W. R. TIDMARSH.

WOOD PULP GRINDER.

APPLICATION FILED AUG. 31, 1920.

1,398,753.

Patented Nov. 29, 1921.

2 SHEETS—SHEET 1.

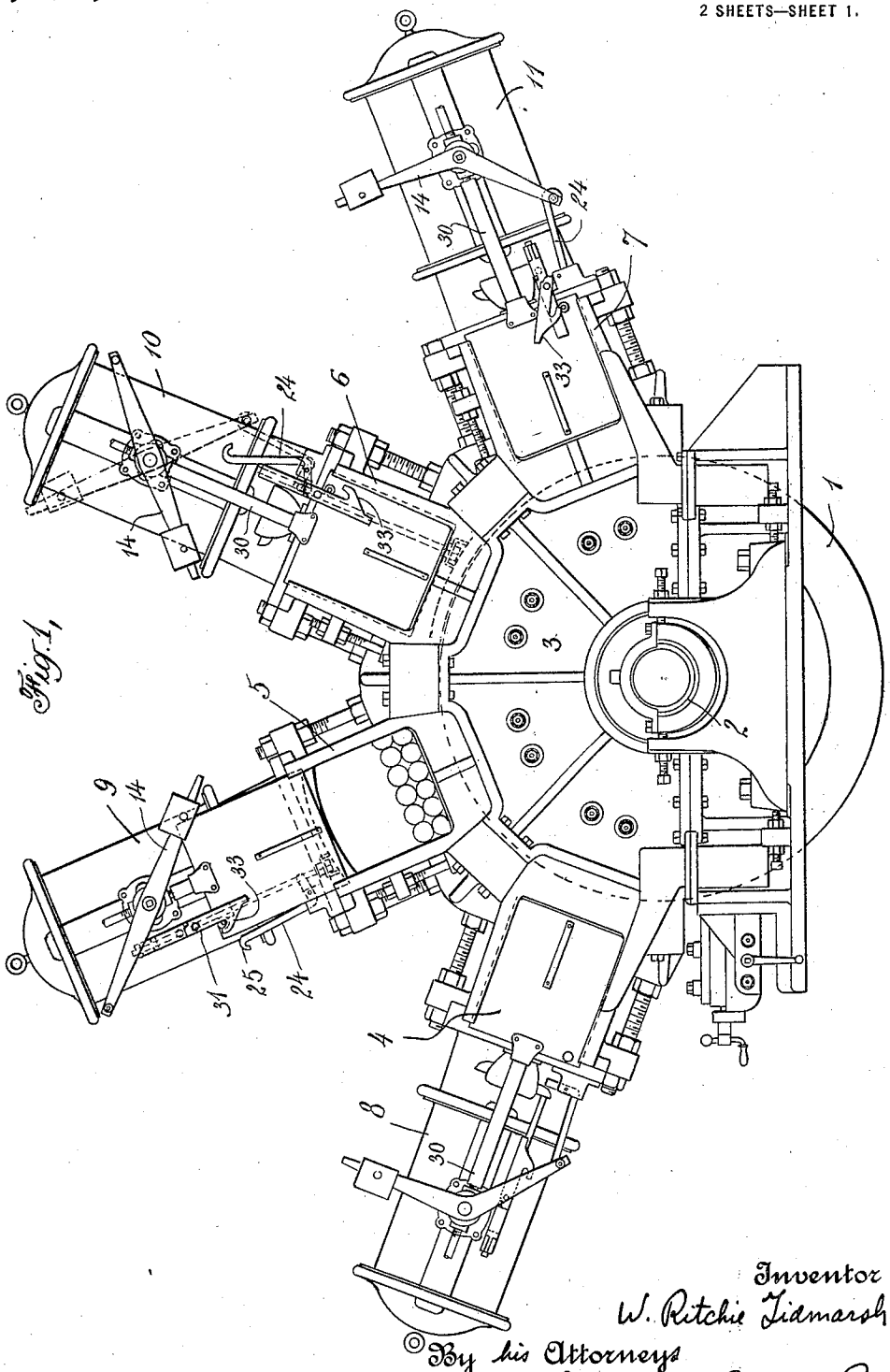


Fig. 1.

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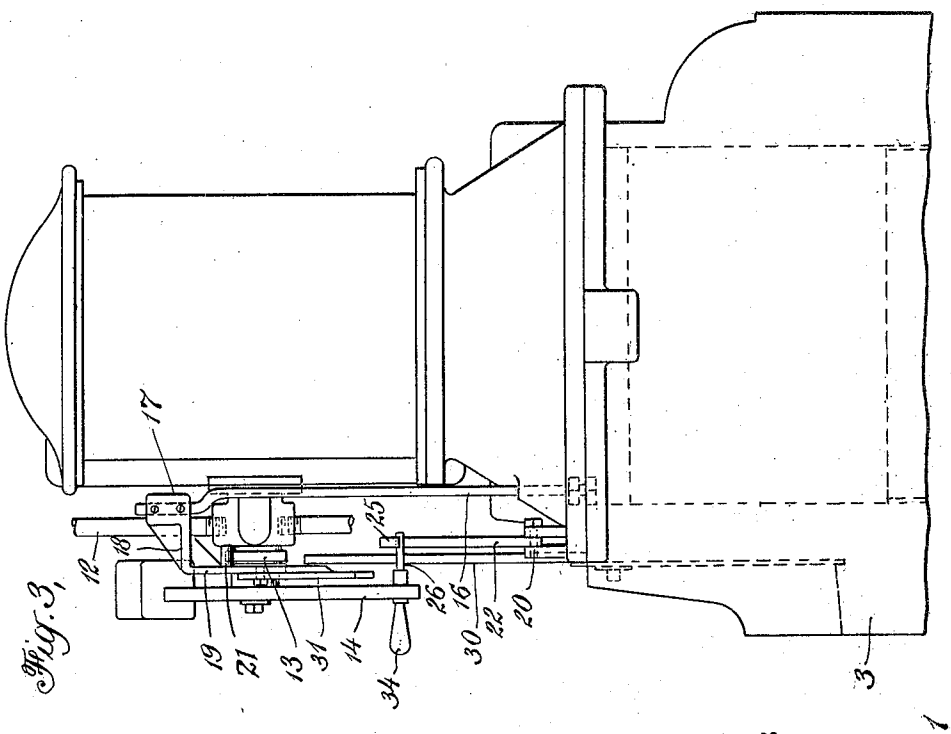


Fig. 3.

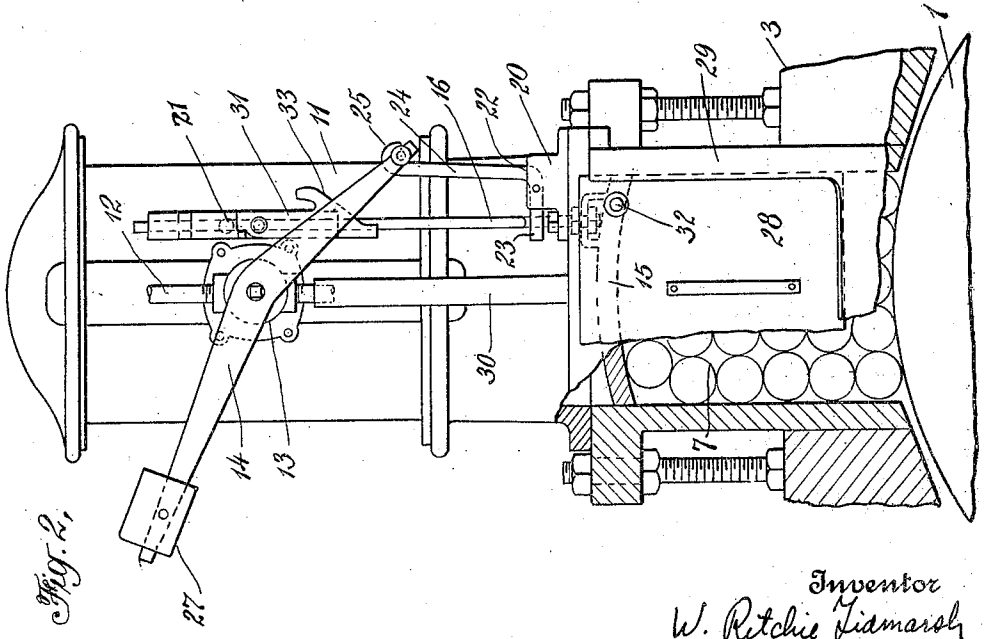


Fig. 2.

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UNITED STATES PATENT OFFICE.

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WOOD-PULP GRINDER.

1,398,753. Specification of Letters Patent. Patented Nov. 29, 1921.

Application filed August 31, 1920. Serial No. 407,153.

To all whom it may concern:

Be it known that I, WILLIAM RITCHIE TIDMARSH, a citizen of the United States, residing at Bangor, in the county of Penobscot, State of Maine, have invented certain new and useful Improvements in Wood-Pulp Grinders; and I do hereby 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.

This invention relates to wood-pulp grinders used in making the so-called "mechanical pulp" employed in the manufacture of newsprint and other low grade papers, and particularly to that type of grinder in which a series of wood receiving pockets are radially disposed about a grindstone. More specifically it relates to means for automatically retracting the pressure foot and opening the door of a pocket as soon as the wood within that pocket has been ground away.

In the grinding of mechanical wood-pulp, the wood is forced against the peripheral face of a rapidly rotating grindstone, and the ground pulp carried away to screens by a stream of water which plays upon the stone during the grinding. In one common type of grinder, a series of from two to four pockets is radially disposed about the upper half of the grindstone casing. Into these pockets is placed the wood to be ground, the doors of the pockets closed, and a plunger or pressure foot within the pocket brought to bear against the wood to force it hard against the rotating stone. The power driving the pressure foot is commonly supplied through the piston rod of a fluid pressure cylinder usually hydraulic mounted upon the pocket.

The stage of grinding may be indicated by different mechanical means placed on various standard grinders, but it is often the case that the pocket doors must be opened from time to time in order that the stage of the grinding may be determined, and the need for supplying more wood apprehended. The result is that the operator must be constantly opening the doors to find out just how matters stand, and if he is lazy and not properly supervised, or if he has too many machines to care for, it often happens that pockets are emptied unknown to him and remain empty some twenty or thirty minutes, or more. Meanwhile, the grindstone, relieved of this pressure, rapidly gains speed, especially if driven by a water wheel, and such sudden gains in speed are usually the cause of grindstones bursting. Furthermore, when the pocket has at last emptied, in order to prepare it for a fresh charge, the operator must reverse the valve in order to retract the pressure foot, and also open the door. These operations are usually done by hand.

It is accordingly an object of this invention to do away with these objections, and this is done by providing means which automatically reverse the hydraulic valve, withdraw the pressure foot, and open the door as soon as the pocket to which these things appertain has been emptied. The operator is thus immediately apprised of the situation and can proceed to refill the pocket without loss of time. This happy result is effected by causing the movement of the pressure foot itself to operate means which reverse the valve, and providing means movable with the pressure foot for engaging the door and opening it as the pressure foot is retracted.

In order that the invention may be more clearly understood reference is had to the accompanying drawings disclosing one embodiment thereof, and in which;

Figure 1 is a side elevation of a four-pocket grinder, the grinding in each pocket being shown in various stages;

Fig. 2 is a detail view of one of the pockets and its cylinder, showing the mechanism whereby hydraulic valve is automatically reversed;

Fig. 3 is a side elevation of the pocket and cylinder shown in Fig. 2, looking toward the left.

Referring now to the drawings, 1 represents a pulp grindstone journaled in suitable bearings 2 and inclosed with a housing 3. Adjustably mounted upon this housing, and radially disposed with reference to the grindstone, is a series of pockets 4, 5, 6 and 7. Mounted upon these pockets are cylinders 8, 9, 10 and 11, respectively, in which pistons reciprocate and operate the pressure feet which force the wood within the pockets against the grindstone. Water is introduced into the ends of a cylinder 11 (Figs. 2 and 3), through pipe 12, the flow being directed to the desired end of the

cylinder by means of an oscillating valve 13, this valve being oscillated by means of a lever or arm 14 in a manner to be described later. When water is introduced into the upper end of the cylinder the piston forces the pressure foot 15 downwardly and this presses the wood in the pocket against the face of the grindstone. When the water is introduced into the lower end of the cylinder this motion is reversed and the pressure foot is retracted. A sliding door 28 closes the pocket during grinding. The foregoing arrangement except for the arm 14 is generally old and forms no part of the invention.

Attention is now called particularly to Figs. 2 and 3 showing the specific mechanism whereby the hydraulic valve of a cylinder is automatically reversed when its corresponding pocket is emptied, thereby retracting the pressure foot and simultaneously opening the door of the pocket.

Secured to the upper face of the pressure foot is a rod 16 which projects through an opening in the casing which supports the cylinder, as clearly shown in Figs. 2 and 3. At the upper end of this rod 16 is secured an L-shaped member 17 having a horizontal arm 18 and a vertical arm 19, from which projects a horizontal lug 21. Mounted upon the upper end of the pocket 7 is a slotted casting 20 between the legs of which is journaled an L-shaped latch 22 having a horizontal arm 23 and a vertical arm 24. The upper end of the vertical arm is provided with a hook 25 which is adapted to engage with a pin 26 projecting from one end of arm 14.

When the pressure foot is in its uppermost position, the pocket filled with wood, and the valve 13 positioned to allow water to enter the upper end of the cylinder and thus begin the downward or forward movement of the pressure foot, the parts are arranged as shown in Figs. 2 and 3. As the pressure foot descends carrying with it rod 16 and member 17, the valve 13 is held open in the desired forward position by means of arm 14 held in the position shown by means of engagement with latch 22. When the wood has been ground away and the pressure foot lies close to the grindstone, the horizontal lug 21 on arm 19 of member 17 engages with the horizontal arm 23 of latch 22, thus causing the vertical arm of the latch to swing toward the left and disengage pin 26. A weight 27 mounted upon the other end of the arm 14 being thus free to fall, operates to reverse valve 13 and causes water to enter the lower end of the cylinder, thus effecting an immediate withdrawal of the pressure foot 15.

The pocket 7 is closed by means of door 28 slidably mounted in guideways 29 and supported, when open, by means of guide rod 30. This door is automatically opened when the pressure foot is retracted as follows: Pivoted upon the vertical arm 19 of the member 17 is hooked member 31 positioned so as to slide over the face of the door when the rod 16 follows the pressure foot in its downward movement. Situated upon the face of the door and in line with this hooked member is pin 32. When member 31 first contacts with the pin 32, it is swung to the left because of the engagement of a cam surface 33 with the pin 32. As the downward movement continues member 31 rides past the pin 32 and resumes its normal and vertical position with its hook below the pin. When the flow of water has been reversed by the tripping of the latch 22, as described above, and the retractive movement of the pressure foot begins, the member 31 engages pin 32 and carries the door upward with it.

The operation of the valves is as follows: Assume that a pocket has been emptied, its pressure foot withdrawn and its door opened. The operator then charges the empty pocket with wood, manually frees pin 32 from hooked member 31 and lowers the door. He seizes the handle 34 of arm 14, swings the arm downwardly and secures it in this position by means of latch 22. The valve 13 is thus turned to admit water to the upper end of the cylinder, and pressure is applied to the wood. When the wood has been ground away and the pocket in readiness for recharging, latch 22 is automatically tripped, valve 13 reversed and pressure foot 15 retracted carrying door 28 with it.

The various stages of this operation may be seen in Fig. 1. In that figure pocket 4 is shown with its door closed and the grinding just beginning. Pocket 5 is shown with the pressure foot retracted and the pocket being refilled. Pocket 6 is shown as just being emptied, with the valve arm and retaining latch shown in dotted lines in their positions just prior to completion of the grinding, and in solid lines subsequent to completion. The hooked member 31 is below the pin on the door and is in position to retract the door. The grinding in pocket 7 is shown as about one-half completed. The hooked member 31 is shown in the act of riding over the pin on the door.

It will thus be seen that the present invention provides a simple and effective means for automatically reversing the flow of water, retracting the pressure foot, and opening the door of each pocket the moment that pocket becomes empty and should be recharged. There is thus no necessity for constant inspection by the operator. Nor is there the danger that the pockets may become empty in the absence of such inspection.

Although one specific form of apparatus has been shown as particularly well adapted

to accomplish the ends sought, it is to be distinctly understood that the invention in its broader aspects is not to be limited to these details of construction. Neither is it necessarily limited to the grinding of wood, as it is clear that it may find application wherever it becomes necessary to know when a pocket containing material being ground has been emptied and should be recharged.

I claim:

1. In a grinding machine the combination of a grinding element, a pocket adjacent the grinding element adapted to receive the material to be ground, a door on the pocket, a reciprocating pressure foot in said pocket for forcing the material to be ground against the grinding element, means for automatically retracting the pressure foot when the pocket is ready for recharging, and means movable with the pressure foot for opening the door as the pressure foot is retracted.

2. In a grinding machine the combination of a grinding element, a pocket adjacent the grinding element adapted to receive the material to be ground, a fluid actuated reciprocating pressure foot in the pocket for forcing the material to be ground against the grinding element, a valve controlling the flow of fluid whereby the pressure foot is moved either toward or away from the grinding element, a lever controlling the operation of said valve and normally urged to a position in which the pressure foot is moved away from the grinding element, means for holding said lever in a position in which the valve is opened to move the pressure foot toward the grinding element, and means for automatically releasing said holding means and permitting the lever to return to its normal position when the pocket is ready for recharging, and thus retract the pressure foot.

3. In a grinding machine the combination of a grinding element, a pocket adjacent the grinding element adapted to receive the material to be ground, a door on the pocket, a hydraulically-actuated reciprocating pressure foot in the pocket for forcing the material to be ground against the grinding element, a valve controlling the flow of water whereby the pressure foot is moved either toward or away from the grinding element, a weighted lever controlling the operation of said valve, a latch adapted to hold the lever against the action of its weight in a position such that the valve is turned to force the pressure foot toward the grinding element, and means movable with the pressure foot for tripping the latch when the pocket is ready for recharging, thus freeing the lever which operates the valve to retract the pressure foot, and a member associated with said tripping means for engaging the door and opening it when the pressure foot is retracted.

4. A wood-pulp grinder, comprising the combination of a grindstone, a pocket adjacent the grindstone adapted to hold the wood to be ground, a door on the pocket, a reciprocating pressure foot in said pocket adapted to force the wood against the grindstone, automatic means for retracting the pressure foot when the pocket is ready for recharging and means movable with the pressure foot opening the door as the pressure foot is retracted.

5. A wood-pulp grinder comprising the combination of a grindstone, a pocket adjacent the grindstone adapted to hold the wood to be ground, a door on the pocket, a hydraulically-actuated reciprocating pressure foot in the pocket adapted to force the wood against the grindstone, a hydraulic valve controlling the direction of motion of said pressure foot, automatic means for operating the valve to retract the pressure foot when the pocket is ready for recharging and means carried by the pressure foot for engaging the door and opening it as the pressure foot is retracted.

6. Means for opening the door of a wood-pulp grinder pocket when the pressure foot is retracted, comprising a rod movable with the pressure foot, a hooked member pivoted thereto designed to engage a projection on the door when the pressure foot is retracted and a cam surface on said pivoted hooked member designed to contact with the projection on the door during the movement of the pressure foot toward the grinding element and swing the hooked member so that it may pass the projection.

In testimony whereof I affix my signature.

WILLIAM RITCHIE TIDMARSH.