No. 636,419. Patented Nov. 7, 1899.

A. E. WATKINS.

BOOT OR SHOE POLISHING MACHINE.

(Application filed Feb. 23, 1898.)

(No Model.) 6 Sheets—Sheet 1.

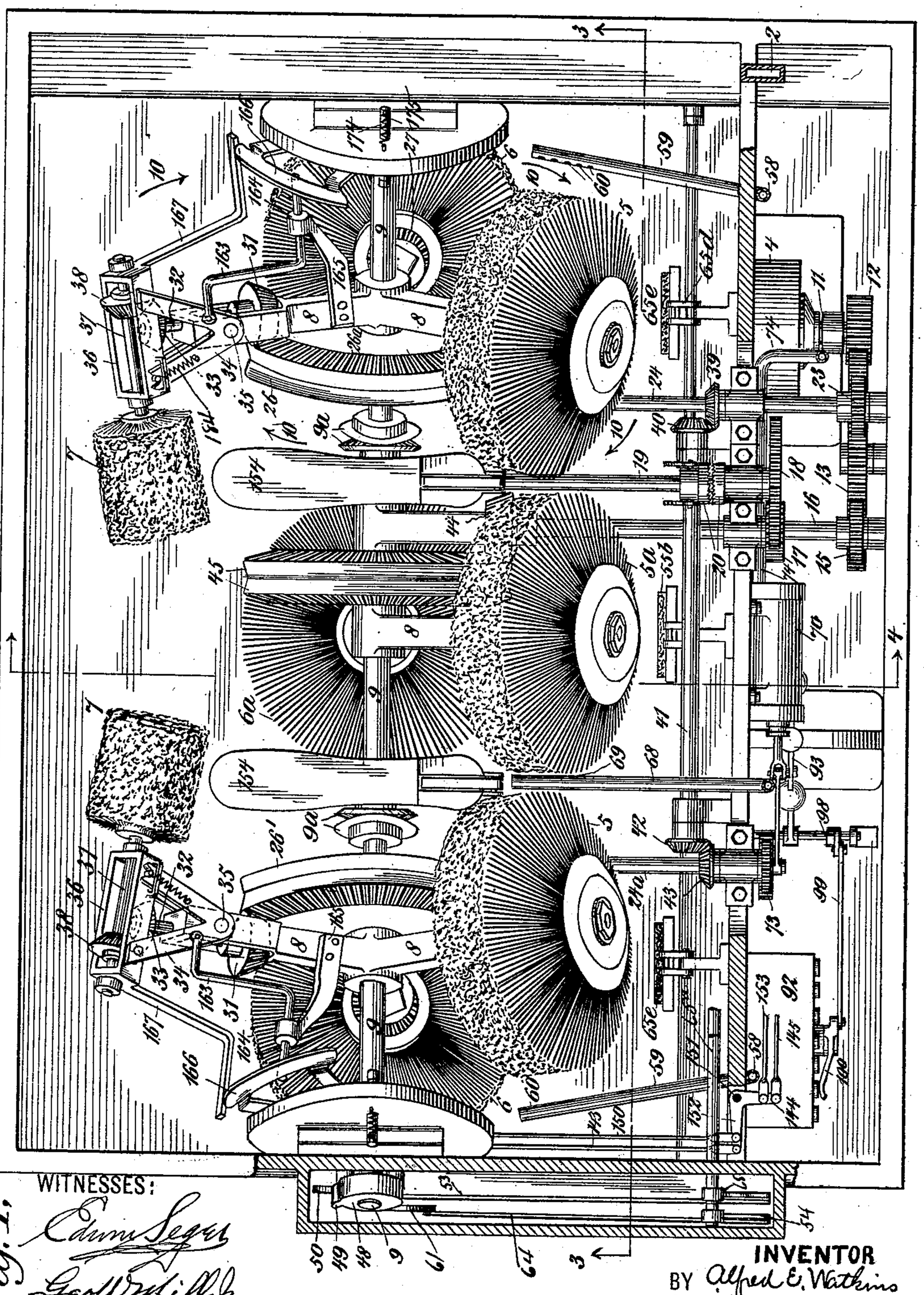

Fig. 1.

WITNESSES:

Edwin Segar

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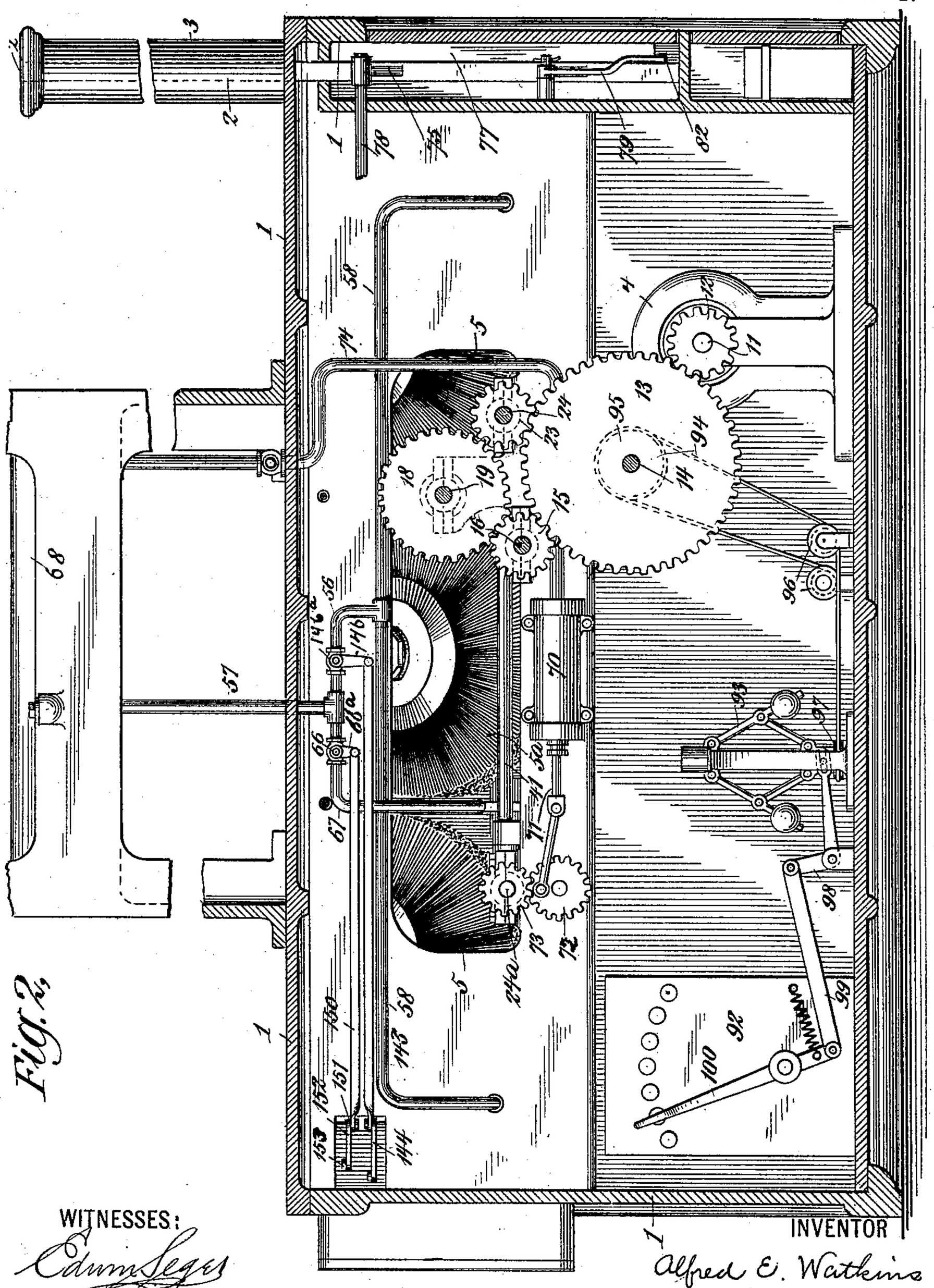

FIG. 2.

WITNESSES:

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(No Model.) 6 Sheets—Sheet 3.

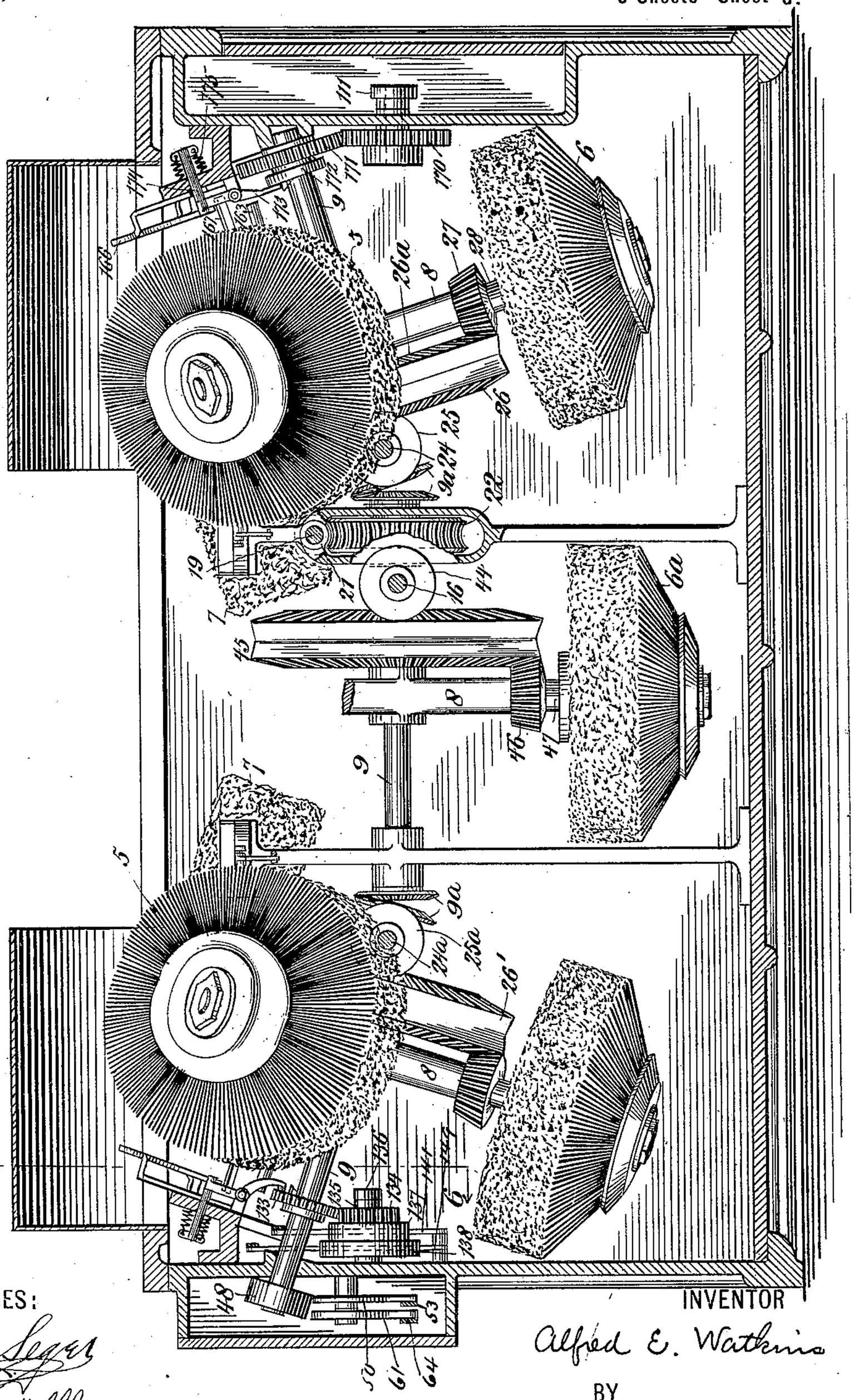

Fig. 3.

WITNESSES:

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(Application filed Feb. 23, 1898.)

(No Model.) 6 Sheets—Sheet 4.

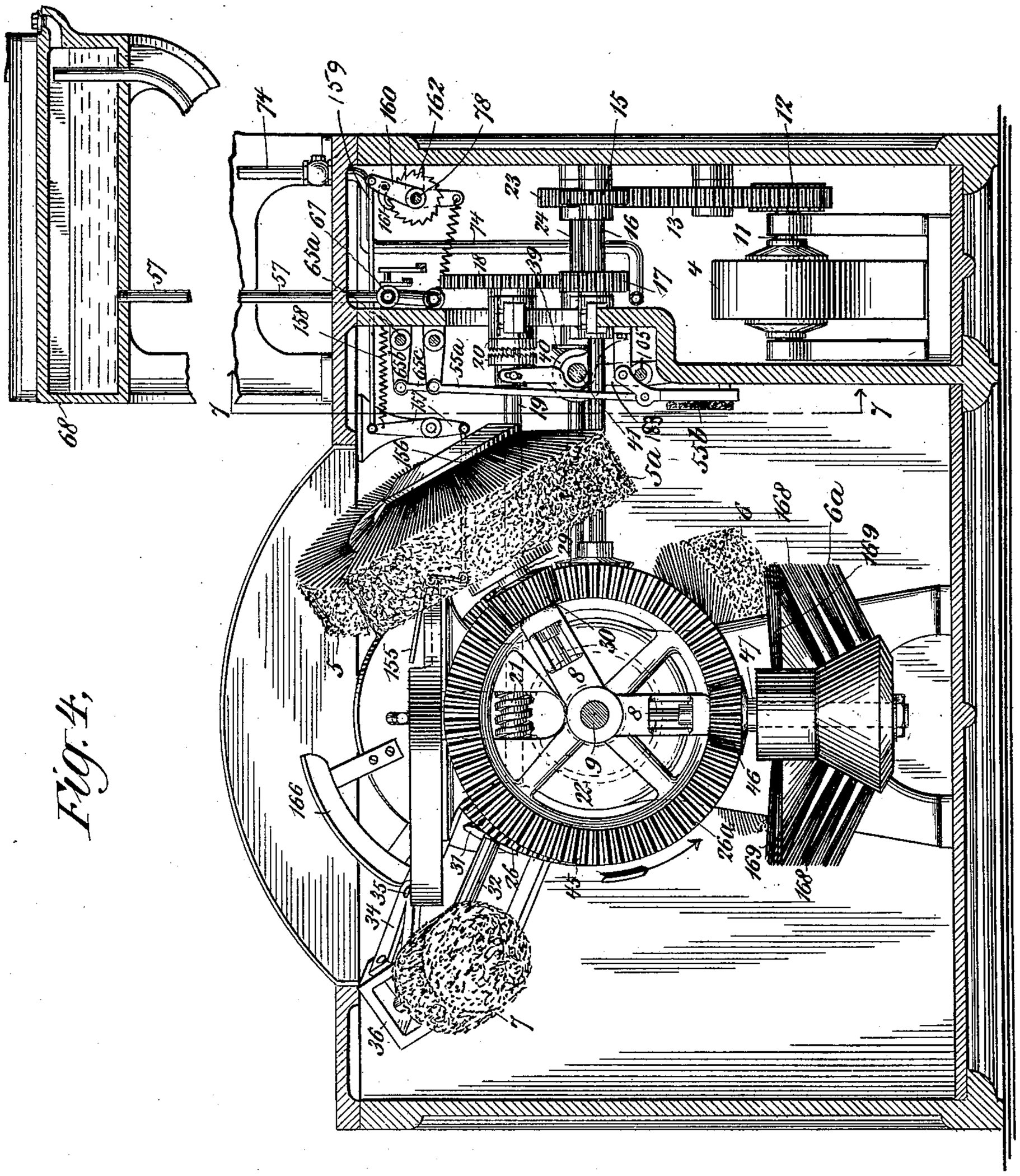

Fig. 4.

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(No Model.) (Application filed Feb. 23, 1898.)

6 Sheets—Sheet 5.

Fig. 6.

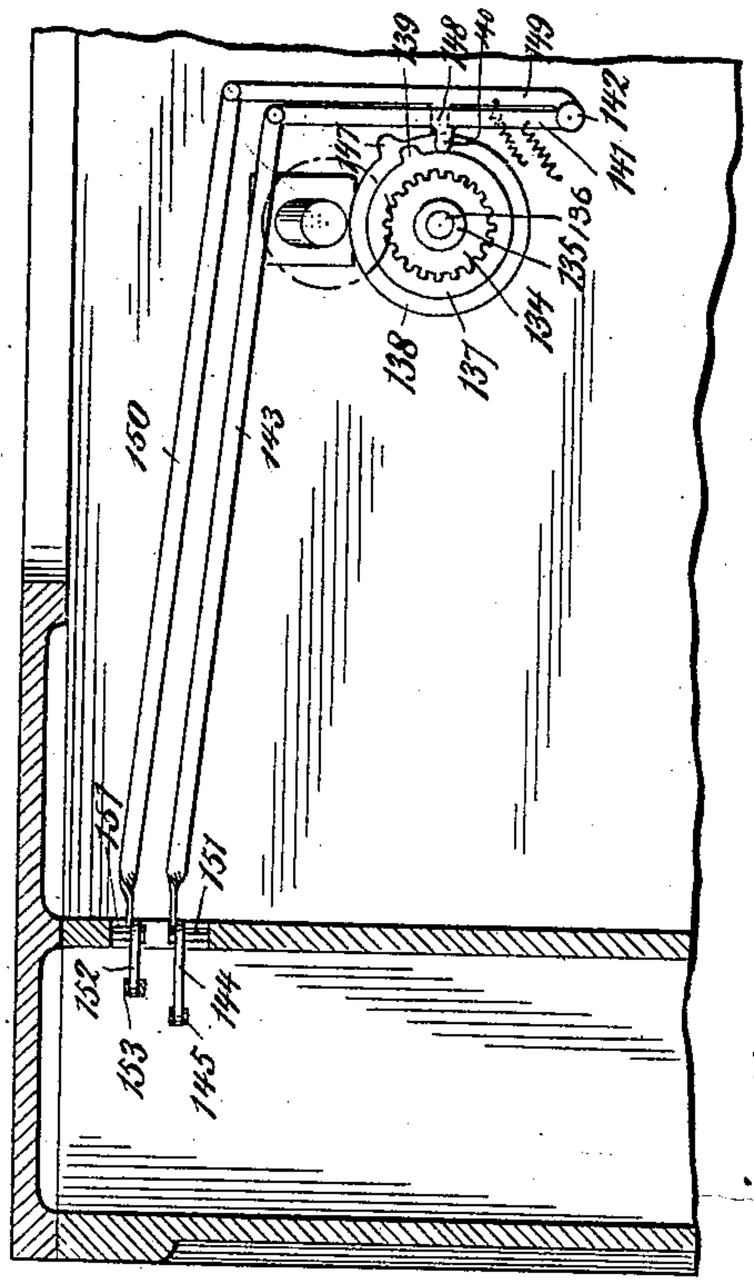


Fig. 7.

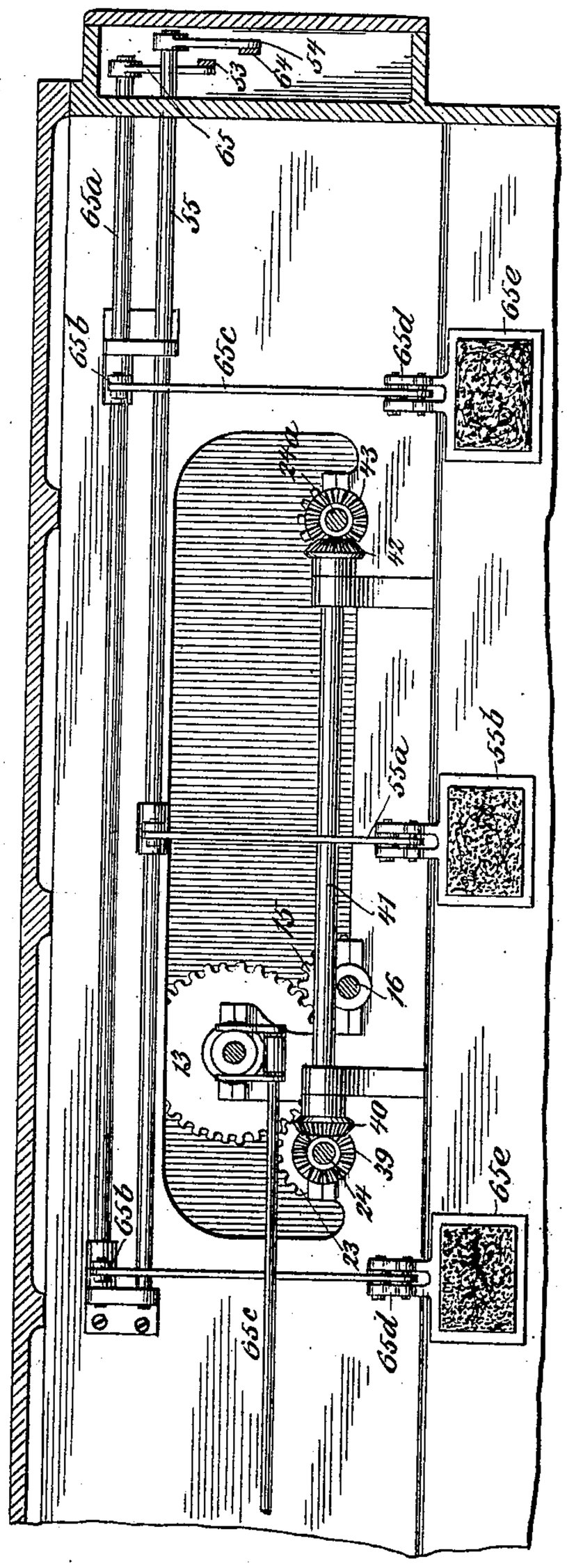
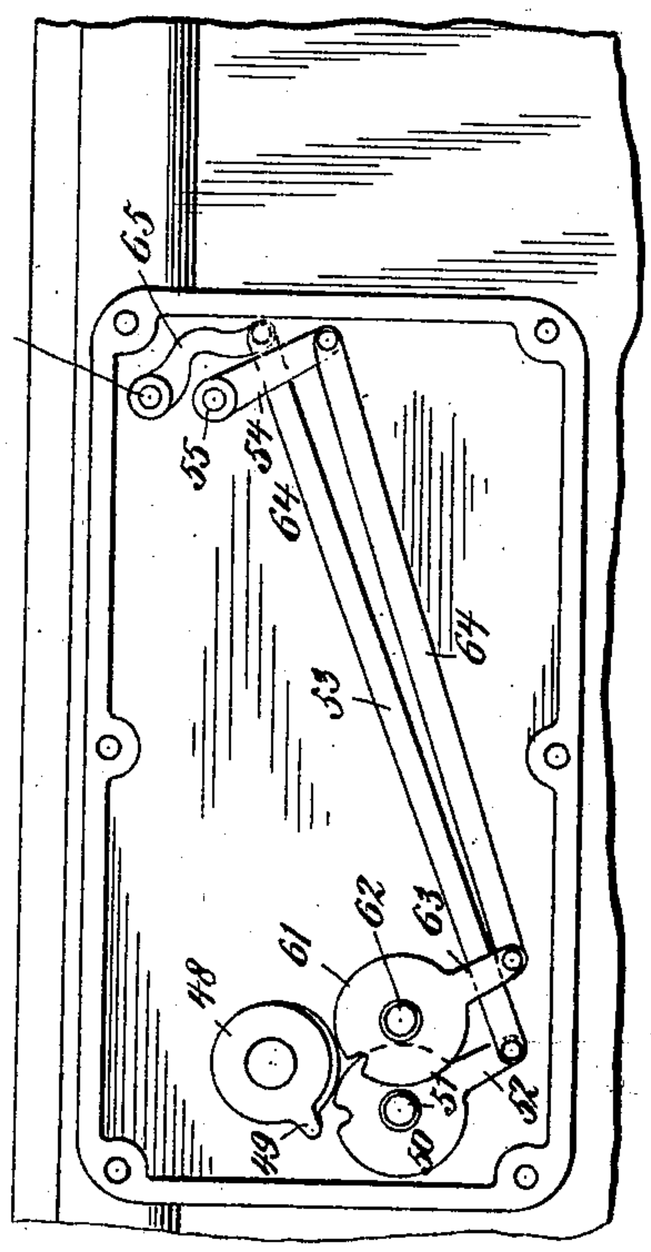


Fig. 5.



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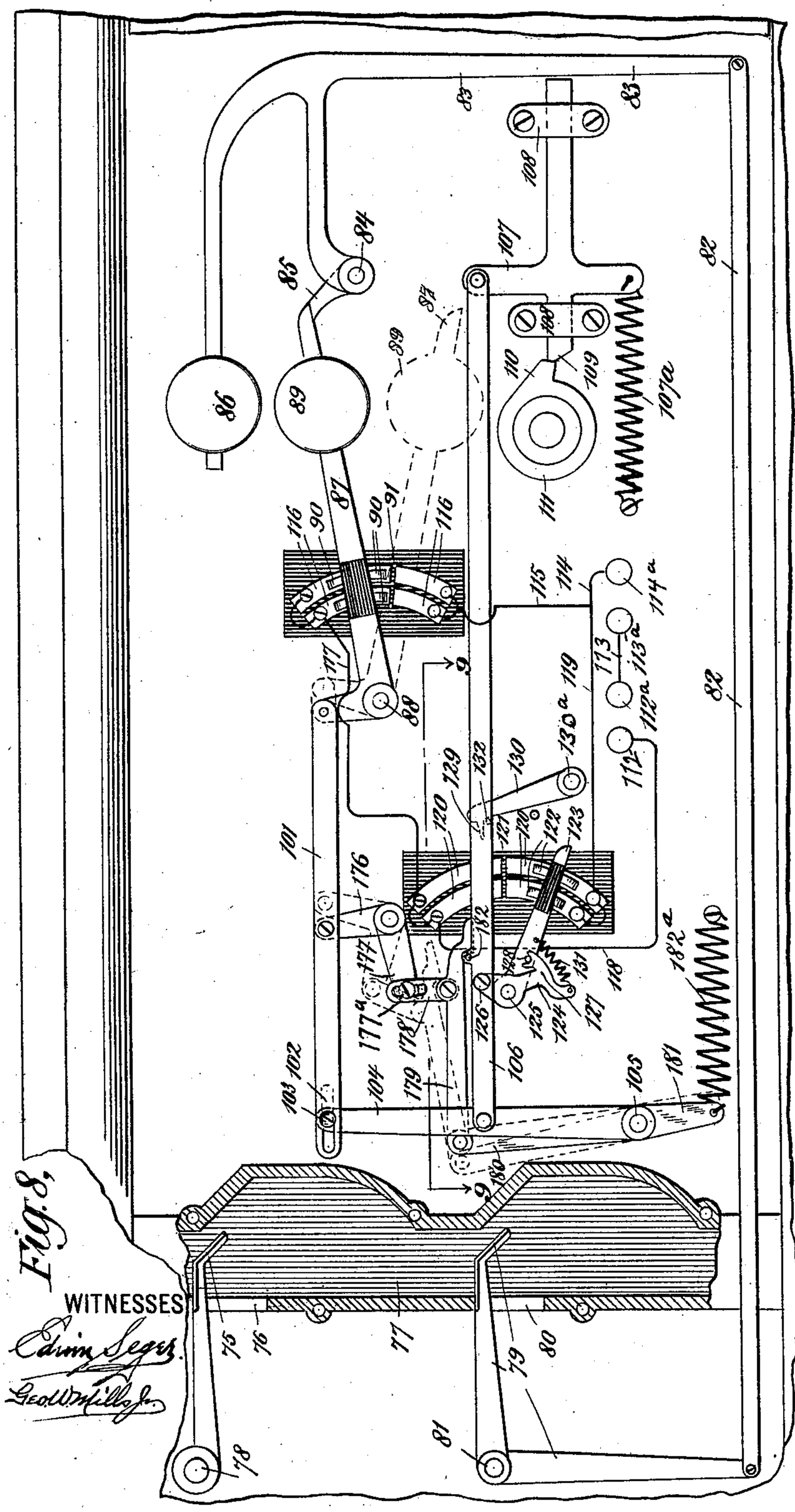

Fig. 8.

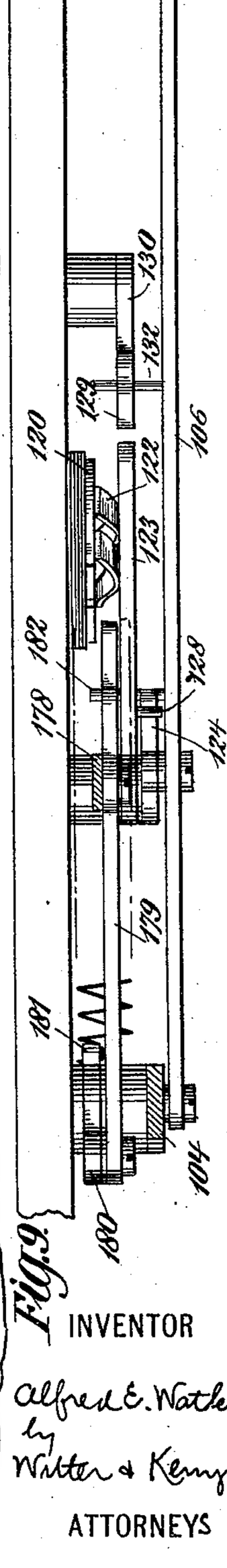

Fig. 9.

WITNESSES:
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Geo. W. Hill Jr.

INVENTOR
Alfred E. Watkins
by
Witter & Kenyon
ATTORNEYS

UNITED STATES PATENT OFFICE.

ALFRED E. WATKINS, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF SEVEN-EIGHTHS TO BERNARD F. SEADLER, OF NEW YORK, N. Y.

BOOT OR SHOE POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 636,419, dated November 7, 1899.

Application filed February 23, 1898. Serial No. 671,252. (No model.)

To all whom it may concern:

Be it known that I, ALFRED E. WATKINS, a citizen of the United States, and a resident of Jersey City Heights, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Boot or Shoe Polishing Machines, of which the following is a specification.

My invention relates to boot and shoe polishing machines.

It has for its object to simplify and improve the construction and operation of such machines, to make such machines more rapid and certain in the execution of their work, and to preferably cause both shoes to be polished on both sides at the same time; also, to provide improved apparatus for supplying water and blacking-polish to the brushes.

It consists of the devices and combinations hereinafter described, and claimed in the claims at the end of this specification.

I have shown in the drawings and will now proceed to describe the preferred form of my improved apparatus, in which similar reference characters in the different figures relate to corresponding parts.

Figure 1 is a plan of the preferred form of my improved apparatus. Fig. 2 is a vertical section through the machine just back of the front casing, viewing the machine from the front. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 1, viewed as shown by the arrows, with the exception that the brushes have been partially rotated in their course beyond the position shown in Fig. 1, and brush 5^a, with its connections, has been shown in full and the air-pump, with its connections, has been omitted. Fig. 4 is a vertical cross-section on the lines 4 4, Fig. 1, viewed as shown by the arrows. Fig. 5 is a side elevation showing part of the mechanism for operating the spraying devices. Fig. 6 is a vertical section of part of the devices for operating the daubers, taken on the line 6 6 of Fig. 3, viewed as shown by the arrows. Fig. 7 is a vertical section of the upper part of the machine, taken on the lines 7 7, Fig. 4, viewed as shown by the arrows. Fig. 8 is a side elevation of switching mechanism for an electric motor which I prefer to use and which I have shown as coin-controlled. Fig. 9 is a plan view of the same.

My improved apparatus is preferably intended to be put into operation by the dropping of a coin into a slot and is preferably driven by an electric motor, although it is evident that my improved devices may be set in operation by other means and may have other motive power.

1 is the casing of my machine.

2 is a slot through upright standard 3 into which the coin is dropped, by means of which, as will be hereinafter described, the mechanism is set into operation.

4 is an electric motor connected in any usual way with any suitable current-supplying device.

I preferably employ three sets of brushes for polishing boots or shoes, a separate set adapted to engage with the outer side of each shoe and the other set adapted to engage with the inner side of both shoes. Of these 5 5 are the daubing-brushes for the outer sides of the shoes, and 5^a is the daubing-brush for the inner sides. 6 6 are the polishing-brushes for the outer sides of the shoes, and 6^a is the polishing-brush for the inner sides. 7 7 are end brushes for polishing the heels and toes. All of these brushes are loosely mounted upon arms 8, so as to be capable of axial revolution upon said arms, and said arms 8 are rigidly keyed upon or secured to a line of shafting 9, which runs lengthwise through the machine, as shown in Fig. 1. As shown, this shafting has its ends preferably raised at a slight angle to the central part, the ends and the central part being geared to one another by bevel-gearing 9^a or other universal joint, the said line of shafting being supported in suitable bearings. This line of shafting is free to rotate, and in its rotation carries with it arms 8 and all of the brushes, giving them a circular revolving motion, as indicated by the arrows 10 in Fig. 1.

The mechanism for rotating the line of shafting 9 and for revolving the brushes upon their arms 8 is as follows: Mounted upon the shaft 11 of electric motor 4 is pinion 12, which

meshes with gear-wheel 13 on shaft 14. This gear-wheel is much larger than the pinion that drives it, in order that the motor while running fast may impart comparatively slow rotary motion to the line of shafting 9. Gear-wheel 13 meshes with pinion 15 upon shaft 16. Shaft 16 also carries another pinion 17, adapted to mesh with gear-wheel 18 upon shaft 19. This gear-wheel, as shown in Fig. 4, is normally out of engagement with worm-shaft 19, but is thrown into engagement with it by means of clutch 20 upon shaft 19, as will be hereinafter described. Shaft 19 carries at its inner end worm 21, the latter meshing with worm-wheel 22 upon central line of shafting 9. When the two parts of clutch 20 are thrown into engagement with each other and the motor is energized, the line of shafting 9 will be rotated in the direction shown by the arrows 10 in Fig. 1, carrying with it all of the brushes. The brushes will thus revolve or describe in their movement the circumference of a circle.

Rotary motion is imparted to the brushes by the following mechanism: Spur-wheel 13 also engages with pinion 23 on shaft 24. Shaft 24 carries at its inner end beveled gear-wheel 25, which meshes with large beveled gear-wheel 26, loosely mounted upon the line of shafting 9. This gear-wheel 26 has beveled teeth 26^a on its opposite side, and these teeth mesh with small beveled gear-wheel 27, keyed to sleeve 28 upon arm 8. This sleeve also carries polishing-brush 6 at the right of the machine and is free to rotate upon arm 8. By means of the above-described mechanism the polishing-brush on the right-hand side of Fig. 4 is given a rapid rotary motion upon its axis. Daubing-brush 5, to the right of the machine, is similarly mounted upon a sleeve (not shown) loosely fitted upon its arm 8 and having a beveled gear-wheel (not shown) meshing with the teeth 26^a of beveled gear-wheel 26. Daubing-brush 5 is thus rapidly rotated upon its axis in the same manner as polishing-brush 6.

The end brush or heel-and-toe brush 7 is rotated upon its axis by means of the following-described mechanism. 31 is a small bevel gear-wheel mounted upon shaft 32, supported in bearings in arm 8 and carrying at its other end bevel gear-wheel 33. Gear-wheel 31 meshes with the teeth 26^a of large bevel gear-wheel 26 and is thus rotated in its bearings. 34 is an oscillating frame pivoted at 35 to said arm 8. Pivoted to this oscillating frame 34 is a frame 36, which furnishes bearings for shaft 37, upon which end brush 7 is mounted. Frame 36 is carried in a notch in oscillating frame 34 and is held down in said notch by a spring 184, permitting the brush 7 to give when passing over the foot. Shaft 37 has at its other end bevel gear-wheel 38, which is adapted to engage with bevel gear-wheel 33 when oscillating frame 34 is thrown to its extreme left-hand position, as shown in Fig. 1. In this position motion is transmitted through bevel gear-wheel 33 and bevel-gear 38 to shaft 37 and heel-and-toe brush 7, causing that brush to rapidly rotate on its axis. Also mounted upon shaft 24 is bevel gear-wheel 39, which meshes with bevel gear-wheel 40 upon shaft 41, which turns loosely in bearings in the framework of the machine and carries at its left-hand end the bevel gear-wheel 42. The latter meshes with bevel-gear 43 on shaft 24^a. This shaft 24^a carries at its farther end a bevel gear-wheel 25^a, which meshes with a large bevel gear-wheel 26′, which is loosely mounted on the line of shafting 9 at the end of the machine and is also beveled on both of its opposite sides exactly as in the case of bevel gear-wheel 26. The brushes at the left-hand side of the machine are similarly adapted to operate upon the left side of the left foot and upon the heel and toe and have similar driving mechanism to that already described for driving the brushes 5, 6, and 7 at the right of the machine. This mechanism, being a mere duplication, will not be further described.

The mechanism for driving the brushes 5^a 6^a in the center of the machine is as follows: Shaft 16 carries at its inner end beveled gear 44, meshing with the bevel-teeth upon one side of the large bevel gear-wheel 45, loosely mounted upon the line of shafting 9. This bevel gear-wheel 45 has bevel-teeth upon opposite sides, as shown in Fig. 1. The teeth upon one side of gear-wheel 45 mesh with bevel gear-wheel 46, mounted upon sleeve 47, the latter loosely surrounding the arm 8 in the center of the machine, which carries polishing-brush 6^a. Sleeve 47 carries polishing-brush 6^a, rapid rotary motion being thus imparted to this polishing-brush 6^a. Daubing-brush 5^a is likewise driven by a similar gear-wheel 30, mounted upon a sleeve 29 upon its arm 8, its teeth meshing with the teeth of large bevel gear-wheel 45. This mechanism is an exact duplicate of the mechanism for driving the polishing-brush 6^a.

By means of the above-described mechanism two distinct motions are communicated to the three sets of brushes—first, a rapid rotary motion of each brush upon its axis, and, secondly, a revolving circular motion of each of said brushes, by which each brush is in turn brought upward and against the side or end, or both, of the shoe to be polished and caused to pass along the length of one side of the shoe, and is then given a downward circular motion until it is brought back into its original position.

The set of brushes in the middle of the machine apply the blacking to and polish the inner sides of both shoes and part of the heel and part of the toe, while the two sets of outside brushes apply the blacking to and polish the outer sides of both shoes and also the heel and toe.

My improved apparatus for applying polish to the daubing-brushes is as follows: Mounted upon the line of shafting 9 at the left end

of the machine is a disk 48, having a toe or cam portion 49. In its rotation this toe 49 first engages with an opening in wheel 50. This wheel is loosely mounted upon stud 51 and also has an arm 52, which is pivotally secured to a rod 53. The latter is pivotally secured to arm 65, fixedly mounted upon shaft 65[a]. This shaft carries two arms 65[b], upon the end of each of which is a rod 65[c], connected at its end to the center of a lever 65[d], upon which is mounted a blacking-pad 65[e], one for each of the side daubing-brushes 5 5. As disk 48 turns it lifts blacking-pads 65[e] into engagement with daubing-brushes 5 5, and thus supplies these brushes with blacking. After toe 49 has passed out of engagement with the opening in wheel 50 the weight of the blacking-pads returns them and wheel 50 and the intervening mechanism to their normal position. After leaving wheel 50 toe 49 engages with a similar opening in wheel 61. Wheel 61 is loosely mounted upon stud 62 and has an arm 63 pivotally secured to rod 64. The latter is pivotally secured at its other end to arm 54, fixedly mounted upon shaft 55. Shaft 55 carries an arm 55[a], connected at end of the center of a lever 55[c], upon the end of which is a blacking-pad 55[b] for the middle daubing-brush 5[a]. As disk 48 turns it lifts blacking-pad 55[b] into engagement with daubing-brush 5[a], the weight of the pad returning the parts to their normal position, as above described.

It will be noted that the above arrangement of disk 48 and wheels 50 and 61 and their connections with the blacking-pads cause the blacking-pads which engage with the outer daubing-brushes 5 5 to be first operated and then immediately afterward the blacking-pad 55[b] for the middle daubing-brush. This is made necessary in the construction shown in the drawings, as daubing-brushes 5 5 are in their movements slightly in advance of daubing-brush 5[a]. It will also be noted that disk 48 is actuated at the very beginning of the rotary motion of the line of shafting 9, so that blacking will be applied to the brushes soon after they commence their respective movements.

In practice I prefer to throw water in the form of spray upon the daubing-brushes instead of applying water directly to the blacking.

My improved device for spraying the daubing-brushes is as follows: To the line of shafting 9 is secured a gear-wheel 133, which meshes with gear-wheel 134 upon sleeve 135, the latter loosely mounted upon shaft 136. Sleeve 135 also carries two disks 137 and 138, which accordingly rotate with the rotation of the line of shafting 9. In this rotation the toe 139 of disk 137 strikes against finger 140 of a lever 141, fulcrumed at 142 and pivotally secured at its other end to rod 143. The latter is pivoted at its other end to bell-crank 144, pivoted at 151 in the framework of the machine, and bell-crank 144 is pivoted to arm 145 and the latter to rod 146, which controls valve 146[a] in pipe 56. Pipe 56 is connected with pipe 57, which runs to a water-reservoir 68. When toe 139 upon disk 137 strikes finger 140 upon lever 141, it opens valve 146[a] and allows water to pass through pipes 57 56 and both branches of pipe 58, then to pipes 59 at each side of the machine, and thence to be driven in the form of spray through openings 60 in the end of the pipes against the daubing-brushes 5 5. Similarly toe 147 upon disk 138 strikes against finger 148 on lever 149 and through pivotally-connected rod 150, bell-crank 152, pivoted at 151, rod 153, and arm 66[a] opens valve 66 in pipe 67, permitting the water to pass from pipe 57 through pipe 67 to pipe 58, and thence be blown in spray, through orifices 69 in the end of the pipe, against daubing-brush 5[a].

I prefer to employ air-pressure above the surface of the water in reservoir 68. For this purpose I provide a pump 70. This pump may be of any ordinary construction, and, as shown, is operated by means of piston-rod 71, connected to driving-wheel 72, the latter being geared to pinion 73 on shaft 24[a]. Thus while the brushes are being rotated on their axes pump 70 will be pumping air from any suitable source through pipe 74 into the upper part of the reservoir 68. By using a pressure in excess of atmospheric-air pressure the action of the sprayers 60 is made more prompt and effective.

In my improved machine I have found it expedient to arrange the outer daubing-brushes 5 5 slightly in advance of the central daubing-brush 5[a], as there is not as much tendency in that position of the brush to interference between the outer ones and the central one. For this reason I have shown the spraying mechanism as arranged so that the spray will be first applied to the outer brushes, and then after a short interval it will also be applied to the central one. This is accomplished by arranging toe 139 on disk 137 slightly in advance of toe 147 on disk 138, so that valve 146[a] will be opened a short time before valve 66. After toes 139 and 147 have passed by fingers 140 and 148, respectively, the valves 146[a] and 66 can be closed and the connecting parts be returned to their former positions by any suitable mechanism. The mechanism is so arranged that the valves will be opened and the spray be thrown upon the daubing-brushes immediately after the brushes begin their movements. Immediately after that takes place the blacking-pads are raised and blacking is applied to the daubing-brushes.

In the drawings I have shown my improved device as driven by an electric motor, and I have also shown improved coin-controlled devices for controlling the electric circuit through the motor, which I will now proceed to describe. A coin is dropped through slot 2 in standard 3 and strikes against arm 75, projecting through an opening 76 in the wall of chamber 77, into which chamber the coin

drops after leaving slot 2. Arm 75 is pivoted at 78 and is adapted when released, as hereinafter described, to permit the coin to continue its descent through the chamber 77. In this further descent the coin strikes an arm of bell-crank 79, which projects through an opening 80, similar to 76, in the wall of the chamber. Bell-crank 79 is pivoted at 81, and at its other end is pivotally secured to rod 82. Rod 82 is pivotally fastened to frame 83. This frame 83 is pivoted at 84 and carries a toe 85 and also a weight 86. The end of the long arm of bell-crank 87, which is pivoted at 88 in the framework of the machine and which carries weight 89, rests normally upon the end of toe 85. When the coin drops, it presses the end of bell-crank 79, pulls toe 85 upward from under the end of arm of bell-crank 87, thus permitting the bell-crank to fall. In its downward movement through metallic surfaces 90 the bell-crank closes the break 91 in the circuit through the electric motor and starts the operation of the machine. The circuit through the motor is not shown in full detail, as it may be constructed in any suitable manner. This circuit preferably passes through a rheostat 92, which may be of any suitable construction and which is automatically actuated to increase or decrease the strength of the current by means of a governor 93. This governor may be of any ordinary construction. As shown in the drawings, it is operated by means of a belt 94, passing over a pulley on shaft 14 and over idle-pulleys 96 and around pulley 97 on the shaft of the governor. By means of bell-crank 98 and levers 99 and 100 the rheostat is operated in the usual way.

Through weight 86 bell-crank 79, toe 85, and intermediate connections are immediately restored to their normal position after the coin has passed by lever 79. In practice I have found it expedient to cause bell-crank 87 to be promptly returned to its normal position after falling, so that the end of its long arm will again rest upon toe 85, as shown in Fig. 8. This is accomplished by means of the following-described mechanism: Secured to the short arm of bell-crank 87 is rod 101. In slot 102, in the other end of this rod, works a pin 103, projecting from the end of lever 104 fulcrumed at 105. A rod 106 is pivotally secured to this lever at or near its center and is secured at its other end to frame 107, adapted to slide in guides 108. This frame has a nose 109, which bears against cam 111 or its toe 110, against which it is pressed by spring 107^a, fastened to sliding frame 107.

When the machine is at rest, toe 110 of cam 111 rests against nose 109 of frame 107 and keeps frame 107 pressed back with spring 107^a stretched, as shown in Fig. 8. As soon as the machine begins to operate cam 111 begins to rotate, being driven by a line of shafting 9, through gear-wheel 171 on a line of shafting 9, and gear-wheel 170, mounted on the shaft of cam 111, as shown in Fig. 3. Nose 109 soon drops off from toe 110, whereupon spring 107^a pulls frame 107 and rod 106 to the left, as seen in Fig. 8, the rod 106 pushing lever 104 in the same direction, pin 103 thereon through rod 101 pulling bell-crank 87 upward into its original position, with the end of the long arm resting upon and held by toe 85. The circuit is thus broken at 91 shortly after the machine commences its operation. In order, however, to preserve the circuit unbroken through the electric motor, I provide another and second circuit-controller beside lever 87 and its metallic surfaces 90, arranged in circuit with the electric motor, but also arranged in a branch of the same around the first circuit-controller, lever 87, and metallic surfaces 90. This second circuit-controller is the arm 123, loosely mounted on shaft 125, carrying the metallic surfaces 122. The circuit through the motor, with its two branches, one through each of the circuit-controllers, is as follows: From one pole 112^a of the source of electrical energy to wire 113, binding-post 113^a, motor 4, resistance-box 92, binding-post 114^a, wire 114 115, through conductors 116, metallic surfaces 90, conductors 116, wires 117 118 to the other pole 112, this part comprising the branch through the first circuit-controller. The circuit through the second branch is as follows: Pole 112^a, wire 113, binding-post 113^a, motor 4, resistance-box 92, binding-post 114^a, wires 114 119, conductors 120, metallic surfaces 122, the other part of conductors 120, wire 118, back to the other pole 112.

When a coin depresses arm 79, the circuit is closed through the first branch at 91 by means of the first circuit-controller and the machine is started, but also immediately thereafter the circuit is again broken at 91 by the rising of bell-crank 87, as already described. Before this break occurs, however, the circuit through the second branch is closed at break 121 in conductors 120 by the rising of arm 123 and its metallic surfaces 122, as will be now described, thus uninterruptedly maintaining the circuit through the motor. Fixedly secured to shaft 125 is bell-crank 124. This bell-crank is fastened at one end 126 to rod 106. Near its other end it has a forked arm 127, bearing against pin 128 of arm 123, and has a spring 131, also fastened to arm 123. As rod 106 is pressed to the left, when nose 109 slips off from toe 110, bell-crank 124, through arm 127 and pin 128, forces arm 123 and its metallic surfaces 122 upward until the end of arm 123 rests upon and is held by nose 129 of stop 130, loosely pivoted at 130^a, and until metallic surfaces 122 close the branch circuit at 121. Arm 123 and metallic surfaces 122 are held in this position by nose 129 of stop 130 until released, as hereinafter described. Thus the circuit through the electric motor is not broken by the break at 91.

The circuit through the motor is broken when the machine has completed its work by the following means: Cam 111 is gradually ro-

tated as the line of shafting 9 rotates, and just before that shaft completes one rotation the inclined cam-surface of toe 110 begins to push nose 109, frame 107 backward or to the right, as seen in Fig. 8. This draws rod 106 to the right and forces bell-crank 124 downward, but as arm 123 is caught by stop 130 spring 131 is strained until pin 132 upon rod 106 in its movement to the right trips stop 130, whereupon arm 123 and metallic surfaces 122 fly downward, breaking the circuit at 121 so quickly that all danger of burning out or fusing is avoided.

To insure that the brushes shall not begin their movements before both feet are placed in position upon the foot-rests 154, I have devised the following-described mechanism: Pivoted at the rear of the heel of each foot-rest is a bell-crank wire or lever 155, one arm of which normally projects slantingly upward across the heel part of the foot-rest, as shown in Fig. 4, the other of which is secured by rod 156 to lever 157. A spring 158, fastened to this lever, tends to hold the arm of bell-crank 155 slantingly upward over the heel portion of the foot-rest. The other end of each lever 157 is connected by rod 159 to a pivoted arm 160, the latter carrying pawl 161, adapted to engage with ratchet-wheel 162, fixedly mounted upon shaft 78. Upon this same shaft 78 is fixedly mounted arm 75, which projects through opening 76 into coin-chute 77 and which acts as a stop to hold the coin from falling farther down in the chute. As the heel of the boot or shoe to be polished is placed in position it forces down the arm of bell-crank 155, and thus partially rotates shaft 78 and slightly depresses arm 75, tending to withdraw it, so as to permit the coin to continue its fall down the chute.

In order to make certain that both feet are in proper position before the coin is permitted to fall beyond stop 75, I preferably arrange two pawls and ratchet-wheels on shaft 78, connecting each with a bell-crank arm 155, as described, arranging them so that if one heel only is placed in position shaft 78 will not be rotated far enough to permit the passage of the coin by stop 75, but upon the successive depression of the two bell-crank levers 155 the shaft 78 will be rotated far enough to permit the coin to slip past stop 75.

Shaft 19 is shown in Fig. 4 as normally disconnected from shaft 16 and as adapted to be thrown into connection therewith by means of a clutch 20 for the purpose of throwing the line of shafting 9 out of connection with the motor toward the close of the operation in time to insure that the brushes shall not revolve beyond their proper positions for beginning the next shoe-blacking operation. In practice, however, I find that such a precaution is not needed and the clutch 20 may be dispensed with, the gear-wheel 18 and pinion 17 in such a case being always in engagement with each other. If it is desired, however, to make use of the clutch, it can be operated by the driving mechanism of the machine in any suitable manner.

In the operation of the heel and toe brushes in my improved machine these brushes first polish the back and sides of the heel. They are then forced by the foot outward, oscillating frame 34 swinging outward on pivot 35 until the oscillating frame has passed the center and falls outward, thus separating gear-wheels 37 and 38 and stopping the rotation of the heel and toe brushes while passing along the sides of the shoe. Rod 163, secured to oscillating frame 34 and adapted to slide through a bearing 164 in standard 165 and strike against the face of cam 166, and arm 167, secured to frame 36 and adapted to strike against the upper surface of cam 166, prevent oscillating frame 34 from falling too far outward. As heel and toe brushes 7 arrive opposite the forward part of the instep rod 163 and arm 167 by riding upon raised cam-faces of arm 166 throw oscillating frame inward back again over its center, bringing gears 33 and 38 into contact, and thereby start heel and toe brushes rotating again and force these brushes over the tops of the forward part of the shoes, which they then polish. These heel and toe brushes are thus enabled to effectively polish the heels and toes and to effectively remove any trace of a dividing-line, which would otherwise always be visible where side brushes alone are used. Central line of shafting 9 is shown in the drawings as slightly bent upward at its outer parts, carrying the outside brushes and connecting mechanism. While I prefer this arrangement, as it enables the outside brushes to be placed in a somewhat more advantageous position for operating upon the foot, it is not at all a necessary one. The machine will work satisfactorily with a straight central shaft. Cam 166 is attached to a stem 174, which passes through an opening in the framework and is there secured to springs 175, which tend to pull inward the stem 174 and with it the cam 166. Secured to the cam and stem is the finger 173, the cam, stem, and finger being in one piece and pivoted to the framework, as shown. Finger 173 rests upon cam 172 and is by the revolution of cam 172 forced inward, thus pushing stem 174 and cam 166 outward against the pressure of springs 175 and permitting arm 167 to pass the edge of cam 166. When the finger 173 falls off the cam 172, the springs 175 instantly pull the stem 174 back inward and with it the cam 166, which thereupon bears against rod 163 and arm 167 and puts brush 7 into operation.

Any suitable form of brushes may be used in my improved machine; but I prefer to use a form of brush in which there are two sets of bristles, the bristles intersecting each other, preferably, at a slight angle, as shown at 168 and 169 in brush 6^a in Fig. 4. Such a construction makes a very effective, strong, and durable brush. It is also particularly effect-

ive in introducing blacking into the crevice between the soles and upper and in polishing such parts of the shoe.

The means for throwing the parts of clutch 20 into or out of engagement with each other are as follows: Secured to rod 101 is a bell-crank lever 176, the arm 177 of which has a pin 177ª working in a slot in arm 178. Arm 178 is pivotally secured to arm 179, the latter being pivotally secured at one end to lever 180 and at the other end has a hook which when the machine is at rest hooks over and is caught by a pin 182 on rod 106. Lever 180 is secured to shaft 105, as is also lever 181, the latter having spring 182ª secured to it. Upon shaft 105 is also keyed arm 183, pivotally secured to the movable part of clutch 20, as shown in Fig. 4. When bell-crank 87 falls, rod 101 pulls bell-crank 176 to the right, raising arm 177, and through pin 177ª and arm 178 pulls arm 179 upward and free from pin 182. Spring 182ª immediately pulls lever 181 to the right, rotating shaft 105 to the left, as shown in Fig. 8, and to the right, as shown in Fig. 4, and throwing the movable part of clutch 20 into contact with the other part of the clutch, thus through shaft 19 and worm 21 causing the line of shafting 9 to rotate. Bell-cranks 176 and 177 and arm 178 are returned to their normal position by the return of rod 101 to its normal position. Through a slot in arm 178 arm 179 is then allowed to drop down upon rod 106, with its hook to the right of pin 182, as seen in Fig. 8, and upon a return of rod 106 to its normal position levers 180 181, shaft 105, arm 183, and the movable part of clutch 20 are restored to their normal position and the line of shafting 9 ceases to rotate.

I do not in this application claim the coin-controlling devices or the improved brush here shown and described, as they are made the subject-matter, respectively, of two other divisional applications hereof.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a boot and shoe polishing machine the combination with a line of shafting and means for rotating it, of an arm fixedly connected to and turning with the line of shafting, a frame pivoted to said arm, a toe-brush loosely mounted upon said frame and adapted to revolve with said arm and frame, means for moving said frame upon the arm so as to move the toe-brush into or out of operative position, and another arm connected to and turning with said line of shafting, a brush mounted upon and adapted to revolve with said arm and means for rotating said brushes upon their axes, substantially as set forth.

2. In a boot and shoe polishing machine the combination with a line of shafting and means for rotating it, of arms fixedly connected to and turning with the shafting, a frame pivoted to one of said arms, a toe-brush loosely mounted upon said frame and adapted to revolve with the said arm and frame, means for moving said frame upon the arm so as to move the toe-brush into or out of operative position, brushes loosely mounted upon each of the other said arms and adapted to revolve with the line of shafting and arms, and means for rotating the said brushes upon their axes, whereby the brushes will be brought successively into operative position, substantially as set forth.

3. In a boot and shoe polishing machine, the combination with a line of shafting, gearing connecting it with the main driving mechanism of the machine, of arms fixedly connected to and turning with the line of shafting, brushes loosely mounted upon said arms and adapted to revolve with the line of shafting and arms, a gear-wheel loosely mounted upon the line of shafting, gearing meshing with the said wheel and connected to the main driving mechanism of the machine for driving said gear-wheel, and a gear-wheel for each brush connected thereto and also meshing with the said loosely-mounted gear-wheel, whereby a rapid rotary motion will be imparted to each brush and the brushes will be brought successively into operative position, substantially as set forth.

4. In a boot and shoe polishing machine, the combination with a line of shafting, a worm-wheel thereon, a worm meshing with the worm-wheel and connecting gearing between it and the main driving mechanism of the machine, whereby a comparatively slow rotary motion will be imparted to the line of shafting, of arms fixedly connected to and turning with the line of shafting, brushes loosely mounted on said arms and adapted to revolve with the line of shafting and arms, a gear-wheel loosely mounted upon the line of shafting, gearing meshing with the said wheel and connected to the main driving mechanism of the machine for driving said gear-wheel, and a gear-wheel for each brush connected thereto and also meshing with the loosely-mounted gear-wheel, whereby a rapid rotary motion will be imparted to each brush and the brushes will be brought successively into operative position, substantially as set forth.

5. In a boot and shoe polishing machine, the combination with a line of shafting, gearing connecting it with the main driving-shaft of the machine, a daubing, a polishing and a heel and toe brush, each loosely mounted upon an arm secured to and revolving with the line of shafting and each adapted to rotate on its axis and having a gear-wheel meshing with a large gear-wheel loosely mounted upon the line of shafting, gearing connecting the said loosely-mounted gear-wheel with the main driving mechanism of the line of shafting, and means for supplying blacking to the daubing-brush, substantially as set forth.

6. In a boot and shoe polishing machine, the combination with a line of shafting and means for rotating it, of an arm fixedly connected to and turning with the line of shaft-

ing, a large gear-wheel loosely mounted upon the line of shafting, gearing meshing therewith and connecting the said wheel with the driving mechanism of the machine adapted to cause said gear-wheel to rotate, an oscillating frame pivoted to the said arm and a heel and toe brush and a gear-wheel connected thereto mounted upon the oscillating frame, all so arranged that the heel and toe brush will revolve as the line of shafting and arm revolve and whenever the oscillating frame is thrown forward the heel and toe brush will also rotate upon its axis, and when said frame is thrown backward will cease to rotate upon its axis, substantially as set forth.

7. In a boot and shoe polishing machine, the combination with a line of shafting and means for rotating it, of an arm fixedly connected to and turning with the line of shafting, a large gear-wheel loosely mounted upon the line of shafting, gearing meshing therewith and connecting the said wheel with the driving mechanism of the machine adapted to cause said gear-wheel to rotate, an oscillating frame pivoted to the said arm and a heel and toe brush and a gear-wheel connected thereto mounted upon the oscillating frame, all so arranged that the heel and toe brush will revolve as the line of shafting and arm revolve and whenever the oscillating frame is thrown forward the heel and toe brush will also rotate upon its axis, and when said frame is thrown backward will cease to rotate upon its axis, and means for throwing the oscillating frame forward, substantially as set forth.

8. In a boot and shoe polishing machine, the combination with a line of shafting and means for rotating it, of an arm fixedly connected to and turning with the line of shafting, a large gear-wheel loosely mounted upon the line of shafting, gearing meshing therewith and also connected with the driving mechanism of the machine, adapted to cause the said gear-wheel to rotate, a shaft mounted in bearings in the said arm and carrying two gear-wheels, one meshing with the said loosely-mounted gear-wheel, an oscillating frame pivoted to the arm and carrying a shaft mounted in bearings thereon, a heel and toe brush at one end of said shaft and a gear-wheel at the other end adapted, when the oscillating frame is thrown forward, to mesh with the other of the said gear-wheels upon the arm and thereby cause the heel and toe brush to rotate, all so arranged that the heel and toe brush will revolve as the line of shafting and arm revolve and whenever the oscillating frame is thrown forward, the heel and toe brush will also rotate upon its axis and when that frame is thrown backward it will cease to rotate, substantially as set forth.

9. The combination in a boot and shoe polishing machine, with three sets of brushes, one for polishing the outer side of each foot and the third for polishing the inner sides of both feet, of a rotary line of shafting and means for rotating it, arms for said brushes fixedly connected to and turning with the line of shafting and adapted to give to said brushes a circular revolving motion to bring them successively into operative position, and means for rotating said brushes upon their axes whereby two boots or shoes may be polished at the same time, substantially as set forth.

10. The combination in a boot and shoe polishing machine, with three sets of brushes, one for polishing the outer side of each foot and the third for polishing the inner sides of both feet, of a rotary shaft, gearing connecting it with the main driving mechanism of the machine whereby comparatively slow rotary motion will be imparted to the line of shafting, arms for said brushes fixedly connected to and turning with the line of shafting and adapted to give the said brushes a circular revolving motion to bring them successively into operative position, a large gear-wheel for each set of brushes loosely mounted upon the line of shafting, gearing connecting it with the main driving mechanism of the machine, a gear-wheel upon each arm connected to the brush carried by such arm and adapted to mesh with the said loosely-mounted gear-wheel whereby the brushes will be caused to revolve upon their axes, substantially as set forth.

11. In a boot and shoe polishing machine the combination with a line of shafting and means for rotating it, arms fixedly secured to and turning with the said line of shafting, a frame pivoted to one of said arms, a toe-brush revolubly mounted upon said frame, a daubing-brush, a polishing-brush and a heel-brush, each revolubly mounted upon one of the other of said arms and means for rotating said brushes upon their axes, whereby the said brushes will be brought successively into operative position for polishing shoes and will be rotated upon their axes during the operation, substantially as set forth.

12. In a boot and shoe polishing machine, the combination with a line of shafting and means for rotating it, of a daubing-brush, a polishing-brush and a heel and toe brush, each revolubly mounted upon an arm fixedly secured to and turning with the said line of shafting, a large gear-wheel loosely mounted upon the shaft, gearing meshing therewith and connecting it with the driving mechanism of the machine and adapted to cause said gear-wheel to rotate, a gear-wheel upon each arm connected to the brush carried by said arm and adapted to mesh with the said loosely-mounted gear-wheel, whereby the said brushes will be brought successively into operative position for polishing the shoes and will be rotated on their axes during the operation, substantially as set forth.

13. The combination in a boot and shoe polishing machine, with three sets of brushes, one for polishing the outer side of each foot and the third for polishing the inner sides of both feet, a rotary shaft with its end por-

tions, bearing the two outer sets of brushes, at an angle to the middle part of said line of shafting bearing the middle set of brushes, means for rotating it, arms for said brushes fixedly connected to and turning with the line of shafting and adapted to give said brushes a circular revolving motion to bring them successively into operative position, and means for rotating said brushes upon their axes whereby both shoes will be polished at the same time, substantially as set forth.

14. The combination in a boot and shoe polishing machine, with three sets of brushes, one for polishing the outer side of each foot and the third for polishing the inner sides of both feet, a rotary line of shafting with its end portions, bearing the two outer sets of brushes, at an angle to the middle part of said shaft bearing the middle set of brushes, gearing connecting it with the main driving mechanism of the machine, whereby comparatively slow rotary motion will be imparted to the line of shafting, arms for said brushes fixedly connected to and turning with the line of shafting and adapted to give to said brushes a circular motion to bring them successively into operative position, a large gear-wheel for each set of brushes loosely mounted upon the line of shafting, gearing connecting it with the main driving mechanism of the machine, a gear-wheel upon each said arm connected to the brush carried by said arm and adapted to mesh with the said loosely-mounted gear-wheel whereby the brushes will be caused to rotate upon their axes, substantially as set forth.

15. In a boot and shoe polishing machine, the combination with a line of shafting, a motor for driving the machine and connection between the line of shafting and motor whereby the shaft will be rotated, of arms fixedly connected to and turning with the line of shafting, brushes loosely mounted on said arms and adapted to revolve with the line of shafting and arms, suitable spraying and daubing devices for throwing spray and applying polish to the brushes, means for rotating said brushes upon their axes actuated by the motor, and means for operating the spraying and daubing devices actuated by the motor, whereby the brushes will be moistened and will receive polish and will then be brought successively into operative position and be rotated upon their axes for polishing boots and shoes, substantially as set forth.

16. In a boot and shoe polishing machine, the combination with a daubing-brush and means for operating it, of a spraying-tube having orifices adjacent to the daubing-brush, a reservoir for supplying water under pressure to the said tube, a valve for controlling said supply, and means for automatically opening and closing said valve, substantially as set forth.

17. In a boot and shoe polishing machine, the combination with a daubing-brush and means for operating it, of a spraying-tube having orifices adjacent to the daubing-brush, a reservoir for supplying water under pressure to said tube, a valve in said tube controlling said supply, a set of levers and arms opening and closing the valve, and a cam for operating said levers and arms rotated by the mechanism of the machine when it starts whereby the daubing-brush will be automatically moistened, substantially as set forth.

18. In a boot and shoe polishing machine, the combination with a daubing-brush and means for operating it, of a spraying-tube having orifices adjacent to the daubing-brush, a reservoir for supplying water under pressure to the said tube, an air-pump automatically operated by the driving mechanism of the machine for maintaining an air-pressure in the reservoir, a valve in said tube for controlling said supply, a set of levers and arms for opening and closing the valve, and a cam for operating said levers and arms rotated by the driving mechanism of the machine when it starts, whereby the daubing-brush will be automatically moistened, substantially as set forth.

19. In a boot and shoe polishing machine, the combination with a daubing-brush and means for operating it, of a blacking-pad adapted to swing against the daubing-brush and means for swinging it against and away from the pad, automatically operated by the mechanism of the machine, substantially as set forth.

20. In a boot and shoe polishing machine, the combination with a daubing-brush and means for operating it, of a hinged blacking-pad adapted to swing against the daubing-brush, a set of arms and levers for swinging the pad, and a cam for operating said arms and levers rotated by the mechanism of the machine whereby blacking will be automatically applied to the daubing-brush, substantially as set forth.

21. In a boot and shoe polishing machine, the combination with a daubing-brush and means for operating it, of a hinged blacking-pad adapted to swing against the daubing-brush, means for supplying blacking to the pad, a set of arms and levers for swinging the pad, and a cam for operating said arms and levers rotated by the mechanism of the machine whereby blacking will be automatically applied to the daubing-brush, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED E. WATKINS.

Witnesses:
EDWIN SEGER,
GEO. W. MILLS, Jr.