K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245.

Patented Jan. 19, 1909.

7 SHEETS—SHEET 1.

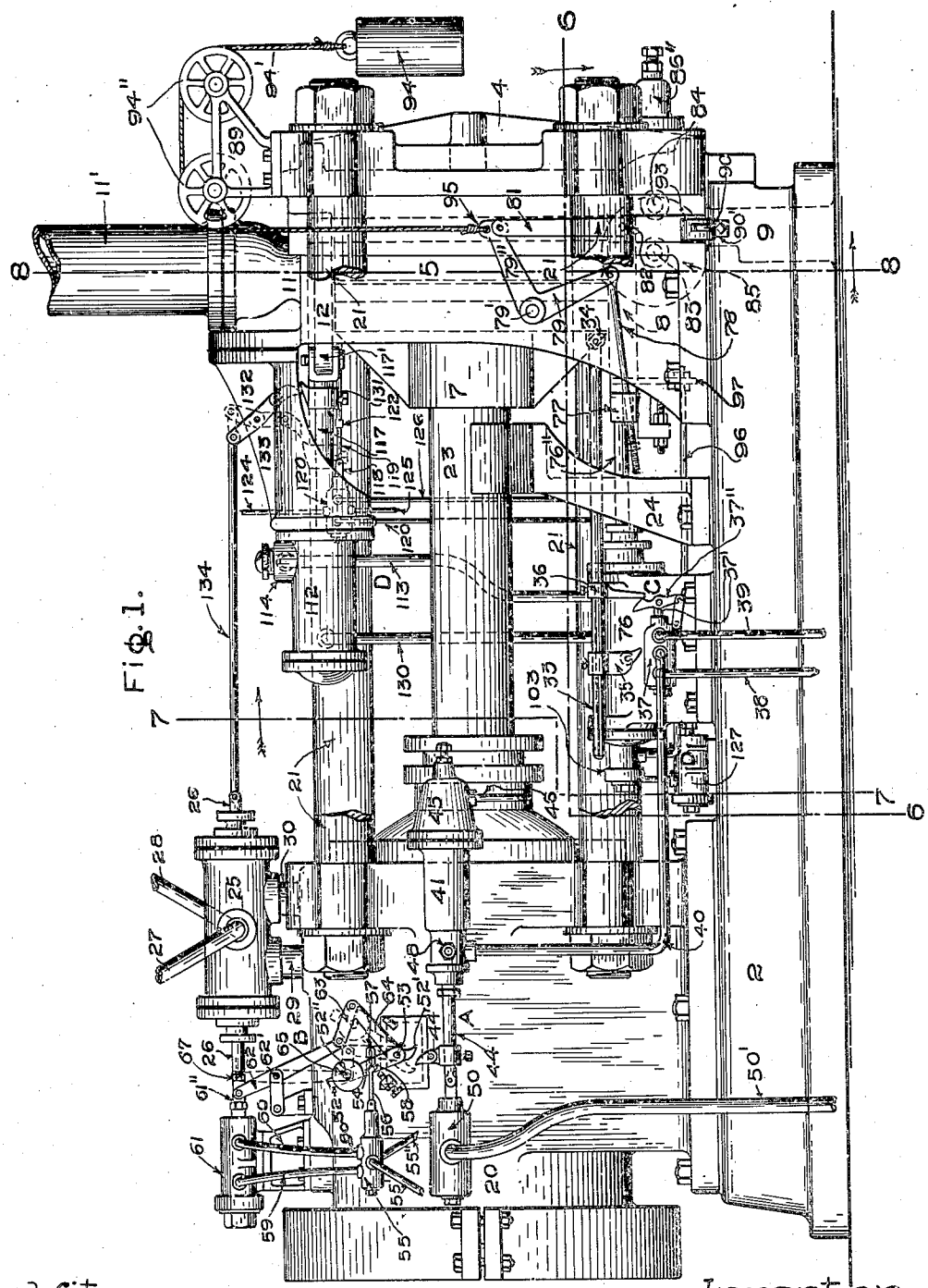


Fig. 1.

Witnesses:
M. S. Crozier.
C. A. Sloan

Inventor,
Kristen A. Torsen,
by Harry D. Wallace
Att'y.

K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245.

Patented Jan. 19, 1909

7 SHEETS—SHEET 2

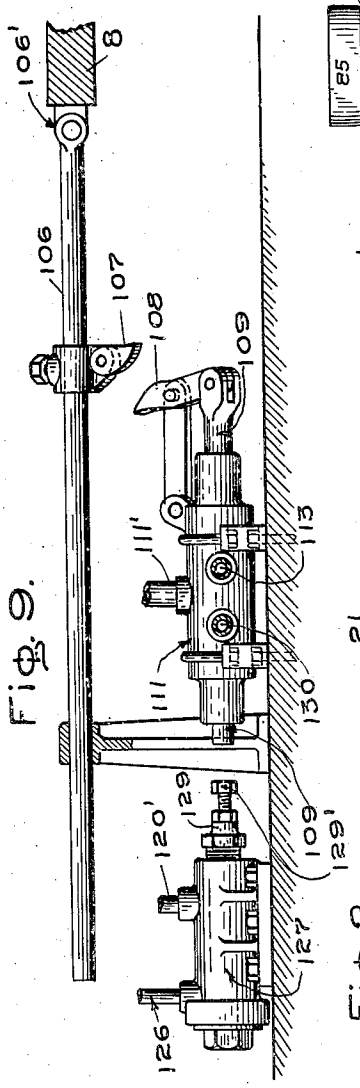


Fig. 9.

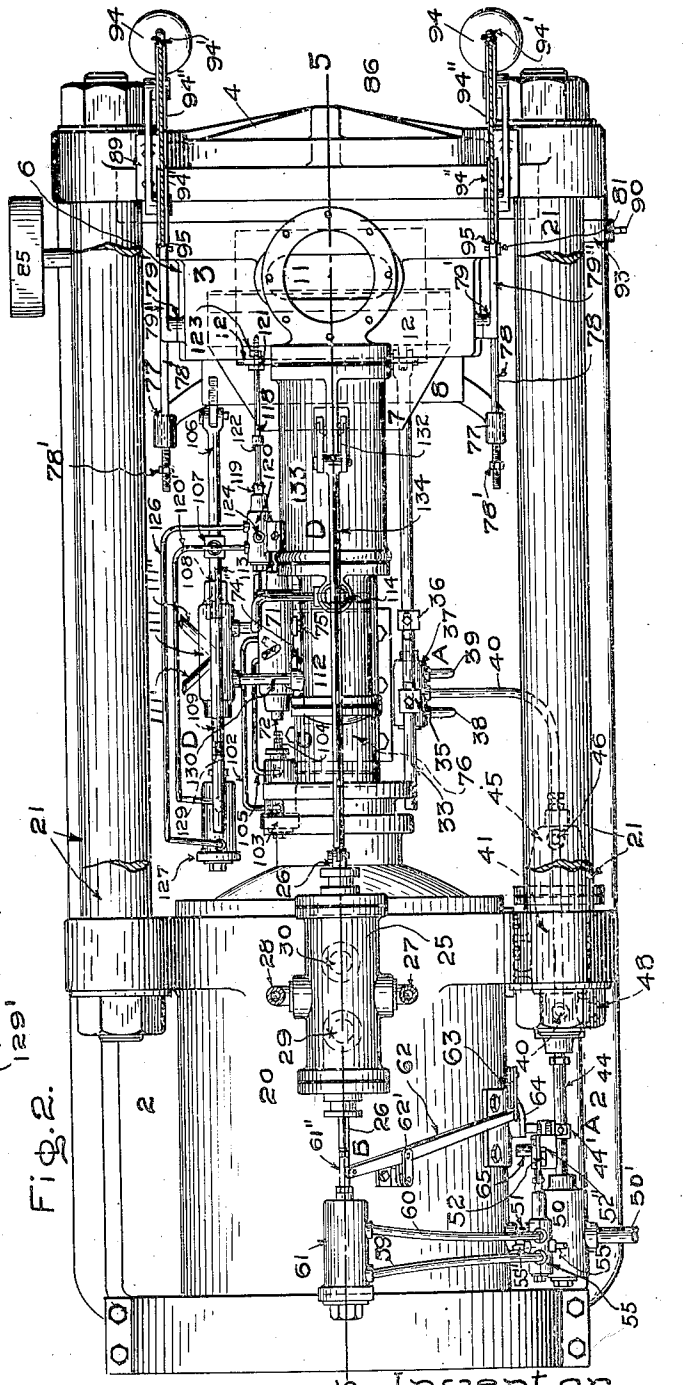


Fig. 2.

Witnesses:

M. G. Crozier

C. A. Stockum

Inventor,

Kristen A. Torsen,

by Harry D. Wallace

Att'y.

K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245. Patented Jan. 19, 1909.

7 SHEETS—SHEET 3.

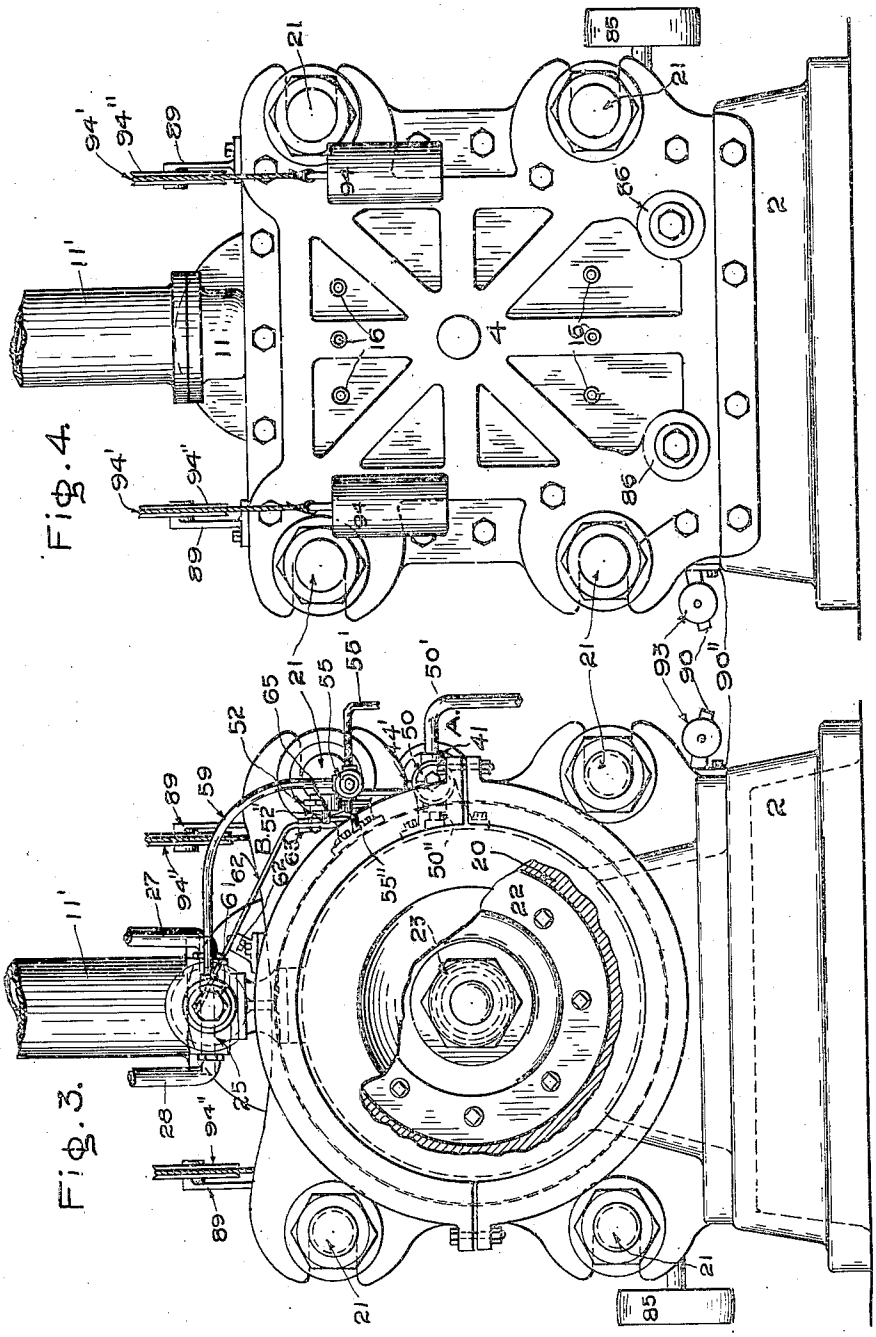


Fig. 4.

Fig. 3.

Witnesses:
M. G. Crozier.
C. A. Slocum

Inventor,
Kristen A. Torsen,
by Harry D. Wallace
Att'y.

K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245.

Patented Jan. 19, 1909.

7 SHEETS—SHEET 4.

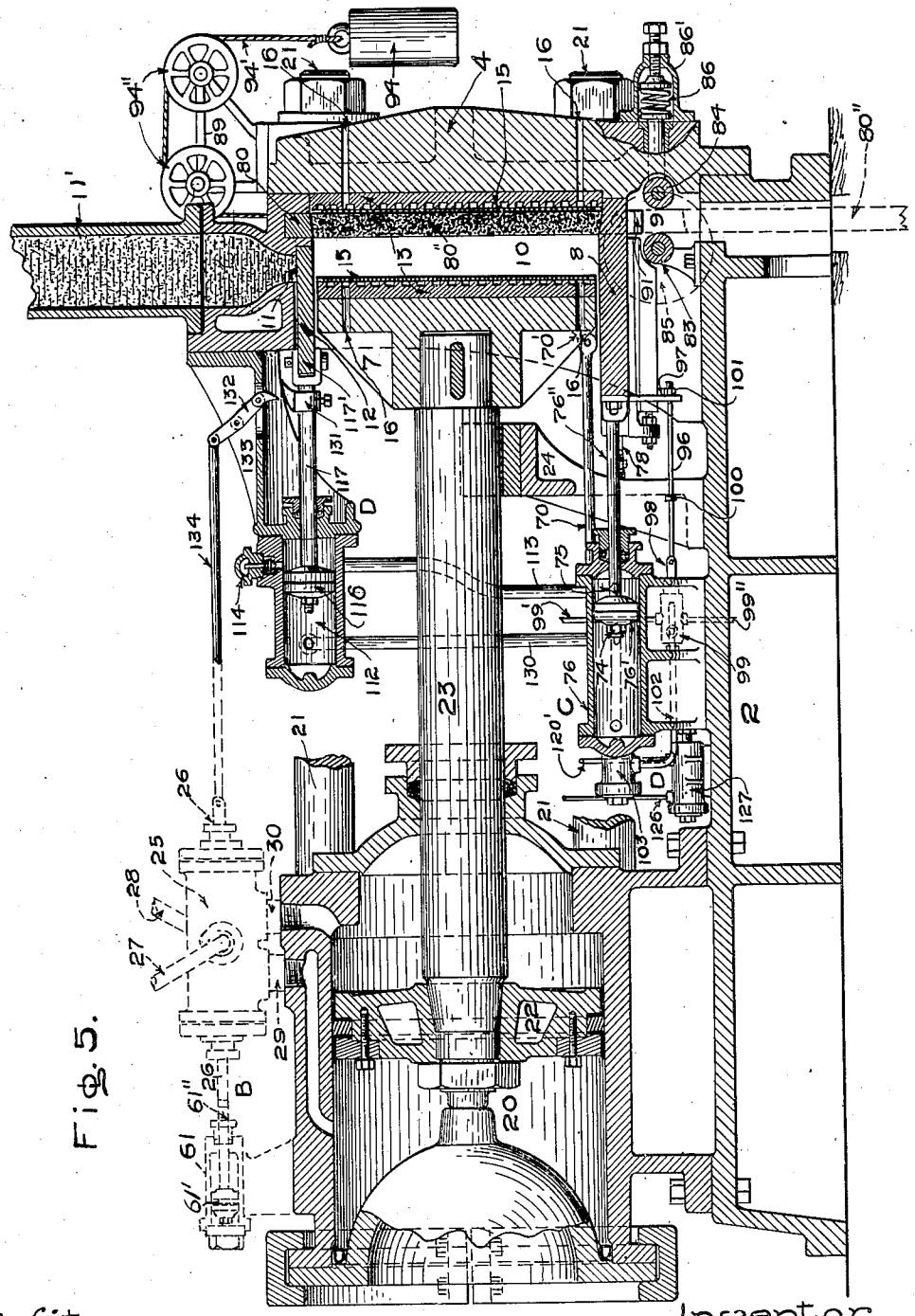


Fig. 5.

Witnesses:
M. G. Crozier.
C. A. Slocum

Inventor,
Kristen A. Torsen,
by Harry De Wallace
Att'y.

K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245.

Patented Jan. 19, 1909.

7 SHEETS—SHEET 5.

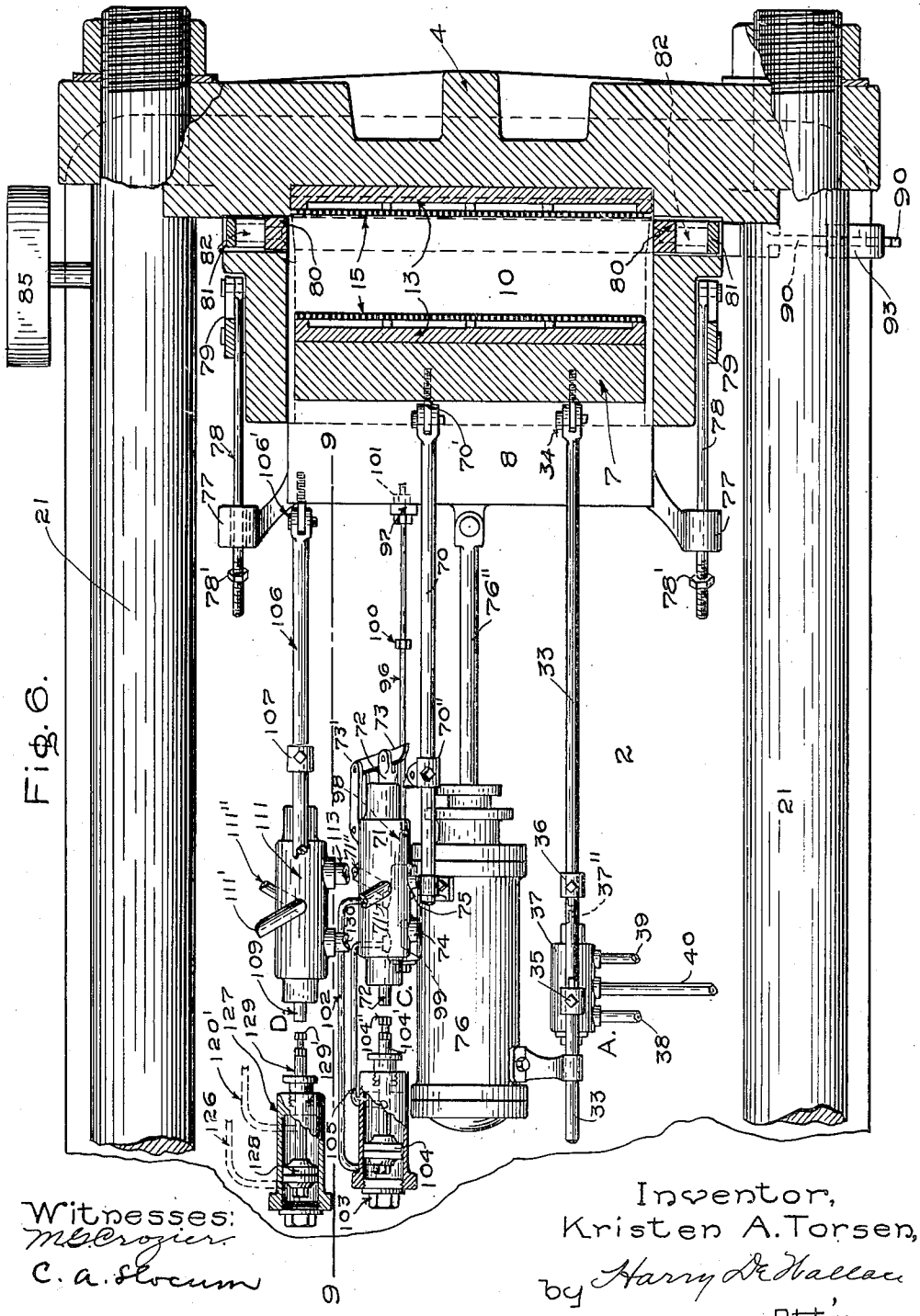


Fig. 6.

Witnesses:
M. G. Crozier
C. A. Slocum

Inventor,
Kristen A. Torsen,
by Harry D. Hallam
Atty.

K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245.

Patented Jan. 19, 1909.

7 SHEETS—SHEET 6.

Fig. 8.

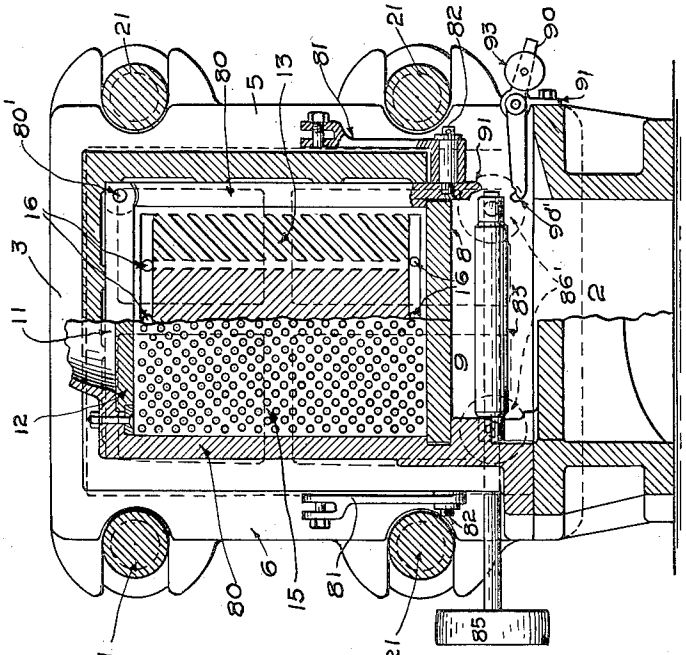
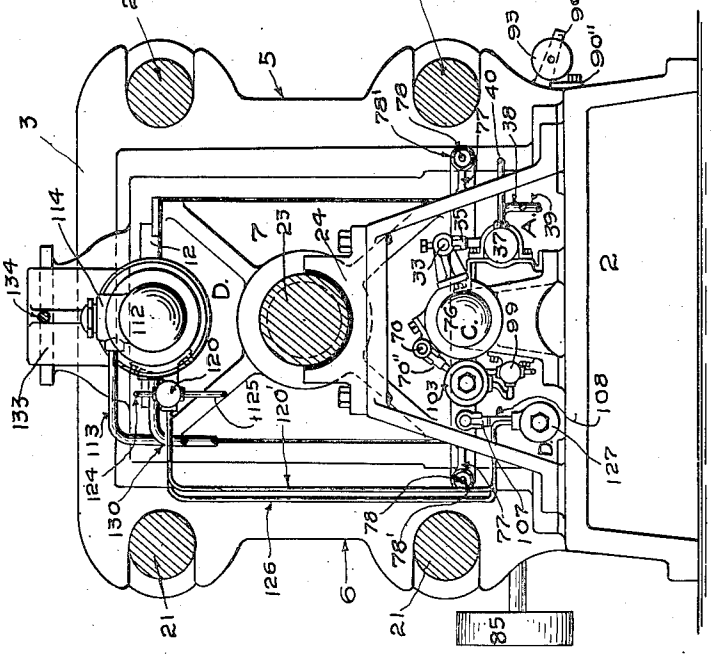


Fig. 7.



Witnesses:
M. L. Crozier
C. A. Slocum

Inventor:
Kristen A. Torsen.
by Harry DeWallace
Att'y

K. A. TORSEN.

AUTOMATIC PULP PRESS.

APPLICATION FILED JAN. 8, 1908.

910,245. Patented Jan. 19, 1909.

7 SHEETS—SHEET 7.

Fig. 10.

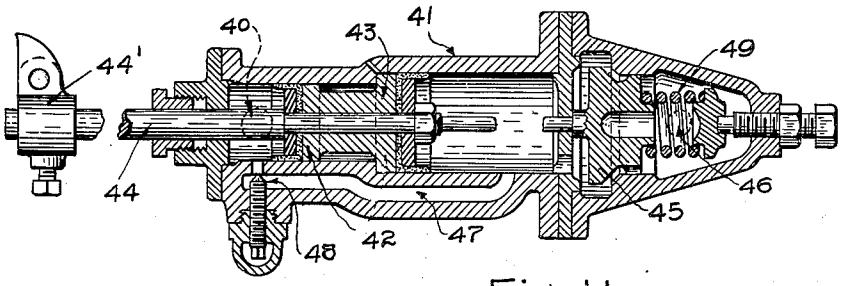


Fig. 11.

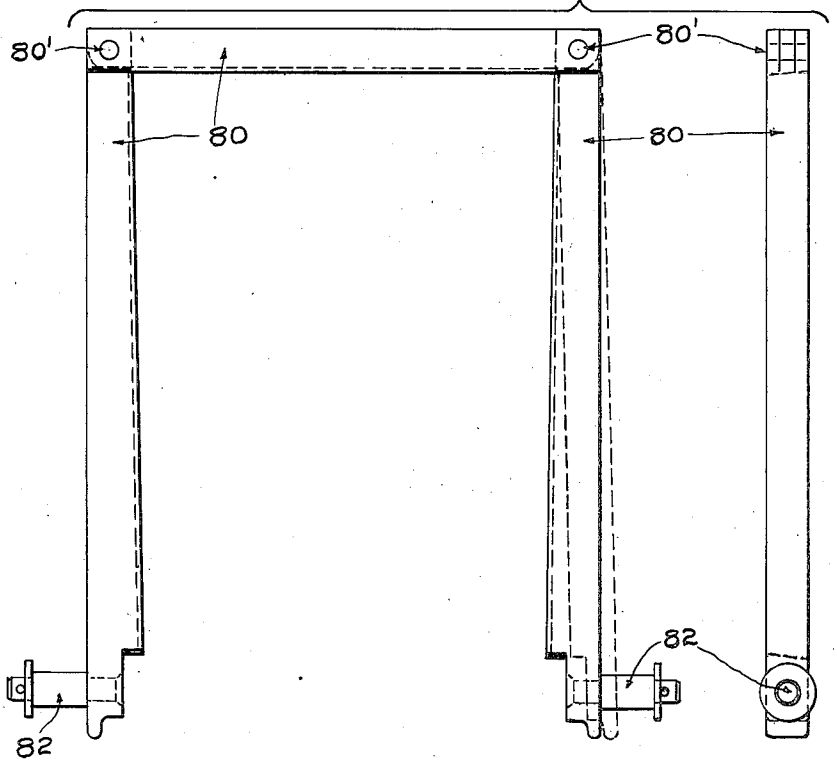
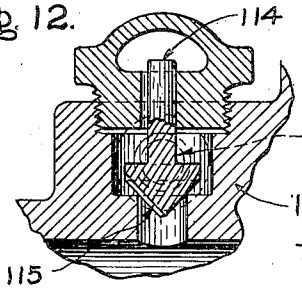


Fig. 12.



Witnesses:
M. G. Crozier
C. A. Slocum

Inventor,
Kristen A. Torsen.
by Harry D. Wallace
Att'y.

UNITED STATES PATENT OFFICE.

KRISTEN A. TORSEN, OF WATERTOWN, NEW YORK.

AUTOMATIC PULP-PRESS.

No. 910,245. Specification of Letters Patent. Patented Jan. 19, 1909.

Application filed January 8, 1906. Serial No. 400,780.

To all whom it may concern:

Be it known that I, KRISTEN A. TORSEN, a citizen of the Kingdom of Norway, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Automatic Pulp-Presses, of which the following is a specification.

This invention relates to improvements in pulp presses, designed for use in reducing fluid wood pulp to sheets or cakes, and the invention relates particularly to a pulp press of the class, which is entirely automatic in all of its working.

The object of the invention is to provide a press to be operated by a powerful fluid pressure, which is capable of reducing fluid pulp to dry or semi-dry cakes or sheets of uniform size and thickness convenient for either storing or shipping.

A further object is to provide a pulp press which is entirely automatic in its working, and wherein, from the time the fluid pulp is delivered to the compression chamber and the machine is started, until the resulting cakes of dry pulp are formed and ejected from the machine and the power is shut off, no manual attendance or work is required.

A further object is to provide a simple, strong, rapid and automatic pulp press of the class, which is capable of being operated continuously for long intervals at a high speed, and wherein, owing to novel construction and arrangement of its parts, the device may be made of comparatively light materials, and may be produced, installed and operated with great economy as compared with presses of the class heretofore devised and constructed.

The invention consists principally in providing a suitable base, upon which is mounted a strong compression-box having a press-chamber therein, an opening or inlet being provided at the top of the chamber for the admission of fluid pulp, and another opening through the bottom of the chamber for the discharge of the dry pulp cakes, the press-chamber also provided with one open end, in which is disposed a platen or plunger capable of being forced into the chamber to press the water out of the pulp; the said platen provided on its inner face with suitable drainage plates to carry off the water, and like drainage facilities being provided on the opposite wall of the press-chamber for a like purpose.

The invention further consists in providing a frame disposed in the chamber, in which the dry or semi-dry sheets or cakes of pulp are formed, the said frame being vertically movable through the bottom opening in the chamber, for the purpose of discharging the cakes or sheets of pulp.

The invention further consists in providing means for the rapid removal of the cakes from the frame.

The invention further consists in providing a powerful main pressure cylinder also mounted on the base and immovably connected to the compression-box, the said cylinder having a piston and a piston rod, the latter connected to the platen and capable of operating the same reciprocally; the main cylinder being operated by a low pressure by means of which the pressing is begun, then operated by a high pressure to effect the final pressing, and then operated a second time by low pressure, for the purpose of reversing the piston and withdrawing the platen, to permit of the ejecting of the pulp cake, and the refilling of the chamber with fluid pulp for another pressing.

The invention further consists in providing a reciprocating gate to open and close the pulp inlet in the top of the press-chamber, and a similar gate to open and close the outlet or opening in the bottom of the chamber.

The invention further consists in providing a number of groups or series of automatic pressure actuated parts for controlling the operation of the main cylinder, and also for opening and closing the inlet and outlet to said chamber. The said automatic operating parts consisting chiefly of a number of pressure actuated valves, cylinders and connecting parts, preferably operated by water pressure, and each group or series arranged to operate independently of the other. And the invention further consists in providing a number of simple timing devices to control the operation of certain parts of the machine, and in simple means for effecting the repeating of the cycle of pressing operations, to make the working of the machine continuous for long intervals or periods.

Other features and parts of the invention will be understood from the detail descrip-

tion which follows, reference being had to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation, showing the general construction and arrangement of the pulp press ready for use. Fig. 2 is a plan view of the complete machine. Fig. 3 is a front end elevation, showing a part of the main cylinder cut away exposing the piston. Fig. 4 is a rear end elevation. Fig. 5 is a vertical longitudinal section, substantially on the line 5—5 of Fig. 2, showing the internal arrangement of the main cylinder, the compression-box, and several of the operating valves and cylinders, also showing means for discharging the cake of pulp after each pressing. Fig. 6 is a partial horizontal section, enlarged, substantially on the line 6—6 of Fig. 1, showing the platen, bottom gate and certain of the pressure controlled parts of groups A, C and D, which are located on the base; also showing operative connections between said parts and the platen and bottom gate. Fig. 7 is a central cross-section, substantially on the line 7—7 of Fig. 1 (some minor parts being omitted), showing the platen and rear-end of compression-box in elevation; also showing the location and arrangement of certain of the automatic operating parts employed for opening and closing the upper and lower gates. Fig. 8 is a vertical cross-section, substantially on the line 8—8 of Fig. 1, showing the pulp frame disposed in the press-chamber; also showing the construction and arrangement of one set of drainage plates; also showing the means for spreading the pulp frame and carrying away the cakes of dry pulp. Fig. 9 is a view, substantially on the line 9—9 of Fig. 6, showing in elevation certain of the pressure actuated operating parts belonging to group D, looking rearwardly from the center of the machine. Fig. 10 is a detail horizontal section of the two-piston valve employed for operating the high pressure valve. Fig. 11 is an enlarged detail view of the pulp frame. Fig. 12 is an enlarged detail section of the check-valve employed for timing the opening of the pulp gate.

Similar characters of reference are assigned to corresponding parts throughout the several figures.

In the drawings, 2 represents a base, upon which is mounted a compression-box, for use in reducing fluid pulp to dry or semi-dry cakes or sheets. This box is preferably made entirely of metal, chiefly cast, and consists of a top 3, a stationary head 4, front side 5 and rear side 6, all of which parts may be joined in a manner suitable for withstanding the strain of a high pressure.

7 represents a platen, or movable pressure-head, which operably fits the rear open end of the compression-box. A gate or door 8, movable horizontally and disposed directly beneath platen 7, forms the bottom or floor of the box, and is also employed for closing a slotted opening or outlet 9, which extends downwardly through base 2.

10 represents the press-chamber or interior of the box in which the wet pulp is pressed and a solid cake formed by the inward movement of platen 7.

11 is an opening or inlet in the top of the box, through which fluid pulp is supplied to chamber 10, and 11′ is a pulp supply-pipe connecting to the inlet. A pulp gate 12, movable horizontally the same as gate 8, forms the upper side of chamber 10, and is employed for opening and closing the pulp inlet 11. Gates 8 and 12 are both held in closed position during the pressing of the pulp, and are arranged to open and close alternately to discharge the cake and to refill the chamber.

The fluid pulp when delivered to the chamber for pressing, consists of an incorporated mixture of finely ground wood and water, the percentage of water usually varying from 90% to 98%. After press-chamber 10 is filled with fluid pulp, gate 12 is closed, thus confining the pulp within the box, then pressure is applied to force platen 7 into the chamber. In order to take away the water and leave the dry pulp in the chamber, a grooved drainage plate 13 is secured to the inner face of head 4, and a similar plate is secured to the inner face of platen 7, the grooves in each case facing the chamber. Perforated strainer plates 15, preferably brass, are then mounted over the grooved faces of plates 13, and form the front and rear walls of chamber 10. The perforations in plates 15 should be very small, so that little if any pulp may pass through with the water. A covering of fine wire cloth or like material may be substituted for plates 15 and produce good results. After chamber 10 is filled with pulp stock and the platen is forced into the chamber, the water incorporated with the pulp will be forced through plates 15 into the grooves of plates 13, and will then be carried off through ports or passages 16, preferably under suction or vacuum draft in any suitable manner.

20 represents a main pressure cylinder, mounted on the opposite end of base 2 facing the compression-box. A series of strong stay-rods 21 form a skeleton connection between the box and this cylinder. Cylinder 20 has a piston 22, and a piston rod 23 the outer end of which connects with platen 7, and by means of which pressure from the main cylinder is imparted to the platen for pressing the pulp. Piston rod 23 is supported and guided centrally by a bracket 24 mounted on the base.

The automatic working of my pulp press is carried out by a number of valves and

cylinder of smaller and lighter construction than the main cylinder, which are arranged and operated in groups or series designated by the letters A, B, C and D. These are disposed and mounted at different points convenient to the compression-box and main cylinder, and they are all preferably operated by water-pressure, although air or steam may be employed, and they are provided with suitable piping and other fittings common to devices of the class. Each group is operated independently by pressure derived from a common source. With but a single exception, these smaller valves and cylinders are preferably operated by a low pressure. Low pressure is employed in main cylinder for the first stage of the pressing, the final pressing being effected by high pressure, through the operation and control of group A, while the platen is returned after the pressing of each cake by low pressure, by the operation of the parts in group B. A uniform high pressure might be employed for operating all of the valves and also the main cylinder and produce good results. In carrying out the principal steps of a complete cycle of operations necessary to form each cake, group A is first employed for operating piston 22 and platen 7 by high pressure to press the fluid pulp; group B, for reversing the piston and platen by low pressure; group C for opening and closing the bottom gate for the removal of the pulp cake, and group D, for opening and closing the top gate for refilling the chamber with wet pulp, and also for operating a low pressure valve connected to main cylinder 20, to start the succeeding round of operations.

25 represents a four-way valve mounted upon cylinder 20. This valve has an operating-rod 26 extending through both ends of its casing. A low-pressure inlet pipe 27 connects with a source of pressure, and an exhaust pipe 28 drains the valve. Valve 25 has pressure connections with cylinder 20 through pipes 29 and 30, by means of which piston 22 may be forced either to the left or right. Valve 25, as shown in Figs. 1, 2 and 5 is set for pressure into main cylinder through pipe 29. Assuming that chamber 10 is filled with pulp, that gates 8 and 12 are closed, and that valve 25 is set as last described, the machine is started by turning low pressure into said valve through inlet pipe 27. The low pressure will then pass into cylinder 20, and piston 22 will begin to move, forcing platen 7 to the right to begin the pressing.

33 represents a rod connected to the lower end of the platen, by eye-bolt 34. Upon this rod is adjustably mounted oppositely facing rigid triggers or trips 35 and 36.

37 represents a three-way valve (in group A) mounted on the base, having an inlet 38, and an exhaust 39, and an operating-rod 37′, to which is connected a lever 37″ pivoted at its lower end to the valve casing, while the free end of said lever is disposed between trips 35 and 36, in such manner that when rod 33 is moved to the right or left, valve 37 will be operated in corresponding directions. Thus when platen 7 begins its movement into press-chamber 10, by the operation of piston 22, in the first instance, by low pressure from valve 25, it carries with it rod 33, and trigger 35 engages lever 37″ and swings it to the right, opening valve 37 for pressure through a pipe 40 into a cylinder 41, (also in group A) mounted on the front side of cylinder 20. Cylinder 41, which only receives pressure from valve 37, has two pistons, 42 and 43, mounted on a rod 44, which passes out through the casing. When the water enters the chamber of piston 42, it forces both pistons and rod 44 to the right, and any water that happens to be in the opposite end of cylinder 41, will be forced out through a valve 45 and a pipe 46, until the inner end of rod 44 closes valve 45, which is connected to end of cylinder 41. At the time the water enters chamber of piston 42 and acts upon the latter, it also enters a duct or passage 47 formed in the side of the casing (see Fig. 10), and is carried into the forward end of the cylinder where it in turn acts against the larger piston 43, and drives the two pistons back to the left. The difference in the area of the two pistons permits of the forward and backward movement with the same charging of cylinder 41. The time in which the return movement of the pistons may be effected is regulated by a screw-valve 48, disposed in passage 47. A spring 49 opens exhaust valve 45 as after rod 44 is moved to the left and valve 37 is reversed by trigger 36. Rod 44 carries a trigger 44′, and connects at its outer end with the operating-rod of a high pressure valve 50, which is mounted on the side of cylinder 20, in line with cylinder 41. High pressure enters valve 50 through a supply pipe 50′ and passes thence into main cylinder through a pipe 51, which connects with the chamber to the left of piston 22. High pressure, therefore, is only employed for forcing the piston of main cylinder toward the compression-box: the return of said piston being effected by low pressure from valve 25 through pipe 30 after the pressing, to permit of the removal of the pulp cake and the refilling of the chamber, which will be explained more fully below. The operation of pistons 42 and 43 in valve 41 to the right, as described, opens valve 50 and lets high pressure into cylinder 20, while the return operation of the double pistons shuts off the high pressure. The time required for the high pressure to complete the pressing of the pulp and the forma-

tion of the cake, or in other words the duration of the high pressure for pressing, is regulated by the screw-valve 48, as explained. While the high pressure is in the main cylinder, passage 29 leading to low pressure valve 25 is open, and to prevent loss of the high pressure by exhausting through valve 25 and inlet pipe 27, a check-valve (not shown) is disposed in the inlet pipe above the valve.

As the pressure supplied to valve 25 does not operate it, it is necessary to provide an auxiliary mechanism for automatically shifting said valve to effect the return of piston 22 and the platen after each pressing. To this end, I provide a lever 52, pivoted to the main cylinder at 53, and having its lower end 52′ disposed in the path of trigger 44′ carried by rod 44. Lever 52 forms an operative connection between groups A and B. The upper arm of lever 52 carries a counterweight 52″, and a pin 54 projects from the face of the lever below the weight.

55 represents a four-way valve mounted on main cylinder 20, operated by low pressure received through a pipe 55′ and exhausting at 55″. To the operating-rod of valve 55 connects an extension-rod 56, having a slot in its outer end in which pin 54 is disposed and plays. Through the last named connections valve 55 is operated and controlled. When rod 44 travels to the left to shut off the high pressure, as described, trigger 44′ engages point 52′ of lever 52 and swings the lever and weight to the right just over the center, then trigger becomes free. When lever 52 passes the center, it will gravitate rapidly and with considerable force by its own weight to the position shown in dotted lines Fig. 1, and in finishing its travel, pin 54 engages end 57 of slot and opens valve 55 for pressure through pipe 59 into another cylinder 61 mounted on cylinder 20 in line with valve 25. Cylinder 61 only receives the pressure from valve 55, and as the water first enters said cylinder it forces piston 61′ and rod 61″ to the right. Rod 61″ has abutting contact with adjusting-screw 67 on the end of connecting-rod 26 of valve 25, when the latter is set for pressure into main cylinder through pipe 29, as shown in Figs. 1, 2 and 5, and when rod 61″ is forced outwardly, as described, it reverses valve 25 for pressure into cylinder 20 through pipe 30, which forces piston 22 and platen 7 back to the left. Piston rod 61″ connects to one end of a lever 62 pivoted at 62′, its lower end connecting to a link 63, which in turn connects with a second link 64, the lower end of the latter being pivoted at 53, the same as lever 52. When piston rod 61″ travels to the right, lever 62 and the two links 63 and 64 will be shifted to the position shown in dotted lines in Fig. 1, and in doing so link 64 will engage a projection 65 on counterweight 52″ and carry lever 52 back to the left, or first position. As lever 52 finishes its stroke, pin 54 strikes end 58 of slot in rod 56 and reverses valve 55, shifting the pressure from said valve through pipe 60 into cylinder 61, reversing the latter and throwing lever 62 and links 63 and 64 to position shown in full lines Fig. 1, thus automatically restoring all of these parts in group B to first position, ready for another cycle of pressing operations. It will be noted that the parts in group B only partially control low pressure valve 25, *i. e.* operate it in the direction to cause the reversing of piston 22 after the pressing.

The pressing of the fluid pulp in chamber 10 having been effected and the platen withdrawn by the operation of the parts hereinbefore described, the next step in order will be to explain the opening of gate 8 and removal of the cake or sheet of pulp.

70 represents a rod (similar to rod 33) attached to platen 7, preferably near its lower end by eye-bolt 70′, and carries an adjustable trigger 70″ (see Figs. 6 and 7).

71 is a four-way valve in group C, having low pressure inlet pipe 71′ and exhaust pipe 71″, and having an operating-rod 72 extending through both ends of its casing, to one end of which is pivoted a lever 73, having its fulcrum at 73′ and its free end disposed in the path of trigger 70″. Valve 71 supplies pressure through pipes 74 and 75 to a cylinder 76, having a piston 76′ and a piston rod 76″, the outer end of the latter connecting with gate 8. The movement of platen 7 to the left or out of the chamber moves rod 70 with it, and trigger 70″ engaging lever 73 opens valve 71 for pressure into cylinder 76 through pipe 75, and forces piston rod 76″ and gate 8 to the left, thereby opening the bottom of chamber 10 for the removal of the pulp cake through outlet 9. Gate 8 has formed on its outer corners at front and back of machine perforated lugs or arms 77, through which rods 78 pass and have free play. Rods 78 carry adjustable stops 78′, by means of which the rods are drawn to the left in the latter half of the outward movement of gate 8. The inner ends of rods 78 are pivoted to arms 79 of a pair of bell-cranks which are pivoted to the front and rear sides of the compression-box at 79′.

80 represents a frame-like part (see Figs. 5, 6, 8 and 11) having a top and two side rails, which are held together by bolts or screws 80′. This frame is disposed in the press-chamber 10 against the inner perforated face of head 4, in such position that the opening in the frame, which is preferably the same height and breadth as the inner face of platen 7, registers with the platen. Within this frame the pulp cake 80″ is formed by the pressure applied to

the platen, the water in the pulp passing off through plates 15 and waste passages 16. Gate 8 being closed during the pressing, serves the part of a bottom rail for the frame. Frame 80 is disposed in chamber 10 directly above opening 9 and is movable upward and downward through said opening.

81 represents links connected at their upper ends to arms 79″ of the bell-cranks, the lower ends being pivotally connected to the opposite sides of the frame 80 by studs 82, which project through openings in the side walls of the compression-box. The arrangement of these parts is such that when gate 8 is opened, frame 80 with the pulp cake pressed into it, is forced downwardly by the operation of rods 78, the bell-cranks, and links 81, through outlet 9, far enough for the cake 80″ to be fed in between and gripped by a pair of rollers 83 and 84 disposed beneath the compression-chamber. Roller 83 is constantly driven by power applied to a pulley 85 disposed on the rear side of the machine. Roller 84 does not mesh with roller 83 and only revolves during the interval in which the cake is passing between the rollers. Roller 84 is adjustable and operates under tension, by means of springs 86 and may be made to exert sufficient pressure against the cake to positively carry it out of the frame. Springs 86 are incased in caps or boxes 86′ located at opposite ends of roller 84. These rollers are driven at a speed that will insure the removal of the pulp cake from the frame 80 quickly, in order that gate 8 may be closed and chamber 10 refilled with fluid pulp for another pressing without loss of time. The inner edges of frame 80 are preferably beveled, as shown, in order that the movement and suction of the platen when withdrawn will not distort the cake or shift it in the frame.

90 represents a lever pivoted to front side of the base at 90′, the inner end of which is formed into a hook or notch 90″ (see Fig. 8), adapted to receive a projecting point 91 of one rail of frame 80 as it descends. After these parts come together, the downward movement of the frame will tilt lever 90, and owing to the arc of said lever and the grip of notch 90″, the lower end of the frame will be spread slightly for the purpose of loosening the cake and allowing its removal from the frame more readily. A counterweight 93 on the outer end of lever 90 will lift the inner end as soon as the frame has been returned to the press-chamber.

The pulp frame 80 is lowered by the opening of gate 8, but the closing of the gate will not raise the frame. Immediately after the cake has been removed, gate 8 begins to close and the frame is then raised to its place in the chamber by a pair of heavy weights 94 suspended from one end of ropes or cables 94′, the other end of the ropes being attached to bell-crank arms 79″ at 95. Ropes 94′ are supported at each side of top of machine by a pair of sheaves 94″ mounted in brackets 89. Owing to the positioning of the stops 78′, the raising of the pulp frame will occur with the initial inward movement of gate 8.

The automatic closing of gate 8 is effected as follows; 96 represents a rod, one end of which is connected to the outer end of gate 8, by passing through a downwardly extending lug 97, (see Figs. 5 and 6) the other end being connected to an operating-rod 98, of a four-way valve 99 in group C, located on the base near cylinder 76. The free end of rod 96 is provided with two stops 100 and 101, spaced some distance apart, between which lug 97 is disposed. In order to allow some time to elapse between the opening of gate 8 and the operation of valve 99, stop 100 on rod 96 will not be engaged by lug 97 until the gate has nearly completed its outward travel. When lug 97 finally moves rod 96 and opens valve 99, water pressure from said valve passes through pipe 102 into cylinder 103, and drives its piston 104 and piston rod 104′ to the right, the exhaust from the other side of the piston passing back into valve 99 through pipe 105. When piston rod 104′ moves outwardly, adjusting screw 104″ engages operating-rod 72 of valve 71 with force enough to reverse valve 71, and restore lever 73 to position ready to be acted upon by trigger 70″ carried by rod 70 when the platen is again shifted to the left. Valve 99 receives its water pressure through pipe 99′ and exhausts through pipe 99″. The reversing of valve 71, which receives its supply of water from the source of pressure, sends the pressure through pipe 74 into cylinder 76, which drives piston rod 76″ in the direction to close gate 8. As this gate closes lug 97 by engaging stop 101 on rod 96 reverses valve 99, which in turn reverses cylinder 103, and thus leaves all of the valves and cylinders in group C ready to be operated in the same manner after a succeeding pressing.

During all of the automatic operations heretofore described, which in practice would consume but little time, pulp inlet gate 12 has remained closed, preventing the pulp stock from reaching chamber 10 while lower gate 8 was opening and closing. It will now be in order to describe the several parts of group D, together with their operations, which effect the opening and closing of gate 12 and the refilling of the press-chamber 10.

106 represents a rod (similar to rod 33) attached to the outer end of gate 8 at 106′ and carries a trigger 107, disposed in the same manner as trigger 35, which as gate 8 closes, as just described, catches and operates a lever 108, connected to operating-rod 109 of a four-way valve 111 mounted on the base, and forming a part of group D, and

opens said valve for pressure through it into a cylinder 112, through a pipe 113. Valve 111 receives its pressure through a pipe 111′ and exhausts through a pipe 111″. After the water leaves pipe 113, it passes into or through a check-valve 114, which is provided on its face with a number of grooves 115. The purpose of the check-valve is to delay, as much as need be, the operation of piston 116 of cylinder 112, so that piston rod 117 which connects by eye-bolt 117′ to upper gate 12 will not open said gate and let a new supply of fluid pulp into chamber 10 before the last cake has been ejected and bottom gate 8 has been fully closed. The length of time for the opening of gate 12 is regulated by the number and size of the grooves 115. When cylinder 112 has received enough pressure from valve 111 to open gate 12, the press-chamber will be instantly filled with fluid pulp which is preferably delivered under pressure, and then gate 12 must be closed. This is done as follows: A rod 118, which is an extension of operating-rod 119 of a small valve 120, connects with the outer end of pulp gate 12, by passing through a perforated lug 121, (similar to lug 97). Rod 118 is also provided with stops 122 and 123, arranged the same as stops 100 and 101, and having the same functions, *i. e.* to delay the opening and closing of valve 120 until near the end of the travel of gate 12. Thus when gate 12 is pulled outwardly, lug 121 catches stop 122 and operates valve 120. This valve receives the water pressure through a pipe 124 and exhausting at 125, when operated by the leftward movement of gate 12, sends the pressure downwardly through a pipe 126 into a cylinder 127, and drives piston 128 and rod 129 to the right against the end of piston rod 109 of valve 111, with sufficient force to reverse valve 111, and thus send the pressure from the latter upwardly through a pipe 130 into cylinder 112, driving piston 116 and rod 117 in the direction to close gate 12. When gate 12 closes, lug 121 engages stop 123, again reverses valve 120, sends pressure back to cylinder 127 through a pipe 120′ and leaves that valve in the original position. Piston rod 117 carries a trigger 131, which on the return travel of said rod, as just described, trips a lever 132, pivoted centrally to a bracket 133 and connecting at its upper end to a rod 134, which is an extension of operating-rod 26 of valve 25, mounted on main cylinder 20. The operation of rod 134 reverses valve 25 from the position into which it was shifted by cylinder 61, as last described, and opens said valve again for low pressure into main cylinder 20 through pipe 29. The main cylinder will then react upon platen 7, and begin the pressing of the next cake of pulp.

The foregoing detailed explanation describes one complete cycle or round of operations required for the pressing of one cake of pulp, the ejecting of the cake, the refilling of the press-chamber with fluid pulp, and the recharging of the main cylinder with low pressure to begin the pressing over again, and shows the automatic working of the machine. The points of all the triggers, except 35 and 36 are intended to be on a pivot, so as to be rigid when operating the levers, but adapted to swing on pivot at each return movement.

Each time press-chamber 10 is filled and gate 12 is closed, a subsequent pressing will begin immediately by low pressure through valve 25. The low pressure not being strong enough to complete the pressing, has strength enough to force the platen 7 part way into the chamber, or far enough to start the operation of valve 37 and cylinder 41, which in turn opens the high pressure valve for pressure into the main cylinder, by which the final pressing is accomplished. The high pressure is then shut off by the automatic reversal of cylinder 41, and then trigger 44′ on rod 44 sets in motion the parts comprising group B. Piston 22 in main cylinder is then reversed by low pressure from valve 25 and the platen is withdrawn. The outward movement of the platen coöperating with certain parts in group C effects the opening of lower gate 8, the ejecting of the pulp cake and the closing of said gate. The closing movement of gate 8 coöperating with certain parts in group D, then effects the opening of pulp gate 12, the refilling of the press-chamber, and the opening of valve 25, which is the beginning of the next round of pressing operations. Each cycle of pressing operation is the same as above described, and when the several groups of automatic parts are properly arranged and adjusted, the machine will be capable of pressing fluid pulp and reducing the same to dry cakes or sheets with great rapidity and at small expense.

It is obvious that some changes or modifications of the parts may be made without departing from the spirit of the invention, and I therefore do not restrict myself to the precise construction and arrangement of the same as shown and described herein.

The automatic operating parts of my device may also be applied to other pulp presses of the class and materially increase their capacity as well as to reduce the expense of their operation.

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

1. An automatic pulp press, comprising a main cylinder having a piston and piston-rod, a compression-chamber having an open end facing said cylinder, a platen operably disposed in the open end of said chamber

and connected to said piston-rod, a fluid pulp inlet connected with the top of said chamber, a pulp-gate to close said inlet, a slotted opening in the bottom of said chamber, a bottom gate to close said opening, a pulp frame normally positioned in said chamber between said inlet and said slotted opening, a fluid-pressure-operated mechanism for opening and closing said bottom gate and for forcing said frame partially through said slotted opening, independent means for restoring said frame to normal position in said chamber, means for opening said pulp-gate to permit the refilling of said chamber and for closing said inlet automatically after the closing of said bottom gate, and a mechanism operable by the closing movement of said pulp-gate for effecting a repetition of the pressing operation, substantially as described.

2. An automatic pulp press, comprising a main cylinder having a piston and a piston-rod, a compression-chamber connected to said cylinder and having an open end, a platen operably fitting the open end of said chamber and connected to said piston-rod, an inlet for the admission of fluid-pulp into said chamber, a gate to open and close said inlet, a pulp frame disposed in said chamber in which a cake of semi-dry pulp may be formed by the inward travel of said platen, means for collecting and carrying away water pressed from said pulp, a slotted opening in the bottom of said chamber, a gate disposed horizontally in the bottom of said chamber adapted to close said opening during the pressing of the pulp, a fluid-pressure-mechanism to automatically open said bottom gate and also to lower said frame and the pulp cake through said opening, a pair of rollers to grip and remove the pulp cake while said frame is in the lower position, and means for effecting the return of said frame to its upper position, substantially as described.

3. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve to supply a low pressure to both sides of said piston, a second valve to supply a high pressure to one side of said piston, a single compression-chamber immovably connected to said cylinder, said chamber having a fluid pulp inlet at its top and a dry pulp outlet at its bottom, and having its inner end facing said piston open, a platen slidably fitting the open end of said chamber and connected to the outer end of said piston rod, by means of which said platen may be forced into or withdrawn from said chamber by the reciprocal movements of said piston, a perforated strainer plate mounted on the inner face of said platen, a perforated strainer plate mounted on the inner face of the opposite end of said chamber, a grooved drainage plate disposed behind each of said perforated plates and connected with a series of waste-water ports disposed in said platen and in the closed end of said chamber, a sliding gate to open and close said pulp inlet, a sliding gate to open and close said pulp outlet, a frame disposed in said chamber between said gates, in which a dry pulp cake may be formed by the inner movement of said platen, a series of levers and links connecting said frame with said bottom gate, by means of which said frame may be lowered through said pulp outlet to discharge the pulp cake when said gate is opened, and a pair of weights to carry said frame back into said chamber, substantially as described.

4. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve to supply a low pressure to operate said piston reciprocally, a second valve to supply a high pressure to drive said piston rod outwardly, a group of independent pressure operated parts to partially control said low pressure valve, a single press-chamber immovably connected to said main cylinder, said press-chamber having a fluid pulp inlet in its top and a dry pulp outlet in its bottom, and having one open end facing said main cylinder, a platen movably fitting the open end of said press-chamber and connected to said piston rod, the inner face of said platen fitted with a strainer and a drainage plate, a strainer and a drainage plate mounted on the inner face of the opposite end of said press-chamber, the said strainer plates forming the inner end walls of said press-chamber, a sliding gate disposed in said press-chamber above said platen to open and close said pulp inlet, a sliding gate disposed in said press-chamber beneath said platen to open and close said pulp outlet, a frame having its lower end open disposed in said press-chamber in a plane parallel to said strainer plates, the lower open end thereof arranged to receive the inner end of said bottom gate, the said frame adapted to receive and hold the dry pulp remaining after each pressing of the fluid pulp, a series of levers and links connecting each side of said frame with the bottom gate, by means of which said frame may be forced downwardly through said pulp outlet to discharge the pulp cake when said gate is opened, a pair of rollers, one power driven, the other spring-pressed, disposed beneath said pulp outlet adapted to effect the removal of the pulp cake from said frame, and a series of weights to restore said frame to its position in said press-chamber simultaneously with the initial closing movement of said bottom gate.

5. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve connected to said main cylinder

adapted to supply a low pressure to operate said piston reciprocally, a second valve mounted on said main cylinder adapted to supply a high pressure to operate said piston in one direction, a group of pressure actuated parts to partially control said low pressure valve, a group of pressure operated parts to control said high pressure valve, a press-chamber connected to said main cylinder, said press-chamber having a fluid pulp inlet at its top and a pulp outlet at its bottom, and having one open end facing said main cylinder, a platen vertically disposed in the open end of said press-chamber and connected to one end of said piston rod, the inner face of said platen fitted with a perforated strainer plate and a grooved drainage plate, a perforated strainer plate and a grooved drainage plate fitted to the inner face of the opposite end of said press-chamber facing said first named plates, a sliding-gate disposed in the upper part of said press-chamber, a sliding-gate disposed in the bottom of said press-chamber, a frame for receiving and holding a cake of dry pulp disposed in said press-chamber directly above said pulp outlet, the said frame connected with said bottom gate and adapted to be lowered through said pulp outlet to discharge the cake of pulp by the opening of said bottom gate, and a pair of weights to lift and hold said frame in said press-chamber while said bottom gate is closing.

6. An automatic pulp press, comprising a double-headed cylinder having a piston and a piston rod, a valve to supply a low pressure to both sides of said piston, a second valve to supply a high pressure to one side of said piston, a single compression-chamber immovably connected to said cylinder, said chamber having a fluid pulp inlet in its top, and a dry pulp outlet in its bottom, and having its inner end facing said cylinder open, a platen slidably fitting the open end of said chamber and connected to one end of said piston rod, by means of which said platen may be forced into or withdrawn from said chamber by the reciprocal travel of said piston, a sliding gate to open and close said pulp inlet, a pressure operated mechanism to reciprocally operate said gate, a slidable bottom to open and close said pulp outlet, a pressure operated mechanism to reciprocally operate said bottom, a frame disposed in said chamber between said gate and said bottom in which a cake of dry pulp may be formed by the inward movement of said platen, a series of levers and links connecting said frame with said bottom, by means of which said frame may be lowered through said pulp outlet to discharge the pulp cake when said bottom is open, and a pair of weights to carry said frame back into said chamber.

7. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve to supply a low pressure to operate said piston reciprocally, a second valve to supply a high pressure to drive said piston outwardly, a group of independent pressure operated parts to partially control said low pressure valve, a single-press-chamber immovably connected to said cylinder, said press-chamber having a fluid pulp inlet at its top and a dry pulp outlet at its bottom, and having one open end facing said main cylinder, a platen movably fitting in the open end of said press-chamber and connected to one end of said piston rod, the inner face of said platen fitted with a strainer plate and also a drainage plate, a strainer plate and a drainge plate mounted on the inner face of the opposite end of said press-chamber, a sliding gate disposed in said press-chamber above said platen to open and close said pulp inlet, a pressure actuated mechanism to automatically operate said gate, a sliding gate disposed in said press-chamber beneath said platen to open and close said pulp outlet, a pressure actuated mechanism to operate said gate automatically, a frame having its lower end open disposed in the press-chamber in a plane parallel to the inner face of said platen, the lower open end thereof arranged to receive the inner end of said bottom gate, the said frame adapted to receive and hold the dry pulp remaining after each pressing of the fluid pulp, a series of levers and links connecting each side of said frame with said bottom gate by means of which said frame may be forced downwardly through said pulp outlet to discharge the pulp cake when said gate is opened, a pair of rollers, one power driven, the other spring-pressed, disposed beneath said pulp outlet adapted to effect the removal of the pulp cake from said frame, means for spreading said frame to release the cake of pulp, and a series of weights to restore said frame to its position in said press-chamber simultaneously with the closing movement of said bottom gate, substantially as described.

8. An automatic pulp press, comprising a double-headed cylinder having a piston and a piston rod, a valve to supply a low pressure to operate said piston reciprocally, a second valve to supply a high pressure to drive said piston outwardly, a group of independent pressure actuated parts to partially control said low pressure valve, a single-press-chamber immovably connected to said cylinder, said press-chamber having one open end facing said cylinder, a platen slidably fitting the open end of said press-chamber and connected to the outer end of said piston rod, a gate disposed in said press-chamber above said platen adapted to open and close said pulp inlet, a pressure actuated mechanism to operate said gate auto-

matically, a second gate disposed in said press-chamber beneath said platen adapted to open and close said pulp outlet, a pressure actuated mechanism to automatically operate said second gate, a frame having its lower end open disposed in said press-chamber in a plane parallel to the inner face of said platen, the lower open end thereof adapted to receive the inner end of said second gate, and said frame adapted to receive the dry pulp remaining in said press-chamber after each pressing of the fluid pulp, a series of levers and links connecting the opposite sides of said frame with said second gate, by means of which said frame may be lowered through said pulp outlet to discharge the pulp cake when said gate is opened, and a series of weights supported by sheaves mounted on top of said press-chamber, to raise said frame to its position in said chamber simultaneously with the initial closing movement of said second gate, substantially as described.

9. An automatic pulp press, comprising a double headed cylinder having a piston and a piston rod, a valve to supply low pressure to operate said piston reciprocally, a second valve to supply high pressure to drive said piston in one direction, a group of independent pressure operated parts to partially control said low pressure valve, the said parts being self-acting for the purpose of restoring themselves to first position after operating said low pressure valve, a single-press-chamber immovably connected to said cylinder, said press-chamber having a fluid pulp inlet in its top and a dry pulp outlet in its bottom, and having one open end or side facing said piston, a plunger slidably fitting the open end or side of said press-chamber and connected to said piston rod, a sliding gate disposed in said press-chamber beneath said plunger adapted to open and close said pulp outlet, a pressure actuated mechanism to automatically operate said gate, a sliding gate disposed in said press-chamber above said plunger adapted to open and close said pulp inlet, a pressure actuated mechanism adapted to be set in motion by the closing of said first named gate to automatically operate said second gate, a check-valve connected to one part of said last named mechanism adapted to delay the opening of said inlet gate until after the outlet gate has been closed, a frame having its lower end open disposed in said press-chamber in a plane parallel to and registering with the inner face of said plunger, the said frame adapted to receive the dry pulp remaining after each pressing of the fluid pulp, means for lowering said frame for the discharge of the dry pulp, and means for returning said frame to said press-chamber before the opening of said pulp inlet.

10. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve to supply low pressure to operate said piston reciprocally, a second valve to supply high pressure to operate said piston in one direction only, a series of independent pressure operated parts to partially control said low pressure valve, the said parts being self-acting for the purpose of reversing themselves after operating said low pressure valve, a press-chamber immovably connected to said main cylinder, said press-chamber having a fluid pulp inlet at its top and a dry pulp outlet at its bottom, and having one open side facing said main cylinder, a platen slidably fitting the open side of said press-chamber and connected to said piston rod, a bottom gate disposed in said press-chamber beneath said platen adapted to open and close said pulp outlet, a pressure actuated mechanism adapted to be set in motion by the outward movement of said platen to automatically operate said bottom gate, a top gate in said press-chamber above said platen adapted to open and close said pulp inlet, a pressure controlled mechanism adapted to be set in motion by the closing of said bottom gate to automatically open and close said top gate, a check-valve connected with one part of said mechanism adapted to prevent the opening of said top gate until after the bottom gate has been closed thereby to prevent escape of the fluid pulp through said outlet until the same is acted upon by said platen, and a series of parts connecting with said low pressure valve adapted to be operated by the closing movement of said top gate, thereby to recharge the main cylinder with low pressure to effect the beginning of a new cycle or round of pressing operations, substantially as described.

11. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve connected to said main cylinder adapted to supply a low pressure to operate said piston reciprocally, a second valve mounted on said main cylinder adapted to supply a high pressure to operate said piston in one direction, a group of pressure actuated parts to partially control said low pressure valve, a group of pressure controlled parts to operate said high pressure valve, a press-chamber connected to said main cylinder, a pulp inlet in the top of said chamber, a pulp outlet in the bottom of said chamber, a platen vertically disposed in one end of said press-chamber and connected to one end of said piston rod, the inner face of said platen fitted with a grooved drainage plate and a perforated strainer plate, a grooved drainage plate and a perforated strainer plate fitted to the inner face of the opposite end of said press-chamber facing said platen, a sliding gate disposed in the upper side of said press-chamber beneath said pulp inlet, an automatic

mechanism to control and operate said sliding gate, a gate disposed in the bottom of the press-chamber above said pulp outlet, an automatic mechanism to control and operate said gate, a frame for receiving a cake of pulp resulting from the pressing of the fluid pulp by said platen, disposed in said press-chamber directly above said pulp outlet, the said frame connected to the bottom gate and adapted to be lowered through said pulp outlet to discharge the cake of pulp by the opening movement of said gate, and a pair of weights to lift and hold said frame in said press-chamber while said bottom gate is closing, substantially as described.

12. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve connected to said main cylinder adapted to supply a low pressure to operate said piston reciprocally, a second valve mounted on said main cylinder adapted to supply a high pressure to operate said piston outwardly, a group of pressure actuated parts to partially control said low pressure valve, a series of pressure controlled parts to operate said high pressure valve, a check-valve carried by the latter series adapted to prolong or shorten the duration of the high pressure in said main cylinder, a press-chamber connected to said main cylinder, said press-chamber having a fluid pulp inlet in its top and a dry pulp outlet in its bottom, and having one open end facing said main cylinder, a platen operatively fitting the open end of said press-chamber and connected to one end of said piston rod, a sliding gate disposed in said press-chamber beneath said pulp inlet, an automatic pressure-controlled mechanism to operate said gate, a second gate disposed in the bottom of said press-chamber above said pulp outlet, an automatic pressure-controlled mechanism to operate said gate, a frame adapted to receive a cake of dry pulp resulting from the pressing of the fluid pulp by said platen, disposed in said press-chamber directly above said pulp outlet, the said frame connected to the bottom gate and adapted to be lowered through said pulp outlet for the ejecting of the pulp cake by the opening of said gate, a pair of rollers disposed beneath said press-chamber adapted to effect the removal of the pulp cake from said frame, and a pivoted lever to spread said frame for the purpose of loosening the pulp cake, substantially as described.

13. An automatic pulp press of the class described, comprising a main cylinder having a piston and a piston rod, a valve connected to said main cylinder adapted to supply a low pressure to operate said piston reciprocally, a second valve mounted on said main cylinder adapted to supply a high pressure to operate said piston in one direction, a group of pressure-actuated parts to effect the operation of said piston in the opposite direction, a series of pressure-controlled parts to open and close said high pressure valve, a check-valve carried by a two-piston cylinder adapted to prolong or shorten the duration of the high pressure in said main cylinder, a press-chamber connected immovably to said main cylinder, said press-chamber having a fluid pulp inlet at its top and a dry pulp outlet at its bottom, and having one open side facing said main cylinder, a platen operatively fitting in the open side of said press-chamber and connected to one end of said piston rod, a sliding gate disposed in said press-chamber beneath said pulp inlet, a sliding gate disposed in said press-chamber beneath said platen and above said pulp outlet, a frame adapted to receive a cake of pulp resulting from the pressing of the fluid pulp, disposed in said press-chamber directly above said pulp outlet, the said frame connected with said bottom gate and adapted to be lowered through said pulp outlet by the final opening movement of said gate, a pair of rollers disposed beneath the pulp outlet adapted to grip and carry away the cake of pulp from said frame, and a pair of weights to raise said frame simultaneously with the initial closing movement of said bottom gate.

14. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a press-chamber immovably connected to said main cylinder having one open end facing said main cylinder, and having a pulp inlet through its top and a pulp outlet through its bottom, a platen movably fitting the open end of said press-chamber and connected to one end of said piston rod, a slidable gate disposed in the bottom of said press-chamber above said pulp outlet, a valve operable by said platen and a cylinder operatively connected to said gate adapted to open and close said pulp outlet at each outward movement of said platen, a sliding pulp gate disposed in the top of said press-chamber beneath said pulp inlet, a valve operable by said lower gate and a cylinder operatively connected to said pulp gate adapted to open and close said pulp inlet after the closing of said lower gate, a valve connected with said main cylinder adapted to be operated by the closing movement of said pulp gate to supply low pressure to said main cylinder to begin the pressing of the fluid pulp in said press-chamber, a second valve connected to said main cylinder adapted to be operated reciprocally by the initial inward movement of said platen, to supply high pressure to said main cylinder for effecting the final pressing of the pulp and for shutting off said high pressure, and a group of automatic pressure actuated parts adapted to reverse said low pressure valve and effect the return movement or travel of said piston and said platen.

15. An automatic pulp press, comprising a double headed cylinder having a piston and a piston rod, a valve to supply a low pressure to both sides of said piston, a second valve to supply a high pressure to one side of said piston, a single press-chamber connected to said cylinder, said press-chamber having a fluid pulp inlet at its top and a dry pulp outlet at its bottom, and having one open end facing said cylinder, a plunger slidably fitting the open end of said press-chamber and connected to one end of said piston rod, by means of which said plunger may be forced into or withdrawn from said press-chamber by the reciprocal movements of said rod, a sliding gate to open and close the pulp inlet, a pressure-controlled mechanism to reciprocally operate said gate, a slidable bottom to open and close said pulp outlet, a pressure-controlled mechanism to reciprocally operate said bottom gate, and a frame disposed in said press-chamber between said gate and said bottom in which a cake of dry pulp may be formed by the inward movement of said plunger, substantially as described.

16. An automatic pulp press, comprising a main cylinder having a piston and a piston rod, a valve to supply a low pressure to operate said piston reciprocally, a second valve to supply a high pressure to drive said piston in one direction only, a group of independent pressure actuated parts to partially control said low pressure valve, a single press-chamber immovably connected with said main cylinder, said press-chamber having an inlet for the admission of fluid pulp at its top, and an outlet for the discharge of dry pulp at its bottom, and having one open end facing said main cylinder, a platen connected to the outer end of said piston rod and slidably fitting in the open end of said press-chamber, a sliding gate disposed in the press-chamber above the platen to open and close said inlet, a pressure-actuated-mechanism to operate said gate automatically, a sliding bottom disposed in the press-chamber beneath said platen to close and open said outlet, a pressure-actuated-mechanism to automatically operate said bottom, and a frame having its lower end open disposed in the press-chamber in a plane parallel to the inner face of the platen, the lower open end thereof adapted to receive the inner end of said bottom, the said frame adapted to be held in the press-chamber during the pressing of a cake of pulp, and then lowered through said outlet by the opening of said bottom to discharge said cake, substantially as described.

17. An automatic pulp press, comprising a main pressure cylinder having a piston and a piston rod, a valve to supply a low pressure to both sides of said piston, a second valve to supply a high pressure to one side of said piston, a double piston cylinder to control said high pressure valve, a single press-chamber immovably connected to said cylinder and having one open end facing said cylinder, a fluid pulp inlet in the top of said press-chamber, a dry pulp outlet in the bottom of said press-chamber, a slidable pressure-head fitting the open end of said press-chamber and connecting to one end of said piston rod, a sliding gate operatively disposed in said press-chamber between said pulp inlet and said pressure-head, a pressure-actuated mechanism to reciprocally operate said gate for opening and closing said pulp inlet, a slidable bottom operatively disposed in said press-chamber between said pulp outlet and said pressure-head, and a pressure-actuated mechanism to reciprocally operate said bottom for opening and closing said pulp outlet, substantially as described.

18. An automatic pulp press, comprising a press-chamber having one open end, and having an inlet for fluid pulp at its top and an outlet for dry pulp at its bottom, a platen movably fitting in the open end of said press-chamber, a pulp gate slidably fitting in the open end of said press-chamber above said platen, a bottom gate slidably fitting in the open end of said press-chamber beneath said platen, a vertically movable pulp frame disposed in said press-chamber normally registering with the inner face of said platen, a main pressure cylinder immovably connected to said press-chamber and operatively connected to said platen, an auxiliary cylinder adapted to operate said pulp gate reciprocally, an auxiliary cylinder adapted to operate said bottom reciprocally and also to effect the lowering of said pulp frame into said pulp outlet, and a pair of weights to raise said pulp frame to its position in said press-chamber, substantially as described.

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

KRISTEN A. TORSEN.

Witnesses:
HARRY KAY,
HARRY W. SUDDS.