E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

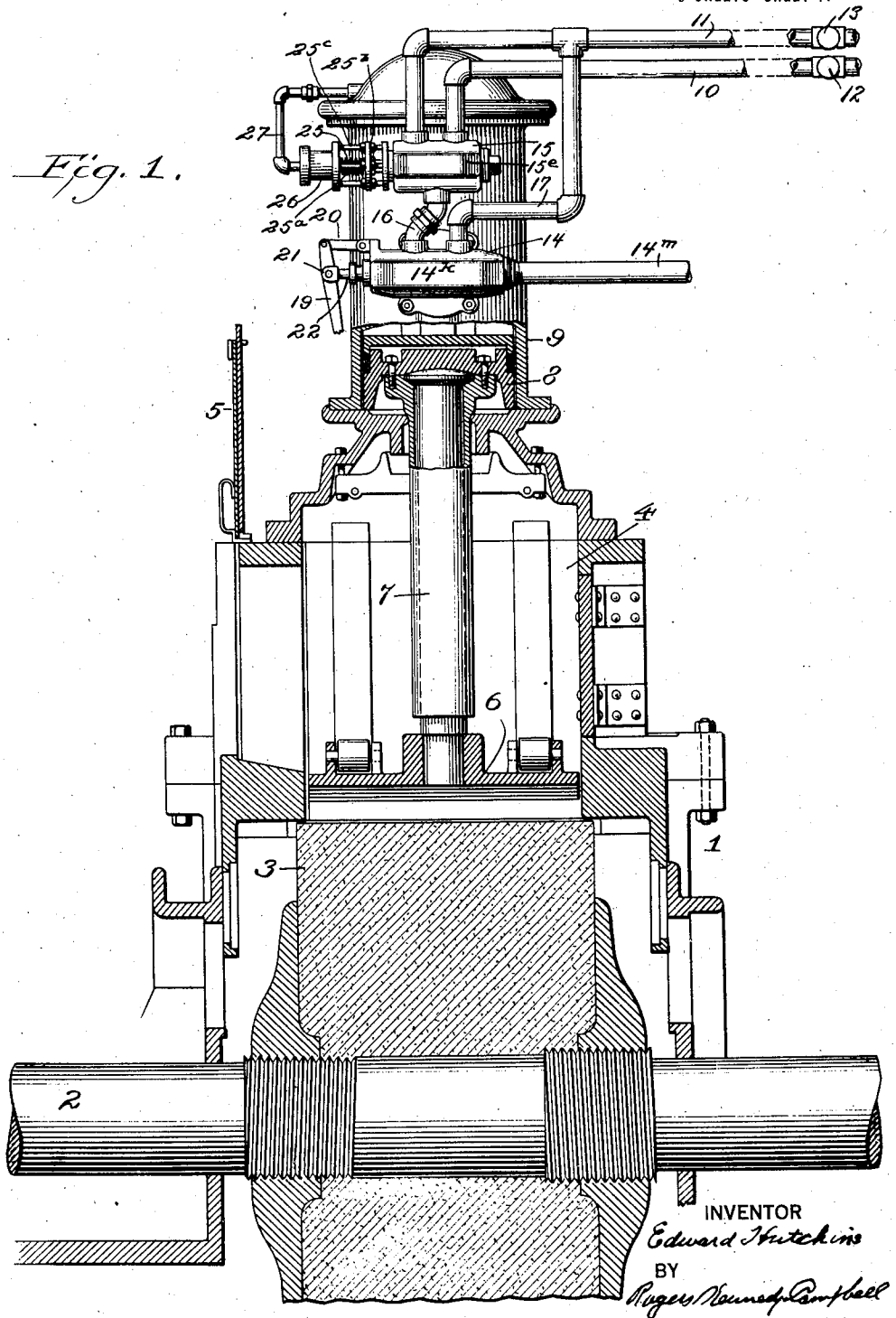
APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 1.

Fig. 1.



INVENTOR

Edward Hutchins

BY

Rogers Kennedy & Campbell

ATTORNEYS.

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

APPLICATION FILED DEC. 9, 1918.

1,333,660. Patented Mar. 16, 1920.

8 SHEETS—SHEET 2.

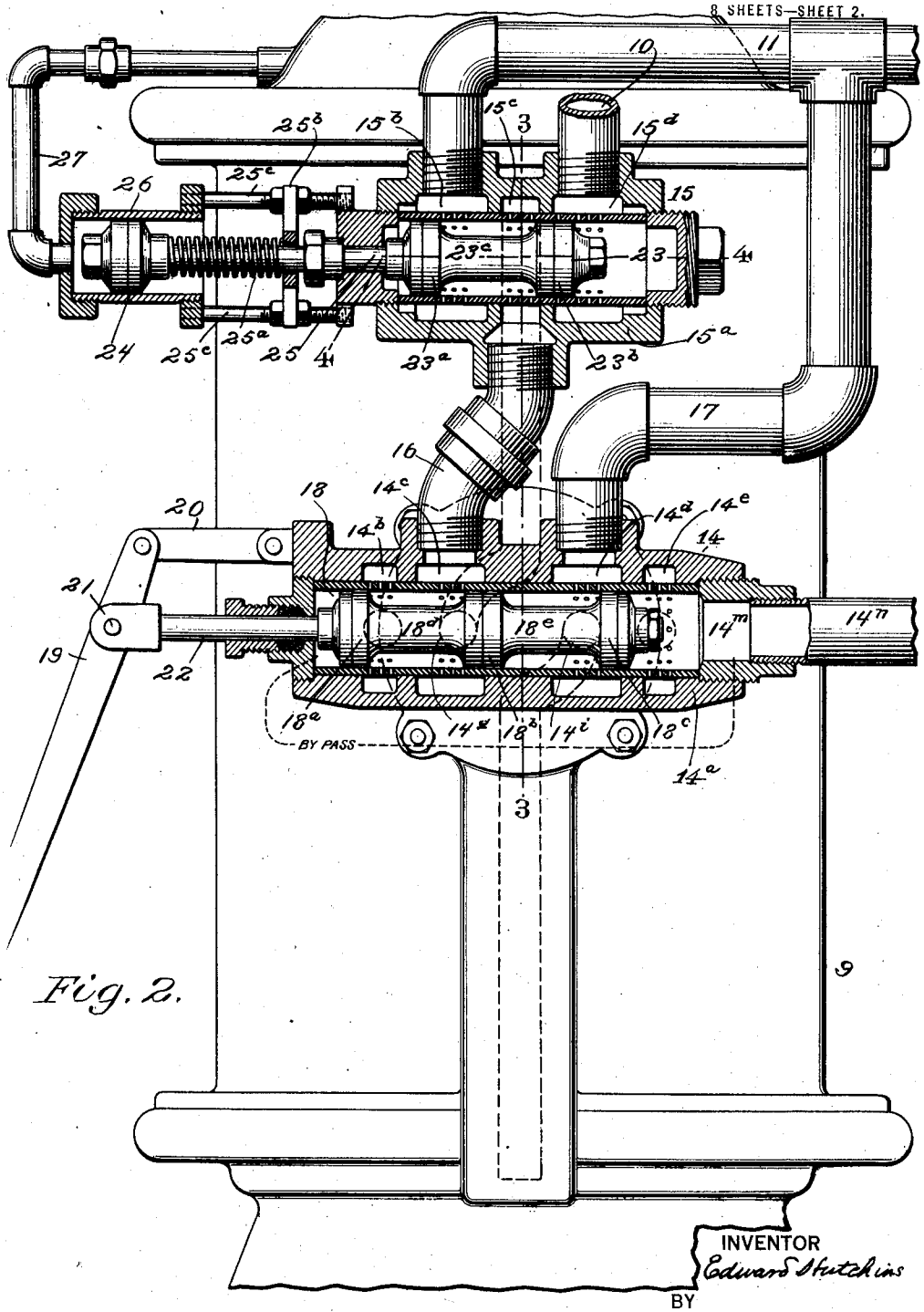


Fig. 2.

INVENTOR
Edward Hutchins
BY
Rogers, Kennedy & Campbell
ATTORNEYS

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 3.

Fig. 3.

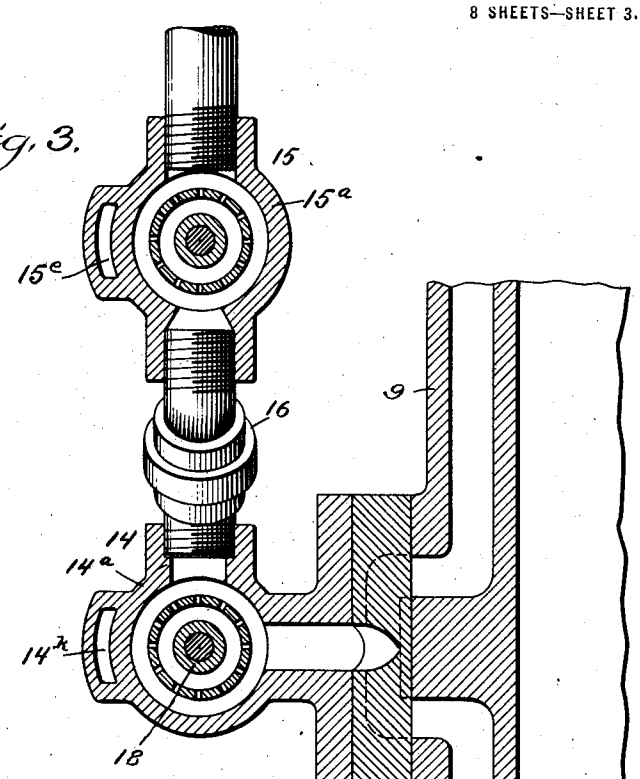
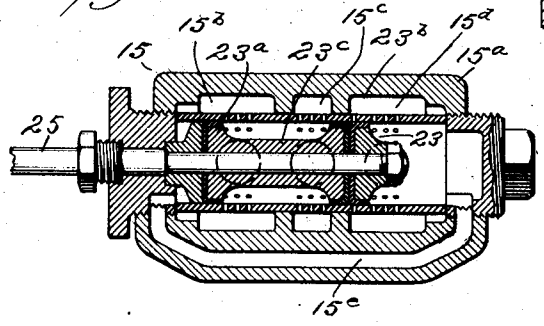


Fig. 4.



INVENTOR

Edward Hutchins

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

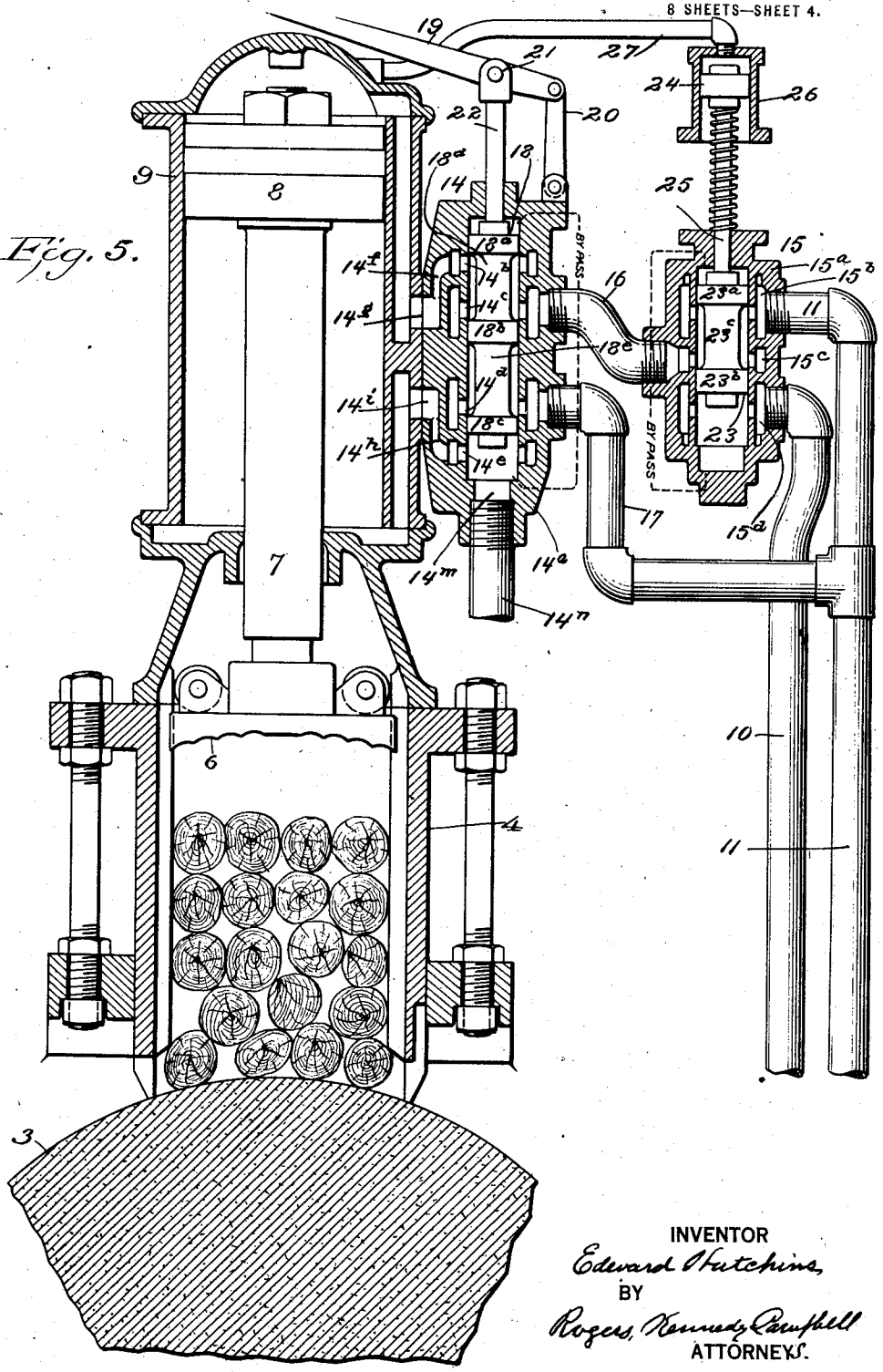
APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 4.

Fig. 5.



INVENTOR

Edward Hutchins,

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

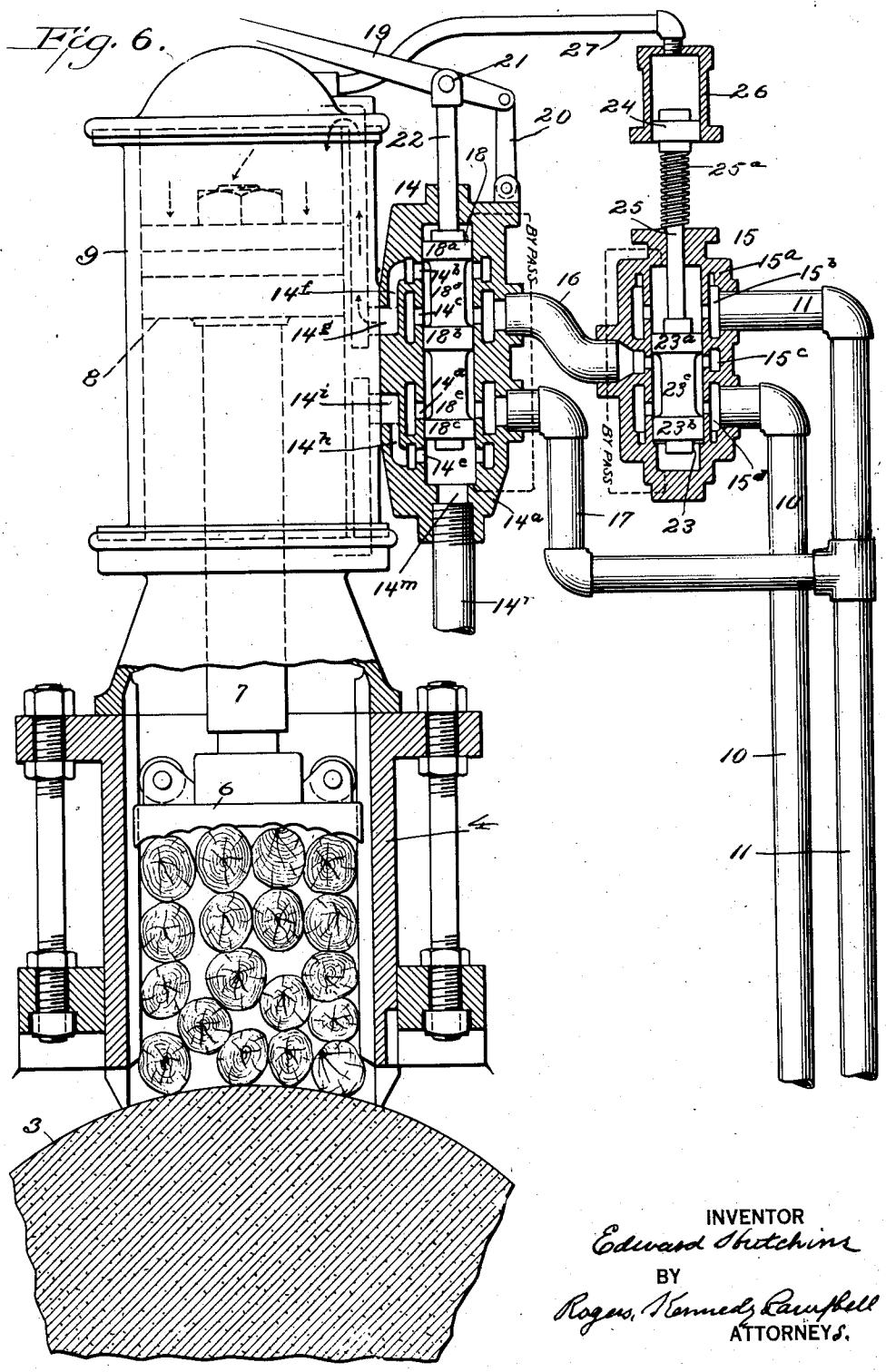
APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 5.

Fig. 6.



INVENTOR

Edward Hutchins

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

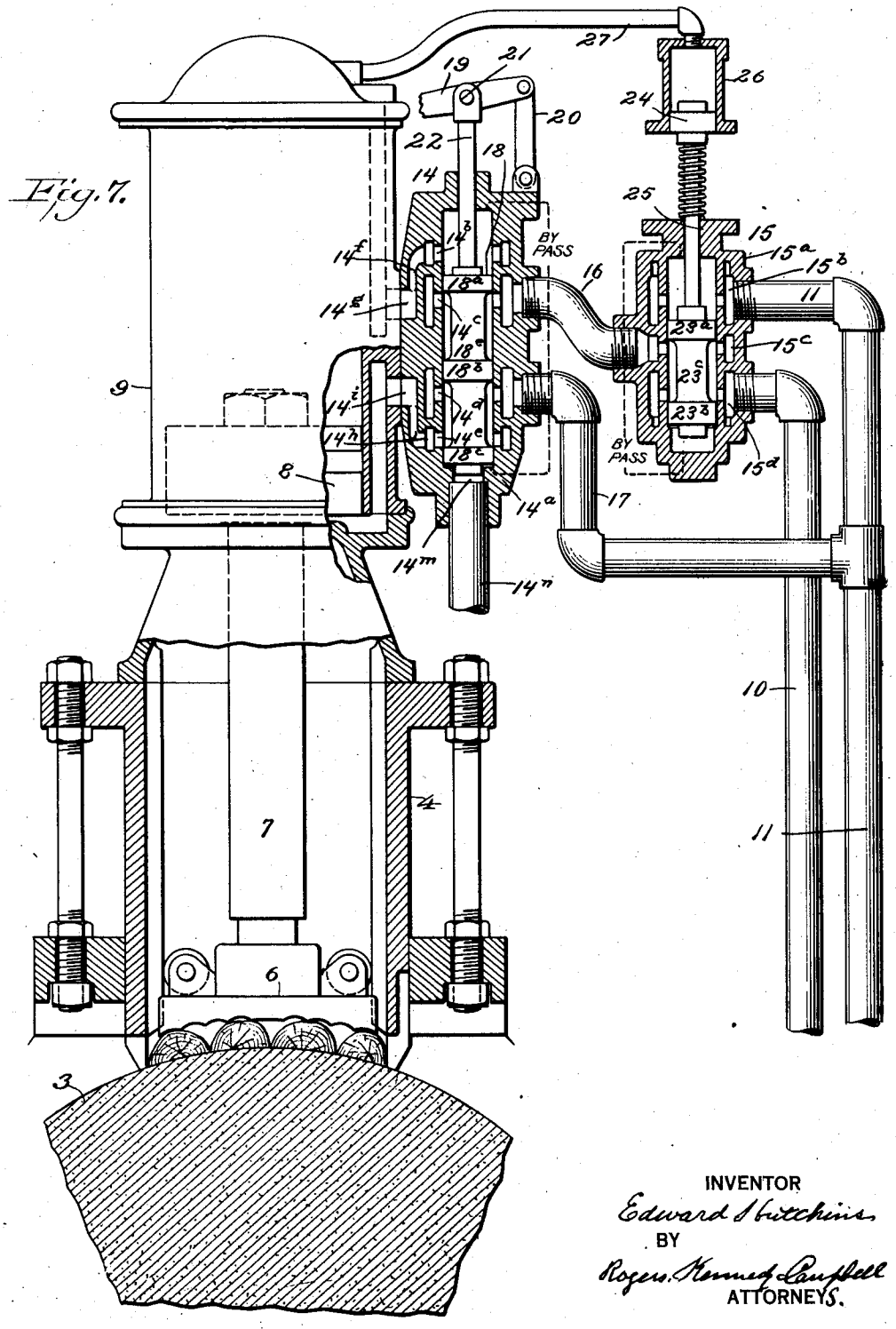
APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 6.

Fig. 7.



INVENTOR

Edward Hutchins

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

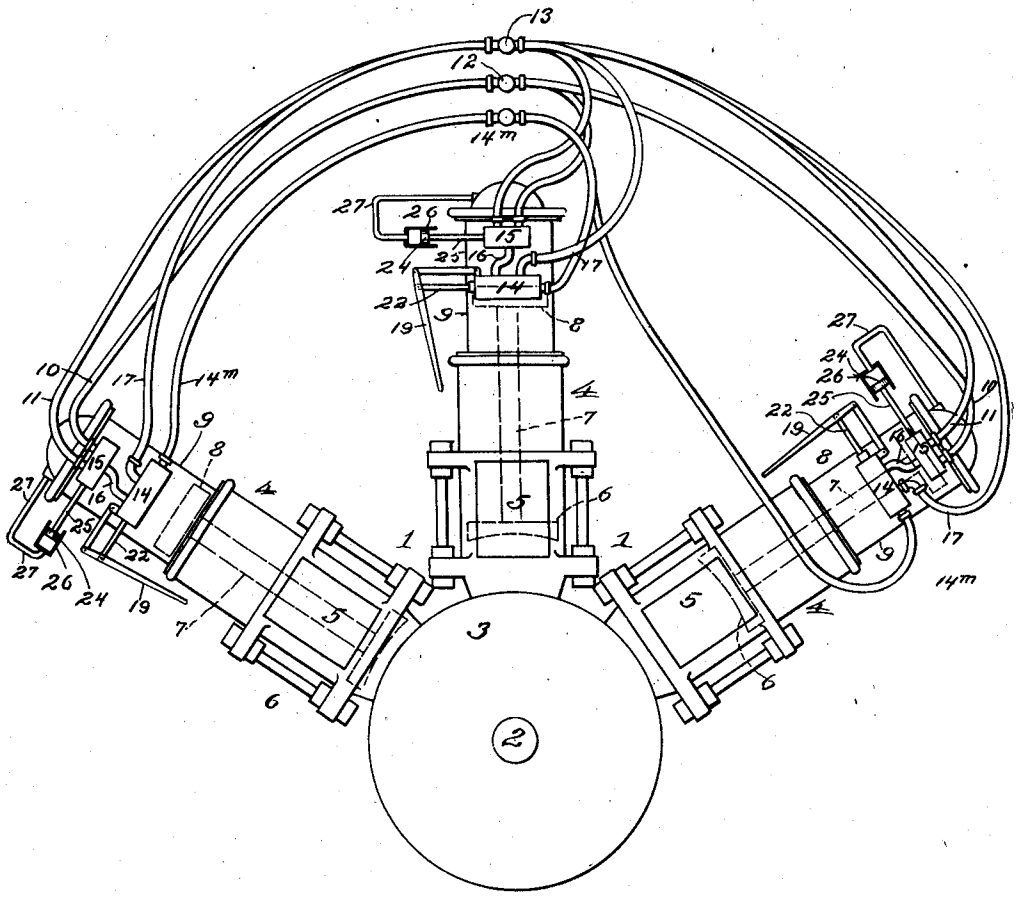
APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 1.

Fig. 8.



INVENTOR

Edward Hutchins,

BY

Rogers, Kennedy & Campbell

ATTORNEYS

E. HUTCHINS.

GRINDER FOR THE PRODUCTION OF WOOD PULP.

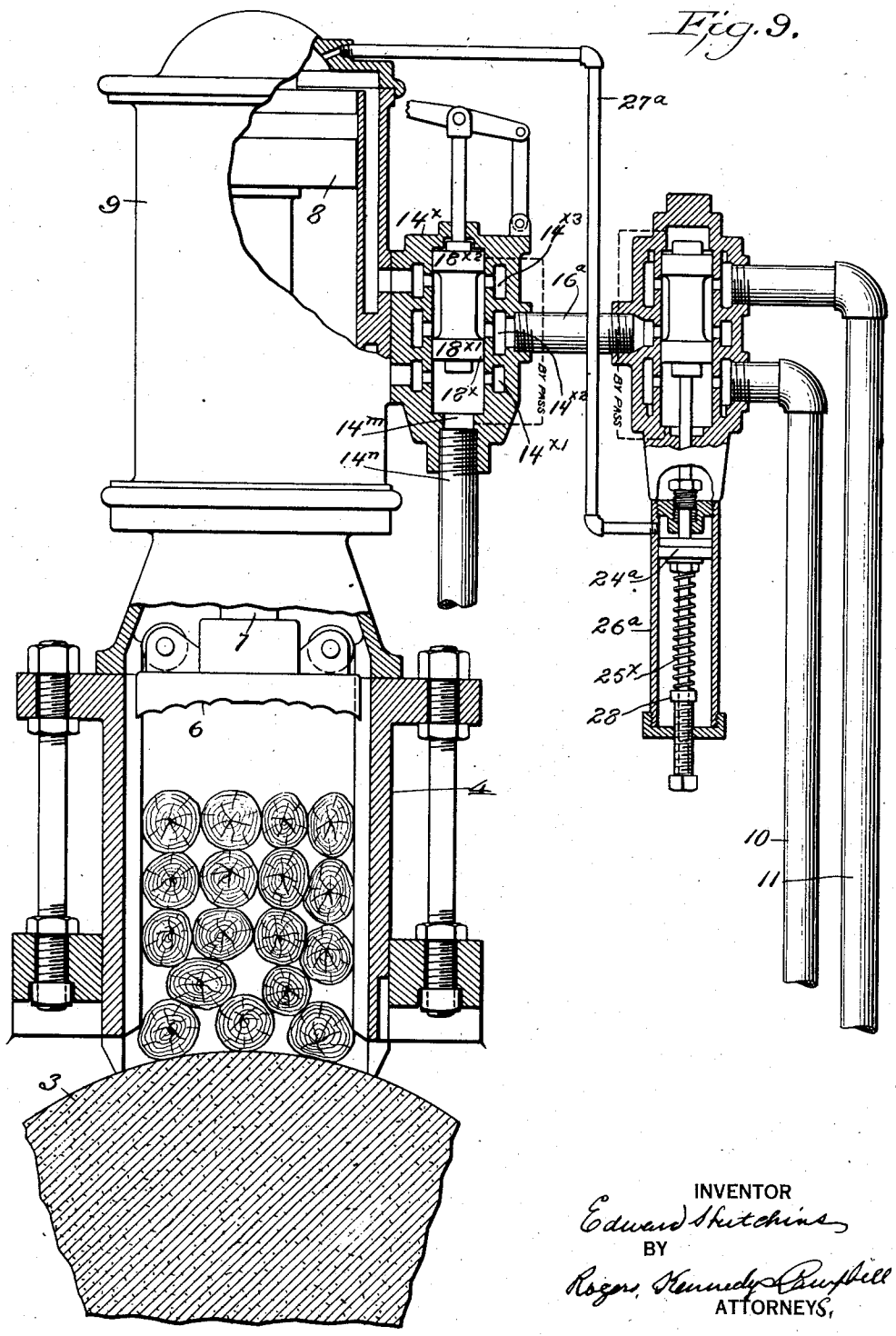
APPLICATION FILED DEC. 9, 1918.

1,333,660.

Patented Mar. 16, 1920.

8 SHEETS—SHEET 8.

Fig. 9.



INVENTOR

Edward Hutchins

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

UNITED STATES PATENT OFFICE.

EDWARD HUTCHINS, OF NEW YORK, N. Y., ASSIGNOR TO INTERNATIONAL PAPER COMPANY, A CORPORATION OF NEW YORK.

GRINDER FOR THE PRODUCTION OF WOOD-PULP.

1,333,660. Specification of Letters Patent. Patented Mar. 16, 1920.

Application filed December 9, 1918. Serial No. 265,826.

To all whom it may concern:

Be it known that I, EDWARD HUTCHINS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Grinders for the Production of Wood-Pulp, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to machines for grinding wood for producing wood pulp for use more particularly in the manufacture of paper, machines for this purpose usually comprising a grindstone against the periphery of which the wood, held in pockets, is forced by means of power pistons operated by pressure fluid, usually water. It is customary to employ a plurality of pockets for holding the wood and to apply the pressure to the wood by means of pressure devices connected with the power pistons operating in power cylinders, there being a cylinder and piston and pressure device for each pocket. In the grinding operation, the pressure fluid is admitted to the upper end of the cylinders so as to force the pistons down and urge the wood against the periphery of the stone, and when all the wood in a pocket is ground, the pressure fluid is cut off from the upper end of the cylinder and admitted to its lower end, thereby retracting the piston and connected pressure device so that a new supply of wood may be placed in the empty pocket. The several cylinders are connected up each with two sources of pressure fluid by two pipe connections, in which connections controlling valves are placed, by which the pressure fluid from one source is admitted to the cylinders on the pressure sides of the pistons to advance the same and apply "grinding" pressure to the wood, and by which the pressure fluid from the other source of pressure is admitted to the other sides of the pistons to retract the same and "back off" the pressure devices, when the wood in a pocket is all ground and a new supply is to be furnished.

In the operation of such mechanism, when all the wood in a pocket is ground, the controlling valve of the cylinder of that pocket is adjusted to cut off the "grinding" pressure and admit the "backing off" pressure, whereby the piston is retracted and the pressure device backed off from the wood and brought to rest in the upper end of the pocket. A new supply of wood is now placed in the pocket, and the valve again actuated, this time to admit pressure fluid to the upper end of the cylinder so as to lower the pressure device on the wood and force the same against the stone. In this lowering action of the pressure device, and until the latter engages the wood, the pressure fluid flows freely into the upper end of the cylinder, due to the fact that the descent of the piston is unobstructed, and consequently a reduction of pressure takes place in the other parts of the system where it is acting on the pistons of the other pockets remaining in action. This in turn reduces the force with which the wood presses against the stone in these pockets, and permits the stone to speed up, thereby causing an ineffective and unsatisfactory grinding action on the wood and a waste of power.

It is the aim of the present invention to obviate this objectionable action, and the invention consists in means for controlling the "backing off" pressure fluid which is normally used for retracting the pistons, so that it will act on the piston to lower the same and connected pressure device to the wood in the newly filled pocket, said means acting, when the further descent of the pressure device is resisted by engagement of the same with the wood, to automatically cut off said "backing off" pressure and admit "grinding" pressure to the cylinder to advance the piston for the grinding action. In this way, there will be no relief or reduction of the pressure fluid acting on the pistons of the other pockets, and consequently no speeding up of the stone or interruption in the proper and effective grinding action on the wood which would follow such reduction in pressure.

In the more specific embodiment of the invention, an automatic controlling valve is placed in the connection from the pressure side of the piston (that is, the side on which the "grinding" pressure fluid acts to effect the grinding action) to the pipes which supply the "grinding" pressure fluid and the "backing off" pressure fluid, which controlling valve when in one position, will admit "backing off" pressure to the pressure side of the piston to lower the same to the wood, and when in another position will cut off the "backing off" pressure and admit

the "grinding" pressure to the pressure side of the piston. The movement of the valve to this latter position is effected automatically by means of a valve actuating plunger piston connected with the controlling valve and sliding in a cylinder which is in communication with the power cylinder on the pressure side of the power piston, the accumulation or stepping up of the pressure in the power cylinder, when the further descent of the power piston is resisted by the contact of the pressure device with the wood, operating to advance the plunger piston and thereby shifting the controlling valve to the position where it will cut off the "backing off" pressure and admit the "grinding" pressure.

In the accompanying drawings:

Figure 1 is a longitudinal sectional elevation of a wood grinding mechanism having my invention applied thereto, the section being taken through one of the pockets for holding the wood, and the power cylinder being shown partly in elevation.

Fig. 2 is a vertical section on an enlarged scale of the manually operated valve and the coöperating automatic controlling valve.

Fig. 3 is a vertical section on the line 3—3 of Fig. 2.

Fig. 4 is a horizontal section on a reduced scale of the automatic controlling valve on the line 4—4 of Fig. 2.

Fig. 5 is a diagrammatic view of the power cylinder and piston and the two controlling valves, said valves being in a position to cut off "grinding" pressure and admit "backing off" pressure to the pressure side of the piston to lower the same on the wood.

Fig. 6 is a similar view showing the automatic controlling valve changed in position to cut off "backing off" pressure and admit "grinding" pressure to the pressure side of the piston to effect the grinding operation.

Fig. 7 is a similar view showing the manually operated valve in changed position to cut of "grinding" pressure and admit "backing off" pressure to the power cylinder to retract the piston.

Fig. 8 is a diagrammatic view indicating the connection of the valves with the pipes supplying the pressure fluids where there are three power pistons and cylinders for three pockets.

Fig. 9 is a diagrammatic view showing a modified form of the controlling valves, said valves being set to admit "backing off" pressure to lower the piston.

Referring to the drawings:

1 designates a frame or housing in which is mounted a rotary power shaft 2 having fixed to it a grindstone 3. Bolted to the housing is a pocket 4 for holding the wood to be ground, which pocket is open at one end for the reception of the wood and is provided with a door 5 for closing the open end. In the pocket is a pressure device or shoe 6 to act on the wood and force it against the periphery of the grindstone, which shoe is connected with the lower end of a piston rod 7 whose upper end is connected with a power piston 8 sliding in a power cylinder 9 bolted to the upper end of the pocket. On the admission of pressure fluid, usually water, to the upper end of the cylinder on the pressure side of the piston, the latter will descend and the pressure shoe will force the wood against the stone and thereby effect the grinding action, and on the admission of pressure fluid to the opposite end of the cylinder, the piston will be retracted and will move the pressure shoe away from the stone, this latter action being effected when the wood is all ground and a new supply is to be placed in the pocket.

The pressure fluid for actuating the piston is usually supplied from two different sources, one through main distributing pipe 12 for acting on the pressure side of the piston to effect the grinding operation, and which for convenience I term the "grinding" pressure, and the other supplied through main distributing pipe 13 for acting on the other side of the piston to retract the same, which for convenience I term the "backing off" pressure; and in machines of this character it is common to employ a plurality of pockets, usually three, for holding the wood, each with its power piston and cylinder, the two pressures for the several cylinders being supplied from the main distributing pipes 12 and 13 by means of branch pipes 10 and 11, respectively, as shown in Fig. 8. In such an arrangement, therefore, the several connections for the two pressures for the three cylinders communicate with each other so that any reduction in the pressure acting in one cylinder will affect that in the other cylinders. When, therefore, a piston of a refilled pocket is lowered to the wood by admitting the "grinding" pressure to the pressure side of the piston, as has been the practice heretofore, a reduction of the "grinding" pressure takes place in the system, with the objections heretofore mentioned; and in utilizing the "backing off" pressure to lower the piston to the wood, in accordance with my invention, I provide the power cylinder with two valve mechanisms 14 and 15, the former manually operated and controlling the admission of the pressure fluid to the opposite ends of the cylinder, and the other automatically operated and controlling the admission of both pressure fluids to the cylinder on the pressure side of the piston.

The valve mechanism 14 comprises a valve casing 14^a provided with internal annular ports 14^b, 14^c, 14^d, 14^e. The port 14^b communicates by means of a longitudinal port 14^f extending in the wall of the valve casing, with a port 14^g, which leads longitudi-

nally through the wall of the power cylinder and opens into the upper end of the same on the pressure side of the piston. The port 14^e communicates by means of a longitudinal port 14^h extending in the wall of the valve casing with a port 14^i extending longitudinally in the wall of the power cylinder and opening into its lower end. The port 14^e communicates with a pipe 16, by which either the "grinding" pressure fluid or the "backing off" pressure fluid is admitted by the valve 14 according to the adjustment of said valve, as will be more fully described later on; and port 14^d communicates with a pipe 17 by which the "backing off" pressure fluid is admitted. Also the valve casing is provided with a by-pass port 14^k extending longitudinally in the wall of the casing and communicating at its ends with the opposite ends of the casing, and with an exhaust 14^m opening into an exhaust pipe 14^n.

A slide valve 18 operates in the valve casing and is provided with three valve heads 18^a, 18^b and 18^c, and with two intervening valve cavities 18^d and 18^e. This valve when adjusted to the left, as indicated in Fig. 2, will admit the pressure fluid from pipe 16 to the upper end of the cylinder through the port 14^c, valve cavity 18^d and ports 14^b, 14^f and 14^g. The pressure fluid from pipe 17 will be blocked by valve heads 18^b and 18^c, and the lower end of the cylinder will be opened to the exhaust by ports 14^i, 14^h and 14^e and exhaust port 14^m. When now the valve is moved to the right, the pressure fluid entering through the pipe 16 will be blocked by the valve heads 18^a and 18^b, the pressure fluid entering through pipe 17 will pass to the lower end of the cylinder through ports 14^d, valve cavity 18^e, ports 14^i, 14^h and 14^e, while the upper end of the cylinder will be opened to the exhaust through ports 14^g, 14^f and 14^b and by-pass 14^k.

The valve 18 is operated by means of a hand lever 19 pivoted at its upper end to a link 20 which is in turn pivoted to the casing, the said lever being pivoted between its ends, as at 21, to a valve stem 22 connected with the valve and extending outwardly through the end of the casing.

It will be understood that this main valve 18 is operated by the attendant first in one direction, as shown in Fig. 2, when the pressure fluid is to be admitted on the pressure side of the piston to lower the same, and then in the other direction when the wood in the pocket is all ground, and the pressure shoe is to be retracted to permit a new supply of wood to be placed in the pocket. This valve mechanism, as above described, is similar in construction and operation to those heretofore employed in this art, and except in so far as it coöperates with the automatic controlling valve by which the "backing off" pressure is utilized to lower the piston, it forms no part of the present invention.

The automatic controlling valve mechanism 15, as shown more particularly in Figs. 2 and 4, comprises a valve casing 15^a provided with three annular internal ports 15^b, 15^c and 15^d and with a by-pass port 15^e, which latter extends longitudinally in the wall of the casing and communicates at its ends, respectively, with the opposite ends of the casing. Port 15^c communicates with the pipe 16, which, as before stated, leads to the casing of the valve mechanism 14 and connects with port 14^e therein. Port 15^b communicates with branch pipe 11, before alluded to, for supplying the "backing off" pressure fluid, and port 15^d communicates with branch pipe 10, before alluded to, for supplying the "grinding" pressure fluid. Sliding in the valve casing 15^a is a valve 23 provided with two heads 23^a and 23^b, and with an intervening valve cavity 23^c. In one position of this valve, for instance as shown in Figs. 2 and 5, the "backing off" pressure fluid will be admitted to the pipe 16 through port 15^b, valve cavity 23^c and port 15^c, while in the other position of the valve, as shown for instance in Figs. 6 and 7, the "grinding" pressure fluid will be admitted to pipe 16 through port 15^d, valve cavity 23^c and port 15^c. This valve therefore acts as a selector to determine which of the two pressures will be admitted to the valve mechanism 14 to act on the pressure side of the power piston, "backing off" pressure in the one instance to lower the piston to bring the pressure shoe against the wood, and "grinding" pressure in the other instance to force the wood against the grindstone.

The automatic action of the valve 23 to change from "backing off" pressure to "grinding" pressure is effected by means of a plunger piston 24, which is connected with the stem 25 of the valve 23 and which slides in a cylinder 26 communicating with the power cylinder on the pressure side of the piston by means of a pipe 27. When the valve 23 is in the position shown in Fig. 2, admitting "backing off" pressure to the pressure side of the power piston to lower the latter to its work, the plunger piston 24 stands in the outer end of the cylinder 26, there being an absence of pressure in the upper end of the power cylinder and the plunger piston being free of pressure, by reason of the fact that the power piston is descending in its cylinder without obstruction. When, however, the power piston is arrested in its further descent by the engagement of the pressure device with the wood, the "backing off" pressure being admitted to the upper end of the power cylinder, steps up or accumulates, and reacting through pipe 27 on the plunger piston 24, the latter will be moved along in its cylinder and will shift

the valve 23 to the right, as shown in Fig. 6, thereby cutting off the admission of "backing off" pressure fluid to pipe 16, and admitting "grinding" pressure fluid thereto from pipe 10, and this "grinding" pressure acting on the pressure side of the power piston in place of the "backing off" pressure, will urge the piston down and cause the pressure shoe thereon to force the wood against the grindstone.

The parts will remain in this position so long as the valve 18 is allowed to remain in the position shown in Fig. 2, in which position of the parts the power piston will be subjected to the "grinding" pressure and the wood subjected to the grinding action. When, however, the wood in the pocket is completely ground and the pressure shoe is to be retracted to permit the pocket to be refilled, the operator grasping hand lever 19 shifts the valve 18 to the right, as shown in Fig. 7. The "grinding" pressure fluid will now be cut off from the upper end of the cylinder, and the latter will be opened to the exhaust through ports 14^g, 14^f and 14^b and by-pass port 14^k, and "backing off" pressure fluid will enter the lower end of the cylinder from pipe 17 through port 14^d, valve cavity 18^e, and ports 14^e, 14^h and 14^i, and this pressure acting on the piston will raise the same and consequently the pressure shoe connected thereto. The moment the upper end of the cylinder is thus opened to the exhaust, plunger piston 24 will be relieved of pressure and it will be moved outwardly in its cylinder by a returning spring 25^a surrounding the stem of the plunger piston, and bearing at one end against the piston and at its other end against a plate 25^b adjustably mounted on two thread rods 25^c connecting the cylinder 26 with the valve casing. The power piston is now in retracted position with the pressure shoe in the upper end of the pocket, "grinding" pressure fluid is cut off by the automatic valve, "backing off" pressure admitted by the automatic valve to pipe 16 is cut off by valve 18, and the power piston is held in its elevated retracted position by the "backing off" pressure fluid entering through pipe 17. When now the pocket has been refilled with wood and the grinding operation is to be started, the operator grasping hand lever 19 moves the valve 18 back again to the position shown in Figs. 2 and 5, which action will cut off "backing off" pressure through pipe 17 from the lower end of the power cylinder, and will open this end of the cylinder to the exhaust, while at the same time "backing off" pressure fluid, entering through pipe 16 from pipe 11 through the casing of the automatic valve, will flow into the upper end of the power cylinder, and acting on the piston therein will lower the same to its work, and when the pressure device brings up against the wood, the "backing off" pressure accumulating in the upper end of the power cylinder will, as before explained, shift the automatic valve and thereby cut off this pressure and admit "grinding" pressure to perform the grinding operation.

Referring to the various diagrammatic views Figs. 5, 6 and 7,—in Fig. 5 the manually operated valve 18 has just been shifted to start the grinding action in the refilled pocket, and the "backing off" pressure is acting on the pressure side of the power piston to lower the pressure device to the wood, the "grinding" pressure fluid being cut off by the automatic valve, and the lower end of the cylinder being opened to the exhaust.

In Fig. 6 the pressure device has brought up against the wood, and the accumulating "backing off" pressure in the upper end of the cylinder, due to the resistance of the further descent of the piston, has advanced the plunger piston 24 and operated the automatic valve so as to cut off "backing off" pressure to pipe 16 and admit "grinding" pressure to the upper end of the cylinder, thereby starting the grinding action on the wood.

In Fig. 7 the grinding operation is completed and the attendant has shifted the position of the valve 18 so as to retract the power piston. This has opened the upper end of the cylinder to the exhaust, and admitted "backing off" pressure to the lower end of the cylinder to retract the piston.

It will be understood from the foregoing description that when the valve 18 is operated to start the grinding operation on the wood in the refilled pocket, "backing off" pressure is first admitted to the power cylinder on the pressure side of the piston and will act to lower the same, and when the further descent of the piston is resisted by the engagement of the pressure device with the wood, "backing off" pressure is automatically cut off from the cylinder and "grinding" pressure automatically admitted, this action being effected by the automatic operation of the valve 23. In other words, by means of my improved mechanism, the resistance offered by the wood to the descent of the pressure device under the action of the "backing off" pressure fluid, automatically cuts off said pressure and brings the "grinding" pressure fluid into action to effect the grinding operation. In a system where there are a number of power pistons acting on the wood under "grinding" pressure from a common source of supply, utilization of the "backing off" pressure to lower the pressure device in a refilled pocket to its work, possesses the advantage that in the lowering action of the piston, the grinding pressure acting on the other power pistons will not be affected or reduced, so that the objectionable speeding

up of the grindstone will be prevented, and the effective grinding action on the wood will be insured.

In the modified form of the apparatus shown in Fig. 9, the operation is the same as that described, the only difference being in the specific form of the manually operated valve, and in the specific form of the plunger piston of the automatic valve and the parts immediately associated therewith. In this case the accumulating pressure of the "backing off" pressure fluid in the upper end of the power cylinder, acts through pipe 27^a on the inner end of the plunger piston 24^a, to move the same outwardly in its cylinder 26^a, instead of acting on the outer end of the piston to move it inwardly as in the first instance described. The returning spring 25^x in this case bears at one end against the plunger piston and at its other end against the end of a hollow bolt 28 screwed in the outer end of the cylinder 26. By this means the tension of the spring may be adjusted.

The manually operated valve 18^x in this modified form of the apparatus, is provided with but two valve heads 18^{x1} and 18^{x2}, and the valve casing 14^x is provided with but three ports 14^{x1}, 14^{x2} and 14^{x3}, the pressure fluid both for "grinding" pressure and "backing off" pressure being admitted to the valve casing by one pipe 16^a instead of the two pipes 16 and 17 as in the first instance described. In the position of the valves shown, the "backing off" pressure from pipe 11 will enter the upper end of the power cylinder and advance the power piston, the lower end of the cylinder being opened to the exhaust; and when the pressure device brings up against the wood, the accumulating pressure acting on the plunger piston 24^a, will shift the automatic valve and admit "grinding" pressure to the upper end of the cylinder. When now the valve 18^x is shifted to its other position, the plunger piston will be moved back by its spring 25^x, the "backing off" pressure will be admitted to the lower end of the cylinder, and the upper end of the cylinder will be opened to the exhaust.

On reference to Figs. 2 and 4 it will be observed that ports 15^b and 15^d are so related to each other and to the valve heads 23^a and 23^b and valve cavity 23^c, that when the valve moves to the right from the position shown, there is no time when both ports are closed. In other words, port 15^d is opened up and placed in communication with valve cavity 23^e before port 15^b is closed by valve head 23^a, so that the valve can never take a "dead" position, cutting off pressure to the valve operating plunger piston 24. Otherwise the automatic valve would be brought to rest before completing its movement as there would then be no pressure acting on the plunger piston. In the remaining diagrammatic views, it has not been attempted to show this relation of the parts.

In the accompanying drawings I have shown my invention embodied in the particular detailed form which I prefer to adopt, and which in practice has been found to answer to a satisfactory degree the ends to be attained. It will be manifest, however, to the skilled mechanic that these details may be variously modified and changed without departing from the limits of my invention, and it will be understood that the invention is not limited to any particular form or construction of the parts, except in so far as such limitations are set forth in the claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a power piston therein to force the wood against the grinder, means for admitting pressure fluid from one source of supply to the pressure side of the piston to advance the same toward the wood, and means acting when the advance of the piston is resisted by the wood, to automatically cut off the pressure fluid acting in the cylinder, and admit pressure fluid from a different source of supply to the pressure side of the piston.

2. In a wood grinding mechanism, the combination of a grinder, means for holding the wood to be ground, a power cylinder and a piston therein carrying a pressure device for forcing the wood against the grinder, connections from two different sources of pressure fluid supply to the cylinder, valve mechanism in said connections adapted to admit the pressure fluid from one source to the pressure side of the piston to advance the pressure device to the wood, and means controlled by the resistance offered by the wood to the further advance of the pressure device, for operating the valve mechanism to cut off said pressure fluid and admit the pressure fluid from the other source to the cylinder.

3. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, connections from two sources of pressure fluid supply to the cylinder, and a valve in said connections adapted when in one position to admit pressure fluid from one source to the pressure side of the piston, and adapted when in another position to cut off said pressure and admit pressure fluid from the other source to the pressure side of the piston.

4. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, means for admitting

"backing off" pressure fluid to said cylinder on the pressure side of the piston to advance the same toward the wood, and means acting when the advance of the piston is resisted by the wood, to automatically cut off the "backing off" pressure fluid, and admit "grinding" pressure fluid to the cylinder on the pressure side of the piston.

5. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, means for admitting pressure fluid from one source of supply to the cylinder on the pressure side of the piston to advance the same toward the wood, and means operated by the increased pressure on the pressure side of the piston when the advance of the same is resisted, for cutting off the pressure to the cylinder and admitting thereto a pressure fluid from another source of supply.

6. In a wood grinding mechanism, the combination of a grindstone, a pocket for holding the wood to be ground, a power cylinder and a piston therein having a pressure device adapted on the advance of the piston to force the wood against the stone, and adapted on the retraction of the piston to be held in the upper end of the pocket to permit a new supply of wood to be inserted, means for admitting pressure fluid from one source to the cylinder on the pressure side of the piston to lower the pressure device to the wood, and means acting automatically, when the further advance of the piston is resisted by engagement of the pressure device with the wood, to cut off the said pressure and admit pressure fluid from another source to the cylinder to cause the pressure device to force the wood against the stone.

7. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the stone, a valve casing communicating with the cylinder, connections to said valve casings from two different sources of pressure fluid supply, a valve in said casing adapted when in one position to admit the pressure fluid from one source to the cylinder on the pressure side of the piston to advance the latter to the wood, a piston plunger connected with the valve, a cylinder in which said plunger operates, and a pipe connecting said cylinders on the pressure sides of the respective pistons; whereby the accumulation of pressure in the power cylinder, when the advance of the power piston is resisted, will react on the plunger piston and shift the valve to cut off the pressure to the cylinder and admit a pressure fluid thereto from another source.

8. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a power piston therein to force the wood against the grinder, connections from two sources of pressure fluid supply to the cylinder, a valve mechanism in said connections operable to admit said pressure fluids to the opposite ends of the cylinder respectively to advance and retract the piston, and a second valve mechanism in said connections adapted when in one position to admit the pressure from one source to the first mentioned valve mechanism, and when in another position to cut off said pressure and admit the pressure fluid from the other source; whereby when the first valve mechanism is set to admit pressure fluid to the pressure side of the power piston, the other valve mechanism may be operated to admit pressure fluid from either of said sources to the pressure side of the piston.

9. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, connections from two sources of pressure fluid, a valve in said connections adapted when in one position to admit pressure fluid to the cylinder on the pressure side of the piston to advance the same, and adapted when in another position to admit pressure fluid to the opposite side of the piston, and to open the other side to the exhaust to retract the piston, an automatic valve in said connection controlling the passage of fluid to the first mentioned valve, a plunger piston connected with said automatic valve, a cylinder in which the plunger piston slides, a pipe connection between said cylinder and the power cylinder on the pressure side of the power piston, said plunger piston being operated by the increased pressure in the power cylinder when the advance of the power piston is resisted by the wood, and said automatic valve when so operated cutting off the pressure fluid to the cylinder from one source and admitting pressure fluid thereto from the other source, and a spring acting on the automatic valve to return it to its former position when the first valve is operated to admit pressure to the cylinder to retract the piston.

10. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, connections for supplying pressure fluid to the power cylinder from two sources of supply, a valve mechanism in said connections to control the admission of the pressure fluid from the two sources respectively to opposite sides of the piston to advance and retract the same, and a second valve to control the admission of the pressure fluids to the power cylinder to the pressure side of the piston.

11. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood

against the grinder, connections for supplying pressure fluid to the power cylinder from two sources of supply, a valve mechanism in said connections to control the admission of the pressure fluid to the two sources respectively to opposite sides of the piston to advance and retract the same, and a second valve to control the admission of the pressure fluids to the power cylinder to the pressure side of the piston, said second valve being controlled in its operation automatically by the increased pressure on the pressure side of the piston when the advance of the latter is resisted by the wood.

12. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, a valve casing communicating respectively with the ends of the cylinder, a valve in said casing controlling said communications, a second valve casing communicating with the first valve casing, pipes connecting the second valve casing with two separate sources of pressure fluid supply, and a valve in the second casing adapted when in one position to admit the pressure fluid from one source to the first valve casing, and adapted when moved to another position, to cut off said pressure and admit the pressure fluid from the other source to the first valve casing.

13. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to force the wood against the grinder, a valve casing communicating respectively with the ends of the cylinder, a valve in said casing controlling said communications, a second valve casing communicating with the first valve casing, pipes connecting the second valve casing with two separate sources of pressure fluid supply, and a valve in the second casing adapted when in one position, to admit the pressure fluid from one source to the first valve casing, and adapted when moved to another position, to cut off said pressure and admit the pressure fluid from the other source to the first valve casing, this latter movement of the valve being effected automatically by the pressure in the power cylinder on the pressure side of the piston.

14. In a wood grinding mechanism, the combination of a grinder, a power cylinder and a piston therein to advance the wood against the grinder, a valve casing communicating respectively with the ends of the cylinder, a valve in said casing controlling said communications, a second valve casing communicating with the first to admit pressure fluid to the pressure side of the piston, a pipe for supplying "backing off" pressure fluid connected with the second mentioned valve casing, a branch pipe from said pipe to the first mentioned valve casing to supply "backing off" pressure to the cylinder to retract the piston, a pipe for supplying "grinding" pressure fluid connected with the second valve casing, and a valve in the latter casing operable to control the passage of the two pressure fluids to the first mentioned valve casing.

In testimony whereof, I have affixed my signature hereto.

EDWARD HUTCHINS.