May 26, 1931. D. E. HARDING 1,806,756

LEATHER GRADING MACHINE

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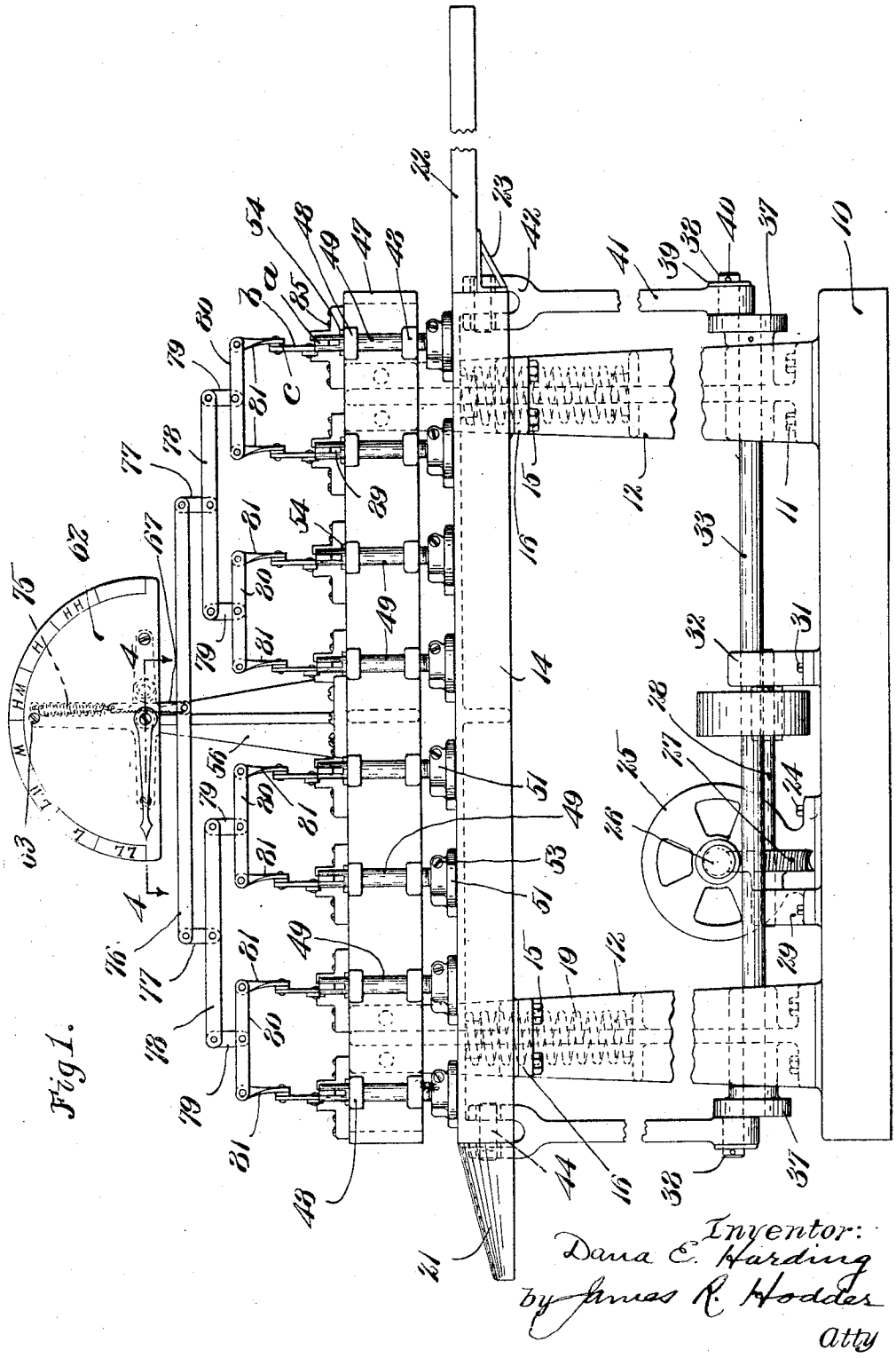


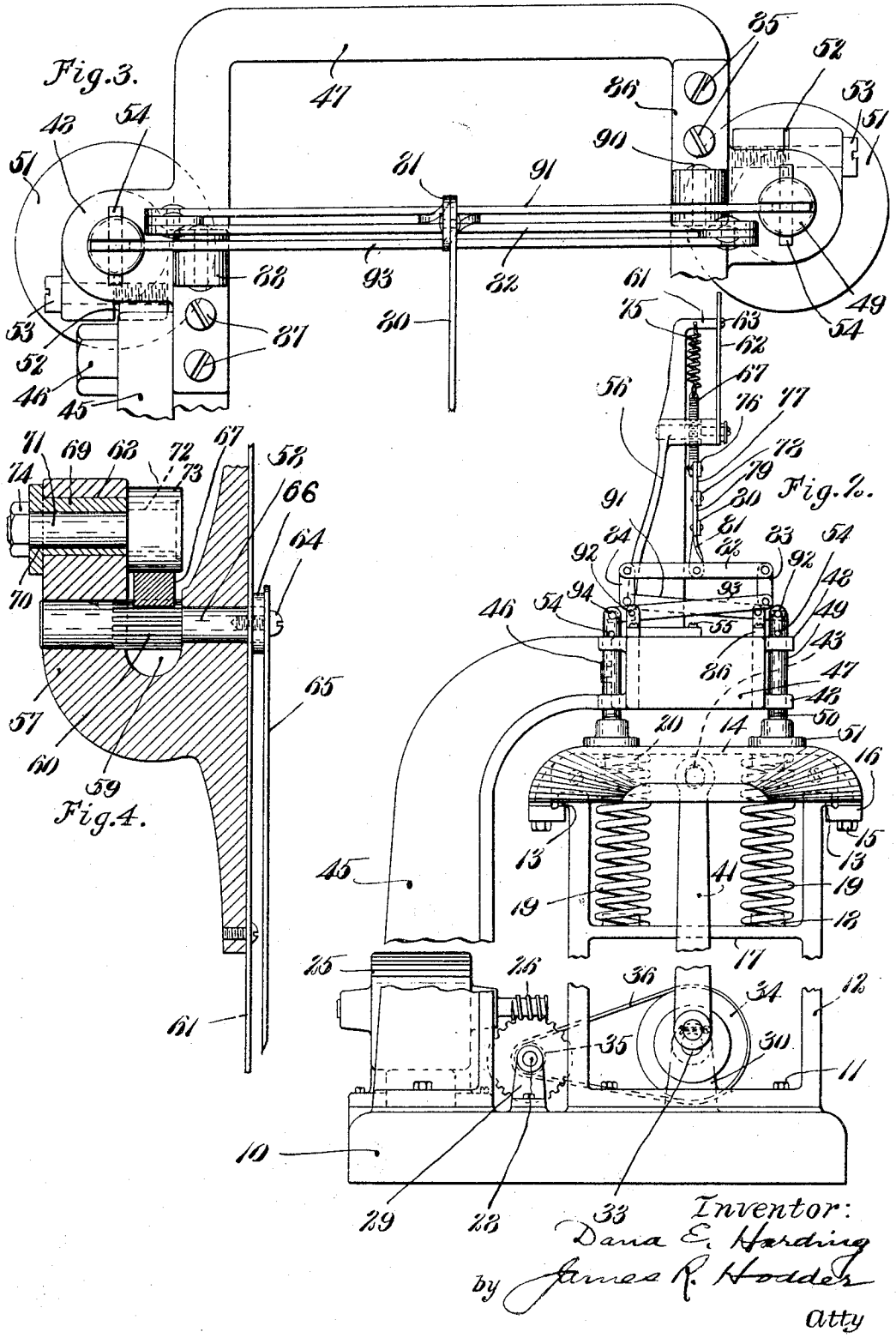
Fig 1.

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LEATHER GRADING MACHINE

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UNITED STATES PATENT OFFICE

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LEATHER GRADING MACHINE

Application filed September 29, 1924. Serial No. 740,474.

My present invention relates to leather working machines and more particularly to an improved grading machine applicable for averaging the thickness of flexible sheet material, as hides or skins.

In the manufacture of leather from hides, one of the important steps, particularly in the manufacture of leather from the hides of calves and sheep, is the grading of the skin into groups of different thicknesses. For example, an important step in the manufacture of leather from calf skins is grading the finished skins into groups, such as is demanded by the trade in which the leather is to be used, and assuming this use is in the manufacture of shoes, it is customary to grade the finished skin into different thicknesses suitable for light ladies' shoes, ladies', medium ladies', men's, heavy men's, etc. At the present time with but very few exceptions this step is performed manually and is done by the workman folding the skin down the central back portion, grasping the folded skin between the thumb and finger and running the thumb and forefinger the entire length of the hide. From the feel of the thickness of his thumb and finger, the operator is able to judge with a surprising degree of accuracy the average thickness of the skin operated on, and the average thickness of a skin determines in which group, as light ladies', ladies', men's, heavy men's, etc., the skin is to be graded. Various attempts have been made to perform this operation mechanically in order to do away as much as possible with the human element as it has been found that no two graders will average the skins in identically the same manner. In my copending application, Serial No. 669,909, filed Oct. 22, 1923, there is disclosed a machine in which the averaging of the thickness of skins is performed and the present invention is the result of a study of the imperfections noted in the operation of the apparatus disclosed in such application.

In the prior devices it was found that accurate results cannot be consistently attained and such prior machines are capable only of averaging the thickness on a given line across the width of the skin and, although mechanical checks to prevent too rapid fluctuations of the indicating hand have been provided, the results, as indicated on and by the machine, are only true within certain limits. In my present machine I have devised an apparatus for averaging the thickness over a predetermined area of a skin and this predetermined area is the central longitudinal portion of the skin and on which average thickness depends the classification of the skin as a commercial product. In carrying out my invention I arrange a plurality of rows of separately and independently movable members connected through a system of linkages whereby the individual movements of such members is averaged and the average result of such movement positively and visually indicated on a dial.

The principal object of my invention, therefore, is an improved grading or averaging machine of the type above referred to.

Another object of my invention is an improved apparatus for mechanically averaging the thickness of a skin or hide of relatively flexible material over a predetermined area thereof.

A further object is a mechanically reciprocable table associated with the averaging elements.

Other objects and novel features of the construction and arrangement of parts will appear as the description of the invention progresses.

In the accompanying drawings illustrating a preferred embodiment of my invention,

Fig. 1 is a front elevation;

Fig. 2 is a side elevation showing certain portions thereof broken away;

Fig. 3 is a partial plan view of Fig. 1, and

Fig. 4 is a sectional plan view on the line 4—4 of Fig. 1.

Referring to the drawings, 10 designates a rectangular base on the top of which and at each end thereof are secured by bolts 11 standards or uprights 12. The upper ends of the standards 12 extend outwardly laterally and form stops indicated by the numeral 13, as shown in Fig. 2. Mounted above the standards 12 is a table 14 and to the

under side of the table adjacent to each end thereof and secured thereto by bolts 15 are lugs 16, the upper surface of which lugs engage with the lower surface of the stops 13. The standards 12 have formed integral therewith, and intermediate the top and bottom thereof, members 17. Formed integral with the member 17 and extending upwardly from the upper surface and at either end thereof are projections 18 on which fit the lower end of coil springs 19. The upper end of the coil springs 19 fit over projections 20 formed integral with, and extending downwardly from, the under surface of the table 14. These springs 19 yieldingly hold the table 14 upward from the standards 12 and the lugs 16, engaging with the stops 13, limit the upward movement of said table 14. The table 14 is thus yieldingly held in position in the apparatus. Formed integral with, and at the entrance end of the table 14 is a tapered end 21 to facilitate feeding of the skins or hides onto the table 14. At the end of the table 14 remote from the tapered portion 21 is an extension 22 which may be of any suitable length, and this extension 22 is secured to the table 14 by a bracket 23.

Secured to the base 10 near one side thereof by bolts 24 is a motor or other prime mover 25. On the driving shaft of the motor 25 is formed a worm 26 which meshes with, and drives, a worm gear 27 secured to a shaft 28 that is rotatably mounted in bearing members 29 secured to the top surface of the base 10. Formed integral with, and extending upwardly from, the bottom of the standards 12 are bearing members 30. Secured to the top surface of the base 10 by bolts 31 is a bearing member 32 which is in alignment with the bearing members 30 formed on the standards 12. Rotatably mounted in the bearing members 30 and 32 is a shaft 33. Secured to the shaft 33, in any suitable manner, is a pulley 34. Secured to the shaft 28, in any suitable manner, is a pulley 35 and over the pulleys 34 and 35 runs a belt 36 and by means of which power is transmitted from the shaft 28 to the shaft 33. To each end of the shaft 33 is secured, in any suitable manner, a plate 37, and secured to each member 37 and extending outwardly therefrom is a crank pin 38. Rotatably mounted on the crank pins 38 and held thereon by washers 39 and cotter pin 40 are connecting rods 41. The upper end of each of the connecting rods 41 is forked, as indicated at 42, and the upper forked ends 42 are provided with elongated openings 43. Secured in the under side of the table 14 are shafts or pins 44 which pass through the elongated holes 43 in the forked end 42 of the connecting rods 41. Rotary movement of the shaft 33 will cause a reciprocating movement of the table 14 and the elongated holes 43, in connection with the shafts 44, will cause a momentary stop or pause of the reciprocating movement of the table 14 at the upper limit of movement thereof.

Secured at each end of the base 10 directly behind the standards 12 are uprights 45. These uprights extend upwardly and then forwardly to a point over the standards 12, and secured to such uprights by bolts 46 is a rectangular member 47. This rectangular member 47 is spaced apart from, and lies parallel to and in the same direction as, the table 14, as clearly shown in the drawings. On each side of the rectangular member 47 and spaced equally from each other are pairs of lugs 48. These lugs extend laterally outward from the rectangular member 47 and each pair is provided with aligned holes which form vertical bearings, in each pair of which is slidably mounted a shaft 49. Each of the shafts 49 is threaded at its lower end, as indicated at 50, and screwed into the threaded portion 50 are members 51. Each of the members 51 is formed with a slot 52 extending through the upper portion thereof into the interior threaded portion, as clearly shown in Fig. 3, and a screw 53 is provided for clamping the upper portion of the member 51 onto the threaded portion 50 of the vertical shaft 49. Through each of the vertical shafts 49 above the upper lug 48 is fixed a pin 54 which prevents too far a downward movement of such shafts 49 and plungers 51 toward the table or platform 14.

Secured to the top of the rectangular member 47 by screws 55 and centrally with respect to the length of such rectangular member 47 is an upright 56. Formed integral with the member 56 is a bearing 57 in which is rotatably mounted the horizontal shaft 58. The bearing member 57 is provided with a cut out portion 59, and formed integral with the shaft 58 intermediate the ends thereof so as to be visible in the cut out portion 59 in a pinion 60. At the top of the member 56 is formed a projection 61 which acts as a support for the upper end of a dial plate 62, a screw 63 holding the dial plate 62 in engagement with the projections 61. The dial plate 61 is substantially a semi-circle, as clearly shown in Fig. 1, and the dial plate is divided into segments on which are marked various characters as "L L", "L", "LM", etc., the designations corresponding to the general character of the material to be worked upon. Secured to one end of the shaft 58 by screw 64 is an indicating hand 65, a washer 66 being placed between the indicating hand 65 and the face of the dial plate 61. Meshing with the pinion 60 on the shaft 58 is a vertically arranged rack 67. The bearing member 57 is provided with a perforation 68 lying parallel to the bearing for the shaft 58, and adjustably mounted in said perforation 68 is a member 69. This member 69 is provided with a perforation 70 parallal to, but eccentric with, the axis of such member

69, and adjustably secured in the perforation 70 is a shaft 71. One end of the shaft 71 is enlarged, as shown at 72, and on this enlarged portion is rotatably mounted a hardened steel roller 73 which is positioned to be engaged by the rack 67 in the vertical movement thereof, while the other end is threaded to receive a nut 74 and by means of which the shaft 71 is secured in the member 69. By rotating the member 69 in the perforation 68, the distance between the circumference of the hardened roller 73 and the vertically mounted rack 67 may be varied. Secured to the top end of the rack 67 is the lower end of a spring 75, the upper end of this spring 75 being secured to the projection 61, this spring 75 tending to force the rack 67 upward and thus rotate the shaft 58 to a position to bring the indicating hand 65 into its zero or normal position, as indicated in Fig. 1.

A beam 76 is pivotally attached at its central point to the lower end of the rack 67. At each end of the beam 76 is pivotally attached the upper end of a link 77. To the lower end of each link 77 is pivotally attached at its middle point a beam 78. At each end of each of the beams 78 is pivotally attached the upper end of a link 79. Pivotally attached to the lower end of each link 79 and at its central point is a beam 80. Pivotally attached to each end of each of the beams 80 is the upper end of a link 81. Each link 81 has its lower end turned so as to lie in a plane perpendicular to the plane in which lies the upper end, as clearly shown in the figures. Pivotally attached to the lower end of each of the links 81 and at its middle point is a beam 82 which, as will be seen by reference to the drawings, lies at right angles to the beams 76, 78, and 80. To the front end of each of the beams 82 is pivotally attached the upper end of a link 83, while pivotally attached to the lower end of each of said beams 82 is pivotally attached the upper end of a link 84. Adjacent to each pair of lugs 48 in the front side of the rectangular member 47 and secured to the upper surface of such member by screws 85 is an angular support 86, the upstanding end or arm of which is slotted in a direction parallel to the beams 82. Adjacent to each of the pairs of lugs 48 in the rear face of the rectangular member 47 and secured thereto by screws 87 is an angular support 88 also provided with a slot that lies parallel to the beams 82. Each of the vertically arranged shafts 49, that are slidably mounted in the pairs of lugs 48 on the front side of the rectangular member 47, is provided at its upper end with a slot 89. Pivotally mounted in each of the slots in the bracket member 86 on a pin 90 is a lever 91. Each of the levers 91 is also pivotally mounted in the upper end of the vertically mounted shafts 49 on the front of the member 47 on pins 92. Each of the levers 91 at the end remote from the bracket 86 is pivotally attached to the lower end of the links 84. Pivotally attached to the brackets 88 on the rear member 47 by pins 92 are levers 93 which levers are also pivotally attached to the upper end of the vertically arranged shafts 49 in the lugs 48 on the rear of the member 47 by pin 94. These levers 93 are also pivotally attached at the ends remote from the brackets 92 to the lower end of links 83. The system of linkages above described defines a construction such that the vertical movement imparted to the rack 67 will be equal to the average vertical movement of the vertically arranged shafts 49 and this average movement will be imparted to, by means of the rack 67 and pinion 60, the indicating hand 65 and the amount of this movement will be visually indicated on the dial plate 61.

When the shaft 33 has been rotated so as to bring the crank pins 40 into their lowermost position, the table 14 will have been moved to its lowermost position against the compression of the springs 19 and the downward movement of the vertically arranged shafts 49 being limited by the pins 54, there will be a space between the upper surface of the table 14 and the lower surface of the members 51. The table 14 will remain out of engagement with the members 51 a sufficient length of time to enable an operator to slide a skin or hide, whose average thickness is to be determined, over the beveled portion 21 and onto the table 14 and in proper position to engage with, and operate, the vertically arranged shafts 49. The construction is such that, when the lugs 16 are in engagement with the stops 13 and the table 14 moved up into engagement with the lower face of the members 51, the pins 54 are so positioned that the indicator indicates zero.

The operation of my improved apparatus is as follows, it being assumed that the apparatus is constructed as above described and that, power having been turned into the motor 25, the shaft 33 will be rotated in the proper direction and at the proper speed to cause an alternate upward and downward movement of the table 14. When the table 14 moves to its lowermost position, the operator slides a hide or skin over the bevelled portion 21 onto the table 14 and brings the required portion of the hide or skin under the members 51. The continued rotation of the shaft 33 will raise the table 14, this upward movement being assisted by the springs 19, and the upper surface of the hide or skin will engage with the under surface of the members 51 and each individual member 51 will be lifted a distance equal to the thickness of the skin or hide at the particular point with which it is in engagement. The average of the amounts that the total number of members 51 has raised will be communicated through the system of linkages above described to the indicating hand 65 and this

average movement will be visually indicated on the dial plate 61. The operator will make a mental note of the position indicated and will grade the hide or skin in accordance therewith. It will be thus seen that my device measures the thickness at a predetermined number of points in a predetermined area of a skin or hide and is thus distinguished from prior devices which merely indicate the average thickness along a single line drawn transverse to the skin or hide.

While I have necessarily shown and described the preferred embodiment of my invention somewhat in detail, it is to be understood that I may vary the size, shape, and arrangement of parts within wide limits without departing from the spirit of the invention.

Having thus described my invention, what I claim as new is:

1. An improved grading machine comprising a plurality of independently and longitudinally movable shafts adapted to simultaneously have end engagement with a skin or hide at spaced points over a predetermined area thereof, and means cooperating with said movable shafts to measure the average movement thereof.

2. An improved grading machine comprising a plurality of independently and longitudinally movable shafts arranged to simultaneously have end engagement with a skin or hide at spaced points over a predetermined surface extending substantially along the length of a skin or hide, and means associated therewith for visually indicating the amount of average movement of said movable shafts.

3. An improved grading machine comprising a base, a table mounted thereon, a plurality of independently and longitudinally movable shafts mounted above, and movable with respect to, said table, means for moving said table toward and from the independently movable shafts, and means associated with said independently movable shafts for visually indicating the average movement of all of said shafts.

4. An improved grading machine comprising a base, a table yieldingly mounted on said base, a plurality of independently and longitudinally movable shafts mounted above said table, means for moving said table alternately toward and from said shafts, means for causing an appreciable slowing down in the vertical movement of said table at the extreme limits of travel thereof, averaging means associated with said vertically movable shafts for averaging the movement of all of said shafts, and means associated with said averaging means for visually indicating said average movement.

5. An improved grading machine comprising a plurality of independently movable members interconnected together adapted to simultaneously engage with a hide or skin at a plurality of spaced points over a predetermined area thereof and means co-operating therewith to indicate the average movement of said movable members.

6. In a machine for measuring leather, a work support, a set of members for contacting with a piece of leather carried by the support upon relative approaching movement of the support and the set of members in a direction normal to the surface of the support, means for causing said relative movement of the support and set of members, the members being individually moved various distances as determined by variations in the thickness dimensions of the leather in the spots covered by the members, and means controlled by said members for averaging the thickness of the piece of leather and indicating such average.

7. In a machine for measuring leather, a work support, a set of members above the work support for contacting with a piece of leather on the support upon relative movement of the work support and the set of members along a path normal to the surface of the work support, means for causing said relative movement between the work support and the set of members, said members being yieldingly mounted so as to be operated individually by the pressure of the piece of leather thereagainst, and means operated by said members for averaging and indicating the extent of movement of the members.

8. In a machine for measuring a piece of leather, a work support, a plurality of movably mounted plungers having their work-contacting faces arranged in a given plane, means for lifting the work support to press a piece of leather thereon against the plungers, and means controlled by the plungers for averaging and indicating the extent of operation of the plungers when pressed upon by the piece of leather.

In testimony whereof, I have signed my name to this specification.

DANA E. HARDING.