

(No Model.)

4 Sheets—Sheet 1.

L. COTÉ.
PANTOGRAPH.

No. 469,775.

Patented Mar. 1, 1892.

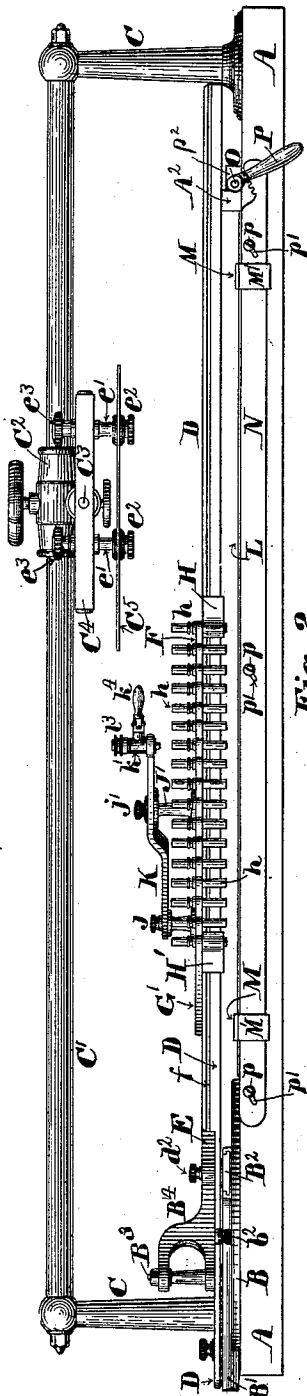


Fig. 2.

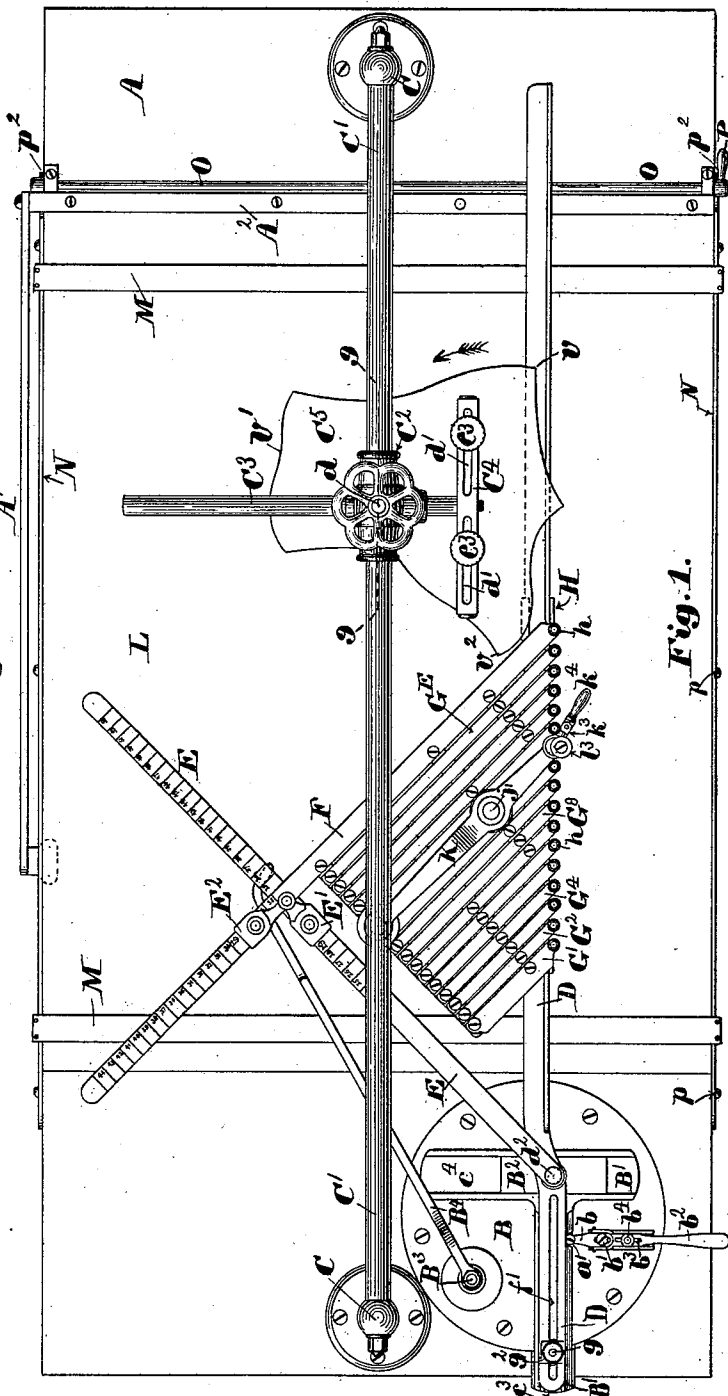


Fig. 1.

Witnesses:

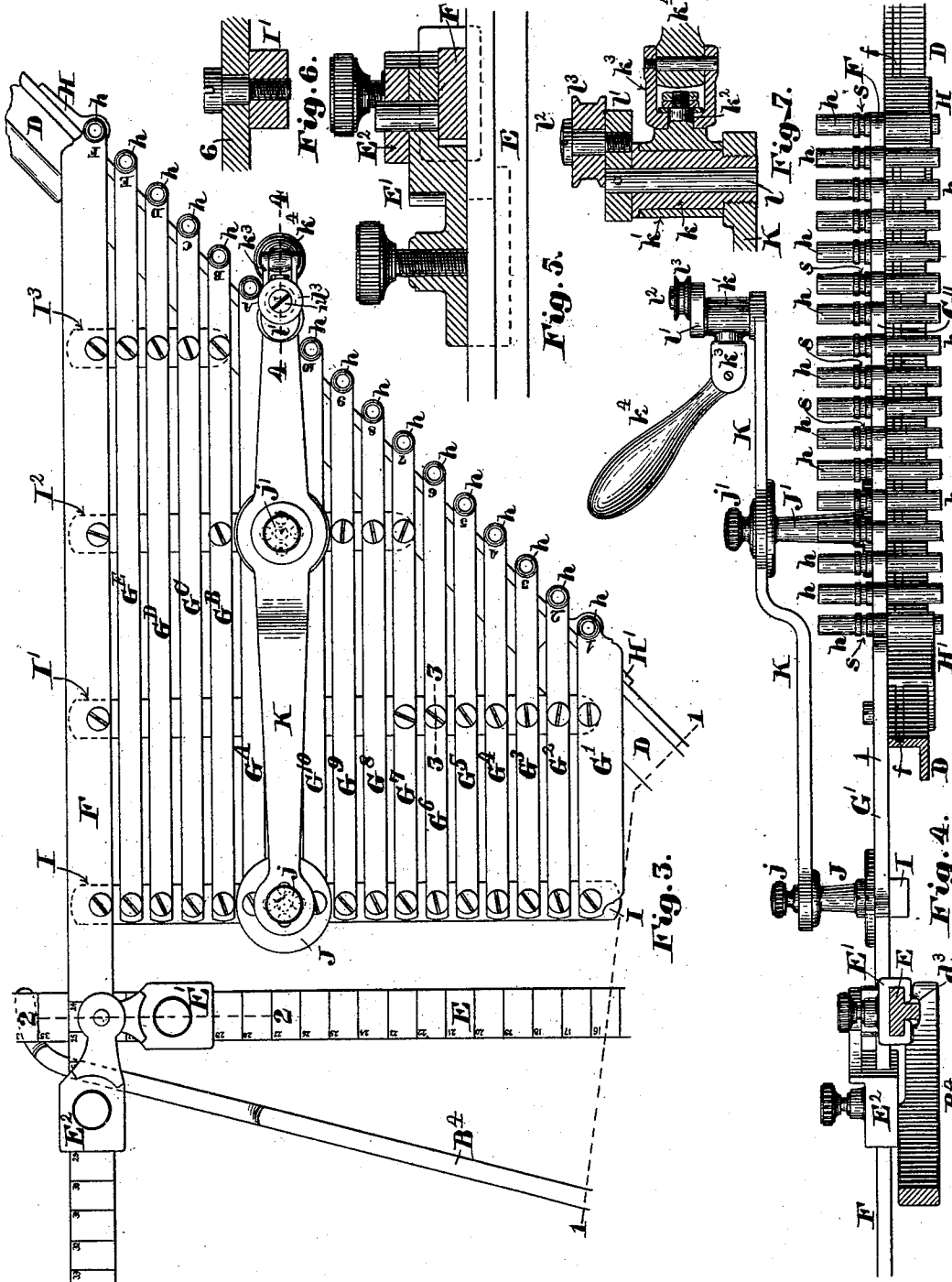
Walter E. Lombard.
J. Clifford Entwistle

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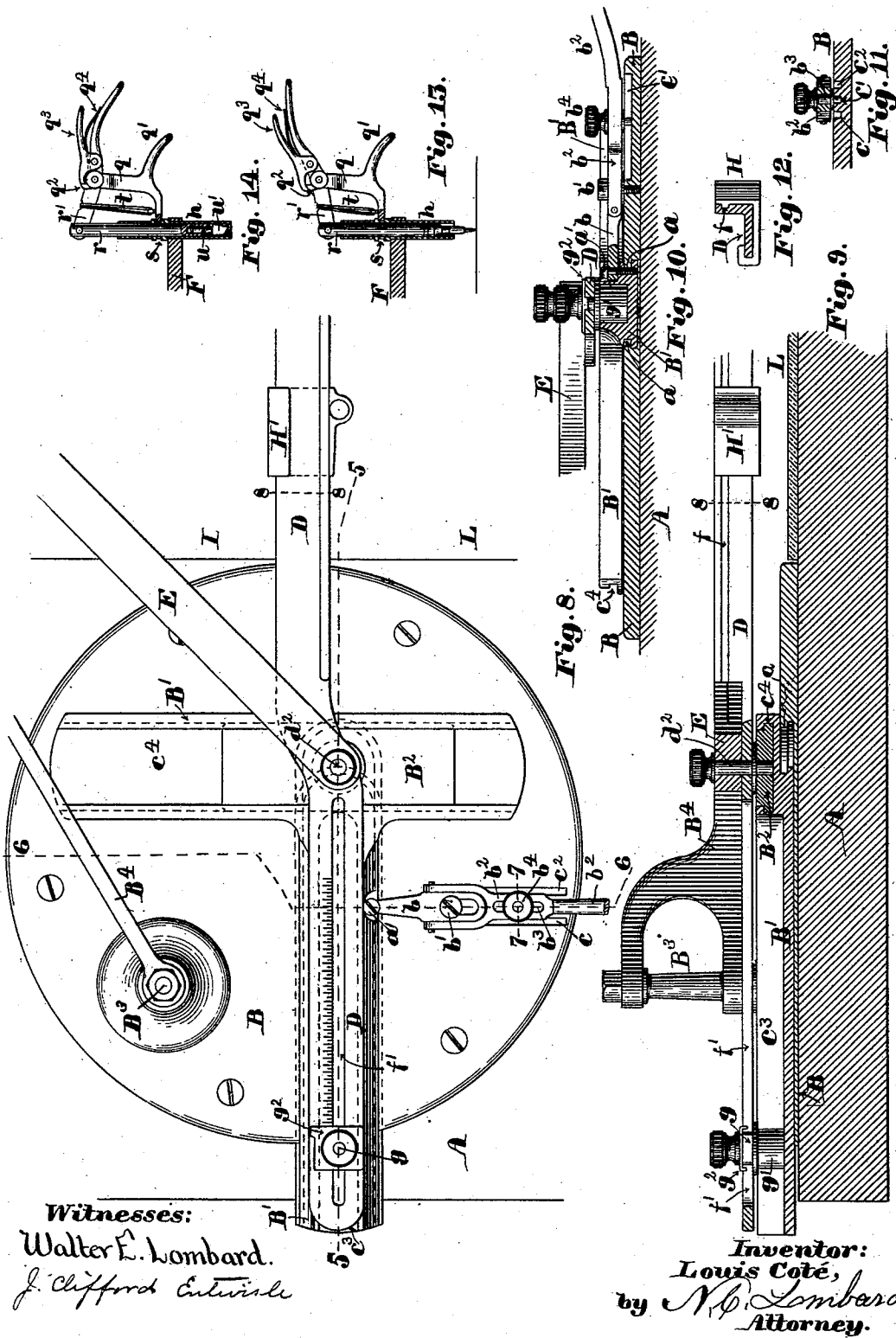
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4 Sheets—Sheet 3.

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4 Sheets—Sheet 4.

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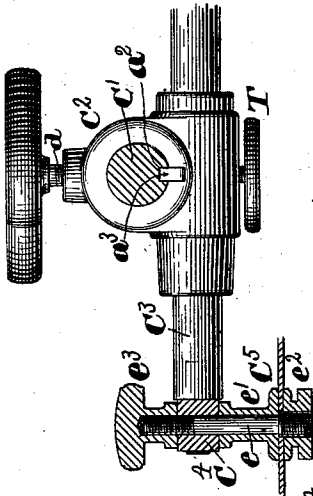


Fig. 16.

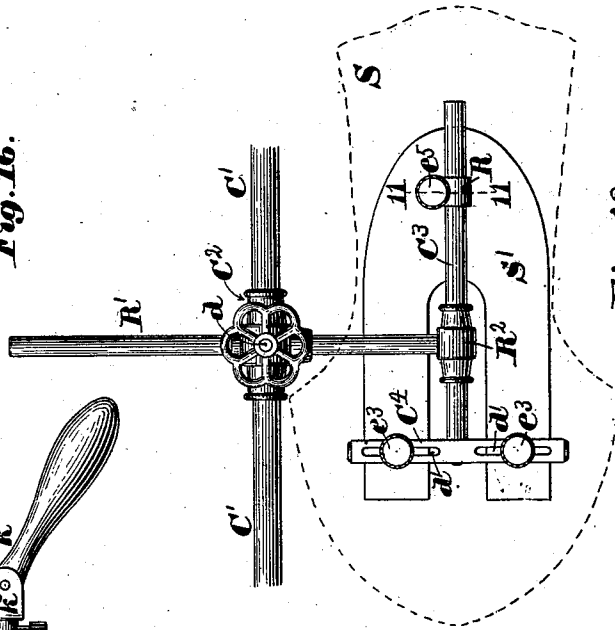


Fig. 18.

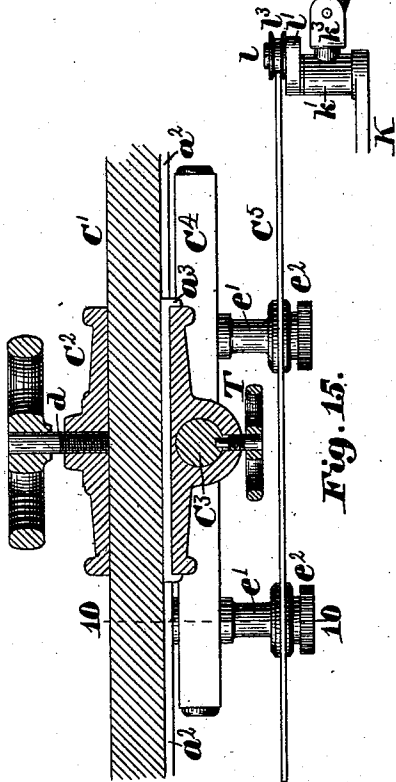


Fig. 15.

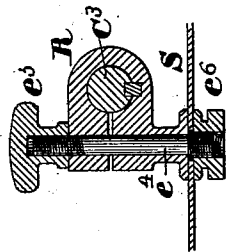


Fig. 19.

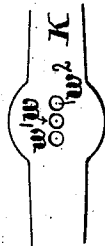


Fig. 17.

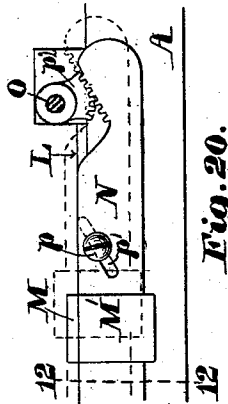


Fig. 20.

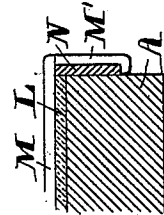


Fig. 21.

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UNITED STATES PATENT OFFICE.

LOUIS COTÉ, OF ST. HYACINTHE, CANADA.

PANTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 469,775, dated March 1, 1892.

Application filed November 2, 1891. Serial No. 410,614. (No model.)

To all whom it may concern:

Be it known that I, LOUIS COTÉ, of St. Hyacinthe, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Pantographs, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to pantographs, and has for its object the adaptation of the pantograph to use in outlining and proportioning boot and shoe patterns and drawing the same on paper or cutting the same from paper or other suitable material.

In the manufacture of boots and shoes a great number of sizes and styles have to be made to meet all the requirements of the various purchasers, and in order to withstand the sharp competition in the business it is necessary that economy be exercised in the cutting of the stock, and therefore patterns have to be made for each size and style of upper. A very important item in the production of these patterns is the proper outlining and proportioning of all the sizes of a given style from a single pattern, and this when done by hand by an expert draftsman is an expensive operation. To obviate the necessity of employing such skilled labor to do this work and to render it practical for any intelligent workman to produce his own patterns, or, if desired, to cut his own uppers, all correctly proportioned and scaled up or down from a single pattern, is the object of my present invention; and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the drawings, and to the claims hereinafter given, and in which my invention is clearly pointed out.

Figure 1 of the accompanying drawings is a plan of a pantograph embodying my invention with the pencil and knife holder omitted. Fig. 2 is a front elevation of the same. Fig. 3 is a plan of a portion of the same, parts drawn to an enlarged scale. Fig. 4 is a sectional elevation of the same, the cutting plane being on line 1 1 on Fig. 3. Fig. 5 is a sectional elevation, the cutting plane being on line 2 2 on Fig. 3 and looking toward the left of said Fig. 3. Fig. 6 is a section on line 3 3

on Fig. 3. Fig. 7 is a section on line 4 4 on Fig. 3, enlarged. Fig. 8 is a plan of another portion of the machine, drawn to an enlarged scale. Fig. 9 is a vertical section on line 5 5 on Fig. 8 and showing portions of certain parts in elevation. Fig. 10 is a vertical section on line 6 6 on Fig. 8, looking toward the right and showing the adjusting-lever in elevation. Fig. 11 is a vertical section on line 7 7 on Fig. 8. Fig. 12 is a sectional elevation, the cutting plane being on line 8 8 on Figs. 8 and 9 and looking toward the right of said figures. Fig. 13 is a vertical section of the pencil-carrying socket and showing the pencil-manipulating levers and spring in elevation. Fig. 14 is a similar view of the same socket with the cutting-knife and its controlling lever and spring applied thereto. Fig. 15 is a section of the pattern-holding devices on line 9 9 on Fig. 1, looking toward the front of said figure. Fig. 16 is a section on line 10 10 on Fig. 15, looking toward the right of said figure. Fig. 17 shows in plan a portion of the center of the guide-arm and the top of the stud to which it is secured. Fig. 18 is a plan of another modification of the pattern-holding devices. Fig. 19 is a vertical section on line 11 11 on Fig. 18, enlarged. Fig. 20 is a front elevation of a portion of the devices for lifting the paper-holding bars, and Fig. 21 is a section on line 12 12 on Fig. 20.

In the drawings, A is a rectangular table made, preferably, of wood, which may be supported in any suitable manner at a convenient height for operation.

B is a metal disk or plate having cut through it an open slot extending about three-fourths of the distance across it a little to one side of its center, the side walls of said slot being provided with inwardly-projecting lips *a a*, to which is fitted, so as to be movable thereon, the three-armed or T-shaped bar or plate *B'*, to which is pivoted at *a'* the inner end of the lever *b*, fulcrumed upon the pin *b'*, set in the disk B. The disk B is firmly secured to the table A and has formed in its upper surface a plurality of grooves *c*, *c'*, and *c''*, arranged at right angles to the line of movement of the bar *B'*, and the lever *b* has pivoted thereto, between its fulcrum-pin and the bar *B'*, the forked end of the handle *b''*, provided with the slot *b''*, in which is adjustably secured the pin

b^4 , the lower end of which engages one of the slots c , c' , or c^2 when the free end of the handle b^2 is depressed. The table A also has firmly secured thereto the supporting-bars A' and A^2 at the rear edge and right-hand end, respectively, and has secured to its upper surface, one near each end thereof, the standards C, the upper ends of which are connected together by the rod C' , in the under side of which is formed the longitudinal groove a^2 , said rod C' having mounted thereon, so as to be adjustable endwise thereof, the sleeve C^2 , which is provided with the spline a^3 to fit the groove a^2 and the set-screw d to clamp said sleeve in position on said rod C' . The sleeve C^2 has formed therein a socket or bearing at right angles to but below the rod C' , in which is fitted, so as to be movable endwise therein, the rod C^3 , having secured to its front end the bar C^4 , which has formed therein the slots d' d' , in which are adjustably secured by the nuts e^3 the clamping-bolts e and the pendent hubs $e'e'$, to which the metal pattern C^5 is secured by means of the nuts e^2 e^2 , as shown in Figs. 1, 2, 15, and 16. The three-armed bar B' has formed in its upper surface the rectangular groove c^3 and the inverted-T-shaped groove c^4 , arranged at right angles to the groove c^3 , said groove c^4 having fitted thereto, so as to be movable endwise therein, the plate B^2 , to which is pivoted by the common fulcrum-pin d^2 the bars D and E. The bar D has its main body from near the fulcrum-pin d^2 to its right-hand end made L-shaped, and has formed in its front side the shallow longitudinal groove f , as shown in Figs. 9 and 12. The horizontal web portion of the bar D extends beyond the fulcrum-pin d^2 toward the left of Figs. 1 and 8, and has formed therein the longitudinal slot f' , in which is adjustably secured the stud g , upon the lower end of which is mounted the roll g' , which fits into the groove c^3 in the bar B' , as shown in Figs. 9 and 10. The stud g also carries the rectangular plate g^2 , one edge of which serves as an index to assist in the proper adjustment of the stud in said slot, the bar D having formed therein a series of graduations, as shown in Fig. 8. The bar D is made of sufficient length to rest at its free right-hand end upon the bar A^2 , by which and the bar A' it is maintained at a suitable distance above and parallel to the table A, as shown in Figs. 1 and 2. The bar D has an offset or bend in it near the fulcrum-pin d^2 , so that the pencil-holding sockets (to be hereinafter referred to) may extend below said bar and at the same time be in line with the centers of the fulcrum-pins d^2 and g , as shown in Fig. 1. The bar E is T-shaped in cross-section, the central rib being upon its under side, as shown in Fig. 4, and rests in a notch d^3 in the radius-arm B^1 , mounted upon and movable about the vertical stud B^3 , set in the plate B, as shown in Figs. 1, 2, 4, and 8. F is a rectangular bar arranged to rest upon the bars D and E in a position at a variable angle thereto and adjustably con-

nected thereto by means of the two slides E' and E^2 , fitted to and clamped upon said bars E and F, respectively, and pivoted together by a suitable pin, as shown in Figs. 1, 3, 4, and 5. The front end of the bar F is connected by the pencil and knife socket h to the slide H, fitted to and movable endwise of the bar D, as shown in Figs. 1, 2, 3, 4, and 12. The bar F has pivoted to its under side a series of bars I , I' , I^2 , and I^3 , upon which rest a series of socket-carrying bars, as G^1 , G^2 , G^3 , G^4 , G^5 , G^6 , G^7 , G^8 , G^9 , G^{10} , G^{11} , G^A , G^B , G^C , G^D , and G^E , each of which is pivoted to at least two of the supporting-bars I , I' , I^2 , or I^3 , and the front end of the bar G^1 is connected by its pencil-socket to the slide H' , as shown in Fig. 4. The bars E and F are graduated, so as to facilitate the correct adjustment of the slides E' and E^2 thereon.

J and J' are two standards mounted upon the bars I and I^2 above the bars G^9 , G^{10} , and G^A and having secured to their upper ends the arm K by means of the thumb-screws j and j' in such a manner that it may be adjusted in a direction parallel to a line drawn through the centers of the several pencil or knife holding sockets h , said arm having a series of holes formed therein to receive the shanks of the screws j and j' , as shown in dotted lines in Fig. 3, the upper end of said standards J and J' having formed therein a corresponding number of threaded holes to receive the threaded ends of said screw-shanks.

The arm K has set in its front end the tubular stud k , upon which is mounted the sleeve k' , provided with a hub or shank k^2 , upon which is secured by suitable nuts the U-shaped swivel k^3 , to which is pivoted the handle k^4 , by which the machine is manipulated. The stud k has mounted therein the spindle l , to the upper end of which is secured the crank l' , having the crank-pin l^2 , upon which is mounted the truck l^3 , having formed therein a peripheral groove, the bottom of which is directly over the center of the spindle l , which in turn is directly over the center of one of the pencil-sockets or in the vertical plane cutting through the series of pencil-sockets. In operating the instrument the truck l^3 is placed with its grooved periphery in contact with the edge of the pattern C^5 and kept in contact therewith, while it is passed entirely around its perimeter.

L is a plate of glass resting upon the table A between the disk B and the bar A^2 and secured in position in any convenient manner, and M M are two clamping-bars for holding the paper or leather in position on said glass, said bars being provided at each end with a downwardly-projecting hook M' , which engages with the lifting-bar N, secured one to the front edge and one to the rear edge of the table A by means of the screw-studs p , which pass through oblique slots p' , cut through said bars N and screwed into the table A, as shown in Figs. 1 and 2. Each of the

bars N has formed in its upper edge near one end thereof a series of rack-teeth arranged in a plane parallel to the center lines of the slots p' , with each of which the teeth of a segment of a gear mounted upon the rocker-shaft O, mounted in bearings on the table A, engage, as shown in Fig. 20. The shaft O has secured upon one end thereof the lever P, by which it may be rotated to raise or lower the bars M M.

In one of the sockets h is placed a pencil or knife holding spindle r , to the upper end of which is pivoted one end of the lever r' , fulcrumed on the stand q , which has a forked arm to embrace the peripheral groove s in the socket-tube h with an outwardly-projecting finger-receiving arm q' and the latch-catch q^2 . The lever r' projects outward beyond its pivotal connection to said stand q and has pivoted thereto the latch-lever q^3 , the outer arm of which is forced upward by the spring q^4 to cause its inner end to engage with the catch q^2 when the outer arm of the lever r' is depressed to raise the pencil or knife from contact with the paper or the glass plate against the tension of the spring t , all as shown in Figs. 13 and 14.

The pencil is mounted in a tubular socket constructed and arranged to clamp the pencil-lead in the same manner as the well-known tubular drawing-pencil, and is shown in elevation in Fig. 13.

In Fig. 14 the knife for cutting patterns is shown. The spindle r has a cylindrical hole drilled in its lower end, in which is inserted the shank u of the knife u' in such a manner that it is free to revolve therein, but will not fall out when the spindle is raised, as shown in Fig. 14. The knife has an inclined cutting-edges so formed that the end of the knife which rests upon the glass when in action is at one side of the axial line of the shank of said knife, so that it will automatically maintain a position with its cutting-edge to the front in whatever direction it may be moved.

The pattern shown in Fig. 1 and marked C^5 is for a boot-quarter; but in order to adapt the machine to draw or cut patterns of long-legged boot-fronts or shoe-vamps a modification of the supports for the patterns is necessary, as follows: The pattern C^5 may be readily supported by two pendent attachments to the slotted bar C^4 ; but if a long-legged boot-front pattern or a shoe-vamp pattern is to be drawn or cut three pendent supports for the pattern are necessary and the pattern must be arranged with its center line extending in the direction of its greatest dimension parallel to the rod C' , as shown in Fig. 18. To this end the rod C^3 is removed from the bearing in the lower part of the sleeve C^2 , and the rod R' , having the sleeve-like hub R^2 at one end, is fitted in said bearing, and the rod C^3 is inserted in the sleeve R^2 and has adjustably secured thereon the split sleeve R , which is secured in position by the clamping-bolt e^4 and nut e^5 , and the vamp-pattern S' or the

boot-leg pattern S (shown in dotted lines in Fig. 18) is secured to the pendent supports e' e' and R , as shown in Figs. 2 and 18. The rods C^3 and R' are prevented from turning about their axes in their bearings by a set-screw, as T , screwed into their bearings and entering a longitudinal groove in said rods, as shown in Figs. 15 and 16.

The operation of my invention is as follows: The several parts of the apparatus being in the positions shown in Figs. 1 and 2, the first operation is to move the free end of the lever P upward into a horizontal position, so as to move the bars N obliquely upward, and thereby lift the bars M from contact with the glass plate L, when the paper or other material to be drawn upon or cut is placed in position on the glass plate and beneath the bars M M, and then the lever P is returned to the position shown in Fig. 2, when the bars M M will be forced down upon the material to be acted upon, so as to hold it firmly in position. If a pattern is to be drawn upon paper, the pencil and its holder r (shown in Fig. 13) are inserted in the tubular socket h appropriate to the size of pattern that it is to draw, and the stand q has its forked arm fitted to the groove s of said socket, as shown in Fig. 13. If the pattern is to be cut from paper or other material, the knife u and its holder r , stand q , and attachments are applied to the same socket in place of the pencil. The pattern C^5 , S , or S' is adjusted to the proper position above the socket-carrying bars, and the slides E' and E^2 are adjusted on the bars E and F to the graduation appropriate to the size of pattern on the machine—i. e., at 30, if No. 5 pattern is used, or 29, if No. 4 pattern is used, as in the drawings. The truck l^3 is then brought into position, with its periphery at the bottom of its groove in contact with the pattern C^5 at a suitable point, as v . The lever q^3 is then disengaged from the catch q^2 and the tension of the spring t will cause the pencil or knife to be brought into contact with the material to be acted upon. The operator then moves the truck l^3 around the pattern C^5 by means of the handle k^4 in the direction indicated by the arrow on Fig. 1, when the pencil or knife, if set in the tubular socket h , fitted in the bar G^{11} , directly beneath the truck-carrying bar K, will describe on or cut from the paper or other material an exact duplicate in outline of the pattern on the machine. To draw or cut patterns of larger or smaller sizes than the pattern on the machine, the pencil or knife is placed in the socket corresponding to the number of the boot for which the pattern is intended. If this were done with the slide-plate B^2 made fast or immovable, and the fulcrum-pin g removed, so that the bar E and the pencil-carrying bars would be moved about a fixed fulcrum, like the ordinary pantograph, each of the different sizes drawn would be reduced or increased in size in a true mathematical proportion in all directions; but as

the patterns for the smaller sizes do not diminish in size in the same proportion throughout, or, in other words, as the dimension of the pattern in the direction of the height of the boot or shoe requires to be reduced less in proportion than in the direction of the length of the shoe, it becomes necessary to make some provision in the machine for giving this varying proportion. This provision consists in the employment of the sliding plate B^2 , connected by the common fulcrum-pin d^2 to the bars D and E, the slotted extension of the bar D, the fulcrum-pin g , and the groove c^3 in the plate B' . When the plate B^2 is free to move in the groove c^4 , so that the bar D will move about the fulcrum-pin g , a pattern will be drawn or cut by moving the truck $\mathcal{B}$ about the pattern C^5 , that is increased or reduced in a certain proportion in the direction of the length of the rod C, and in a certain other proportion in a direction at right angles to said rod, the amount of the variation of said two proportions being determined by the distance from the fulcrum-pin d^2 , at which the fulcrum-pin g is clamped to the bar D. In certain cases it is desirable to make the leg portion of the pattern of a greater proportionate dimension in the direction of the length of the boot or shoe than the foot independent of the variation in the proportions produced by the movements of the members of the pantograph about the two fulcrum-pins d^2 and g ; and to this end the lever $b\ b^2$, pin b^4 , and grooves c , c' , and c^2 are employed as follows: When it is desired to draw or cut a pattern of a smaller size than the pattern on the machine, but having a fuller leg in proportion to its height without increasing the proportion of the length of the foot, the lever $b\ b^2$ may be in the position shown in the drawings, with the pin b^4 in the groove c' , or it may be adjusted to the left of Fig. 1, with the pin b^4 in the groove c . The pencil or knife is fitted to the proper socket h . The wheel $\mathcal{B}$ is moved into contact with the pattern C^5 —say at v —and moved around the pattern in contact therewith until the point v' is reached, when the lever $b\ b^2$ is moved about its pivot by first raising the handle b^2 , and the pin b^4 is made to engage the groove c^2 , which operation causes a movement of the plate B' with the bars D E F and the other socket-carrying bars a certain distance toward the left of Fig. 1, thus adding an equal amount to the dimension of the leg in that direction. The operator then moves the truck $\mathcal{B}$ around the pattern in the same direction until the point v^2 is reached, when the lever $b\ b^2$ is moved back to its original position, and then the truck $\mathcal{B}$ is moved to the starting-point v to complete the pattern. The amount of variation made by the manipulation of the lever $b\ b^2$ may be varied by moving it so as to transfer the pin b^4 from one groove to the next, or from the groove c to the groove c^2 , or by moving the pin b^4 nearer to or farther from the fulcrum-pin b' , so that

the angular movement of said lever necessary to transfer the pin b^4 from one groove to another will be increased or diminished, according to the requirements of the case. The machine, as illustrated in the drawings, is supplied with a No. 4 pattern and the slides E' and E^2 are adjusted on the bars E and F to the graduation numbered 29, which is the proper number if the patterns to be drawn or cut are graded according to the English or American scale, where the variation between the sizes is one-third of an inch; but if the patterns to be drawn or cut are to be graded according to the French scale, in which the difference between the sizes is only about one-fourth of an inch, the slides E' and E^2 should be moved on the bars E and F until they coincide with the graduations numbered 40, when, if the same No. 4 pattern be properly adjusted to a position centrally over the series of pencil or knife carrying bars, a series of patterns may be drawn or cut proportioned according to the French scale. If the pattern to be used on the machine should for any reason be larger or smaller than No. 4, the slides E' and E^2 would have to be moved on the bars E and F as many divisions above or below where they are now set if English sizes are to be proportioned, or above or below No. 40 if French sizes are to be drawn or cut, as the pattern on the machine is sizes larger or smaller than No. 4. It must be understood that the graduations on the bars E and F are at a distance apart equal to the distance from the center of one pencil-carrying bar to the center of the next pencil-carrying bar and that said graduations are so arranged thereon and numbered that the graduations coinciding with the ends of the slides E' and E^2 shall indicate the number of divisions on the bars E and F between the pivotal connection of said slides and the center of the fulcrum-pin d^2 and the center of the pencil-socket in the bar F, respectively. This adjustable pivoting of the bars E and F, whereby the whole series of pencil-carrying bars may be moved bodily to greater or less distance from the fulcrum-pin d^2 without changing their relations to each other, thus rendering it possible to adapt the machine to work from different-sized original patterns in grading patterns to the same scale or to grade patterns to different scales from the same pattern, is a very important feature of my invention, and as far as my knowledge extends is entirely new.

The machine may be adapted to draw or cut patterns for half-sizes by adjusting the pins j and j' in the proper holes in the bar K and in the studs J and J' . The studs J and J' are set centrally over the bar G^{11} , and in the upper end of each are formed three holes u^3 , u^4 , and u^5 , the hole u^3 being in the center and directly above the center of the bar G^{11} , the hole u^4 being directly over the center of the space between the bars G^{10} and G^{11} , and the hole u^5 being directly over the center of

the space between the bars G^{11} and G^A . The bar K has formed therein two series of three holes w , w' , and w^2 , arranged as shown in Fig. 17. When the machine is adjusted as shown in the drawings, the pins j and j' are passed through the holes w into the holes w^3 in the studs; but if it is desired to draw or cut half-sizes, said pins are passed through the holes w^2 in the bar K and into the holes w^4 in the studs or through the hole w' in the bar or arm K and into the hole w^5 in the studs J and J'. It will be observed by referring to Fig. 17 that the holes in the arm K in the longitudinal central line of said arm and that the holes in the studs J and J' are arranged in rows at right angles to said center line of the arm K, and that in making the adjustments of said arm as described the axis of the crank-shaft in the end of the arm K will be moved a distance equal to one-half the distance between the centers of two contiguous pencil-sockets and in the vertical plane which cuts through the row of said sockets. The amount of variation in the proportion of the width of the boot-leg pattern to the height of the same may be varied by adjusting the fulcrum-pin g to a greater or less distance from the pin d^2 independent of the manipulation of the lever b b^2 .

I claim—

1. In combination with the four bars E, F, G' , and I' of an ordinary pantograph, the bar I, a plurality of bars pivoted to said bars I and I' in positions parallel to each other and to the bars F and G' and each provided with a pencil-carrying socket at a different distance from the bar I to any of the other bars, a bar for supporting the front or pencil-carrying ends of the bars F and G' just in the rear of the pencil-carrying sockets and parallel to the line of said sockets, two slides or clips mounted on said bar so as to be freely movable endwise thereof and pivoted one to the front end of the bar F and the other to the bar G' , said supporting-bar being pivoted to one end of the bar E, and a bar or bars and a pivotal radius-arm for supporting the movable ends of said supporting-bar and the bar D, respectively.

2. The combination, with the bars E, F, G' , and I' of an ordinary pantograph, of the bar D, pivoted to one end of the bar E and constructed and arranged to support the front ends of the bars F and G' at one side of said pivotal connection and extending beyond said pivot in the opposite direction and having formed in said extension a longitudinal slot, a slotted arm secured to the table or bed of the machine parallel to the front edge thereof, an adjustable fulcrum-pin mounted in the slot in said lever D and projecting into the slot in said bar, a pair of slides or clips embracing and adjustable endwise of said bar D and pivoted one to the front end of each of the bars F and G' , and a pencil-carrying socket mounted in the front end of each of said bars F and G' .

3. In a machine for outlining and proportioning or grading patterns of different sizes from a single model, the combination, with the four bars D, F, G' , and I' of an ordinary pantograph, of the bar I, arranged parallel to the bar I' and pivoted to the bars F and G' , a plurality of bars of different lengths pivoted to said bars I and I' between the bars F and G' in positions parallel to each other and said bars F and G' , a pencil-socket mounted in the front end of each of the bars F G' and the intermediate parallel bars, all arranged in a line oblique to the bar E, the bar D, pivoted to one end of the bar E and arranged to support the front ends of the bars F and G' and the intermediate parallel bars at one side of said pivotal connection and extending beyond said pivotal connection in the opposite direction and provided with a longitudinal slot extending from a point in close proximity to said pivot to a point some distance outside thereof and fulcrumed upon a stud or pivot constructed and arranged to be adjusted to a greater or less distance from said pivotal connection, a pattern-plate suspended above the pencil-carrying bars, and a guide wheel or truck constructed and arranged to roll in contact with the edge of said pattern-plate with its edge at the point of contact directly over the center of one of the pencil-sockets.

4. In a machine for outlining and proportioning patterns of different sizes from a single model, the combination, with a pantograph having a series of pencil-carrying bars of different lengths arranged parallel to each other, of the bar D, pivoted to the main bar B' of the pantograph and extending beyond or outside of said pivot and having formed therein a longitudinal slot extending from near said pivotal connection to near the end of said extension, a table or bed for supporting the working parts of the machine and the paper or other material to be operated upon, a grooved T-shaped bar or plate mounted upon said table, a fulcrum-pin mounted in the slot in the bar D and extending into the groove in said T-shaped bar and freely adjustable toward and from the pivotal connection of the bars D and E, the plate B², fitted to and movable in a transverse groove in said T-shaped bar and adapted to maintain the pivoted ends of the bars D and E at the desired height above the table, a pivoted radius-arm and a raised bar or bars for supporting the opposite ends, respectively, of said bars at the desired elevation, a pattern-plate suspended above the pencil-carrying bars, a guide-carrying lever or arm detachably mounted directly above one of said pencil-holder-carrying bars, and a guide-carrying wheel or truck mounted upon a revoluble crank carried by said guide lever or arm in such a manner that its point of contact with the pattern will always be in axial line with the center of one of the pencil-holding sockets.

5. In a machine for outlining and proportioning patterns of different sizes from a sin-

gle model, the combination, with the four bars E, F, G', and I' of an ordinary pantograph, a series of pencil-carrying bars of different lengths arranged between and parallel to the bars F and G', a table or bed for supporting the working parts of the machine and the material to be operated upon, the T-shaped bar B, provided with the two grooves c^3 and c^4 , arranged at right angles to each other, said bar being mounted upon said table and movable thereon in the direction of the length of the groove c^3 , the plate B, fitted to and movable endwise in the groove c^4 , the bar D, pivoted at d^2 to the bar E and the plate B² and provided with the slot f , a fulcrum-pin adjustably secured in said slot f and projecting into the slot c^3 in the bar B', the radius-arm B⁴ and the bars A and A' for supporting the movable ends, respectively, of the bars E and D, and means having provision for moving the T-shaped bar B', the plate B², and the pantograph pivoted thereto in a direction parallel to the front of the table and locking it in its adjusted position, substantially as described.

6. In a pantograph-machine, the combination of the bars D E F G' I I' and a series of pencil-carrying bars mounted upon the bars D, I, and I' between the bars F and G', the slot f in the bar D, a table for supporting the working parts of the machine, a pivoted radius-arm and raised bars for supporting the movable ends of the bars E and D, respectively, a bar or plate having a groove in its upper side extending in the direction of the length of the table and parallel with its front side, a fulcrum-pin adjustably secured in the slot f and engaging with the groove in said grooved bar, the pin d , connecting the bars D and E, and means having provision for moving said pivotal connection of the bars D and E in a straight line at right angles to the front edge of the table.

7. The combination, in a pantograph, of the table A, the raised bars A' and A², the T-shaped bar B', having grooves c^3 and c^4 , the plate B², the bars D, E, F, G', I, and I', a series of pencil-carrying bars arranged between and parallel to the bars F and G', the pivot-pin d^2 , connecting the bars D and E to the plate B², the fulcrum-pin g , adjustably secured in the slot f in the bar D and extending into the groove c^3 in the bar B', the rod C', supported above the pencil-carrying bars in a position parallel to the upper surface of the table, the hub or sleeve C², fitted to and adjustable endwise of said rod, the T-shaped pattern-carrier C³ C⁴, adjustably mounted in a bearing in the hub C², the pattern C⁵, suspended from said carrier above the pencil-carrying bars, the arm K, mounted above and movable with one of said pencil-carrying bars, and the truck l^3 , mounted upon a crank-pin revoluble with an axle set in said arm, with its axis directly beneath the periphery of said truck at the bottom of its groove and in axial line with one of the pencil-holding sockets.

8. In a pantograph, the combination, with a series of pencil-carrying bars of different lengths arranged parallel to each other, of a table for supporting the working parts of the machine and the material to be operated upon, a pattern-plate suspended above the pencil-carrying bars, a guiding wheel or truck mounted upon a revoluble crank carried by an arm located above and movable with one of said pencil-carrying bars, and a handle connected to said truck-carrying arm by a universal and swiveling joint as a means of manipulating said arm in carrying the truck around the pattern.

9. In a pantograph-machine, the combination of the table A, the bars N N, provided with the oblique slots p' and at one end with a series of rack-teeth arranged in a plane parallel to the sides of the slots p' , the toothed segments p^2 , the shaft O, the handle P, and the paper-holding bars M M, provided with the hook ends M', substantially as described.

10. In a pantograph, the combination, with the pencil-carrying bar, of the tubular socket h , provided with the peripheral groove s , the pencil or knife carrying spindle r , fitted to be movable vertically therein, the stand q , provided with the arm q' and the catch q^2 stepped in the groove s , the lever r' , fulcrumed in the stand q and pivoted to the spindle r , the locking-latch lever q^3 , and the springs q^4 and t , all constructed, arranged, and operating substantially as described.

11. In a pantograph, the combination of a series of pencil or knife carrying bars of different lengths arranged parallel to each other, the bar C, arranged above said pencil-carrying bar, the bar R', the sleeve R², secured to one end thereof, the rod C³, the slotted bar C⁴, the clamp R, adjustably mounted on said rod C³, the pendent studs $e' e'$, adjustably secured in the slotted bar C⁴, a pattern-plate secured to said studs $e' e'$, and the clamp R, the arm K, the crank l' , carried by said arm K, and the truck l^3 , mounted on the crank-pin, with the periphery of its groove directly over the axis of the shaft of said crank, substantially as described.

12. The combination, in a pantograph-machine, of the bars D and E, pivoted together at d^2 , a series of pencil or knife carrying bars of different lengths arranged parallel to each other and connected together so as to maintain such parallelism, slides connecting two of said pencil-carrying bars to the bar D, so as to be freely movable endwise thereof, and one of said pencil-carrying bars, as F, extending across and beyond the bar E, a series of graduations on each of said bars E and F, and the two slides E' and E², pivoted together and fitted to and adjustable on the bars E and F, respectively, substantially as described.

13. In a pantograph provided with a series of pencil or knife carrying bars of different lengths arranged parallel to each other and a model-pattern arranged above said bars, the combination of the two studs J and J', each

provided with a series of three holes u , u' , and u^2 , the arm K, provided with two series of three holes w , w' , and w^2 , arranged as set forth, the removable pins j and j' , and the
5 crank l' and truck l^2 , carried by said arm K, all constructed, arranged, and operating substantially as described.

In testimony whereof I have signed my

name to this specification, in the presence of two subscribing witnesses, on this 14th day of 10
October, A. D. 1891.

LOUIS COTÉ.

Witnesses:

F. X. A. BOISSEAU,
H. LANGEIER.