No. 673,367. Patented Apr. 30, 1901.

J. A. McHARDY.

RASP MACHINE.

(Application filed June 9, 1900.)

(No Model.) 6 Sheets—Sheet 1.

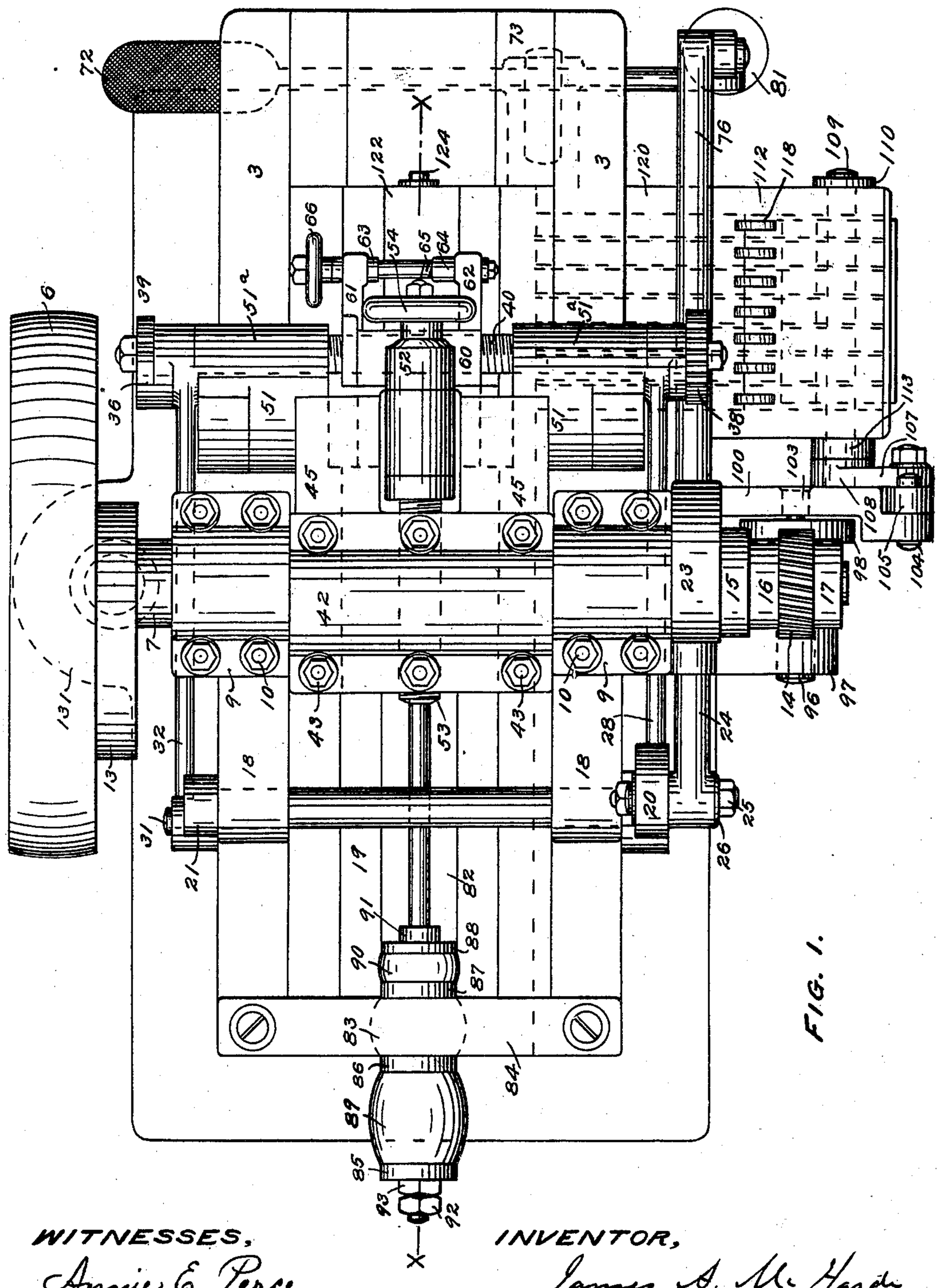

FIG. 1.

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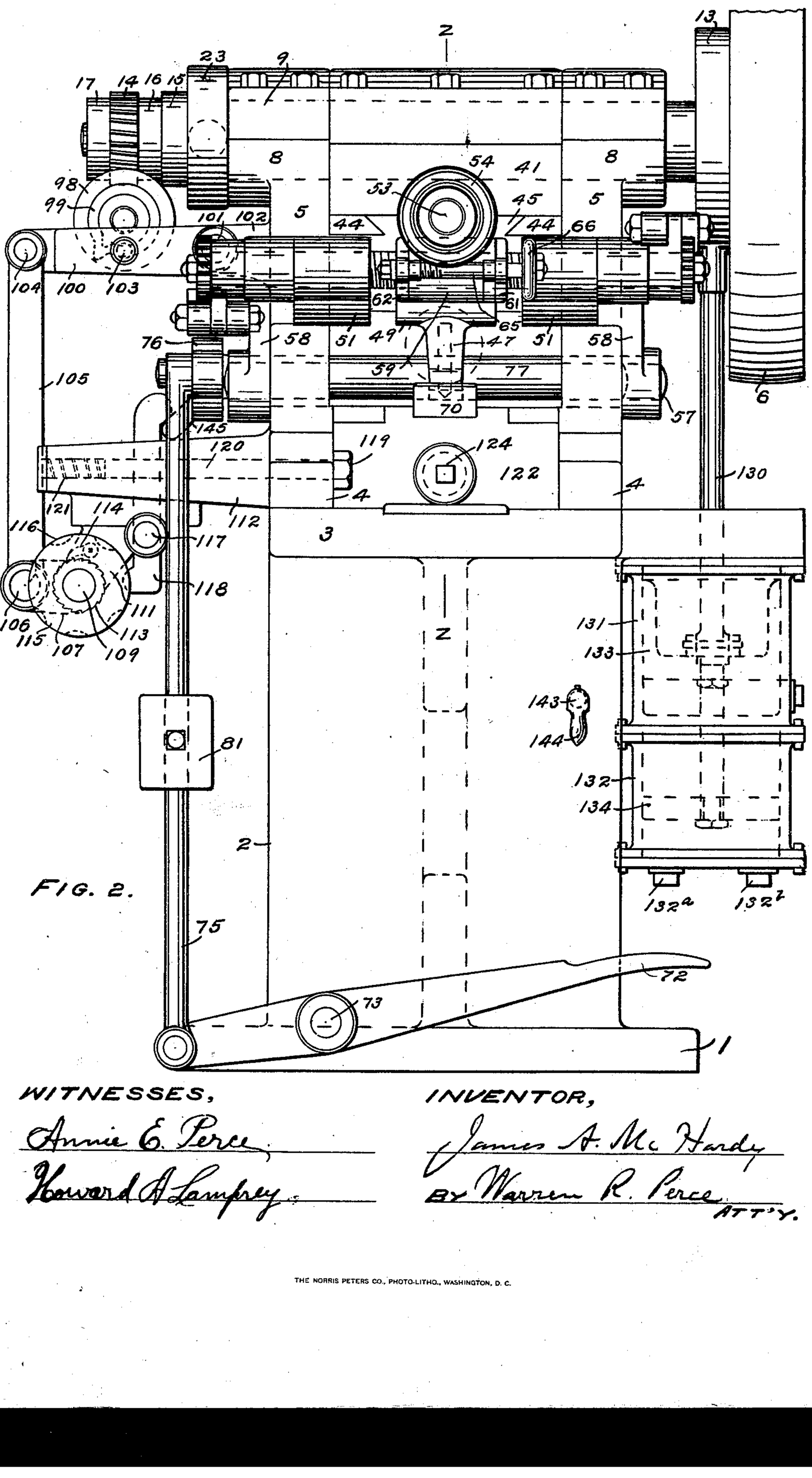

FIG. 2.

WITNESSES,

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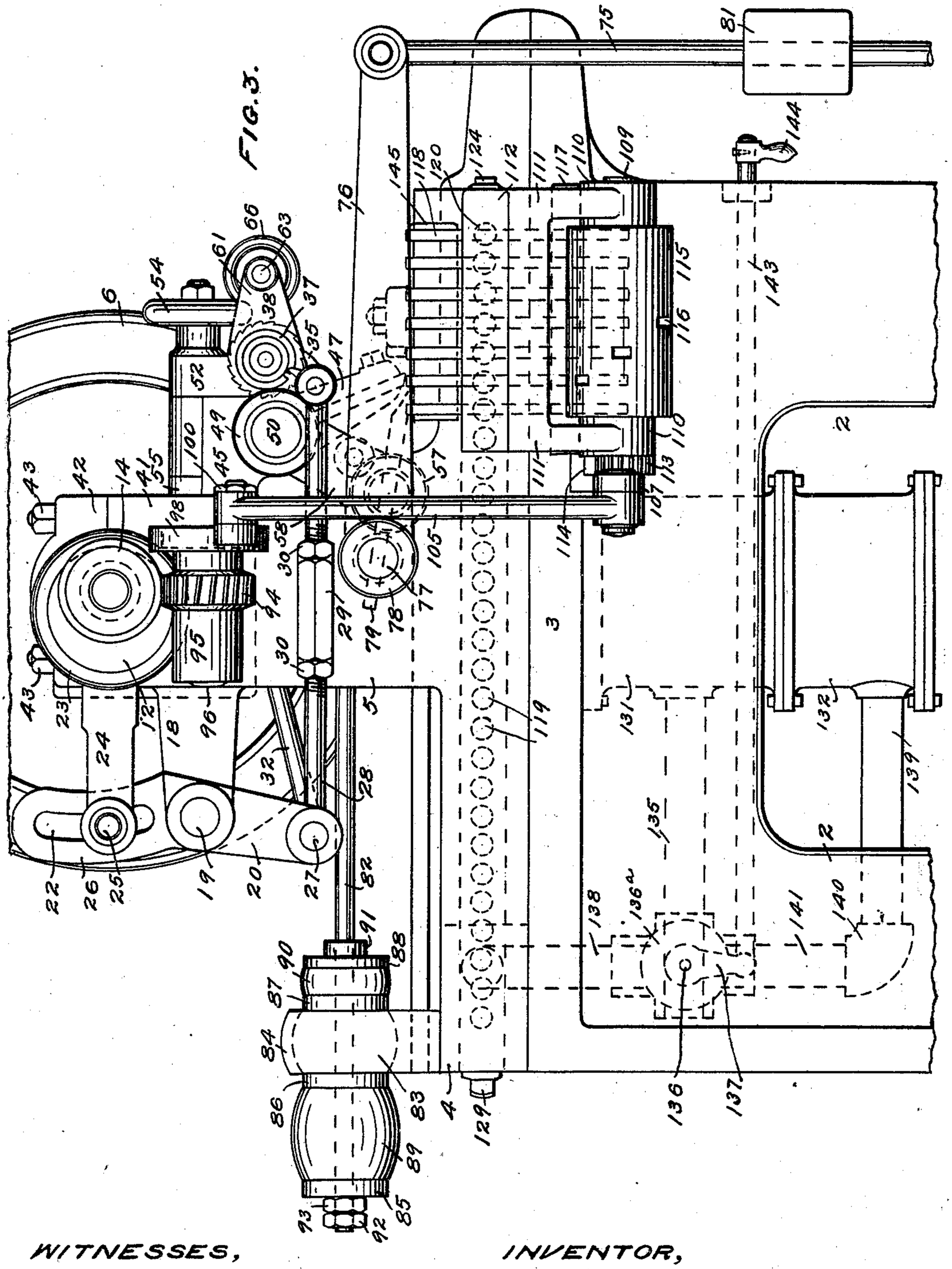
(No Model.)

6 Sheets—Sheet 3.

FIG. 3.



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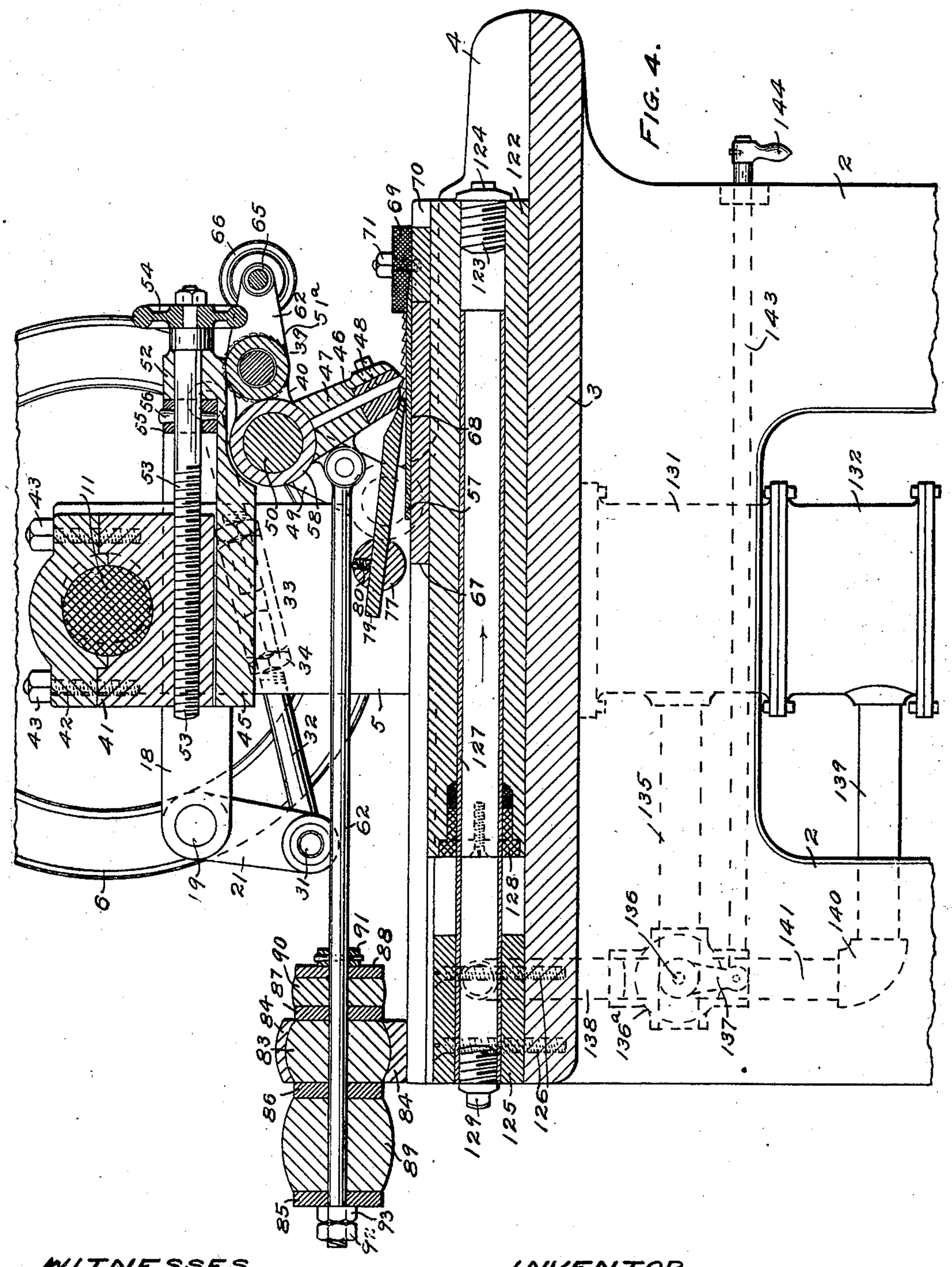
(No Model.)

6 Sheets—Sheet 4.

FIG. 4.



WITNESSES,

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RASP MACHINE.

(Application filed June 9, 1900.)

(No Model.) 6 Sheets—Sheet 5.

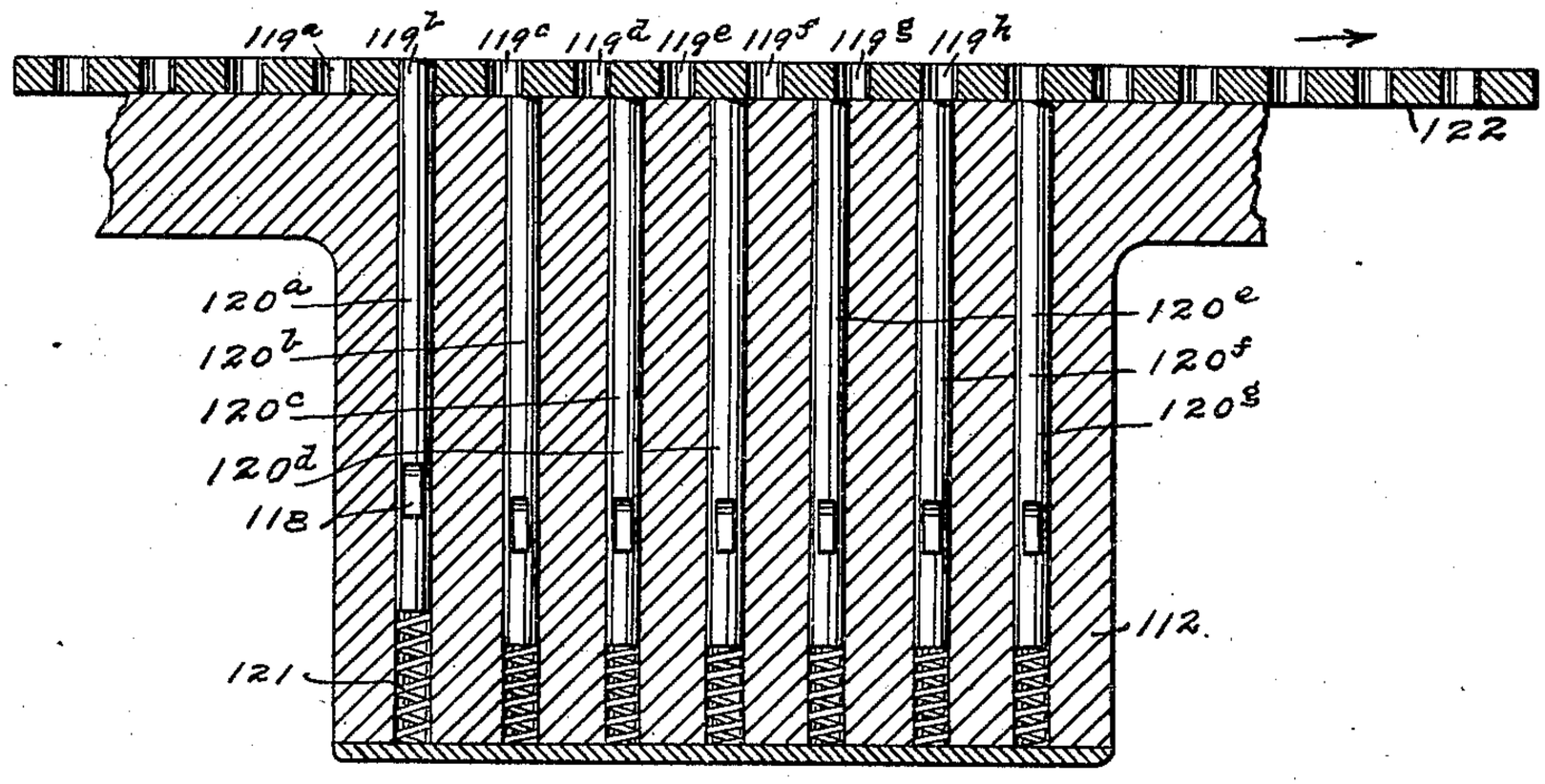


FIG. 5.

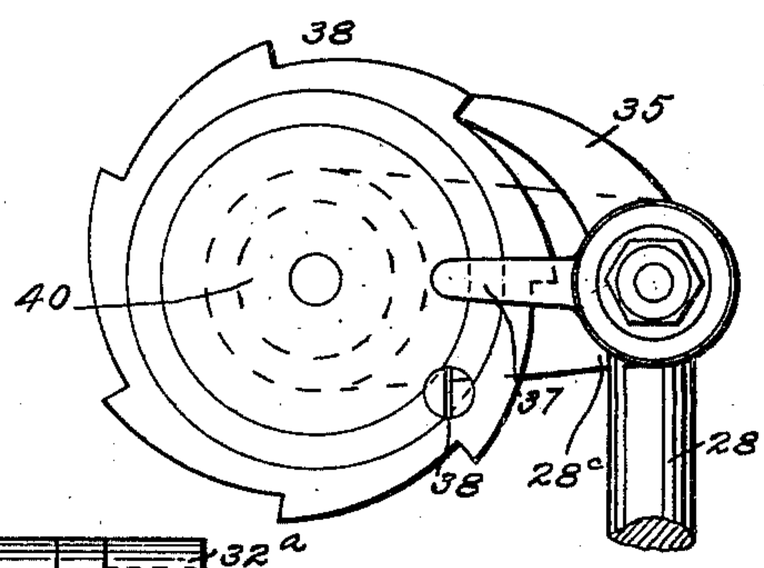


FIG. 6.

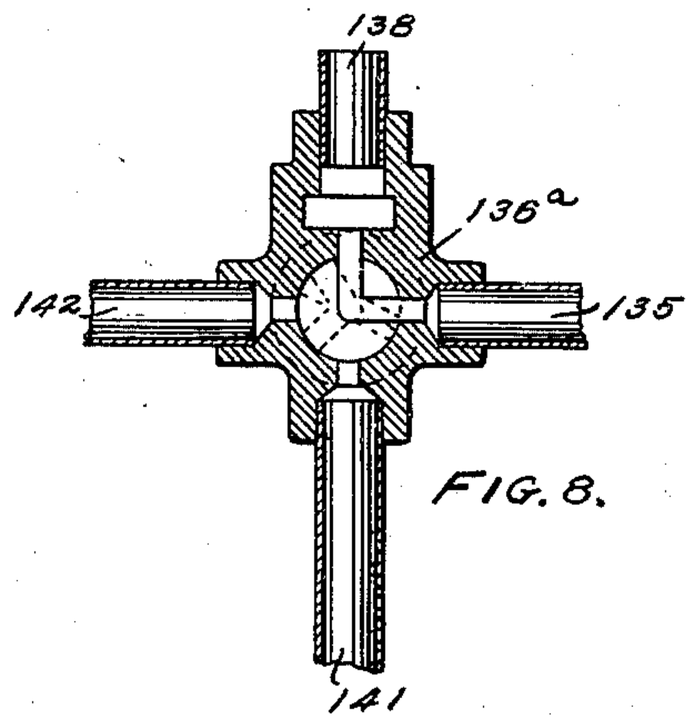


FIG. 8.

FIG. 7.

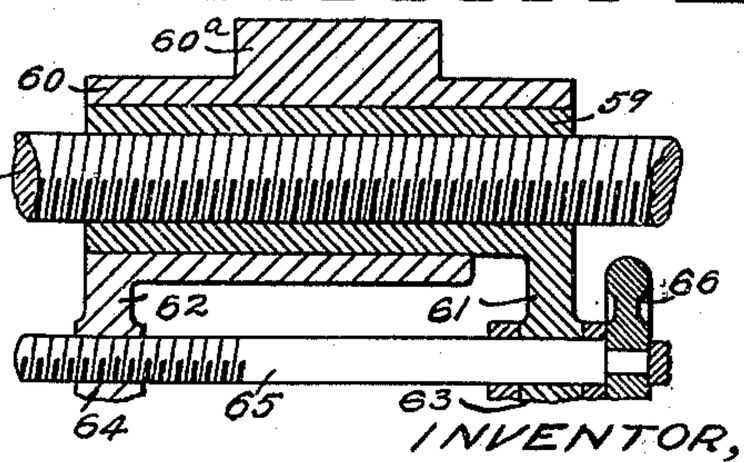
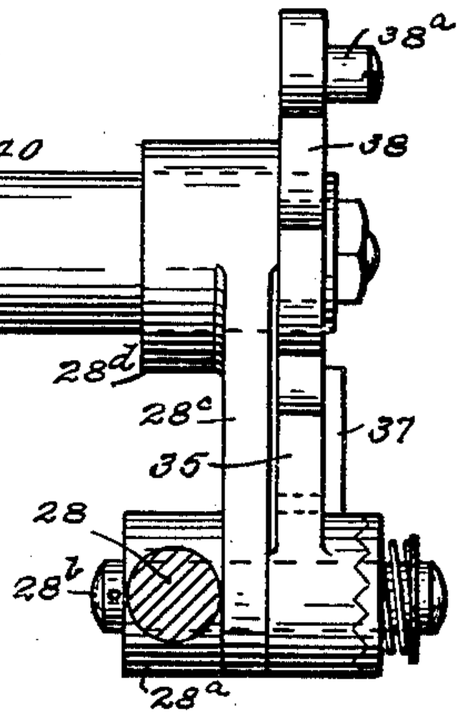


FIG. 9.



WITNESSES,

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RASP MACHINE.

(Application filed June 9, 1900.)

(No Model.) 6 Sheets—Sheet 6.

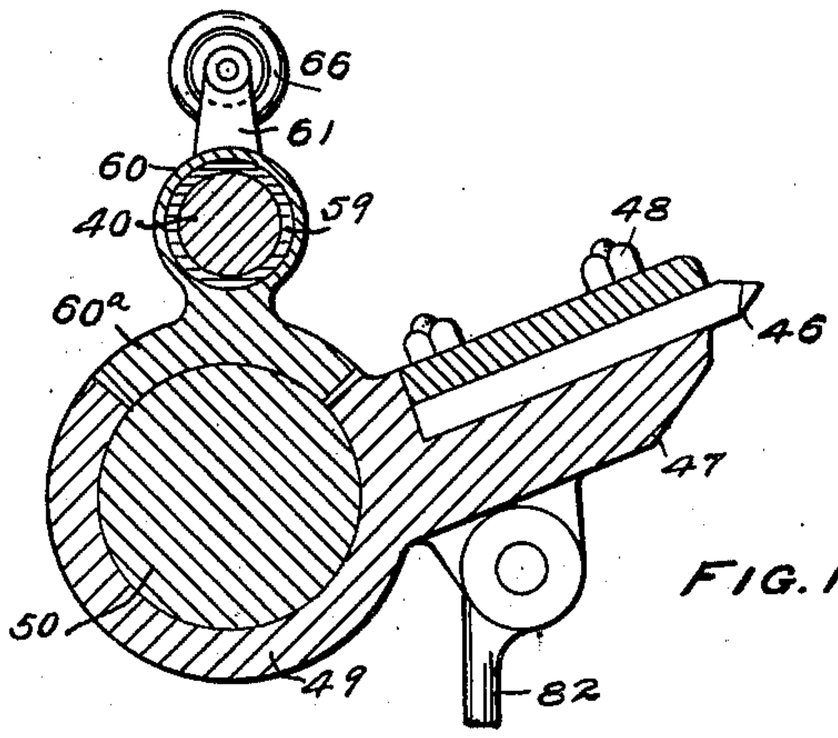

FIG. 10.

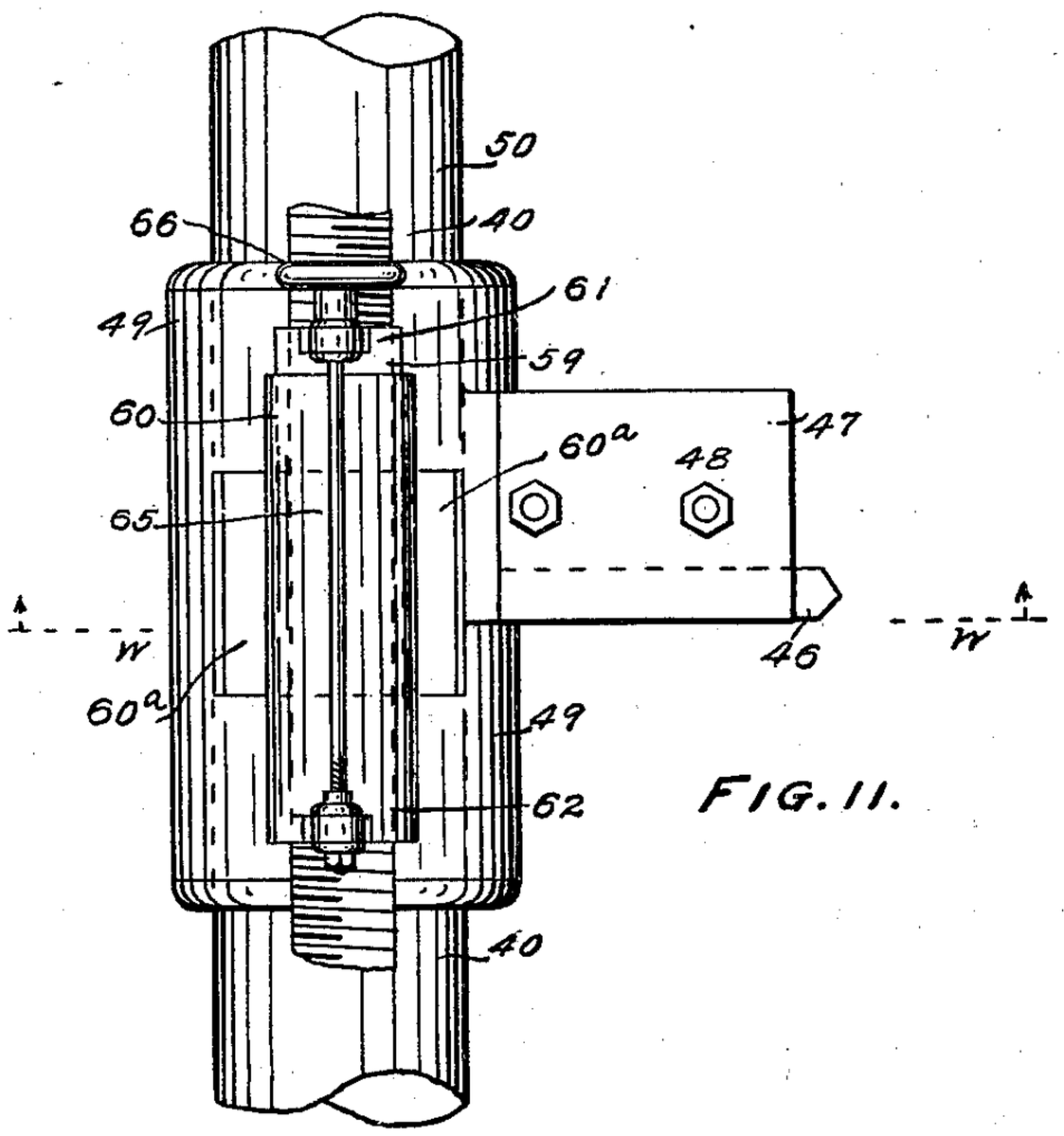

FIG. 11.

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UNITED STATES PATENT OFFICE.

JAMES A. McHARDY, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO ELTON C. CHURCH, OF SAME PLACE.

RASP-MACHINE.

SPECIFICATION forming part of Letters Patent No. 673,367, dated April 30, 1901.

Application filed June 9, 1900. Serial No. 19,738. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. McHARDY, a subject of the Queen of Great Britain, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Rasp-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

Like numerals indicate like parts.

Figure 1 is a top plan of my improved machine for making rasps. Fig. 2 is a front end elevation of the same. Fig. 3 is a side elevation thereof. Fig. 4 is a view of said machine, partly in side elevation and partly in section, on line *x x* of Fig. 1, and on line *z z* of Fig. 2. Fig. 5 is a central horizontal section of the pin-supporting bracket, with the pins and spiral springs therein in plan, together with a section in the same plane of the perforated side of the sliding bed, wherewith said pins are engageable. Fig. 6 shows in elevation one of the feed-rods with its pawl and also the ratchet-wheel of the screw-rod which controls the cross-feed. Fig. 7 is a top plan of the said screw feed-rod and connected parts. Fig. 8 is a central vertical section of the valve and pipes controlling the movements of the air for the travel of the sliding bed. Fig. 9 is a view, partly in elevation and partly in horizontal section, of the cross-feed screw, sleeve-nut, and means for adjusting the tool laterally with reference to the blank. Figs. 10 and 11 are detail views, Fig. 10 being drawn as seen on line *w w* of Fig. 11.

My invention relates to machines for the manufacture of rasps; and it consists in the novel construction and combination of the several parts hereinafter particularly described, as set forth in the claims.

The frame of the machine consists of the base 1, sides or standards 2, table-bed 3, uprights 4, and supports 5.

The machine is driven by power communicated by a belt to the pulley 6, which is fastened upon and turns the main shaft 7. The main shaft 7 is mounted in bearings 8 upon the tops of the supports 5. Caps 9 are bolted at 10 to the bearings 8 to cover the bearing-surfaces of said main shaft. The main shaft 7 has a centrally-arranged crank 11, Fig. 4, and two eccentrics, one marked 12 and the other not shown, but carrying the collar 13 and a worm-gear 14. The hub of the eccentric 12 is shown at 15, and the hub of the worm-gear 14 is shown at 16 and 17.

From the supports 5 brackets 18 project, in which is mounted a rock-shaft 19. On the rock-shaft 19 and oscillated by it are the link-arms 20 21. The link-arm 20 is extended upwardly from the rock-shaft 19 and is somewhat curved and made with a curved slot 22, Fig. 3. On the eccentric 12 is a ring or collar 23, and extending therefrom is the arm 24. A bolt or screw 25, with a nut 26 thereon, allows the adjustment of the arm 24 in the slot 22 of the upper extension of the link-arm 20. To the lower end of the link-arm 20 is pivoted at 27 a feed-rod 28, made up of two parts or sections which are screwed into an interiorly-threaded sleeve or tube 29 (whose opposite ends, respectively, have right-handed and left-handed threads) in order to adjust the length of the rod, and the rod is held in such adjusted position by the check-nuts 30. On the rock-shaft 19, at the opposite end thereof, is the link-arm 21, Fig. 4, to which is pivoted at 31 the feed-rod 32, made up of two parts connected by an interiorly-threaded sleeve 33 (right-hand and left-hand threaded) and held by nuts 34, as indicated in dotted lines in said figure.

The forward ends of the feed-rods 28 32 are supported by bearings 28^a and 32^a, respectively, (see Figs. 6 and 7,) upon pins 28^b and 32^b. These pins pass through the ends of the rocker-arms 28^c and 32^c, whose tubular bearings 28^d and 32^d are mounted on the screw-rod 40, as shown in Fig. 7. On the forward end of each of the feed-rods 28 and 32, on bearings 28^a and 32^a, respectively, is mounted a pawl, that on the rod 28 being shown at 35 and that on the rod 32 being shown at 36. Each of said pawls has a tailpiece, that of the pawl 35 being designated 37 and that of the pawl 36 being designated as 37^a, Fig. 7. These pawls 35 and 36 engage, respectively, the ratchet-wheels 38 and 39, which are fastened on and turn with the screw-rod 40. On the outer surface of each of the ratchet-wheels 38 39 is a circular concentric groove or channel, (see Figs. 3 and 6,) wherein is a pin, which may be made ad-

justable in said groove or channel, if desired, said groove or channel being made for the purpose of allowing such adjustment. The pin in the ratchet-wheel 38 is designated as 38ª, and that in the ratchet-wheel 39 is designated as 39ª. The ratchet-teeth of the wheel 38 project angularly in one direction and those of the wheel 39 in the opposite direction, so that when the ratchet-wheel 38 is intermittently moved by the pawl 35 the screw-rod 40 is turned in one direction, but when the ratchet-wheel 39 is intermittently moved by the pawl 36 the screw-rod 40 is turned in the opposite direction.

The crank 11 of the shaft 7, Fig. 4, is supported in a circular aperture formed in the head or block 41 and the cap or cover 42 thereof, said cap or cover being fastened to the head or block 41 by the screws 43. As shown in Fig. 2, this head or block 41 has two beveled ways 44, between which and supported thereby is the carriage 45, which is capable of adjustment on said head or block.

The cutting-tool 46 is held by the tool-holder 47 in a slot thereof, Fig. 4, and secured in position by the set-screw 48. Said tool-holder has pieces of hardened steel at the bottom, as indicated in Fig. 4. The tool-holder 47 also has a tubular head 49, which is loosely mounted on the shaft 50. The shaft 50 is mounted in the bearing 51, extending from the carriage 45 on each side, Fig. 1. The cylindrical portions of the screw-rod 40 are loosely mounted in other bearings 51ª, extending from the bearings 51, as fully shown in Fig. 4. From the forward part of the carriage 45 is the projection 52, integral therewith. Through this projection 52, in an aperture thereof, is mounted the shank of a screw 53, which is turned by a hand-wheel 54. A collar 55 surrounds said shank, and a pin 56 passes through the collar 55 and shank of the screw-rod 53 to prevent its withdrawal. The threads of the screw 53 engage with the head or block 41, as shown in Fig. 4.

Studs 57 are mounted in the uprights 4, and on said studs are the rocker-arms 58, whose upper tubular bearings receive the shaft 50, on which shaft is the tubular head 49 of the tool-holder 47.

The tool-holder-adjusting means consist of a sleeve 59, whose bore is screw-threaded, (see Fig. 9,) through which the screw-rod 40 passes engageably. This sleeve 59 has a bracket 61, on the end of which is a tubular bearing 63. The sleeve 59 is mounted and movable in the smooth bore of a sleeve 60, from which is a projection 60ª. The sleeve 60 has a bracket 62, on the end of which is a tubular screw-threaded bearing. An adjusting-screw 65, turned by a hand-wheel 66, has its shank mounted in the bearing 63 of the bracket 61 and its screw-threaded portion mounted and engaged in the tubular threaded bearing 64 of the bracket 62. Said projection 60ª enters a recess in the tubular head 49 of the tool-holder 47, as shown in Figs. 10 and 11.

On the table-bed 3 of the machine rests a plate or bar 67, of lead, and the blank 68, which is to be operated upon and made into a rasp, lies upon said plate or bar. The forward end of the blank 68 is secured in position by the blank-holder 69, which extends slightly over it, and said holder 69 is screwed down upon the cross-piece 70 by the screw 71, Fig. 4. A treadle-lever 72 turns on a shaft 73. At the rear of the treadle-lever 72 it is pivotally connected with the rod 75. The rod 75 at its top is pivotally connected with the rocker-arm 76, Fig. 3, which has at its extremity a shaft 77, mounted in a tubular bearing 78. Through the shaft 77 a presser-bar 79 passes, Figs. 3 and 4, and is adjustable therein, being held in position by the screw 80. The free or forward end of the presser-bar 79 rests upon the blank 68 with sufficient force to hold it, caused by the weight 81 on the rod 75. The lead bar or plate 67 is held between the two upwardly-projecting sides of the sliding bed, hereinafter described.

From the back of the tool-holder 47 is a lug to which is pivotally connected a rod 82. The rod 82 is mounted and movable in a block 83, whose upper and lower surfaces are somewhat spheroidal, Fig. 4. The block is mounted in the cross-piece 84, which is furnished with bearing-surfaces adapted to receive the block 83 and to allow a movement of it therein. This arrangement is shown in Figs. 3 and 4, where 85, 86, 87, and 88 represent collars or washers, and 89 and 90 rubber blocks or springs. A fixed collar 91 is on the rod 82, and the end of the rod 82 is threaded to receive the check-nuts 92 93. The rod 82 passes through said collars and rubber springs, as well as through the block 83.

The worm-gear 14 on the main shaft 7 engages with the worm-gear 94, which by its hub 95 is mounted on the shaft 96, passing through a bracket 97 from the frame or support 5 of the machine. This worm-gear 94 and its hub 95 have the wheel 98, Fig. 2, rotating therewith. In the outer face of the wheel 98 is the cam-groove 99, whose shape is seen in Fig. 2. A rocker-arm 100 is pivoted at 101 to a lug 102, which extends from the support 5, and said arm 100 has a pin 103, which enters the groove 99 of the wheel 98. At the outer end of the rocker-arm 100 is pivoted at 104 the link-bar 105. The link-bar 105 at its lower end is pivoted at 106 to the rocker-arm 107, whose hub 108 is loosely mounted on the shaft 109. The shaft 109 is mounted in tubular bearings 110 110 of the hangers 111 111 of the pin-supporting bracket 112, which projects from one of the sides 4 of the machine. This shaft 109 is turned by a ratchet-wheel 113. A pawl 114, mounted on the rocker-arm 107, communicates intermittent movement to the ratchet-wheel 113. A drum or cylinder 115 has curved recesses or cam-sockets 116 spirally arranged thereon, and it turns with the shaft 109.

On a rod 117 beneath the bracket 112 are

mounted levers 118, each having its ends oppositely bent and rounded, Fig. 2, the lower ends of said levers 118 being adapted and arranged to be seated in the recesses or cam-sockets 116 of the roller 115, respectively.

One of the sides of the sliding bed, hereinafter described, has a series of circular equidistant holes 119, Fig. 3. A series of pins 120 is mounted in the bracket 112, Fig. 2, in bores therein adapted to receive them, the bottoms of which bores are closed. In each of said bores is a spiral spring 121, pressing one of its ends against the bottom of the bore and the other against the inner end of the pin 120. The spring 121 normally forces the pin 120 into that hole 119 in the side of the sliding bed which is in alinement with it. Each pin is slotted to allow the passage of one of the levers 118 through it, and the bracket 112 is slotted for the same purpose.

On the bed 3 of the machine is the sliding bed 122, movable thereon between the sides 4. The sliding bed 122 has the central tubular bore 123 throughout it from end to end, Fig. 4, the front opening of which bore is closed by the screw-plug 124. A block 125, having a central tubular bore through it, is fastened by screws 126 126 to the bed 3 of the machine. The bores of said block and sliding bed are in alinement and continuous with each other. A tube 127 extends through the bore of the block 125 and nearly through the bore of the sliding bed, as shown in Fig. 4, but is loose in the bore of the sliding bed, so that said bed can slide thereon in the direction indicated by the arrow in Fig. 4. A stuffing-box 128 (with packing) in a recess at the inner end of the bore of the sliding bed surrounds the tube 127. Two screws, one of which is shown in dotted lines in the tube 127 in Fig. 4, controls the pressure on the packing of the stuffing-box 128. A screw-plug 129 closes the outer end of the bore of the bulkhead 125.

The collar or ring 13 on the eccentric on the main shaft 7 next to the pulley 6 has the piston-rod 130 connected therewith, Fig. 2. Two cylinders 131 132, whose inner contiguous ends are centrally perforated for the passage of the rod 130, form, respectively, an air-pressure chamber and a vacuum-chamber. In the air-pressure chamber 131 the piston-rod 130 carries a piston 133, and in the vacuum-chamber 132 the piston-rod 130 carries a piston 134. The vacuum-chamber 132 has the inlet and outlet 132^a and 132^b. (Seen in Fig. 2.) A pipe 135 opens from the air-pressure chamber 131 and extends into a valve 136^a, (shown in detail in Fig. 8,) whose valve stem or plug 136 has a handle 137. From the valve a pipe 138 extends up and bends to enter the tube 127. A pipe 139 opens from the vacuum-chamber 132 and enters an elbow 140, and a pipe 141 extends from the elbow 140 and enters the said valve. A rod 143 from the handle 137 of the valve is mounted on the frame of the machine and extends in front. At its front or outer end the rod 143 is provided with a handle 144. In Fig. 8 I show the detail of this valve. The valve and stem have three ways: First, the way shown in solid lines in Fig. 8, whereby the pipes 135 and 138 are brought into communication; second, the straight diametrical way, (shown in dotted lines,) whereby the pipes 138 and 141 are brought into communication, and, third, the right-angled way, (shown in dotted lines,) whereby the pipes 138 and 142 are brought into communication.

In Fig. 5 I show in section an escapement device for regulating the movement of the sliding bed 122. This escapement resembles a vernier device and is thus described: The sliding bed is movable during the operation of rasp-cutting in the direction indicated by the arrow in Figs. 4 and 5. The holes 119 in said sliding bed are equidistant; but in the distance between the centers of two adjacent holes there must be a number (for the purpose of this explanation say seven) of feed movements to present the blank 68 to the action of the cutting-tool 46. In Fig. 5 I have specially designated certain of the holes 119 as 119^a, 119^b, 119^c, 119^d, 119^e, 119^f, 119^g, and 119^h and the pins in said figure as 120^a, 120^b, 120^c, 120^d, 120^e, 120^f, and 120^g. The pin 120^a is in engagement with the hole 119^b, and all the other pins are disengaged. By the rotation of drum 115 the recess 116 thereof in line with the lever 118 of the pin 120^a moves said lever and withdraws said pin from the hole 119^b, whereupon the sliding bed 122 being free moves in the direction of the arrow until the hole 119^c comes opposite the pin 120^b, whereupon the pin 120^b by the force of the spiral spring 121 behind it enters the hole 119^c. The rotation of the drum 115 brings that one of its recesses 116 which is in line with the lever 118 of the pin 120^b, whereupon the said lever withdraws the pin 120^b from the hole 119^c, and the sliding bed being free moves until the hole 119^d is opposite to the pin 120^c, which then is forced into it by the pressure of the spiral spring behind it, and so in like manner pin 120^d enters hole 119^e, pin 120^e enters hole 119^f, pin 120^f enters hole 119^g, and pin 120^g enters hole 119^h, consecutively. The sliding bed 122 has by these seven movements now come into such position that when the pin 120^g is withdrawn from the hole 119^h the hole 119^a comes into position to receive the pin 120^a. This constitutes, substantially, a vernier device by which when the pin 120^a is engaged with the hole 119^b there must be seven movements of the sliding bed 122 before the hole 119^a moves into position to receive the pin 120^a, or, in other words, while the sliding bed 122 has moved a distance equal to the distance from the center of the hole 119^a to the center of the hole 119^b there have been eight distinct and separate movements of the sliding bed 122 to feed the blank 68 to the tool 46.

Having thus described the various parts of

my improved machine for the manufacture of rasps, I will now proceed to explain its operation.

The feed motion of the sliding bed 122 is caused by compressed air, as follows: The revolution of the pulley 6, moved by power applied by a belt, rotates the shaft 7, and the eccentric thereon next to said pulley having the collar 13 mounted on it reciprocates the piston-rod 130. Air is thus compressed in the well-known manner in the cylinder or chamber 131, and at the same time a vacuum is produced in the chamber or cylinder 132. The compressed air passes from the cylinder 131 through the pipe 135, valve 136, and pipe 138 into the tube 127, and so presses the sliding bed 122 in the direction of the arrow in Fig. 4, said sliding bed, however, being held by one of the pins 120 in one of the holes 119 of the side of said bed, as illustrated in Fig. 5. The rasp-blank 68 is secured in position upon the lead-bar 67 by means of the clamp 69, which is operated by the screw 71. The presser-bar 79 bears down upon the blank 68 by the force of the weight 81 upon the rod 75. The tool 46 is adjusted in the tool-holder 47 and held in position by the screw 48. The angle of inclination of the tool-holder 47 (and of the tool 46 therein) is regulated by the screw 53, which is turned by the hand-wheel 54. By means of this screw the carriage 45 (through the projection 52 of which the shank of the screw 53 passes) is movable on the beveled ways 44 of the block 41. The further forward the carriage is moved from the block 41 the nearer the tool-holder 47 will approach a line perpendicular to the blank 68. This adjustment determines the direction of the cut of the tool 46 into the blank 68. The tool and tool-holder are also adjustable laterally with reference to the blank 68 by means of the screw-rod 65, operated by the hand-wheel 66, as fully described in my pending application for Letters Patent, Serial No. 727,078. By the action of the crank 11 of the main shaft 7 the block 41 and the carriage 45, connected therewith, which carries the tool-holder and tool in moving forward, cause the tool 46 to deliver an angular thrusting blow upon the blank, and thus to cut a tooth therein. The rubber blocks 89 90 on the rod 82, which is pivotally connected at one end with the tool-holder 47, serve to compel the cutting edge of the tool 46 to penetrate the blank instead of sliding over it. The cross-feed motion, by which the tool 46 is moved sidewise to cut the rasp-teeth in rows across the blank 68, is caused by the turning of the screw-rod 40 intermittently by means of one of its ratchet-wheels deriving motion from the adjacent pawl, the latter being moved reciprocally by a feed-rod from the oscillating arm 19. The turning of the screw-rod 40 moves the sleeve-nut 60, engaged therewith, and the projection 60^a of said sleeve-nut, extending into the recess of the tubular head 49 of the tool-holder 47, communicates the movement to said tool-holder. This cross-feed motion (as also the reverse thereof) is fully set forth in my said pending application. The sliding-bed movement which feeds the blank 68 lengthwise is given as follows, the air-pressure being ready to move the sliding bed 122 forward in the direction of the arrow in Fig. 4 whenever the escapement device will allow: The worm-wheel 14 on the main shaft 7 turns the worm-wheel 94 on the shaft 96. Said worm-wheel 94 has a cam-grooved wheel 98 connected with it, and the cam-groove 99 receives the pin 103 of the rocker-arm 100. The rocker-arm 100 communicates motion by the rod 105 to the rocker-arm 107, which by means of the pawl 114 moves the ratchet 113 intermittently, thus gradually turning the drum or cylinder 115, which is connected with said ratchet. When a recess 116 of the drum 115 comes into position to receive the lower end of a lever 118, said lever by force of the spiral spring (see Fig. 5) moves forward, carrying with it the pin 120, through which said lever passes into engagement with that hole 119 of the sliding bed 122 which is in alinement with such pin. In the interval between the disengagement of one pin from the sliding bed and the engagement of another pin with the sliding bed the compressed air in the tube 127 has moved the sliding bed forward. When it is desired that not any pin 120 shall be engaged with the sliding bed, the depression of the treadle 72 will by means of the connecting-rod 75 lift the arm 76, and a projection thereof, 145, (shown in dotted lines in Fig. 2,) which lies beneath the upper bent ends of the levers 118, causes the withdrawal of the engaged pin of the series. This same movement of the treadle 72 raises, by means of the rod 75 and lever 76, the presser 79 from contact with the blank 68. The rearward or return movement of the sliding bed 122 is caused by the following means: By operating the rod 143 by the handle 144 the stem 137 of the valve 136 is moved, thereby closing the pipes 135 and 138 in the valve (which previously have been connected, as shown in Fig. 8) and bringing the bent angular valveway shown in said figure into continuity with the pipes 138 and 142, whereupon the compressed air escapes through the pipe 142 (which is an exhaust) into the external air. The handle 144 is again used to move the rod 143 and the stem 137, so that the pipes 135, 138, and 142 are all closed; but the straight way (shown in Fig. 8 by dotted lines) connects the pipes 138 and 141, whereupon the vacuum in the chamber 132 sucks the air out of the tube, and the sliding bed 122 thus is returned to its former position.

It is obviously within my invention if steam should be used instead of compressed air for the purpose of moving the sliding bed 122 steam-pressure can be communicated to the sliding bed to move it in either direction or in both directions alternately.

I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In a machine of the class described, having a main shaft driven by power, the combination with the table of the machine provided with guides or ways, of a sliding bed movable on the table between said guides or ways, an eccentric upon said main shaft, a piston-rod reciprocated by such eccentric, a cylinder with inlet and outlet pipes, a piston upon the piston-rod within the cylinder, a pipe from said cylinder to the sliding bed, adapted to communicate pressure from the cylinder to the sliding bed and an escapement device movable by power derived from the main shaft, for the purpose of allowing a series of consecutive, intermittent limited motions during each forward traverse of the sliding bed, substantially as specified.

2. In a machine for the manufacture of rasps, the combination of the table 3 having the upright sides 4, the sliding bed 122 movable on said table and having a longitudinal bore, the block 125 fastened to the table 3 and provided with a transverse bore continuous with the bore of the sliding bed 122, the main shaft 7 having an eccentric whereon is the collar 13, the piston-rod 130 reciprocated by said eccentric and collar, the cylinder 131 with an inlet-pipe, the piston 133 at the end of the piston-rod within the cylinder, the tube 127 fixed in the bore of the block 125 and extending loosely into and nearly through the bore of the sliding bed 122, and provided with a proper stuffing-box, the plugs 124, 129 at the outer ends of the bores of the block 125 and sliding bed 122, respectively, the pipes 135, 138 continuous with each other and opening, respectively, into the cylinder 131 and tube 127, substantially as shown and for the purpose specified.

3. In a machine for the manufacture of rasps having a main shaft driven by power, the combination with the table of said machine, of a bed provided with guides or ways, and a sliding bed movable on the bed between said guides or ways and provided with a longitudinal bore closed at its outer end, a block or head fastened upon said table and having a bore continuous with the bore of the sliding bed but closed at its outer end, a tube fixed in said block or head and extending loosely into and nearly through the bore of the sliding bed and provided with a stuffing-box, an eccentric upon the main shaft, a piston-rod reciprocated by the eccentric, a vacuum-cylinder, a piston in said cylinder and upon said rod, and a pipe connection between said cylinder and tube with an intermediate valve in said pipe connection, substantially as and for the purpose specified.

4. In a machine for the manufacture of rasps, having a main shaft driven by power, the combination with the table of said machine, of a bed provided with guides or ways, a sliding bed movable on the bed between said guides or ways and provided with a longitudinal bore closed at its outer end, a block or head fastened upon said table and having a bore continuous with the bore of the sliding bed but closed at its outer end, a tube fixed in said block or head and extending loosely into and nearly through the bore of the sliding bed and provided with a stuffing-box, an eccentric upon the main shaft, a compression-cylinder and a vacuum-cylinder, a piston-rod reciprocated by the eccentric and extending through the compression-cylinder and into the vacuum-cylinder, proper inlets and outlets for said cylinders, a piston upon the piston-rod in the compression-cylinder, a piston upon the piston-rod in the vacuum-cylinder, a three-way valve having an exhaust-pipe and a valve-stem and handle moving said valve-stem, a pipe from the compression-cylinder to said valve, a pipe from the vacuum-cylinder to said valve and a pipe from said valve to said tube, all arranged and operating substantially as shown and for the purpose specified.

5. In a machine for the manufacture of rasps having a main shaft, the combination with the table of the machine having upright sides, of a sliding bed movable upon said table between said sides, means adapted to move said sliding bed, two or more holes in a series in the side of the sliding bed and two or more holes in a corresponding series in one of the sides of said table, a bracket upon the frame of the machine and provided with tubular seats, two or more pins in a series mounted and movable in said tubular seats consecutively and *seriatim* into engagement with said holes in the sliding bed and table side as the pins, respectively, are in alinement with said holes and means operated by connections therewith to the main shaft adapted to move said pins into such engagement and to remove them therefrom, substantially as set forth.

6. In a machine for the manufacture of rasps having a main shaft, the combination with the table of the machine having upright sides, of a sliding bed movable upon said table between said sides, means adapted to move said sliding bed, two or more holes in a series in the side of the sliding bed and two or more holes in a corresponding series in one of the sides of the table, a bracket upon the frame of the machine and provided with holes, two or more pins in a series mounted and movable in the holes last aforesaid consecutively and *seriatim* into engagement with the holes of the sliding bed and of the table side as the pins, respectively, are in alinement therewith, a drum-cylinder having spirally-arranged cam-sockets in its surface and movable intermittently by its connections with the main shaft, levers centrally pivoted and mounted on a fixed support, each connected with and adapted to move one of said pins into and out of said engagement and

each having its end engageable with and movable by one of the cam-sockets of said drum-cylinder, substantially as described.

7. In a machine for the manufacture of rasps, the combination of the table 3, having the upright sides 4 with a series of holes therein, the sliding bed 122 movable on the table 3 between the sides 4 thereof and having a series of holes 119 on one side thereof corresponding with the holes first aforesaid, independent means adapted to slide said bed 122 upon the table 3, the main shaft 7 of the machine, the worm-gear 14 upon said shaft 7, the worm-gear 94 mounted on the shaft 96 and having the wheel 98 provided with the cam-groove 99 on the face thereof, the rocker-arm 100 pivotally mounted on the lug 102 of the frame of the machine, a pin 103 extending from the rocker-arm 100 and engageable with the cam-groove 99 of the wheel 98, the link-rod 105 pivotally connected with the rocker-arm 100, the rocker-arm 107 mounted on the shaft 109 and pivotally connected with the link-rod 105, the pawl 114 mounted on the rocker-arm 107, the ratchet 113 mounted on the shaft 109, the drum-cylinder 115 having the cam-sockets 116 and mounted on the shaft 109 and connected with the ratchet 113, the bracket 112 extending from the frame of the machine and having a series of holes therein, the pins 120 mounted and movable in the holes of the bracket 112, respectively, the spiral springs 121 in said bracket-holes, the levers 118, each mounted upon a fixed support 117 and having a bent lower end engageable with that cam-socket 116 of the drum or cylinder 115, which is in alinement, and each extending through a slot in the bracket 112 into connection with a pin 120, all operating substantially as described and for the purpose specified.

8. In a machine for the manufacture of rasps, the combination of the table 3, having the upright sides 4, with a series of holes therein, the sliding bed 122, movable on the table 3 between the sides 4 thereof and having a series of holes 119 on one side thereof corresponding with the holes first mentioned, independent means adapted to slide said bed upon the table 3, the treadle 72, the link-rod 75, the lever 76 and the angularly-extending projection 145 thereof, the bracket 112 extending from the frame and having a series of holes therein, the pins 120 mounted and movable in the holes of the bracket 112, respectively, the levers 118, each mounted on a fixed support 117 and having a bent upper end, as shown, all operating substantially as set forth and for the purpose specified.

9. In a machine for the manufacture of rasps, the vernier-escapement device herein described, consisting of the combination of a sliding bed 122 with means to move the same and having a series of equidistant holes 119^a, 119^b, 119^c, 119^d, 119^e, 119^f, 119^g and 119^h, the fixed bracket 112 having a series of equidistant holes, which are, however, farther apart than the holes of the first series aforesaid, in which bracket-holes are, respectively, the pins 120^a, 120^b, 120^c, 120^d, 120^e, 120^f and 120^g, and spiral springs 121, the pins and the holes wherein they are mounted and movable, being so far apart (but equidistant) that, when the pin 120^a is disengaged from the hole 119^b, the pin 120^b is engageable with the hole 119^c, next the pin 120^c is engageable with the hole 119^d, next the pin 120^d is engageable with the hole 119^e, next the pin 120^e is engageable with the hole 119^f, next the pin 120^f is engageable with the hole 119^g and next the pin 120^g is engageable with the hole 119^h, and next said pin 120^a is engageable with the hole 119^a, substantially as shown.

10. In a machine for the manufacture of rasps, a vernier-escapement, consisting of a fixed bracket with a certain number of pins separately movable therein and extending therefrom and arranged in equidistant spaces, with means adapted to move said pins, a sliding bed properly supported and means adapted to move said bed, and a series of holes in said bed, one less in number than said pins, but arranged equidistant in a space nearly equal to the whole distance of the pins apart, substantially as shown and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES A. McHARDY.

Witnesses:

SAMUEL S. STONE,

HOWARD A. LAMPREY.