

(No Model.)

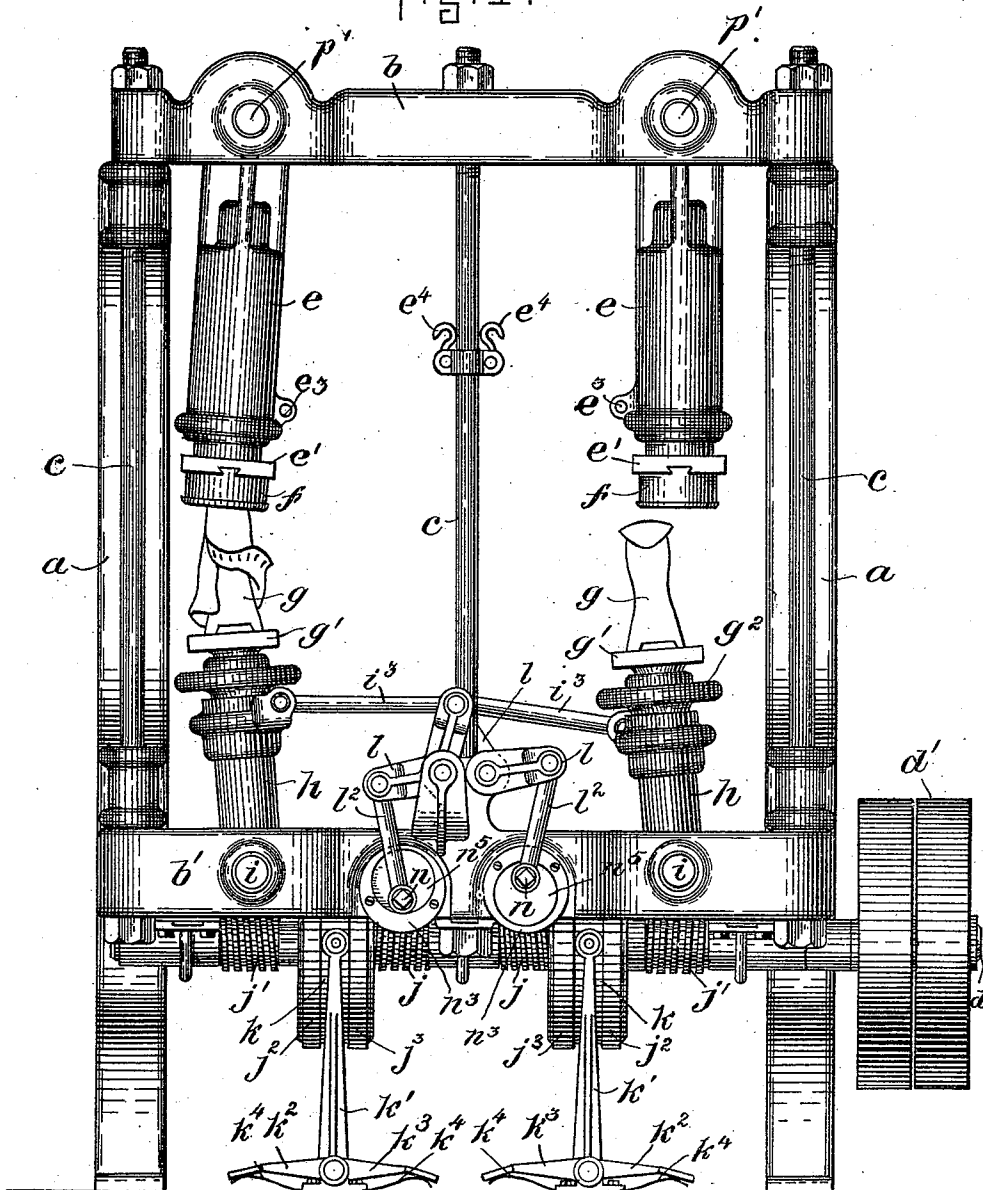
6 Sheets—Sheet 1.

E. C. JUDD.
SOLE LEVELING MACHINE.

No. 554,067.

Patented Feb. 4, 1896.

Fig. 1.



WITNESSES.

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(No Model.)

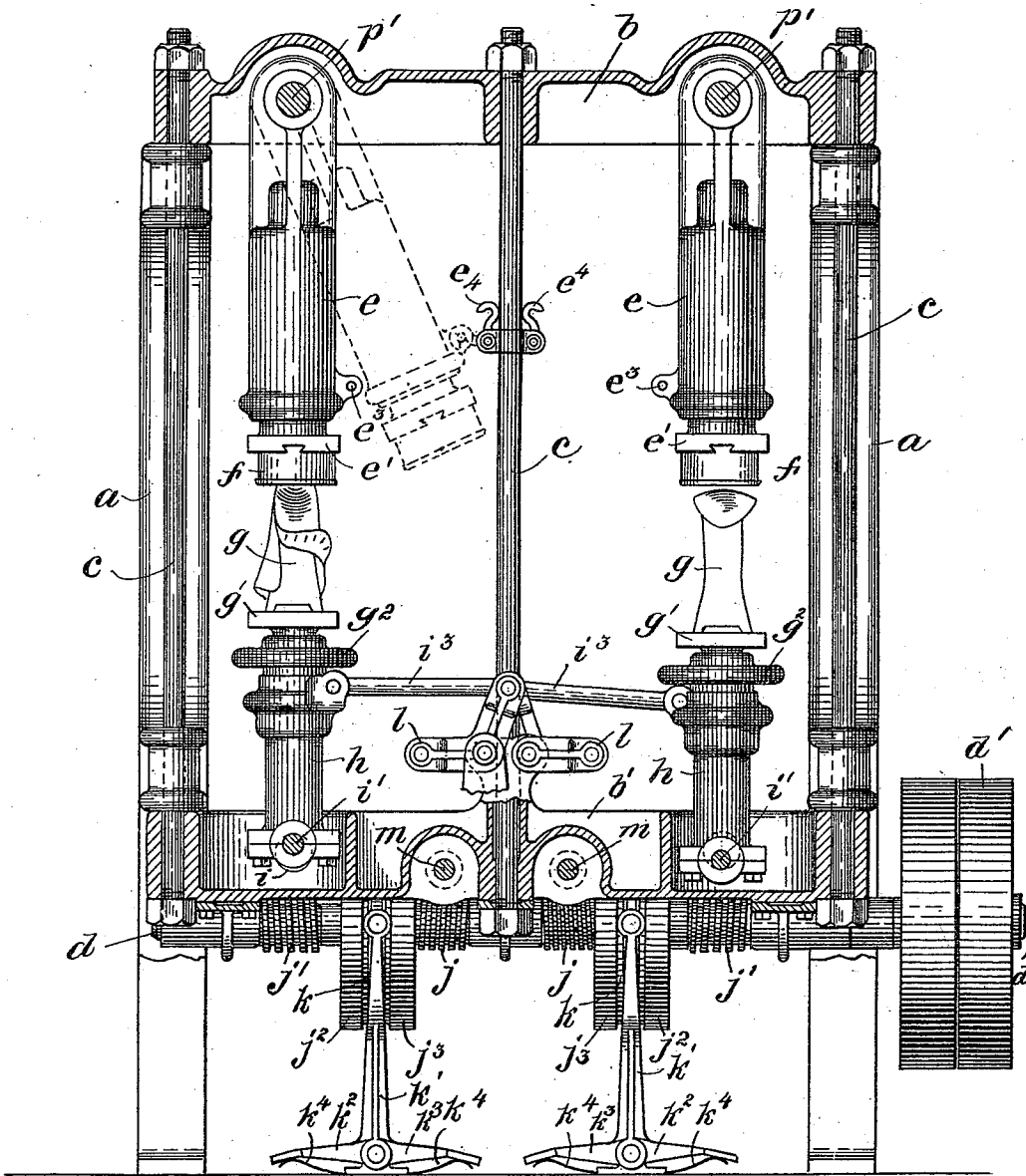
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Fig. 2



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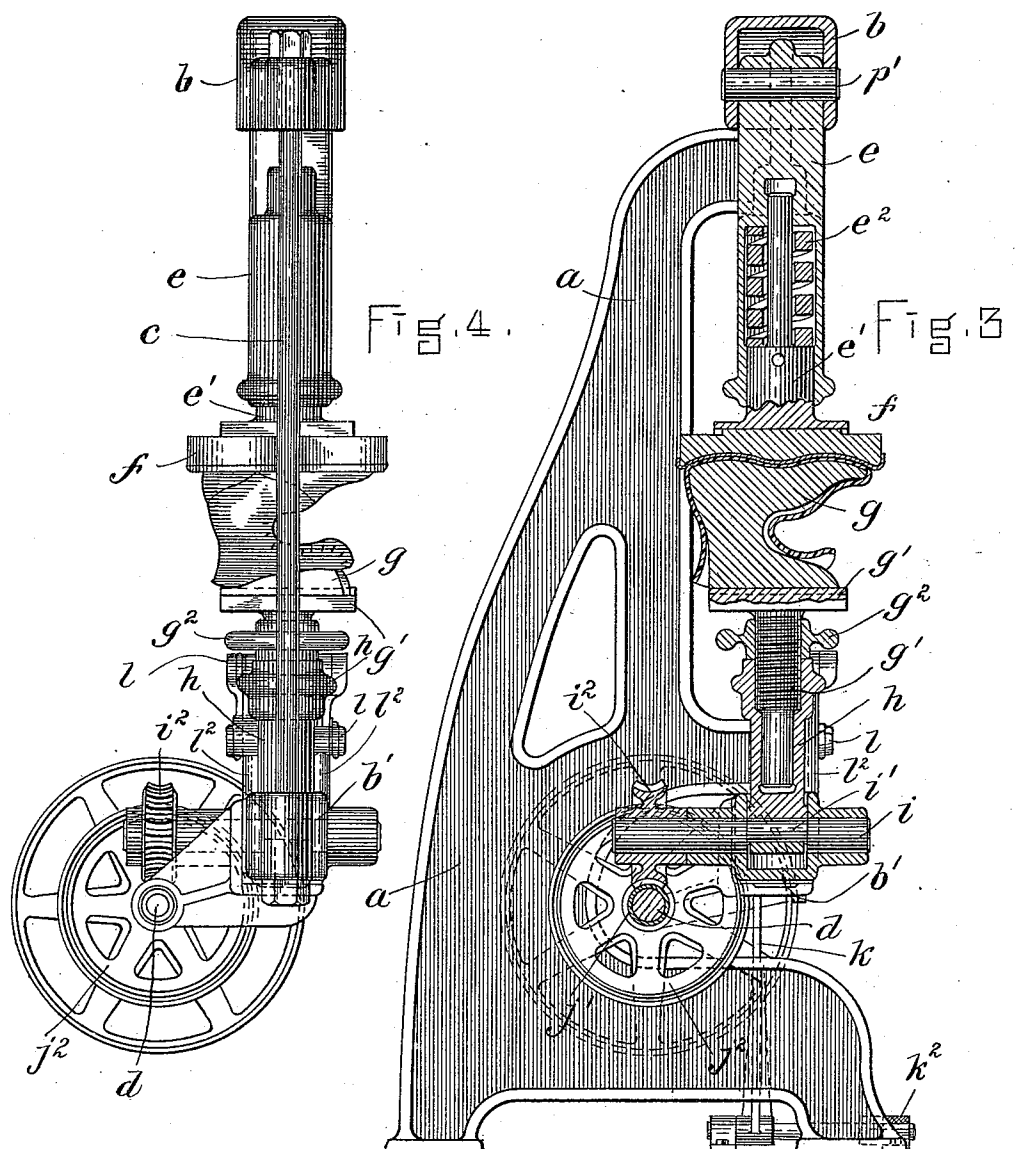
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Patented Feb. 4, 1896.



WITNESSES.

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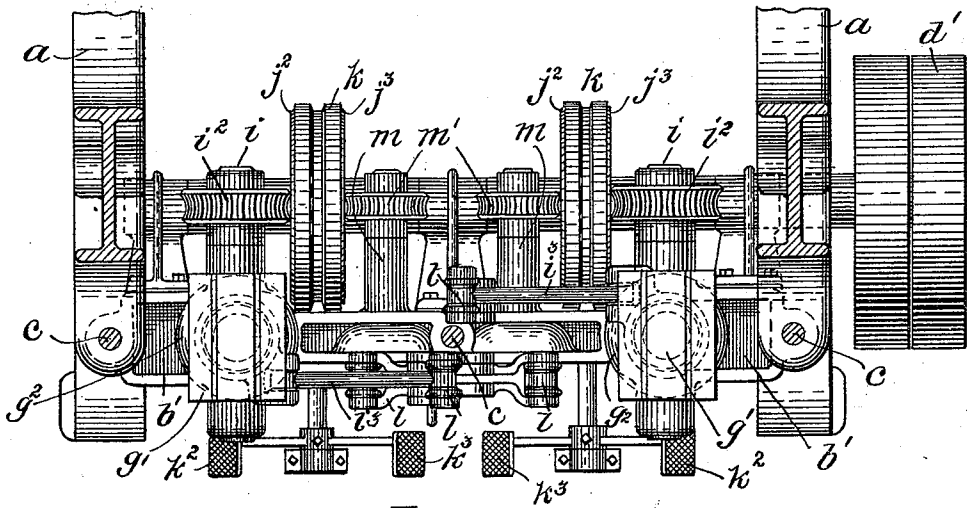


Fig. 5.

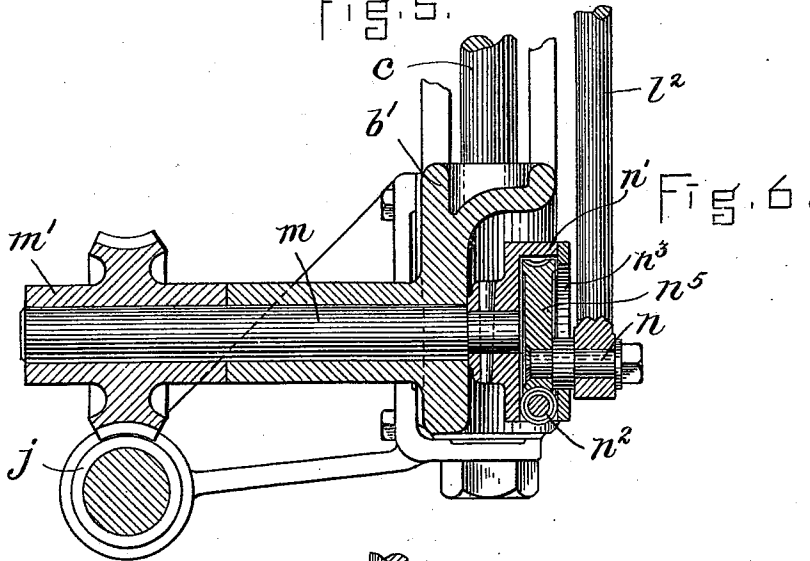
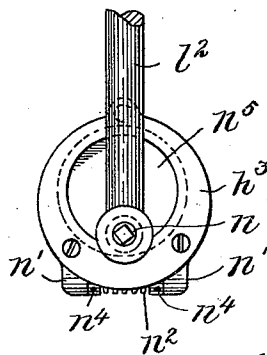


Fig. 6.

Fig. 7.



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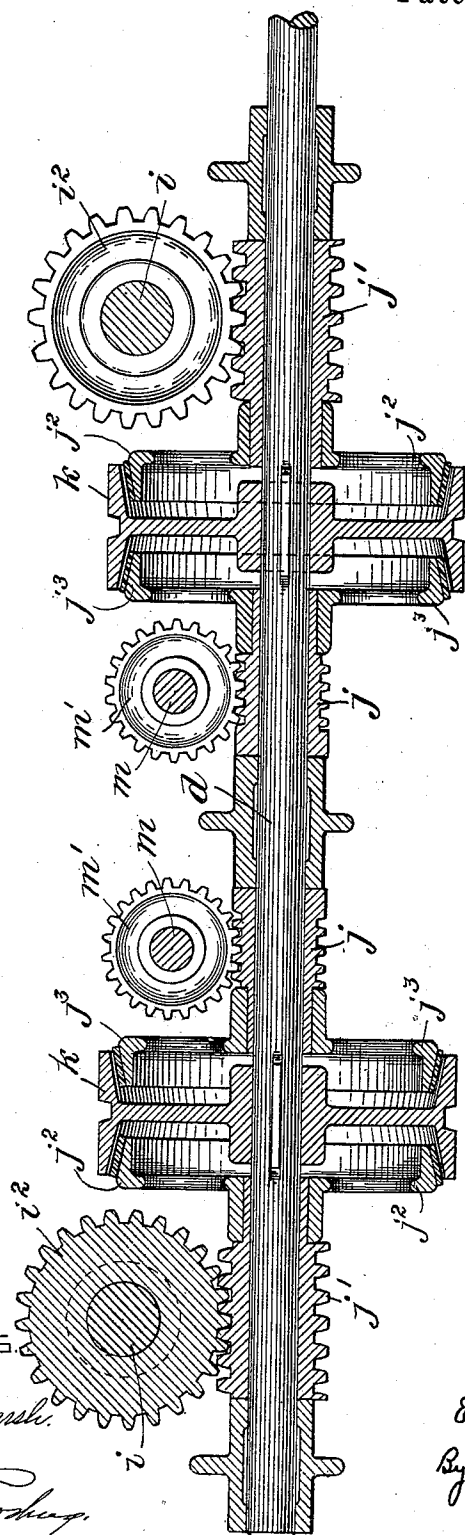
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E. C. JUDD.
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Fig. 6.



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Fig. 10.

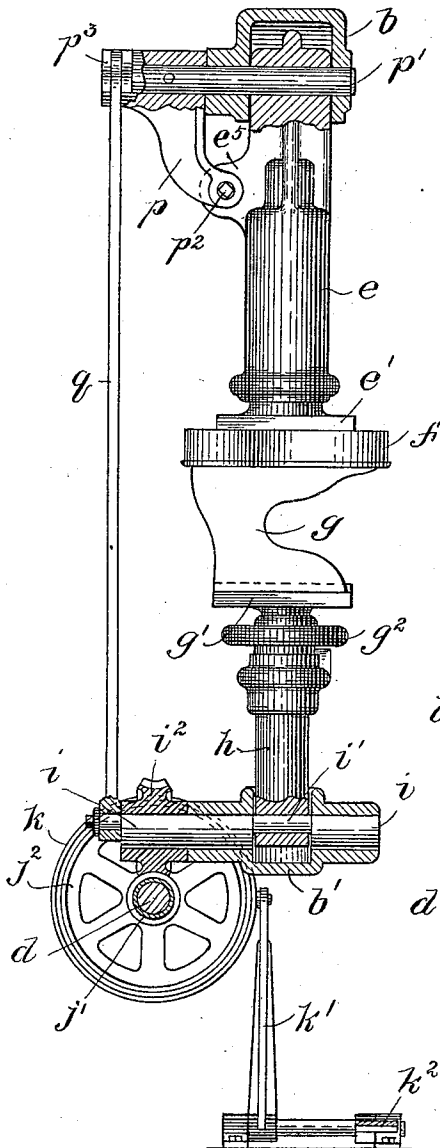
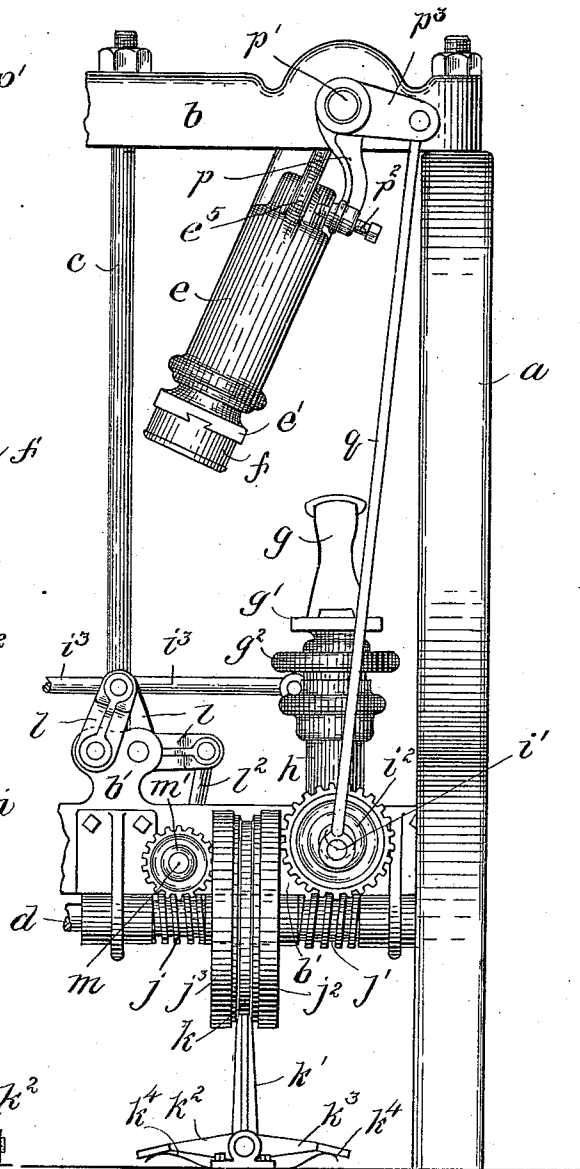


Fig. 9.



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UNITED STATES PATENT OFFICE.

EDWARD C. JUDD, OF BOSTON, MASSACHUSETTS.

SOLE-LEVELING MACHINE.

SPECIFICATION forming part of Letters Patent No. 554,067, dated February 4, 1896.

Application filed July 22, 1895. Serial No. 556,666. (No model.)

To all whom it may concern:

Be it known that I, EDWARD C. JUDD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Sole-Leveling Machines, of which the following is a specification.

This invention has relation to sole leveling or molding machines in which the sole of the boot or shoe is given the proper shape and curvature by the pressure of two surfaces, one of which conforms to the shape of the last upon which the boot or shoe was made and the other is the converse thereof; and it relates more particularly to that class of machines in which the last and die are so arranged that they have an oscillatory movement transversely to the last, whereby the pressure upon the sole progresses across it, in contradistinction to that class in which the surfaces oscillate in paths parallel to the axis of the last to cause the pressure to commence at one end of the sole and progress toward the other end.

It is now well known that there are many objectionable features incident to the last-mentioned class which have led to the employment of the transversely-oscillating die and last, by the use of which the sole may be leveled or molded expeditiously without so great tendency to separating the sole from the upper along the shank portion or to causing the sole to creep or move upon the upper, or the outer sole to creep upon the under sole and injure the boot or shoe; but heretofore there has been an objectionable feature incident to the leveling-machines in which the die and last are oscillated in paths transversely of the last, in that in all the machines of which I have knowledge the die and last are geared positively together, and when it is desired to mold the sole of a boot or shoe it is necessary to swing them to one side, place the boot or shoe upon the last, and then begin the operation of leveling, which causes the pressure to begin upon one side of the sole and progress transversely of the last, thereby causing the sole to creep to one side upon the upper and injure the shoe or boot.

My invention, then, has for its object the obviation of all of the objections incident to machines of both of the classes referred to

above, by the provision of a machine in which the leveling-pressure of the die and last upon the sole has no injurious effect upon the shoe by causing the sole to move bodily relatively to the upper.

The invention therefore consists in certain improvements which are hereinafter more particularly described, whereby the last and die are so arranged and operated in such way that they meet and grasp the sole along the median line (the median line of the last coinciding with the median line of the die) and cause the leveling-pressure to progress therefrom alternately in both directions, thereby insuring that the displacement caused by the progressive pressure in one direction is neutralized by the succeeding progressive pressure in the opposite direction.

The invention likewise consists in certain improvements whereby the last may have a positive movement toward and from the die, for placing the shoe thereupon and removing it therefrom, and in other improvements whereby the die may be swung from an operative to an inoperative position as the last is lowered, and vice versa.

It likewise consists in devices for adjusting the oscillatory movements of the last and die, so that the lateral movement thereof may be commensurate with the size of sole which it is desired to mold, whereby different-sized soles may be leveled by the same machinery.

The invention further consists in various other features of construction and arrangement, which I shall now proceed to describe with more particularity and set forth in the appended claims.

Reference is to be had to the annexed drawings and to the letters and figures marked thereon, forming a part of this specification, the same letters indicating the same parts or features, as the case may be, wherever they occur.

On the drawings, Figure 1 is a front elevation of my improved leveling-machine. Fig. 2 is a front elevation of the same partially in section. Fig. 3 is a vertical section through the machine. Fig. 4 is a side elevation of the last and die and the means for raising and lowering the last. Fig. 5 is a plan view of the machine. Figs. 6 and 7 are views, somewhat enlarged, illustrating the means for ad-

justing the oscillatory movement of the last. Fig. 8 is a sectional view of the driving-shaft and the clutch devices. Figs. 9 and 10 illustrate the mechanism for moving the die to one side after the operation of leveling has been accomplished in order that the finished boot or shoe may be removed and a new one inserted.

In carrying out my invention I employ a frame having two side standards, *a*, and top and bottom braces, *b b'* bolted together by long bolt-rods *c* and supported by the standards *a*.

d indicates the driving-shaft supported in bearings in the bottom cross-brace, *b'*, and to which power may be transmitted by means of the pulley *d'*.

e indicates a die-supporting arm swung loosely upon a pivot-shaft *p'* in the cross-brace *b* and provided with a sliding die-holder *e'*, there being a spring *d²* interposed between the holder and the arm. To the holder may be secured in any suitable way, as by a dove-tail tongue and groove, the die *f*.

The removable last *g* is supported upon a threaded holder *g'* mounted in a socket in an arm *h*, and can be adjusted relatively thereto by means of a nut *g²*, as will be readily understood.

The die and the last are independent of each other; but when a shoe or boot is upon the last, which is pressed up against the die, an oscillating movement of the last will carry the die from side to side and the sole will be molded between them.

In order to move the last toward and from the die for the purpose of placing a boot or shoe thereon or removing it therefrom, I employ the following devices: The arm *h* is mounted upon a pitman *i'* forming a part of a shaft *i* arranged beneath the arm and having a worm-wheel *i²* to which power is transmitted by a worm *j'* mounted loosely on the cross-shaft *d*. When the worm is rotated by means of the clutch device to be hereinafter described, the worm-wheel is revolved and the pitman raises the arm vertically until the sole of the shoe on the last is in engagement with the die, where it is held until the worm is rotated again to cause the pitman to move to its lowest point.

In order to give the proper oscillatory movement to the last I mount upon the bottom cross-brace a bell-lever *l*, one arm of which is connected to the last-supporting arm *h* by a pivoted link *i³* and the other arm of which is connected by a pivoted link *l²* with a wrist-pin *n* secured to a shaft *m* arranged parallel to the shaft *i* before described. The shaft *m* may be intermittently revolved by a worm-wheel *m'* thereon driven by a worm *j* loosely mounted on the driving-shaft *d*. Thus it will be seen that when, by the clutch mechanism which will be described, the worm *j* is revolved the worm-wheel, its shaft, and the wrist-pin *n* will, through the medium of the bell-lever and the links, cause the last and the die to oscillate gently from side to side.

By reason of the independence of the die and the last relatively to each other the tendency of the die, unless engaged by the last, is to hang vertically with its median line in the central vertical longitudinal plane of the last, so that when a boot or shoe has been placed upon the last and the latter is elevated until the sole is engaged between it and the die the pressure at that time is upon the median line of the sole. Then the leveling pressure progresses from the median line of the sole first to one side and then to the other, causing the displacement effected by the progressive pressure upon one side of the sole to be neutralized by the progressive pressure upon the other side. This result cannot be obtained where the die and last are geared positively together, as in such case the pressure must commence at one extreme edge of the sole and progress to the other extreme edge, as is obvious to those skilled in the art.

In order to intermittently and alternately operate the last-elevating devices and the oscillating mechanism, I mount the driving-worms *j'* and *j* loosely upon the worm-driving shaft *d* and provide them with friction-pulleys *j²* *j³*, respectively, with which a sliding clutch *k* splined to the shaft may alternately engage; and to shift the said clutch and hold it in engagement with either of said friction-pulleys I employ a double foot-lever pivoted to a standard and having an arm *k'* to move it, there being treadles *k²* *k³* to throw the lever to one side or the other, the operator keeping his foot upon the treadle as long as it is desired to transmit motion to either of the friction-pulleys. Springs *k⁴* are inserted beneath the treadles to insure the return of the clutch to its central neutral position as soon as one of the treadles is released from the pressure of the foot.

In order that the machine may be employed for different sizes of boots and shoes, I employ mechanism for adjusting the length of the path of oscillation of the die and last, so that for a narrow last their lateral movement will be shorter than for a wide last. Upon the end of shaft *m* I rigidly secure a cylindrical box *n'*, in the lower part of which is mounted a worm *n²*. A worm-wheel *n⁵* is placed in the box, so as to be in engagement with the worm, and is retained in place by a ring *n³* secured by screws to the walls of the box.

The wrist-pin is rigidly fastened to the worm-wheel at a point remote from its axis, so as to be eccentric thereof. The axis of the worm-wheel is also eccentric relatively to the axis of the box and the shaft, so that when the worm *n²* is rotated by means of a pin thrust in holes *n⁴* in its end the wrist-pin will travel in a circular path from a point nearest the axis of the shaft to a point remote therefrom, and therefore vary the travel of the link *l²* and the lower arm of the lever *l*. When the wrist-pin is in the position shown in Fig. 7, it is at its nearest possible point to the axis

of the shaft *m*, and the last will have its shortest possible lateral throw, as will be understood.

The die-supporting arm may have an eye *e*³ with which a hook *e*⁴ on rod *c* may engage to hold the die in an inoperative position out of the way, as shown in Fig. 2, when a boot or shoe is being placed upon or removed from the last; but I generally prefer to employ the mechanism illustrated in Figs. 9 and 10, by means of which the die may be automatically moved into and out of the vertical lines of the last just before the last is elevated and after it is depressed.

p indicates a lever mounted loosely on a rock-shaft *p*¹ in the cross-brace *b* and having in the end an adjusting-screw *p*², adapted to bear against an ear *e*³ on the die-supporting arm. Rigid with said lever *p* is an arm *p*³, which is connected with a wrist-pin on the worm-wheel *i*², the parts being so timed that when the said wheel is rotated to depress the last the last is depressed slightly and the die-supporting arm is swung to one side and held in that position until just before the last is elevated, when the die will be allowed to swing back into place and the lever *p* will be drawn back so as to allow the die and the last to oscillate freely.

It will be observed that the lever *p* when in an inoperative position is entirely disengaged from the die-supporting arm, so that the latter is not impeded in its movements.

I have shown my improved mechanism as employed in a twin machine, having two sets of each device, and I have described one side of it; but it will be understood that the halves are duplicates of each other and operate in the same way independently of each other.

The operation of the machine is extremely simple. Suppose the parts are in the positions shown in Fig. 9—that is to say, when the last is depressed and the die has been swung to one side. A boot or shoe is placed upon the last, and the operator places his foot upon treadle *k*² and holds it thereon. This causes the clutch *k* to engage the friction-pulley *j*², and the resulting rotation of the worm *j*¹ and worm-wheel *i*² allows the die to swing down into place and elevates the last until the sole of the boot or shoe is pressed firmly between the die and the last. The sole is now grasped by the die and last with its median line lying in the central vertical longitudinal plane of the die and last. The operator's foot is then removed from the treadle *k*² and the engagement of the worm *j*¹ and worm-wheel *i*² locks the parts in that position. The treadle *k*² is then depressed, throwing clutch *k* into engagement with the friction-pulley *j*³, and the worm *j* and worm-wheel *m*¹ cause the die and the last to oscillate gently from side to side through the medium of the lever *l*, links *l*¹ and *l*², and wrist-pin *n*.

The pressure upon the sole is from end to end thereof and begins at the median line

thereof, progressing across the sole first to one side and then to the other until the sole is sufficiently molded or leveled. The lateral movements of the last and die prevent the straining of the stitches or the breaking of the threads, while pressure upon the sole is neutralized so as to prevent creeping, as has been hereinbefore described. The foot is pressed upon the treadle *k*³ until the sole has been molded or leveled, when it is removed and treadle *k*² is depressed, which causes the last to be lowered and the die to be swung to one side.

While I have described all of my improvements in connection with a machine in which the die and last have a lateral oscillation across the axis of the sole, yet it will be seen that many of them may be employed upon a machine in which the oscillations of the die and last are parallel to the axis of the sole. For instance, the means for elevating and depressing the last may be used in connection with an endwise-acting die and last, so that the pressure upon the sole progresses from the transverse median line thereof first toward the toe and then toward the heel. In fact, I do not limit myself to the exact details of arrangement and construction herein set forth, as many changes may be made without affecting the spirit or scope of the invention.

Instead of having a loosely-mounted die and a positively-acting last, the latter may be mounted to swing loosely upon a pivot and the power may be connected with the die for oscillating it and for moving it vertically or radially to clamp the sole, or else the last may be positively oscillated and the die elevated and lowered relatively thereto, the essence of my invention residing in means of any kind for clamping a sole between two surfaces along its median line before oscillating the same, whether longitudinal or transverse, so that the pressure may progress alternately to each side thereof, for the purpose hereinbefore set forth.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all the forms in which it may be made or all the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. A machine for leveling soles, comprising in its construction a last, a die, means for oscillating the same, and means for imparting to one of said parts a radial movement independently of the other part, substantially as set forth.

2. A machine for leveling soles, comprising in its construction a pivoted die, a pivoted last independent thereof, means for clamping a sole between said last and said die with its median line coinciding with the median lines of said last and said die, and means for oscillating said last and die, whereby the pressure

upon the sole progresses to one side of said median lines and then to the other side, as set forth.

3. A machine for leveling soles, comprising
5 in its construction a loosely-pivoted die, a laterally-oscillating last, and means for positively elevating said last to engage a sole with the die, the median line of the sole being coincident with the median lines of said
10 die and said last.

4. A machine for leveling soles, comprising
in its construction a pivoted die-supporting arm, a yielding die mounted thereon, a last, an arm for supporting said last, means for
15 moving said arm vertically to cause the last and die to engage a sole between them, and means for oscillating said last-supporting arm.

5. A machine for leveling soles, comprising
20 in its construction a die adapted to be oscillated, an oscillatory last, means for elevating and lowering said last, means for oscillating said last, and means for intermittently and alternately operating said elevating and lower-
25 ing means, and said last-oscillating means, as set forth.

6. A machine for leveling soles, comprising
in its construction a pivoted die, a pivotally-mounted last disconnected from said die, said
30 pivots being parallel to the last, whereby a lateral oscillation is imparted, a driving-shaft, a lever connected to said last, and means consisting of a worm on the shaft and a worm-wheel actuated thereby and connected with
35 the lever for rocking said lever and thereby oscillating said last and die, as set forth.

7. A machine for leveling soles, comprising
in its construction a pivoted die, an oscillating last, and means for intermittently mov-

ing said die out of the vertical lines of said
40 last when a shoe is to be placed on or removed from said last.

8. A machine of the character described, comprising in its construction a pivoted die,
45 a pivoted last, means for intermittently raising and lowering said last, and means for throwing said die into and out of an operative position as said last is raised or lowered, as set forth.

9. A machine of the character described,
50 comprising in its construction a movable die, an oscillating last adapted to be engaged therewith, a shaft, a wrist-pin on said shaft, means for transmitting power from said wrist-pin to said last to oscillate it, and means for vary-
55 ing the position of the wrist-pin radially of the axis of the shaft, whereby the oscillatory movement of the last may be varied in its length.

10. A machine of the character described,
60 comprising a pivoted die, a pivoted last adapted to be engaged therewith, a driving-shaft, a power-transmitting device, as a link, a rotatable toothed disk secured revolubly to the shaft eccentrically thereof, a wrist-pin se-
65 cured eccentrically to the said disk, and a rotatable worm mounted in bearings on the said shaft and engaging the teeth of the disk for revolving it and thereby moving the wrist-pin radially of the axis of the shaft.
70

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of July, A. D. 1895.

EDWARD C. JUDD.

Witnesses:

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A. D. HARRISON.