H. A. WEBSTER.

SOLE LEVELING MACHINE.

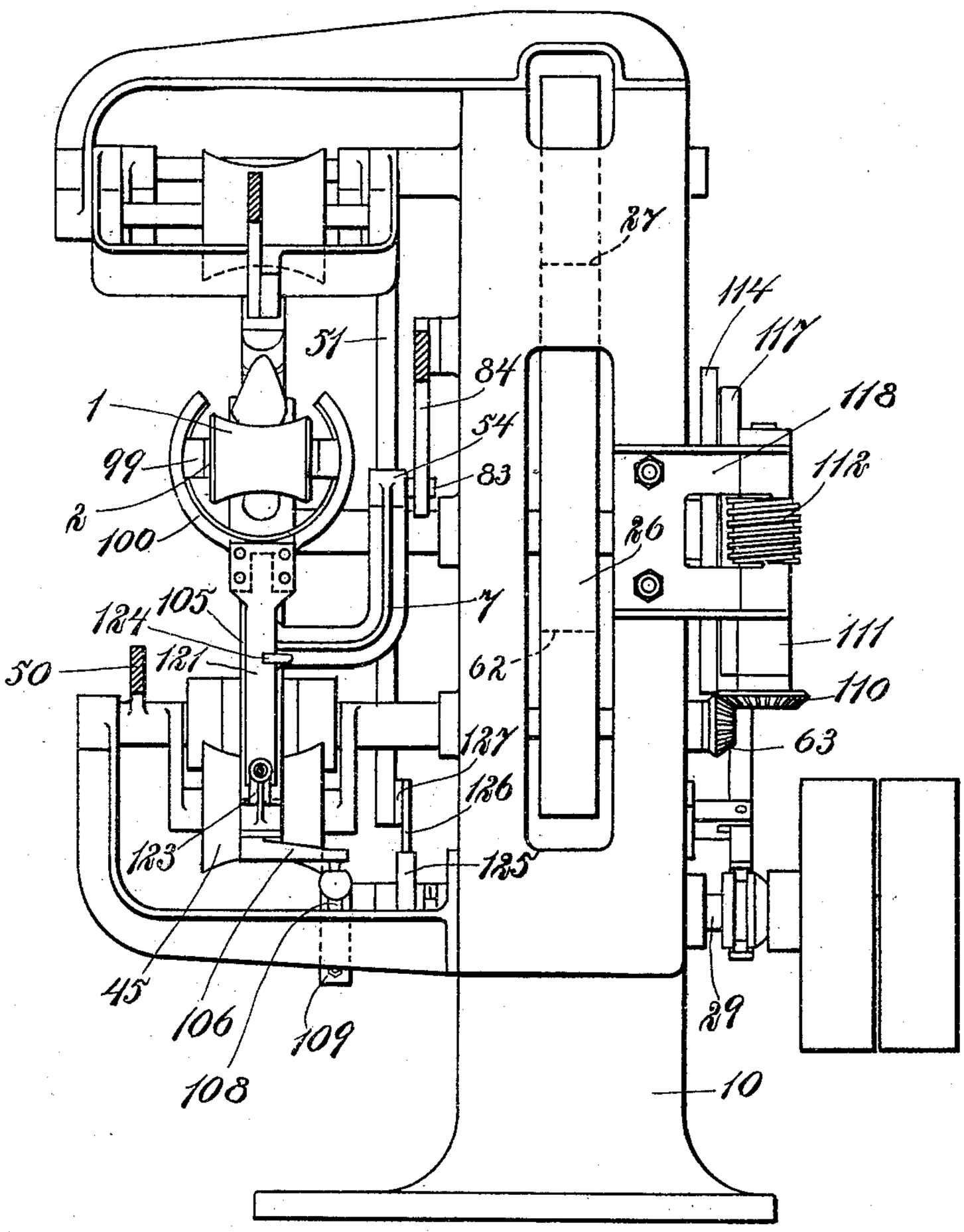
APPLICATION FILED DEC. 19, 1904.

940,627.

Patented Nov. 16, 1909.

6 SHEETS—SHEET 1.

Fig. 1



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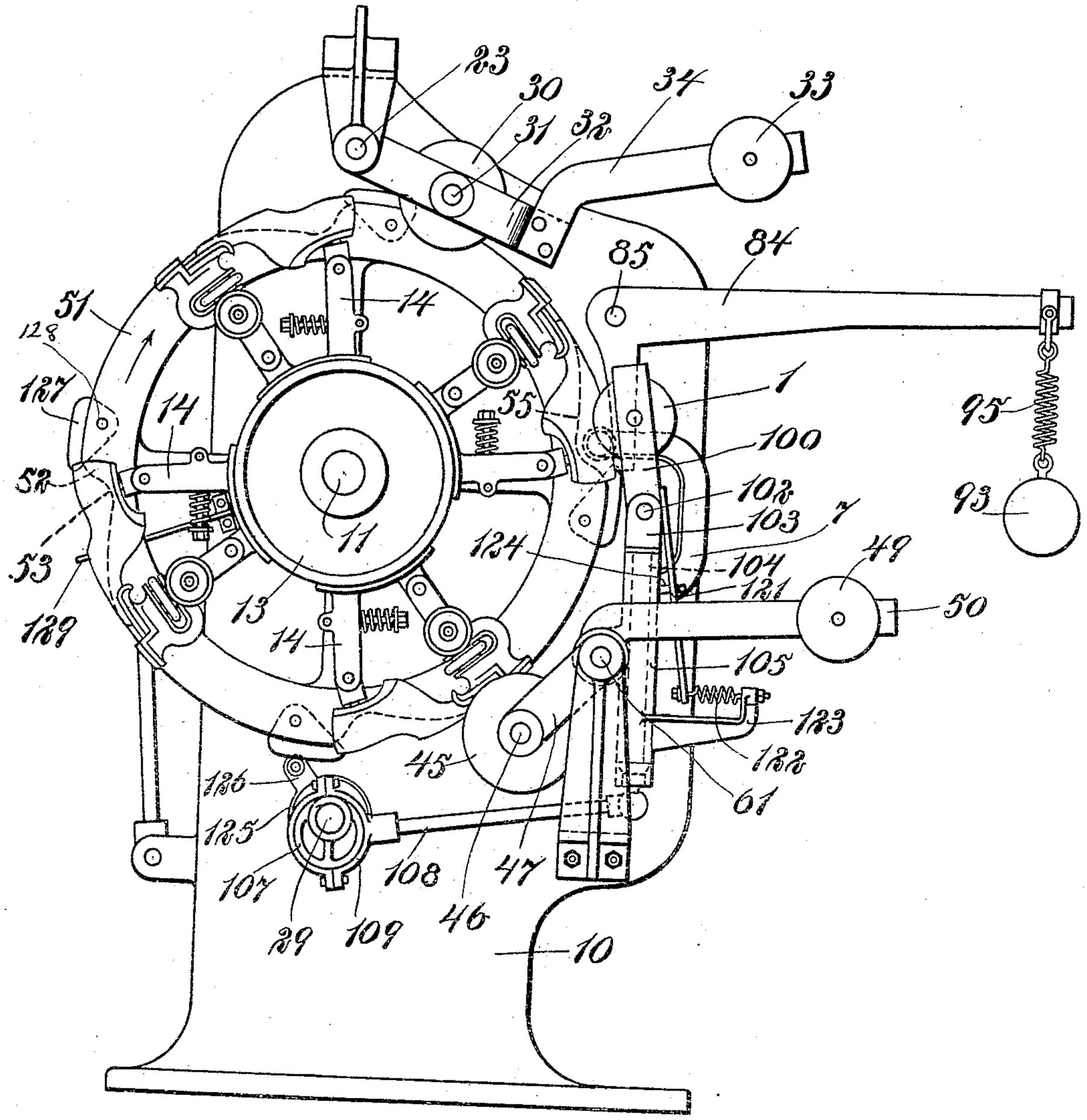
6 SHEETS—SHEET 2.

Fig. 2



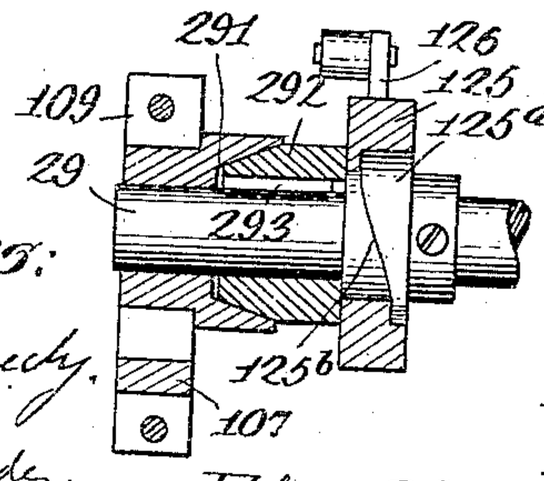


Fig. 2a

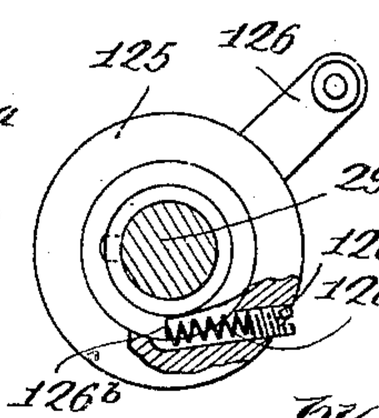


Fig. 2b

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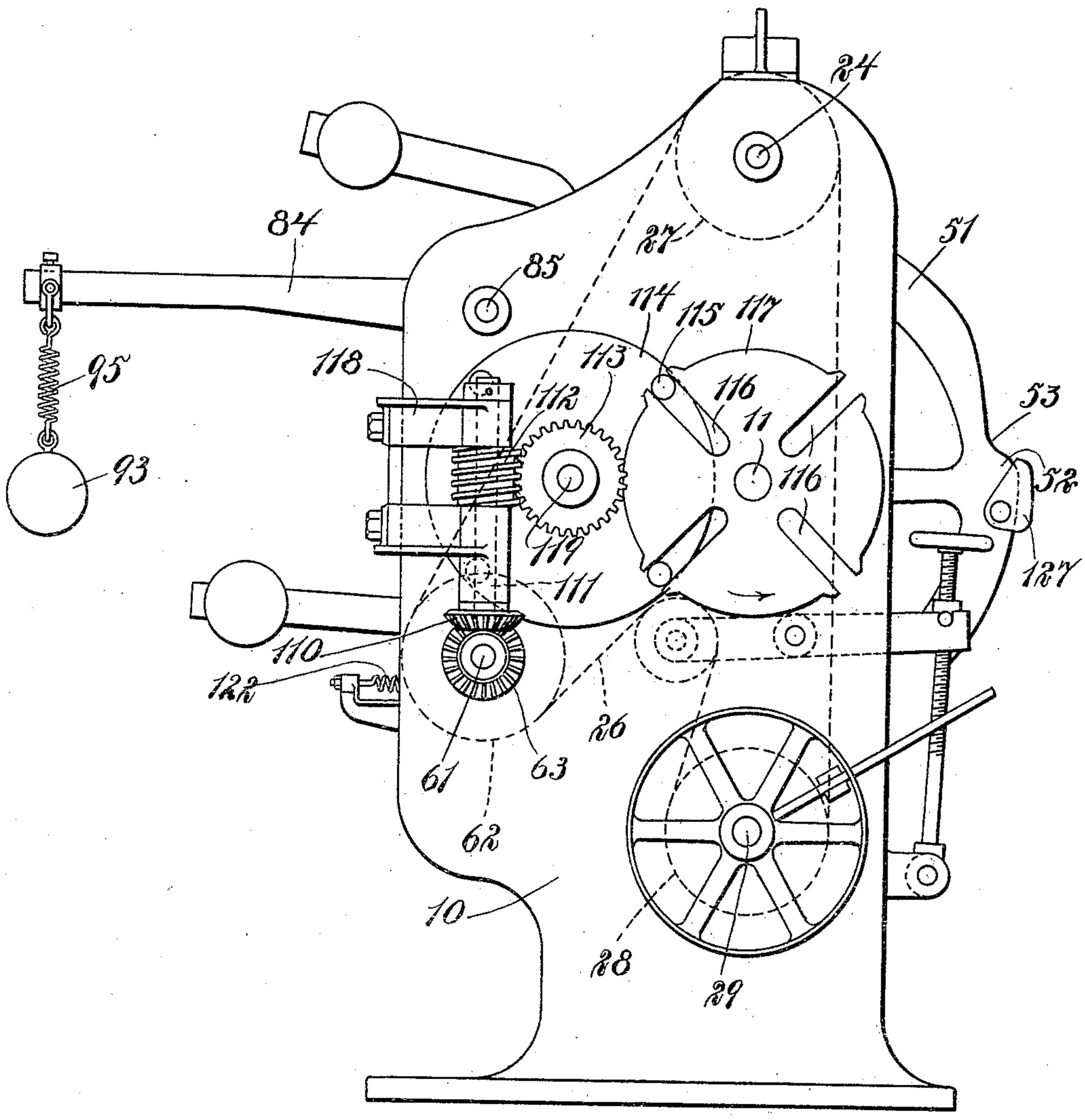
6 SHEETS—SHEET 3.

Fig. 3



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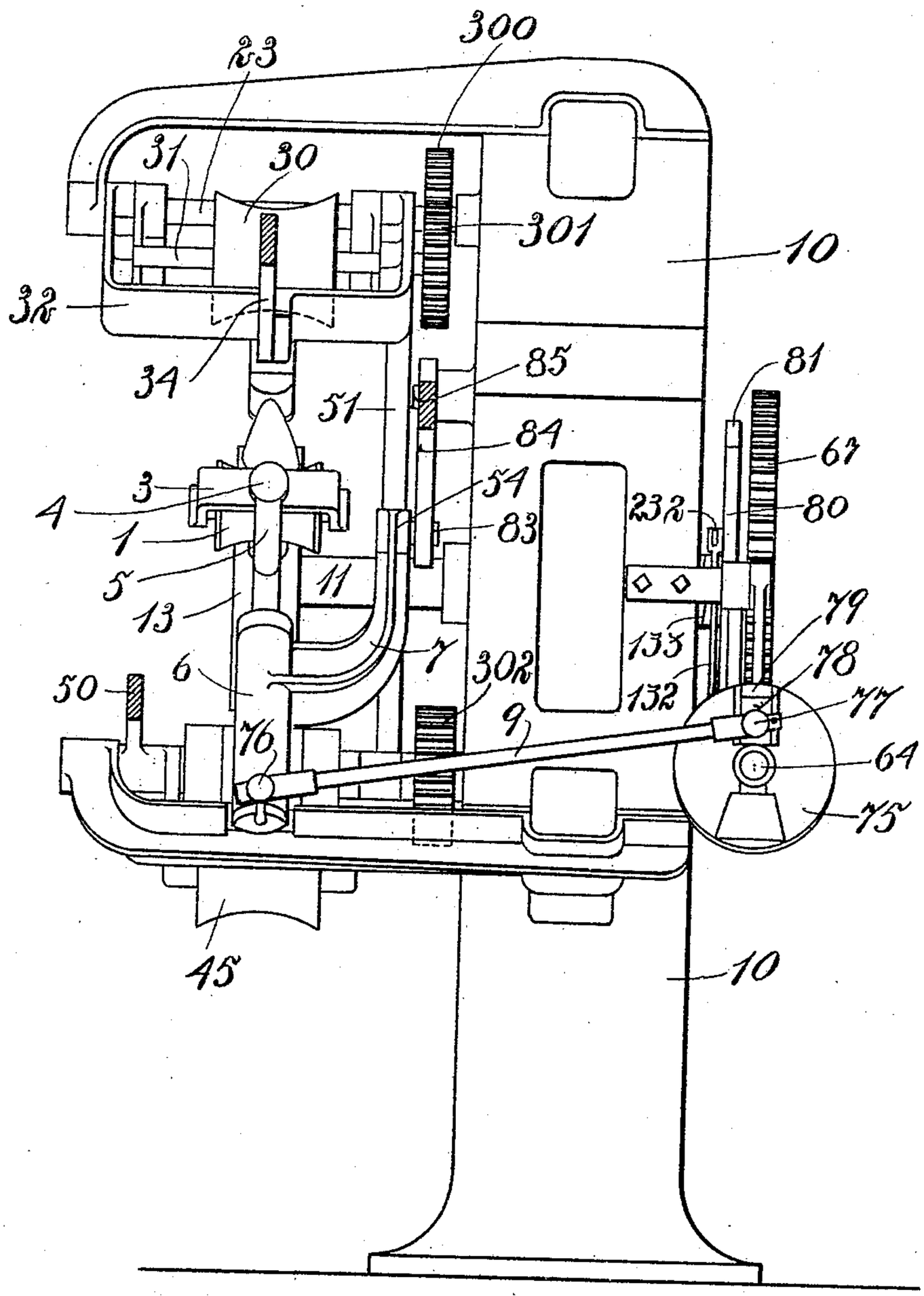
6 SHEETS—SHEET 4.

Fig. 4



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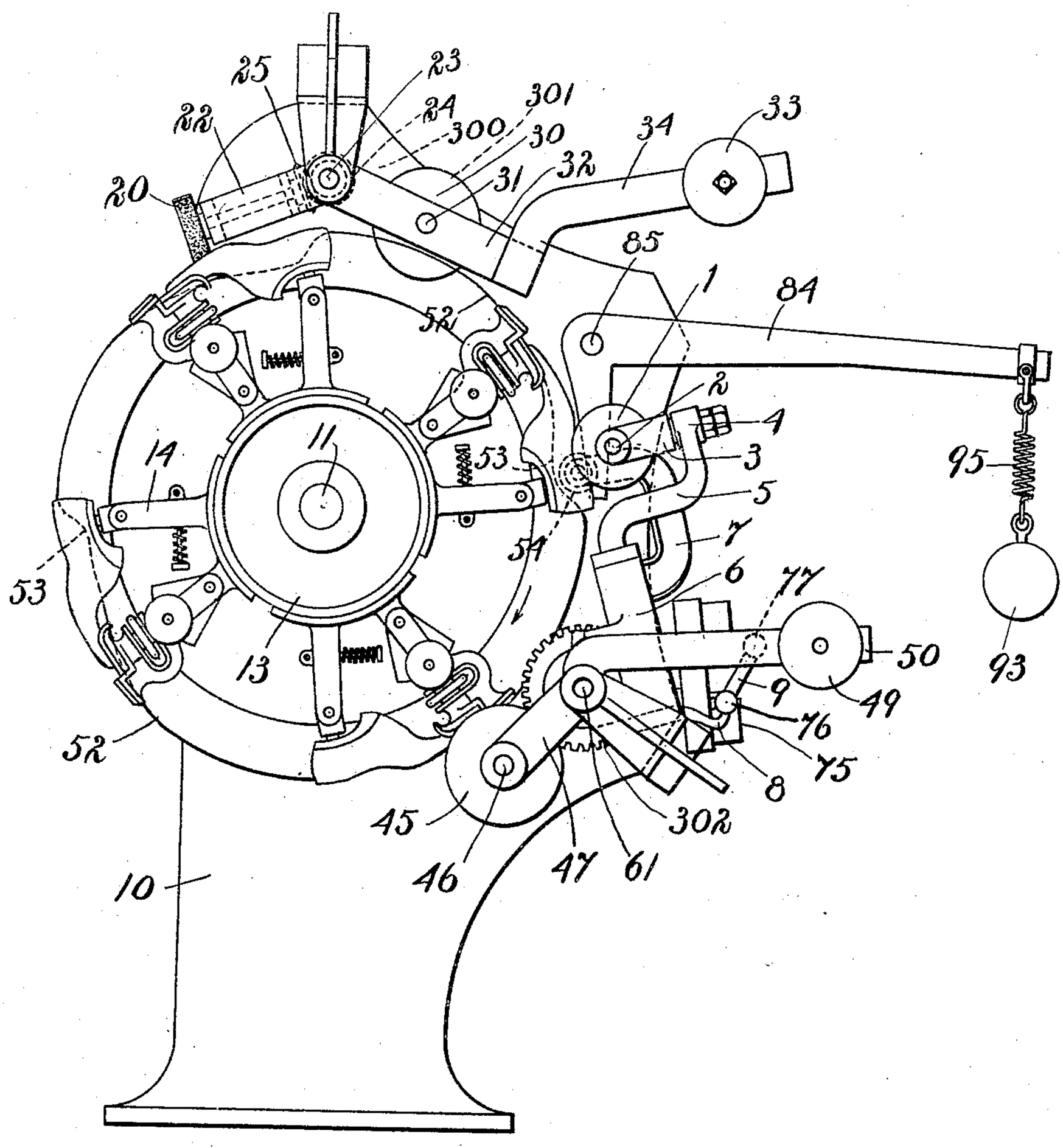
6 SHEETS—SHEET 5.

Fig. 5



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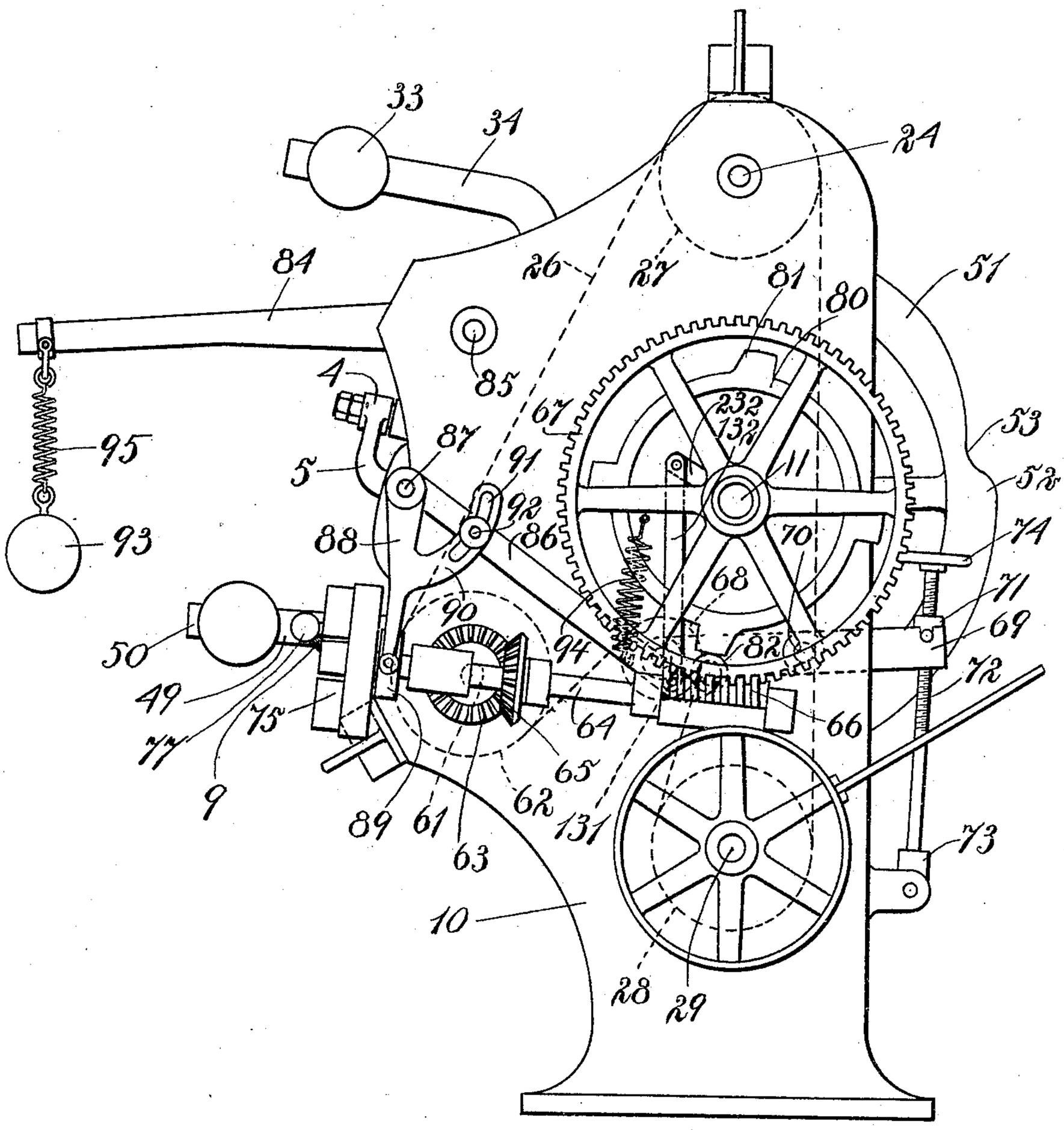
6 SHEETS—SHEET 6.

Fig. 6



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UNITED STATES PATENT OFFICE.

HAROLD A. WEBSTER, OF HAVERHILL, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHARLES K. FOX, OF HAVERHILL, MASSACHUSETTS.

SOLE-LEVELING MACHINE.

940,627. Specification of Letters Patent. **Patented Nov. 16, 1909.**

Application filed December 19, 1904. Serial No. 237,386.

To all whom it may concern:

Be it known that I, HAROLD A. WEBSTER, of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Sole-Leveling Machines, of which the following is a specification.

This invention relates to sole-leveling machines, and consists in certain improvements upon such machines which will be hereinafter fully described and claimed.

Hitherto it has been difficult with sole-leveling machines in which the leveling-tool is a roll, to press down and compact the edges of the sole in those portions where the curvature is the most abrupt, especially in the shank portion, and as a result the soles of shoes operated on by such machines have not conformed properly to the shape of the last and of the foot of the wearer. This difficulty was overcome in a machine heretofore constructed by providing rolls having two differently-curved zones, one shaped to act on a fore-part edge of a sole and the other, with a shorter radius of curvature adapted to act on a shank edge, the axis of the roll being always held parallel to itself and capable of moving only toward and away from the shoe. In the present machine the same result is achieved in a more perfect manner by providing the machine with a roll mounted so as to be capable of turning about two axes substantially perpendicular to each other and to the axis of the roll, and furnishing means for oscillating the roll about one of the said axes; and it is in this improved construction and arrangement that my present invention principally consists.

Of the accompanying drawings,—Figure 1 represents a rear elevation of a sole-leveling machine embodying the preferred form of my invention. Figs. 2 and 3 represent elevations as seen from opposite sides of the machine. Fig. 2^a is a detailed view of the clutch, the same being viewed as a vertical section taken through the center of shaft 29. Fig. 2^b is an elevation of the same mechanism as seen from the right of Fig. 2^a. Figs. 4, 5 and 6 represent similar views of a modified form of the invention.

The same reference characters indicate the same parts in all the figures.

The machine comprises the supporting frame 10 which carries the shaft 11, holder 13, jacks 14, the various leveling-rolls, and operating mechanism therefor.

The novel features of this invention consist of a roll 1 which is provided with trunnions 2 mounted in bearing blocks 99 slidably supported on a track carried by or formed on the curved arms of a yoke 100, the latter being pivoted at 102 to a bracket 103 on a spindle 104 extending through and rotatably mounted in a tubular bearing formed in a tool-holder 105 pivotally mounted on the driving-shaft 61 so as to be capable of being moved toward and away from the jack-carrying head 13. The construction and arrangement of the tool-holder is such that when the tool is in position to act upon a shoe carried by one of the jacks as shown in Fig. 2, the bearing for the bracket 103 and its spindle 104 extends approximately in the same direction as the shoe carried by the jack, and the axis of the spindle 104 and the point of contact between the roll and the shoe are substantially or nearly in the same straight line. Thus when the spindle is oscillated by means to be presently described, the roll will tilt laterally in such a way as to roll from side to side over the sole of the shoe practically without sliding movement.

The mechanism for oscillating the roll in the manner referred to comprises an arm 106 mounted on the end of spindle 104, an eccentric 107 on the main driving-shaft 29, and an eccentric rod 108 pivoted to the arm 106 and connected to an eccentric strap 109 surrounding the eccentric.

The jacks are caused to move in the direction of the arrow in Fig. 2, by rotation of the shaft 11 on which the head 13 which carries the jacks is mounted, from shaft 61, which is itself operated from the driving-shaft 29 by belt 26 running over pulleys 62 28 on these two shafts respectively, through the following mechanism; shaft 61 carries bevel gear 63 meshing with a second bevel gear 110 on a shaft journaled in a bracket 118 mounted on the frame 10. This shaft carries a worm 112 in gear with a worm-wheel 113 journaled on stud 119 which also supports a disk 114 carrying a number of projections or studs 115, of which there are as many as there are jacks carried by the head, and which take into radial slots 116 in a disk 117 keyed or otherwise rigidly connected to the shaft 11. This mechanism,

as will be readily apparent, gives the jacks a motion which is alternately fast and slow, for the disk 114 rotates at a constant speed and the studs engage disk 117 at constantly-varying distances from its center. Thus when disk 114 is in such a position that one of its studs 115 is in line with the centers of the stud 119 and shaft 11 and engaged in a slot 116, being then moving directly across the line of the slot and at the minimum distance from shaft 11, the moment arm on which the stud acts, that is, the distance between shaft 11 and the point at which the stud engages the side of the slot, is so short that a small angle of motion of the stud turns disk 117 through a large angle and the shaft 11 and head 13 are rotated with great comparative rapidity, the result being the same as that attained by a large gear in mesh with a small one. On the other hand, when the stud is just entering or just leaving a slot (such position being shown in Fig. 3) its line of motion extends almost in the same direction as the slot it engages, so that a comparatively great amount of travel of the stud is necessary to turn the disk even slightly, and the latter is then given a very slow motion, the speed of disk 114 being always the same. The disks and studs are so arranged that the slowest motion is given to the jacks when the shank part near the broad portion of the sole of one of them is engaged with the roll. The greatest extremes of speed consistent with smooth running are obtained when there are four studs and four slots employed and the proportions are substantially the same as here shown.

In order to bring the roll 1 into operative relation when the shank of a shoe carried by one of the jacks is adjacent to the roll and retain the roll in inoperative position at all other times, the following mechanism is provided: Connected to the shaft 11 adjacent the jack-holder, is a cam-disk or rest 51 which has a plurality of recesses 53 and projections 52, one of each being adjacent each jack, the tool-holder 105 being formed with an arm or bracket 7 which carries a roll 54 adapted to bear against the outer surface of the disk 51 and to be operated by the projections and recesses. The roll 54 is held against the disk by means of a bell-crank lever 84 which bears against a pin 83 carried by the arm 7, the lever being caused to act continuously with yielding pressure by means of a weight 93 attached by a spring 95 to the end of the horizontal arm of the lever. The roll is also yieldingly projected from the tool-holder laterally about the pivot 102 by means of a flexible arm 121 fixed at one end to the yoke 100 and connected at its outer end by a spring 122 with a projecting arm 123 rigidly connected to the tool-holder 105. A stop 124 on the bracket 7 prevents too great projection of the roll and causes it to move with the holder 105 when the latter is turned away from the jack by the mechanism above described.

Normally the roll 1 is held away from the path of motion of the jacks by means of the roll 54 engaging the projecting parts 52 of the disk but when one of the jacks comes adjacent to the leveling-roll the trundle-roll 54 is caused to move into one of the depressions 53 by the pressure of the weighted lever 84, the tool-holder being thereby made to swing toward the jack so as to bring the leveling-roll into engagement with the shoe.

In order that the force of the weight 93 tending to hold the roll 54 against the cam may not be overcome by its momentum due to the rapid rising of the horizontal arm of the bell-crank 84, a spring 95 is interposed between the end of the arm and the weight, and causes the weight to exert a downward pressure at all times on the lever. If desired, this spring 95 may be connected to a stationary part of the machine.

The roll 1 is designed particularly to operate on the shank part of the shoe to press down and compact the edges of the sole at that portion which has the sharpest curvature, the rolls 30 and 45 being designed to perform the leveling operation on the forepart of the sole, and in order to restrict the operation of the roll 1 to action upon the shank part alone, there is provided mechanism for stopping the oscillation of the roll and its holder about the axis of the spindle 104 when the end of the shank part of the sole comes into engagement with the roll. This is effected by mechanism which throws out the clutch by which the eccentric 107 is connected to the shaft 29. This eccentric is loosely mounted on the shaft so that the latter can turn without rotating the eccentric, and is provided with a clutch 125 adapted to be engaged with the shaft 29 so as to rotate therewith, and provided with a projection or dog 126 extending into the path of motion of cams 127 pivoted at 128 to the cam-disk 51. There are as many cams as jacks and they are so positioned that as soon as one jack reaches the point where the heel end of the shank of a shoe carried by it is opposite the roll, a cam 127 comes into engagement with the dog 126 and turns it to throw in the clutch 125 and start the roll oscillating. As soon as the cam passes the dog, the latter is allowed to return to its inoperative position and the clutch is disconnected and the oscillation of the roll stops. Since the cam is pivoted near one end, by turning it about its pivot a greater or less extent of its surface is presented to act on the dog, as will be evident from an inspection of the drawings, and consequently the period of time during which the clutch is

connected may be varied. For shoes having a short shank, only a small extent of the cam is projected, while for longer shoes more of the cam surface is presented. By suitably adjusting the cams, therefore, the roll may be made to operate properly on a shoe of any length, and to stop as soon as the end of the shank part has passed. Preferably there will be enough friction at the pivots of the cams to hold the latter properly in whatever position of adjustment they may be given.

Any suitable form of clutch capable of performing the result desired may be used. For purposes of illustration I have shown in Figs. 2^a and 2^b one such clutch, although of course it will be understood that any other may be used. The eccentric 107 is shown as having a hub 291 having a flaring recess in which enters the tapered end of the sleeve 292 mounted upon the shaft 29 so as to rotate therewith, but capable of sliding longitudinally thereon, being held by any device capable of accomplishing this result, such as by the key 293. The clutch member 125 is permissibly a collar which is mounted upon a cam 125^a affixed to the shaft 29 and having a cam portion 125^b. When the arm 126 is moved to the left as seen in Fig. 2^a or to the right as seen in Fig. 2^b the clutch collar is forced by the cam surface 125^b toward the end of shaft 129, crowding the tapered sleeve 292 into frictional engagement with the hub of the eccentric. After the cam 127 has passed the arm 126 the parts are restored to normal position by a spring 126^a which is set into the clutch collar 125 and bears at one end against a shoulder 126^b on the stationary cam member, and at the other end against an abutment 126^c and the clutch collar.

A pointer 129 fixed to the machine frame is provided in order to indicate the position which a jack should occupy when a shoe is put on it in order that the shank of the shoe may be properly engaged by the roll 1.

In the form of the machine shown in Figs. 4, 5 and 6, the main features are the same but many details are different. In this form the roll 1 is pivoted in a yoke 3 pivotally mounted so as to be capable of turning in a bearing 4 which is formed on an arm 5 mounted in a bearing formed in a tool-holder 6 mounted in a manner similar to that of the holder 105, and the roll is oscillated from side to side by an arm 8 which is connected to the lower end of the arm or spindle 5 and is operated from the crank-disk 75 through a connecting rod 9 joined to the crank-arm 8 by a ball-and-socket joint 76, and by a similar joint 77 to a block 78 mounted in a radial groove 79 in the crank-disk. By adjusting the block 78 toward or away from the shaft 64 on which the disk 75 is mounted the amount of throw of the arm 5 and consequently the inclination of the roll 1 with respect to the edge of the sole on which it acts may be regulated. The mechanism for rotating the jacks comprises a worm-gear 67 mounted on shaft 11 and operated by a worm 66 on the shaft, which is driven by the shaft 61 in the same manner as is shaft 111. The means for starting and stopping the oscillation of the roll and for retarding the motion of the jack when the forward end of the shank part of a shoe comes into contact with the roll are also different in the modified form. The former means comprises mechanism for connecting and disconnecting the disk 75 to and from its shaft. This disk is loosely mounted on shaft 64 and has a clutch member adapted to be engaged with a complemental clutch member 89 mounted on the shaft 64 so as to rotate therewith, but to be capable of sliding longitudinally thereon, and which is connected to one end of the lever 88 pivoted at 87 to the machine frame. On the same pivot 87 is mounted a lever 86 adjustably connected to lever 88 by clamp-stud 92 engaging slot 91 in an arc-shaped projection 90 of the lever and carrying a roll 82 which is normally held in engagement with the cam-disk 80 by a spring 94, as shown in Fig. 3. The disk 80 is provided with a plurality of projections 81 which are adapted to force the roll 82 away from the disk, causing it to turn about its pivot and move the lever 88 with which it is connected in such a direction as to throw the clutch member 89 into engagement with the clutch member carried by the disk 75. The number of projections 81 on the disk 80 is the same as the number of jacks carried by the head, and they are so arranged as to engage the roll 82 and connect the clutch members at the same time that the roll 1 comes into engagement with the shank of a shoe carried by one of the jacks, and the width of the projections is such that the clutch is disconnected as soon as the end of the shank portion has passed by the roll, thus causing the oscillating motion about the axis of the arm 5 to cease at the point indicated, the subsequent action of the roll on the fore-part of the shoe being the same as that of the other leveling-rolls. Lever 86 also is connected at 131 with a link 132 having a pivotal connection with a clutch-arm 232 mounted on the shaft 11 and connected to operate a clutch 133 by which the gear 67 and cam 80 are caused to detachably engage the shaft, they being loosely mounted on the shaft but rigidly connected together. By this linkage, when the roll 82 is moved by a projection 81 and the roll 1 made to oscillate, the head 13 is at the same time disconnected from its actuating mechanism and allowed to come to rest after its momentum has carried it far enough for the forward end of the shank of a shoe to come

into engagement with the roll. Here it remains while the roll tilts back and forth, pressing down and rounding over the edges of the shank, until the projection 81 has moved by roll 82 and the arm 86 is returned, throwing out the oscillating mechanism and connecting the jack-carrying head with the actuating gear. The length of the acting faces of projections 81 determines the length of time the roll 1 is in contact with a shoe and the number of impacts it will make on the edges of the shank.

By reason of the oscillating movement described, which is so rapid that several oscillations may take place while the shank is passing by the roll, the surface of the roll is inclined at a sharper angle to the edges of the shank part of the sole than would be the case if no such motion were given. The rotatable connection of the roll to the yoke 100 of Figs. 1, 2 and 3, and its pivotal connection to the arm 5 of Figs. 4, 5 and 6 being substantially perpendicular to the axis of rotation of said yoke and arm, allows the roll to turn so as to accommodate itself to the different curvatures of the inner and outer edges of the shoe-sole.

I claim:—

1. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, a pivoted frame adapted to swing toward and from the path of the jack, and a leveling-tool carried by said frame and adapted to move laterally so as to vary the inclination of the tool with respect to the jack.

2. A sole-leveling machine comprising a jack, and a tool mounted to operate on a sole carried by said jack and arranged to oscillate about an axis extending in the same general direction as the length of the sole on which the tool is acting and also to turn about an axis perpendicular to said first-named axis and to the sole.

3. A sole-leveling machine comprising a jack, a tool mounted to operate on a sole carried by said jack and arranged to oscillate about an axis extending in the same general direction as the length of the shoe on which the tool is acting and also to turn about an axis perpendicular to said first-named axis and to the sole, and means for oscillating said tool about one of said axes.

4. A sole-leveling machine comprising a jack, a tool-holder pivoted for movement toward and from said jack, and an operating tool comprising a roll carried by said tool-holder and arranged to turn about three axes substantially perpendicular to each other.

5. A sole-leveling machine comprising a jack adapted to move progressively in a predetermined path, a tool adapted to act on a sole carried by said jack, means to oscillate said tool, said means being normally inoperative, and means for rendering said tool-oscillating means operative during the period in which the shank portion of a sole is in engagement with said tool.

6. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, and a tool adapted to operate on a sole carried by said jack and mounted for rotary movement laterally of the jack about an axis approximately coincident with the center of the acting face of the tool and also to turn about a second axis transverse to the said first axis and in line with the center of the acting face of the tool.

7. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, an operating tool, means for alternately holding said tool first yieldingly in the path of said jack and then out of said path, the tool being arranged to act on a sole supported by the jack, and means for oscillating the tool laterally about the jack while the tool is acting on the shank portion of a sole.

8. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, an operating tool, means for alternately holding said tool first yieldingly in the path of said jack and then out of said path, the tool being arranged to act on a sole supported by the jack, means for oscillating the tool laterally about the jack while the tool is acting on the shank portion of a sole, and means for rendering said tool-oscillating means inoperative at all other times.

9. A sole-leveling machine comprising a series of jacks revolved progressively in a circular path, an operating tool, means for alternately holding said tool first yieldingly in the path of the jacks and then out of said path, the tool being arranged to act on the sole supported by each jack, mechanism adapted to be rendered operative or inoperative for constantly altering the inclination of said tool with respect to said path, and means for rendering said mechanism operative while the shanks of the soles are in engagement with the tool and inoperative at all other times.

10. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, a tool adapted to operate on a sole carried by said jack, means to oscillate said tool laterally with respect to the jack, and means for moving the jack, said means being constructed and arranged to permit retardation of the jack while the roll is in contact with the shank part of the sole.

11. A sole-leveling machine comprising a jack adapted to move progressively in a predetermined path, a tool adapted to act on a sole carried by said jack, means to oscillate said tool, said means being normally in-

operative, and means for rendering said tool-oscillating means operative during the period in which the shank portion of a sole is in engagement with said tool, said means being adjustable to vary the period of operation.

12. A sole-leveling machine comprising a jack adapted to move progressively in a predetermined path, a tool adapted to act on a sole carried by said jack, means to oscillate said tool, said means being normally inoperative, and means comprising a clutch and a cam moving simultaneously with the jack adapted to actuate the clutch, for rendering said tool-oscillating means operative during the period in which the shank portion of a sole is in engagement with said tool.

13. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, a tool adapted to operate on a sole carried by said jack, means to oscillate said tool laterally with respect to the jack, and means for moving the jack constructed to move the jack with a relatively very slow motion while the roll is in contact with the shank part of the sole and with greater speeds at other times.

14. A sole-leveling machine comprising a jack having a progressive movement in a predetermined path, a tool adapted to operate on a sole carried by said jack, means to oscillate said tool laterally with respect to the jack, and means for moving the jack comprising driving and driven rotatable members engaging each other with constantly-varying lengths of lever arms and angles of relative movement, constructed to move the jack with a relatively very slow motion while the roll is in contact with the shank part of the sole and with greater speeds at other times.

In testimony whereof I have affixed my signature, in presence of two witnesses.

HAROLD A. WEBSTER.

Witnesses:
E. BATCHELDER,
C. F. BROWN.