E. A. STIGGINS.

GRADING MACHINE.

APPLICATION FILED JUNE 14, 1910.

1,163,115.

Patented Dec. 7, 1915.

4 SHEETS—SHEET 1.

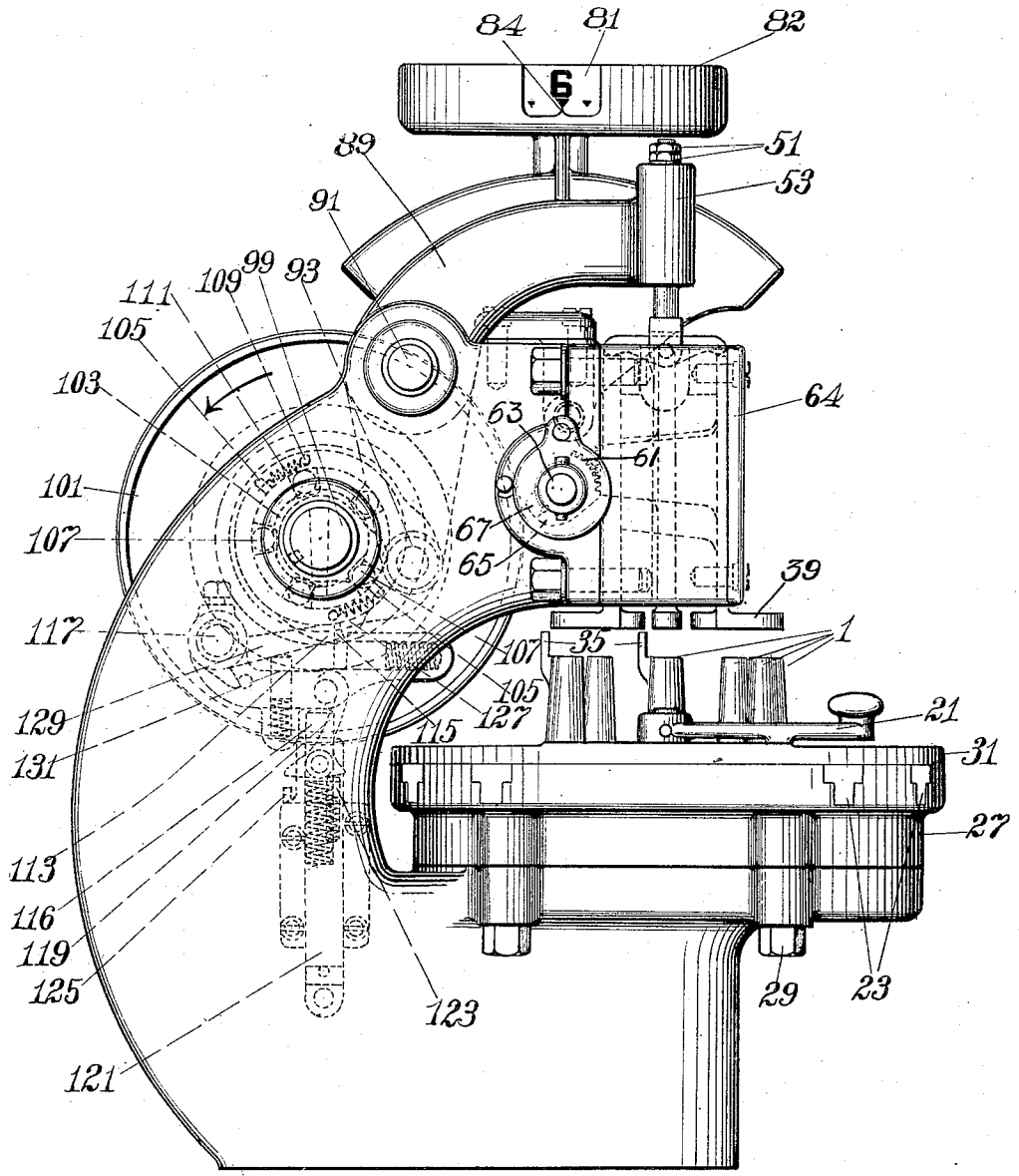


Fig. 1.

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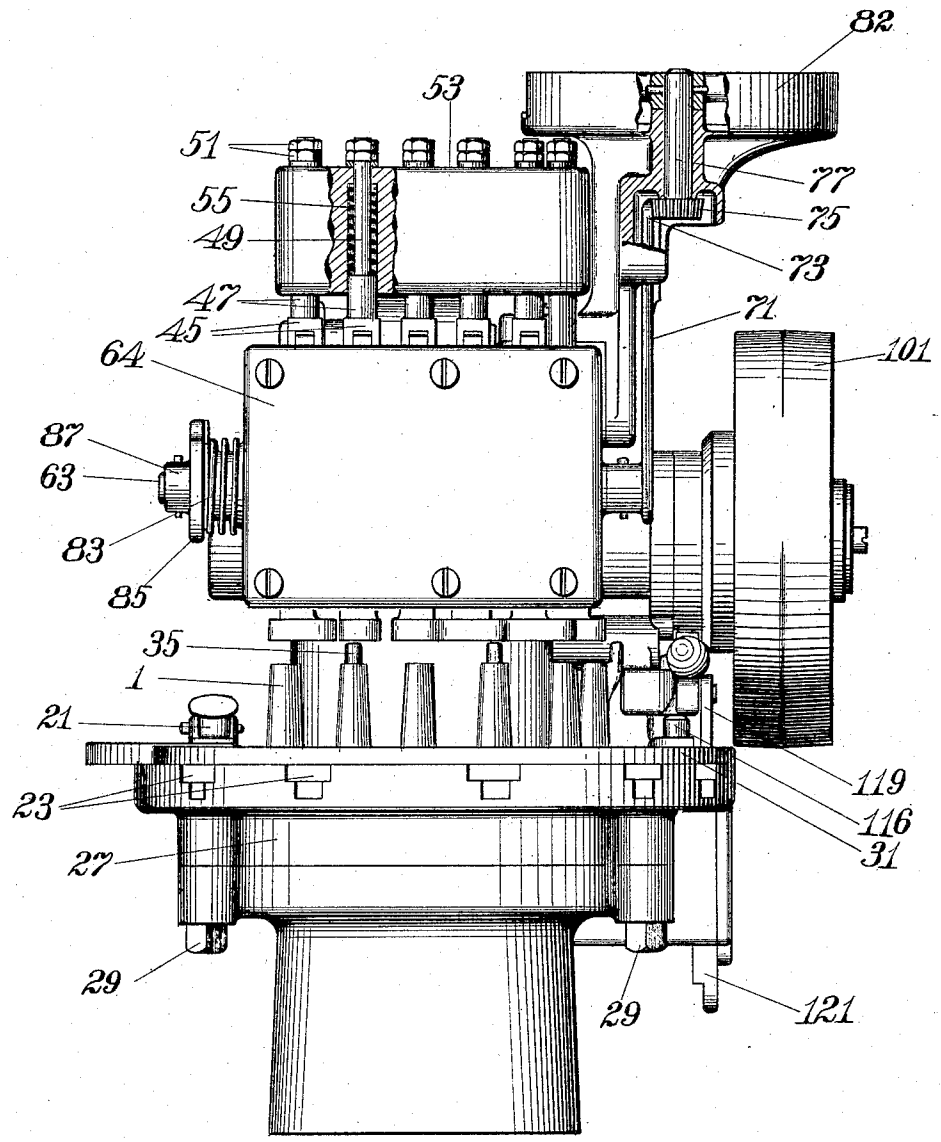


Fig. 2.

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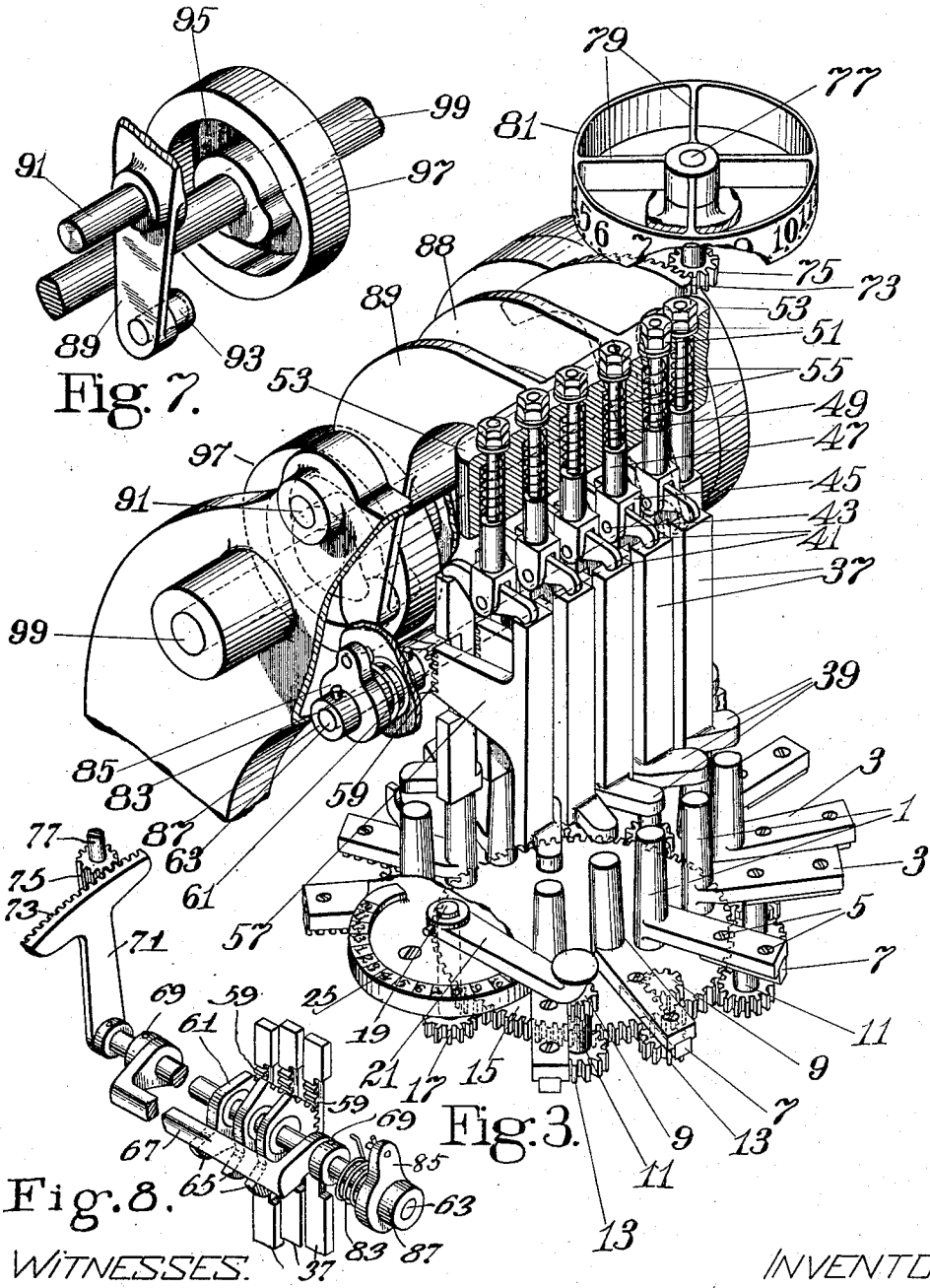


Fig. 7.

Fig. 3.

Fig. 8.

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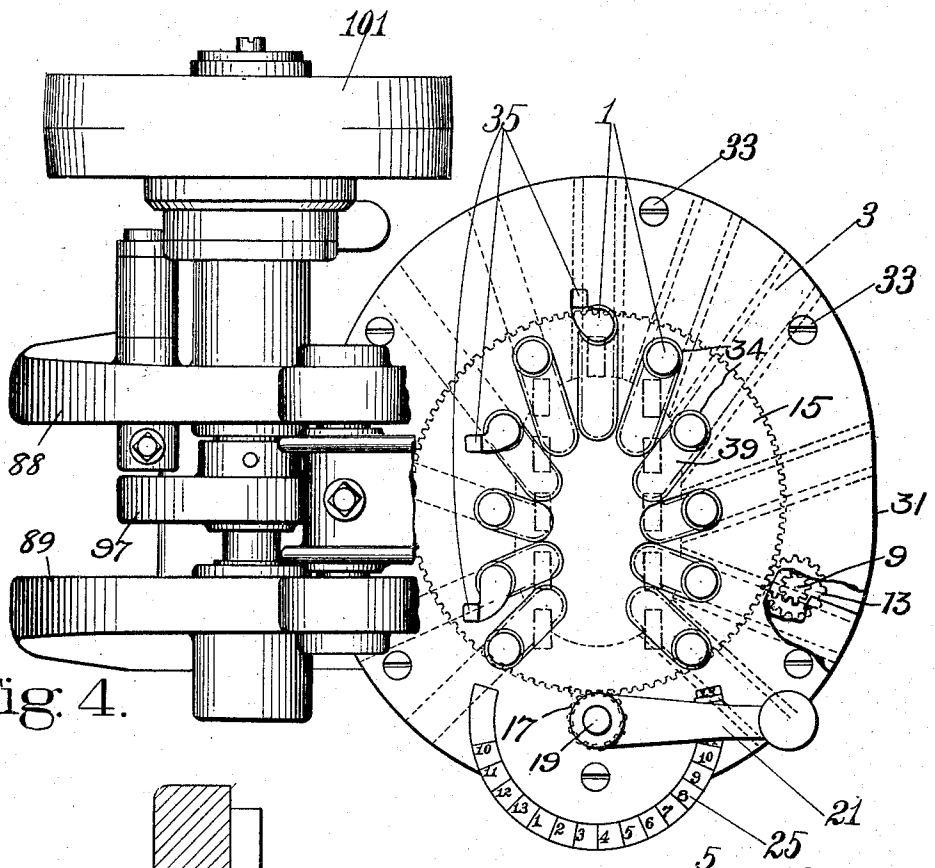


Fig. 4.

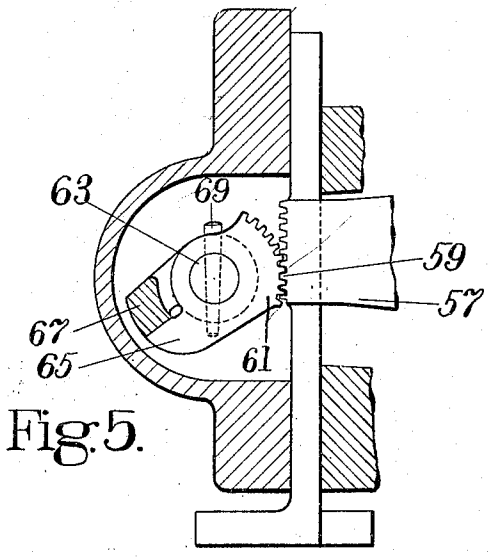


Fig. 5.

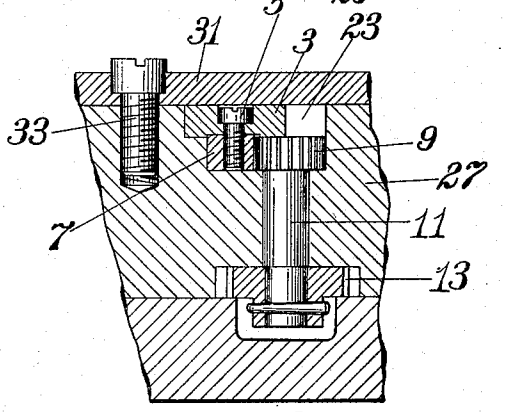


Fig. 6.

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UNITED STATES PATENT OFFICE.

EDWARD A. STIGGINS, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

GRADING-MACHINE.

1,163,115. Specification of Letters Patent. Patented Dec. 7, 1915.

Application filed June 14, 1910. Serial No. 566,765.

To all whom it may concern:

Be it known that I, EDWARD A. STIGGINS, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Grading-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to machines for detecting the thinnest spot in a predetermined extent of a piece of stock, and is herein set forth in connection with a machine for detecting the thinnest spot in a predetermined extent of a sole.

In the manufacture of shoes it is usual to cut the soles from a hide by means of a die; and, inasmuch as the thickness of a hide varies in different portions, the individual soles cut therefrom are frequently not of the same thickness throughout their extent. It is, therefore, customary to even the soles before incorporating them into shoes; and in order that material may not be wasted it is desirable to determine the thinnest portion in a given extent of a sole and then to remove sufficient material from the sole to make it of a uniform thickness equal to the thickness of the said thinnest portion.

Accordingly, one object of the present invention consists in the provision of means for engaging a piece of stock approximately simultaneously in several places and means for setting a governing member in accordance with the thickness of said piece of stock at the thinnest place engaged. This governing member may operate an indicator, if desired, and in the illustrative machine there is provided a support and a plurality of detectors between which the piece of stock is gripped, the shortest distance between the support and the operative face of that detector which is nearest to it being visibly indicated on a scale so that the operator may thereafter cause the piece of stock to be evened or sorted or otherwise operated upon or manipulated in accordance with the result determined by the machine. Preferably the detectors are spring-pressed, and the gripping movement is controlled by a treadle which may act through any suitable mechanism. It may be that the thickness of the finished piece of stock in certain localities is immaterial within the limits ordinarily encountered and that the desirable thing is to detect the thickness of the thinnest portion in a selected extent. For example, in the manufacture of shoes the thickness of the greater portion of the sole is ordinarily immaterial, and the sole may be evened in accordance with the thickness of the thinnest portion in the margin of the forward part.

Accordingly another object of this invention consists in the provision in a machine of the class described of a support comprising a plurality of fingers so arranged that a line connecting similarly located points in the several fingers will form a curve corresponding with the outline of a given portion of the piece of stock to be measured; and preferably means are provided for adjusting said fingers in such a manner that a line connecting similarly located points in one position will form a curve which is similar to that formed by lines connecting the same points when the fingers are in any other adjusted position. In the illustrative machine the fingers are arranged in a curve which corresponds with the outline of the forward part of a sole, and the adjusting means permits the fingers to be arranged to receive soles of different sizes.

These and other objects of the invention including certain details of construction and combinations of parts will be described in connection with the accompanying drawings and pointed out in the appended claims.

Referring now to the accompanying drawings, Figure 1 is a front elevation of a machine embodying the present invention; Fig. 2 is a side elevation; Fig. 3 is a perspective with certain parts removed so as to show the details of the thickness-detecting mechanism; Fig. 4 is a plan view of a portion of the machine, the position which the detectors would occupy being indicated by dot-and-dash lines; Fig. 5 is a detail sectional view showing one of the loose segment gears and its connections with the operating bar and with the rack on the corresponding detector; Fig. 6 is a detail sectional view of the gearing for adjusting the fingers; Fig. 7 is a detail perspective showing the cam which moves the cross-head, and Fig. 8 is a detail perspective showing three of the

inner row of detectors together with the mechanism whereby the position of the shaft 63 is determined by the position of that detector which has been moved farthest. In order to promote clearness none of the outer row of detectors is shown.

In the illustrative machine, which is designed for use with soles, the supporting fingers 1 are so arranged that a line drawn through the uppermost central point in each finger will form a curve which corresponds with the outline of the forward part of a sole, as best shown in Fig. 4. In order to provide adjustment for these fingers to position them for use with soles of different sizes, each finger is formed with an extension 3 (see Fig. 3) to which there is fastened by screws 5 a rack 7. Each rack meshes with a pinion 9 fast to an upright shaft 11 to the lower end of which is fastened a second pinion 13. The pinions 13 mesh with a master gear 15 which is actuated by a pinion 17 carried by an upright shaft 19, to the upper end of which is pinned a handle 21. The extensions 3 are arranged in guideways 23 (see Figs. 1, 2 and 6), and the handle 21 may be moved over a scale 25 the numerals on which indicate the sizes of the soles which the fingers may be adjusted to support. The shafts 11 and 19 have bearings in a member 27 of circular outline which is held in place by screw bolts 29. The guideways 23 for the extensions 3 are formed in this member 27; and a plate 31, fastened to the member 27 by screws 33 and provided with slots 34 (see Fig. 4) to receive the fingers 1, serves to hold the parts in place. The scale 25 is graduated and the guideways 23 arranged in such a manner that when the handle 21 is in a given position with respect to any numeral, the fingers 1 will be positioned in a curve which corresponds with that of the forepart of a sole of the size indicated by said numeral. Thus with the handle in the position shown, the machine is set to receive a number 11 sole. In order to facilitate the placing of a sole in position, upwardly projecting stops 35 are provided. The fingers are arranged with their supporting faces in a common plane and collectively form a support for a predetermined extent of the sole.

Arranged to coöperate with each finger is a detector 37 having a foot 39 elongated in the direction of the extension 3 of the corresponding finger 1 so that some portion of the foot of each detector is always opposite the corresponding finger in whatever position the fingers may stand. It should be understood, however, that these elongated feet are provided merely for use with soles of different sizes and that the surfaces of said feet may, if desired, be made of an extent equal to or less than that of the surfaces of the corresponding supporting fingers. It is necessary that the detectors and the supporting fingers be caused to approach each other, and in the illustrative machine provision is made for moving the detectors. The detectors are shown as bars and for convenience are arranged in pairs except for the odd one which engages the tip of the sole. Eleven detectors are shown, but it should be understood that any convenient number may be used, that they may be arranged in any desired manner, and that relative motion between the support and the detectors may be imparted in any suitable manner. The tops of each pair of detectors are engaged by a rocker arm 41 pivoted at 43 to a yoke 45. The stem 47 of each yoke, as well as that of the odd detector, is provided with a reduced portion 49 and carries set nuts 51 for adjustably limiting the normal position of the detectors. These stems pass through counter-bored holes in an actuator, herein shown as a cross-head 53; and surrounding each stem is a coiled spring 55 which engages with one end the base of the counter-bore and with the other the shoulder on the stem, said springs being of sufficient strength to flatten out a warped or otherwise distorted sole before being compressed. With the construction thus far described it is clear that when the detectors are brought down upon a sole, first the sole will be flattened out and then the detectors will be moved a distance inversely proportional to the thickness of the sole at the portion engaged, that is, the detector which engages the thinnest portion will be moved farthest. The extent of movement of that detector which engages the thinnest portion of the sole will differ from that of the remaining detectors, and this difference in extent of movement is made use of to register or indicate the thickness of the thinnest portion engaged.

Each detector in the outer or right-hand row (see Fig. 3) as well as the single detector at the end of the series is provided with an extension 57 on which is a rack 59 which meshes with a segment gear 61 while each detector in the inner row has the rack 59 formed directly on its stem (see Fig. 8 wherein three detectors of the inner row are shown). These segment gears are arranged side by side and loosely mounted on a shaft 63. Referring now more particularly to Figs. 5 and 8 each segment gear is provided with a toe 65 to engage a bar 67 which extends parallel with the shaft 63 and is fastened at each end to said shaft by means of pins 69. As the detectors are moved downwardly the segment gears 61 are rotated in a clockwise direction as viewed in Fig. 5, and the toes 65 lift the bar 67 and move the shaft 63 angularly. If the sole which is being measured is of uniform thickness, the toes 65 will all be in engagement with the bar 67 at the end of the move-

ment of the detectors. If, however, one portion which is engaged is thinner than the remaining portions, that detector which engages it will be moved farther than the other detectors, its corresponding segment gear 61 will consequently be rotated farther and will lift the bar 67 from off the toes 65 of the other segment gears. This position of the parts is illustrated in Fig. 8 wherein three detectors are shown. In the illustration the left-hand detecor 37 has been moved downwardly farther than either of the other two, and the toe 65 of its corresponding segment gear 61 has lifted the bar 67 out of engagement with the toes of the other two segment gears. The angular position of the shaft 63 will therefore be determined by the position of this one detector, and this shaft may serve as a governor to control the adjustment of certain other parts of the machine. In the illustrative machine this governor controls an indicating mechanism. As best shown in Figs. 1 and 2 the detectors are inclosed in a casing provided with a removable side plate 64.

Referring now more particularly to Figs. 2 and 3, an arm 71 is fast to the shaft 63 and carries at its upper end a segmental rack 73 which meshes with a pinion 75. This pinion is fast to an upright shaft 77 which carries at its upper end a spider having arms 79; and these arms support a cylindrical scale or indicator 81 upon the outer face of which are a series of numerals to indicate in units of any desired system the distance between the support and that detector which is nearest to it. In the illustrative machine this is always the detector which has moved farthest. In order to return the shaft 63 to its normal angular position after the thinnest portion in the given area of the stock has been determined, a coiled spring 83 Fig. 8 is fastened at one end to the frame of the machine and at the other to the flange 85 of a collar 87 which is pinned to the shaft 63. The scale 81 is surrounded by a shield 82 which is provided with a cut-away portion in its front wall, as shown in Fig. 1, to expose the numeral which indicates the desired measurement. The lower wall of the cut-away portion of the shield is provided with a small pointed finger 84 to aid the operator in reading the measurement.

The cross-head 53 which serves as an actuator for the detectors is carried by levers 88 and 89 which are mounted upon a shaft 91 having bearings in the frame of the machine. A roller 93 Fig. 7 carried by the lower end of the lever 89 is arranged to run in a camway 95 cut in a member 97 which is fast to the driving shaft 99, said shaft carrying a continuously rotating loose pulley 101 which is arranged to be connected with said shaft at will in a manner presently to be described. It is desirable that the numeral which indicates the thickness of the thinnest portion of the given area be held in view for an appreciable time so that the operator may have time to note it. The camway is accordingly designed with this end in view. For approximately 240 degrees the walls of the camway are concentric with the axis of the shaft 99. For the remaining 120 degrees the walls describe comparatively abrupt curves which extend farther from said shaft. The result is that when the shaft 99 is revolved the cross-head 53 is brought quickly to its lowest position, held there while the shaft revolves approximately 240 degrees and then quickly raised. It should be noted, however, that there would be a certain pause in the movement of the detectors even if the camway were of a more uniform curvature, this pause taking place during the compression of the springs 55.

The shaft 99 and with it the cam member 97 is actuated from a continuously rotating pulley 101 through a one-revolution clutch of the Horton type. The specific features of the clutch will not be described in detail, since they form no part of the present invention. It should be understood, however, that depression of a treadle, not shown, which is attached to the sliding member 121 causes the shaft 99 to make one revolution and then to come to rest.

The operation of the machine is as follows:—The operator stands in front of the machine, places a sole upon the supporting fingers 1 with its edge in contact with the stops 35 and depresses the treadle. This throws in the one revolution clutch, as indicated above, and causes the actuator 53 to move downwardly. The scale is graduated in irons and half-irons, (an iron being approximately 1/48 of an inch) and the machine is adapted to measure thicknesses ranging from one to eighteen irons, this range being ample, since the usual thickness of a sole is more than six and less than twelve irons. As is apparent from Fig. 1 the numeral 6 is normally exposed while the distance from any given detector to its corresponding supporting finger is much more than six irons, being in fact twenty-four irons. This arrangement is to facilitate the placing of a sole upon the supporting fingers by providing sufficient space between said fingers and the detectors. During the movement of the cross-head or actuator 53 the scale is turned backwardly, the numerals exposed being successively of lower denomination until the numeral eighteen is reached. At this point and from this point during the remainder of the downward movement of the actuator the numeral exposed indicates in irons the distance between the support and the oper-

ative faces of the detectors, if such faces remain at all times in a common plane. Otherwise the numeral exposed depends upon the position of that detector which engages the thinnest portion of the stock. As the actuator continues its downward movement the sole is gripped between the support and the detectors. If that portion of the sole which is engaged is of uniform thickness the operative faces of the detectors are at all times in a common plane. If, however, one portion is thinner than the others, the detector which engages it will be moved farther than the others and will determine, as explained above, the numeral which is exposed to view. It should be understood that the springs 55 are of sufficient strength to flatten out a wrinkled or otherwise distorted sole before yielding. After the sole has been flattened out the continued movement of the actuator which forces downwardly those detectors which are in engagement with the thinner portions of the sole, serves merely to compress the springs of those detectors which are incapable of further movement. The movement of the parts thus far is accomplished quickly owing to the contour of the camway 95. The actuator having reached its lowest position is held there during the greater part of the revolution of the shaft 99 so that the numeral which is exposed may remain in view a sufficient time to be read easily, and is then quickly raised. At this point the clutch is automatically thrown out, the spring 83 turns the shaft 63 backwardly, and the machine comes to rest in the position shown in Fig. 1.

Although the invention has been set forth in connection with a machine in which a plurality of yielding detectors are actuated to force a sole against a support it should be understood that relative movement between the detectors and the support is all that is required, that the yielding feature is not indispensable, that the particular stock acted upon is immaterial and that the invention is not to be limited in the scope of its application to the particular machine shown and described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. A machine of the class described having a support for a sole comprising fingers arranged to contact with the margin of a given portion of a sole, a member for adjusting said fingers to accommodate soles of different sizes, connecting means between said member and fingers and a scale with respect to which said member may be moved, in combination with means for determining the thinnest portion of the piece of stock engaged by said fingers.

2. A machine of the class described having a plurality of supporting fingers each provided with an extension, a member having guideways to receive said extensions and means for simultaneously adjusting said extensions in and out in said guideways, in combination with means for determining the thickness of the thinnest portion of a piece of stock supported by said fingers, including a plurality of detectors coöperating with said fingers to grip the stock.

3. A machine of the class described having a plurality of fingers for supporting a substantially flat piece of stock and means for adjusting said fingers to accommodate pieces of different sizes, in combination with detecting mechanism comprising a plurality of detectors having elongated feet to cooperate with said fingers in different adjusted positions.

4. In a gaging machine for leather sole blanks and the like, the combination with a suitable support for a blank, means for positioning a blank on said support, a multiplicity of gaging members above the support and individually yieldable to variations in the thinness of the leather, means for raising and lowering the gaging members, and means for indicating the relative proximity of the lowest member to the top of the support, whereby the thinnest place is located and measured.

5. A machine of the class described having, in combination, means against which a piece of stock may be pressed, a plurality of detectors, means, including springs, permitting said detectors to yield, for causing relative movement between said detectors and said first named means to grip the stock between them, and means controllably related to all the detectors but selectively controlled by the one or ones nearest said first named means and including a single common member actuated to indicate the thickness of the stock engaged by such one or ones of the detectors.

6. A machine of the class described having, in combination, a support for a piece of stock, a plurality of independently movable detectors, means for bringing said detectors into contact with said stock and for holding them in such position, and means controllably related to all the detectors but selectively controlled by the one or ones nearest said support and including a single common member actuated to indicate the thickness of the stock engaged by such one or ones of the detectors.

7. A machine for detecting the thinnest place in a given area of a piece of stock of varying thickness having, in combination, a support for said piece of stock, a series of detectors, an actuator, a spring between said actuator and each detector, means for moving said actuator toward said support whereby said detectors are yieldingly pressed against said stock, and means con-

trollably related to all the detectors but selectively controlled by the one or ones nearest said support and including a single common member actuated to indicate the thickness of the stock engaged by such one or ones of the detectors.

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

EDWARD A. STIGGINS.

Witnesses:
FRANCIS J. GANAWAY,
CHESTER E. ROGERS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."