J. STEHLIN.

HYDRAULIC PRESS.

APPLICATION FILED FEB. 6, 1911.

1,004,214.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 1.

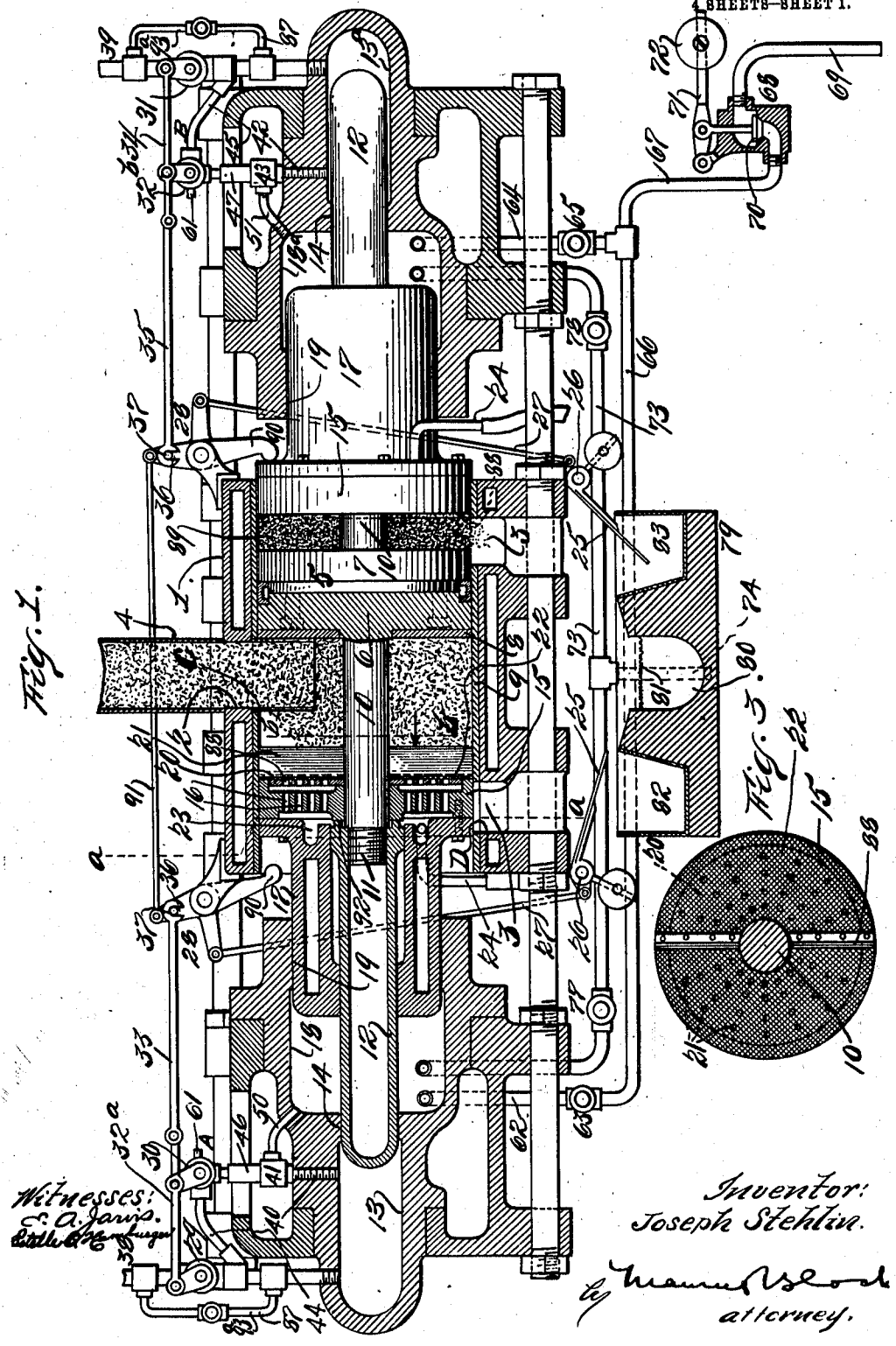

Fig. 1.

Fig. 3.

Witnesses:
C. A. Jarvis.
Edith C. Lugar.

Inventor:
Joseph Stehlin.
by Munn & Co
attorney.

J. STEHLIN.

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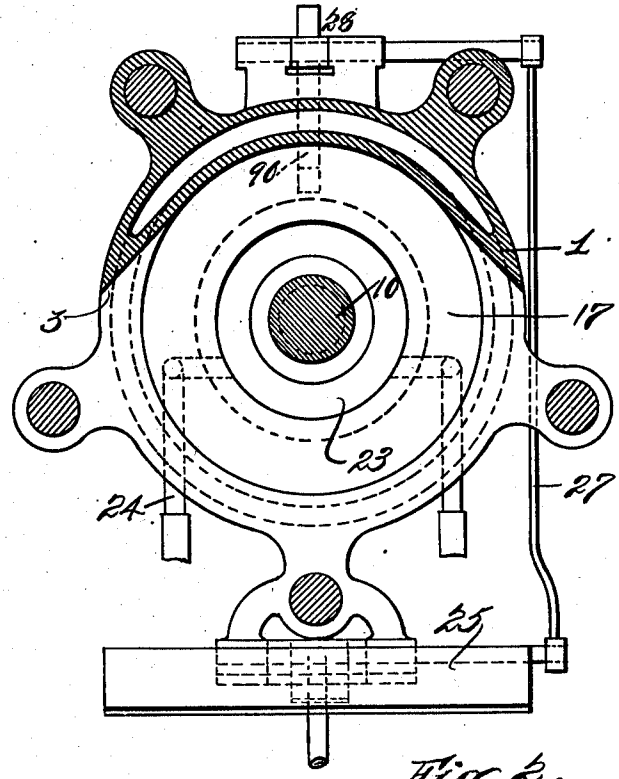

Fig. 2.

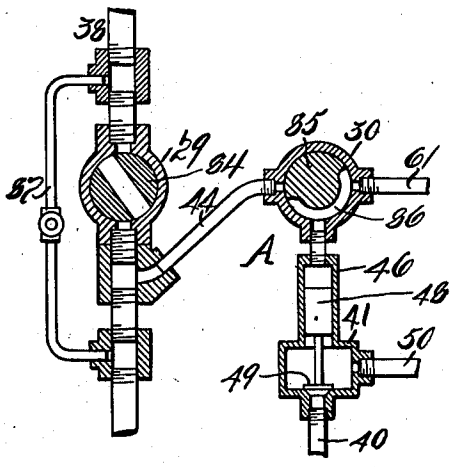

Fig. 4.

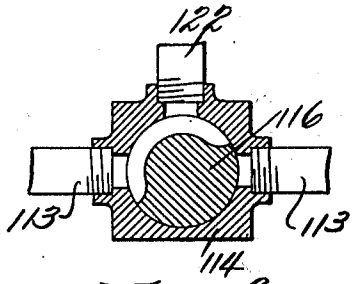

Fig. 8.

Witnesses:
C. A. Jarvis
Estelle O. Henburger.

Inventor:
Joseph Stehlin.
by Munn & Koch
attorney.

J. STEHLIN.

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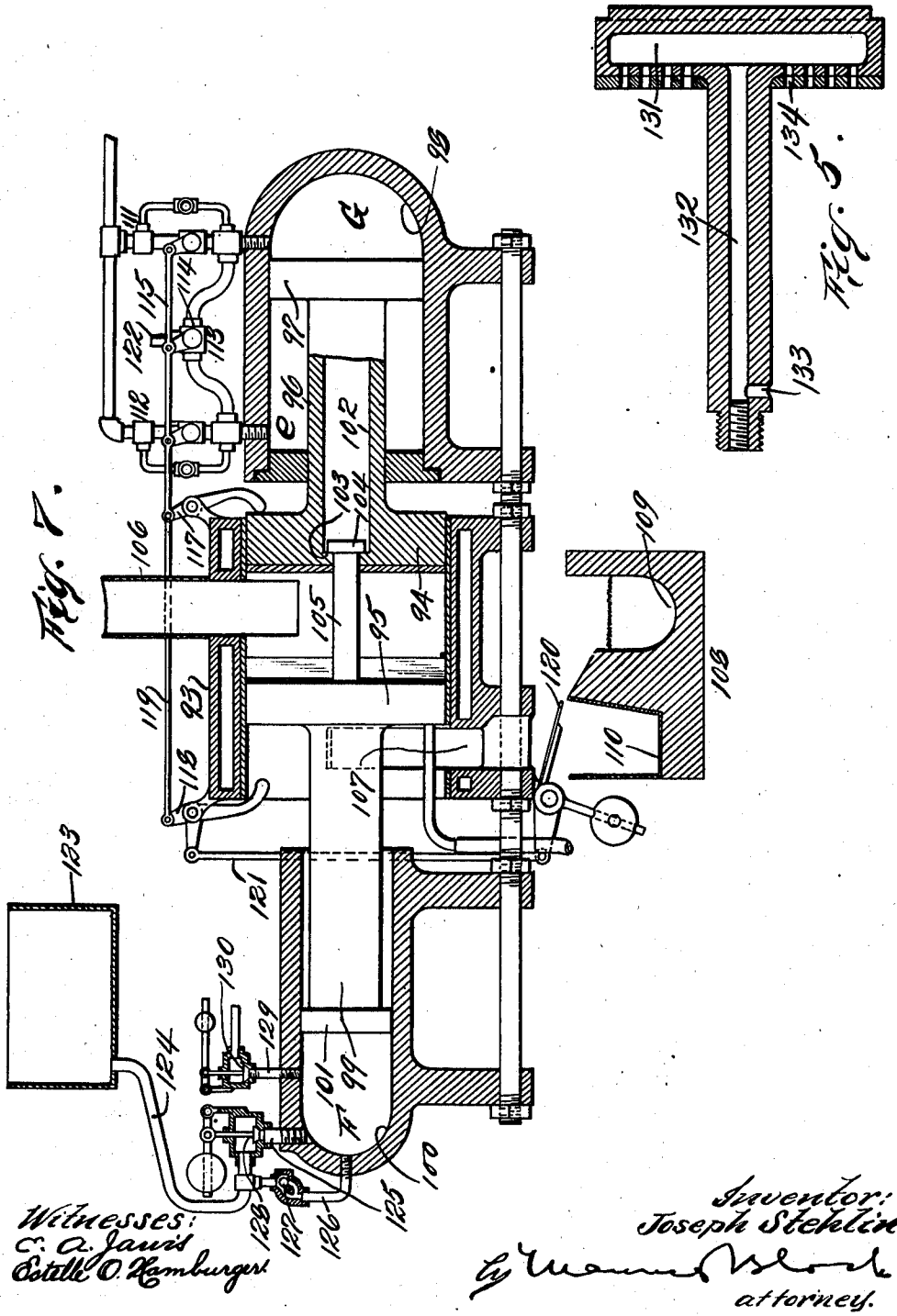
4 SHEETS—SHEET 3.



Witnesses:
C. A. Jarvis
Estelle O. Hamburger

Inventor:
Joseph Stehlin.
by Munn & Co
attorneys.

J. STEHLIN.

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4 SHEETS—SHEET 4.

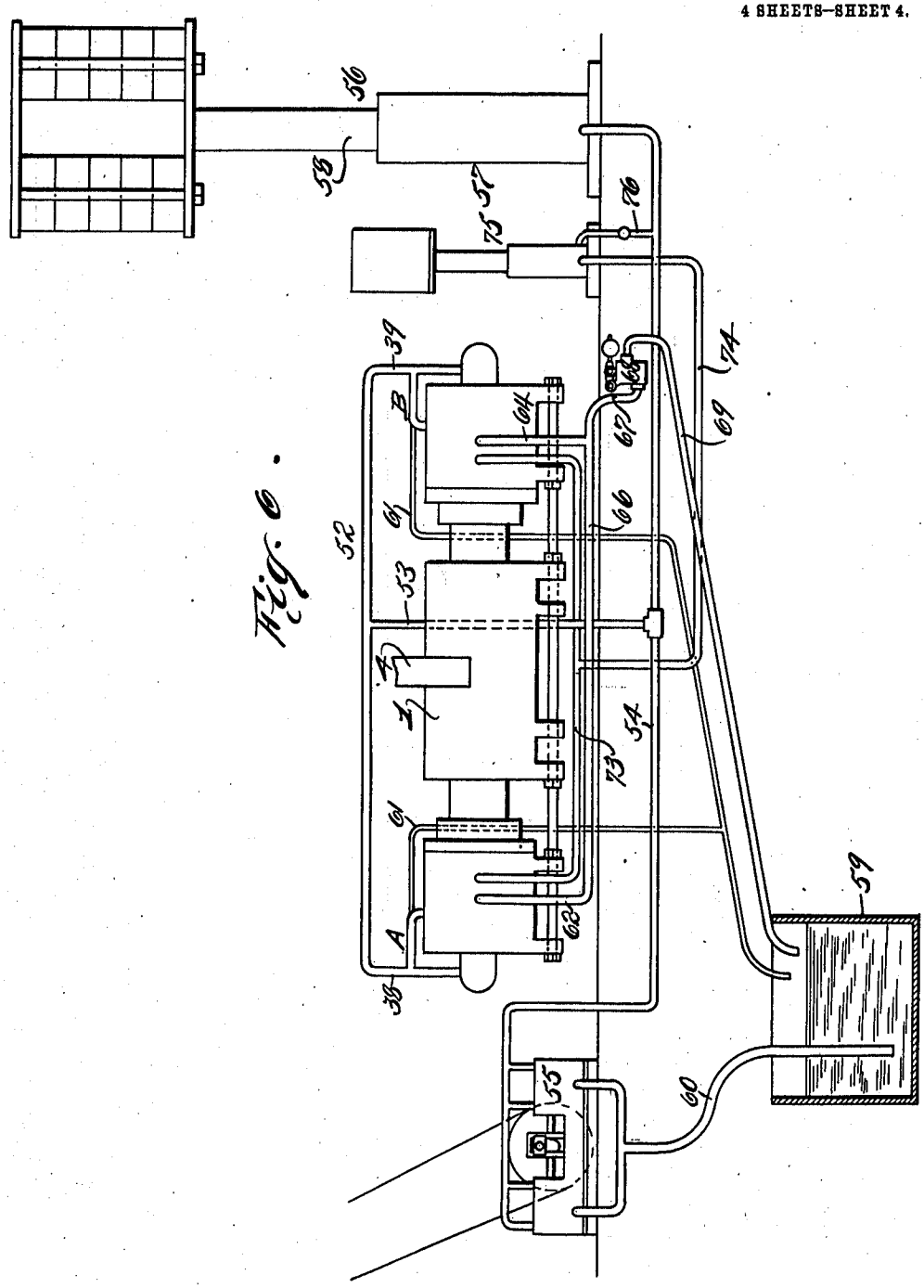

Fig. 6.

Witnesses:
C. A. Jarvis
Estelle C. Lemburger.

Inventor:
Joseph Stehlin
by Munn & Wood
attorney.

UNITED STATES PATENT OFFICE.

JOSEPH STEHLIN, OF NEW YORK, N. Y.

HYDRAULIC PRESS.

1,004,214. Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed February 6, 1911. Serial No. 606,684.

To all whom it may concern:

Be it known that I, JOSEPH STEHLIN, a citizen of the United States of America, residing at Manhattan, borough, city, county, and State of New York, have invented certain new and useful Improvements in Hydraulic Presses, of which the following is a full, clear, and exact description.

This invention relates to an improvement in presses, but more particularly to a press for acting upon compressible material, such for instance, as wet grains, flaxseed or any other material.

The chief object of my invention is to provide a press by which water can be pressed from wet grain more completely than with the presses now in use.

To provide a powerful press for the above named purpose, I have embodied the principle of the hydraulic ram in a suitable form for the purpose of compressing the wet grains and thereby force the greater part of the water or moisture therefrom.

I will now proceed to describe my invention in detail, the novel features of which I will finally claim, reference being had to the accompanying drawings, forming part hereof, wherein:

Figure 1 is a longitudinal central sectional view of a press embodying my improvements, certain parts being shown in elevation; Fig. 2 is an enlarged vertical sectional view, the section being taken on a line *a*—*a* in Fig. 1; Fig. 3 is a face view of one of the auxiliary pistons, or movable abutments, which form part of my improvement, the piston rod being shown in section, the section being taken on a line *b*—*b* in Fig. 1; Fig. 4 is an enlarged vertical sectional detail view, partly in elevation, of the controlling valve mechanism for the hydraulic rams; Fig. 5 is an enlarged sectional detail view of a modified form of master piston; Fig. 6 is a diagrammatic view illustrating the hydraulic circuit which forms part of my improvement; Fig. 7 is a longitudinal central sectional detail view, illustrating my improvement embodied in another form; and Fig. 8 is an enlarged vertical sectional view of the two-way relief valve employed in the form of press illustrated in Fig. 7.

Referring to the drawings, particularly to Fig. 1, one of the elements of my improved press consists of a cylinder or receptacle for the material to be pressed, which is indicated by 1, the said receptacle being provided with an inlet 2 and an outlet 3, the outlet 3 being considerably out of alinement with the inlet 2, as can be seen. Any well known means may be employed for introducing the material into the receptacle 1, in this instance, a chute 4 through which the material can flow by gravity. Another element of my improved press consists of a master piston 5 which is adapted for reciprocation in said cylinder or receptacle 1. In this instance the master piston 5 is made up of two sections 6 and 7 secured together, the faces of said sections being covered or protected by a disk 8 (one only being shown) preferably made from acid proof material. The cylinder 1 is also preferably lined by a bushing 9 made from some acid proof material. As can be seen in Fig. 1, each section of the master piston 5 carries a piston rod 10 which is threaded on its outer end as at 11, one only being shown completely. To the threaded end of each piston rod is secured a supplemental ram piston 12. The free end of one piston 12 enters a ram cylinder 13, while the other enters a ram cylinder 13ª. Suitable means will be employed to render the fitting of the said ram pistons and cylinders, at the points 14, liquid tight. Further elements of my improved press consist of the auxiliary pistons or movable abutments 15 which are perforated as at 16 (one only being shown in detail) to permit of the passage of liquid therethrough. Each auxiliary piston or abutment is secured to an auxiliary ram 17, one of which works in an auxiliary ram cylinder 18, and the other in an auxiliary ram cylinder 18ª. A liquid tight connection at the points 19 will be made by any of a number of well known expedients.

To protect the face of the auxiliary pistons 15, I cover the same with a plate 20, perforated as at 21, the said plate being made out of an acid proof material. To prevent the material under treatment from being pressed through the openings 16 and 21, I cover the plate 20 with a fine mesh screen 22.

As can be seen in Fig. 1, the auxiliary ram piston 17 is recessed or channeled as at 23, the said channel having in communication therewith an outlet pipe 24, through which any liquid that may be forced

through the openings 16 and 21 into the channel 23 can escape. Each piston 17 is provided with the said channel 23 and outlet pipe 24, although only one is shown.

Under and adjacent each outlet 3, I position a deflector or damper 25 pivoted as at 26 to (in this instance) the cylinder or receptacle 1. The dampers 25 are connected by links 27 to rocker-arms 28, which in turn are actuated by the movable abutments or auxiliary pistons 15. The function of the said rocker-arms is to operate controlling valves in the casings 29 and 31 for the ram cylinders 13 and the controlling valves mounted in the casings 30 and 32, for the auxiliary ram cylinders 18. The valves in the casings 29 and 30 are actuated by a connecting link 32^a, and, therefore, operate in unison, which link in turn is connected by a link 33 with the adjacent rocker-arm 28. The valves in the casings 31 and 32^b are likewise connected to their adjacent rocker-arm 28 by the links 34 and 35. The links 33 and 35 are removably connected to their rocker-arms 28, they being slotted as at 36, in order that they can be moved upwardly and away from the rocker arm pins 37, for a purpose to be hereinafter explained.

Notwithstanding that the valves operated by the rocker arms 28 are operated in unison they are oppositely positioned, that is to say, when the valve in the casing 29 is closed the valve in the casing 30 will be opened to the relief position.

The line of pipe in which the valve casing 29 is located is a feed line 38 for the ram piston 12, which operates the master piston 5 toward the right in Fig. 1, while the valve casing 31 is located in a feed line 39 for the ram cylinder 13^a which operates the master piston 5 toward the left. The valve in the casing 30 controls the flow of liquid from the ram cylinder 13 to the auxiliary ram cylinder 18. The liquid flows through the pipe 40 and valve casing 41. The valve in the casing 32 controls the flow of liquid from the ram cylinder 13^a to the auxiliary ram cylinder 18^a. The liquid flows through the pipe 42 and valve casing 43. Pipes 44 and 45, which connect the valve casings 30 and 32 respectively with the pipe lines 38 and 39 respectively, are provided for the purpose of connecting a cylinder 46 on the valve casing 41 and a cylinder 47 on the valve casing 43 with the feed lines 38 and 39 respectively, for a purpose to be hereinafter explained.

Each cylinder 46 and 47 is provided with a piston 48 (see Fig. 4) which in turn is connected to a check valve 49 in the casings 41 and 43. The valve casing 41 is connected to the auxiliary ram cylinder 18 while the valve casing 43 is connected to the auxiliary ram cylinder 18^a by the pipes 50 and 51 respectively. The hydraulic circuits from the feed lines 38 and 39 to the ram cylinders 18, 18^a including the valves are indicated in a general way by A and B respectively.

By referring to Fig. 6 it will be seen that the lines 38 and 39 are connected by a line pipe 52, which in turn is connected by a pipe line 53 to a main 54, one end of which is connected to a suitable pump device 55 and the other end to a condenser or equalizer 56. The employment of a power pump and condenser is a well known combination in the hydraulic art, the function of the condenser 56, which comprises a cylinder 57 and weighted piston 58, being to produce a steady pressure upon the movable elements of the devices upon which the power is exerted. The pump 55 draws liquid from a tank or collector 59, through a pipe line 60. Each valve casing 30 and 32 has leading therefrom a relief pipe 61, which leads to the collector 59. In Fig. 6 the valves have been omitted.

The cylinder 18 has leading therefrom an exhaust or relief pipe line 62, having a check valve 63 adapted to open and allow liquid to flow from the said cylinder, but to prevent liquid from being forced into said cylinder. The cylinder 18^a is likewise provided with an exhaust or relief pipe 64 having a check valve 65 adapted to perform the same function as the check valve 63 in the pipe line 62. The pipe lines 62 and 64 are connected by a common conductor 66, which in turn is connected by a line 67 with a pressure determining valve cage 68, the said cage being connected, by a pipe line 69 with a collector 59. Liquid is prevented from flowing from the line 67 to the collector 59, until the pressure upon the pistons 17 has reached a predetermined point, by a valve 70, which is held down by a lever 71 carrying an adjustable weight 72.

As can be seen in Fig. 1 the cylinders 18 and 18^a are connected together by a pipe line 73 which in turn is connected by a pipe line 74 to a relatively small condenser or equalizer 75 similar to the condenser 57. The condenser 75 is connected to the pipe line 54 by a valve controlled pipe line 76.

In the pipe line 73 are placed check valves 77 and 78 which are adapted to allow liquid to flow into the cylinders 18, 18^a, but to prevent flow therefrom. The function of the condenser 75 is to keep the cylinders 18, 18^a filled with liquid. The reason for such a provision will be hereinafter set forth.

To collect the pressed material, I provide a collecting device 79 consisting of a central channel 80 for liquid, provided with a screen 81 and the receptacles 82 and 83, adjacent thereto for the pressed material.

By referring to Fig. 4, it will be seen that the valve cage 29 contains a valve 84 and the cage 30 a two-way valve 85, provided with a passage 86 for liquid. The cages 31 and 32 are provided with similar valves.

Each feed line 38 and 39 is provided with a supplemental valve controlled pipe line 87 which serves as a by-pass for a purpose to be hereinafter explained.

From the foregoing description it will be apparent that my improved press is designed to compress material by means of hydraulic power, it being especially adapted to compress or force liquid from wet material. As my improved press is particularly adapted for use in connection with wet grain, I will, in the description of the operation of the press, refer to wet grain.

In order that the press may perform work during every minute of its operation, I arrange the said press in such manner as to permit of the introduction of the material to be pressed, on one side of the master piston, while work is being done on the opposite side thereof, the outlet for the pressed material being located out of alinement with the inlet and at a position in the wall of the cylinder, or receptacle, for the material corresponding to the end of the working stroke of the master piston, so that as the master piston commences a return working stroke the pressed material will drop through into the outlet. As the grain, after it has been pressed, will be more or less caked, I prefer to provide some means for severing the caked material to separate it, in order that it will more readily fall into the outlet. As herein illustrated, I have shown a cutting blade 88, one on each piston 15 (see Figs. 1 and 3), which, as the pistons 5 and 15 approach each other, will cut its way into the material and prevent the said material from caking into one mass. As can be seen in Fig. 2, the outlets 3 in the cylinder or receptacle 1 are of a sufficient area to permit of the dropping out of the pressed material after it has been pressed.

While the material is under pressure, the liquid therein will flow through a screen 22 and openings 16 and 21 in a piston 15, thence out through an outlet pipe 24. As considerable pressure upon the material is exerted some of the liquid may be forced between a piston 15 and bushing 9. In this event the said liquid will flow through an outlet 3 and onto that damper or baffle plate 25 which may at the time be in its raised position. The liquid which may fall upon the said baffle or damper will run off and into the channel 80 through the screen 81. Any small quantity of grain that may find its way with the liquid will remain on the screen 81 and may be removed therefrom by any suitable means. When the material has been pressed as thoroughly as possible and carried to the proper outlet 3, the damper under the said outlet will lower and allow the material to fall into its adjacent collector.

As illustrated in Fig. 1, the master piston 5 and auxiliary 15, on the right, have just completed a working stroke, the compressed material being indicated by 89. The material to be pressed is illustrated as falling into the receptacle. It may here be stated that the rocker-arms 28 are actuated by the movement of the pistons 15, while said pistons are finishing a return stroke. The rocker-arms operate the valves 84 and 85 (Fig. 4) as has been stated. Just before a piston 15 reaches the end of its stroke it will contact the arm 90 of its adjacent rocker-arm 28. While the said piston is finishing its stroke the valves controlling the action of the said piston and master piston will be operated to stop further action of the piston 15 and to reverse the movement of the master piston 5 in order that the fresh material, that has been deposited, can be pressed.

By referring to Fig. 4, the relative position of the valves 84 and 85 will be seen; in other words, when a valve 84 for the cylinder 13 or 13^a is closed the valve 85 for a cylinder 18 or 18^a will be in a position to put a cylinder 18 or 18^a in communication with a relief pipe 61.

As the piston 15, on the right in Fig. 1, has completed its stroke and moved the adjacent rocker-arm 28, the valve 84 in the cage 31 will be open and the valve 85, in the cage 32^b, thrown to put the cylinder 47 in communication with the feed pipe 39. The position of the valves 84 and 85, referred to when the said piston 15 has completed its stroke, will be the reverse of the valves 84 and 85 in the cages 29 and 30, illustrated in Fig. 4. As the rocker-arms 28 are connected by a link 91, consequently the valves for the cylinders 13, 13^a and 18 and 18^a will always be reversely positioned relative to each other.

The opening of the valve 84 in the feed line 39, as above described, will allow the liquid from the pressure devices 55 and 56 to flow into the cylinder 13^a and force the piston 12 therein to the left, thereby forcing the master piston 5 to the left and pushing the material ahead of it and toward the auxiliary piston or abutment 15 on the left in Fig. 1. As the valve 85 in the cage 32^b will be positioned to throw the cylinder 47 in communication with the pipe line 39 the liquid under pressure will flow into said cylinder 47 and force the piston therein (48 in Fig. 4) downwardly, whereby the valve 49 (in Fig. 4) will close the pipe 42. As the pressure upon the said piston 48 from above and the pressure upon the valve 49 from below will be equalized, the said valve 49 will remain seated. When the piston 5 draws away from the auxiliary piston 15 the pressed material will fall into the outlet 3 adjacent thereto and finally into the receiver 83.

As the master piston travels toward the left under the influence of the pressure on

the right some of the liquid in the cylinder 13 will flow through the pipe 40 into the valve cage 41, thence through the pipe 50 into the cylinder 18 (see Fig. 4). As the valve 84 is closed and as the valve 85 has been moved to throw the cylinder 46 in communication with the relief 61, the pressure upon the top of the piston 48 will be released and the valve 49 opened by the pressure of the liquid in the cylinder 13, whereby liquid will flow, as has been stated, into the cylinder 18. As the area of the auxiliary ram cylinder 17 is greater than the area of the supplemental piston 12, the movement of the piston 17 will be slower than the movement of the master piston 5, but the pressure thereupon will be greater.

When the master piston 5 reaches the point C, the flow of fresh material will have been cut off. During this movement of the said master piston, the piston 15 will have been moving toward the said master piston, but at a much slower speed. After the inlet has been completely closed, the compressing of the material between the said pistons will take place. The pressure per square inch upon the material is controlled by the pressure controlling valve 70 located in the exhaust or relief pipe lines. Even though the material is confined between the pistons 5 and 15 after the inlet has been closed, the said pistons will continue to move toward each other and gradually press the water from the material. For the sake of explanation, I will assume that a pressure of two hundred pounds per square inch is desired. Consequently I set the weight 72 to exert a pressure, corresponding to two hundred pounds per square inch, upon the valve 70.

When the pressure upon the auxiliary piston 17 reaches two hundred pounds per square inch, or rather slightly more than two hundred pounds per square inch, the valve 70 will open, thereby relieving the pressure upon the piston 17. As soon as the pressure is released the continued movement of the master piston 5 will force the piston 15 ahead of it, together with the pressed material, and toward the outlet 3 adjacent the left end of the cylinder or receptacle 1. As the piston 17 travels with the master piston 5 liquid from the cylinder 18 will continue to flow into the receiver 59. Liquid will also flow from the cylinder 13 to the cylinder 18 during the said movement of the pistons, but owing to the opening of the controlling valve 70 no pressure upon the piston 17 will take place. The pistons 5 and 15 will continue to move toward the left until the piston 15 contacts with and moves the rocker arm 28 to open the valve 84 in the casing 29, and moves the valve 85 to place the cylinder 46 and pipe line in communication. When the piston 15 comes to rest the face of said piston will be about on a line with the wall D of the outlet 3 on the left of Fig. 1. As soon as the said valve opens the pressure of the liquid flowing therethrough will force the master piston toward the right again, and the space between the right hand face of the piston 5 and left hand face of the piston 15 on the left in Fig. 1, will have filled up with fresh material, as soon as the master piston 5 has left the inlet on the working stroke, toward the left, previously described.

As the piston 5 moves toward the right, and when the inlet has been uncovered more material will flow into the receptacle. Before the piston 5 uncovers the said inlet the shoulder 92 of the supplemental piston 12 will contact with the piston 15 and draw the said piston along with it. By the time that the master piston has finished its working stroke toward the left, the piston 15 will have been caused to close the outlet 3. Consequently when the bulk of the material is introduced into the receptacle 1 none of it will prematurely escape through the outlet. Both pistons 15 are actuated by the master piston in the manner described.

When a piston 17 comes to a state of rest over an inlet 3, the space in its cylinder 18 or 18^a will not be filled with liquid owing to the exhausting process, above described, but owing to the provision of the auxiliary condenser 75 liquid will be forced into the partially depleted cylinder, whereby the said cylinders are always kept filled and no time will be lost in filling up the cylinder when a working stroke commences.

Should I desire to move the pistons, for cleaning purposes or for any other reason, slightly, I move the slotted ends of the links 33 and 35 away from the pins on the rocker arms 28 and close the valves in the casings 29 and 31. After having done this, I allow the liquid under pressure to pass through the valve controlled by-passes 93^a.

The form of press illustrated in Fig. 7 comprises a cylinder or receptacle 93, having a movable master piston 94 and an auxiliary piston or abutment 95. The piston 94 carries a piston rod 96 having a head 97 adapted to work in a ram cylinder 98. The auxiliary piston 95 is provided with a piston rod 99 adapted to work in an auxiliary ram cylinder 100. The rod 99 is provided with a head 101. In this instance, the piston rod 96 is bored as at 102 and has a shoulder 103 adapted to contact with a head 104 on a supplemental rod 105 on the piston 95. Material is introduced into the receptacle 93 by a chute 106, the said receptacle being also provided with an outlet 107 in communication with a collector 108, having a channel 109 for liquid and a receiver 110 for the pressed material.

Liquid is supplied to the ram cylinder 98

through feed lines 111 and 112 cross connected by a pipe line 113, a three-way valve casing 114 (see Fig. 8) being included in the pipe line 113. The valves in the feed lines 111 and 112 are operated together by means of a link 115, which also operates the three-way valve 116 in the casing 114. The link 115 is connected to the rocker arms 117 and 118 by a link 119. A damper 120 is placed under and adjacent to the outlet 107, the said damper being operated by the rocker arm 118 by means of a connecting link 121. The function of the damper 121 is the same as the function of the dampers 25.

The valves in the feed lines 112, 111 are oppositely disposed, that is to say, when one is open the other is closed. As herein illustrated, the valve in the line 111 is open and the three-way valve 116 positioned to open communication between the space *e* ahead of the piston 97 and a relief pipe line 122.

To keep the space F ahead of the auxiliary piston 99 filled with liquid, I have, in this instance, shown a tank 123, which is connected by a pipe line 124, and a valve controlled inlet pipe 125, with the auxiliary cylinder 100. A by-pass 126, having a check valve 127, connects the pipe line 124 with the said cylinder.

The valve 128 which controls the flow of liquid from the cylinder 100 is weighted and is set to open only when a predetermined pressure has been exerted on the piston 95 by the piston 94. The check valve 127 permits liquid to flow from the tank 123 to the cylinder 100 to refill the same, when the piston 99 is drawn ahead by the piston 94, after a working stroke has been completed. As herein illustrated, the piston 94 is starting a working stroke, the space between the pistons 94 and 95 being supposedly filled with material. As the piston 94 travels forwardly the material in the receptacle will be placed under pressure after the said piston has closed the inlet. After the inlet has been closed both pistons 94 and 95 will travel together until the head 101 on the piston 99 closes the opening to the outlet 129, which is normally closed by a weighted valve 130, which prevents the liquid from escaping too rapidly during the movement of the said piston 95. When the outlet 129 has been closed, the piston 95 will cease moving and will remain stationary until the pressure thereupon reaches a predetermine point, at which time the valve 128 will open. When the valve 128 opens the piston 95 will again travel with the piston 94, the liquid flowing into the tank 123, until the material has been brought over the outlet 107, at which times the rocker arm 118 will have been moved to open the valve in the line 112, close the valve in the line 111, and cause the two-way valve 114 to open communication between the space G, behind the piston head 97 and relief pipe 122. During the return stroke of the piston 94, which is an idle stroke, the piston 95 is moved past the outlet 107 as shown.

Fig. 5 illustrates a form of piston which I may use instead of the piston 5 in Fig. 1, the said piston being hollow as at 131 to form a chamber, having a channel 132 in communication therewith, an outlet 133 being provided. This form of piston is perforated as at 134. This for mof piston is to provide an increased escape for liquid. At the completion of the idle stroke, the position of the valves in the lines 111 and 112 and the valve 116 will be reversed by the movement of the rocker-arm 117.

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

1. A press comprising a plurality of pistons, means adapted to introduce material between said pistons, a hydraulic device adapted to force said pistons toward each other, and means adapted to cause said pistons to travel in the same directions when the pressure upon one of said pistons has reached a predetermined point.

2. A press comprising a plurality of pistons, means adapted to introduce material between said pistons, a pressure exerting device adapted to force said pistons toward each other, and means adapted to cause said pistons to travel in the same directions when the pressure upon one of said pistons has reached a predetermined point.

3. A press comprising a receptacle for material, a master piston within said receptacle, an auxiliary piston also within said receptacle, means adapted to actuate said master piston, means acted upon by said master piston adapted to actuate said auxiliary piston and means adapted to introduce material between said pistons.

4. A press comprising a receptacle for material, a master piston within said receptacle, an auxiliary piston also within said receptacle, a hydraulic device adapted to actuate said master piston, a hydraulic device actuated by said master piston adapted to operate said auxiliary piston, and means adapted to introduce material between said pistons.

5. A press comprising a receptacle having an inlet for material and also an outlet therefor, a master piston within said receptacle, an auxiliary piston also within said receptacle, said pistons being adapted for movement toward each other, said outlet being normally closed by said auxiliary piston, means adapted to introduce material between said pistons, means adapted to force said master piston toward said auxiliary piston, means adapted to force said auxiliary piston toward said master piston, and away from said outlet, and means adapted

to cause said pistons to move in unison toward said outlet when the pressure has reached a predetermined point.

6. A press comprising a receptacle having an inlet for material and also an outlet therefor, a master piston within said receptacle, an auxiliary piston also within said receptacle, said pistons being adapted for movement toward each other, said outlet being normally closed by said auxiliary piston, means adapted to introduce material between said pistons, a hydraulic device adapted to force said master piston toward said auxiliary piston, a hydraulic device adapted to force said auxiliary piston toward said master piston, and away from said outlet, and means adapted to cause said pistons to move in unison toward said outlet when the pressure has reached a predetermined point.

7. A press comprising a receptacle having an inlet for material and an outlet therefor, a movable abutment normally closing said outlet, a piston within said receptacle adapted for movement toward said abutment, means adapted to introduce material between said piston and said abutment, means adapted to force said piston toward said abutment, and means adapted to cause said abutment to uncover said outlet when the pressure has reached a predetermined point.

8. A press comprising a receptacle having an inlet for material and an outlet therefor, a movable abutment normally closing said outlet, a piston within said receptacle adapted for movement toward said abutment, means adapted to introduce material between said piston and said abutment, a hydraulic device adapted to force said piston toward said abutment, and means adapted to cause said abutment to uncover said outlet when the pressure has reached a predetermined point.

9. A press comprising a receptacle having an inlet for material and an outlet therefor, a movable closure for said outlet, a movable piston within said receptacle, means adapted to introduce material in said receptacle between said piston and said closure, means adapted to force said piston toward said closure, and means adapted to automatically move said closure away from said outlet when the pressure has reached a predetermined point.

10. A press comprising a receptacle having an inlet for material and an outlet therefor, a movable closure for said outlet, means adapted to introduce material into said receptacle, means adapted to exert pressure upon said material, and means adapted to cause said closure to move away from said outlet when the pressure has reached a predetermined point.

11. A press comprising a receptacle, means adapted to introduce material into said receptacle, a device adapted to compress said material, a hydraulic device adapted to actuate said compressing device and means adapted to automatically release the pressure upon said material when said pressure has reached a predetermined point.

12. A press comprising a receptacle having an inlet for material, a piston adapted for reciprocation in said receptacle, a perforated abutment within said receptacle also adapted for reciprocation, said receptacle being provided with an outlet for said material, said outlet being normally closed for the passage of material by said abutment, means adapted to introduce material between said piston and said abutment, means adapted to force said piston and said abutment toward each other, and means adapted to permit said piston and said abutment to move toward said outlet simultaneously after the pressure upon said abutment has reached a predetermined point.

13. A press comprising a receptacle having an inlet for material and an outlet therefor, a piston adapted for reciprocation in said receptacle, means adapted to reciprocate said piston, a movable perforated abutment in said receptacle also adapted for reciprocation, means adapted to introduce material between said piston and said abutment, means adapted to force said piston and said abutment toward each other, and a screen carried by said abutment, said screen being placed over the perforations in said abutment.

14. A press comprising a receptacle having an inlet for material and an outlet therefor, a piston adapted for reciprocation in said receptacle, means adapted to reciprocate said piston, a movable perforated abutment in said receptacle also adapted for reciprocation, means adapted to introduce material between said piston and said abutment, means adapted to force said piston and said abutment toward each other, and a severing device carried by said abutment.

15. A press comprising a receptacle provided with an outlet, a plurality of pistons within said receptacle, means for introducing material into said receptacle and between said pistons, means adapted to force said pistons toward each other at different speeds, and means adapted to permit said pistons to be moved simultaneously toward said outlet at the same speed when the pressure upon said material has reached a predetermined point.

16. A press comprising a receptacle, a master piston within said receptacle, an auxiliary piston also in said receptacle, a hydraulic ram cylinder, a piston rod carried by said master piston adapted for reciprocation in said ram cylinder, means actuated by the pressure in said ram cylinder adapted

to force said auxiliary piston toward said master piston, means adapted to force said master piston toward said auxiliary piston, and means adapted to introduce material between said pistons.

17. A press comprising a receptacle, a master piston within said receptacle, an auxiliary piston also in said receptacle, a hydraulic ram cylinder, a piston rod carried by said master piston adapted for reciprocation in said ram cylinder, means actuated by the pressure in said ram cylinder adapted to force said auxiliary piston toward said master piston, a hydraulic device adapted to force said master piston toward said auxiliary piston, and means adapted to introduce material between said pistons.

18. A press comprising a receptacle, a master piston within said receptacle, an auxiliary piston also in said receptacle, a hydraulic ram cylinder, a piston rod carried by said master piston adapted for reciprocation in said ram cylinder, means actuated by the pressure in said ram cylinder adapted to force said auxiliary piston toward said master piston, means adapted to force said master piston toward said auxiliary piston, means adapted to introduce material between said pistons, and means adapted to release the pressure upon said auxiliary piston when said pressure reaches a predetermined point.

19. A press comprising a receptacle, a piston adapted for reciprocation within said receptacle, a plurality of hydraulic rams adapted for alternate actuation adapted to reciprocate said piston, abutments carried by said receptacle, means adapted to introduce material alternately on each side of said piston and between said piston and said abutments, and automatic means adapted to control the actuation of said rams.

20. A press comprising a receptacle, a master piston within said receptacle, a hydraulic device adapted to actuate said piston, a supplemental ram cylinder, means adapted to convey liquid to said cylinder, a piston rod operated by said master piston adapted to work in said ram cylinder, an auxiliary ram cylinder in communication with said supplemental cylinder, a piston in said auxiliary cylinder, an auxiliary piston mounted in said receptacle and adapted for operation by said auxiliary piston, and means adapted to control the flow of liquid from said supplemental to said auxiliary cylinder.

21. A press comprising a receptacle, a master piston within said receptacle, a hydraulic device adapted to actuate said piston, a supplemental ram cylinder, means adapted to convey liquid to said cylinder, a piston rod operated by said master piston adapted to work in said ram cylinder, an auxiliary ram cylinder in communication with said supplemental cylinder, a piston in said auxiliary cylinder, an auxiliary piston mounted in said receptacle and adapted for operation by said auxiliary piston, means adapted to control the flow of liquid from said supplemental to said auxiliary cylinder, and means adapted to permit the escape of some of the liquid from said auxiliary cylinder when the pressure therein reaches a predetermined point.

22. A press comprising a receptacle, a master piston within said receptacle, a hydraulic device adapted to actuate said piston, a supplemental ram cylinder, means adapted to convey liquid to said cylinder, a piston rod operated by said master piston adapted to work in said ram cylinder, an auxiliary ram cylinder in communication with said supplemental cylinder, a piston in said auxiliary cylinder, an auxiliary piston mounted in said receptacle and adapted for operation by said auxiliary piston, means adapted to control the flow of liquid from said supplemental to said auxiliary cylinder, means adapted to permit the escape of some of the liquid from said auxiliary cylinder when the pressure therein reaches a predetermined point, and means adapted to refill said auxiliary cylinder after the liquid therein ceases to flow therefrom.

23. A press comprising a receptacle for material, a piston adapted to work in said receptacle, means adapted to operate said piston, said receptacle being provided with an outlet, a collector for said material, a liquid duct mounted adjacent thereto, a movable damper mounted adjacent said outlet, normally covering said collector, and in communication with said liquid duct, and means adapted to move said damper out of communication with said liquid duct and toward said collector, when said piston has reached a predetermined point of its stroke.

24. A press comprising a receptacle having an inlet thereto and an outlet therefrom, out of alinement one with the other, a plurality of pistons within said receptacle, means adapted to introduce material between said pistons, means adapted to force said pistons toward each other until the pressure upon the material has reached a certain predetermined point, and means adapted to permit said pistons to travel together after said pressure has reached said certain point, and means adapted to cause said pistons to come to rest when the material therebetween has reached a point in alinement with said outlet.

25. A press comprising a receptacle having an inlet thereto and an outlet therefrom, out of alinement one with the other, a plurality of pistons within said receptacle, means adapted to introduce material between said pistons, means adapted to force said pistons toward each other until the

pressure upon the material has reached a certain predetermined point, means adapted to permit said pistons to travel together after said pressure has reached said certain point, a collector for said material, a liquid duct mounted adjacent thereto, a movable damper mounted adjacent said outlet normally covering said collector and in communication with said liquid duct, and means adapted to move said damper out of communication with said liquid duct and toward said collector, when said pistons come to rest.

26. A press comprising a receptacle, for material, a master piston adapted for reciprocation mounted within said receptacle, a hydraulic device adapted to continuously reciprocate said piston, an auxiliary piston also mounted in said receptacle, means adapted to introduce material between said pistons, means adapted to cause said pistons to travel in the same direction for a certain period of the stroke of the master piston, means adapted to cause said auxiliary piston to come to rest when said period has been reached, and means adapted to cause said pistons to travel together when the pressure upon the material has reached a certain point, until the limit of the stroke of the master piston has been reached.

27. A press comprising a plurality of hydraulically operated coöperating pressing devices, a main hydraulic feed adapted to operate one of said pressing devices, an auxiliary hydraulic device adapted to operate the other of said pressing devices, and means controlled by the movement of the pressing device first named adapted to cause said auxiliary hydraulic devices to operate.

28. A press comprising a receptacle for material, a pressing device within said receptacle adapted for a predetermined movement, a hydraulic device adapted to operate said pressing device, means adapted to automatically lower the pressure upon said material when said pressing device has reached a predetermined point of its movement.

Signed at New York city, N. Y. this 3 day of February, 1911.

JOSEPH STEHLIN.

Witnesses:
EDWARD A. JARVIS,
ESTELLE O. HAMBURGER.