No. 819,996. PATENTED MAY 8, 1906.

H. A. HERR.

AUTOMATIC PRESS.

APPLICATION FILED OCT. 6, 1903.

5 SHEETS—SHEET 1.

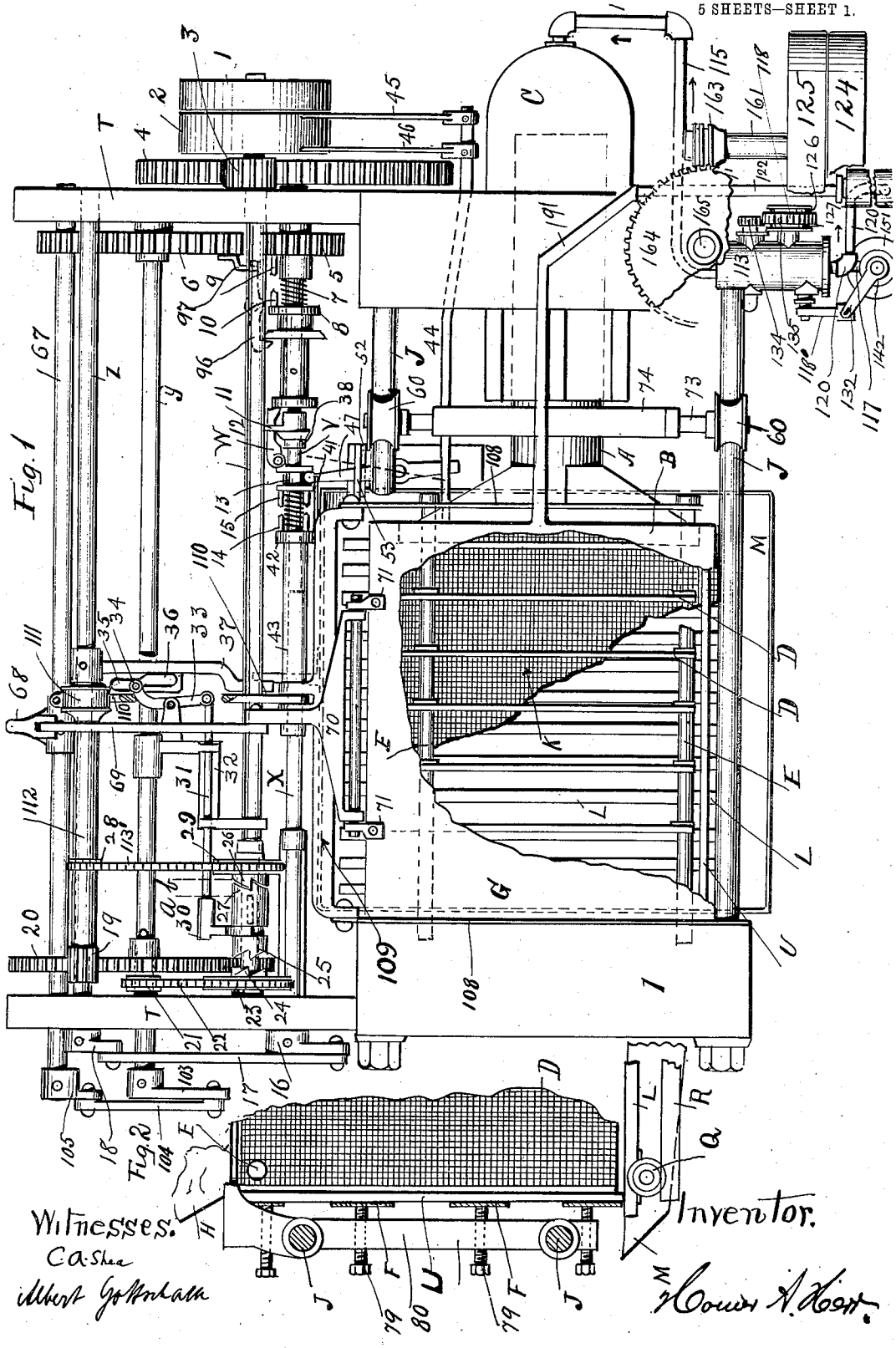

Fig. 1

Witnesses.
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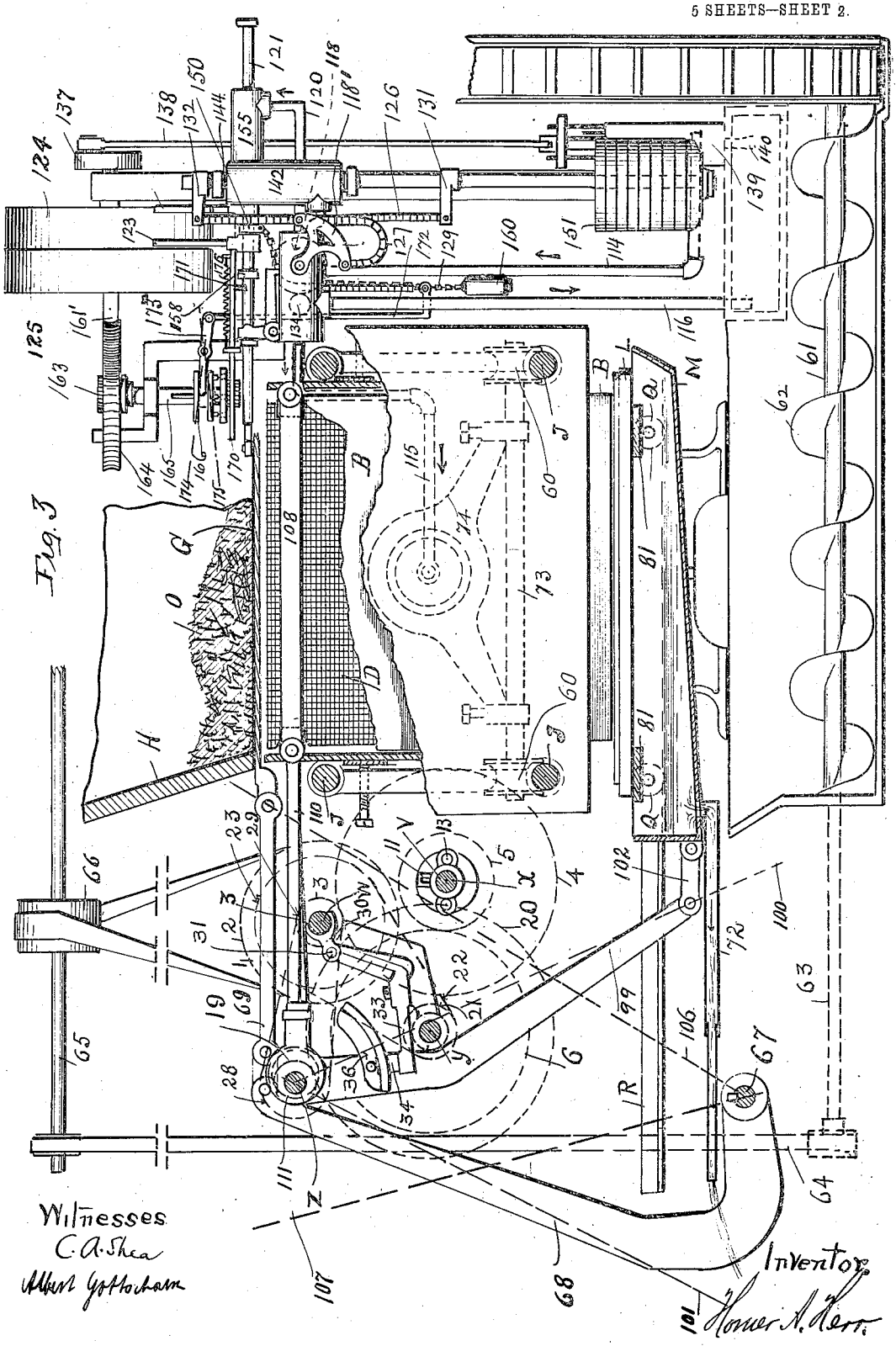

Fig. 3

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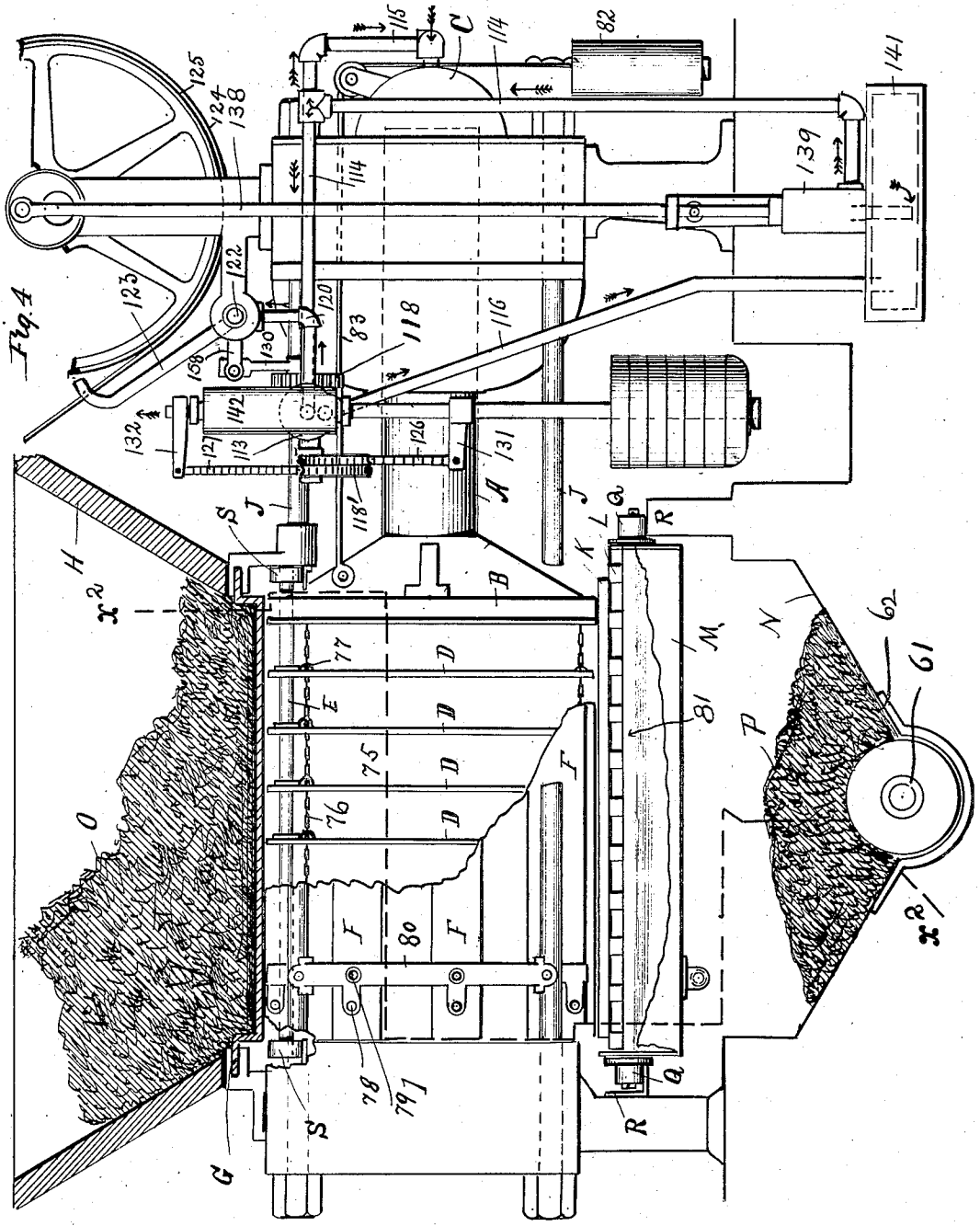
5 SHEETS—SHEET 3

Fig. 4



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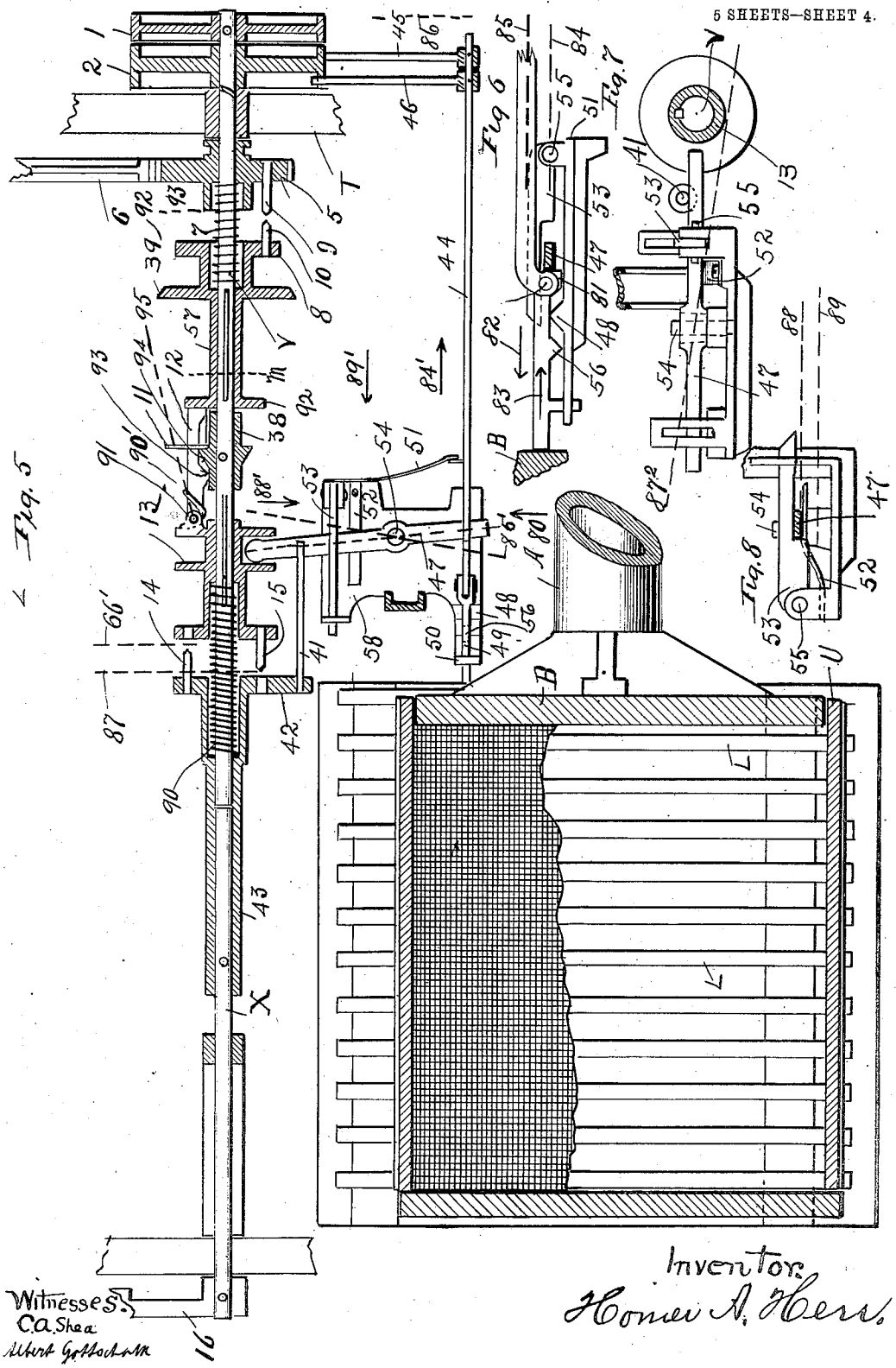

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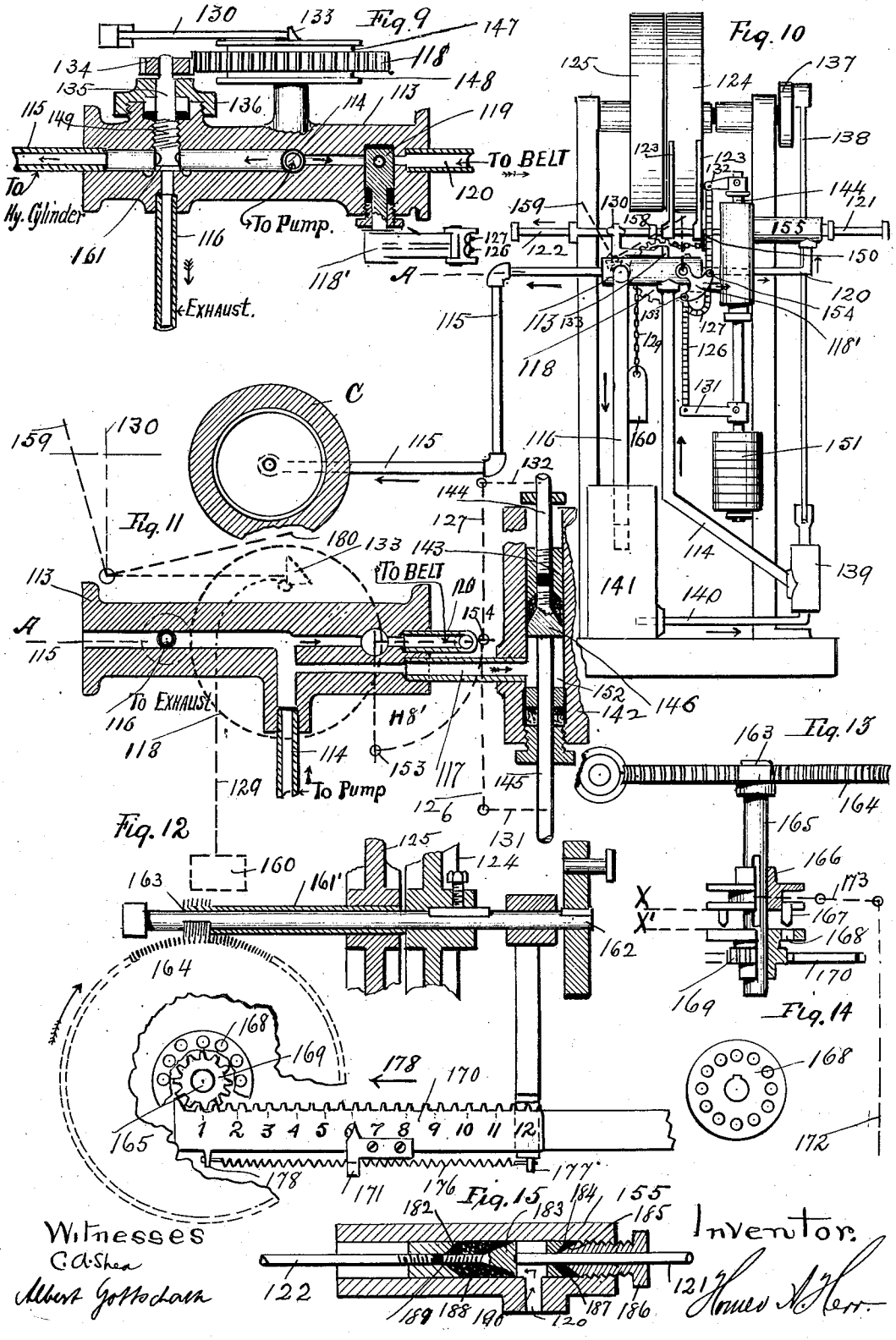

UNITED STATES PATENT OFFICE.

HOMER A. HERR, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC PRESS.

No. 819,996. Specification of Letters Patent. Patented May 8, 1906.

Application filed October 6, 1903. Serial No. 176,020.

To all whom it may concern:

Be it known that I, HOMER A. HERR, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Presses, of which the following is a specification.

My invention has reference to liquid-extracting presses; and it consists of features fully set forth in the following specification and accompanying drawings, forming part thereof.

In my application, Serial No. 130,239, filed November 6, 1902, I show and claim an automatic liquid-extracting press wherein the feeding, the discharging, the starting, the stopping, the residuum-conveying, and other functions are all done automatically. This present invention is an improvement in the device therein shown; and it consists of the following features: In liquid-extracting it is often necessary to sustain the pressure at maximum after it has reached this degree. This invention therefore includes, in combination with automatic means for filling the pressing-chamber, automatic means for discharging the chamber of the resi uum, automatic means for cleaning the walls of the compression-chamber, automatic means for starting the compression, automatic means for stopping the pressure, and automatic means for sustaining the pressure at maximum for any desired period of time, depending on the efficiency of the pressure desired. At the expiration of this time period the pressure is automatically withdrawn and the pressing members and all the coacting elements are returned to their normal position. The means I employ to accomplish this result are as follows: As the belt is shifted from the fast to the loose pulley of the pump the loose pulley is of course actuated rotatively. On being so actuated it actuates a worm-wheel. This worm-wheel communicates motion to a sliding in icator or scale. This indicator is shown in the drawings as sliding; but I do not limit myself to a sliding motion for the same. It could oscillate or rotate. The indicator carries a stop which admits of adjustment, and this adjustment is divided into units of one minute. There can be as many of these units as may be desired. In the drawings I show twelve units, equivalent to a twelve-minute sustaining of the pressure. After the indicator has traversed this twelve-minute cycle it contacts, by virtue of a trip it carries, with a valve-lock and moves it. The moving of this valve permits the valve to be opened that is interposed between the hydraulic cylinder and the exhaust. The water is thus permitted to flow from the said cylinder, or, in other words, is exhausted, and the platen is free to return to its normal position. This valve-trip remains out of locking position until the belt is shifted to the fast pulley of the pump, at which time it closes the said exhaust-port, and the action of the pump is again free to exert pressure in the hydraulic cylinder. The operation is repeated after each pressure in the cylinder or each shifting of the belt from the fast to the loose pulley. The details of this mechanism and other coacting features will be described more at length hereinafter.

A second feature of my present invention, in combination with the features hereinbefore referred to, consists of means to settle the material it is intended to press evenly over every part of the pressing-chamber and to do this while the said chamber is filling. This consists of means to slowly reciprocate the racks while the filling is in progress, thus permitting the material to settle all around them, insuring absolute uniformity of distribution, and therefore absolute uniformity of pressure.

The means I employ for starting the machine, actuating the lid, the bottom, the racks in their cleaning function, the residuum-conveyer, and other elements are all broadly substantially the same as shown in my application hereinbefore referred to, and therefore a mere reference to them is sufficient at this time; but a description of their connection with the new features of my invention will be given hereinafter.

In the drawings like parts are referred to by marks or figures of a corresponding kind in the different views.

Figure 1 is a general plan of the machine. Some of the features for sustaining the pressure are omitted from this view in order to the better explain the automatic valve-actuating mechanism. Fig. 2 is a section on one end of the machine, showing the relation between the tension-rods and the supports for the lateral trays U. Fig. 3 is an end elevation showing pump-sustainer and a part vertical section of the compression-chamber on line X^2 X^2 of Fig. 4. Fig. 4 is a vertical section through the hopper and the residuum-conveyer and the pump in elevation with the

pressure-sustainer removed. Fig. 5 is a horizontal section through the automatic tripping mechanism. Figs. 6, 7, and 8 are details. Fig. 9 is a horizontal section through the valve-chamber of the conductor between the pump and the hydraulic cylinder or a section on line A. Fig. 10 is a side elevation of the pump with the automatic tripping mechanism in position. Fig. 11 is a vertical section on the valve-chamber and a part vertical section through the valve-chamber for actuating the valve for permitting the water to flow from the said chamber to the belt-shifting hydraulic chamber. I term this latter chamber the "accumulator." Fig. 12 is a horizontal section through the fast and loose pulleys of the pump, showing the sleeve carrying the worm on the loose pulley, and a part plan of the indicator mechanism for the pressure-sustainer. The connections are broken away in this view. Fig. 13 is a part elevation and part vertical section through the shaft-clutch and indicator. Fig. 14 is a plan of the clutch-jaw. Fig. 15 is a longitudinal section through belt-shifter hydraulic chamber.

A is the ram, carrying the platen B and working in the hydraulic cylinder C.

D D D D are a series of racks carried on the rod E and united by a link chain 76. These racks are fixed to this chain by pins or any suitable means so that when the chain is taut, as shown in Fig. 4, they are approximately the same distance apart. Pins 77 hold the racks to the chain.

F F are lateral plates for holding the lateral rack U in position, the latter forming one of the sides of the compression-chamber. Figs. 1 and 2 explain this. The sides are similar, and this showing, it is thought, is sufficient to make this clear. The plate F is held to the arm 80 by the pin 78. (Shown in Fig. 4.) The screw 79 adjusts the plate and therethrough the lateral wall U of the compression-chamber.

K is the bottom tray of the compression-chamber, and L L are a series of staves or wooden members on which the tray rests.

81 81 are cross-bars carrying rollers Q, Fig. 3, on which parts L and K are supported.

M is a water carrier and collector and receives the drainage of the racks D D D and conveys it through the outlet-pipe 72 to any desired point.

J J are tension-rods, 74 a supporting-frame for the ram A, Fig. 3, and 73 is connecting-rod for the rollers 60 60, running on the said tension-rods.

61 is a sleeve carried on shaft 63 and carrying conveyers 62 for carrying the residuum from the machine automatically.

64 is a belt actuated by belt-shaft 65, which is the line-shaft of the pressing-room.

W is the prime shaft of the machine.

T T are two standards carrying all the shafts of the machine. (Shown only in Fig. 1.)

3 is a small gear carried by the prime shaft W, which pinion-gear actuates the spur-gear 4 on shaft V.

1 is a fast and 2 is a loose pulley, both carried by the shaft W.

5 is a clutch-gear moving loosely on the shaft V and not controlled in its rotary motion by this shaft. 8 is also a clutch-jaw, but splined to the shaft V, as shown in Fig. 5. Therefore 8 has a longitudinal motion on the shaft, but cannot rotate independent of the shaft.

7 is a spring interposed between the clutch-jaws 9 and 10 of their respective supports 5 and 8.

38 is a stop fixed to the shaft V and carrying a guide 11 for the lever 12, which latter is carried by the jaw 13, the latter also splined to the shaft V, and thus having a longitudinal motion thereon independent of the rotary motion. This clutch-jaw 13, however, rotates with the shaft which carries it, as is evident.

14 and 15 are two clutch-jaws.

42 is a clutch-jaw support and an integral part of the tubular part thereof 43.

X is a shaft in longitudinal alinement with the shaft V, and the tubular member 43 forms a bearing for the end of the said shaft V. The tubular part 43 is fixed to the shaft X. Thus the shaft V rotates independent of the shaft X, and the parts 42 and 5 are normally stationary, while the parts 8 and 13 (clutches) are normally rotating.

The mechanism just described is a compound automatic clutch mechanism for automatically transferring motion from the bottom-actuating mechanism to the mechanism for opening the top of the compression-chamber, and its operation is as follows: As the ram A and the platen B, which it carries, are returned to their normal position by the weight 82 of the chain 83 the platen contacts with the rod 49, an extension of the belt-shifter rod 44, and moves it in the direction of the motion of the platen, as indicated by the arrow 84', Fig. 5. The lever 47 at the time of contact is in the position indicated by the line 85', Fig. 5. The end clutch-pin is now on the line indicated at 66' instead of 87, as shown in the drawings. As the platen B continues its motion the lever 47 is oscillated until it occupies the position shown in the solid drawings, Fig. 5, and in this position the clutch-pins 14 and 15 are in the same rotary plane, and therefore the shaft X, through the members 42 and 43, is rotated. The lever 53 meanwhile drops in engagement with the lever 47 and locks it, and by so doing the clutch 13 is locked in engagement with the clutch 42. Fig. 8 shows this lever in locking engagement with the lever 47. Fig. 8 is looking in the direction of the

arrow 88′. Fig. 7 is looking in the direction of the arrow 89′, and Fig. 6 is looking in the direction of the arrow 80. The lug 81 of the rod 49, as shown in Fig. 6, engages with the lever 47. In Fig. 6 the arrow 82 shows the direction of resistance for the lever 53, and the arrow 83 the direction of resistance for lever-rod 49. I have now described how the clutch 13 is moved and locked for its rotary motion. It is important that I accomplish this motion before the platen has had its complete return to normal position and that the belt should not be shifted from the loose pulley 2 to the fast pulley 1 until this is accomplished or until the clutch-jaws 14 and 15 are engaged. These latter functions I accomplish as follows: 56 is a cam-trip carried by the shifting-rod 49. The parts are so timed that after the clutches aforenamed have become engaged to their limit this cam 56 engages with the cam 48 of the plate 51, and thus raises the arm 49, carrying belt-shifting rod 44 to a degree sufficient to disengage the lug 81 from the lever 47, or, to be graphic, it raises the lever from the line 84 to the line 85, Fig. 6, and on being so raised the lug 81 becomes disengaged from the lever 47, the lever 47 remaining locked by the elements described, and the belt-shifter rod 44 continuing its movement a distance until the belt-shifting arms 46 and 45 have moved a distance equal to the distance from the arm 45 to the dotted line 86, Fig. 5. The belt is now on the tight pulley and the shaft X, by virtue of the clutches 14 and 13 being engaged, will rotate. This rotation will continue until one full cycle or rotation of the shaft X is made, after which the spring-rod 41 will contact with the lever 47 and oscillate it downward, as shown in Figs. 5 and 7, until this lever takes the position shown by the dotted medial line 87. This movement is indicated by the lines 88 and 89 and is sufficient to disengage the lever 47 from the locking-arm 53. Immediately the spring 90, Fig. 5, will force the clutch 13 longitudinally on the shaft V until it contacts with the stop 38 and its motion is thus arrested. Meanwhile the point of the clutch-pin 15 will have moved from the line 87 to 66′, and thus the clutches 42 and 13 are disengaged, but the belt is still on the fast pulley.

12 is a trip dog or lever carried by the clutch 13 pivotally, 91 being the supporting-pivot therefor. This dog is normally held down by a spring. Now, therefore, as the clutch 13 is moved longitudinally on the shaft V, as described, and as the clutch 8 is in contact with the free end of the lever-dog 12 it will be moved also longitudinally on the shaft V, and this movement will bring the end 92 of the latter clutch to the dotted line M, thus bringing the clutch-pins in engagement, and therefore the clutches 5 and 8 will be engaged. Now as the clutch 5 is also a gear-wheel and rotates the spur-gear 6 its connecting parts are thus rotated. These parts will be presently described. The manner in which the dog 12 becomes disengaged from the annular flange 92 of the clutch 57 is as follows: As the clutch 13 receives its longitudinal motion in the manner described the arm 93 of the dog strikes the cam 94 of the stop 38, and the force of the spring 90 immediately oscillates the arm 12, so that its radial line of force is thrown in the direction of the dotted line 95, thus disengaging the two clutches, and they can move longitudinally independently thereafter until the lever 12 is again moved up, as shown in Fig. 5. After the clutch 8 is moved, as described, it is necessary to lock it in this position until the gear 6 has had one full rotation. I accomplish this as follows: 96 is a hooked lever, spring-controlled as to its normal position. (Shown only in Fig. 1.) Now as the cam-face 39 of the clutch 8 strikes the lever named it snaps around and holds it until released by a trip 97, carried by the spur-gear 6, and this trip acts only after one complete revolution of the said gear. On the completion of this said spur-gear's revolution the said lever is oscillated, and thus becomes disengaged from the said annular flange 39. The spring 7 thereafter instantly disengages the clutches 5 and 8 and forces the clutch 8 and all its connections rearward until the annular flange 92 strikes the stop 38. This stop, it will be understood, is fixed to the shaft V, rotates with it, and has no longitudinal motion thereon. It must be remembered that the spring 90 must be of sufficient strength to move the arm 12 in the manner described and the clutches 13 and 8 and also compress the spring 7. The spring 7 must be of sufficient strength to disengage the clutches 5 and 8 and force the clutch 8 back against the stop 38.

Returning now to the shaft X where we left it engaged for rotation, this shaft carries a crank-arm 16 and the crank-arm 16 a link 17, and the link is pivoted to a crank-arm 18 of the rod Z. (Shown only in Fig. 1.) The position of these shafts is indicated in Fig. 3, and as the shafts V and X are on the same horizontal plane they are represented by a single circle in this view.

99 is a lever carried by the shaft Z, and as the arm 18 is three times the length of the arm 16 in practice a rotation of the latter oscillates the former, and thus the lever 99 is oscillated by the rotation of the crank-arm 16 and its shaft X. The parts are of such relative length that this oscillation must be sufficient to swing the arm 99 from the line 100 to the line 101, Fig. 3. The link 102 connects the lever with the water-tank M, and the water-tank carries the cross-bars 81, slats L, and bottom tray of the compression-chamber. Thus a movement of the lever 99 from 100 to 101 opens the bottom of the com-

pression-chamber, and a movement of the same arm from 101 to 100 closes this chamber, and these movements are accomplished by the rotation of the shaft X. Therefore just as the lever 99 returns to the position indicated by the dotted line 100 after having been oscillated to its limit 101, the spring-rod 41 contacts with the lever 47 and unlocks the clutches 13 and 42, as already fully described.

The operation of the lid is as follows: As the gear 6 is rotated the shaft Y, to which it is fixed, also rotates. This shaft carries a crank-arm 103, and this crank a link 104, and to this link is pivoted the crank 105, rigid with the shaft 67, the latter shaft carrying the lid-actuating arm 68. Through the link 69 the lid G is connected. Now as the shaft Y is rotated one revolution the arm 68 oscillates from the dotted line 106 to the line 107 and returns, and this angular movement opens and closes the lid of the chamber, permitting the material to fall into and fill the compression-chamber.

I have now shown how I open and close the bottom of the compression-chamber, how I open and close the lid of this chamber, and how I transfer my power automatically from the actuating mechanism of one to the other. This mechanism is almost the same as that shown in my application hereinbefore referred to. There are, however, some changes in the position and form of the connecting-levers and their actuating parts, and in that regard the present structure is an improvement over my former application.

In practice it has been found that in addition to cleaning the walls of the compartments it is necessary to settle the material around the racks effectually while the chamber is filling. This feature is new over the showing in my former application referred to and in connection with my rack-cleaning mechanism operates as follows: D D D D are the drainage-racks. There can be any number of these racks desired. They are covered with the usual "cheese-cloth" of commerce. E E are the supporting-rods for these racks. Two bars 108 108 (shown in Fig. 1, also in Fig. 3) connect these rods with a union 109, Fig. 1 only. A link 110 connects this union with an eccentric 111. On the prime shaft W is a sprocket-wheel 23, connected by a sprocket-chain 22 with a sprocket-wheel 21, rigid with the gear 20, and both rotate loosely on the shaft Y—that is, this shaft merely serves as a journal for these two wheels. 19 is a pinion actuated by the spur-gear 20. This pinion is rigidly fixed to the sleeve 112, and this sleeve carries the eccentric 111. Also the small sprocket-wheel 28 is carried by this sleeve. 113′ is a sprocket-chain connecting the small sprocket-wheel 28 with the sleeve, which carries it to the larger one 29 on the shaft W. The sleeve 112 and all its rigid connections—*i. e.*, the eccentric, the sprocket-wheel 28, and the pinion 19—rotate on the shaft Z, the said shaft acting as their journal. The sprocket-wheels 29 and 23 rotate on the shaft W independent of the shaft, the shaft merely acting as their journal, as explained. 25 and 27 are jaws of a double clutch. This clutch is splined to the shaft W, and therefore rotates with the said shaft. 26 is a clutch-jaw on the sprocket-wheels 29 and coacts with the clutch-jaw 27 of the body of the clutch. 24 is a clutch-jaw on the sprocket-wheels 23 and coacts with the clutch-jaw 25. 35 is the high part of a cam, and 36 is the low part thereof. This cam is carried by the bottom-actuating arm 99. 33 is a lever. 31 is a rod connecting rod 31 with member 30. Now as the lever 99 swings rearward, opening the bottom of the compression-chamber, the clutch-jaws 24 and 25 will become engaged. Thus the clutch will lock the sprocket-wheel to the prime shaft W, and the large sprocket-wheel will actuate the smaller one 21, and the large spur 20 will actuate the sleeve 112 through the pinion 19, and therefore the eccentric 111 and the bars 110, carrying the rods E E, which support the racks D D D D. This arrangement tually of any impacted residuum. This reciprocating motion and cleans them effecgives to these racks a very rapid transverse cleaning takes place when the bottom is open or when the lever 99 is near the position indicated by the dotted line 101 and for possibly twenty per cent. of its return motion. While this rapid reciprocation of the racks is taking place the end of the clutch occupies the position indicated by the line *a*, Fig. 1, and the jaws 24 and 25 are engaged. As the arm 99 is moved inward, as already described, the friction-roller 34 rides to the part 35 of the cam and swings the clutch to the position shown by line *b* in Fig. 1, and the jaws 26 and 27 are engaged. Thus the sleeve receives its motion from the shaft W through the sprocket-wheels 29 and 28, and there is little augmenting of speed. The normal rotation of the shaft W is about sixteen revolutions per minute, and the relation of the diameters of the sprockets 29 and 28 is as three to one. The sleeve will therefore rotate about forty-eight times per minute, and the racks will reciprocate a like number of times as against about four hundred times per minute when the jaws 24 and 25 are engaged. On the fast reciprocation of the racks the same are cleaned; on the slow, the material is settled around them evenly.

The moment the wheel 6 makes one complete revolution and the lug 97 contacts with and unlocks the clutch 8 the spring 7 will unlock the said clutch 8 from its contact with the clutch 5 and force its disengagement and setting the clutch 8 for the next operation. In certain materials it may be necessary to stop the action of the trays at some point of

the movement of the arm 99. In this case I merely change the form of the track of the friction-roller in the cam 35 and 36 and disengage the clutch-jaws entirely from both sprocket-wheels.

I will now describe the mechanism I employ for actuating the belt-shifter of the pump and the means I use to sustain the pressure in the cylinder.

113 is a valve-chamber. 114 is a water-pipe leading from the pump 139 to this chamber. 115 is a water-conductor leading from the said chamber to the hydraulic cylinder C. 116 is an exhaust-pipe leading from this chamber to the water-tank 141. 117 is a water-conductor leading from the said valve-chamber to the accumulator-chamber 142.

143 is a piston in the accumulating-chamber carrying a rod 144, which in turn carries an arm 132 for the chain 127. 145 is a rod carrying an arm 131, which carries a chain 126. These chains 126 and 127 are both fixed to and control the valve 119.

118 is a spur-gear pivotally supported on the side of the valve-chamber 113. It carries two chain-channels 147 and 148. 133 is a lug integral with the side having channel 147, and 130 is a pivoted bell-crank lever engageable with this lug. 134 is a pinion meshing with this spur 118. 135 is a compensating valve closing the outlet to the exhaust-port 116. The pinion 134 therefore is virtually supported on the valve-stem and has a longitudinal motion as well as a rotary, the latter given it by the spur, the former by the screw carried by the valve.

129 is a chain carried by the wheel 118.

150, Figs. 3 and 10, is a chain support carried by the shaft or rod 122 at one end and fixed to the gear 128 at the other. The function of this chain support is to return the spur 118 to normal position while the belt-shifting rod 122 is so returned. In other words, it will be evident that as the belt-shifting rod 122 passes the belt from the fast to the loose pulley the exhaust-valve is closed by the spur-gear 118 rotating the valve-seating pinion 134, Fig. 9, and the arm 150, Fig. 3, carried by the said belt-shifter rod is connected with the said spur 118 by the chain shown in Fig. 3, through which the said spur is rotated, while the belt-shifter rod 122 returns to normal position.

125 is the loose pulley of the pump, and 124 is the tight pulley thereof.

137 is the crank-disk on the pump-shaft, and 138 the connecting-rod between the pump and the crank.

151 is a weight on the rod 145 of the accumulator.

Having described the parts of the automatic belt-shifting device, its operation is as follows: As the pump is started automatically or otherwise the water follows the direction of the different arrows first through the pipe 114 to the valve-chamber 113. In consulting the vertical longitudinal section, Fig. 11, of this valve-chamber it will be seen the pipe 115 is continuously open, and thus there is a perpetual open connection or conductor leading from the pump to the hydraulic chamber of the machine, as shown in Fig. 10. The pressure is therefore the same in this chamber as in the pressing-cylinder C. Now by consulting the same figure it will be seen the pipe 117, leading from the said valve-chamber to the hydraulic chamber 152 of the accumulator, is also always open. Therefore the pressure on the parts of this chamber is the same as that on the working hydraulic cylinder C. In consulting the horizontal section of this valve-chamber it will be seen the outlet from the pump to the belt-shifter or the hydraulic chamber which controls the belt-shifter is obstructed by a valve 119. This valve is closed except at maximum pressure. Now as the pressure increases in the hydraulic cylinder C, and therefore in the chamber 152, and as it nears maximum the weight 151 is raised by the water pressing on the under side of the valve 146. As this is raised it operates the lever carried by the valve 119 ninety degrees or until the point of this lever 153 is oscillated ninety degrees to the radial line 154, Fig. 11, in which latter position the valve 119 is turned and open. The water will then immediately with the same pressure that is on the cylinder C be admitted to the belt-shifting chamber 155, and the belt will be moved from the fast pulley 124 to the loose 125, and the pumping will cease with pressure at maximum.

It often happens that it is desirable to instantly discharge the pressure from the chamber of the cylinder. This I accomplish automatically by the following means: 130 is a bell-crank lever conveniently pivoted. One arm of this lever engages a lug 133 on the spur-gear 118, Figs. 3, 9, 10, and 11. Immediately on being so engaged the lever 130 will be oscillated from the position shown in the solid drawing, Fig. 10, to the position indicated by the dotted line. This unlocks the chain 129 through the weight 160, and the gear 118 will be immediately rotated, also the pinion 134, and thus give the valve-stem 135 a rotary motion and a longitudinal motion, and thereby unseat the valve 161, permitting the water to flow from the hydraulic cylinder C, also the accumulator-chamber 142 and the belt-shifting chamber 155. I have now described how I automatically stop the pressing, how I automatically withdraw the water from the cylinder C, for the moment the water is released from the accumulator-chamber 142 the valve will be reseated by the weight 151 in obedience to well-known laws. A small drain-port could be provided through

the valve 119 to exhaust the water effectually from the belt-shifting chamber in case the valve 119 should be seated before this necessary result was accomplished.

The reseating of the valve 161 is accomplished as follows: 150 is an arm carried by the belt-shifting rod 122, and a chain runs in channel 148, fixed to spur 118, and rotates said spur ninety degrees against a fixed stop. (Not shown.) This movement reseats the valve 161 and returns the belt to the fast pulley.

The manner in which I sustain the pressure in the hydraulic cylinder is as follows: As the belt is shifted from the fast pulley 124 to the loose pulley 125 of the pump in the manner and by the means described the loose pulley will be actuated, and, as will be seen by consulting Fig. 12, the loose pulley is carried on a sleeve which is mounted on a shaft 162. A worm 163 is carried by the sleeve, and this worm actuates a worm-gear 164. This worm-gear is fixed to the shaft 165. Splined to this shaft is a sliding clutch 168. This clutch has longitudinal motion on the shaft, and it only rotates with the shaft when the jaw 166 engages it. The manner in which these clutch-jaws engage is best shown in Fig. 13, where the jaw 166 is shown as keyed to the shaft 165 and where its mate and follower 168 are shown as loosely mounted on the said shaft 165. The specific structure of this clutch is not a matter of importance. I could use any device of the many applicable to my clutching function. 170 is a rack the teeth of which mesh with the teeth of the pinion 169, an integral part of the clutch-jaw 168. 176 is a spring, and 177 an attachment for the spring on the standard of the machine. 176 or the spring is fixed to the rack and at its opposite end to 177. The operation of this part of the mechanism is as follows: After the loose pulley has started rotating the worm-wheel 164 will be slowly actuated. This worm-wheel is best shown in Figs. 3 and 12, and we will assume that it has one hundred and eighty teeth. We will also assume that the belt-wheel of the pump makes about thirty revolutions per minute. In practice, however, it should run faster. On each revolution of the pump the worm-wheel 164 will rotate one one hundred and eightieths of a revolution, and on thirty revolutions of the pump, the number it is presumed to accomplish in one minute of time, the worm-wheel 164 will rotate one-sixth of a revolution. This worm-wheel will therefore rotate one-sixth of a revolution per minute. The pinion is actuated by the same shaft that actuates the said worm-wheel, and it has twelve teeth. Thus for every minute of loose-pulley revolution the pinion will move two teeth. The arrow 178, Fig. 12, indicates the direction in which the indicator moves when the loose pulley is rotating. Now we will assume that I wish the pressure to be sustained for six minutes at maximum. I then place the pointer on the trip 171 at the six-minute point, and at the expiration of six minutes the lug carried by the indicator 171 will contact with the tripping-arm 130, Figs. 10 and 3, and this arm will be oscillated to the medial line indicated by 159, Figs. 10 and 11. The lug 133 now being free to move, the weight 160 will pull the spur-gear ninety degrees down, and this rotation will raise the valve 161, thus exhausting the water from the reservoir C through the valve-chamber 113 and terminate the period of high pressure therein after sustaining it for a predetermined period of six minutes. The moment the wheel 118 is released in the manner described the weight 160 pulls not only the wheel 118, as described, but through the link 172 the lever 173 is raised, the raising of which disengages the clutch-jaw 166 from the jaw 168, whereupon the spring 176 pulls the indicator-bar back to its normal position. The dotted lines x and x' are diagrammatical and show the movement of the clutch-jaw 167, Fig. 13.

The dotted lines 172 and 173 in Fig. 13 correspond to the elements of like designation in Fig. 3.

For the successful working of the hydraulic machine it is absolutely essential that the valves are absolutely water-tight at high pressure. Fig. 15 shows my preferred manner of constructing the valves in the small chambers. 182 represents a piston. This piston carries a belt-shifter rod 122. The angle of the inner face of the said piston is thirty degrees. A plug 183 is carried by a rod 121. This latter rod permits of adjustment of the plug 183, and as it is rotated the screw end thereof 189 being threaded into the plug will draw it pistonward. This will pack the packing 188 water-tight. 190 is the water-chamber, and of course the pressure is in all directions the same. The packing 187 will be equally tight, as the parts 183 and 184 will be called upon to resist leakage.

It remains for me to describe how to start the pump automatically after the pressure has been sustained as above. It will be remembered after the valve 161 is opened to exhaust the water will flow out of the cylinder C and the weight 82 will return the said cylinder to normal. Meanwhile and during the action of the sustainer the compression-cylinder, or rather chamber, is entirely closed top and bottom; but the moment the platen contacts with the rod 49 it and 44, its extension, are moved and the automatic mechanism for opening and closing the bottom is actuated in the manner already fully described. Thereafter the top and its connections are actuated and the top is opened and closed. Now as the top is closed the arm 191 of the lid G (shown only in Fig. 1) strikes the belt-

shifter rod 122 of the pump, and this rod 122 will be moved. The moving of this rod will contact the arm 150, which it carries, with the lug 133 of the spur 118 and lock it after the chain 129 (shown in Fig. 3 and Fig. 10) rotates this spur ninety degrees, thereby bringing it to its normal position. The returning of the spur 118 as above reseats the valve 161 and closes the port, which exhausts. The chamber is now filled and ready for pressing again.

I do not confine myself to the specific features set out and could make many modifications without departing from the spirit of my invention.

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

1. In an automatic press the combination of a pressing-chamber, a platen moving in the said chamber, means for actuating the platen compressively, means for arresting the compressive action of the platen at a predetermined pressure limit, an indicator, a trip and a lock, whereby the indicator indicates a time period for predetermined maximum pressure, the lock locks the elements during this period and the trip trips the lock at the expiration of this period, thus unlocking the pressure, as and for the purpose set out.

2. In an automatic press the combination of a pressing-chamber, a pressing means moving in the said chamber, means for actuating the said pressing means, an indicator, means for predetermining a maximum pressure, a lock for sustaining the said maximum pressure at maximum, an adjustable trip guided in its adjustment by the indicator and means for automatically returning the pressing means to its normal position at the expiration of its predetermined sustained period after which the lock is tripped and the pressure is released.

3. In an automatic hydraulic press the combination of a hydraulic cylinder, a piston moving in the said cylinder, a pump having a fast and loose pulley, a liquid-conductor leading from the pump to the said cylinder, a belt-shifter actuating a belt from the fast to the loose pulley of the pump at maximum pressure automatically and means to force the belt automatically on the fast pulley on the fall of pressure.

4. In an automatic hydraulic press having a compression-chamber, a platen moving in the said chamber, automatic means for starting the action of the platen, automatic means for arresting the compressive action of the platen at maximum pressure, automatic means for maintaining maximum pressure for a predetermined period of time comprising a moving trip, a fixed lock, and a time-indicator for the trip whereby the indicator prescribes the position for the trip and at the expiration of the time so indicated the lock will be moved by the trip thus releasing the pressure on the platen.

5. In an automatic press the combination with the pressing-chamber of a platen moving in the said chamber, means for actuating the said platen, automatic means for arresting the compressive action of the platen at predetermined maximum pressure, means for predetermining and indicating maximum pressure and automatic means for releasing pressure when it reaches its predetermined maximum, means for maintaining a maximum pressure means for varying the period of time during which maximum pressure can be maintained and means for returning the pressing means to normal thereafter.

6. The combination in an automatic press of a compression-chamber, a platen moving therein, a pump, means for actuating the pump, a hydraulic cylinder a liquid-conductor from the pump to the hydraulic cylinder, a valve in the said conductor, hydraulic means for actuating the said valve controlled by the pressure in the cylinder means for maintaining the said valve in position whereby the pressure is prolonged in the cylinder at maximum and means for automatically exhausting the liquid in the cylinder.

7. The combination in an automatic press of a compression-chamber, a platen moving in the said chamber, a hydraulic cylinder, a pump, a conductor leading from the pump to the said cylinder, a belt-shifter, hydraulic means for actuating the belt-shifter and automatic means for exhausting the water from the said cylinder after the said belt is shifted.

8. The combination in an automatic hydraulic press of a compression-chamber, a platen moving in the said chamber, a cylinder for carrying the platen ram, a pump, a water connection between the pump and the cylinder, automatic means for stopping the pump, automatic means for sustaining the pressure in the cylinder for any predetermined time, automatic means for discharging the water from the cylinder at the limit of such time period and automatic means for starting the pump.

9. The combination in a hydraulic press of a cylinder, a pump having a fast and a loose pulley, a valve-chamber said valve-chamber having a pressure equal with that in the pump and the said cylinder, a hydraulic belt-shifter, a valve in the aforesaid chamber and means for automatically operating the said valve whereby the water is permitted to flow to the belt-shifter to shift the belt from the fast to the loose pulley of the pump thus arresting the pump action.

10. The combination in an automatic press of a compression-chamber, a series of compartments in said chamber, means for cleaning the walls of the said compartments, means for producing pressing action in said chamber to a predetermined maximum,

means for sustaining said pressure at maximum in said chamber for a predetermined time, and means for automatically releasing the said pressure at the expiration of the said time.

11. The combination in an automatic press of a compression-chamber, a series of walls dividing the said chamber into a series of compartments, automatic means for cleaning the walls of the said compartments, means for producing pressing action in the said chamber to a predetermined degree, means for sustaining the pressure at maximum for a predetermined time, an adjustable mechanical device for varying the period of high pressure and automatic means for releasing the said pressure at the expiration of the time period.

12. The combination in an automatic press of a compression-chamber, means for producing compressive action in the said chamber to a predetermined high-pressure limit, a belt-shifting device on the moving of which the actuating mechanism for compression ceases, automatic means for moving the said belt-shifter, means for maintaining a uniform high pressure for a predetermined time period and means for automatically releasing the pressure at the expiration of the said period.

13. The combination in an automatic hydraulic press of a cylinder, a platen, a compression-chamber, automatic means for arresting the compressing action of the platen at a predetermined pressure limit, automatic means for sustaining the water in the cylinder for a predetermined time, automatic means for discharging the water from the said chamber at the expiration of said time limit and means to regulate the time intervening between maximum compression and the time of discharge from the said cylinder.

14. The combination in an automatic hydraulic press of a compression-chamber, a platen moving in the said chamber, means for actuating the said platen, a top for the said chamber, automatic means for actuating the said top, a pump, a connection for conveying liquid from said pump to said cylinder, means for automatically stopping the pump, means for maintaining a sustained pressure in the cylinder for a predetermined time and means for automatically starting the pump, said means controlled by the lid-moving mechanism.

15. The combination in an automatic press of a compression-chamber, a platen moving in the said chamber, a means for actuating the said platen, a top for the said chamber, automatic means for actuating the said top, a pump, a liquid-conveyer from the pump to the said cylinder, means for automatically stopping the pump, means for automatically starting the pump said means consisting of a moving element of the machine and means for sustaining the pressure in the cylinder for a predetermined time.

16. The combination in an automatic hydraulic press of a compression-chamber, a platen moving compressively therein, means for actuating the platen, a top for said chamber, a bottom for said chamber, a pump, means for automatically starting the pump means for automatically stopping the pump, means for filling the chamber while the top is open, means for sustaining the pressure in the chamber for a predetermined time while the top and bottom are closed and means for releasing the pressure thus sustained preceding the opening of the bottom, as and for the purpose set out.

17. The combination in an automatic hydraulic press of a compression-chamber, a platen moving in the said chamber, means for actuating the platen, a top for said chamber, a bottom for the said chamber, a pump, means for automatically starting the pump, means for automatically stopping the pump, means for filling the chamber while the pump is idle, means for moving the lid over the chamber also while the pump is idle, means for sustaining the pressure in the chamber after the pump has forced the pressure to a predetermined high-pressure limit, means for sustaining the pressure at this limit for a predetermined time, means for opening the bottom of the chamber after the expiration of this time and automatic means for transferring motion from the bottom-actuating mechanism to the top-actuating mechanism while the pump is idle.

18. The combination in an automatic press of a pressing-chamber, a series of walls forming a series of drainage-racks or partitions in the said chamber, means for automatically cleaning the walls of the said partitions, a pressing means moving therein, means for stopping the pressure at a predetermined time, means for sustaining the pressure for a predetermined time and means for automatically releasing the pressure at the expiration of the said time.

19. The combination in an automatic press of a pressing means, a compression-chamber in which said pressing means moves, means for automatically cleaning the said chamber, automatic means for arresting pressure at a predetermined time, means for sustaining pressure thus arrested for a certain time limit, automatic means for releasing pressure permitting the pressing elements to return to their normal position, automatic means for starting the pressure after the said elements are so returned.

20. An automatic mechanism for a hydraulic liquid-extracting press in combination with the cylinder, platen, ram, compressing-chamber, pump, connection between the pump and the cylinder of a means to stop the pressure at a predetermined time, a means to hold the pressure and automatic means to return all the pressing elements to their nor-

mal position at the expiration of time limit for pressure-sustaining comprising an exhaust-port from the cylinder, means for opening this port and a gravity device controlling the return of the platen.

21. In an automatic hydraulic press having a compression-chamber and a pump with a liquid-conductor between the pump and the said cylinder a valve-chamber located in said conductor, a conductor leading from said chamber to the pump, a conductor leading from said valve-chamber to the cylinder, a hydraulic belt-shifter, a conductor leading from the said valve-chamber to the belt-shifter chamber, a valve therebetween, an accumulator-chamber, a conductor leading from the said accumulator to the said valve-chamber the said conductor being perpetually open permitting pressure in the said accumulator of like tension with that in the hydraulic cylinder, an exhaust-port, a valve in said port, whereby the pressure in the valve-chamber between the pump and the hydraulic chamber or cylinder will at all times be equally exerted in the accumulator and the pressure on the piston in this accumulator will open the valve in the conductor leading to the belt-shifter and the action of the belt-shifter will operate the valve in the exhaust-port, as and for the purpose set out.

22. The combination in an automatic hydraulic press of a pump, a hydraulic-pressure cylinder, a conductor leading from the pump to the said cylinder, a valve-chamber in this conductor, an exhaust-port in this chamber, automatic means for actuating this port, a belt-shifter valve in this chamber controlling the hydraulic actuating of the belt-shifter, and automatic means for actuating this belt-controlling valve, as set out.

23. The combination in an automatic hydraulic press of a pump, a hydraulic-pressure cylinder, a conductor leading from the pump to the said cylinder, a valve-chamber in this conductor, an exhaust-port in this chamber, automatic means for actuating this port, a belt-shifter-controlling valve in this chamber, automatic means for opening the valve leading to the belt-shifter and means for closing the same automatically.

24. The combination in an automatic press of a substance receiving and retaining chamber, means for producing compressive action in said chamber, a lid for said chamber, a bottom for said chamber, automatic means for arresting the pressure movable while the top and the bottom are closed, means for sustaining the pressure while the top and bottom are closed, automatic means for releasing the pressure and automatic means for operating the bottom after the pressure is released, as and for the purpose set forth.

25. In an automatic press the combination of a compression-chamber, a pressing member moving in said chamber, means for actuating the said member, an inlet to said chamber, an outlet from said chamber, means to sustain the pressure in said chamber at maximum for variable time periods while the inlet and outlet are closed, a hand-controlled indicating device whereby the variable time periods for pressure-sustaining are predetermined and predeterminable and means for opening the outlet after the pressure is released from maximum.

26. In an automatic press the combination of a pressing-chamber, a pressing member moving therein, means for actuating said member, an inlet to said chamber, an outlet from said chamber, automatic means to sustain the pressure in said chamber at a predetermined maximum while the said inlet and outlet are closed, hand-controlled means to vary and indicate the maximum period for pressure-sustaining, automatic means to open and close the outlet after maximum pressure is released, automatic means to open and close the inlet after the outlet is opened and closed as and for the purpose set forth.

27. In an automatic press the combination of a pressing-chamber, a pressing member moving therein, means for actuating said member, an inlet to said chamber, an outlet from said chamber, automatic means to sustain the pressure in said chamber at maximum at a predetermined pressure limit while the inlet and outlet are closed, automatic means to open and close the outlet after maximum pressure is released, automatic means to clean the chamber while the outlet is open, automatic means to open and close the inlet after the outlet is closed, as and for the purpose set forth.

28. In an automatic press the combination of a pressing-chamber a pressing member moving therein, means for actuating the said member, an inlet for said chamber, an outlet from said chamber, means for sustaining the pressure in the said chamber at maximum while the inlet and outlet are closed, a series of compartments in said chamber forming liquid-drainage members, means for opening automatically the outlet from said chamber and means for automatically cleaning the walls of said compartments while the bottom is open, as and for the purpose set forth.

29. In an automatic press the combination of a pressing-chamber, a pressing member moving therein compressively, means for actuating the said member, an inlet to said member, means for automatically closing the said inlet, an outlet from said chamber, means for opening the said outlet automatically, automatic means for sustaining the pressure in the said chamber at maximum, adjustable hand-controlled means to vary and predetermine the period of sustained high pressure and a residuum-conveyer, whereby the residuum is conveyed from the machine after the release of the high pressure

and the opening of the bottom, as and for the purpose set forth.

30. In an automatic press the combination of a pressing-chamber, a pressing means moving in the said chamber, means for actuating the said compressive means, an inlet to said chamber, means for automatically feeding the material to be pressed into the said chamber, an outlet from said chamber means for automatically sustaining the pressure at maximum in said chamber for a predetermined time, adjustable means to vary predetermine and control the period of sustained high pressure after filling and before discharging, and a liquid-conveyer and collector.

31. The combination in an automatic press of a compression-chamber, automatic means for filling the said chamber, automatic means for discharging the material from the said chamber after pressure, automatic means for sustaining the pressure in the said chamber for a predetermined time, hand-controlled means to vary and predetermine the period of high pressure said pressure-sustaining means acting while the chamber is filled and a residuum-conveyer, said conveyer acting after the said chamber is empty.

32. The combination in an automatic press of a compression-chamber, automatic means for filling the said chamber, automatic means for discharging the material from the said chamber after pressure, automatic means for sustaining the pressure in the said chamber at maximum for a predetermined time, an indicator, hand-controlled means to serve as a guide in determining the period of high pressure sustaining, a water collector and conveyer and a residuum-conveyer, as and for the purpose set forth.

33. The combination in an automatic hydraulic press of a compression-chamber, a series of compartments in the said chamber, means for feeding the material into the said compartments before pressure, automatic means for discharging the material from the said compartments after pressure, means for sustaining the material in the said compartments during a predetermined time at maximum pressure, a time-pressure-sustaining gage or indicator, adjustable means coacting with the gage to predetermine the period of sustained pressure in said compartments and a residuum-conveyer, as and for the purpose set forth whereby as the adjustable means is located at a coinciding point on the pressure-sustaining gage the pressure will be sustained at maximum for the time period so indicated.

34. The combination in an automatic hydraulic press of a cylinder, ram and piston, platen and pump, a chamber accessible to the pressure in both the pump and the said cylinder, a valve in the said chamber controlled by the pressure of the water, a power-transferring device hydraulically actuated, whereby the pressure of the water operates the said power-transferring device stopping the action of the pump and transferring the power so used to an idler.

35. In an automatic hydraulic press the combination with a hydraulic cylinder, ram, platen, and compression-chamber of a valve-chamber pump, a valve in the said chamber, automatic hydraulic means for operating the said valve, a liquid-conductor, said conductor and valve-chamber being connected with both the pump and the cylinder and subject to the same pressure, a belt-shifter controlled by the said valve and an automatic exhaust valve or port automatically controlled.

36. An automatic hydraulic press having a water-conductor between the pump and the cylinder of the press, a valve-chamber, a belt-shifter, a valve in the said chamber actuated automatically by liquid-pressure, automatic means for actuating the belt-shifter and automatic means for releasing the pressure on the cylinder.

37. In an automatic hydraulic press, a hydraulic cylinder having an exhaust-port, a pump, a water-conductor leading from the pump to the said cylinder, a valve in the said conductor and a belt-shifter combined with mechanism interposed between the belt-shifter mechanism and the exhaust-valve whereby the latter is controlled.

38. In an automatic hydraulic press a hydraulic cylinder, a pump, a water-conductor leading from the pump to the said cylinder, a valve in the said conductor, a belt-shifter, hydraulic means for actuating the said belt-shifter controlled by the said valve, automatic means for exhausting the water from the said cylinder consisting of an exhaust-port, a valve therefor and means for actuating the said valve and automatic means for closing the exhaust-valve after water exhaustion, as and for the purpose set out.

39. In an automatic hydraulic press the combination with the cylinder, of a pump, a conductor between the pump and the said cylinder, automatic means for starting the said pump, automatic means for stopping the said pump, automatic means for withdrawing pressure from the cylinder after the pump is stopped.

40. In an automatic hydraulic press in combination with the cylinder, a pump, automatic means for starting the pump, automatic means for stopping the pump, automatic means for sustaining the pressure in the cylinder for a predetermined time, adjustable means for predetermining and varying this time and automatic means for arresting the action of this pressure-sustaining means.

41. In an automatic hydraulic press the combination with the cylinder of the press of a pump, automatic means for starting the pump, automatic means for stopping the pump, automatic means for sustaining the

pressure in the pump and cylinder at maximum for a predetermined time and automatic means for withdrawing the water from the cylinder at the expiration of this time.

42. In an automatic hydraulic press in combination with the hydraulic cylinder of the press of a pump, a conductor between the said pump and the said cylinder, an exhaust-valve communicating with the said cylinder, automatic means for operating the said exhaust-valve at a predetermined pressure whereby the pressure caused by the action of the pump is withdrawn from the cylinder.

43. The combination in a hydraulic press of a pressing-chamber, a pressing member moving in the said chamber automatically actuated and controlled, hydraulic means for automatically stopping the pressure at a predetermined maximum and automatic means supplemental to the hydraulic for sustaining the pressure for a predetermined time and means for returning the pressing elements to their normal position after having been thus sustained.

44. The combination in a hydraulic press of a compression-chamber, means for automatically feeding the said chamber, means for automatically discharging the material after pressure from the said chamber, means for automatically cleaning the said chamber, means for automatically conveying the residuum from the zone of the machine, means for automatically subjecting the substance under pressure to sustained high maximum pressure and means for returning all the coacting elements to their normal position.

45. The combination in an automatic press of a compression-chamber, a series of walls in said chamber forming compartments, means for cleaning the said walls, means for automatically producing compressive action in the said chamber, means for automatically feeding the said chamber, means for automatically forcing the said pressure to maximum, means for automatically locking the pressure at maximum, means for automatically unlocking the pressure from maximum at the end of a predetermined period and means for automatically returning the pressure-sustaining means to its normal position as and for the purpose set forth.

46. The combination in an automatic press of a pressing-chamber, a series of partitions in the said chamber thereby dividing the chamber into a series of compartments, means for automatically feeding the material into the said machine-chamber and means for evenly distributing the material over every part of the chamber consisting of means to move the said partitions.

47. The combination in an automatic press of a pressing-chamber, means for producing compressive action therein, means for automatically feeding the material into the said chamber, and means for gently agitating the material while being fed into the said chamber, whereby the said material will be evenly distributed over every part of the chamber.

48. The combination in a hydraulic liquid-extracting press of a compression-chamber, a platen moving therein, a series of drainage-racks in said chamber, means for automatically filling the said chamber and means for automatically distributing the material in said chamber to every part thereof, said means comprising an automatically-controlled rack shaking or agitating mechanism.

49. The combination in an automatic hydraulic liquid-extracting press of a compression-chamber, a platen moving therein, a series of drainage-compartments in said chamber, means for automatically filling the said compartments and means for giving to the walls forming the said compartments a gentle reciprocation during filling whereby the said compartments have the material placed therein evenly over every part of them and whereby perfect extraction of the liquids is facilitated.

50. The combination in an automatic press of a compression-chamber, a platen moving therein, means for automatically feeding the material into the said chamber, means for automatically cleaning the said chamber, means for automatically closing said chamber, means for automatically holding the pressure in said chamber at maximum for a predetermined time and means for automatically discharging the material from the said chamber at the expiration of the said time.

51. The combination in an automatic hydraulic press of a compression-chamber, means for automatically feeding the material for compression into the said chamber, means for actuating the compression elements to maximum, a time-pressure indicator, a trip and a pressure-releasing lock operated by the trip, means for sustaining the pressure in the chamber at maximum for a predetermined time, means for automatically stopping the pressure at the expiration of the said time, automatic means for returning the pressing elements to normal on the stopping of the said pressure, automatic means for starting the said pressing elements when the said elements have reached their normal, as and for the purpose set forth.

52. A pressure-sustainer in a liquid-extracting press comprising in combination with the pressing-chamber and the pressing elements, automatic means for stopping the pressure, automatic means for sustaining the pressure, the said latter comprising a moving part and a coacting trip, the said moving part moving while the pressure is sustained and the said trip actuated by the moving part at the time limit of such pressure-sustaining, and thereafter the pressing elements are free to be returned to their normal position.

53. A pressure-sustainer for a liquid-ex-

tracting press comprising in combination with the pressing-chamber and the coacting pressing elements, automatic means for stopping the pressing elements at any desired maximum in their pressing function, automatic means for sustaining the pressure, a movable indicator and a tripping device, whereby as the maximum pressure is reached the indicator is started and at the limit of its adjusted traverse it contacts with the tripping device thus arresting the movement of the indicator and tripping the maximum-pressure-sustaining means, as and for the purpose stated.

54. A pressure-sustainer in a liquid-extracting press comprising in combination with the pressing-chamber and the pressing elements coacting therewith, automatic means for stopping the pressure, automatic means for sustaining the pressure, means for predetermining the period of pressure-sustaining, automatic means for locking the pressure-sustainer during the period of its action and automatic means for unlocking the said pressure-sustainer at the expiration of predetermined time period, as and for the purpose set out.

55. A pressure-sustainer in a hydraulic liquid-extracting press in combination with the pressing-chamber, the pressing elements and means for actuating the pressing elements, of means for stopping the compressive action of the pressing elements at a predetermined pressure, means for sustaining the said elements stationary at their maximum position for a predetermined time, means for predetermining this time and means for returning the elements to their normal position at the expiration of this time.

56. The combination in an automatic hydraulic press for liquid extracting of a pressing-chamber, pressing means moving therein, consisting of a platen, automatic means for arresting the pressure on platen at a predetermined pressure, means for sustaining the platen at its maximum pressure for a predetermined time, an indicator carrying numerals to indicate the time limit of pressure desired and a tripping device controlled in its action by the position of the indicator, as and for the purpose set forth.

57. The combination in a hydraulic liquid-extracting press of a pressing-chamber, a hydraulically-actuated platen moving therein, automatic means for arresting the action of the platen, means to sustain the pressure on the platen for a predetermined time at maximum, means to fix and indicate the time period for maximum-pressure sustaining, automatic means to arrest the platen's sustaining means and automatic means for returning the platen to its normal position after the platen-sustaining pressure means is actuated, as and for the purpose set out.

58. The combination in a hydraulic press for liquid-extracting of a compression-chamber, means for producing hydraulically pressure in the said chamber, means for sustaining the pressure in the said chamber at maximum, an indicator to indicate and predetermine the period of sustained pressure, means to sustain the pressure on the platen, automatic means to arrest the platen's pressure-sustaining means and means to return the platen to its normal position.

59. The combination in a hydraulic press of a compression-chamber, a pump, an indicator-moving mechanism, an indicator to predetermine the period for maximum pressure, means for actuating the said indicator-moving mechanism, a lock for the said indicator mechanism and means for unlocking the said indicator mechanism.

60. The combination in an automatic hydraulic press of a compression-chamber for receiving the material from pressure, automatic means for holding the pressure at maximum for a predetermined time an adjustable indicator to adjust and indicate the time limit of pressure-sustaining, means for tripping this indicator at the expiration of this time and means for returning this indicator to its normal position automatically.

61. The combination in an automatic pressing mechanism of a pump, a hydraulic cylinder, a conductor leading from the pump to the said cylinder, a valve-chamber in said conductor, an accumulator-cylinder, a conductor between the valve-chamber and the accumulator-cylinder, a weighted piston in the said accumulator-cylinder, a belt-shifting chamber, a conductor leading from the valve-chamber to the belt-shifting chamber, a valve therein and means interposed between the piston in the accumulator and the said valve whereby a movement of the piston will control the movement of the said valve.

62. The combination in a hydraulic press of a pump, a cylinder, a conductor leading from the pump to the said cylinder, a valve-chamber in said conductor, a belt-shifter, an exhaust-port from the said valve-chamber, means controlled by the pressure to operate the belt-shifter and means controlled by the belt-shifter to operate the exhaust-port valve.

63. The combination in an automatic press of a compression-chamber, a pump, having a fast and loose pulley, automatic means for controlling the pump consisting of a belt-shifter, means for actuating the belt-shifter at a predetermined pressure, whereby the pump is arrested, automatic means for sustaining pumping action to a predetermined pressure limit, and automatic means to force the belt on the fast pulley of the pump on the fall of pressure, as and for the purpose set out.

64. The combination in a hydraulic press, having an automatic belt-shifting device, of a cylinder, means for sustaining the pressure in

the said cylinder, a pump, a fast and loose pulley on the pump, and an exhaust-port controlled by the said belt-shifting device, whereby as the belt-shifter is automatically operated the rod will actuate the trip and the trip will permit the exhaust-port to be opened and thus relieving the pressure by discharging the water through the said valve.

65. An automatic hydraulic press having in combination with a hydraulic cylinder, a compression-chamber, a top for the said chamber, a bottom for the said chamber, automatic means for moving the top, automatic means for moving the bottom, automatic means for sustaining the pressure and means operated by the moving of the top for starting the pressure in the said compression-chamber.

66. An automatic press having a pressing-chamber, a platen moving therein and a pump with a fast and a loose pulley, a liquid-conductor between the pump and the cylinder, a pressure-sustainer, a pump with a fast and loose pulley and where the pressure is brought to maximum while the belt is on the fast pulley, means for sustaining the pressure while the belt is on the loose pulley, means for releasing the pressure after the expiration of its sustained period and means for automatically returning the belt to the fast pulley after the pressure is back to normal.

67. In an automatic hydraulic press having a cylinder, ram and platen with a compression-chamber in combination with a means to sustain the pressure in the cylinder comprising a pump having a fast and a loose pulley, a conductor between the pump and the cylinder an exhaust-port from the cylinder, means for transferring motion from the fast to the loose pulley and a mechanical connection from the loose pulley to the said exhaust-port whereby the latter is opened at a predetermined number of revolutions of the said loose pulley.

68. The combination in a hydraulic liquid-extracting machine having a compression-chamber, a movable lid on said chamber, a movable bottom to said chamber, means to automatically sustain the pressure, means to automatically withdraw the pressure, means for varying and adjusting, controlling and predetermining the time period for pressure-sustaining, automatic means to move the top when the pressure is withdrawn, automatic means for moving the bottom after the pressure is withdrawn, means for locking the top and bottom closed while the pressure is sustained and means for automatically starting the pressure after the top and bottom have been moved.

69. An automatic hydraulic press having a cylinder, ram and platen in combination with a time-indicator and pressure-sustaining device and comprising an indicator, an exhaust-valve, a lock for said valve, a trip for said lock and an automatic means for operating the lock-trip, whereby the indicator indicates the period for pressure-sustaining and the lock is unlocked by the trip at the expiration of this period, as and for the purpose set out.

70. The combination in a hydraulic press of a pressing-chamber, an outlet from said chamber, an inlet to said chamber, means for closing the outlet automatically, means for closing the inlet automatically, after feeding material into the said chamber, means for opening the outlet of the said chamber automatically after pressure, means for predetermining the degree of pressure comprising an adjustable trip, an indicator and means interposed between the trip and the source of power for pressure whereby the trip is thrown into action and causes the pressure to be withdrawn and means for sustaining the pressure for a predetermined time.

71. The combination in a hydraulic press of a compression-chamber, a pressing means operating in the said chamber, an inlet to said chamber, an outlet from said chamber, means for feeding material into the said chamber automatically, a pump, a conductor leading from the pump to the pressing means when the chamber is closed, an exhaust-port in the said conductor, means for arresting the pump's action at a predetermined pressure and means for sustaining the pressure for a predetermined time thereafter, comprising an indicator and an adjustable valve-trip coacting with and operating said valve at the expiration of its preindicated traverse but while the pump is out of action.

72. An automatic liquid-extracting press having a pressing-chamber and the pressure automatically controlled in the said chamber, an inlet to said chamber, an outlet from the said chamber, means for predetermining the degree of pressure, consisting of an adjustable indicator and a coacting trip, means for sustaining the pressure for a predetermined time at its predetermined maximum and means for arresting the pressure at the expiration of the said time comprising a locking means for the pressure-sustaining elements whereby the said trip coacts with the said locking means releasing the pressure in the pressing-chamber.

73. An automatic liquid-extracting press having a pressing-chamber, means for producing and controlling the pressure in the said chamber automatically, comprising in combination with the elements for actuating the pressing means, a lock, a lock-trip, and an adjustable indicator, means for automatically confining the substance to be pressed in the said chamber, means for predetermining the degree of pressure, means for arresting the pressure at a predetermined maximum and means for sustaining the pressure at maximum for a predetermined time whereby the indicator predetermines the period for maxi-

mum-pressure sustaining and the coacting of the trip with the said lock unlocks the pressure-producing elements from their source of action thus releasing the pressure.

74. An automatic liquid-extracting press having a pressing-chamber, means for producing and controlling the pressure in the said chamber automatically, means for automatically confining the material in the said chamber during pressure, means for predetermining the degree of pressure, comprising a lock, a lock-trip and an indicator whereby the indicator prescribes the position for the tripping predetermining the time limit for maximum pressure and the trip unlocks the pressure-producing elements from their source of action, permitting said elements to return to their normal position, means for sustaining the pressure at its predetermined maximum for a predetermined time and means for arresting the pressure at the expiration of the said time, and means for opening the said chamber at the expiration of the time limit.

75. In an automatic hydraulic press for liquid-extracting having a pressing-chamber, means for producing pressure in said chamber, an inlet to said chamber, an outlet from said chamber, independent mechanical means for opening and closing the inlet and outlet alternately, means for varying the maximum, comprising an indicator and an adjustable trip-pressure, means for sustaining the pressure at this maximum for a predetermined time comprising a lock whereby the trip can be adjusted to the indicator for any desired period of pressure-sustaining at maximum and at the expiration of this time period the lock is engaged by the trip, the pressure thus released and the parts returned to their normal position.

76. In an automatic press for liquid-extracting having a pressing-chamber, means for opening the chamber automatically, means for filling the chamber automatically, means for discharging the chamber of the residuum automatically, means for predetermining the degree of pressure for maximum automatically, comprising a trip and an indicator, means for sustaining the pressure at maximum for a predetermined time comprising a pressure-retaining lock, whereby at the expiration of the time limit preindicated for high-pressure sustaining the said trip contacts with the lock and thus unlocks the pressure-sustaining elements and whereby the indicator indicates this time period for high-pressure sustaining.

77. The combination in a liquid-extracting press of a compression-chamber, a series of partitions forming a series of walls for a series of compartments in said chamber, strainers carried by the said walls, a liquid-collector, means for producing pressure in the said chamber from zero to maximum; means for holding the said pressure at maximum for a predetermined time limit, means for preindicating this time limit and means for withdrawing the pressure at the expiration of the said time limit.

78. The combination in a liquid-extracting press of a compression-chamber, a series of partitions forming compartments in the said chamber having walls, means for moving the said walls forming the said compartments independent of the sides and ends of the chamber, liquid-strainers carried by the said walls, as and for the purpose set out.

79. The combination in a liquid-extracting press of a compression-chamber, means for producing compressive action in the said chamber, means for feeding the said chamber with material for pressure, means for holding the pressure in the said chamber at a fixed maximum for a fixed period of time, means for mechanically predetermining this time, means for preindicating this time period during which all the elements for producing pressure are locked whereby after the material is fed into the chamber the entrance thereto is closed and locked, pressure is then applied automatically and after reaching a predetermined maximum is held for a predetermined time at maximum and at the expiration of this time the mechanism is unlocked.

80. The combination in a liquid-extracting press of a compression-chamber, means for producing compressive action in the said chamber, a series of partitions forming a series of compartments in said chamber, strainclothes carried by the said partitions means for indicating a time period for high, uniform pressure sustaining, means for locking the mechanism during this period and means for unlocking the mechanism at the expiration of this period whereby as the material is fed into the chamber the pressing elements are inoperative, thereafter become operative automatically and force the pressure up to a predetermined maximum, and whereby the pressure is held at this maximum for a predetermined time and during this time the pressing elements are locked against a return movement, but at the expiration of this time they are automatically unlocked and then return to their normal position, as and for the purpose set out.

81. In an automatic press having a compression-chamber, a movable bottom for the said chamber, a movable top for the said chamber, automatic means for moving the top, automatic means for moving the bottom, a prime shaft, means for automatically engaging the said shaft with the bottom-moving mechanism, means for locking the said shaft with the bottom-moving mechanism during the opening and closing of the bottom, means for unlocking the said bottom-moving mechanism after the bottom is closed, means for locking the top-actuating mechanism to

its actuating mechanism after the bottom is closed and means for unlocking the said top from its actuating mechanism after the top is closed, as and for the purpose set out.

82. In an automatic hydraulic press having a compression-chamber, a movable top and a movable bottom with actuating mechanism therefor, a prime shaft, a compound clutch on the said prime shaft, automatic means for engaging the said top-actuating means with the said clutch, automatic means for disengaging the said clutch with the said top-actuating means, automatic means for engaging the said clutch with the said bottom-actuating mechanism and automatic means for disengaging the said clutch with the said bottom-actuating means, as and for the purpose set out.

83. In an automatic press having a compression-chamber with an inlet thereto and an outlet therefrom, means to open and close the inlet, means to open and close the outlet, an automatic mechanism interposed between the outlet-closing mechanism and the inlet-opening mechanism, whereby as the former is automatically closed the latter is automatically opened by the said mechanism becoming unlocked from the outlet-closing mechanism and locked to the inlet-opening mechanism, as set out.

84. The combination in an automatic press for liquid-extracting and having a compression-chamber with an inlet thereto and an outlet therefrom, a prime mover, means to automatically operate the inlet and outlet and a power-shifting mechanism automatically controlled, whereby as the pressure is completed in the said chamber the outlet will be opened by a moving part of the machine contacting with and locking the prime shaft with the outlet-operating mechanism, and as the outlet is closed the inlet-operating mechanism will be automatically locked to the said prime shaft and the outlet-operating mechanism will be unlocked therefrom.

85. An automatic press having a compression-chamber with a top and a bottom therefor and means for automatically moving the top, means controlled by a moving part of the machine for engaging the bottom-actuating mechanism with its source of power and motion at a predetermined time, means for locking this mechanism so engaged at a predetermined time, means for unlocking this mechanism and means for automatically engaging the said mechanism with the lid-actuating mechanism for the purpose set out.

86. In an automatic press having a compression-chamber with an inlet thereto and an outlet therefrom, means to open and close the inlet, means to open and close the outlet, and an automatic mechanism interposed between the outlet-closing and inlet-opening mechanism whereby as the former is closed the latter is opened by the said mechanism becoming unlocked from the outlet-closing and locked to the inlet-opening mechanism, as and for the purpose set out.

87. In an automatic press having a compression-chamber, ram, platen, and pump with a movable top and movable bottom and a prime mover, automatic means for operating the bottom means for withdrawing the compressive action of the ram and platen after a predetermined pressure on the material in the chamber, means connected with a moving part of the machine and operated after the withdrawal of the ram for connecting the said prime mover with the bottom-actuating mechanism whereby the bottom is opened and closed; means for disconnecting the bottom-actuating mechanism with the prime mover on the closing of the bottom, means for connecting the top-actuating mechanism with the said prime mover after the bottom is closed whereby the top is opened and closed.

88. An automatic press having a compression-chamber with means for producing pressure therein, in combination with an automatic means for predetermining a maximum pressure in said chamber and means for automatically sustaining the said pressure at maximum.

89. An automatic press having a compression-chamber with means for producing pressure therein, in combination with an automatic means for arresting pressure at a predetermined maximum, means for varying this maximum and means for automatically releasing the pressure at maximum.

90. An automatic press having a compression-chamber with means for producing pressure therein, in combination with an automatic means for arresting pressure at maximum, means for sustaining the said pressure at maximum for a predetermined time and means for arresting the pressure at the expiration of this time.

91. In an automatic press having a compression-chamber, an inlet to the said chamber, an outlet from the said chamber, means to open and close the inlet, means to open and close the outlet, a prime mover, automatic means interposed between the prime mover and the outlet-operating mechanism whereby the same is operated, automatic means interposed between the said prime mover and the inlet-operating mechanism whereby the latter is operated and whereby after compression the chamber is opened at its outlet and then closed, and thereafter it is opened at its inlet and then closed, as and for the purpose set out.

92. In an automatic press having a compression-chamber, pressing means actuated therein, an inlet to said chamber automatic means to open the inlet, means to fill the chamber while the inlet is open, means to close the inlet after chamber filling and auto-

matic means to start compressive action likewise after chamber filling.

93. In an automatic press having a compression-chamber, pressing means actuated in the said chamber, means for holding the pressure at a fixed predetermined maximum, an inlet to the said chamber, automatic means to open and close the inlet, means to fill the chamber while the chamber is open and means connected with a moving part of the machine to start compressive action automatically after the said chamber is filled, as and for the purpose set out.

94. In an automatic press having a compression-chamber, an inlet to the said chamber, means for producing compressive action in the said chamber to a variable fixed predetermined maximum, an outlet from the said chamber and automatic means for actuating the outlet after compression.

95. In an automatic press having a compression-chamber, an inlet to the said chamber, means for producing compressive action in the said chamber, an outlet from the said chamber, means for actuating the outlet, but disengaged therefrom during compression, and means controlled by a moving part of the mechanism for controlling the outlet-operating mechanism and connecting it with its operating means after compression.

96. In an automatic press having a compression-chamber, an inlet thereto, an outlet therefrom, means for producing compressive action in the said chamber, means for filling the chamber with the substance to be pressed while the inlet is open, means operated by a moving part of the machine for controlling the outlet-operating mechanism after compression and automatic means for automatically controlling the pressure-controlling means operated by a moving part of the mechanism, after chamber filling.

97. In an automatic press having a compression-chamber, an inlet thereto, an outlet therefrom, means for producing compressive action in the said chamber while the inlet and outlet are closed, means for controlling the degree of pressure at maximum, and means for varying this degree and making this variable pressure automatic in its action, means for automatically opening and closing the outlet after pressure and means for automatically opening and closing the inlet after the outlet is opened and closed.

98. In an automatic press having a compression-chamber with an inlet thereto and an outlet therefrom, means for producing pressure in the said chamber while the inlet and outlet are closed, automatic means for predetermining a predetermined maximum pressure, means for automatically opening and closing the outlet after pressure, means for automatically opening and closing the inlet after the outlet is closed and means for automatically starting the pressure after the inlet is closed.

99. In an automatic press having a compression-chamber, an inlet thereto and an outlet therefrom, means for producing compressive action in the said chamber while the inlet and outlet are closed, means for predetermining the degree of this pressure at maximum, means for holding this pressure at maximum for a predetermined time period, means for opening the outlet from the chamber at the expiration of this period.

100. In an automatic press having a compression-chamber, an inlet thereto, an outlet therefrom, means for producing compressive action in the said chamber from zero to maximum, means for holding this pressure at maximum in the said chamber for a predetermined time, means for releasing the pressure at the expiration of this time, means for opening the outlet automatically at the expiration of the time limit for maximum pressure, means for discharging the said chamber of residuum, means for automatically closing the said outlet after such discharge, means for opening the inlet after the closing of the outlet, means for filling the chamber after inlet-opening, means for closing the said chamber after filling and means for starting compressive action automatically thereafter.

101. The subcombination in an automatic hydraulic press comprising in combination with the cylinder of the press of an exhaust port or valve, a pump having a fast and a loose pulley, a lock for the valve, a rack, means for controlling the return of the rack automatically, a lock-trip carried by the said rack, means connected with a moving part of the pump whereby the rack is actuated when the pump-actuating belt is on the loose pulley, whereby as the pump forces the pressure in the cylinder from zero to maximum the said lock holds the valve closed but thereafter the action of the rack, through its connection with the loose pulley of the pump, trips the valve-lock and the valve is opened, as and for the purpose set out.

102. A subcombination an automatic hydraulic press comprising a valve-actuating means and consisting in combination with the cylinder of the press of a pump, a conductor between the pump and the said cylinder, a valve in the said conductor, means connected with a moving part of the pump for opening the valve at a predetermined maximum pressure in the cylinder and means connected with a moving part of the machine for closing the said valve at a predetermined point in the cycle of the machine, as and for the purpose set out.

103. A subcombination in an automatic press comprising a valve-actuating means and consisting in combination with the cylinder of the press of a pump, a conductor be-

tween the said pump and the said cylinder, a valve, means for automatically opening the said valve at a predetermined pressure at maximum and means connected with a moving part of the machine for automatically closing the said valve at a predetermined point in the cycle of the machine.

104. A subcombination in an automatic hydraulic press comprising a pressure-producing means, means for arresting the pressure at a predetermined maximum and means connected with a moving part of the machine for automatically starting the pressure at a predetermined point in the cycle of the machine.

105. A subcombination in an automatic hydraulic press comprising a valve-actuating means and consisting in combination with the cylinder of the press of a pump, said pump forcing water into the said cylinder during its pressing moments, a valve, means for opening the said valve at a predetermined maximum pressure thereby exhausting the water from the said cylinder, and means for closing the said valve at a predetermined point in the cycle of the machine, thus permitting the said pump to again force the water into the said cylinder.

106. A subcombination in an automatic press having a compression-chamber in combination with a pressure-producing means, a variable time-indicator indicating variable time units for pressure sustaining at maximum and means for automatically arresting and withdrawing the pressure at the or any of the time periods predetermined by the said time-indicator.

107. A subcombination in an automatic press comprising a pressure-producing means, means for arresting the pressure at a predetermined maximum, means for sustaining the pressure at maximum for a predetermined time, means connected with a moving part of the machine for starting the pressure at a predetermined point in the cycle of the machine.

108. In an automatic press having a compression-chamber with pressing means acting therein and having a series of partitions in the said chamber forming thereby a series of compartments, in combination with means for evenly filling the said compartments before pressure and means for cleaning the said compartments after pressure.

109. In an automatic press having a compression-chamber with compartments therein formed by a series of partitions and a compression means acting the said chamber in combination with means for evenly filling the said compartments before pressing and consisting of mechanism for slowly reciprocating the said racks, or shaking them and means for cleaning the said racks after chamber-pressure, consisting of mechanism for rapidly shaking the said partitions, as and for the purpose set out.

110. In an automatic press having a pressing-chamber and means for producing pressure therein in combination with a series of drainage-racks forming thereby a series of compartments in the said chamber, means for shaking the said racks transversely to their movement during pressing.

111. In an automatic press having a compression-chamber with a series of drainage-racks in said chamber forming thereby a series of compartments, a prime mover, means for shaking the said racks whereby the said racks are cleaned and a mechanical connection between the said prime mover and the said racks.

112. In an automatic press having a compression-chamber with a series of drainage-racks in the said chamber forming thereby a series of compartments and an eccentrically-actuated rack-shaking mechanism, as and for the purpose set out.

113. A subcombination to a hydraulic press comprising in combination with the cylinder of the press, an automatic pressure-controller and a time-recorder for maximum-pressure sustaining whereby the pressure in the cylinder is controlled and a time period for high pressure predetermined.

114. A subcombination to a hydraulic press comprising in combination with the cylinder of the press of a maximum-pressure sustaining means, means for predetermining maximum pressure in the said cylinder, means for predetermining a time period for maximum pressure and means for arresting the pressure at the expiration of this period.

115. A subcombination to a hydraulic press comprising in combination with the cylinder of the press of a means to predetermine a maximum pressure in the said cylinder, means to arrest the pressure at the said predetermined maximum, means to predetermine a time period for maximum-pressure sustaining, means to hold the pressure during the said time period and means to arrest the pressure at the expiration of this period.

116. A subcombination to a hydraulic press in combination with the cylinder of the press, the pump, a conductor between the pump and the said cylinder, an exhaust-valve, means to operate the said valve automatically, a pressure-controller, a pressure-predetermining indicator whereby maximum pressure is indicated and predetermined, a lock for the said valve and means for operating (opening) the said valve at maximum pressure.

117. A subcombination to a hydraulic press in combination with the cylinder of the press, the pump, the conductor from the pump to the said cylinder, an exhaust-valve of means to operate the said valve automatic-

ally, a pressure-controller, a pressure-predetermining indicator whereby maximum pressure is predetermined, a lock for the said valve, a time-indicator for maximum-pressure sustaining and a movable lock-trip, whereby the said trip is stationary while pressure is going up to maximum and during the after maximum pressure is reached the said trip is moved for a time period indicated by the time-indicator for maximum-pressure sustaining, and at the expiration of this time trips the lock permitting the exhaust-valve to be opened.

118. A subcombination to a hydraulic press in combination with the cylinder of the press, the pump, conductor between the pump and the said cylinder of an exhaust-valve, means to operate the said valve automatically, a pressure-controller, a pressure-predetermining indicator, whereby maximum pressure is predetermined, a lock for the said valve and means for operating the said lock at maximum pressure, whereby the said valve is opened and water thus discharged from the cylinder, as set out.

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

HOMER A. HERR.

Witnesses:
THOMAS D. HOSKINS,
C. W. MCMAHON.