



L. COTE & L. E. COTÉ.

MACHINE FOR OUTLINING AND GRADING BOOT OR SHOE PATTERNS.

(Application filed June 29, 1899.)

(No Model.)

6 Sheets—Sheet 2.

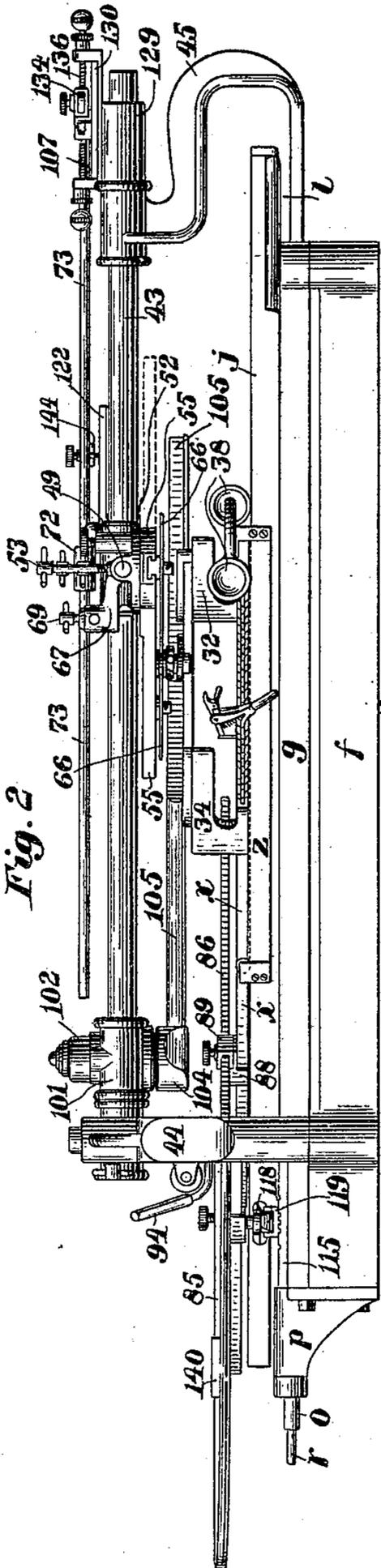


Fig. 2

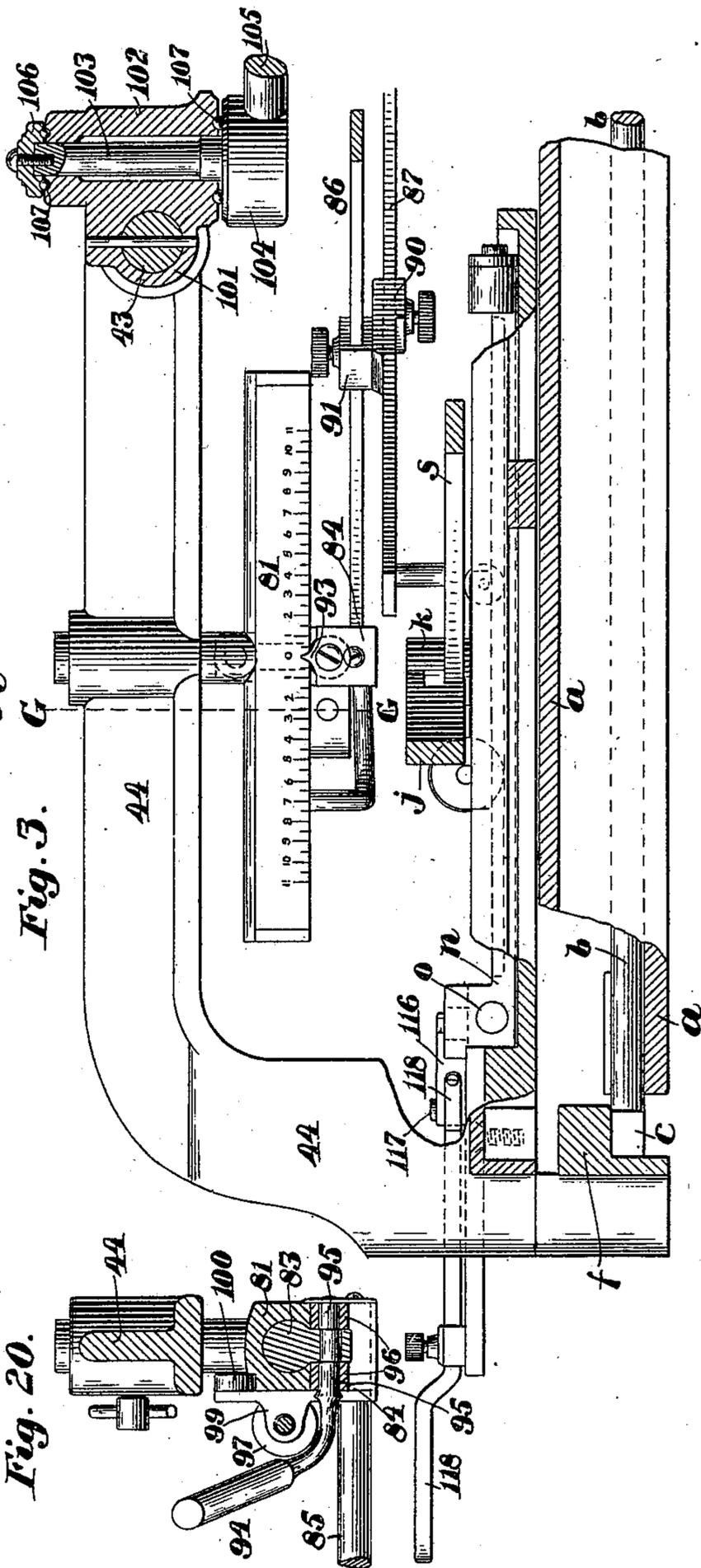


Fig. 3

Fig. 20

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No. 646,415.

Patented Apr. 3, 1900.

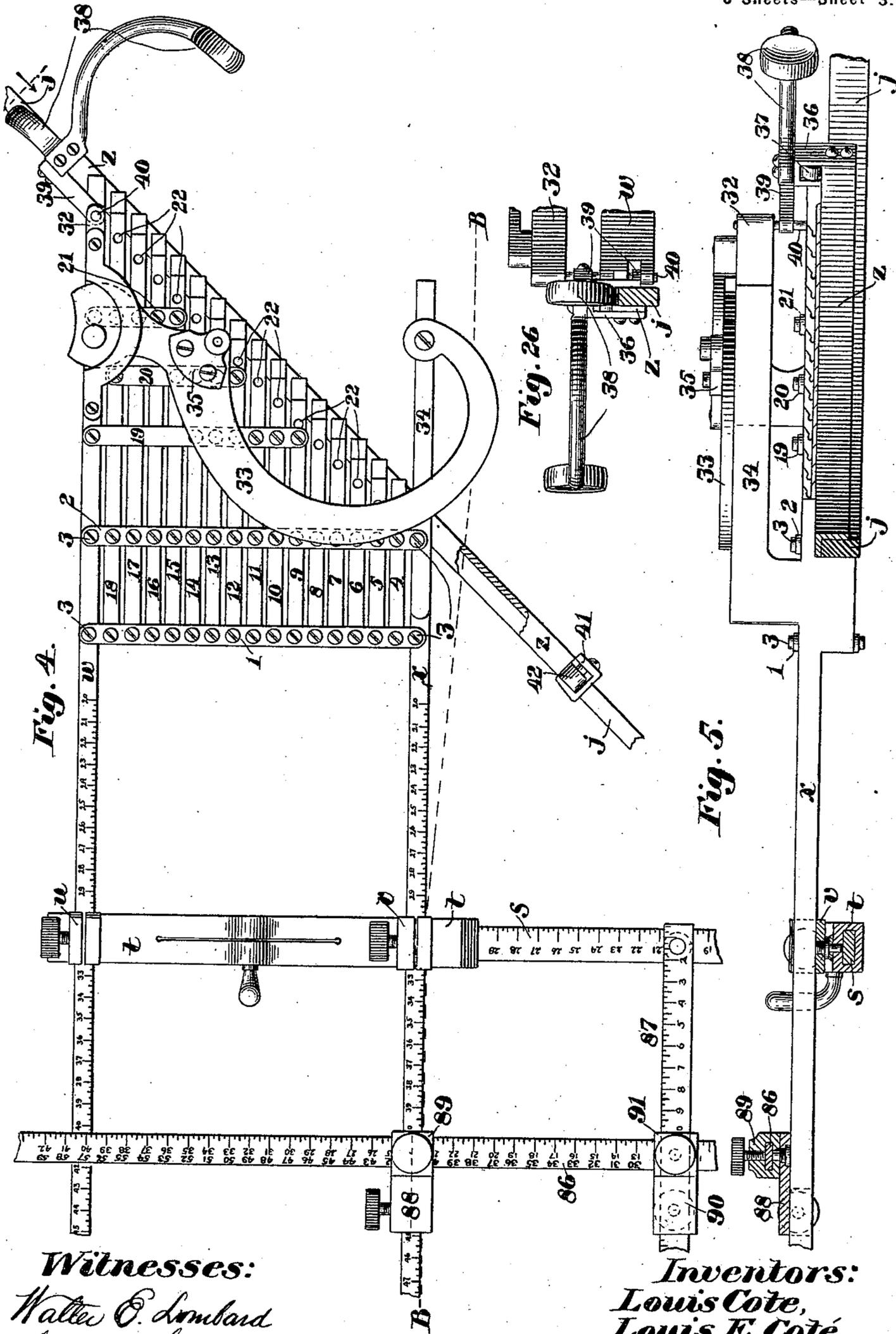
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6 Sheets—Sheet 3.



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6 Sheets—Sheet 4.

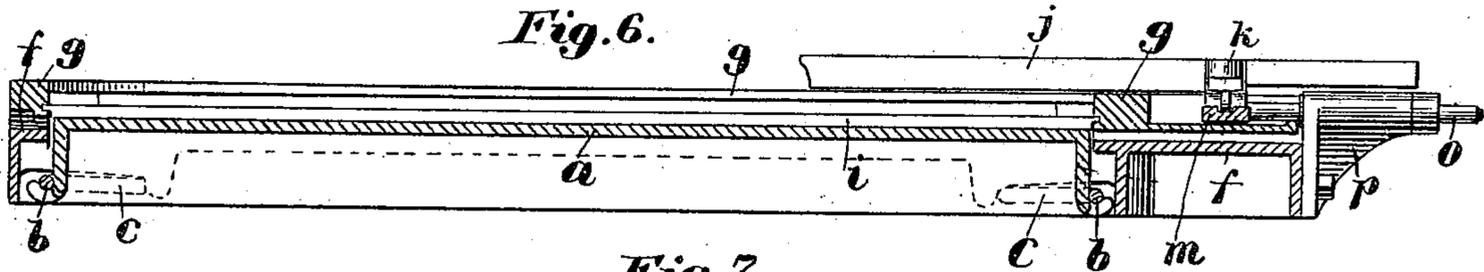


Fig. 6.

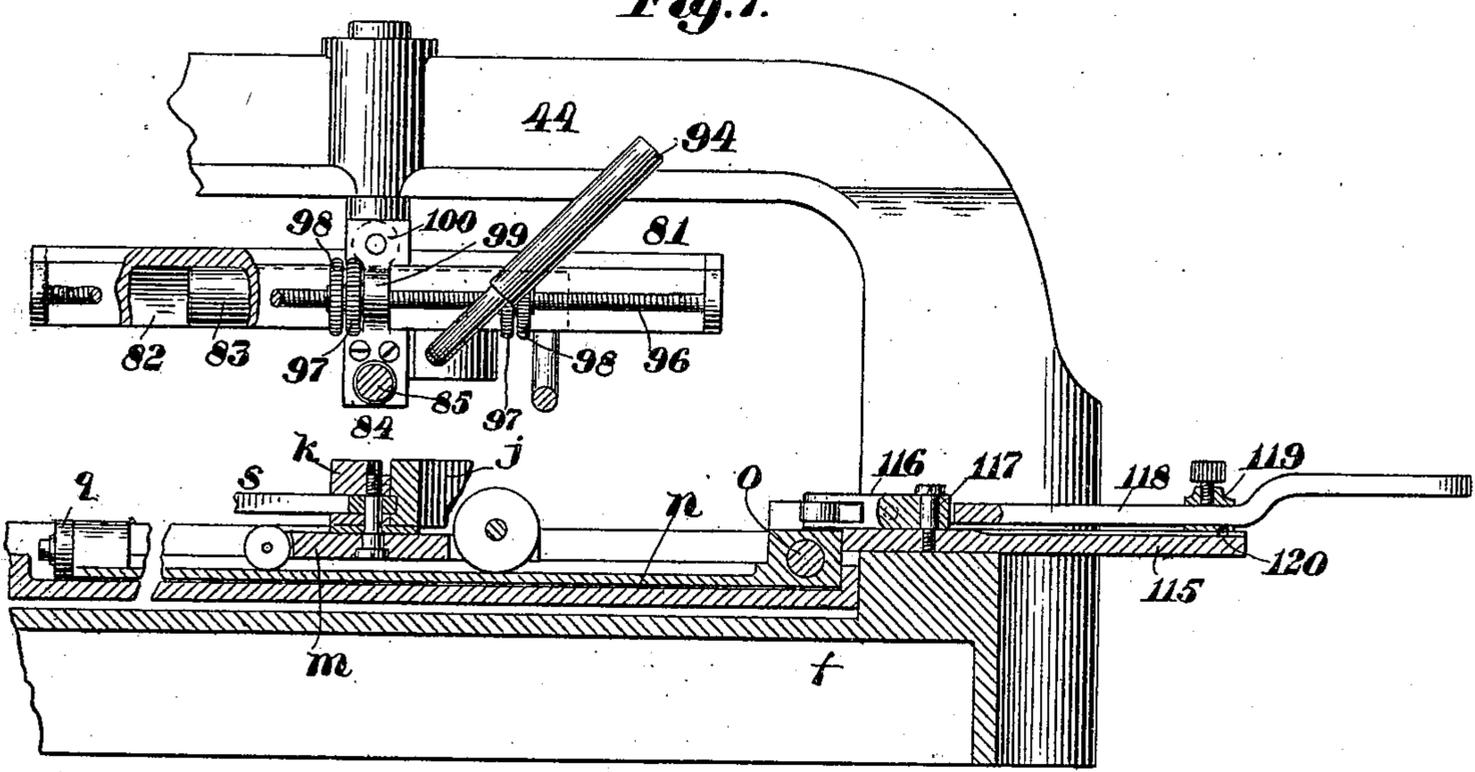


Fig. 7.

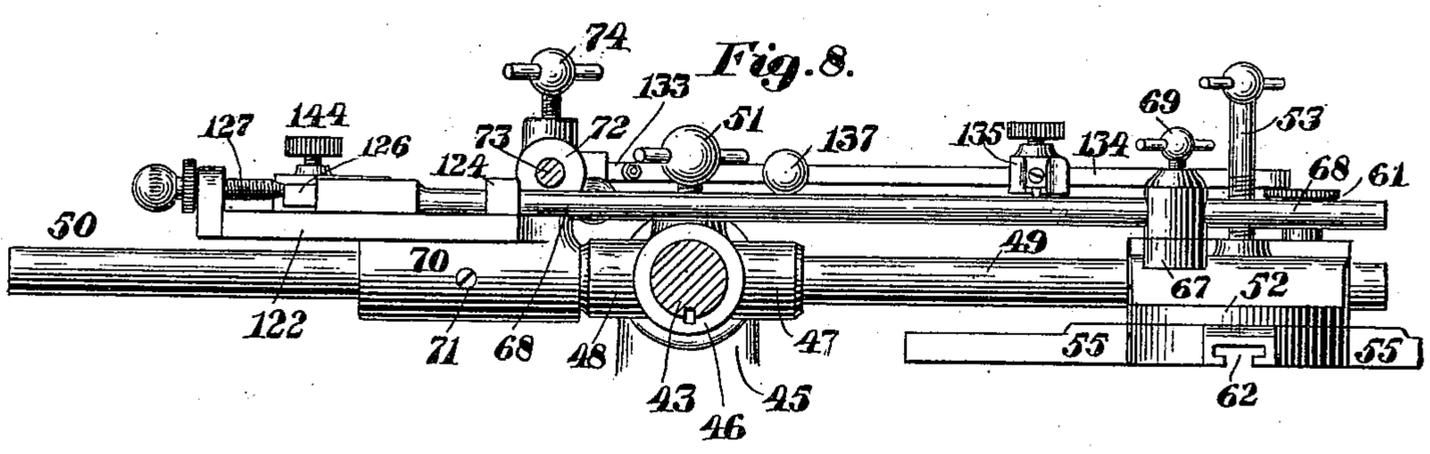


Fig. 8.

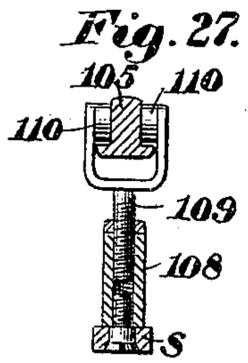


Fig. 27.

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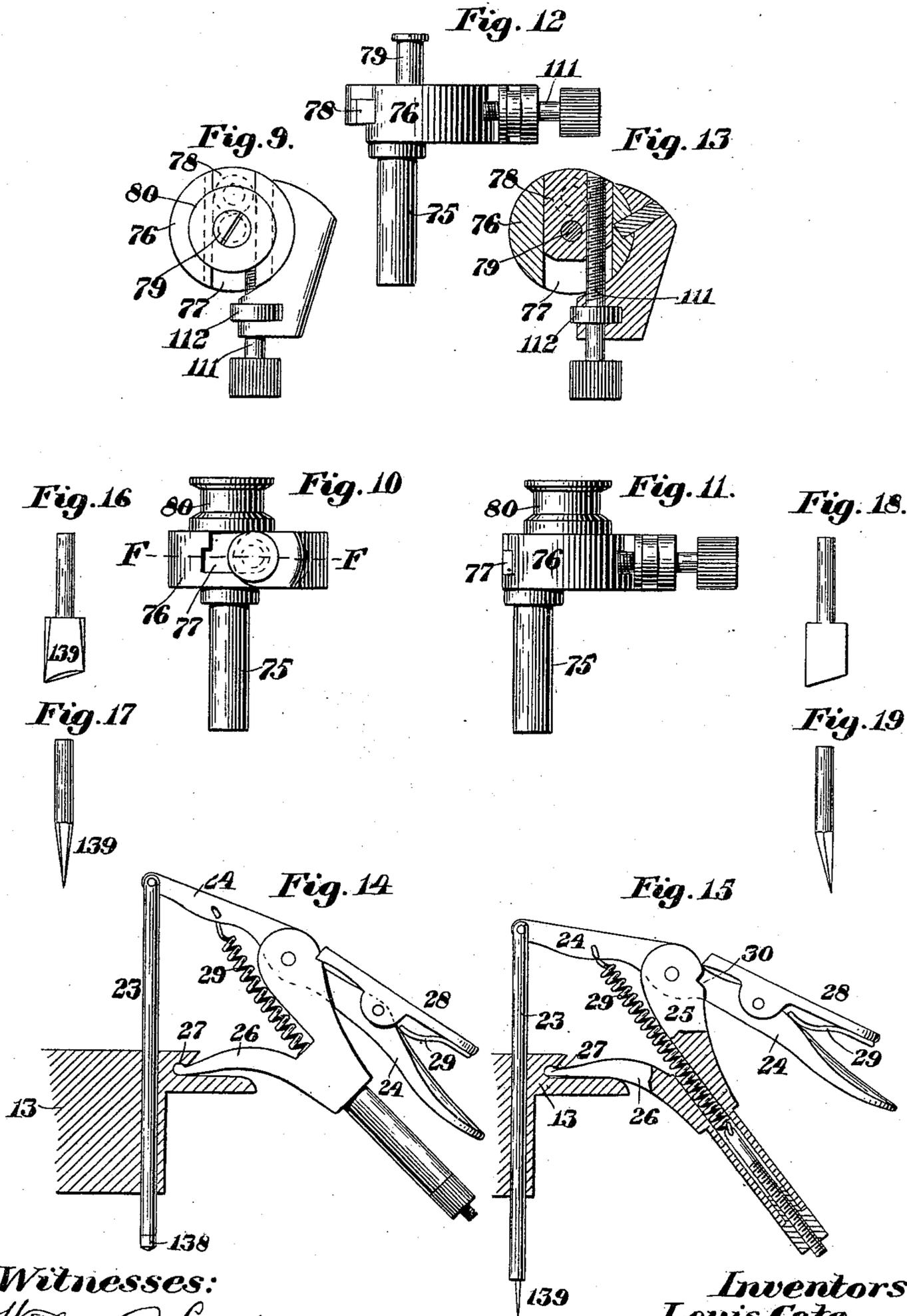
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6 Sheets—Sheet 5.



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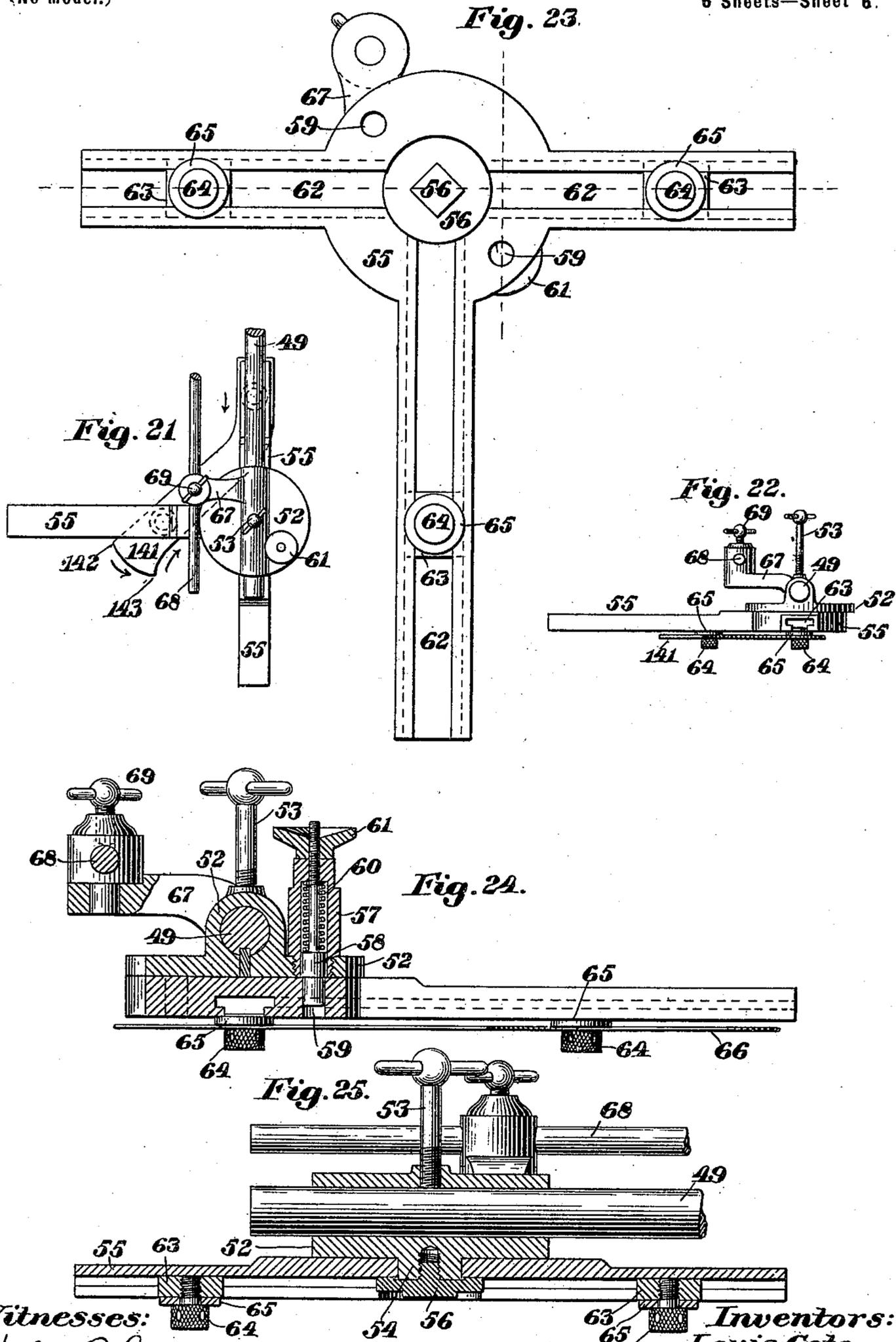
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(No Model.)

6 Sheets—Sheet 6.



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# UNITED STATES PATENT OFFICE.

LOUIS COTE AND LOUIS E. COTÉ, OF ST. HYACINTHE, CANADA; SAID LOUIS E. COTÉ ASSIGNOR TO SAID LOUIS COTE.

MACHINE FOR OUTLINING AND GRADING BOOT OR SHOE PATTERNS.

SPECIFICATION forming part of Letters Patent No. 646,415, dated April 3, 1900.

Application filed June 29, 1899. Serial No. 722,214. (No model.)

*To all whom it may concern:*

Be it known that we, LOUIS COTE and LOUIS E. COTÉ, of St. Hyacinthe, in the Province of Quebec and Dominion of Canada, have jointly  
5 invented certain new and useful Improvements in Machines for Outlining and Grading Boot or Shoe Patterns, of which the following, taken in connection with the accompanying drawings, is a specification.

10 Our invention relates to machines for outlining and grading boot and shoe patterns and marking the same on paper or cutting the same from paper or other suitable material in which the principle of the pantograph is  
15 employed and is an improvement upon the invention described in the Letters Patent No. 469,775, issued to Louis Cote March 1, 1892; and it consists in certain novel features of construction, arrangement, and combination  
20 of parts, which will be readily understood by reference to the description of the accompanying drawings and to the claims hereto appended and in which our invention is clearly pointed out.

25 Figure 1 of the drawings is a plan of a machine embodying our invention with the marker or knife holder removed. Fig. 2 is a front elevation of the same. Fig. 3 is a partial section on line A A on Fig. 1 looking  
30 toward the left of said figure, but showing certain parts in elevation. Fig. 4 is a partial plan of the same, drawn to an enlarged scale. Fig. 5 is a sectional elevation of the same parts, the cutting plane being on line B B on  
35 Fig. 4. Fig. 6 is a vertical section through the bed and vertically-movable frame on line C C on Fig. 1 looking toward the bottom of said figure. Fig. 7 is a partial sectional elevation, the cutting plane being on line D D  
40 on Fig. 1 and looking toward the right of said figure. Fig. 8 is a partial sectional elevation, the cutting plane being on line E E on Fig. 1 and looking toward the right of said figure. Fig. 9 is a plan of the pattern-bearing guide-truck and its carrier, drawn to an enlarged  
45 scale. Fig. 10 is an elevation of the same looking toward the top of Fig. 9. Fig. 11 is an elevation looking toward the right of Fig. 10. Fig. 12 is a similar view with the guide-truck removed and the truck-carrying block  
50 adjusted to a different position. Fig. 13 is a

sectional plan of the same, the cutting plane being on line F F on Fig. 10. Fig. 14 is an elevation of the knife or marker carrying spindle and its lifting and locking mechanism with the marker in said spindle and locked  
55 in raised position. Fig. 15 is an elevation of the same parts, except that a cutting-knife is substituted for the marker, said cutter being in contact with the upper surface of the bed  
60 upon which the material to be cut rests. Figs. 16 and 17 are respectively a side elevation and an edge view of a cutter having an inclined cutting edge in the same vertical plane as the axis of its shank with its longest portion  
65 eccentric to said axis. Figs. 18 and 19 are similar views of a cutter in which the inclined cutting edge lies in a vertical plane tangent to the periphery of its shank. Fig. 20 is a section on line G G on Fig. 3 looking  
70 toward the right of said figure. Figs. 21 and 22 are respectively a plan and a front elevation of the application of a modified form of the pattern. Fig. 23 is an inverted plan of the pattern-holding spider. Fig. 24 is a vertical  
75 section of the same on line H H on Fig. 23 looking toward the left of said figure. Fig. 25 is a section on line I I on Fig. 23 looking toward the top of said figure. Fig. 26 is a sectional elevation illustrating the hinge connection between the slide that supports the series of tool-carrying bars and the bar of the pantograph, and Fig. 27 is a transverse section of the bars and illustrating the manner of supporting the former by the latter.  
85

In the drawings, *a* is the bed or table upon which the cardboard or other material to be acted upon is to be supported and is secured in a fixed position to any suitable bench or frame of wood (not shown) and has mounted in  
90 suitable bearings thereon the rocker-shafts *b b*, each provided with two arms or lifter-toes *c c* and each having secured to its rear end a toggle-arm *d d*, the movable ends of which arms are connected together by a common pin,  
95 from which depends a rod *e*, connected at its lower end to a treadle, (not shown,) by which said rocker-shafts may be partially rotated, one of said arms being slotted for the passage of said connecting-pin. A rectangular skeleton frame *f* incloses said bed *a* and rests upon  
100 the lifter-toes *c c* in such a manner that it may

be raised to a limited extent by the partial rotation of the rocker-shafts  $b\ b$  through the action of the toggle-arms  $d\ d$  when acted upon by said treadle.

5 The frame  $f$  has secured to its upper side, at its front corners only, the supplementary rectangular frame  $g$ , the under surface of which is raised a short distance above the upper surface of the frame  $f$ , except at the two front  
10 corners, so that the sheet of material  $h$  to be acted upon may be easily placed in position upon the bed  $a$  beneath said frame  $g$ , as shown.

The bars of the frame  $g$  have their inner edges grooved to receive the tenoned ends of  
15 the two bars  $i\ i$ , which are freely adjustable therein and arranged to rest upon the material  $h$  to hold it in the desired fixed position, as shown in Figs. 1 and 6.

A radius arm or bar  $j$  is secured near one  
20 end to the hub  $k$  and is provided at its right-hand end with the antifriction-roll  $l$ , which rests upon the upper surface of the frame  $g$ , along which it rolls as said radius-arm is vibrated about the axis of said hub  $k$ .

25 The hub  $k$  is pivoted to the carriage  $m$ , provided with guide-wheels which rest in and are movable endwise of a groove formed in the upper surface of the bar  $n$ , arranged at a right angle to the front of said frame  $f$ , said bar  $n$   
30 being supported at its front end upon the rod  $o$ , which is movable endwise in a bearing in the stand  $p$ , and at its rear end by the trucks  $q$ , resting upon a plate forming an extension of the frame  $g$ , the rear end of said bar  $n$  being  
35 connected by the brace  $r$  to the outer end of the rod  $o$ , as shown in Fig. 1. Another radius arm or bar  $s$  is pivoted to the hub  $k$  by the same pin which connects said hub to the  
40 movable endwise thereof, the slide  $t$ , the central portion of which is slotted, as shown in Figs. 1 and 4. The slide  $t$  has pivoted thereto the slides  $u$  and  $v$ , provided with set-screws, by which they are clamped to the bars  $w$  and  
45  $x$ , respectively, as shown. The slide  $t$  is provided with a hand clamping-screw, by which said slide  $t$  may be clamped to the bar  $s$  at any desired point.

$w$  is a bar fitted to and adjustable endwise  
50 in the slide  $u$  and connected at its front end by the pin 40 and the stand 36 39 to the slide  $z$ , fitted to and movable endwise upon the bar  $j$ .

The construction, arrangement, and operation of the bars  $j$ ,  $s$ , and  $w$  and the slide  $z$   
55 are substantially the same as in the machine described in the before-cited Letters Patent, except as hereinafter specified.

A bar  $x$  is fitted to the slide  $v$ , so as to be  
60 movable endwise therein, and rests at its front end upon the slide  $z$ , as shown in Figs. 4 and 5.

The bars  $w$  and  $x$  are connected together  
by the bars 1 and 2, in addition to the slides  $t$  and  $u$  and  $v$ , in positions parallel to each other  
65 by pivot-pins 3, and the bars  $w$  and  $x$  have graduated scales marked upon their upper sides, as shown.

In the before-cited patent the bar  $x$  extends  
toward the rear only to the point of connection to the bar 1; but in the present invention it extends to the rear beyond said bar 1  
70 to a greater distance than the bar  $w$ .

Between the bars  $w$  and  $x$  are arranged parallel thereto and to each other and equidistant from each other a series of bars 4, 5, 6,  
75 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18, each pivoted to the bars 1 and 2 and to one or more of the bars 19, 20, and 21, as shown in Fig. 4 and substantially as shown in said cited patent; the front ends of said bars resting upon  
80 the slide  $z$ , mounted and movable endwise of the bar  $j$ . Each of said bars 4 to 18 has formed therein, just at the rear of said bar  $j$ , a socket or perforation 22 to receive the knife or marker holding spindle 23, to the upper end  
85 of which is pivoted one end of the lever 24, fulcrumed on the stand 25, which is provided with the arm 26, having at its end the upwardly-projecting rib 27 to engage the slotted front end of the bar in which said spindle 23  
90 is mounted. The lever 24 extends outward beyond its pivotal connection to said stand 25 and has pivoted thereto the latch-lever 28, the outer arm of which is forced upward by the spring 29 to cause its inner end to engage  
95 the detent 30 when the outer arm of said lever 24 is depressed to raise the knife or marker from contact with the material being operated upon against the tension of the spring 31, substantially as in said prior patent and as  
100 shown in Figs. 14 and 15.

The bar  $w$  has secured thereto or formed in one piece therewith the arm 32, projecting upward and forward therefrom, upon which is firmly secured one end of the curved bar  
105 33, the opposite end of which is similarly secured to the arm 34, extending upward and forward from the bar  $x$  and secured to or formed in one piece therewith, as shown in Figs. 4 and 5. The curved bar 33 has secured  
110 thereto between its two ends the plate 35, which has formed therein a socket in axial line with the axis of the hole 22 through the bar 13, as shown in Fig. 4.

The right-hand end of the slide  $z$  is provided with a stand 36, in which is mounted a  
115 truck 37 to rest upon the bar  $j$ , and has firmly secured thereto the handle 38, by which the various bars forming the pantograph may be moved in any desired direction in a horizontal  
120 plane. The stand 36 is provided with ears or arms 39, by which and the pin 40 the bar  $w$  and the slide  $z$  are hinged together, as shown in Figs. 4, 5, and 26. The left-hand end of the slide  $z$  is also provided with a guide-  
125 stand 41, in which is mounted an antifriction-truck 42 to rest upon the bar  $j$ , as shown in Fig. 4. A cylindrical rod 43 is mounted in a fixed position in bearings in the goose-neck-like arm 44 at one end and in the curved  
130 stand 45 at its other end, with its axis parallel to the front edge of the frames  $f$  and  $g$  and to the upper surface of the bed  $a$ , and has mounted thereon, so as to be adjustable end-

wise thereof, the sleeve-like hub 46, said rod and hub being provided with a spline-groove and a key to prevent said hub from being moved about the axis of said rod, as shown in Fig. 8. The sleeve 46 has formed upon opposite sides thereof the laterally-projecting hubs 47 and 48, in which are set the rods 49 and 50, respectively, at right angles to the rod 43, with their axes in the same horizontal plane as the axis of said rod 43, and said sleeve is provided with a set-screw 51, by which it may be secured to said rod 43 in any desired position. The rod 49 has fitted thereon, so as to be movable endwise thereof, the circular disk 52, secured in any desired position thereon by the clamping-screws 53 and prevented from rotation on said rods by a suitable key fitting a spline-groove in said rod 49, as shown in Figs. 24 and 25. The disk 52 has formed upon its under side the centrally-arranged circular hub 54, upon which is fitted, so as to be revoluble thereon, the three-armed spider 55, which is secured in position thereon by the large-headed screw 56. The disk 52 has screwed into its upper surface the chambered hub 57, in which is mounted the locking-bolt 58, arranged to engage with one or the other of two holes 59, formed in said spider upon opposite sides of its axis of revolution, said bolt being pressed downward by the spring 60 and provided with a nut-like head 61, by which said bolt may be withdrawn from engagement with said spider when it is desired to reverse it.

Each arm of the spider 55 has formed in its under side a T-shaped groove 62, in which is fitted, so as to be adjustable lengthwise thereof, a nut 63, to which is fitted a clamping-screw 64, provided with a washer 65, between which and the head of said screw is clamped the pattern 66, as shown in Fig. 24.

The disk 52 has formed thereon or secured thereto the arm 67, having a hub at its outer end, in which is formed a bearing to receive the rod 68, to which said hub is secured in any desired position by the set-screw 69, as shown in Figs. 1, 8, 24, and 25.

The rod 50 has a hub 70 secured thereon in a normally-fixed but adjustable position by the set-screw 71, which hub is provided with an upwardly-projecting arm terminating in a hub 72, in which is formed a bearing to receive the rod 73, to which said hub is secured in any desired position by the set-screw 74.

The socket in plate 35 has fitted thereto, so as to be freely revoluble therein, the spindle 75, provided with an eccentric head 76, having formed in its upper surface the lipped groove 77, extending transversely across it, in which is fitted the block 78, provided with the upwardly-projecting pin 79, upon which is mounted the grooved guide-truck 80, which bears against the edge of the pattern-plate 66, substantially as described in the before-cited prior patent. In said prior patent the bar corresponding to the bar *j*, in this application extended beyond the hub *k* toward the left of

Fig. 1, was slotted longitudinally and had adjustably secured in said slot a fulcrum-pin the lower end of which engaged a groove in a fixed plate beneath said bar, said groove being arranged parallel to the axis of the pattern-supporting rod, and when said fulcrum-pin was secured in the desired adjusted position in the slot in said bar the distance between the axis of said pin and the pin corresponding to the hub *k* of the present invention always remained the same in whatever positions the bars of the pantograph might be placed in the operation of the machine until said fulcrum-pin was adjusted to a new position in the slot in said bar. We have found that in the operation of the machine described in said prior patent when a pattern was to be cut or marked having two opposite edges of the same, but reversed, shape, so that the two halves of said pattern should be exact duplicates, one edge of the pattern (resulting from the operation of the machine) would be slightly shorter than the opposite edge. It has also been found desirable to cut or mark patterns varying in length in regular graded proportion, but of uniform width, which could not be accomplished by the machine described in said prior patent. There are some patterns used in the manufacture of boots and shoes that could not be graded and cut or marked upon the machine described in said prior patent because of the inability of the grooved guide-truck that controls the action of the cutting or marking tool to traverse the entire outline of the metal pattern on the machine, owing to passages or slits of considerably less width than the diameter of said truck. To obviate these several defects is the object of our present invention, and to this end we have modified the construction of the machine as follows:

The bar *j*, though extending to the left beyond the hub *k*, is not provided at its left-hand end with a slot and an adjustable pin set therein, and the slotted plate with which said pin engaged is omitted, said hub *k* being pivoted to the reciprocating carriage *m*, as shown and described. The arm 44 has secured thereto or formed in one piece therewith the bar 81, arranged at right angles to the vertical plane in which lies the axis of the rod 43, and is provided in its under side with a longitudinal groove 82, in which is fitted, so as to be movable endwise therein, the rod 83, provided with a downwardly-projecting lug 84, in which is set a guide-rod 85, which projects laterally therefrom at right angles to said rod 83 and has mounted thereon, so as to be movable endwise thereof, a sleeve 140, provided with a socket to receive a ball formed upon one end of the bar 86, which is adjustably secured to the bars *x* and 87, respectively, by means of the swiveling sides 88 and 89, as shown in Figs. 1, 2, 3, 4, and 5. The bar 87 is pivotally connected to the bars at 92, as shown in Figs. 1 and 4. The bars 86 and 87 are graduated upon their upper

surface to a scale corresponding to the scales upon the bars *s*, *w*, and *x*, and the bar 86 has an additional series of graduations designated by smaller figures. The right-hand vertical face of the bar 81 is graduated to a scale of thirtieths of an inch in opposite directions from its center, and the lug 84 has secured thereon the index 93, as shown in Figs. 3 and 20. The rods 83 and 85 are clamped in the desired adjusted position by the handle 94, eccentrics 95, and clamping collars or washers 96, as shown in Figs. 1, 2, 7, and 20. A threaded rod 96<sup>a</sup> is mounted in a fixed position in ears projecting from the bar 81 and has adjustably fitted thereon a pair of stop-nuts 97 and a pair of check-nuts 98, and the lug 84 has secured thereon the stand 99, which embraces the rod 96 between the pair of stop-nuts 97 and carrying at its upper end a truck 100, which rests upon a flat surface upon the bar 81, as shown in Figs. 7 and 20. The rod 43 has secured thereon in a fixed position the horizontal hub 101, which has formed in one piece therewith the vertical hub 102, in which is mounted the vertical spindle 103, provided with the large head 104 at its lower end, having set therein or formed in one piece therewith the radius-arm 105, the outer portion of which has a cross-section in the form of an inverted T, (see Fig. 27,) the upper end of said spindle having firmly secured thereto the disk 106, between which and the upper end of the hub 102 and between the lever end of said hub and the spindle-head 104 is inserted a series of balls 107, as shown in Fig. 3. The outer or right-hand end of the bar *s* has pivoted thereto the lower end of a swiveling hub 108, in the upper end of which is adjustably fitted the threaded shank 109, the upper end of which is forked and has mounted upon pins projecting inward from each prong of said fork trucks 110, which rest upon the projecting ribs of the radius-arm 105 and serve to support the outer end of the bar *s* and all the bars carried thereby at suitable heights above the upper surface of the bed *a*, as shown.

In some cases the pattern upon the machine from which other sizes are to be graded is of such a shape that it is necessary in order to mount it in the proper position upon the machine to employ two only of the clamping devices on the spider 55, as shown in Figs. 21 and 22.

In the cited prior patent the grooved guide-truck which engaged the edge of the metal pattern was mounted upon a pin set in a fixed eccentric position relative to the axis of the spindle about which the axis of said truck revolved as it was moved about the pattern on the machine.

In our present invention the pin 79, upon which the truck 80 is mounted, is set in or formed integral with the block 78, as before described, and said block is provided with a threaded perforation to receive the adjusting-screw 111, provided with the collar 112, which

is engaged by the forked arm 113, secured to one side of the eccentric head 76 of the spindle 75, as shown in Figs. 9, 10, 11, and 13, drawn to a greatly-enlarged scale. By this construction we are enabled when a pattern is to be cut or marked having slits or passages too narrow to admit the passage of the truck 80 to remove said truck, adjust the block 78 and pin 79 until one side of said pin is in axial line with the axes of the spindles 75 and 23, as shown in Fig. 12, and cut the pattern by using said pin 79 to press against the metal pattern, said pin being made of steel and as small as is consistent with a due regard to strength.

The front end of the extension-plate 114 of the frame *g* has secured thereto the plate 115, having its rear upper surface graduated to a scale of thirtieths of an inch to facilitate the proper adjustment of the bar *n* in a direction parallel to the axis of the rod 43. The front end of the bar *n* has formed therein a slot which is engaged by a truck carried by the rear end of the short lever 116, pivoted to the plate 115 at 117 and having pivoted thereto between its two ends by a horizontal pivot the forked handle 118, provided with the adjustable slide 119, having in its under side a short pin 120, which engages one or the other of a series of grooves 121, formed in the upper surface of the plate 115, as shown in Figs. 1, 2, and 3, and substantially as in the cited prior patent.

By the employment of the bars 86 and 87 and the freely-movable fulcrum of the bar 86 patterns of all sizes may be accurately graded from a single pattern on the machine, so that if the pattern used as a guide is symmetrical or has its two halves duplicates of each other the various sizes of patterns cut or marked by the machine will be properly graded and each half of each pattern will be an exact duplicate of its other half.

A plate 122 is secured in a fixed position on the hub 70, has formed in its upper surface a series of detent-grooves 123, and is provided with an ear 124, in which is formed a bearing for the rear end of the rod 68. A short lever 125 is pivoted at one end to said plate 122, and its other end engages the notched rear end of the rod 68 and has pivoted thereto by a horizontal pin, near the middle of its length, the hand-lever 126, constructed and arranged to operate in the same manner as the lever 118 for the purpose of reciprocating the rod 68 to readily adjust the pattern-holding spider 55, as may be desired. The plate 122 is provided with two stop-screws 127 and 128 for limiting the movement of the lever 126, as shown in Figs. 1 and 8.

The right-hand end of the rod 43 has secured thereon a hub 129, formed upon or secured to the plate 130, which has formed therein a series of detent-grooves 131, is provided with the lug or ear 132, in which the rod 73 has a bearing, and has pivoted thereon the short lever 133, which engages by its mov-

able end the notched head of the rod 73, said lever having pivoted thereto between its two ends by a horizontal pivot the hand-lever 134, having an adjustable slide 135, provided with a detent to engage said grooves, substantially as in the case of the lever 118, said plate also being provided with the stop-screws 136 and 137, as shown.

The operation of our invention is as follows: The several parts of the machine being in the positions shown in the drawings, with the index 93 pointing to zero on the bar 81, and the pattern 66 is in the position indicated by the full outline thereof shown in Fig. 1, the frame *f* is raised by operating the toggle-arms *d d* to partially rotate the shafts *b b*, and the paper, cardboard, or other material to be operated upon is placed upon the bed beneath the bars *i i*. The arms *d d* are then returned to their normal positions by removing the foot from the treadle, when the bars *i i* will rest upon said material and hold it in a fixed position, being pressed thereto by the weight of the frame *f*. The operator then seizes the handle 38 and moves the bar *j* and the parts carried thereby about the axis of the hub *k*, so as to cause the guide-truck 80 to pass around the pattern 66 in the direction indicated by the arrow on Fig. 1, said truck being held in firm contact with said pattern throughout its entire perimeter. If a pattern is to be drawn or marked upon paper, the marker 138 is inserted in the tool-carrying spindle 23, as shown in Fig. 14; but if the pattern is to be cut from card or pasteboard the knife 139 (shown drawn to an enlarged scale in Figs. 16 and 17) is inserted in said spindle, as shown in Fig. 15, and said spindle is inserted in the proper spindle-carrying bar for the desired size of pattern, and said spindle is raised and locked in said raised position, as shown in Fig. 14. When the truck 80 is brought into contact with the pattern 66, the lever 28 is disengaged from the detent-notch 30, when said spindle 23 will be moved downward by the tension of the spring 29 until the point of the marker 138 or knife 139 comes in contact with the material to be acted upon, and the operator moves the truck around the pattern 66, pressing said truck hard against said pattern, as described, and when said truck has reached the starting-point a pattern will have been marked upon or cut from said material properly graded to the desired size, according to what socket-bar the spindle *i* is placed in. If said spindle is placed in the socket of bar 13, the pattern drawn or cut will be an exact duplicate of the pattern on the machine; but if said spindle is placed in any other of the sockets 22 the pattern produced will be either larger or smaller than the pattern on the machine, according to whether said spindle is set in a socket in one of the bars 14 to 18 or in one of the bars 12 to 4, and as many sizes larger or smaller as the spindle is removed sockets from 13. In moving the truck 80 about the pattern, as above described, the bar

*j*, though not connected directly thereto, practically vibrates about the axis of vibration of the bar 86, which is its point of connection to the sleeve 140, and the hub *k* and carriage *m* move along the bar *n* substantially as the pin *d*<sup>2</sup> and the plate B<sup>2</sup> moved along the slot *c*<sup>4</sup> in said cited prior patent under similar conditions; but as the sleeve 140 is at no time clamped to the rod 85, but is at all times freely movable endwise of said rod, controlled only by the movements of the bar 86, it follows that the movements of the marking tool or cutter when the spindle 23 is placed in any socket 22 other than the one formed in bar 13 are varied from the movements of the same tools under the conditions described in said prior patent, in which the bar corresponding to the bar *j* of this application was moved about a fulcrum-pin firmly clamped to said bar, so that in all the movements of the pantograph said bar moved about a fulcrum-pin that remained at all times during such operation at the same distance from the pivotal connection of the bars D and E of said patent and corresponding to the hub *k* of this application, while in our present invention the distance between the pivotal connection of the bars *j* and *s* and the pivotal connection of the bar 86 to the sleeve 140, which is the center about which the pantograph is vibrated, varies to a greater or less extent, according to the adjustments of the slides connecting the bar 86 with the bars *x* and 87 and the travel of the truck 80 lengthwise of the pattern. In said prior patent when the guiding-truck was moved in the direction of the length of the bar D without vibrating said bar no movement of the pivot-pin *d*<sup>2</sup> and the plate B<sup>2</sup> along the groove *c*<sup>4</sup> took place and the distance between the pins *d*<sup>2</sup> and *g* remained constant; but in our present invention if the truck 80 is moved in the direction of the length of the bar J when said bar is in the position shown in Fig. 1 and its right-hand end is held stationary the hub *k* and carriage *m* will be moved along the bar *n* toward the front or the rear, according to the distance the truck 80 is moved toward the right or left, respectively, while at the same time the distance between the axis of the hub *k* and the pivotal connection between the bar 86 and the sleeve 140 varies, as above set forth. It is by virtue of this difference of construction and operation that we are able to accurately grade all sizes of patterns from a single pattern so that all of said graded patterns shall have the proper length upon each side of the central vertical line instead of being too short on one side of said line and too long on the other side, as hereinbefore described.

It should be understood that the centers of all the sockets 22, the axis of the hub *k*, and the center of the ball-and-socket joint connecting the bar 86 and the sleeve 140 are all in the same vertical plane at all times and that the slides *t* and *u* are adjusted upon the bars *x* and *w*, respectively, to the graduation-

mark appropriate to the size of the pattern on the machine, which is determined by first measuring the whole length of the boot or shoe pattern, including vamp and quarter, by a scale of sizes, and as the pattern upon the machine, as shown in the drawings, is a pattern of the quarter of a lady's boot, the length measure of which is thirty sizes, the slides  $t$  and  $u$  are adjusted to the graduation-marks 30 on the bars  $x$  and  $w$ , respectively, as shown.

The bar 86 and its adjustment upon the bars  $x$  and 87 control the proportioning of the width of the produced pattern relative to its length, and therefore in order to properly adjust said bar 86, and thereby properly proportion the width of the produced patterns, the width of the model-pattern is first measured by a scale of widths differing from and independent of the scale of sizes, and the bar 86 must be adjusted upon the bar  $x$  according to said measure, and as the pattern on the machine, as shown in the drawings, measures forty widths the slide 88 should be adjusted to "40" on the bar  $x$ , the slide 90 to "10" on bar 87, the slide 89 to "40" on bar 86, and the slide 91 to a position on bar 86 that will place the bar 87 parallel to bar  $x$ .

It is obvious that when patterns of men's or children's boots or shoes are to be graded, the appropriate pattern selected for use on the machine is first measured by a scale of sizes for its length and by a scale of widths, and the bars  $s$  and 86 are adjusted to the proper graduations on the bars  $x$ ,  $w$ , and 87, as above described.

When it is desired to mark or cut graded patterns having fuller leg portions in proportion to their heights without increasing the proportion of the length of the foot, the operation is the same as described in said cited prior patent; so, also, the adjustment of the several slides to adapt the machine to different sizes of guide-patterns on the machine or to change from cutting patterns according to the English and American scale of sizes to cutting patterns according to the French scale of sizes, substantially as described in said prior patent.

To cut or mark graded patterns which are required to be graded only in one direction—that is, in the direction of the height of the boot—but of uniform width in the direction of the length of the boot, as a stay or facing for the front of a boot, a model-pattern 141 of the desired shape is mounted upon the machine, as shown in Figs. 21 and 22. Then with the rods 83 and 84 adjusted, with the index 93 pointing to zero on the bar 81 and the marker or cutter raised, the operator moves the truck 80 into contact with said pattern 141 at 142, then drops the cutter into contact with the material, and moves the truck 80 from 142 to 143 in the direction indicated by the arrows on Fig. 21. When the point 143 is reached, the operator moves the bar 85 toward the front a given distance—say three-thirtieths of an inch—into contact with the

front stop 97 and the bar  $n$ , carriage  $m$ , and the hub  $k$  toward the right by means of the lever 118 a given distance—say eight-thirtieths of an inch. Then with the truck 80 resting against the edge of the pattern 141 the cut from 143 to 142 in the same direction is completed and the pattern produced will be graded at its two ends, but will be of the same width as the pattern upon the machine.

When patterns are to be graded from a model-pattern on the machine having slits or passages in outline to be traced too narrow for the passage of the truck 80, said truck is removed from the pin 79 and the block 78 and pin 79 are adjusted until the periphery of the pin 79 is in line with the axis of the spindle 75, when the cutting or marking of the pattern may be proceeded with as before by pressing the periphery of said pin 79 against the edge of the pattern on the machine, the cutter shown in Figs. 18 and 19 being carried by the spindle 23.

The model-pattern 66 or 141 may be adjusted to a limited extent toward or from the front of the machine by slackening the set-screw 53 and operating the hand-lever 126 so as to cause the detent on the slide 144 to engage the desired groove 123; but if a greater change in the position of the pattern is desired the two set-screws 53 and 69 are slackened and the spider and its supporting-disk are moved by hand to the desired position, when said set screws are tightened to hold said spider in a fixed position. In like manner said pattern may be adjusted in the direction of the length of the rod 43 by the proper manipulations of the set-screws 51 and 74 and the hand-lever 134.

In outlining and grading some styles of patterns it is desirable to increase or diminish the height of the produced pattern to a greater extent than the length is increased or diminished or to increase the height while the length is decreased, or vice versa. This may be accomplished in the following manner: If it is desired to produce patterns either larger or smaller than the pattern 66, (shown in Fig. 1,) but having a greater proportionate height than said pattern, the parts of the machine being in the positions shown in Fig. 1, the guide-truck 76 is moved around the pattern 66 in the direction indicated by the arrow on said figure until it reaches the upper right-hand corner of said pattern 66, when the set-screw 53 being slackened and the set-screw 69 being screwed down tight upon the rod 68 the hand-lever 126 is moved toward the front of the machine until it comes in contact with the stop-screw 128, thereby moving the pattern 66 toward the rear of the machine a predetermined distance, when the detent on the slide 144 is engaged with a groove in the plate 122 to lock said pattern against movement in either direction. The movement of the truck is then continued in the same direction until it has passed around the left-hand rear corner of said pat-

tern and arrived at a point at the same distance from the front of the machine as it was when the pattern was moved toward the rear. The hand-lever 126 is then moved toward the rear until it is arrested by the stop-screw 127, and the detent on the slide 144 is engaged with a groove in plate 122 to lock said pattern, when the movement of the truck is continued until the starting-point is reached, and the pattern being marked or cut is completed, said produced pattern having a proper graded proportion either larger or smaller than the model-pattern on the machine, according to whether the marker or cutter carrying spindle is set in one of the bars 14 to 18 or one of the bars 12 to 4, except that the leg of the produced pattern will have a greater proportionate height than the pattern on the machine. If a less proportionate height is desired, it can be obtained by readjusting the stop-screws 127 and 128 and reversing the movements of the hand-lever when the model-pattern is to be adjusted.

In some cases it is desirable to produce graded patterns having a greater or less proportionate dimension in the direction of the length of the boot or shoe than the model-pattern, and this may be readily accomplished by slackening the set-screw 51, tightening the set-screw 74, moving the truck along the bottom of the pattern 66 until it reaches the right-hand front corner of said pattern, and then moving the hand-lever 134 toward the right or left, according to whether the proportionate length of the produced pattern is to be diminished or increased, the stop-screw 136 and 137 being previously adjusted to the desired position to limit the movements of said lever, substantially as above described in reference to the hand-lever 126 and stops 127 and 128.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a machine for outlining and grading patterns of different sizes from a single model, the combination with a pantograph mechanism provided with a series of marker or cutter carrying bars of uniformly-varying lengths, each provided with a socket to receive the tool-carrying spindle; a tool-carrying spindle mounted in either of said sockets; a model-pattern mounted in a fixed position near said pantograph mechanism; a revoluble headed spindle mounted in a socket above and in axial line with the socket in one of said tool-carrying bars; a pattern-bearing guide mounted upon and adjustable radially of said spindle-head.

2. In a machine for outlining and grading patterns of different sizes from a single model-pattern, the combination of a pantograph mechanism provided with a series of socketed bars of uniformly-varying lengths; a marker and cutter carrying spindle interchangeably fitted to said sockets; a model-pattern mounted in a normally-fixed but adjustable position near said pantograph mechanism; a supporting-plate between said pattern and pan-

tograph mechanism, and provided with a socket in axial line with one of the sockets in said tool-carrying bars; a headed spindle fitted to and revoluble in the socket of said plate; a revoluble guide-truck supported upon and adjustable radially to the axis of said headed spindle to a greater or less degree of eccentricity thereto.

3. In a machine for outlining and grading patterns of different sizes from a single model-pattern, the combination of a pantograph mechanism provided with a series of socketed bars of uniformly-varying lengths; a model-pattern pivotally mounted near said pantograph mechanism; a guide supported by said pantograph mechanism and arranged to bear against said pattern and thus control the movement of the pantograph; means for reversing the position of said pattern; and means for locking said pattern in either of two fixed positions.

4. In a machine for outlining and grading patterns of different sizes from a single model-pattern, the combination with a pantograph mechanism provided with a series of socketed bars of uniformly-varying lengths; a model-pattern mounted near said pantograph mechanism; a guide carried by said pantograph mechanism and arranged to bear against said pattern to control the movements of said pantograph mechanism; a lever for adjusting said pattern to a predetermined position toward or from the front of the machine; and similar lever for adjusting said pattern toward the right or left of said machine to a predetermined position, and means for locking said levers in said adjustable positions.

5. In a machine for outlining and grading patterns of different sizes from a single model-pattern, the combination of a pantograph mechanism provided with a series of socketed tool-carrying bars of uniformly-varying lengths; the bar *j* for supporting the front ends of said tool-carrying bars; the laterally-movable bar *n* arranged at right angles to the front of the machine; the carriage *m* mounted upon and movable endwise of said bar *n*; a fulcrum-pin connecting the bar *j* and the main bar *s* of the pantograph together and to said carriage; a model-pattern arranged near said pantograph mechanism; a guide carried by said pantograph mechanism and arranged to bear against said pattern to control the movements of said pantograph mechanism; a pattern-outlining tool carried by either one of said socketed bars; and means for readily adjusting said bar *n* and carriage *m* to a predetermined position in a direction parallel to the front of the machine.

6. The combination with the bars *s*, *w*, *x* and 1 of a pantograph, the bar 2 and a plurality of cutter or marker carrying bars, pivoted to said bars 1 and 2 in positions parallel to each other and to the bars *w* and *x* and of uniformly-varying lengths, of the bar *j* pivoted at one end to said bar *s*, and supported at its other end upon the frame *g*; the slide

$z$  hinged to the bar  $w$ , and movable endwise upon said bar  $j$ ; the laterally-adjustable bar  $n$ ; the carriage  $m$  carrying the pivot connecting said bars  $j$  and  $s$  and movable endwise on said bar  $n$ ; the bar 87 pivoted at one end to the bar  $s$ ; the bar 86 pivoted to a freely-movable fulcrum; the two pairs of pivotally-connected slides 88, 89, and 90, 91, by which said bar 86 is adjustably connected to the bars  $x$  and 87 respectively.

7. The combination in a pantograph-machine of the bars  $j$  and  $s$  pivoted together and to a carriage movable in a direction at right angles to the front of the machine; the bars  $w$  and  $x$ ; a slide mounted upon and movable endwise of said bar  $j$  and pivoted to the front end of the bar  $w$ ; the slide  $t$  mounted upon and adjustable endwise of the bar  $s$ ; slides fitted to and adjustable endwise of the bars  $w$  and  $x$ , and pivoted to the slide  $t$ ; a plurality of bars connecting said bars  $w$  and  $x$ ; a plurality of tool-carrying bars of variable lengths pivoted to the bars connecting the bars  $w$  and  $x$  and resting at their front ends upon the slide  $z$ ; the rod 43 arranged above and parallel to the front of the machine and to the bed or table of the machine; the arm 44; the rod 85 suspended from said arm 44; a sleeve or slide mounted upon and freely movable on said rod in a direction parallel to the rod 43; the bar 86 pivoted to said sleeve; the bar 87 pivoted at its front end to the bar  $s$ ; and suitable pivoted slides for adjustably connecting said bar 86 to the bars  $x$  and 87, as set forth.

8. In a machine for outlining and proportioning or grading patterns of different sizes from a single pattern, the combination with a pantograph having a series of marker or cutter carrying bars of different lengths arranged parallel to each other, and the bar  $j$  pivoted to the main bar  $s$  of the pantograph, and supporting the front ends of said cutter-carrying bars, a bed for supporting the material to be operated upon; a frame surrounding said bed and supporting the working parts of the machine; the laterally-movable bar  $n$  arranged at right angles to the front of said bed; a carriage mounted upon and movable endwise of said bar  $n$  and carrying the pivot connecting said bar  $j$  to the main bar  $s$  of the pantograph; the rod 43 arranged above and parallel to said bed; the bar 81 suspended from the arm 44, arranged at right angles to said rod 43 and provided with a longitudinal groove in its under side; a bar fitted to and adjustable end-

wise in said groove; the guide-rod 85 secured to said bar at right angles thereto; a sleeve or slide mounted upon and freely movable endwise of said rod 85; the bar 87 pivoted at its front end to the bar  $s$ ; the bar 86 pivoted to the sleeve on the rod 85; the pivoted slides 88, 89, and 90, 91, for adjustably connecting said bar 86 to one of the bars of the pantograph proper and to the bar 87 respectively, as set forth.

9. In a machine for outlining and grading patterns of different sizes from a single model, the combination of a pantograph mechanism; a model-pattern arranged near said pantograph mechanism; the bar 33; the spindle 75 set in a socket in said bar 33 and provided with the slotted head 76; the block 78 fitted to and adjustable endwise of the slot in said head; the pin 79 set in or formed integral with said block; a guide-truck mounted upon said pin; and means for adjusting said pin and truck to a greater or less distance from the axial line of the spindle 75.

10. In a machine for grading patterns, the combination of a pattern-outlining tool; means including a guide-wheel for controlling the movements of said tool; a model-pattern against which said guide-wheel bears; and detent-levers for adjusting said model-pattern in either direction from its normal position, in a line parallel to the front of the machine, and also at right angles thereto, and plates provided with detent-grooves to determine the distance to which said levers may be moved and to lock them in said adjusted position.

11. In a machine for grading patterns, the combination of a pattern-outlining tool; mechanism for supporting said tool; a model-pattern; a guide carried by said tool-supporting mechanism and constructed to bear against and cooperate with said pattern to control the movements of said outlining-tool; a swiveling carrier for said guide; and means for adjusting said guide to a greater or less degree of eccentricity to the axis of its carrier.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 19th day of June, A. D. 1899.

LOUIS COTE.  
LOUIS E. COTÉ.

Witnesses:

F. X. A. BOISSEAU,  
J. P. BERZMET.