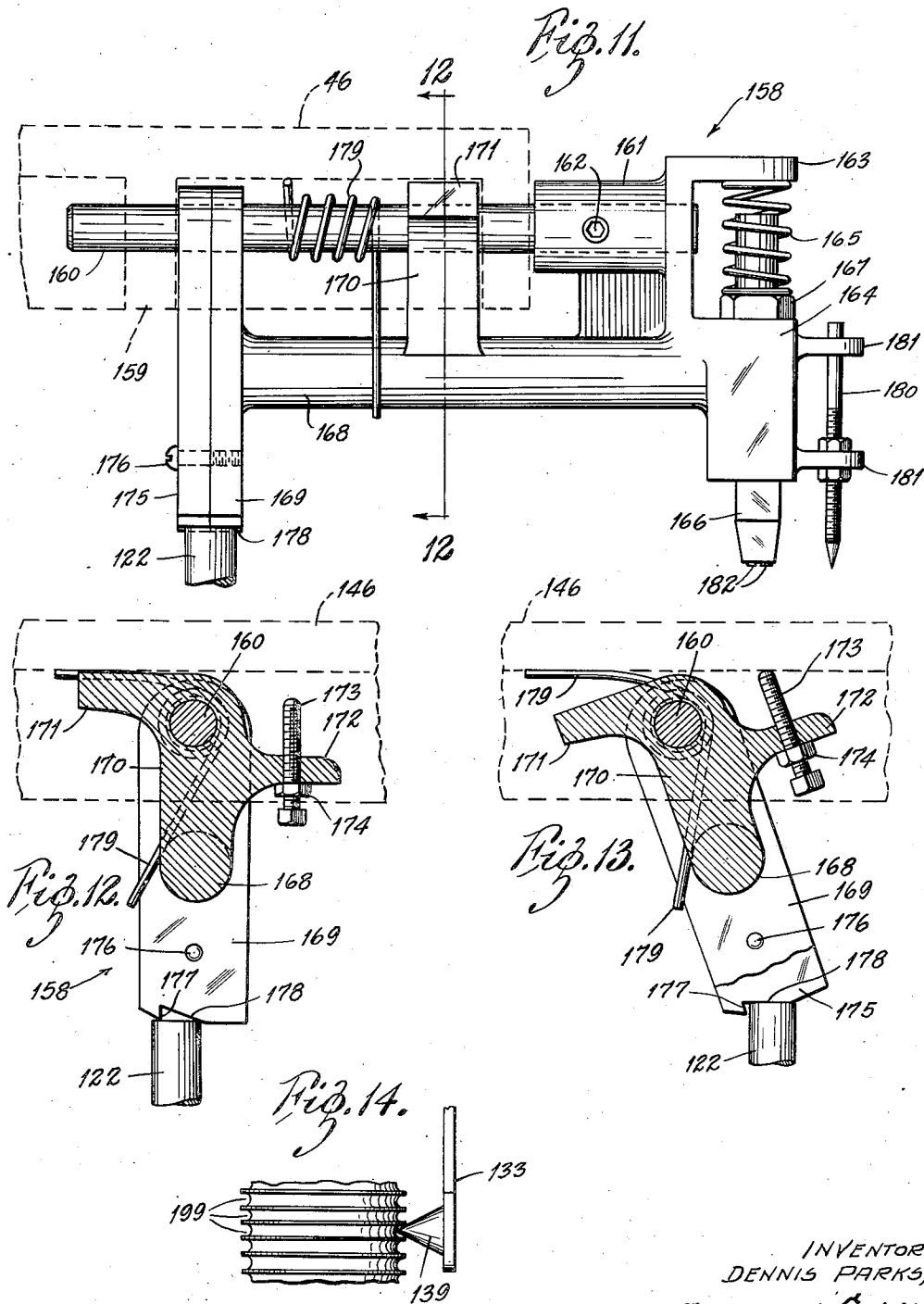
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SOLE GRADING MACHINE

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UNITED STATES PATENT OFFICE

2,219,489

SOLE GRADING MACHINE

Dennis Parks, St. Louis, Mo.

Application May 21, 1938, Serial No. 209,399

22 Claims. (Cl. 101—2)

The general object of this invention is to provide an improved rotary sole grading machine which shall be characterized by rapidity of operation, extreme accuracy in grading, the automatic stamping, or imprinting on each sole of its grade in irons, and the automatic discharge of the graded soles into a series of containers, in such manner that each sole of a given grade will be deposited into a container adapted to receive that particular grade.

My machine is of the type which grades soles according to the thinnest marginal portion at either side of the sole, and usually only in the forward portion thereof—that is, the sole portion proper, as distinguished from the heel portion of the sole—and one of the important objects of the invention is to provide novel mechanism for enabling the thinnest portion at either edge of the sole to be determined with great accuracy while the sole is being rapidly passed through the grading mechanism.

As soles differ in width over a wide range, from soles for the smallest child's shoe to soles for the largest man's shoe, and as it is necessary that the grading proceed along the marginal portions of the soles whatever be the width of the series of soles being graded at any particular time, another object of my invention is to provide simple means, easily adjusted, to delimit the field of grading, so that the same grading mechanism may be used for grading soles varying in width from the minimum to the maximum.

As soles also differ in length over a similar range as indicated with respect to their width, it is obvious that the sole for a child's shoe, for example, will require a much shorter grading operation than the sole for a man's shoe; and it is therefore an important object of the invention to provide readily adjustable means for determining the length of the grading operation in accordance with the length of the soles being graded at any particular time.

Another object of the invention is the provision of means for adjusting the grading mechanism so as to accurately grade soles of different thicknesses. That is to say, when a series of relatively thick soles is being graded, the space through which the soles pass in contact with certain grading rollers is required to be greater than when a series of relatively thin soles is being graded, and my invention provides means for readily adjusting the vertical width of this space.

Another object of the invention is to provide adjusting means for the grading mechanism

which will enable the soles to be graded with extreme accuracy to irons and half-irons, or, where such extreme accuracy is not required, to grade by whole irons only. For example, the machine from which the drawings accompanying this application were made is adapted to grade normally to half-irons, and for men's shoes has a capacity ranging from 6 to 12 irons. The adjusting means referred to may be so set that half-iron grading will be eliminated, anything over 6 and less than 7 irons being graded as a 7, and so on throughout the range of grades. This same adjusting means also permits of adjustment of the grading mechanism to compensate for wear of parts, producing inaccuracy in grading.

It frequently happens that the thinnest portion of a sole selected by the grading mechanism may be only slightly more or less than a given grade measurement so that, for example, a sole only slightly less in thickness than, say, 7 irons, may be discharged into the container for 6½ iron soles; while a sole only slightly greater in thickness than 7 irons may be discharged into the container for 7½ soles. To insure correct grouping of these intermediate grades, it is an object of my invention to provide means for automatically causing a sole whose grade measurement differs only slightly, in one direction or the other, from a given thickness in irons at its thinnest portion, representing one of the grading stages of the machine, to be definitely discharged into the container for soles most nearly approximating the grade measurement of the sole.

My machine involves the employment of a circular series of grading pins, which are automatically adjusted in height by the grading mechanism and cause the soles to be discharged from the machine into containers at various points around the machine according to the grade measurements of the soles, and it is one of the objects of the invention to provide means for initially raising each of these pins in order as they approach the grading mechanism, to bring them into co-operative relation with the latter, and to render said means adjustable in position in accordance with the length of the soles being graded, in order that said pins may be raised to operative position at the beginning of the grading operation.

Another object of the invention is the provision of a series of novel members adapted to be operated selectively by the grading pins aforesaid to cause the graded soles to be discharged into the appropriate containers.

Another object of the invention is to combine with said members for effecting the discharge of the soles dies, or like means, for impressing or imprinting the grade number in irons on each sole before its discharge.

Another object of the invention is to combine with the members for effecting the discharge of the soles means for preventing the sole from turning while its grade is being marked thereon, and also to insure the soles being delivered to the containers in proper position for assembly with previously delivered soles.

Another object of the invention is to provide readily adjustable means for guiding the soles as they are being delivered one at a time to the grading mechanism.

Another object of the invention is the provision of means for preventing the passage of more than one sole at a time to the grading mechanism during the operation of the feeding, or delivering, mechanism.

In the operation of grading, the soles are rapidly passed, one at a time, under a pair of grading rollers, previously alluded to, which are arranged in line and extend to the sides of the soles being graded, and it is one of the special objects of the invention to pivotally mount these rollers between their inner ends, so that the outer end portions thereof may readily follow any decrease in thickness at either edge of the sole and thus set the grading mechanism.

Another special object of the invention is the provision of a vertically adjustable member having a grading head at its lower end, which member is operatively associated with the grading rollers and is adapted to be raised and lowered in the movements thereof when grading a sole, and the lowest position of which grading head, determined by the thinnest portion of the sole over which the grading rollers pass, determines the height to which the respective grading pins are positioned.

Another detailed object of the invention is to mount said vertically adjustable member in a manner to permit the grading head to be turned to various adjusted positions, and to so shape said grading head that, according to the position to which it is turned, it will determine the length of the grading operation in accordance with one of the broad objects of the invention heretofore set forth.

Another detailed object of the invention is the provision of novel means for frictionally controlling the movements of the grading pins, to insure that they will remain in any position to which they may be moved in the grading operation.

Another detailed object of the invention is the provision of a series of adjustable pivoted contact members, which are adjusted to successively increase in height by half-iron intervals, beginning at a height corresponding to the thinnest sole to be graded, and which contact members are adapted to be selectively engaged by the grading pins according to the respective heights of said pins, as the latter are moved in a circular path beneath the contact members, to operate the corresponding marking and discharging members, and each of which contact members also operates after contact therewith of a grading pin, to lower such pin out of possible contact with other contact members until it has been reset by the grading mechanism.

Another detailed object of the invention is the provision of means for automatically lowering each grading pin immediately prior to its pass-

ing under the grading head, to prevent contact of the pin with the side of the grading head.

Other objects of the invention relate to the novel construction of certain other parts for carrying out the broader objects of the invention, and to details of construction and combinations of parts, all of which will hereinafter be fully described in the detailed description of the invention to follow and set forth in the accompanying claims.

Before proceeding with such detailed description, I wish it to be understood that my invention is not to be limited to the special constructions to be described except where such limitation is necessitated by the specific inclusion of such constructions in certain of the appended claims.

My invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a plan view of improved machine, a small portion at either side of the machine being broken away for lack of space;

Fig. 2 is a view in side elevation, the lower portion of the machine, constituting its support being broken away;

Fig. 3 is a vertical sectional view, taken on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged transverse sectional view of a part of the upper portion of the machine taken on the line 4—4 of Fig. 2;

Fig. 5 is an enlarged detail view in elevation illustrating the grading pin lifting mechanism;

Fig. 6 is a vertical sectional view on the line 6—6 of Fig. 4, illustrating the various adjustments for the grading head;

Fig. 7 is a horizontal section taken on the line 7—7 of Fig. 4, showing the shape of the grading head;

Fig. 8 is a broken sectional view showing a sole held on one of a series of traveling tables by one of the combined marking and discharging members, and illustrating the path of the sole from the grading rollers to a container for that particular grade of sole;

Fig. 9 is a detail view in elevation, complementary to Fig. 8, showing the manner of discharging the sole;

Fig. 10 is an enlarged detail view, taken on the line 10—10 of Fig. 1, illustrating the adjusting mechanism for determining the line of grading;

Fig. 11 is an enlarged view in side elevation of one of the contact members;

Fig. 12 is a section on the line 12—12 of Fig. 11;

Fig. 13 is a view similar to Fig. 12, but showing the plate of the contact member in its normal inclined position; and

Fig. 14 is an enlarged detail view of the grade adjuster.

Referring now to the drawings, the numeral 1 indicates a vertical frame, which is continued down to a supporting standard, or base (not shown). As shown more clearly in Fig. 3, this frame provides at its upper end a cylindrical bearing 2 in which is secured a vertical bearing shaft 3 by means of a locking bolt 4. Rotatably mounted on the bearing shaft 3 is a circular platform 5, having a hub portion 6. The platform 5 is provided with a continuous depending flange 8, and secured at equal intervals to this flange around the periphery of platform 5 are four receiving tables 9 which are bolted to the flange 8 by bolts 10 to have their upper sides lie flush with the upper side of the platform 5. The upper part of frame 1 is provided with an integral

circular supporting band 11, adjustably mounted around the periphery of which by means of set screws 12, are a series of containers for the graded soles, indicated by the numerals 13 and corresponding in number to the number of combined marking and discharging members employed (see also Figs. 1 and 2). In Figs. 2 and 3 only one of these containers is shown to prevent confusion in the illustration. The platform 5 is rotated in the following manner:

Mounted centrally on the top of the platform 5, and bolted thereto by bolts 14, is a ring gear 15 (see also Figs. 4 and 5) with which meshes a pinion 16 on the lower end of a driven shaft 17. On the upper end of this shaft is mounted a bevel gear 18, Figs. 1, 3 and 4, which is driven by a bevel pinion 19 secured intermediate the ends of a drive shaft 20 mounted in bearings 21. Mounted on one end of the shaft 20 are fast the loose pulleys 22, 23, respectively, from the former of which it is driven by a belt (not shown) from any suitable source of power. When the shaft 20 is driven, it will be seen that the platform 5 and its tables 9 will be rotated about bearing shaft 3 though the connections described.

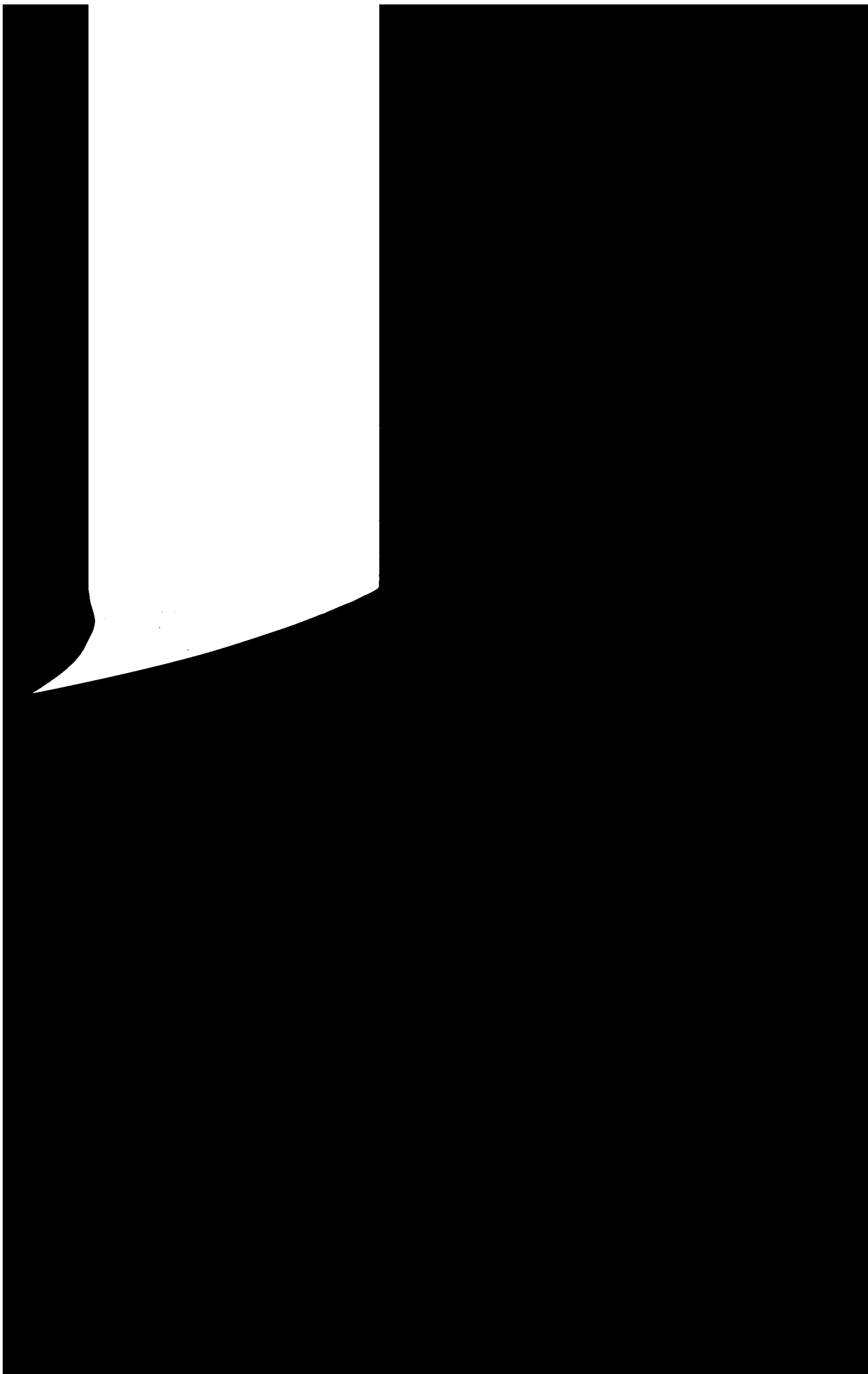
The shaft 20 has mounted on the end opposite to that on which the pulleys 22 and 23 are mounted a sprocket wheel 24, Figs. 1 and 4, over which and a sprocket wheel 26 a sprocket chain 25 passes. The sprocket wheel 26 is mounted on the end of a shaft 27 supported in bearings 28, and on this shaft are mounted friction, or drive, rollers 29, 30, which are spaced apart and fixedly secured on the shaft by set screws 31. These rollers co-operate with grading rollers 32 and 33, to be later described, to cause the soles to be passed under and in contact with the grading rollers, as shown more clearly in Fig. 4, in which the sole passing between the two sets of rollers is indicated by 34. The soles are delivered to the grading rollers by a feed chain 35 having an upper horizontal run and having secured thereon at equal distances apart from either end of the chain two projecting lugs 36, 37, respectively, which are adapted to engage and deliver the soles to the grading rollers, as later explained. The chain 35 is a sprocket chain, and as shown more clearly in Figs. 2 and 3, passes at one end, that adjacent the grading rollers, over a sprocket 38 mounted on a cross-shaft 39, which is driven from the sprocket chain 25. The other end of chain 35 passes over a sprocket 40 mounted on a shaft 41 and protected by a guard 42, shown at the extreme right of the figures indicated, and at the bottom of Fig. 1. The shaft 41 is mounted in two plates 43 bolted at 44 to the end of a vertically-disposed bar extending horizontally between the two sprockets 38 and 40, and indicated at 45. This bar is relatively thick, and its upper edge supports the upper run of the feed chain 35 and causes it to travel in a true horizontal path. The numeral 46 indicates a stationary, circular support, which has a central hub 47 firmly secured to the upper end of the bearing shaft 3 by a lock bolt 48. It is located above and parallel to the rotating platform 5. The hub 47 is encircled at a distance by the ring gear 15 previously referred to. Bolted to the top of the support 46 are bracket members 49 located in pairs on either side of the bar 45 and bolted to the latter at 50 to firmly secure it in position. The manner of supporting a pile of soles of equal length and width on the machine, and of guiding and delivering the same,

one at a time, to the grading rollers will now be described, referring particularly to Figs. 1, 2 and 3.

The numerals 51 indicate a pair of parallel guide bars having at their bottom edge inwardly-extending flanges 52, which serve as supports for the soles, as indicated by dotted lines in Fig. 1. The bars 51 project upward at right-angles to the flanges 52, and form bars acting as guides for the soles as they are carried forward by the feeding chain 35. The guide bars 51 are adapted to be moved toward and from each other to accommodate various widths of soles by the following mechanism:

Each bracket member 49 of the two sets of bracket members which secure the bar 45 in position is provided on its rear side with a cylindrical bearing 53 in which is rotatably mounted the pivot 54 of a bell-crank lever 55. One arm of each of these levers is pivotally connected at its outer end to one of the guide bars 51, as shown at 56. The other arm of each lever of the forward set is pivotally connected at 57 to one end of an arm 58, the other end of which is flattened and provided with an aperture through which passes the stem 59 (Fig. 3) of a thumb-screw 60, which stem also passes through a slot 61 in the bar 45 and has a screw-threaded end engaged by a thumb-nut 62. By loosening the thumb-nut 62, grasping this member and the corresponding member 61 with the hands, and moving them forward or backward, it will be seen that the arms 58 will rock the bell-crank levers and cause the guide bars 51 to be separated, or brought closer together, as the case may be, to provide the proper width of guide for the particular soles being graded, after which the thumb-nut is turned in one direction and the thumb-screw in the other to bind the ends of the arms 58 against the sides of the bar 45 and thus hold the guide bars securely in their adjusted position. In the adjustment of the guide bars 51 it will be seen that they will always maintain their parallel relation by reason of being actuated by the two sets of bell-crank levers 55. I may state that the rear bell-crank levers 55 are ordinarily employed merely as links to preserve parallelism of the guide bars, but each is provided with an aperture 63 to enable them to be employed as bell-crank-levers, if so desired.

Secured on and projecting upward from the circular support 46 on either side of the guide bars 51 are two posts 63a, supported on the upper ends of which is a cross-shaped casting 64 (Fig. 1) having forwardly and rearwardly extending bars 65, 66, respectively, the whole presenting a flat under side parallel with the upper side of the bar 45. Supported from the outer ends of the two bars 65, 66, by pivoted links 67, is a flat bar 68 (Fig. 3) which is normally pressed downward by a leaf spring 69 interposed between the casting 64 and said bar 68. The latter is parallel with the upper edge of the bar 45 and also with the under side of the casting 64 and its bars 65, 66, and is maintained in this relation in any longitudinal movement thereof by reason of the connecting links 67, the construction, in this regard, being the same in principle as a parallel ruler. The arm 65 is provided at its outer end with an upward-extending bracket-arm 70, on the outer face of which is slidably and adjustably mounted a gauge-plate 71 having a sleeve 72 slidably fitting the bracket-arm 70 and provided with a binding screw 73



in the vertical plane of the respective yokes. Actually, the lines of grading will be slightly outside of these vertical planes, owing to the inclined position assumed by either roller in falling. It will now be seen that if the yokes 93, 94, are separated to a greater distance than that shown in Fig. 10, by placing the pins 95 in the outermost apertures 98, the lines of grading will be advanced nearer the edges of the sole. Conversely, if the pins are placed in the innermost apertures 98, the lines of grading will be nearer the central portion of the sole. The movement of either grading roller to its lowest point in the line of grading is utilized to determine the grade of the sole by means of the associated mechanisms now to be described, referring particularly to Figs. 2, 4, and 6.

Bolted on the upper side of the circular support 46 is a base 100, from which rise two parallel, substantially semi-circular side bars 101 which are united at their upper end by a reduced screw-threaded portion 102 which is integral with the side bars. This screw-threaded portion receives an adjusting nut 103 on which is placed a washer 104. The grading-bar 96 is provided near one end (Figs. 4 and 10) with a guide-bearing 105, and beyond this bearing is bent downward and inward to provide a lower, inwardly-extending arm 106, which has at its end a guide-bearing 107 in line with the guide-bearing 105. The numeral 108 indicates the grading-head, previously referred to, which is located below the circular support 46 and is mounted on the lower end of a slide-rod 109, which extends upward through an opening 110 in said support, between the spaced bars 101, through the guide-bearings 107 and 105 on grading-bar 96 and at its upper end, located well above the guide-bearing 105, is screw-threaded as shown at 109^a and provided with a longitudinal slot 111. Slidably mounted on the rod 109, and supported on the bearing 105 of the grading-bar, is a setting-disk 112, having a hub 113, which is locked to the slide-rod 109 by means of a pin 114 passing through said hub and the slot 111 in said rod. The setting-disk is provided in its periphery with a series of notches 115, one or the other of which is adapted to receive the upper end of a locking-lever 116 (see also Fig. 1), which is pivoted at 117 at one side of one of the side bars 101. The hub 113 (Fig. 4) is provided on its periphery with a mark 118. Screw-threaded on the upper end of slide-bar 108 is an adjusting head 119 which bears against the upper end of the hub 113 of the setting-disk. This adjusting head is provided with a milled upper end 120 to facilitate turning it, and below the milled portion with numbered graduations 121 (Fig. 10), which are adapted to be set with reference to the mark 118.

The purpose of the setting-disk 112 is to enable the operator to turn the grading-head 108 (Fig. 7) so as to determine the length of the grading operation in accordance with the length of soles being graded; and the purpose of the adjusting head 119 is to enable the slide-rod 109 and its grading-head 108 to be raised or lowered to secure accuracy in the grading of the soles, both of which operations will be better understood after the description of other parts of the machine to follow. The purpose of the adjusting nut 103 is to raise or lower the grading bar 96, and thereby through the yokes 93 and 94 and the arms 91 and 92 raise the grading rollers 32, and 33, according as the soles being graded at a particular time are relatively thick, or relatively thin.

Slidably mounted in the rotatable platform 5 in

circular series are the grading pins 122, which have been previously mentioned and which are shown in Figs. 2, 3, 4, 5, 8, and 9. Each of these pins is designed to be initially raised into contact with the grading head 108, or into the position shown at the left of Fig. 4, and thereafter to be lowered to adjusted heights in harmony with any downward movement, or movements, of said grading head as the sole passes under the grading rollers. These pins project at all times above the upper surface of platform 5 and extend downwardly through bosses 123 which are integral with and depend from the underside of the table. On a reduced portion at the lower end of each of these bosses is mounted a depending bracket 124 by means of a circular integral collar 125 (Figs. 3, 4 and 5) which is secured on the reduced portion by means of a set screw 126. The numeral 127 indicates a rocking lever having a circular, central portion 128 which is provided with a conical recess 129 in which is seated a conical friction-member 130. This conical friction-member is centrally screw-threaded and receives the screw-threaded end of a bolt 131 which passes centrally through the bracket 124 and projects slightly beyond the outer face of the friction-member 130. The bolt 131 is provided with a locknut 132 to hold the bolt in any position to which it may be adjusted. The rocking lever 127 is normally inclined downwardly, as best shown in Fig. 5. The numeral 133 indicates a leaf spring which, intermediate its ends is mounted on the lower end of the rocking lever. This is done through the medium of a stub shaft 134, which has a reduced screw-threaded end 135 which passes through an aperture in the lower end of rocking lever 127 and through an aperture in the leaf spring, and has applied to its outer end a jamb nut 136 which bears against the face of the leaf spring and thus secures it firmly on the end of the rocking lever and likewise holds the stub shaft 134 firmly in position against the inner face of the rocking lever. Rotatably mounted on stub shaft 134 is a roller 137, which will be later referred to. In its upper portion the leaf spring 133 bears against the projecting end of bolt 131 and thus maintains the conical friction-member 130 in frictional engagement with the wall of the conical recess 129. The extreme upper end of leaf spring 133 passes through a slot in the upper end of rocking lever 127, and is secured in position therein by having its end bent outward at an angle, as indicated at 138 in Fig. 5. Mounted on the lower end of leaf spring 133, and projecting outwardly therefrom is a cone-shaped pin 139, the purpose of which will be presently described.

The number of grading pins 122 employed is related to the speed of rotation of the platform 5 and the speed at which the soles are delivered by the feed chain 35 to the grading rollers. In the present machine, the adjustment of these speeds is such that four grading pins are used; but with a different adjustment of these speeds, a greater number of grading pins could be employed, say, six or eight. The number of rocking levers with their associated parts corresponds to the number of grading pins employed, and in each instance the lower end of a grading pin rests upon a fixed part of the corresponding rocking lever. In the present instance, this is conveniently done by causing the lower end of the grading pins to rest upon the upper side of the respective stub shafts 134.

It is necessary that in the rotation of the circular platform 5 each of the grading pins in turn

should be lowered a sufficient distance to insure of its passing beneath the grading head 108. To this end, I secure on the under side of the circular support 46 a depending bracket arm 140 (Figs. 4 and 5), on the lower end of which is mounted a roller 141 on a stub shaft 142. This roller is positioned in the path of movement of the grading pins, and as each pin reaches the roller, if its upper end should be at too great an elevation, i. e., higher than the grading-head, it is depressed to a lower position by passing under the roller 141, so that in its further movement it will pass freely under the grading-head 108.

It is also necessary to move the upper end of each grading pin upward into contact with the under side of the grading-head before the grading operation commences, so that the grading pin may be lowered by the grading head the appropriate distance represented by the fall of one or the other of the grading rollers 32, 33, as the thinnest portion of the sole passes under it. To this end I provide the following mechanism:

The numeral 142, Figs. 4 and 5, indicates a bar, which at its inner end is provided with a circular bearing 143 rotatably mounted on the bearing shaft 3 between the bottom of the hub of platform 5 and the top of the cylindrical bearing 2, in which said bearing shaft is secured. Projecting upward from the upper side of bar 142 are two parallel supports 144, the upper ends of which afford bearings for a rock-shaft 145 on the outer end of which is secured a contact lever 146 which has a curved upper edge, and is slightly curved transversely to correspond with the circular path of movement of the roller 137 carried by the rocking lever 127. The contact lever 146 is spring-controlled and to this end is provided with a downward projection 147 at its inner end, to the lower end of which is secured, at 148, one end of a coil spring 149, the other end of which is secured in a bracket 150 located on the under side of bar 142. The bar 142 is adapted to be turned to various positions in accordance with the length of the soles being graded in order that the grading pins may be raised into contact with the under side of the grading head at the proper moment. For this purpose there is provided on the bar 142 near its outer end, on its under side, a bracket 151 in which is mounted a binding screw 152 the inner end of which is adapted to be turned into engagement with the outer side of the circular supporting band 11, and thus hold the bar from movement after it has been secured in a given adjusted position.

It will now be seen, by observing Fig. 5, that after the upper end of a grading pin 122 has passed from under the roller 141, and then moves beneath the grading head 108, the roller 137, previously referred to, will engage the upwardly curved surface of the upper edge of the contact lever 146 and cause the grading pin to be moved upward into contact with the underside of the grading head. This movement will also act to depress the outer end of the contact lever against the resistance of spring 149; and when roller 137 passes off of the end of the contact lever, the latter will be returned to its normal position by the pull of the coil spring, this movement being arrested at the proper point by means of a contact screw 153, Fig. 5, engaging a stop 154 on arm 142. The contact screw is adjustable to regulate the height of contact lever 146, and to be held in its adjusting position by locking nut 155.

Located between the lower guide bearing 101 (Figs. 2 and 6) on the grading bar 96, and a fixed collar 156 on the slide bar 109, is a coil spring 157, the purpose of which is to maintain constant contact of the upper guide bearing 105 of the grading bar with the setting disk 112, and of the latter with the adjusting head 119, so that the slide rod 109 with its grading head 108, the grading bar 96, yokes 93, 94, the arms 91 and 92 and the grading rollers 32 and 33 may be moved together simultaneously, or as a unit, in an upward or downward direction, while at the same time permitting the adjustments of the grading head, and grading rollers heretofore described. The upward movement of the parts just referred to will be occasioned by the springs 99 when a sole is forced by the feed chain under the grading rollers, as indicated in Fig. 4. The downward movement of the parts occurs by gravity whenever a thin portion of the sole passes under a grading roller and permits the same to fall further from an originally lower position than the other grading roller. In Fig. 4, this downward movement would occur if a thinner portion of the sole than that shown should pass under the grading roller 33. If a thicker portion of the sole than that shown should pass under grading roller 33, the grading bar 96, and therefore the grading head 108, would be raised, but this would not affect the particular grading pin 122 positioned under the grading head at the time, the grading head simply rising above the grading pin, and the latter being held to the position to which it was moved in the previous downward movement of the grading head by the action of the conical friction-member 130. If, in the position shown in Fig. 4, a portion of the sole, thinner than that shown passing under roller 33, should pass under roller 32, then this grading roller would fall to a lower position than roller 33 and move the grading head and the pin 122 under the same to a still lower position.

While either grading roller is capable of a rising or falling movement independently of the other, they likewise may be moved simultaneously in an upward or downward direction by reason of the pivotal connection of yoke member 82 carrying the bar 84, and as the sleeve members 86 are mounted to rock on the bar 84 the axes of the grading rollers, considered as a unit, may be canted at one end or the other.

These various movements of the grading rollers enable them to rapidly accommodate themselves to any variations in the thickness of soles passing under them so that, through the medium of the grading head 108, they are capable of adjusting the grading pins 122 with great accuracy to correspond to the thinnest portion of the sole passing under the grading rollers. The means by which the grading pins, as adjusted by the grading head, are utilized for marking the grades on the soles and causing soles of like grade to be deposited in the same container, will now be described.

Referring to Figs. 1, 2, 3, 8, 9, 11, and 12, and particularly the last two figures, the numerals 158, indicate a series of pivoted contact members, thirteen of which are employed, the same being arranged at suitable intervals around the 70 periphery of the stationary circular support 46, and one of which contact members is shown in enlarged detail in Figs. 11 and 12. For mounting these contact members on support 46, the latter is provided on its under side throughout the 75

greater part of its circumference with circular flanges 159, which afford bearings for a series of rock-shafts 160 (Fig. 3), on the outer end of each of which is fixedly secured one of said contact members. As shown by Fig. 11, the body of each contact member is in the form of a casting, which provides a cylindrical portion 161 which is fitted on the outer end of the rock-shaft 160 and secured thereon by a set screw 162. Beyond the cylindrical portion 161, the casting provides a recess, the upper end of which is formed by a stop-plate 163 and the bottom by the upper side of a rectangular die holder 164, in which recess is housed a coil spring 165. Adjustably mounted in the die holder is a die 166 which, as shown by Fig. 11, is provided with a circular stem extending up into the coil spring and which has a screw-threaded portion for receiving an adjusting nut 167, by means of which the die may be raised or lowered. Extending rearwardly from the die holder 164 is a horizontal bar 168, having a vertically-disposed plate 169 at its inner end, the upper end of which is apertured to permit the rock-shaft 160 to pass through it. Projecting upward from about the center of the bar 168 is a boss 170, which is also apertured to permit the rock-shaft 160 to pass through it and which, above this rock-shaft, is provided on one side with a lateral extension 171 and on its other side, below the rock shaft, with a lateral extension 172 in the outer end of which is mounted a stop screw 173, which is held in any given adjusted position by a lock-nut 174. The casting as a whole is, of course, of soft metal, such as brass, and in order to provide a hard-metal contact to be engaged by the grading pins 122, I provide a steel plate 175 which, like plate 169, is apertured at its upper end to permit the rock-shaft 160 to pass through it, and is firmly secured to plate 169 by means of screw 176. At its lower end plate 175 and preferably, also, plate 169, has a portion of its bottom edge cut away to provide a contact shoulder 177, and beyond the same a cam surface 178. Surrounding the rock-shaft 160 is a coil spring 179, having one free end engaging against the side of the bar 168 and another bearing upward against the under side of circular support 46. This spring normally holds each contact member in the inclined position shown, as to a number of them, in Fig. 2.

For holding the sole against turning as it is being marked by one or another of the dies, I mount on the outer side of each die holder 164 a pointed pin 180, which is shown to be adjustably mounted in small brackets 181, and the height of which pin is regulated to pierce the sole at a point removed some distance from the point of contact of the dies with the sole. Each of the dies 166 has on its lower end a suitable number, indicated in Fig. 11 by the numeral 182, in the present case these numbers running in irons and half-irons from 6 to 12, inclusive.

Some manufacturers do not like to have the soles they use marked, or branded with their grade in irons. Where this is the case, the dies 166 can be removed from their holders and dies substituted therefor either having no number thereon, or else having some secret grade mark of the manufacturer in place of a number.

In like manner, if objection should exist to piercing the sole with the pin 180, any other suitable implement for engaging, but not piercing, the sole, could be substituted for the pin.

When a sole has passed completely under the grading roller 32 and 33, it is discharged there-

from and ultimately falls flatwise on one of the four tables 9 secured on the periphery of the revolving platform 5 heretofore described. To accomplish this operation, I secure in a thickened rim portion 183 of said platform a bar 184, by means of a set screw 185 (Figs. 2 and 3) and mount on this bar a relatively wide curved chute 186 (Figs. 1, 2, 3, and 8). This chute, as shown more particularly in Figs. 2 and 8, is provided on its underside near its opposite ends with two clamp bearings 187 receiving bar 184, the tension of the bearings on the bar being regulated by set screws 188. These clamp bearings enable the chute to be turned on the bar to the proper adjusted position to cause the lower end of the chute to occupy the proper position relative to the tables 9 to cause a sole discharged from the grading rollers to slide down the chute and be deposited flatwise on a table 9 as it passes under and beyond the lower end of the chute.

To limit the outward movement of the soles discharged from the grading rollers I slidably mount on the upper edge 186 a stop member 189 (Fig. 1) which may be secured in adjusted positions on the chute by means of a binding screw 190 (Figs. 2 and 3), according to the length of the soles being graded. The stop member 189 is in the form of a curved strip positioned edgewise and extending from the upper edge to near the bottom of chute 186.

After a sole on one of the tables 9 has moved under and been engaged by one of the contact members 158, it is adapted to be discharged from the table and fall into one or the other of the containers 13 previously referred to. In order to insure of the sole being so deposited I provide a series of inclined guides 191 which as shown more clearly in Figs. 1, 2, and 8 are in the form of parallel separated plates secured edgewise on a flat metal bar 192 to which the upper ends of each strip constituting the container 13 are also secured. As indicated at 193, each of the bars 192 is provided at its inner end with an apertured bearing 194 which receives a pivot pin 195, the lower end of which is received in a socket bearing 196 formed on a casting 197, and on the upper end of which the bearing 194 is supported. The casting 197 is adjustably mounted on the circular supporting band 11, and is the member containing the set screw 12 previously referred to, by means of which each casting and its supported guide and containers may be secured in adjusted positions on said supporting band, as shown more clearly in Fig. 8. The inclined guide 191 at the top of each of the containers 13 is positioned to direct the sole falling from the table 9 into a succeeding container 13, relative to the direction of movement of platform 5.

It now remains to describe the means I employ for insuring the deposit of soles varying only slightly in thickness from a given number of irons, or irons and half-irons, in the proper container 13.

Referring to Figs. 2 and 3, the numeral 198 indicates my improved grade adjuster, which is in the form of a cylindrical member provided around its periphery with a series of parallel corrugations 199. This device is secured in vertical position on the upper end of a casting 200 which is adjustably secured on the circular supporting band 11 by means of a set screw 201. This grade adjuster is so positioned that in the movement of the platform 5 each conical pin 139 will engage its surface. The heights of the corrugations, or circular grooves, 199 corresponds, respectively, to

the various heights to which the grading pins 122 may be adjusted within the range of the machine, as measured in irons and half-irons. It frequently happens, however, that the thinnest portion of a sole graded will vary, to a slight extent, from an exact measurement in irons and half-irons, resulting in setting a grading pin 122 at such height, either slightly above or below a corresponding thickness in irons, or irons and half-irons, that the grading pin will either fail to operate the proper contact member 158 by passing under the contact shoulder 177 of plate 175, or else it will be set just high enough to actuate one of the contact members in advance of the one it should actuate. For example, suppose a sole should grade a fraction of an iron less than 7 irons, but nearer 7 irons than $6\frac{1}{2}$ irons; in such case, the grading pin 122, adjusted in height by the grading, might just miss actuating the contact member 158 which would cause the sole to be discharged into the container 13 for 7-iron soles, where it belongs, and actuate the contact member for causing the sole to be discharged into the container for $6\frac{1}{2}$ iron soles. On the other hand, a sole might grade a fraction of an iron greater than 7 irons, but nearer 7 irons than $7\frac{1}{2}$ irons, and cause the grading pin 122, adjusted thereby, to actuate the contact member for discharging the sole into the container for $7\frac{1}{2}$ iron soles, instead of into the container for 7-iron soles. And of course, in either case, the sole would be improperly marked as to its true grade. The unit of measurement known as an iron is considerably less than $\frac{1}{2}$ of an inch in length, and it will be readily seen that very slight variations in width would cause a sole to fall into an intermediate grade on one side or the other of a definite thickness in irons, or irons and half-irons, such as is required to secure correct grading of the sole.

This obstacle to correct grading is overcome by my improved grade adjuster, the circular grooves 199 in which are arranged at distances apart corresponding to half iron movements of the grading pins. Thus, if a sole should, at its thinnest portion, grade 6 irons, the conical pin 139 would strike in a corresponding groove. If the sole should grade $6\frac{1}{2}$ irons, the conical pin would enter the groove 199 immediately above that corresponding to the 6-iron adjustment of the grading pin. The conical pin 139 has a pointed end and cannot ride on the lands between the grooves, hence if the sole should grade slightly more or less than a definite measure in irons as indicated above, the point of the pin will engage the side wall of one or the other of the appropriate grooves 199 and cause the pin to slide down into the groove, thereby raising the grading pin 122, by causing the stub-shaft 134 to be raised, or permitting the grading pin to fall by causing said stub-shaft to be lowered, in either case the movement of the grading pin thus caused corresponding to the variation in the thickness of the sole from a definite measurement in irons or half-irons. Each shoulder 177 is in the same plane as the lower end of the contact member 158, which is actuated thereby, and these shoulders, like the contact members, successively decrease in height by half-iron intervals, in the present instance from a height corresponding to 12 irons to a height corresponding to 6 irons.

In the operation of the machine a pile of soles of uniform length and width being placed on the supports 52, in the position shown by dotted lines in Fig. 1, where they are held from lateral displacement by vertical supports 202 adjustably

mounted on the guide bars 51 (Fig. 2), and power being applied to rotate the drive shaft 20, the feed chain 35 will be driven in the direction indicated by the arrows and the platform 5 revolved about the bearing shaft 3. In the movement of the feed chain, one or the other of the lugs 36, 37 (the lug 36 as shown in Fig. 3) will engage the rear edge of the bottom sole of the pile, and move it forward under bar 68 until its forward edge engages in the crotch between the grading rollers 32, 33 and the friction rollers 29 and 30, when the continued movement of the sole will force the grading rollers to rise, thereby raising the outer ends of arms 91, 92 which compress the coil springs 99 and cause the grading bar 96 with its grading head 108 to be raised. In this movement the outer end of bar 84, carrying the grading rollers and arms will be raised by reason of the pivotal mounting of yoke member 82 in which the inner end of said bar is secured, on the cross bar 80. The adjustment of the movements of the feed chain 35 and rotating platform 5 is such that just prior to the entrance of a sole 34 beneath the grading rollers, as shown in Fig. 3, a grading pin 122 will pass under the roller 141 and be lowered thereby so that its upper end may pass under the grading head 108. Coincident with the passage of the grading pin under roller 141, the roller 137 carried by the rocking lever 127 will pass over the upper edge of the contact lever 146 and as the upper end of the grading pin moves under the grading head, the roller 137 will pass over the upwardly-curved portion at the outer end of contact lever 146, raising the lower end of the rocking lever 127 and through the medium of stub-shaft 134 raising the grading pin to cause its upper end to engage the under side of grading head 108. The movements under consideration are clearly illustrated in Figs. 2, 5 and 3 in the order named. In Fig. 2, a grading pin 122 is shown as it is about to pass under the roller 141, to be lowered; Fig. 5 shows the upper end of the grading pin about to pass beyond roller 141 and under the grading head and the roller 137 about to pass over the upwardly-curved portion at the outer end of contact lever 146; and Fig. 3 shows the grading pin in position under the grading head, in which latter position of the parts the grading of the sole will begin.

When the end of the sole 34 passes beneath the grading rollers, or shortly thereafter, if the sole should be of uniform thickness at each side, both of the yokes 93 and 94 (Fig. 10), will remain in contact with the under sides of the arms 91, 92, under the pressure of the springs 99. If, however, one side of the sole should be thicker than the other, the grading roller at that side will be raised to carry its arm out of contact with the bottom of its yoke. This is shown with respect to the grading roller 32 and arm 91 in Fig. 4. As the sole continues its movement under the grading rollers, if a thinner portion of the sole, within the line of grading, as heretofore explained, should pass under grading roller 33, said grading roller will fall to a lower position by gravity, such movement being reinforced by the power of spring 99 bearing on its arm 92, and the weight of grading bar 96 is such as to cause it to fall a corresponding distance, forcing the slide rod 109 downward, through its lower bearing 107 acting on spring 157, which in turn bears against the fixed collar 156 on said slide rod, thereby lowering the grading head 108 a distance corresponding to the distance grading roller 33 lowers (Fig. 6). It should be explained that the spring 157

is a very strong spring, and its sole function is to maintain the upper guide bearing 105 in contact with the under side of setting disk 112, and the upper side of the latter in contact with the adjustable head 119. So far as the lower guide bearing 107 and the fixed collar 156 are concerned, the spring acts in all respects as a rigid connection between these parts.

As the grading head lowers, it lowers the grading pin 122 which is moving beneath, but in contact with, its bottom, and this movement may occur several times, depending upon the variations in the thickness of the sole. The grading pin will always remain in the lowest position to which it is adjusted by the grading head by reason of the fact that the rocking lever 127, which is rocked by the downward movement of the pin, due to the engagement of the lower end of the pin with the stub-shaft 134 carried by said rocking lever, is maintained in its adjusted position by reason of the engagement of the conical friction member 130 with the conical recess in said rocking lever under the power of the leaf spring 133. Should a thicker portion of a sole passing under the grading rollers succeed a thinner portion, the grading head 108 would simply be raised and the pin 122 would remain in the position to which it had been lowered. In other words, the grading pins 122 are only adjusted to lower positions in the grading operation. They are never raised during the grading of a sole.

In the continued movement of the platform 5, the grading pin 122 will pass beyond the grading head and continue its movement until its upper end engages one or the other of the shoulders 177 of a contact member 158. During the time the grading pin has been moving under the grading head, the sole 34 has been moving beneath the grading rollers. When discharged from between the latter and the friction rollers 29 and 30, the sole falls on the chute 186, as shown by dotted lines in Fig. 8, and is deposited on one of the four tables 9, which the adjusted rate of movement of the platform 5 causes to move beneath the lower end of the chute at the proper moment to receive it. Such table is positioned in line with the grading pin which has just passed from beneath the grading head. The grading pin and the table 9 with the sole thereon continue their movement until, as stated above, the upper end of the grading pin engages the shoulder 177 of a contact member whose height in irons corresponds to the height in irons to which the grading pin has been adjusted. As the platform continues to move, the particular contact member 158 affected will be rocked to a vertical position, as shown in Fig. 8 under the leverage of the plate 175 having the shoulder 177 engaged, causing the contact member to pivot in the bearings of the rock shaft 160, (Fig. 3). As the contact member 158 is turned downward, the lower end of die 166 and the point of pin 180 engage the sole, causing its grade to be stamped therein, if a grade mark is used, and during this operation the pin 180 prevents the sole from turning. By the time the contact member reaches the vertical position, shown in Fig. 8, the cam surface 178 on the bottom of plate 175 will engage the top of pin 122 and lower the grading pin sufficiently to enable it to pass under the shoulder 177, as shown in the detached view, Fig. 13. While the table 9 continues to move, the sole 34 will be held from movement by engagement of the die 166 and pin 180 therewith. The movement of the contact member as a whole from an inclined to a vertical

position is against the resistance of spring 179, and as soon as the rear side of the table passes beyond the plane of said die and pin, or to the position shown in Fig. 9, the said spring exerts its power to restore the contact member to its normal inclined position and at the same time impel the sole rearwardly, relative to the movement of the table, the sole then falling on the guides 191 and thence into the appropriate container 13, as indicated by dotted lines in Fig. 8.

The above operations, described with reference to the actuation of a single grading pin, applies to the operations of all of the grading pins, which are successively adjusted to heights corresponding to the thickness at the thinnest portion of the soles being graded, with the result that all of the soles are automatically graded, grade-marked, and discharged into the appropriate container 13, the soles grading 6 irons being discharged into the container for 6-iron soles, soles grading 7 irons into the container for 7-iron soles, and so on throughout the range of the machine, which, as stated, in the present case is adjusted to grade from 6 irons to 12 irons inclusive, at half-iron intervals.

Referring to Figs. 4, 6, and 7, it can now be explained how the length of the grading can be adjusted by turning the grading head 108. As shown by Fig. 7, the outer surface 203 of the grading head is in the form of a spiral. Assuming the path of a grading pin 122 over its bottom follows the path indicated by the curved dotted line 204, which would represent the maximum length of grading, it will be seen that if the locking lever 116 is moved out of engagement with the setting-disk 112 and the latter be turned in an anti-clockwise direction, the length of the grading line 204 will be shortened in proportion to the decrease in distance of the edge of the grading head from its center; that is to say, by turning the grading head in one direction or the other, the distance the grading pin moves over its bottom, starting at any given point, may be shortened, or lengthened, according to the direction in which the grading head is turned.

The operation and purpose of the adjusting head 119, as well as of the adjusting nut 103, and the manner in which the lines of grading may be changed by adjusting the yokes 93 and 94 on the grading bar, have all been fully set forth in the specification, and further reference thereto is deemed unnecessary.

I claim:

1. A sole grading machine comprising, in combination, a pair of grading rollers, means for passing soles in succession under and in contact with said rollers, a vertically-movable grading head governed in its movements by said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest edge portion of each sole passing under and engaged by them, a series of adjustable grading pins continuously movable by the machine in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means for moving each sole passing from the grading rollers in unison with and in operative relation to the grading pin adjusted thereby, and a plurality of members adapted to be selectively actuated by said grading pins, according to their respective positions, to engage the corresponding soles and cause them to be delivered at definite positions according to their grade as fixed by the adjusted positions of said grading pins, whereby

all soles of like grade passing under said grading rollers will be assembled at the same position.

2. A sole grading machine comprising, in combination, a pair of pivotally-mounted grading rollers, means for passing soles in succession under and in contact with said rollers to cause the same to raise and lower in accord with variations in the thickness of the soles along predetermined lines of grading at either side of the soles, a vertically-movable grading head governed in its movements by said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing under and engaged by them in the lines of grading, a series of adjustable grading pins continuously movable by the machine in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means for moving each sole passing from the grading rollers in operative relation to the grading pin adjusted thereby, and a plurality of pivotally-mounted contact members each of which is adapted to be selectively engaged and turned by one or another of said pins into engagement with the sole associated with such pin, such engagement being determined by the adjusted height of the pin, each contact member so engaged operating to effect a delivery of the sole with which it is turned into contact at a definite position according to its grade as established by the adjusted position of the actuating grading pin, whereby all soles of like grade passing under said grading rollers will be assembled at the same position.

3. A sole grading machine comprising, in combination, a pair of pivotally-mounted grading rollers, means for passing soles in succession under and in contact with said rollers to cause the same to raise and lower in accord with variations in the thickness of the soles along predetermined lines of grading at either side of the soles, adjustable means for determining said lines of grading, a vertically-movable grading head governed in its movements by said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing under and engaged by them in the lines of grading, a series of adjustable grading pins continuously movable by the machine in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means for moving each sole passing from the grading rollers in operative relation to the grading pin adjusted thereby, and a plurality of pivotally-mounted contact members each of which is adapted to be selectively engaged and turned by one or another of said pins into engagement with the sole associated with said pin, such engagement being determined by the adjusted height of the pin, each contact member so actuated operating to effect a delivery of the sole engaged by it at a definite position according to its grade as established by the adjusted position of the actuating grading pin, whereby all soles of like grade passing under said grading rollers will be assembled at the same position.

4. A sole grading machine comprising, in combination, a pair of pivoted grading rollers, means for passing soles in succession under and in contact with said rollers to cause the same to raise and lower in accord with variations in the thickness of the soles along predetermined lines of grading at either side of the soles, a vertically-

movable grading head governed in its movements in said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing under them in the lines of grading, a series of adjustable grading pins continuously movable by the machine in succession under and engaged by said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means for moving each sole passing from the grading rollers in operative relation to the grading pin adjusted thereby, and a series of pivotally-mounted contact members arranged in descending order relative to the movement of the pins each of which is adapted to be selectively engaged and turned by one or another of said pins into engagement with the sole associated with such pin, such engagement being determined by the adjusted height of the pin, each contact member so actuated operating to effect a delivery of the sole engaged by it at a definite position according to its grade as established by the adjusted position of the actuating grading pin, whereby all soles of like grade passing under said grading rollers will be assembled at the same position.

5. A sole grading machine comprising, in combination, sole grading members movable in response to variations in the thickness of soles passing in contact therewith, a vertically-movable grading head governed in its movements by said grading members and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing in contact with said grading members, means for passing soles in succession to said grading members, a continuously rotatable carrier adapted to receive the soles acted on by said grading members, a series of adjustable grading pins mounted in said carrier and movable thereby in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, and a plurality of members adapted to be selectively actuated by said grading pins, according to their respective positions, to engage the soles in order passing from said grading members, grade-mark the same and effect the delivery of each sole at a definite position according to its grade as established by the adjusted position of the actuating grading pin.

6. A sole grading machine comprising, in combination, sole grading members movable in response to variations in the thickness of soles passing in contact therewith, means for passing soles in succession to and past said grading members, a vertically-movable grading head governed in its movements by said grading members and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing in contact with said grading members, a continuously rotatable carrier adapted to receive the soles acted on by said grading members, a series of adjustable grading pins mounted in said carrier and movable thereby in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means located in advance of the head to cause each pin to be lowered below the plane of said head, and a plurality of members adapted to be selectively actuated by said grading pins, according to their respective positions, to engage the soles in order passing from said grading members and effect the delivery of each sole at

a definite position according to its grade as established by the adjusted position of the actuating grading pin.

7. A sole grading machine comprising, in combination, sole grading members movable in response to variations in the thickness of soles passing in contact therewith, means for passing soles in succession to and past said grading members, a vertically-movable grading head governed in its movements by said grading members and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing in contact with said grading members, a continuously rotatable carrier adapted to receive the soles acted on by said grading members, a series of adjustable grading pins mounted in said carrier and movable thereby in succession under said grading head and adapted to be lowered thereby to various positions in accord with the adjusted positions of said head, a friction device supporting each pin and operating to maintain the same in any position to which it may be lowered by the grading head, means located in advance of the grading head to cause each pin to be lowered below the plane of said head, means for raising each pin into contact with the under side of the grading head as it passes under the latter, and a plurality of members adapted to be selectively actuated by said grading pins, according to their respective positions, to engage the soles in order passing from said grading members and effect the delivery of each sole at a definite position according to its grade as established by the adjusted position of the actuating grading pin.

8. A sole grading machine comprising, in combination, sole grading members movable in response to variations in the thickness of soles passing in contact therewith, means for passing soles in succession to and past said grading members, a vertically-movable grading head governed in its movements by said grading members and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing in contact with said grading members, a series of adjustable grading pins continuously movable by the machine in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means for moving each sole passing from the grading members in operative relation to the grading pin adjusted thereby, a series of pivotally-mounted contact members arranged at half-iron intervals in descending order relative to the direction of movement of the pins, each of which is adapted to be selectively engaged and turned by one or the other of said pins into engagement with the sole associated with such pin, such engagement being determined by the adjusted height of the pin, each contact member so actuated operating to effect a delivery of the sole engaged by it at a definite position according to its grade as established by the adjusted position of the actuating grading pin, and independent means for adjusting the height of said grading head.

9. A sole grading machine comprising, in combination, sole grading members movable in response to variations in the thickness of soles passing in contact therewith, means for passing soles in succession to and past said grading members, a vertically-movable grading head governed in its movements by said grading members and

adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing in contact with said grading members, a series of adjustable grading pins continuously movable by the machine in succession under said grading head and adapted to be adjusted thereby to various heights in accord with the adjusted positions of said head, means for moving each sole passing from the grading members in operative relation to the grading pin adjusted thereby, a series of pivotally-mounted contact members arranged at half-iron intervals in descending order relative to the direction of movement of the grading pins, each of which is adapted to be selectively engaged and turned by one or the other of said pins into engagement with the sole associated with such pin, such engagement being determined by the adjusted height of the pin, each contact member so operated effecting a delivery of the sole engaged by it at a definite position according to its grade as established by the adjusted position of the actuating grading pin, and automatic means operable after each pin has moved past the grading head to adjust its height to correspond to an exact measurement in whole or half-irons in the event the grade of the sole which caused the pin to be adjusted was such as to cause the pin to be moved to a height varying from correspondence with such grade measurements.

10. In a machine for grading soles, grading mechanism for detecting the thinnest portion of a sole at either side, means for passing soles in succession through said grading mechanism, a rotary carrier, a series of grading pins adjustably mounted in said carrier and each of which is adapted to be adjusted to a given height corresponding to the thinnest portion of a sole detected by the grading mechanism, said carrier being adapted to receive each sole passing from the grading mechanism at a position operatively related to the grading pin whose height has been adjusted by the sole, a series of pivoted sole-engaging members, and contact devices carried thereby and arranged in a decreasing order of height relative to the direction of movement of said carrier and adapted to be selectively actuated by each grading pin having a corresponding height to turn the sole-engaging member into contact with the sole associated with the grading pin and effect delivery thereof at a definite position determined by the grade of the sole, each of said contact devices having a cam surface adapted to engage and lower the pin actuating it to prevent contact of such pin with other contact devices following the one actuated.

11. In a machine for grading soles, grading mechanism for detecting the thinnest portion of a sole at either side, means for passing soles in succession through said grading mechanism, a rotary carrier, a series of grading pins adjustably mounted in said carrier and each of which is adapted to be adjusted to a given height corresponding to the thinnest portion of a sole detected by the grading mechanism, said carrier being adapted to receive each sole passing from the grading mechanism at a position operatively related to the grading pin whose height has been adjusted by the sole, a series of pivoted holders each of which has at its lower end a die having a grade number, and contact devices carried by the die holders and arranged in a decreasing order of height corresponding to the run of the grade numbers on said dies and adapted to be

selectively actuated by each grading pin having a corresponding height to turn the die into engagement with the sole associated with the grading pin and cause the grade of the sole to be marked thereon.

12. A sole grading machine comprising, in combination, a plurality of means for grading soles according to their thinnest edge portion and for delivering the graded soles at fixed points determined, respectively, by their grade as measured in irons and half-irons, said means including a movable series of actuating members for effecting such delivery, each of which is adapted to be set in accordance with the grade of a sole being graded to a given adjusted position corresponding to the grade of the sole and such position determining the point at which the actuating member shall effect delivery of such sole, and means for automatically adjusting each actuating member after a grading operation to a position corresponding to a definite measurement in irons or half-irons, in the event that its position as fixed by a sole in the grading operation should be intermediate an interval of measurement.

13. A sole grading machine comprising, in combination, a plurality of means for grading soles according to their thinnest edge portion and for delivering the graded soles at fixed points determined, respectively, by their grade as measured in irons and half-irons, said means including a movable series of grading pins for effecting such delivery, each of which is adapted to be set in accordance with the grade of a sole being graded to a given adjusted position corresponding to the grade of the sole and such position determining the point at which the grading pin shall effect delivery of such sole, a series of adjustable rocking levers each of which supports a grading pin, a conical pin carried by each rocking lever, and a vertical cylinder provided with peripheral, parallel grooves arranged at distances from each other corresponding to half-iron intervals, each conical pin in its movement with the grading pin being adapted to engage the surface of said cylinder and be directed into one or the other of said grooves thereby rocking said lever in one direction or the other and adjusting the grading pin to a position corresponding to a definite measurement in irons or half-irons in the event that its position as fixed by a sole in the grading operation should be intermediate an interval of measurement.

14. A grading machine comprising, in combination, a plurality of means for grading soles according to their thinnest edge portion and for delivering the graded soles at fixed points determined, respectively, by their grade as measured in irons and half-irons, said means including a rotary carrier having a series of grading pins mounted therein for free vertical movement and operating to effect such delivery, each of said pins being adapted to be set in accordance with the grade of a sole being graded to a given adjusted position, the grading pin shall effect delivery of such sole, and such position determining the point at which the grading pin shall effect delivery of such sole, a series of pivoted friction members mounted on said carrier each of which supports a grading pin and is adapted to maintain the same in any position to which it may be adjusted, a roller carried by each friction member, and a spring-controlled contact lever mounted in the path of said roller and adapted, when the roller passes over the same, to raise the corresponding grading pin to grading position.

15. A sole grading machine comprising, in combination, a pair of vertically-movable grading rollers, means for passing soles in succession under and in contact with said rollers to cause the same to raise and lower in accord with variations in the thickness of the soles, a vertically-movable grading head governed in its movements by said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing under and engaged by them, a rotatable carrier, a series of tables secured at intervals about its periphery, a series of adjustable grading pins mounted in said carrier in operative relation, respectively, to said tables and movable by the carrier in succession under said grading head to be adjusted thereby to various heights in accord with the adjusted positions of said head, and a series of pivoted, spring-controlled contact members adapted to be selectively engaged by said grading pins according to their positions and turned into engagement with the soles in order passing from said grading rollers, each of said soles being deposited upon a table and held thereon by engagement therewith of the corresponding contact member until the table moves from under it and being then impelled rearwardly by the reaction of the spring of said contact member, and a series of containers respectively positioned to receive the soles discharged from said tables.

16. A sole grading machine comprising, in combination, a pair of vertically-movable grading rollers, means for passing soles in succession under and in contact with said rollers to cause the same to raise and lower in accord with variations in the thickness of the soles, a vertically-movable grading head governed in its movements by said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing under and engaged by them, a rotatable carrier, a series of tables secured at intervals about its periphery, a chute for receiving the soles from the grading rollers and delivering each sole in turn flatwise on one of said tables, a series of adjustable grading pins mounted in said carrier in operative relation, respectively, to said tables and movable by the carrier in succession under said grading head to be adjusted thereby to various heights in accord with the adjusted positions of said head, and a series of pivoted, spring-controlled contact members adapted to be selectively engaged by said grading pins according to their positions and turned into engagement with the sole on a corresponding table against the resistance of its spring and operating to hold said sole stationary while the table moves from under it and then by the reaction of its spring to impel the sole rearwardly, and a series of containers positioned, respectively, under each contact member for receiving the soles delivered thereby.

17. A sole grading machine comprising, in combination, vertically movable sole grading mechanism movable in response to variations in the thickness of soles moved under the same, means for passing soles in succession under said grading mechanism, a vertically-movable grading head governed in its movements by said grading mechanism and adapted to be lowered to successive adjusted positions in accordance with the thinnest portion of each sole passing under the grading mechanism, a rotatable carrier, a series of tables secured at intervals about its periphery, means for delivering each sole passing from the grading mechanism flatwise on one of said

tables, a series of adjustable grading pins mounted in said carrier in operative relation, respectively, to said tables and movable by the carrier in succession under said grading head to be adjusted thereby to various heights in accord with the adjusted positions of said head, a series of pivoted, spring-controlled members each of which carries at its lower end a die, a contact arm on each of said members adapted to be selectively engaged by said grading pins according to their heights to turn the die on its member into engagement with the sole on a corresponding table against the resistance of its spring and operating to hold said sole stationary while the table moves from under it and then by the reaction of its spring to impel the sole rearwardly, a container located under each of said members for receiving the sole delivered thereby, and a sole-engaging device mounted on each of said members at a distance from its die and to be turned into engagement with the sole simultaneously with the die to prevent the sole from turning during the time the die is engaging the same.

18. In a sole grading machine, sole grading mechanism including a vertically-movable grading head of uniformly varying diameter adapted to be moved to adjusted positions in response to variations in the thickness of soles acted on, a series of delivery devices for the graded soles, a series of adjustable grading pins movable by the machine in succession under and in contact with said grading head to be adjusted thereby to various heights in accord with the adjusted positions of said head and adapted, according to their adjustment, to selectively actuate said delivery devices to cause soles of like grade to be delivered at the same point, and means for turning said head to adjusted positions to vary the distance said grading pins will move in contact with said grading head.

19. In a machine for grading soles, grading mechanism for determining the thinnest part of the edge portions of each sole, a continuously rotating carrier for receiving and sorting the graded soles, said carrier having a series of tripping means each of which is automatically set by the grading mechanism to correspond with the grading of the particular sole being operated on, and a plurality of members adapted to be selectively actuated by said tripping means, according to their respective positions, to effect the delivery of each sole at a definite position according to its grade as established by the adjusted setting of the tripping means.

20. A sole grading machine comprising, in combination, a plurality of means for grading soles according to their thinnest edge portion and for delivering the graded soles at fixed points determined, respectively, by their grade, said means including a carrier adapted to be continuously rotated having a series of grading pins mounted therein for free vertical movement and operating to effect such delivery, each of said pins being adapted to be set in accordance with the grade of a sole being graded to a given adjusted position corresponding to the grade of the sole and such position determining the point at which the grading pin shall effect delivery of such sole, and means, adjustable in position, operating automatically in the movement of said carrier to raise each pin in turn to grading position prior to the beginning of the grading operation.

21. A sole grading machine comprising, in combination, a pair of grading rollers, means for passing soles in succession under and in contact with said rollers, a grading member adapted to be positioned by the grading rollers in accordance with the thinnest edge portion of each sole passing under and engaged by said rollers, assembling means, a continuously rotatable member, and adjustable means carried by said rotatable member into cooperative relation with said grading member to be adjusted thereby, and then with said assembling means, to actuate the same, whereby, to cause the soles passing under and from the grading rollers to said rotatable member to be assembled in definite positions determined, respectively, by the various adjusted positions of said grading member.

22. A sole grading machine comprising, in combination, a pair of grading rollers, means for passing soles in succession under and in contact with said rollers, a vertically-movable grading head governed in its movements by said grading rollers and adapted to be lowered to successive adjusted positions in accordance with the thinnest edge portion of each sole passing under and engaged by said rollers, assembling means, a continuously rotatable member, and a plurality of vertically adjustable means carried by said rotatable member under and into cooperative relation with said grading head and said assembling means, successively, to cause the soles passing under and from the grading rollers to said rotatable member to be assembled in definite positions determined, respectively, by the various adjusted positions of said grading head.

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