

No. 688,197.

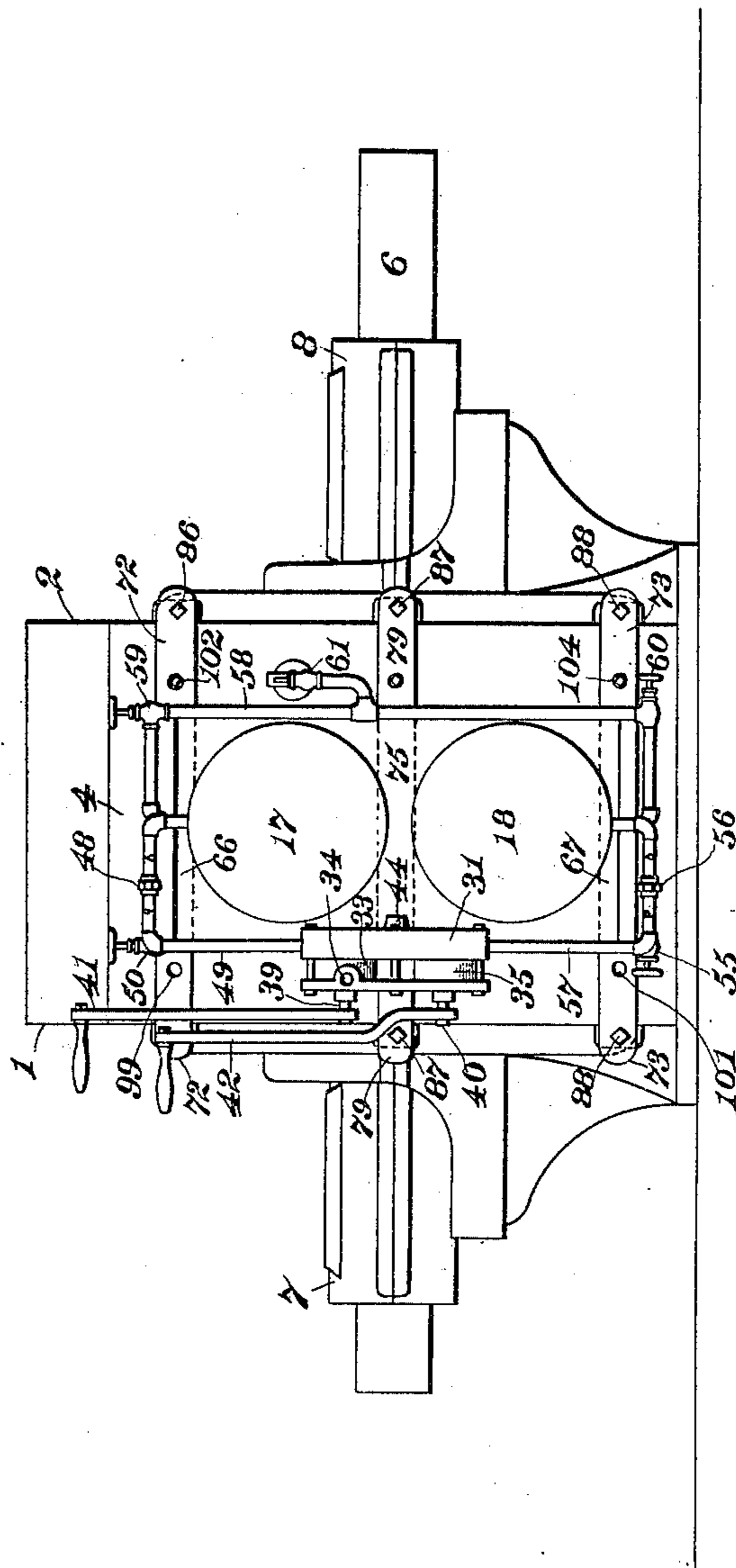
Patented Dec. 3, 1901.

M. R. RUST.
PULP MAKING WOOD GRINDER.

(Application filed Jan. 24, 1901.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses
James E. Smith.
William B. Thomas

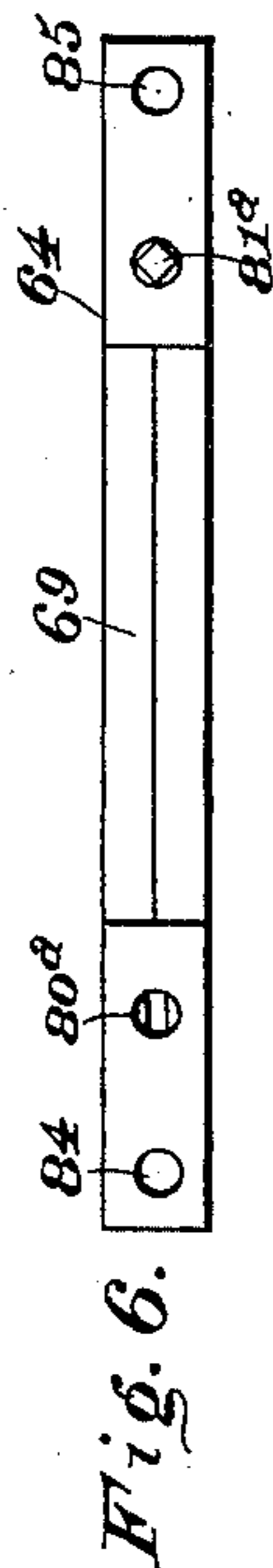
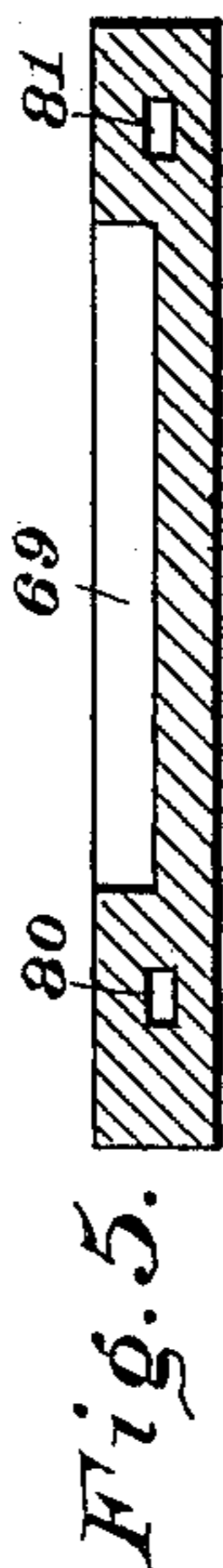
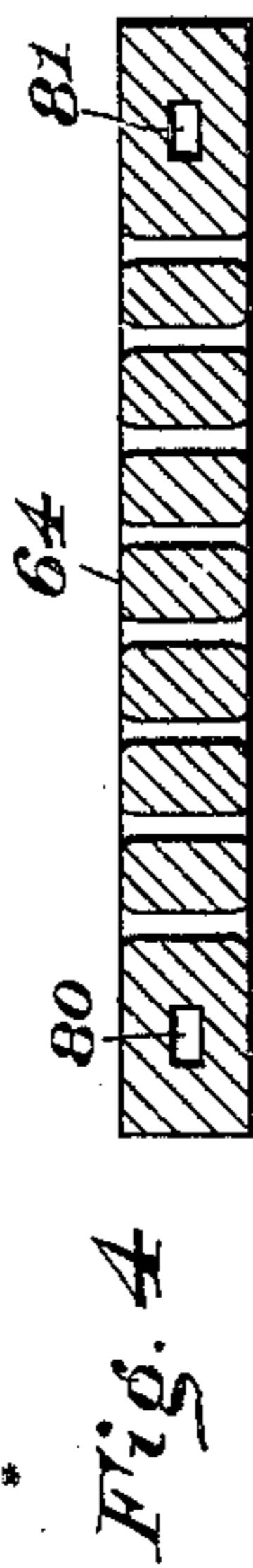
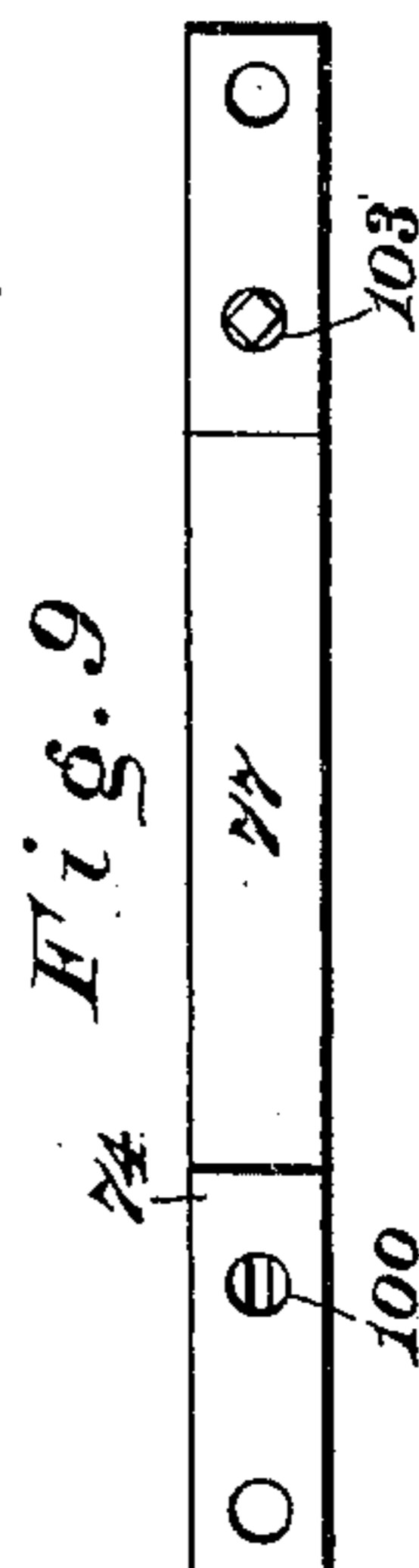
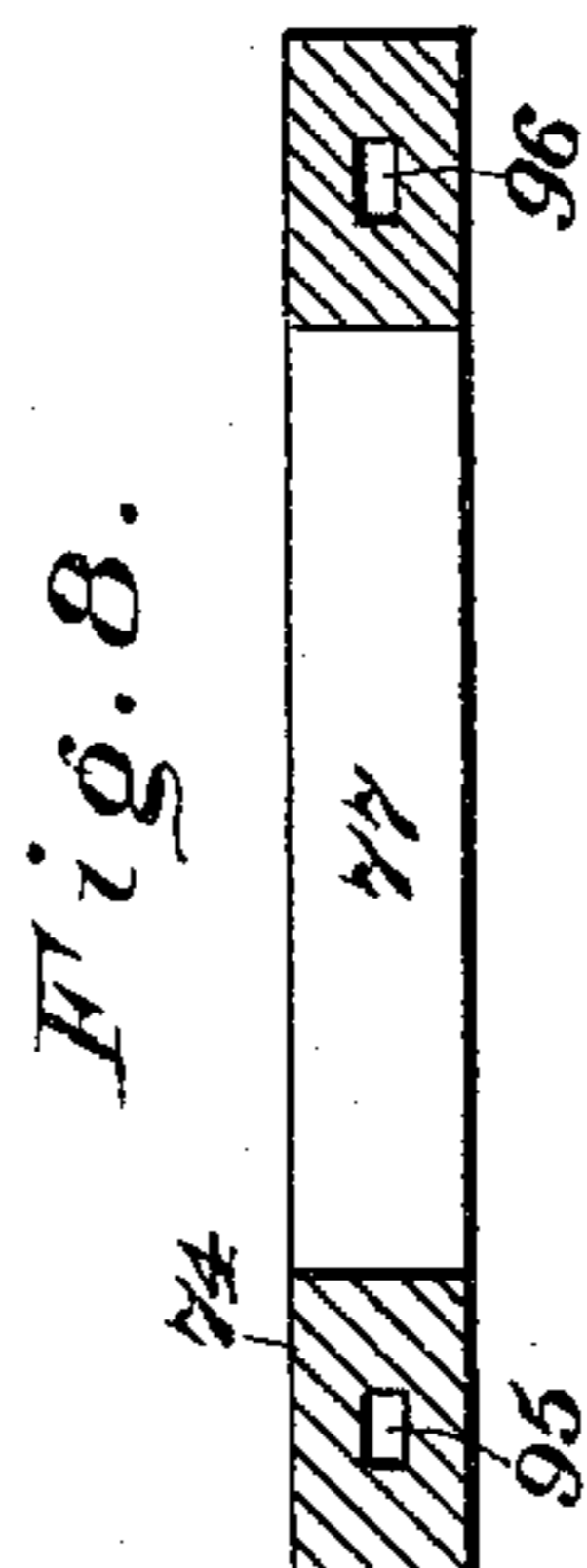
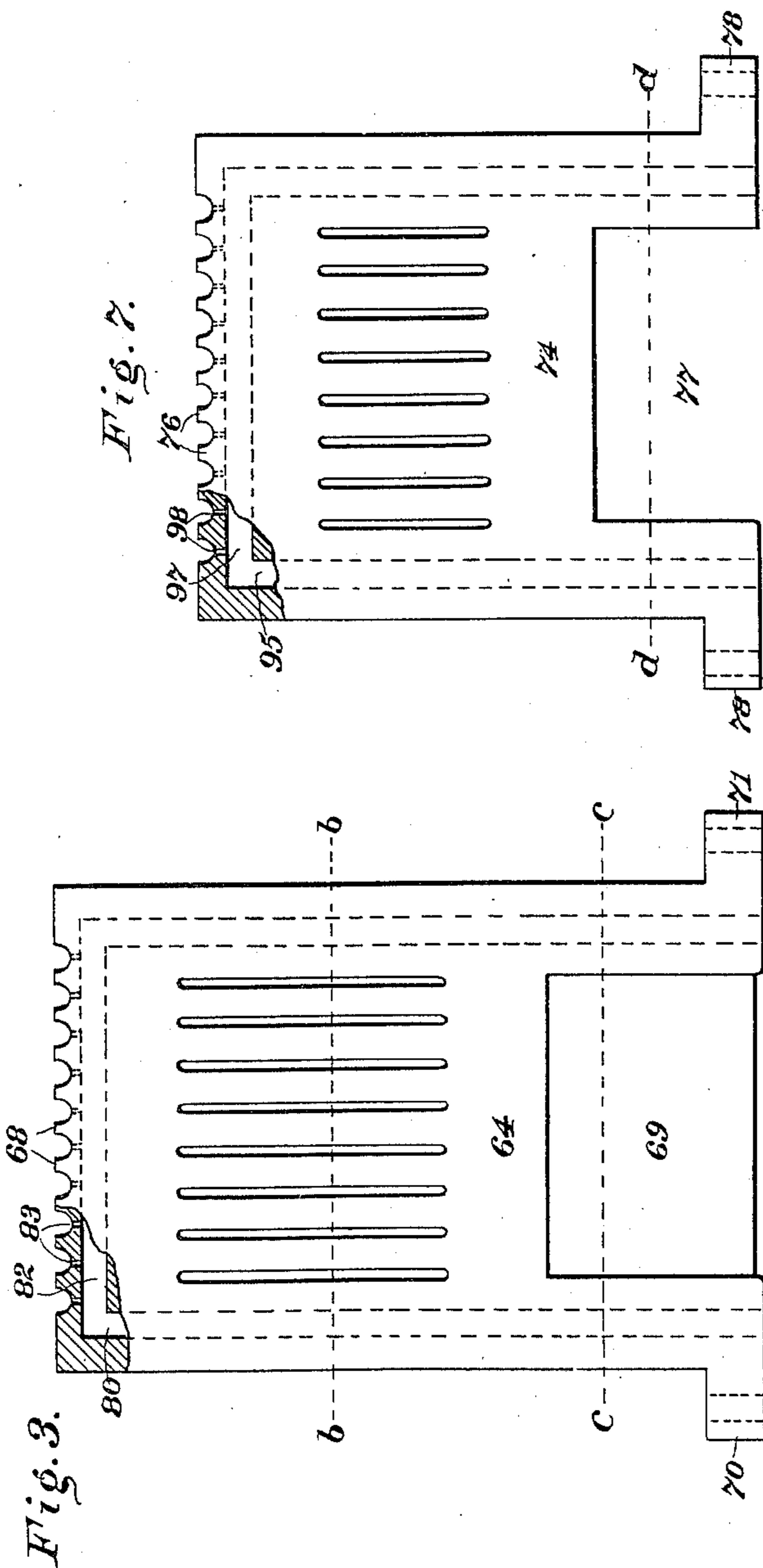
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By Edwin Guthrie
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UNITED STATES PATENT OFFICE.

MORTIMER R. RUST, OF FULTON, NEW YORK, ASSIGNOR TO FRANK B. DILTS, OF FULTON, NEW YORK.

PULP-MAKING WOOD-GRINDER.

SPECIFICATION forming part of Letters Patent No. 688,197, dated December 3, 1901.

Application filed January 24, 1901. Serial No. 44,593. (No model.)

To all whom it may concern:

Be it known that I, MORTIMER R. RUST, a citizen of the United States, residing at Fulton, in the county of Oswego and State of New York, have invented certain new and useful Improvements in Pulp-Making Wood-Grinders; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to pulp-making wood-grinders, and has for its object the production of a machine of the class stated adapted to grind wood into pulp for paper-making by pressing it against a revolving millstone and in which machine horizontally adjustable and guided grinder-plates divide the casing of the device into separate internal compartments or pockets for the reception of the charge of wood to be comminuted.

The object of my invention includes also the provision of grinder-plates of peculiar and special construction, having interiorly-formed ducts arranged to convey the shower-water to the edges of the plates next the stone and perforations through which the water is delivered to the material and stone.

Another object of my invention is to afford a system of valves and piping by which the water discharged by a closing pocket can be caused to open another pocket from which the wood has been ground away.

Each constituent element of my invention is described in detail, and its individual office, together with the mode of operation of the whole, fully explained hereinbelow.

Of the accompanying drawings, throughout which like numerals designate like parts, Figure 1 represents a side view, partly in vertical section, showing the hydraulic-press cylinders, piping, and valve connections, the pistons, rods, and presser-heads, and devices for adjusting the grinder-plates. Fig. 2 is an end view of my invention. Fig. 3 is a plan view of one of the larger grinder-plates; Fig. 4, a cross-section of the plate on line *b b* of the third figure; Fig. 5, a cross-section of the

plate on line *c c* of the third figure, and Fig. 6 a view of the end of the plate which lies outside the casing. Fig. 7 is a plan view of one of the smaller grinder-plates, Fig. 8 being a cross-section on line *d d* of Fig. 7; and Fig. 9 is a view of the end of one of the smaller plates lying outside the casing. The scale of drawings increases after Fig. 2 to more clearly exhibit the special features of the grinder-plates.

Considering Figs. 1 and 2, numerals 1 and 2 mark the sides of the casing and numerals 3 and 4 its ends. The casing may be of any shape, usually rectangular, with a rise in the top, as shown, to accommodate the stone, and an open bottom through which the pulp finds its way to a floor or table and upon which it gathers until removed. The sides, top, ends, and bottom of the casing are bolted together substantially as shown.

The millstone 5, the shaft 6, by which the stone is centrally supported and driven, and the shaft-bearings 7 and 8 are all familiar elements and call for no special description.

As ordinarily constructed, I employ six grinder-plates—four large top and bottom plates, all alike, and two smaller middle plates, which are duplicates. To support and guide the grinder-plates, I form in the sides of the casing corresponding longitudinal rectangular parallel recesses or grooves. These grooves are precisely the same in formation and location on both sides of the stone. In Fig. 1 are shown the grooves and their positions upon one side of the casing, and this illustration would serve as well to indicate those upon the other side or near side on Fig. 1. Of those shown the upper groove is numbered 9, the middle groove 10, and the lower groove 11. All the grooves reach inwardly from the ends far enough to intersect the circumference of the stone's disk if projected upon the sides, and the upper and lower grooves extend the entire length of the casing. The elevated or projecting parts of the sides of casing running lengthwise and marked 12, 13, and 14 indicate the positions of the grooves in the near side, Fig. 1. In Fig. 1 also appear the hydraulic-press cylinders, arranged in pairs attached to each end of the casing, one member of each pair directly over the other.

These cylinders are marked 15 16 on the left and 17 18 on the right of the figure. Each of the cylinders is furnished with a piston, piston-rod, and presser-head. In the sectional portion of Fig. 1 these parts relating to the cylinders 15 and 16 are shown. Of cylinder 15 the piston is designated by number 19, the rod is marked 20, and the presser-head 21. Of cylinder 16 the piston is numbered 22, the rod 23, and head 24. As shown, cylinder 15 has a port 25 leading in toward its outer head and a port 26 leading in near the inner head of that cylinder. Port 26 has a second opening 27 into it from the surface of the cylinder. Cylinder 16 is similarly provided with outer port 28, inner port 29, and its second opening 30.

To govern and direct the pressure-water, I may employ any of the valve and piping systems in use with these machines. I prefer, however, to use a three-way-valve arrangement for each cylinder, placing both valve-seats on one base-casing 31. In Fig. 1 I have removed the hand-levers and have shown the common top or face of the casing of two valves, as well as the valves themselves, in section in order to exhibit the ports covered by the valves. A further advantage of thus combining the two valves is that a single admission or service opening in the top and a single exhaust-orifice in the valve-base suffices for both. Number 32 marks the portion remaining of the top of the valve-casing. It includes the upper valve-chamber 33, having the inlet-opening 34, which in practice is connected with the pump, a lower valve-chamber 35, and a duct 36 joining the two chambers. The valves 37 and 38 may be hollow castings of the quadrantal form shown or any other convenient shape. They are secured to the stems 39 and 40 and turned by means of the hand-levers 41 and 42. (See Fig. 2.) In Fig. 1 both valves are shown in their mean positions and the pressure-water is cut off from both cylinders. The valves are held to their seats by the pressure of the water from the pump. Valve 37—the upper one—covers port 43, opening into a duct leading to the exhaust-port 44 in the valve-seat base. (See Fig. 2.) It also covers, in the position illustrated, the two ports 45 and 46, and the valve may be turned to connect either port with the exhaust-ports 43 and 44 and leave the remaining port open to the pressure-water. Port 45 leads to pipe 47, connecting the valve-seat base and the upper cylinder 17, by way of coupling 48 at the top of Fig. 2, and port 46 leads to pipe 49, which likewise connects base 31 with that cylinder. Cylinder 17 is provided with ports exactly the same as those numbered 25, 26, and 27 belonging to cylinder 15. Hence pipe 49 would lead the pressure-water in near the outer cylinder-head of the cylinder 17 and pipe 47 would deliver the pressure-water near the inner cylinder-head. As ordinarily arranged, pipe 49 possesses no intermediate valve, while pipe

47 includes near the top a globe-valve 50. Valve 38—the lower one—covers port 51, leading, as indicated by broken lines, to the common exhaust-port 44 in the valve-seat base 31. It covers also, in its mean position, the ports 52 and 53, and either of these ports may thus be opened into the exhaust and the other one uncovered to the pressure-water, as already explained.

Number 18 marks the lower cylinder at the right in Fig. 1. It possesses the same sort of internal ports as shown to belong to cylinders 15 and 16. Port 52 opens into pipe 54, which is provided at its lower extremity with a globe-valve 55, and which leads thence by coupling 56 to the cylinder-port opening internally near the inner cylinder-head. Pipe 57, continuing port 53, leads to the cylinder-port opening internally near the outer head of cylinder 18. As is the case with cylinders 15 and 16, the rearwardly-extending cylinder-ports have each a second opening, and these two extra openings of the cylinders 17 and 18 are directly connected by the pipe 58 back of the cylinders. Pipe 58 includes two cut-off or globe valves—one, 59, introduced at the top, and the second valve, 60, near the bottom. Midway between the two valves just mentioned is located the safety-valve 61 for the purpose of permitting water contained between the inner faces of the pistons and inner cylinder-heads to escape, even though the valves 50 and 55 should be closed and that fact overlooked. By reason of the presence and action of the safety-valve no harmful strain is apt to be thrown upon the machine and any surplusage of water is discharged.

By means of the pipes, valves, and connections described above it will be seen that each piston and presser head may be operated alone toward or from the stone. Valves 59 and 60 of pipe 58 being closed and valves 50 and 55 opened, each cylinder, piston, rod, and head is entirely independent of the others. My invention is, however, most advantageously used as a "two-pocket continuous feed-grinder"—that is to say, two of the "pockets" are always grinding and two are always charged with wood to be ground. The continuous grinding prevents racing or undue speeding up of the stone. In practice an upper cylinder at one end of the machine and a lower cylinder at the other end are set grinding together, thus balancing the pressures on the stone and producing superior pulp. The remaining pockets are filled and ready, and at the proper time they are caused to grind, their cylinders forcing the wood to the stone, and the pressure is relieved in the first two cylinders. To avoid wasting water constantly, I operate my invention in the following manner: When it is desired to open a pocket, water is let in behind the piston to move it outwardly and the water fills the cylinder. Instead of discharging this cylinder of water directly out of the machine I close valves 50 and 55 and open valves 59 and 60

and compel the grinding-cylinder to discharge the water held in rear of its piston behind the piston of the companion cylinder below it—that is to say, cylinder 17 in closing its pocket would press water from behind its piston into cylinder 18 to the rear of its piston, the piston of the upper cylinder moving toward the stone and that of the lower cylinder from the stone, or vice versa. Water in front of the pistons is of course discharged by way of the exhaust-port 44.

In Fig. 1 will be seen two of the four doors by way of which the blocks of wood to be ground are placed before the presser-heads in the compartments between the grinder-plates. Two of the doors only are shown. The upper door is designated by number 62 and the lower by 63. The two remaining doors admit the wood to the compartments shown in the sectional portion of the figure. They do not vary in any particular from the two doors illustrated.

The peculiar construction of the grinder-plates is an important part of my invention. In the sectional part of Fig. 1 are shown two of the larger grinder-plates, designated by numbers 64 for the upper and 65 for the lower. Partly hidden by the casing are two more plates 66 and 67, upper and lower, precisely like the one illustrated, the construction of all being the same. Fig. 3 is a plan of plate 64 or of either of the larger plates. As usually cast its weight is materially reduced by forming the series of longitudinal slots. (See Fig. 4.) At the inner end is a row of tooth-like projections 68, and near the opposite end is a recessed portion 69. (See Figs. 3 and 5.) The top and bottom edges of the ends 3 and 4 of the casing fit these recesses of the large plates. At the rear corners are the lugs 70 and 71, extending beyond the side edges, (see Fig. 6,) and which will be again referred to. The lugs are shown on each of plates 66 and 67, (marked 72 72 and 73 73, respectively, in Fig. 2.) There are two middle plates. One of these, plate 74, appears in section, and the other, plate 75, is partly hidden by the casing. (See Figs. 1 and 2.) Figs. 7, 8, and 9 indicate the form of the middle plates. At one end are tooth-like projections 76 of the same size and shape as those belonging to the larger plates. At the rear plate 74 has a portion 77 cut away, and at the rear corners are the outwardly-extending lugs 78 78, precisely like those of the larger plates, and these will be mentioned again. The lugs 79 79 are shown for plate 75 in Fig. 2. To effectively conduct and deliver the shower-water, all the plates, both large and small, are cored when cast to produce the side and end ducts indicated, or they may be hollow throughout. Plate 64 is shown to possess the lengthwise side ducts or channels 80 and 81, joined by the end duct 82, and in Fig. 3 the perforations 83 between the teeth 68 are seen. Through these holes the water is delivered directly upon the stone. The ends of side ducts 80 and 81 outside the

casing are provided with threaded mouths, such as mouth 80^a of duct 80, open for connection with a water-pipe of any convenient construction and arrangement or closed by a screw-plug 81^a, as shown. In Fig. 6 are shown the two screw-holes 84 and 85 through the outer portions of the lugs 70 and 71. The lugs of all the other grinder-plates are provided with like holes. All are interiorly threaded and engage screws—such as those marked 86 86, 87 87, and 88 88—through lugs on the right of Fig. 1. (See also Fig. 2.) These clamping-screws pass through the cleats, such as 89 90 91, on the flange of side 2 of the casing, and nuts 92 93 94, usually constructed with radial holes for the reception of the end of a lever, fit the screws and bear against the cleats. It will be noted that the outer ends of the screws are squared. If, therefore, the proper nuts be held stationary by suitable pins or levers and wrenches applied simultaneously to the squared ends of the screws concerned, the grinder-plate, of which these elements constitute the adjusting mechanism, may be moved toward or away from the millstone.

Figs. 7, 8, and 9 show the lengthwise side ducts 95 and 96 and the end or cross duct 97, together with the perforations 98 between the teeth of 76 of small grinder-plate 74 for conveying and delivering the shower-water to the stone, as already explained in the description of the larger plates. Each grinder-plate has one side duct plugged and one connected with the water-service pipe. Thus plates 66, 74, and 67 have open screw-threaded mouths, respectively numbered 99, 100, and 101, and one side duct closed by screw-plugs 102, 103, and 104. In practice the open mouths are served by branches from a single water-pipe connected by a hose with the source of supply. The actual arrangement of the piping by which the shower-water is served to the plates is capable of being considerably varied under different conditions.

I am aware that the hydraulic-press cylinders with their contained working parts and the means of operating them are of the usual form in machines of this class, and I do not claim those features.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a pulp-making wood-grinder, the combination of the casing having horizontal guide-grooves, a revoluble stone within the casing, flat upper, middle and lower grinder-plates adjustable in the guide-grooves of the casing toward or from the stone and means for adjusting the said plates, the said middle plates being movable directly toward the axis of the stone, and the upper and lower plates movable tangentially toward the stone whereby the casing is interiorly divided into two pairs of like upper and lower compartments arranged directly opposite each other upon opposite sides of the stone, the said upper compartments being located above the axis of the stone and the said lower compartments

below that axis, and mechanism adapted to press against the stone wood placed in said compartments, substantially as described.

2. In a pulp-making wood-grinder, flat
5 grinder-plates having formed within them transverse ducts and perforations leading from the transverse ducts through the adjacent ends of the plates, and other ducts also formed within the plates and adapted to con-
10 duct water from the exterior to the said transverse ducts, substantially as described.

3. In a pulp-making wood-grinder, flat grinder-plates provided with a series of pro-
15 jections at one end, the said plates having formed within them transverse ducts and perforations leading from the said transverse ducts and opening between the said projections, the said plates possessing other ducts also formed within them and adapted to con-
20 duct water from the exterior to the said transverse ducts, substantially as described.

4. A grinder-plate having internal side ducts connected by a transverse internal end duct, discharge perforations from the said
25 end duct, the said plate being recessed at its

opposite end and provided with outwardly-projecting lugs, the said plate being adapted for connection to water-serving piping, substantially as shown and described.

5. In a pulp-making wood-grinder, a pair 30 of cylinders each having corresponding ports leading inwardly to the cylinder-heads, valves whereby pressure-water from an external source may be admitted or discharged, pipes connecting the said pressure-water valves and 35 the ports of the cylinders, cut-off valves included in the said pipes to one of the said ports of each cylinder, one of the said ports of each cylinder possessing a second opening to the surface of the cylinder, a pipe directly 40 connecting the said second openings of the said ports, and cut-off valves included in the said pipe, substantially as described.

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

MORTIMER R. RUST.

Witnesses:

H. L. PLATT,
H. L. LAKE.