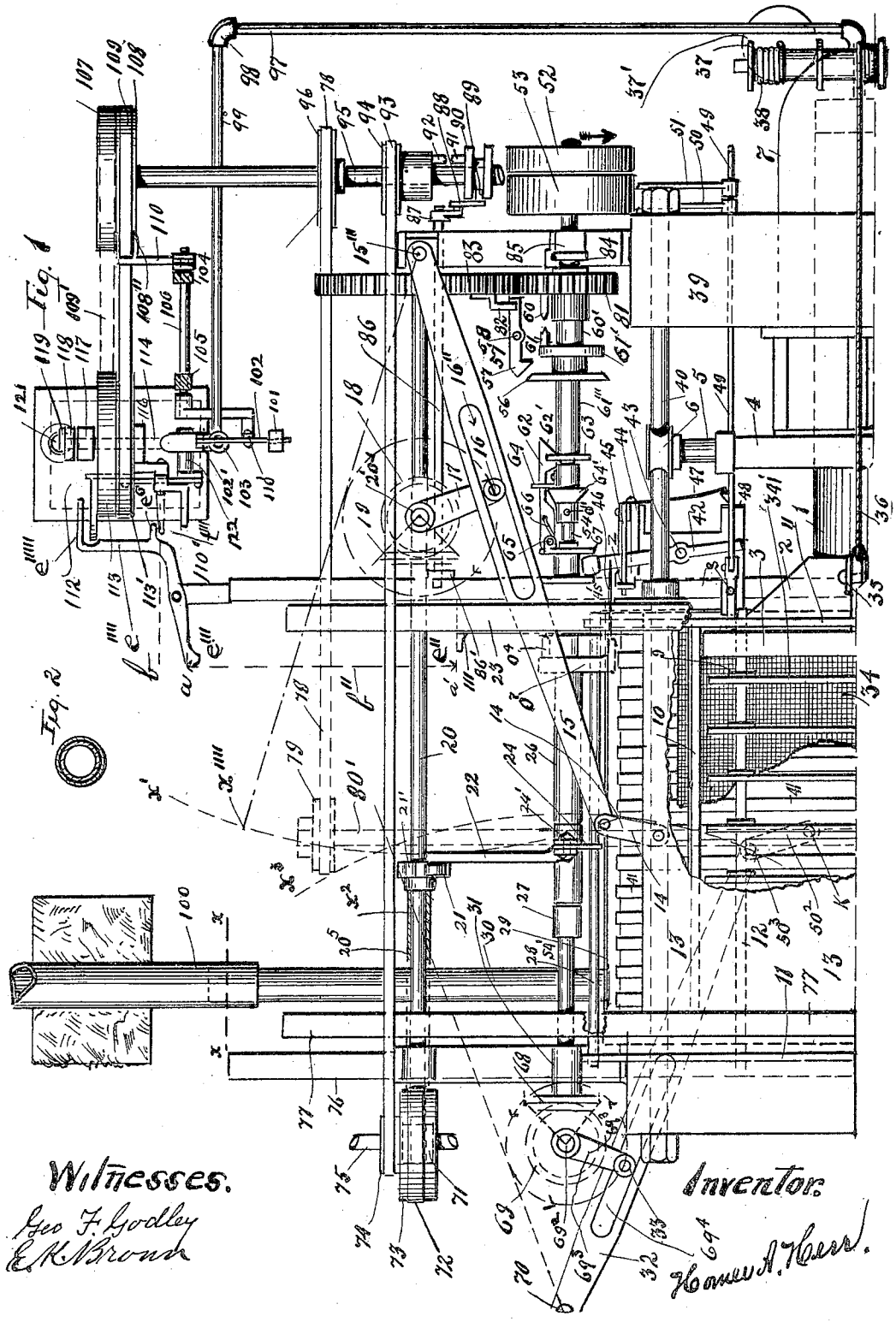
No. 801,872. PATENTED OCT. 17, 1905.

H. A. HERR.

AUTOMATIC PRESS.

APPLICATION FILED NOV. 6, 1902.

6 SHEETS—SHEET 1.



Witnesses.
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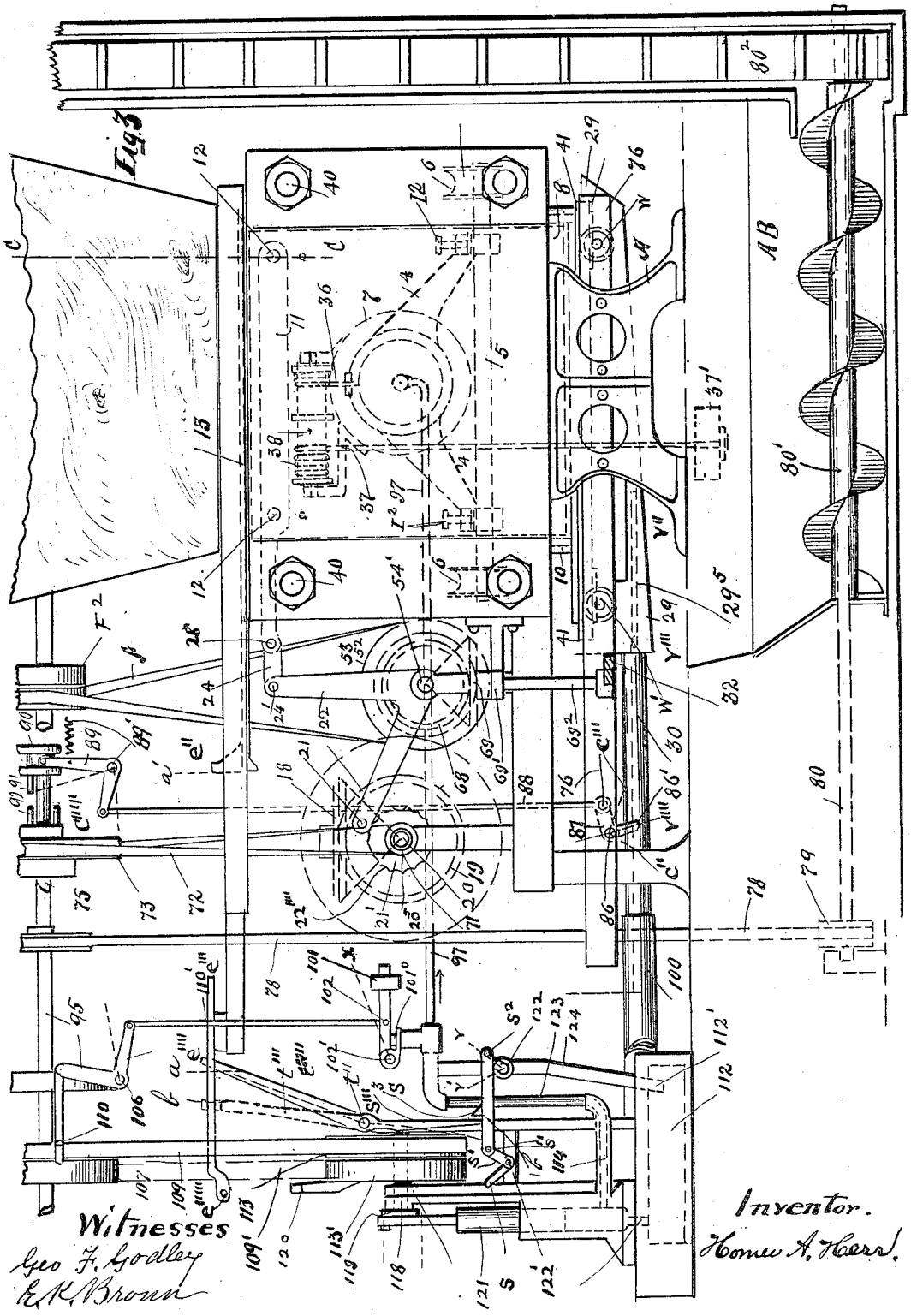

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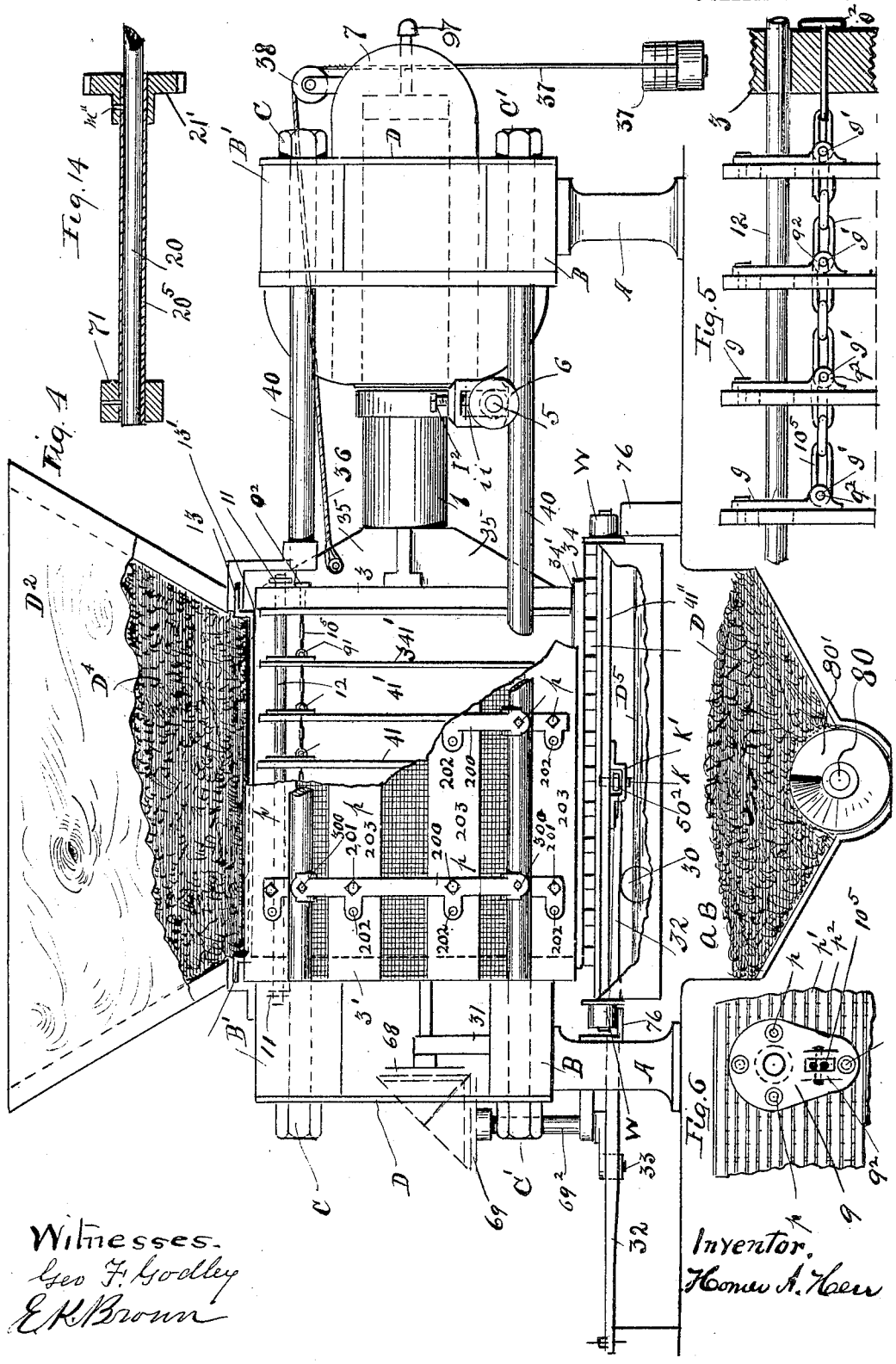

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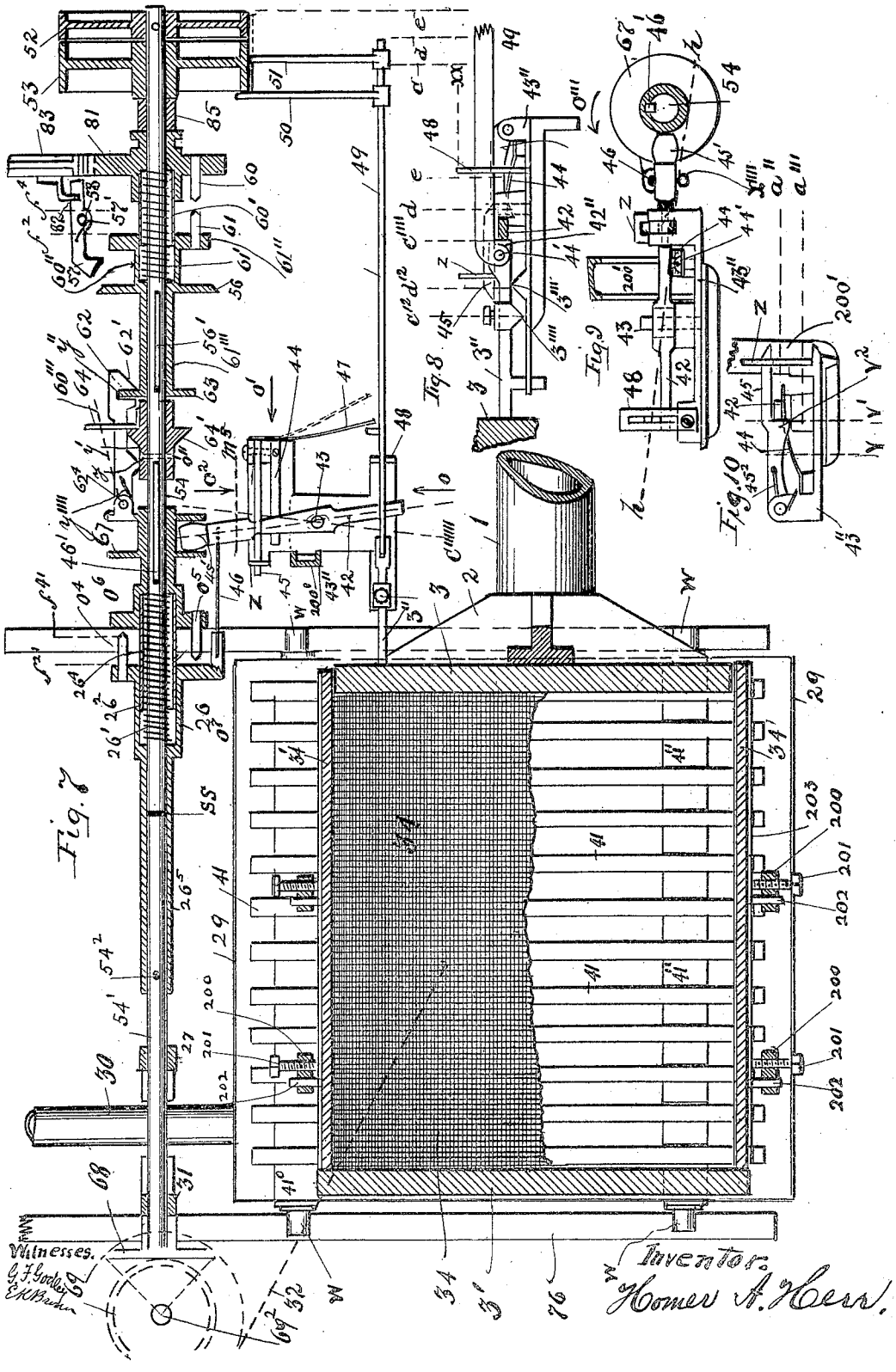

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5 SHEETS—SHEET 5.

Fig. 11

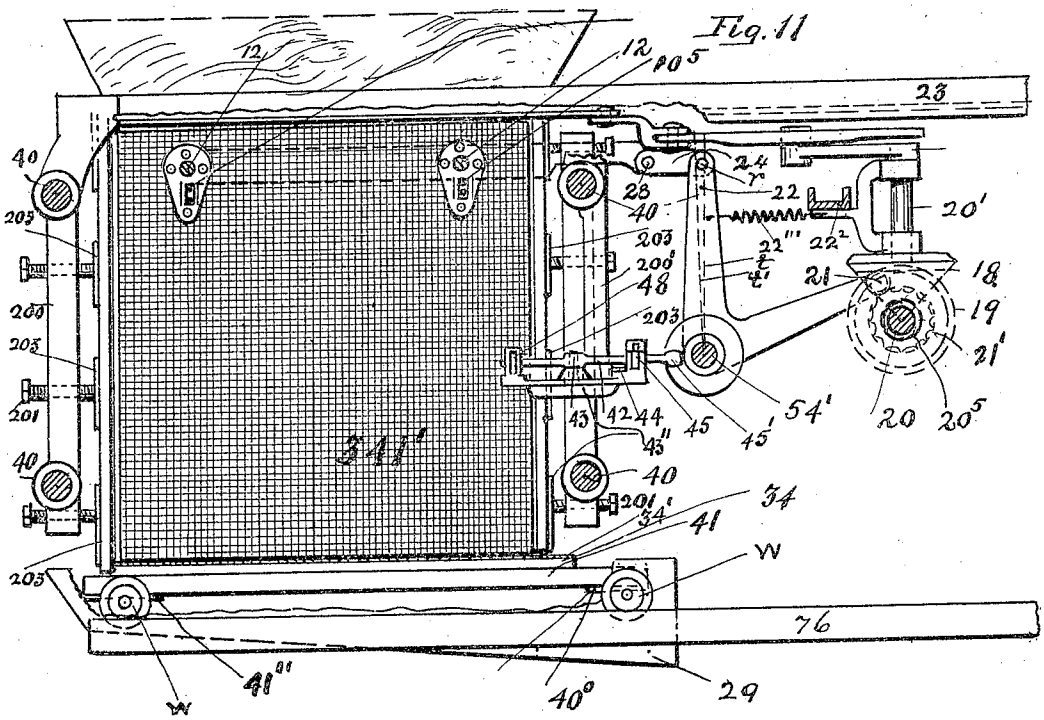


Fig 12

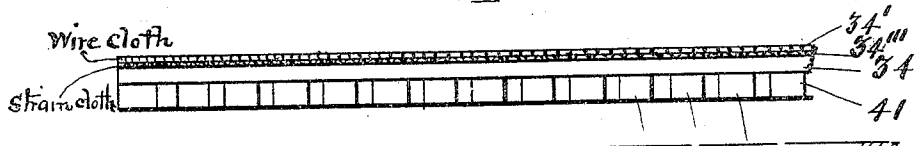
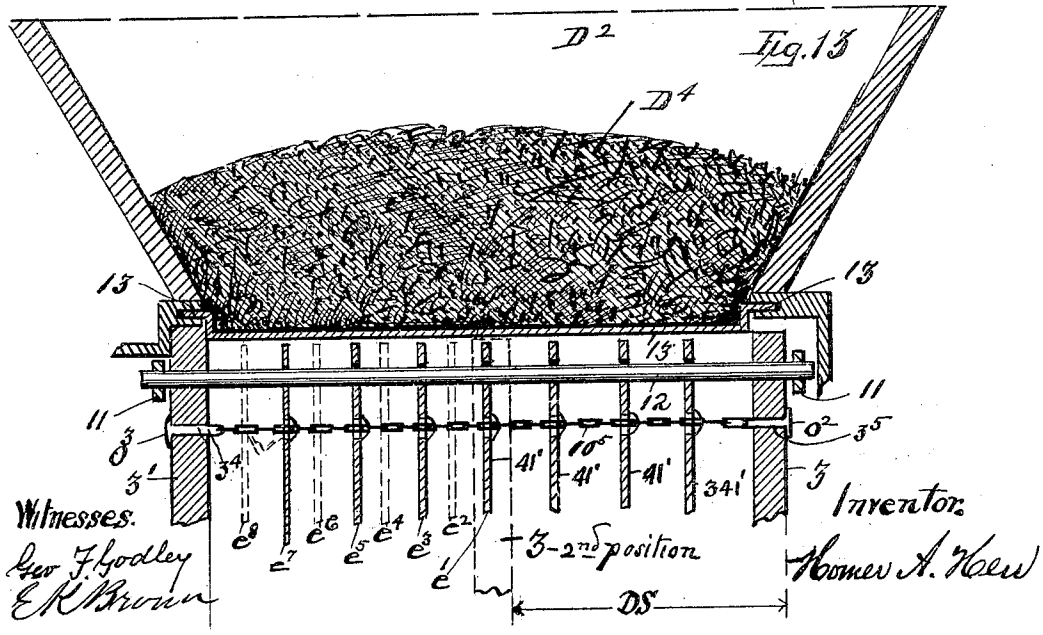


Fig. 13



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UNITED STATES PATENT OFFICE.

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AUTOMATIC PRESS.

No. 801,872. Specification of Letters Patent. Patented Oct. 17, 1905.

Application filed November 6, 1902. Serial No. 130,239.

To all whom it may concern:

Be it known that I, HOMER A. HERR, a citizen of the United States of America, and a resident of the city of Philadelphia, county of Philadelphia, 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 presses in general, and to hydraulic presses in particular; and it consists of features fully set out in the following specification and the accompanying drawings, forming part thereof.

The object of my invention is to provide an automatic press, and while I show the automatic mechanism as applied to a hydraulic press in the drawings, yet I do not restrict its use to presses using the hydraulic principle as a source of power for their pressing moments. It could be equally applied to a screw-press or to presses using other sources of pressing power. By "automatic" I mean the feeding of the material into the press, and the discharging as well is accomplished by automatic means, also the starting and the stopping of the pressure, making the feeding, the discharging, the stopping, the starting, and the care of the residuum entirely automatic and continuous.

A second object of my invention, but one of prime importance in a commercial sense, is the great economy its use inforces to the arts in which such presses are employed, such as beet-sugar factories, cotton-oil mills, wine-making and cider mills, expressing water from wet grains, or any of the numerous other uses where a direct rectilinear pressure is used as the only really satisfactory pressure. Being entirely automatic and thoroughly reliable and effective, the saving in labor by its use amounts to a very large sum.

It consists, in combination with the hydraulic cylinder-chamber and platen (which I will term the "pressing-head" in this specification) and pump, of a pressing-chamber. This chamber is divided into compartments. These compartments are flexible—that is, they expand and contract. They are expanded when the material is put into them and are contracted to their limit at the extreme point of pressure. The compartments are formed by hanging a series of racks, one rack for each compartment, on common supports for the same series. The supports for these racks are, as shown in the specification, two rods located within the pressing-chamber of the machine. There are, however, many other ways in which I could support these racks. I connect the racks by some yielding means, such as a chain or some equivalent means, and affix the chain to the platen at one end and to the thrust end of the pressing-chamber at the other. They are thus distended as the platen moves back after having performed its pressing function. This distension of the racks is accomplished by having each rack fixed to the said chain by a pin or similar means and having them disposed at approximately equal distances apart on the said chain. Thus are the compartments approximately equal in size if care is taken that the chain is taut when the normal position of the platen is reached.

A second feature of my invention is a means to clean the racks when the pressing-chamber is open. This is accomplished by having a rapidly-rotating wheel, which wheel has numerous circumferential notches, actuate a bell-crank lever, which lever in turn gives an exceedingly quick rectilinear reciprocal movement to the supporting-rods for the racks aforenamed. This exceedingly quick motion clears the cloth of all substance impacted thereon by pressure. The movement of these racks is timed to take place only when the pressing-chamber is open and but for a moment. I of course do not limit myself to this specific manner of actuating the racks. These racks are drainage members and permit the liquid to flow down the pressing-chamber with them as conductors. They are formed from strips of wood nailed together at right angles and covered with the stout "cheese-cloth" of commerce.

A third feature of my invention is the stopping of the pressure at a predetermined limit and automatically withdrawing the source of power. This I accomplish by having a lever with an adjustable weight and a small hydraulic piston actuate the weight. I place this piston and weight in the water-conductor leading from the pump to the hydraulic cylinder. Therefore the pressure is the same on this weight-actuating piston as it is on the piston in the hydraulic cylinder that actuates the platen, and by setting the weight on this lever to the indicated point I desire the lever will be lifted, and this lifting will shift the belt that actuates the pump from the fast to the loose pulley of the said pump. After the belt is so shifted the loose pulley of the pump as it rotates will actuate a water-outlet valve

from the hydraulic pressing-cylinder. Immediately on opening this valve the hydraulic cylinder will be returned to its normal position by an actuating-weight therefore carrying the platen with it and expanding the compartments of the compressing-chamber.

A fourth feature of my invention is a means for discharging the contents of the pressure-chamber. This consists of mechanism for moving the bottom of the pressing-chamber out of normal position, thus permitting the contents of the said chamber to fall in the conveyer or hopper under the press, wherefrom it is conveyed to whatever place desired. The details of this mechanism will be described more at length hereinafter, which mechanism also includes means for moving the said bottom back to its normal position after the contents of the said chamber are removed as described.

A fifth feature of my invention comprises means for automatically feeding the material into the pressing-chamber. The specific details of this mechanism I will describe more fully later in this specification; but, broadly, it consists of the following: I provide a hopper directly over the compressing-chamber. I also provide a lid for this chamber. This hopper in practice should contain enough material to fill the pressing-chamber, and where possible in erecting my machine it should be at the bottom of a large bin containing a large supply of material to be pressed. I do not show any bin in the drawings, however, as its use bears no relation to my invention. Nevertheless its use is warmly recommended as a matter of economy. The said lid is provided with material mechanism for moving it away from the top of the compression-chamber, thus permitting the material to fall in the said pressing-chamber, and immediately thereafter the lid is closed.

A sixth feature of my invention is the automatic starting of the pump and the closing of the water-valve aforenamed—that is, the valve leading from the hydraulic chamber for actuating the platen. This is accomplished by the lid of the chamber or the mechanism that actuates the lid and consists of a mechanical connection between the said lid and pump and valve, all of which will be explained more at length later.

Other specific features will be described later in this specification and in the order of their functional performance.

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 mechanism, also showing the pump in position; but only one-half of the hydraulic piston and one-half of the compression-cylinder are shown by reason of space limitations. All the operating elements of these parts are, however, shown. Fig. 2 is a section on line $x\ x$ of Fig. 1, showing the liquid-conductor in vertical section. Fig. 3 is a general end view of the mechanism. This view shows the residuum spiral conductor in side elevation and the residuum carrier or elevator, which latter can be employed or not, as desired. In order to show these features in the solid drawings, it will be noted the standard of the machine has its earth foundation-support removed. Fig. 4 is a side elevation of the hydraulic cylinder and compression or pressing chamber. Part of the near side wall of the feeding-hopper is broken away. This view also shows the receptacle under the machine for receiving the residuum and end view of the spiral residuum-conveyer. The lateral wall of the compression-chamber is also partly broken away in this view to show the compartments in this view in side elevation. Fig. 5 is an enlarged end view of the compartments of the compressing-chamber, showing their supporting-rods and their chain connections for expanding them. Fig. 6 shows an enlarged view of the compartments, also the usual manner of making the said compartments minus their exterior straining-cloth. Fig. 7 is a horizontal section through the compression-chamber and a horizontal section through the primary shaft. This view also shows the plan of the clutch-moving arm. Fig. 8 is an end view of the belt-shifter and clutch-moving arm looking in the direction of the arrow O. Fig. 9 is a side elevation of the clutch-moving arm and a vertical section of the clutch-carrying shaft looking in the direction of the arrow O′. Fig. 10 is an end view of the clutch-carrying arm and a section through the line m^5 of this arm looking in the direction of the arrow O^{22}. Fig. 11 is an end view of the compressing-chamber with the platen removed, showing the manner in which I support the walls (lateral) of this chamber to the tension-rods. Fig. 12 shows the manner in which the bottom of the compression-chamber is made up. The carriage for this bottom is not shown in this view. Fig. 13 is a vertical section of the feed-hopper and upper part of the compression-chamber, being a section on the line $c\ c$ of Fig. 3. Fig. 14 is a longitudinal view of shaft 20 at the end thereof which carries the sleeve for actuating the shaker and a longitudinal section through this sleeve and the gears which it carries.

A A, Figs. 3 and 4, are the standards of the machine.

B and B′ are the compression-blocks. They directly support the tension-rods 40 40 40 40. D D are binding-plates for these blocks, one set at each end of the machine. Fig. 4 explains this part of the hydraulic portion of the mechanism.

I is the hydraulic piston. This carries the platen 3.

7 is the hydraulic cylinder. The piston is inserted in the cylinder in the usual manner.

3′ is the thrust end of the compression-chamber. It is directly affixed to the compression-blocks B B′ and is stationary.

41′ 41′ 41′ are a series of racks, and 12 12 are two supporting-rods for these racks. (Shown best in Figs. 1, 3, 4, 11, and 13.) One end of these rods is inserted through the thrust end 3′ of the compression-chamber and the other is fixed to the platen 3. 10^5, Figs. 5, 6, and 13, is a chain fixed likewise to the end 3′ of the compression-chamber and the platen 3. This chain, as shown, has pins g' g' g' g' passing through the chain-links at equal distances apart and holding thereby each rack to the said chain. These racks are made, as shown in Fig. 6, of bars of wood nailed crosswise. In this figure, p' is the horizontal bar, and p^2 the vertical. A drainage member for the compression-chamber is thus formed by the racks, and when the racks are normally disposed in the compression-chamber each rack becomes the lateral wall of a smaller compression-chamber, and the liquid expressed from the solid contents of the chamber is drained down the rack to the lower part of the chamber and therethrough to the liquid gathering and carrying tank and thence out the outlet-pipes 30 and 100 to whatever point convenience may dictate or suggest. These racks are all identical in structure and function, and the above description will answer for all of the different compartments formed by the racks.

9 (best shown in Figs. 5 and 6) is the metallic guide and support carried by the racks. There are two for each rack, corresponding to the supporting-rods 12 therefor. This support is riveted, as shown at p p, to the rack and makes a rigid and very durable guide. The chain 10^5 is also fixed by pins to lateral walls or projecting integral lugs carried by the rack-plate 9, as shown in Fig. 6 at 9^2. The chain also carries at the thrust end of the chamber a pin 3^4, having an outer head O^3, and on the platen end a pin 3^5, with an outer end O^2. It will now be seen that when the platen is at its normal position or position of rest, as when the hydraulic cylinder is empty, this rack-supporting chain is taut, and the smaller compartments or chambers formed by the racks are about an equal distance apart. When in this position, the lid 13 of the compression-chamber is moved away from the vertical plane of the said chamber, and the material D^4 is allowed to fall in this chamber and into the different compartments into which it is divided by the racks aforesaid. When the platen has moved to its predetermined limit of pressure, the rack indicated in Fig. 13 at e^7 will have moved to e^8, the rack e^5 will have moved to e^7, the rack e^3 will have moved to e^6, the rack e' will have moved to e^5, and so on until the compartment indicated by 341′ will have taken the position of e'. During this movement of the platen and racks the chain 10^5 will become relaxed, and during the movement the liquid expressed from the substance contained in the compressing-chamber or the compartments thereof formed by the racks will be carried down the racks through the base 34, Figs. 11, 7, and 4, and between the slats 41 into the water or liquid chamber 29 and thence to the pipes 30 and 100.

4 is the hydraulic piston-rod support. It is supported on the lower tension-rods 40 40 through the rod 5 and rollers 6, adjustable screws 1^2, Figs. 3 and 4, operating an adjustable bearing i i, Fig. 4. This bearing supports the rods 5 of the piston-rod support 4.

After the piston and the platen 3, that it carries, have been moved to their predetermined limit, as indicated by the line D S and second position mark in Fig. 13, the weight 37′, Figs. 1 and 4, operating through the chain-rope 37, drum 38, and chain-rope 36, which latter is held to the platen-carrying frame by the link 35, returns the said platen to its normal position or the position shown in Figs. 1 and 4 and 7, also the solid drawing of Fig. 13. When the predetermined pressure limit is reached by the platen, the lever 102, Figs. 1 and 3, will be raised to the dotted line X, Fig. 3, by the piston 101^0 being acted on by the water in the water-pipe 97, leading from the pump to the hydraulic cylinder. The pressure is therefore the same on this piston that it is in the hydraulic cylinder, and by moving the weight 101 to the desired pressure position on its supporting-rod I predetermine the limit of pressure in the compression-chamber. 113 is a fast pulley of the hydraulic pump. While the pump is operating the belt is on this pulley; but when the desired limit of pressure is reached, as above predetermined, the oscillating of the weighted arm 102 to the line X, as above detailed, through the rod 110′ and bell-crank lever 106 will move the belt-shifter 110, and thus shift the belt 109 to the pulley 107 of the main shaft 95 and also from the fast pulley 113 to the loose pulley 113′ of the pump. The pump will then stop at the desired limit of pressure. In order to automatically open the valve to permit the egress of the water from the hydraulic-cylinder chamber, it is important that the pump shall not cease its operation until the belt is shifted and that it shall not open the water-valve until this is accomplished. I therefore provide a cam-faced arm 120 on the loose pulley 113′, which as the said pulley is rotated will contact with the arm S of the bell-crank lever S S′, Figs. 1 and 3. The said arm S′ of the bell-crank lever carries one end of the link b, it being held thereto by the pin S″. The other end of the said link is pivoted to the valve-actuating arm S^2. 122 is the water-outlet valve from the hydraulic cylinder, and this valve is directly actuated by the link b through the said arm S^2. Therefore after the predetermined pressure is

reached and the belt is shifted from the fast to the loose pulley of the pump the said water-outlet valve of the pipe water-conductor is opened and the water is free to pass out of the hydraulic chamber 7 back to the pump-reservoir 112 through the said pipe 97 124 at 112′.

It is evident it would be fatal to the automatic working of my machine to have the valve 122 opened before the pump was stopped, and by the above arrangement this is entirely obviated. When this valve 122 is opened, the action of the weight 37′ in forcing the ram against the water in the hydraulic cylinder 7 will discharge the water from the said cylinder and through conductors 97–99 back to the reservoir 112 until the platen carried by the ram is back to its normal position. As the platen is so returned the compartments are again expanded from the contracted position indicated at the dotted platen-line 3, second position, Fig. 13, to the solid drawing of this figure, when the compartments are again ready to be filled with the substance to be pressed.

I have now described the mechanism for and method of pressing after the chambers or compartments are filled, how I automatically predetermine the pressure, and how I stop the pressure and return the platen to its normal position. I shall now describe how I discharge the residuum from the pressing-chamber of the component compartments and how I clean the walls of these compartments. In practice the racks are covered with a strong coarse cloth called "cheese-cloth." Under the heavy pressure some of the material under pressure to some extent becomes impacted in the meshes of the said cloth, and to have the machine effective it becomes necessary to remove this impacted residuum after each pressure. The cleaning of these walls is accomplished while the bottom of the pressing-chamber is open and immediately after the residuum from this chamber is discharged, and as the function of opening the bottom precedes the function of cleaning the racks I will describe the former first.

Before the platen has returned entirely to its normal position in the manner and by the means described it strikes the bar 3″, Figs. 1, 7, and 8. The dotted line C″″, Fig. 8, shows the normal position of the projection 42″. (Shown only in Fig. 8.)

42 is a clutch-actuating lever. This lever is pivoted at 43 to a base-plate 43″, and this base-plate is supported on one of the upper tension-rods 40 by the arm 200′. (Shown complete only in Fig. 11, but indicated in Figs. 9 and 10 at its lower contact end with the said plate 43″.) 45′ is a friction-clutch roller carried by the said lever.

67 is a clutch carried by the shaft 54 and held thereto by the spline 46′. (Shown in Figs. 1, 7, and 9.) Now it will be seen that the clutch 67 has a longitudinal motion on the shaft 54, but rotates with the said shaft. 52 is a belt-wheel fixed to the said shaft 54, and therefore when the wheel 52 rotates the shaft 54 likewise rotates, and as the clutch 67 is splined to the said shaft it likewise rotates. The normal position of the clutch 67 is one of inaction. In this position its controlling-lever 42 is in the position indicated by the dotted line C″″″, and the dotted line C″″ in Fig. 8 corresponds with the dotted line C″″″ in Fig. 7. Therefore it will be seen that the arm 42 in Fig. 7 has moved the clutch-jaw 67 horizontally on its supporting-shaft 54 until the tooth O^5 is engaged with the tooth O^4—that is, O^5 is in the same rotary plane as O^4 and will contact therewith on rotary motion being imparted to the clutch 67.

50 and 51 are belt-shifting arms.

It is very important to the successful working of my machine automatically that the clutch-pins O^5 and O^4 shall be moved into operative position before the belt-wheel 52 is actuated. I therefore have a loose belt-wheel 53 of broad face, so that the belt which is moved by the finger 50 51 through the rod 49 (which is but an extension of the rod 3″, Figs. 1, 7, and 8) will have not yet cleared the broad loose belt-wheel before the above-named clutch-pins will be in their aforesaid operative position. The platen is still in motion toward its normal position of making the rack-supporting chains taut, as shown in Figs. 5 and 13, and while it is moving the rod or bar 3″ from c^{12} to d^{12}, Fig. 8, the lever 42 is moving from C″″″ to its position, as shown in the solid drawings. The movement from c^{12} to d^{12}, Fig. 8, corresponds to the movement of the rod 19 from c to d, Fig. 7. When this movement is accomplished, the lever 42 has moved from v to v', Fig. 10, and becomes locked against a return motion by the locking-jaw V^2 of the lever 45, Fig. 10. The lever 42 has now had its full movement, and it has accomplished its function of moving the clutch-pins O^5 and O^4 into operative position, and it is locked in this position by the locking-jaw V^2 of the bar 45, as stated. Now as the point from c^{12} to d^{12} is traversed the **V**-shaped contact 3″″ on the bar 3″ will have moved to the apex of the **V**-shaped contact 3‴ of the plate 43″. This is a cam-action, and its effect is to raise the end 42″ of the rod 3″ from its engagement with the clutch-actuating lever 42, and this disengaging movement corresponds with the raising of the arm 49 to the dotted line X X, Fig. 8. It will now be seen that the clutch-pins aforenamed are in operative position; but the platen is still moving back to its normal position, and it will be seen that the said pins are locked in this operative position, but have not yet commenced to revolve. The belt-shifter has now shifted from d to e, Fig. 7, and is passing from the loose to the fast pulley 52. A

slight further movement of the platen places the belt on the fast pulley, and there it remains until the platen is moved compressively, and this can only be accomplished by the action of the pump in the manner yet to be described. After the platen is again started the spring 47, carried by the plate 43″, returns the rods 3″ and 49 to normal, and thus brings the belt again on the loose pulley 53.

I have now arrived at that point in my machine where the belt has just commenced to rotate the fast pulley 52 and therethrough the shaft 54 and clutch 67. This wheel rotates very slowly. Two revolutions per minute is an ample speed in practice. As the clutch rotates the pin O^5 of the driver O^6 contacts with the pin O^4 of the follower O^7. Now, it will be seen, the shaft 54 is separated from the shaft 54′ at S S, and the tubular integral projection 26^5 of the extension 26 of the follower O^7 is held to the shaft 54′ by a pin at 54^2. This tubular portion 26^5 of the follower named becomes, in fact, the bearing for the shaft 54. These features and elements are shown in sectional view, Fig. 7, and in the elevation, Fig. 1. The bearing-arms 31 and 27 are fixed to the standards of the machine. The shaft 54′ carries the driver 68 of a set of miter-gears, of which 69 is the follower. The follower 69 is fixed to the upper part or end of the shaft 69^2, and the arm 69^3 is fixed to and carried by the lower end of the said shaft. This arm 69^3 carries a friction-roller 33, which is fitted in the slot 69^4 of the arm 32. The direction of the rotary motion of the arm 69^3 and its actuating-gear is shown by the arrow in the orbit of the said friction-roller, Fig. 1. Space limitations prevent the showing of the arm 32 and these connections in Fig. 7; but as they are clearly shown in the smaller view, Fig. 1, it is not thought necessary to further illustrate them by an enlarged duplication.

50^2, Fig. 1, is a link pivoted to the arm 32 at one end, as shown at 50^3, and to the bottom of the carriage, which supports the bottom rack of the compression-chamber at the other. (Shown at K, Fig. 1, and also Fig. 4.) The link 50^2 is held by a U-shaped member K′ to the cross-bar 41″ of the bottom rack-carriage, and the wooden strips 41 41 are riveted to the said cross-bar. At each end of the said cross-bar is attached supporting-rollers W W. There are two of these cross-bars. (Shown only in Figs. 7 and 11.) 41″ is the forward and 41^9 is the rearward.

I have now described the mechanism for operating the bottom of the compression-chamber, and it is evident that when the aforenamed jaws O^5 and O^4 are in operative contact, as we have just left them, the miter-gear 68 will actuate the follower therefor, 69, and rotate the arm 69^3 in the direction indicated by the arrows already named. As the arm 69^3 is rotated the arm 32 is oscillated on its pivot 70 and the pivot 50^3, which moves the carriage through the connections already named, moves it a distance equivalent to the arc formed by the intersection at the pin 50^3 and the radial dotted line X^2, intersecting the dotted line for the arc X^3. When this movement is accomplished, the bottom of the compression-chamber is entirely removed from its normal position and away from the vertical plane of the said chamber, and all the residuum in the said chamber is free to fall out thereof in obedience to the laws of gravity. In so falling it drops into the conveyer-chamber A B, (shown in Figs. 3 and 4,) and is thus brought under the action of the conveyer 80′. It will be seen that I show a quantity of residuum thus discharged in this chamber in Fig. 4. In practice after the residuum is thus permitted to fall from the compression-chamber there is a small quantity adheres to the sides of the strain-cloths with which the racks forming the walls of the compartments are covered. An effective machine requires that these racks shall be cleaned after each compression. It is also desirable that this cleaning shall take place when the bottom of the machine is open and away from its normal position. This I accomplish by the following means: 20 is a shaft which extends from one side of the machine to the other. At the left side of the machine (shown partly in horizontal section in Fig. 1, also indicated in Figs. 3 and 11, but thoroughly illustrated in Fig. 14) is a sleeve carrying a pulley 71 at its outer end and a circumferentially-indented wheel 21′ at its inner end. 22 is a bell-crank lever carrying a friction-roller 21 on one arm, and this friction-roller rests on the aforenamed wheel 21′, Figs. 3 and 11, also Fig. 1, show these features. The dotted lines (radial) t and t' show the limit of oscillation the wheel 21′ gives the bell-crank arm 22, and the spring 22‴, Fig. 11 only, fixed to the cross-bar 22^2, resists the action of the indents on the wheel 21′. Therefore as the bell-crank lever 22 is moved to the line t' by the said indents on the circumference of the wheel 21 when the roller 21 is on the apex of such indent the spring 22‴ will move the lever to the line t when the said roller is on the curvilinear portion of the said indent. I have already described the rods 12 12 as supporting the racks forming the compartments of the compression-chamber, and further reference to them need not be made except to say that they are at their extremities connected by bars 11 11, and these two bars are united by a rod 28 and the rod 28 is connected by a link 24 to the bell-crank lever 22 and held thereto by a lever-pin 24′, Figs. 1 and 3. The wheel 21′ is geared to rotate rapidly or sufficiently rapid to give an oscillation of about four hundred movements per minute to the lever 22. This rapid reciprocal movement of the racks frees them of all the residuum that had become impacted on their cloth surface. I have yet

to describe how I communicate motion to the wheel 21′ and how it is done at the time the bottom of the compression-chamber is open. This I will now do. Figs. 1 and 3 show 86′ as a depending armor lever fixed to a rod therefor, 86. 29 is a tank for arresting the liquid expressed from the substance under pressure and conducting it through the conductors 30 and 100, as already described. In Fig. 3 is indicated a lateral projection 29^5, carried by the tank 29. The drawing in Fig. 1 is so crowded at the point where this element would appear that it is omitted from this view. This projection on the said water-tank is of a length corresponding to about one-third of the space traversed by the tank—that is, the motion or the distance traversed by the tank during the opening of the bottom of the compressing-chamber. As shown in Fig. 3, it extends from V‴ to V″. 87 is an arm fixed to the rod 86. (Shown in Figs. 1 and 3.) 88 is a vertical rod fixed to the arm 87. 89 is a bell-crank lever actuating the clutch 90 through the vertical rod 88. 91 and 92 are clutch-jaws of the clutch 90. 75 is a counter-shaft, and 73 is a belt-pulley thereon. 95 is the main shaft for the driving mechanism of the machine. Now as the mechanism already described moves the bottom away from the compression-chamber and as the tank is carried by the supporting-carriage for this bottom and as the arm 86′ is in the path of the projection 29^5 it follows that after the bottom of the compression-chamber has moved a certain predetermined distance the end V‴ of the member 29^5 will contact with the arm 86′ and after so contacting will oscillate it, on further motion of the tank, until it has reached the radial position indicated by the line C″, Fig. 3. During this movement the arm 87 has been oscillated to the line C‴ and the bell-crank 89 to the line C⁗. The clutch-jaws 91 and 92 will thus become engaged, and as the clutch 90 is fixed to the shaft 95 it is in continual rotation, and therefore after the two said jaws are contacted the wheel 94 is actuated, and therethrough the belt 93 actuates the pulley 74 and also 73, and the belt 72 from the counter-shaft actuates the pulley 71 of the sleeve 20^5. Now as this sleeve carries this pulley 71 at the one end and the wheel 21′ at the other the latter is thus rotated and the racks reciprocated as and for the purpose already explained. This reciprocation of the racks will continue until the projection 29^5 is cleared by the arm 86′ or as long as it holds it in the position indicated by the line C″ or until the point V‴ of the lateral projection 29^5 has passed the line V⁗ in the bottom closing motion of the rack after having first been opened to its full limit. After this distance is traversed to and fro, as above, the point V‴ of the said lateral projection 29^5 will break its contact with the arm 86′ and the spring 89′ will return the bell-crank 89, rod 88, arm 87, rod 86, and arm 86′ all to their normal positions or the position shown in the solid drawing, Fig. 3.

I have now described the manner and the mechanism for opening the bottom of the compression-chamber to permit the automatic egress of the residuum, and I will now proceed to describe the manner of filling the said chamber automatically, first noting, however, that the arm 69^3 traverses one half of its rotation in opening the said bottom, and in closing the said bottom it closes its circuit in traversing the other half. This brings it back to the normal position, as shown in Fig. 1.

46, Figs. 1 and 7, is a spring-rod made of good resilient material. It is carried by the follower O^7 of the clutch. The normal position of this rod is on a horizontal plane below the clutch-actuating arm 42. Therefore when the said clutch-arm is actuated from the line C⁗⁗ to the position shown in the solid drawing, Fig. 7, the spring-rod 46 will be below the said arm. It will be remembered that the arm 42 when in the position shown in Fig. 1 is locked, as shown. This locking of the arm also locks the clutch-jaws or pins O^5 and O^4, as the former is controlled by the latter, as I have already detailed. It is while the bottom of the compression-chamber is opening and closing that these jaws must remain locked. One revolution of the clutch-pin O^5 accomplishes this result, and after this revolution is completed and the bottom is or has been moved open and again closed it is important that it must stop immediately and not start to open even partially. The first requisite is therefore to unlock the clutch-pins O^5 and O^4 from engagement. This I do as follows: After making a complete revolution the spring 46 contacts with the upper side of the arm 42, and as the follower will travel as long as the clutch-pins O^5 and O^4 are in operative engagement a slight further travel of the spring-rod 46 will depress the lever 42. This is best illustrated in Fig. 9. It will be seen the hole in the lever 42 is oblong, thus permitting of vertical oscillation of this arm. As the clutch 67 is rotated in the direction of the arrow O‴, Fig. 9, the said arm is depressed until it takes the position of the line *h h*. Now as the locking-arm 45 is not depressed with the arm 42 and as the depression of the said arm, as indicated at *h h*, corresponds to a vertical movement of the said arm at its contact with the lock 45 equal to the distance from *a*″ to *a*‴, Fig. 10, the arm 42 thus becomes released from its locking-contact with the arm 45, and the spring 26′, carried by the shaft 54, immediately forces the clutch 67 a distance equal to the distance between the dotted lines f^2 and f^4. This swings the arm 42 to the dotted line C⁗⁗, and the clutch-pins O^5 and O^4 are instantly disengaged and the mechanism immediately arrested from further rotation. This mechanism moves so slowly that the

power of momentum, usual in moving bodies, is practically *nil*. The resiliency of the spring-rod 46 should be of such degree that the amount of deflection to which it will be subject in its function of depressing the lever 42 from its normal position, as shown in the solid drawing, Fig. 9, to the line *h h* in the same figure will be equal to the thickness of that portion of the said lever 42 with which it contacts. By observing this structural requisite the normal position of the said spring-rod will be on the under side of the lever 42 after the clutch is disengaged in the manner just described. This normal position is indicated at X'''' in Fig. 9. In this position it will be seen it is out of the way of the lever 42 when said lever is again oscillated in actuating the clutch 67. The spring 44, on which the lever 42, normally restored, need only be of sufficient strength to resist the weight of the lever 42 in addition to sufficient strength to positively holding the lever 42 against its locking-lever 45, Fig. 8. The spring 45^2 must be of sufficient strength to keep the locking-bar 45 from falling in its slotted guide Z. After the lever 42 is depressed to the line *h h*, as shown in Fig. 9, which corresponds to the distance indicated from the dotted line *a''* to *a'''*, Fig. 10, and thus released from the said lock 45, its oscillation back to normal corresponds to a movement equal to that of from V' to V, Fig. 10, where it remains until again acted upon by the platen 3 and by it oscillated horizontally from the position indicated at the dotted line C''''' to that shown in the solid drawing, same figure. Thus the mechanism for actuating the bottom of the compression-chamber is again put in operative position.

Immediately following the closing of the bottom of the compression-chamber it is necessary to open the top automatically to permit the automatic filling of the said compression-chamber. This I accomplish as follows: 62 is an arm carried by the clutch 67 and pivoted to a lateral lug thereon, 62^4. 64 is a guide for this arm carried by the rotary cam-faced support therefor, 64'. This element 64' is fixed to the shaft 54 by a pin 0''. The arm 62 carries a notch *y''*, which fits the annular flange 63, and this flange is an integral part of the clutch-pin support 61'' and supported thereto by the intermediate shaft-embracing sleeves 61''' and 60''. 81 is a spur-gear, and it is also a clutch-jaw follower, as the pin 61 of the clutch-driving member contacts with the pin 60, whereby the latter is rotated. Now as the aforesaid arm 62 is forced forward so quickly on the movement of the clutch 67, as already described, the clutch-pin support 61'' is likewise so moved, and the pin 61 is thus moved in the rotary plane of the pin 60. Now it will be remembered that the belt remains on the fast pulley as long as the compressing-chamber is open. 56' is a spline locking the clutch-jaw 61, annular flange 63, and cam-faced annular flange 56 to the shaft 54, as to rotary motion of the said shaft. The horizontal motion of the shaft 54 of the clutch 61 and its connections is equal to the distance from the dotted line f^2 to f^4. The clutch-pins 61 and 60 for actuating the top of the compression-chamber being now engaged, it is necessary that they should so remain only long enough to permit the opening and closing of the lid of the compression-chamber 13, and immediately thereafter these jaws must become disengaged, and thus stop the mechanism. I accomplish this as follows: 56 being an annular cam-faced flange and an integral part of the clutch 61'', it follows when I move this clutch in the manner and by the means just described the said annular flange comes in contact with the cam-face of the lever 57, and this lever under the influence of the spring 57' snaps over the annular edge of the said element 56 and locks it. The pivot 58 for the said lever is fixed to a projection of the standard of the machine. The coil-spring 61' in the movement just described of the clutch 61'' and its connections is compressed, and this is accomplished by the energy stored in the compression-spring 26' as the lever 42 moves the clutch 67, as already fully described. To accomplish this successfully, the spring 26' must have twice the strength of the spring 61' or be of sufficient strength to move the lever 42, clutch 67, clutch 61'', and the lock for the latter clutch 57 in addition to compressing the spring 61'.

60' and 26^4 are two tubular shields fitted to one of their respective clutch-jaws tightly and adapted to slide freely into the other. The object of these members is to prevent dirt or any substance from coming in contact with any of the parts they thus protect to the end that the mechanism will not be interrupted in its automatic action.

As the clutch 67 moves the clutch 61'', through the lever 62 of the former being disengageably engaged to the annular flange 63 of the latter, the said latter clutch is moved to the locking position, and it is necessary to unlock the said lever 62, thus permitting the clutch 67 to be again in operative position independent of the clutch 61''. I accomplish this unlocking of the arm 62 as follows: First, it will be noted that clutch 67, clutch 61'', and all their fixed and integral connections at all times rotate with the shaft 54. The cam-faced member 64' also rotates with the shaft 54. Therefore all these parts are at all times circumferentially in the same relative position. Their variable relative movements are thus entirely horizontal. It will also be noted that the part 64' has no horizontal motion. Therefore as the clutch 67 moves in its unlocking motion backward the cam *y* of the arm 62 will strike the cam *y'* of the member 64', and the arm 62 is thus swung to the position in-

dicated by the dotted line 60'''. This oscillation disengages the said arm 62 from the annular flange 63, and meanwhile the flange 56 has become engaged by the locking-lever 57 and is so held until the lid of the compression-chamber is opened and again closed.

The specific mechanism for actuating the lid of the compression-chamber consists of the following: 81 is a spur-gear, and 83 is its follower. In the drawings the relative rotation of these gears is one revolution of the driver 81 to two of the follower 83. In practice this can be varied; but it is well to have them move very slowly in order to allow ample time for the material to fall into the compression-chamber. 20 is a shaft actuated by the follower 83. 19 is the driver of a set of miter-gears, and 18 is its follower. 19 is carried by the shaft 20 and 18 by the shaft 20', Fig. 11. 15 is a lever-arm pivoted at 15''' to the standard of the machine at one end and at the other to a link 14. This link is the intermediate connection between the lever 15 and the lid 13. 17 is an arm fixed to the shaft 20' and having a friction-roller 16 at its outer end. The said roller moves in a slot 16''. Now as the gear 19 of the shaft 20 actuates the gear 18 of the shaft 20' the arm 17 is thereby rotated in the direction of the arrows indicated in Fig. 1 in the orbit of the above-named friction-roller's center. During one half of the rotation of this arm the arm 15 is swung to the position indicated by the radial line X''''. During this movement the lid 13 is opened and the material in the hopper D^2 will fall into the compartments of the compression-chamber, and during the remaining half of the revolution of the arm the lid is closed, thus separating the material in the hopper from the material in the compression-chamber.

I have now again filled the chamber, and the machine is ready to start compressing; but in order to complete the automatic action it is necessary to start the pump automatically and close the water-valve, which up to this time has remained open since the water was discharged from the hydraulic cylinder, as hereinbefore described. This I accomplish as follows: The pump, as shown in Figs. 1 and 3, is in a position of action—that is, the belt 109 is on the fast pulley, as shown in the solid drawing—but for the purpose of making clear the starting of the pump automatically I have indicated by dotted lines the belt as being on the loose pulley and marked this position as 109'. We will now assume that the belt is on the loose pulley or in the position indicated at 109'. When this belt is on this pulley, the arm S is in the position indicated by V' and the water-valve is open. In closing the water-valve the lug S^3 on the bar b is engaged by the depending arm S''', oscillating on its supporting-pivot t'', is moved to the position indicated in the solid drawing Fig. 3. This closes the water-valve. It is accomplished as follows: e'' (best shown in Fig. 1) is a contact carried by the top of the compression-chamber 13. As the said top is moved from its normal position over this chamber it contacts when near its limit of movement with the head e''' of the belt-shifting and water-valve actuating-lever e''''. The lug e^6 of this lever contacts with the said arm t''' and moves it from the limit-line b to the line a. Simultaneously the belt-shifting finger e''''' moves the belt from the loose to the fast pulley, and the pump will immediately start to pump up the hydraulic piston. It will be noted there is but one belt-shifting finger on the lever e''''—*i. e.*, e'''''. Therefore the shifting of the belt by the finger 108'' to the loose pulley and the shifting of the belt to the fast pulley become entirely independent operations, and the one is accomplished by the mechanism moving the bottom of the compression-chamber and the other by the top of the said chamber, as already set out.

We have now arrived at that part of the mechanism where the top of the compression-chamber has been opened and the pump started. This has been accomplished by the gear 83 rotating one-half of its revolution, as already referred to. As it nears its complete revolution the lug 82 of the gear 83 strikes the locking-lever 57 for the annular flange 56 of the clutch 61' and oscillates it on its supporting-pivot 58 to a degree sufficient to disengage the said lever 57 from the said annular flange, whereupon the spring 61' will force the said clutch 61'' back against the part 64' or its normal position. The wheel 81 immediately ceases to rotate, the lid is now closed, the pump is operating, and the piston thereby being gradually put under pressure the belt on wheel 52 is being transferred to loose wheel 53, the point 42'' is being restored to its position, as shown in Fig. 8, to again actuate the lever 42, and all the automatic elements are otherwise at rest until the hydraulic cylinder has again reached its predetermined limit of pressure, when the pump is stopped, piston and platen returned to normal, and all the operations described are repeated, and so on continuously. It may be well to remark that the lever 62, which forms the connection between the clutch 67 and the clutch 61'', remains as we left it in the position indicated by the dotted line 60''' until the clutch 67 is moved, permitting the cam y to be disengaged from the top of the cam y', and the spring y'''' holds the said arm 62 normally shaftward, the guide 64 preventing any lateral displacement of the arm 62.

It will be noted that the lateral walls of the compression-chamber are hung on the tension-rods 40 40 40 40. (Best shown in Figs. 4, 7, and 11.)

202 represents a supporting-pin for the lateral plates 203 203, and 201 represents take-up screws for these plates. These screws per-

mit of lateral adjustment of the plates, and therefore of the chamber. The screws 300 are intended for holding the bars 200 to the rods 40 40.

In Fig. 12 I show a make-up for the bottom and lateral racks of the compression-chamber. 34′ indicates a wire screen; 34‴, the cheese-cloth or strain-cloth proper. 34 indicates the wooden rack, and the supporting cross-bars are indicated at 41. This wire screen can be of wide mesh, as the straining is done by the cloth 34‴. The function of the former is to receive the possible rough usage the platen is at times likely to give it, as it is hardly possible to have the said platen adjusted accurately enough to prevent abusive contact to any except a metallic surface. Therefore I put the real strain-cloth out of the possible contact with the platen in the bottom as well as the sides of the compression-chamber and allow the contact to be entirely with the said wire screen. This screen should either be made of brass or of iron and then galvanized.

In Figs. 3 and 4 I show a shaft 80, carrying a screw conveyer 80′ and actuated by a belt 78 through a wheel 79 of the shaft 80′. I also show an elevator 80^2 in Fig. 3. These parts are in continual motion, and as the residuum is automatically discharged from the machine, or more properly the compression-chamber of the machine, into the conveyer-chamber it is thereafter conducted to whatever point desired.

I desire it understood I do not limit myself to the specific structural features set out in any one particular. I could make many modifications without departing from the spirit of my invention; nor do I confine the use of the automatic features of this invention to an hydraulic press. It could be equally adapted to a screw-press where a more limited power is ample.

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 compression-chamber, a platen moving in the said chamber, means for actuating the said platen, means for feeding the substance to be pressed into the said chamber automatically, means for discharging the contents of the said chamber after pressure, a carriage for the bottom of said chamber, a liquid-collector carried by the said carriage.

2. In an automatic hydraulic press the combination of a compressing-chamber, a series of partitions forming compartments in said chamber, means for cleaning the walls of said compartments, a platen, means for actuating the said platen in said chamber, means for automatically feeding the material into the said compartments preceding pressure and means for automatically discharging the material out of the said compartments after pressure, and a residuum-conveyer whereby the residuum is automatically conveyed from the machine, as and for the purpose set forth.

3. In an automatic hydraulic press the combination of the compressing-chamber, a series of partitions forming compartments in said chamber, a platen, means for actuating the said platen compressively, means for automatically cleaning the walls of the said compartments, means for automatically feeding the material to be pressed into the said compartments, means for automatically discharging the material after pressure from the said compartments, as and for the purpose set forth.

4. In an automatic hydraulic press the combination with the pressing-chamber of a hydraulically-actuated plunger or piston, a platen actuated thereby, a pump, means for stopping the said pump at a predetermined pressure automatically, means for automatically discharging the water used in compression from the hydraulic cylinder, means for automatically returning the said hydraulic piston to its normal position and means for automatically starting the said pump after said piston has returned to a predetermined normal position.

5. In an automatic press the combination of a compressing-chamber a series of partitions in said chamber forming compartments, the walls of the said compartments being formed by a series of drainage-racks, and a series of supporting-rods common to all of the racks, means for automatically feeding the material to be pressed into the said compartments, means for automatically discharging the material after pressure from the said compartments and means for compressing the material while in the said compartments, as and for the purpose set forth.

6. In an automatic press the combination with the pressing-chamber of a platen, means for actuating the said platen, a series of drainage-racks forming compartments in the said chamber, means for automatically feeding the material to be pressed into the said chamber and the said compartments, means for cleaning said compartments of residuum impacted in their walls means for automatically discharging the material after pressure from the said chamber, a liquid conductor and collector coacting with the said drainage-compartments, whereby the liquid expressed from the material under pressure will be conducted from the machine, as and for the purpose set forth.

7. In an automatic press comprising a pressing-chamber, means for automatically feeding the material to be pressed into the said chamber, means for automatically discharging the material after pressure from the said chamber and a movable and portable liquid-collector, means for collecting and carrying the liquid expressed away from the zone of pressure, means for moving the said liquid-collector, as and for the purpose set forth.

8. An automatic press comprising a compressing-chamber, a horizontally-moving platen in said chamber, a series of partitions forming compartments in the said chamber, said partitions capable of horizontal expansion and contraction, a top for the said chamber, a bottom for the said chamber, means for automatically actuating the said top, means for automatically actuating the said bottom, a carriage for the said bottom and a liquid-collector carried by the said carriage.

9. In an automatic press comprising in combination with a compression-chamber a platen, means for automatically feeding the material to be pressed into the said chamber vertically, means for automatically discharging the material from the said chamber after pressure, a water-collector consisting of a movable liquid-carrier, a movable carriage therefor and automatic means for moving the said carriage, as and for the purpose set out.

10. In an automatic press comprising a compressing-chamber, a horizontally-moving platen in the said chamber, a series of vertical partitions forming compartments in said chamber said compartments capable of horizontal contraction and expansion, means for feeding the material to be pressed into the said compartments, means for automatically cleaning the walls of said compartments means for discharging the material from the said compartments and a portable water or liquid conductor coacting with the said compartments in passing the water from the zone of pressure and the machine, as and for the purpose set forth.

11. In an automatic press a compressing-chamber, a horizontally-moving platen in the said chamber, means for feeding the material to be pressed into the said chamber by gravity, means for discharging the material from the said chamber after pressure by gravity, a residuum-conveyer and a water collector and conveyer, said water-collector being interposed between the compression-chamber and the residuum-conveyer, means for moving the said water-collector away from its normal position in the vertical plane of the compression-chamber, thus permitting the residuum in the said conveyer to fall, as and for the purpose set forth.

12. In an automatic press the combination of a compression-chamber, a horizontally-moving platen in said chamber, a series of vertical partitions forming compartments in the said chamber means for feeding the material to be pressed into the said chamber and the compartments thereof by gravity, means for discharging the material residuum from the said chamber after pressure by gravity, a residuum-conveyer and a water collector and conveyer, as and for the purpose set forth.

13. The combination in an automatic press comprising a chamber having one or more movable exterior walls, a platen, means for actuating the platen, means for moving one or more of the said movable walls, means for predetermining the pressure in the chamber to variable degrees a prime mover in the machine, means interposed between the said prime mover and the said movable walls, a residuum conveyer and collector and means for actuating the said residuum-conveyer, as and for the purpose set forth.

14. An automatic press comprising a compression-chamber, a compressing member moving therein, a series of partitions forming compartments expandible in said chamber, means for actuating the said compressive member, a movable top for the said chamber, means for automatically moving the said top, a movable bottom for the said chamber, means for automatically moving the said bottom, a carriage for the said bottom and a liquid-collector carried by the said bottom carriage, as set out.

15. An automatic press comprising a chamber, a platen, a series of drainage-racks in said chamber forming a series of drainage-compartments, a primary movable exterior wall of said chamber, whereby in the moving of which the substance to be pressed is placed into the said compartments, a secondary movable wall of the said chamber, a prime mover, means for automatically cleaning the walls of the said chamber and a mechanical connection between the said prime mover and the said wall-cleaning mechanism, as and for the purpose set forth.

16. In an automatic press having a compression-chamber and said chamber having normally fixed walls, a movable pressing means, means for actuating the said pressing means, means for variably predetermining the degree of pressure in the said chamber, means for moving one of the said fixed walls thereby permitting ingress of the material to the chamber for pressure, means for moving a second of the normally fixed walls thereby permitting the expelling of the material after pressure, a series of drainage-chambers in the said pressing-chamber, a residuum conveyer and collector, as and for the purpose set forth.

17. In an automatic press a pressing-chamber, a movable top for said chamber, a movable bottom for said chamber, automatic means for moving the said top, automatic means for moving the said bottom, means for draining said chamber, means for contracting the said chamber during the pressing function, means for automatically stopping the pressure means for automatically starting the pressure, and means for automatically discharging the residuum from the said pressing-chamber after pressure, consisting of a bottom to the said chamber, a prime shaft actuated independently of the pressing means and a mechanical connection between said prime shaft and the bottom, as and for the purpose set forth.

18. In an automatic press, the combination of a pressing-chamber, having a movable top and a movable bottom of a platen, means for

actuating the said platen, means for arresting the compressive action of the said platen automatically, means for returning the said platen to its normal position, means for discharging automatically the contents of the said pressing-chamber said means causing the automatic movement of the said bottom and means for filling the said pressing-chamber, said means causing the movement of the said top automatically, as and for the purpose set out.

19. The combination in an automatic press of a pressing-chamber, a platen, means for actuating compressively the said platen, a series of expanding and contracting compartments, in the said chamber, liquid-drainage racks forming the said compartments, said racks mounted on a series of rods common to them all, means for actuating the said racks independently of their compressive movements said compartments expanding while the platen is returning to its normal position and contracting during the compressing function of the platen, as and for the purpose set out.

20. The combination in an automatic press of a pressing-chamber having fixed lateral walls, a series of compartments variable in size, said compartments formed by a series of movable racks, means for automatically varying the size of said compartments and means for cleaning said racks, a movable top for said chamber means for opening the said top automatically, a movable bottom for the said chamber means for opening the said bottom, means for closing the said bottom and means for closing the said top, whereby the filling and discharging of the said chamber are facilitated.

21. The combination in a press of a pressing-chamber having fixed lateral walls and a movable top and bottom, movable racks in said chamber of means for opening and closing the said top automatically, comprising a prime mover and a mechanical connection between the said prime mover and the said top means for opening and closing the said bottom automatically means for locking the top-actuating means during the period of its action and means for locking the bottom-actuating means during its action, whereby the automatic action of these functions is assured.

22. An automatic press comprising a compressing-chamber, a series of drainage-compartments variable in size in the said chamber, top for said chamber, means for producing a compressive action in said chamber, means for actuating said top said top-actuating means being independent of the compression-actuating means, and means for locking the top-moving mechanism to its source of power during its action, as and for the purpose set forth.

23. In an automatic press having a compression-chamber and compressive means operated therein, means for automatically feeding the material into the said chamber, said chamber-filling means being independent of the motion of the actuating means for the compression function, means for automatically discharging the residuum from the said chamber, means for locking the said feeding means with its source of motion and power during its action, means for locking the residuum-discharging means to its source of power during its action, whereby the automatic action of the mechanism is assured.

24. An automatic press comprising a compressing-chamber having one or more movable walls, a series of drainage-compartments inclosed within the said walls and means for cleaning the walls which form the said compartments, a platen moving compressingly within said walls, means for actuating the said platen, automatic mechanism for moving the said walls, a prime source of power common to all the mechanism, means for locking automatically the wall-moving mechanism to its source of power during the performance of its function, whereby the said function is automatically assured.

25. An automatic press comprising a compression-chamber having two movable walls, a platen moving within the said walls, means for moving the platen, means for arresting the pressure of the platen at a predetermined maximum, means for varying this maximum means for moving the walls means for locking the wall-moving means against movement during the movement of the platen, a water-carrier and a residuum-conveyer, as and for the purpose set forth.

26. An automatic press comprising a compressing-chamber having one or more movable walls, means for moving the said walls during the filling and the discharging of the said chamber automatically, a source of power for said wall-actuating mechanism and a lock interposed between the said source of power and the said wall-moving mechanism, whereby the former is locked to the latter during the movement thereof.

27. An automatic press comprising a compression-chamber having one or more movable walls, means for moving the said walls automatically, compressive means operating within the said walls, a source of power, a lock interposed between the said source of power and the said wall-moving means, means for locking the said lock to the said wall-moving means at the commencement of its motion, and means for unlocking it therefrom at the end thereof, as and for the purpose set out.

28. In a hydraulic press, the combination of a compressing-chamber, a thrust end therefor, a platen, hydraulic means for actuating the said platen comprising a hydraulic cylinder tension-rods between the said cylinder and the said thrust end of the compression-chamber, lateral walls for said chamber, said walls normally fixed, but capable of adjustment and whereby the said chamber can be

laterally expanded and contracted and with facility adapted to the size of the platen.

29. An automatic hydraulic press comprising a compressing-chamber, a platen operating therein, a hydraulic cylinder having a piston therein for actuating the said platen, a pump, means for stopping the said pump at a predetermined pressure, means for automatically discharging the water from the said cylinder consisting of a valve in the water-conductor between the pump and the said cylinder, said valve being opened when the said pump is arrested, means for returning the said piston and platen to their normal position, means for automatically starting the said pump and means for the closing of the said valve after the said platen and piston have returned to their normal position, as and for the purpose set forth.

30. An automatic hydraulic press comprising a compressing-chamber, said chamber having a series of drainage-compartments, movable walls forming the said compartments, a platen operated therein, a hydraulic cylinder having a piston therein for actuating the said platen, a hydraulic pump, means for stopping the said pump at a predetermined pressure, means for automatically discharging the water from the said cylinder, means for returning the said piston and platen to their normal position, thereby expanding the compressing-chamber, means for filling the said chamber automatically and means for discharging the contents of the said chamber after pressure, as and for the purpose set out.

31. An automatic press comprising a compressing-chamber, a platen operated therein, a means for actuating the platen compressively means for stopping the compressive action of the platen at a predetermined pressure means for automatically withdrawing the pressure, means for returning the said platen to its normal position, thereby expanding the compressing-chamber, means for filling the said chamber automatically, and means for discharging the contents of the said chamber automatically, as and for the purpose set forth.

32. In an automatic press having a pressing-chamber and a platen working therein in combination with means for actuating the platen, said chamber having a series of expandible compartments whereby drainage and pressure are facilitated, means for automatically arresting the action of the platen at a predetermined pressure limit, automatic means for returning the said platen to its normal position, automatic means for filling the said compression-chamber, automatic means for discharging the contents of the said chamber after pressure, and automatic means for starting the action of the said platen compressively, a residuum-conveyer, and a liquid collector and conveyer coacting with said drainage-compartments, whereby the said chamber is automatically filled with the substance to be pressed the platen is then automatically started compressively, the platen is returned to its normal position automatically, and the residuum in the said compression-chamber is then automatically discharged, as and for the purpose set forth.

33. In an automatic press the combination of a compressing-chamber, a series of compartments in said chamber said compartments formed by a series of racks suspended on common rod-supports, means for reciprocating rapidly said racks thus freeing them from impacted residuum, a platen, means for moving the said platen, a connecting link or chain between each of the said racks and with a moving part of the mechanism, whereby the said racks contract the compartments they form during compression and whereby the said compartments are expanded during the return motion of the platen, as and for the purpose set forth.

34. A compression-chamber for an automatic press having a platen moving therein, means for actuating the platen a series of racks vertically supported in said chamber forming thereby a series of rack-walled compartments means for cleaning the said compartments a series of rods serving as rack-supports, a series of links uniting the said racks and means for expanding said links taut said means operated by or through the said platen and thereby separating the racks thus reforming the compartments of the compression-chamber.

35. In an automatic hydraulic press, having a compression-chamber and a platen moving therein, means for actuating the platen, lateral racks forming lateral walls for said chamber, a platen moving horizontally therein, a base-rack for said chamber, a strain-cloth on said racks, a metallic guard-screen interposed between the strain-cloth proper and the moving platen, whereby the cloth on the racks is preserved and the metallic guard-screen receives the abrasive action of the platen in its reciprocal motion.

36. A compression-chamber for an automatic press having lateral racks, lateral, supporting-plates for said lateral racks, transverse compartment-forming racks, means tor automatically cleaning the latter a platen movable in the said chamber and means for adjusting the said lateral plates and therethrough the racks to the platen, as and for the purpose set forth.

37. A compression-chamber for an automatic press having lateral racks, a movable platen fitted to the said chamber, means for actuating the said platen reciprocally over and by said racks means for adjusting the said lateral walls or racks to the said platen, a base-rack, a movable carriage therefor, a liquid-collector carried by said carriage, as and for the purpose set forth.

38. A compression-chamber for an auto-

matic press having lateral racks, longitudinal moving platen, means for actuating said platen reciprocally, transverse-located racks, supporting-rods for said transverse racks and means for connecting the said transverse racks together, means for agitating the said racks, thus cleaning same as and for the purpose set forth.

39. In a hydraulic press the combination of a compression-chamber, a platen, a movable top for said chamber, a movable bottom for said chamber, a prime shaft 54 a longitudinal prime-shaft extension 54', a clutch-jaw splined to the said prime shaft, having thereby longitudinal motion independent of the rotary motion of the shaft, a clutch-jaw splined or fixed to the shaft extension, an actuating-lever 42 for said splined clutch-jaw, means for locking the said lever after the said clutch-jaws are engaged and means for unlocking the said lever and the said clutch-jaws after the full rotation of the said prime-shaft extension, as and for the purpose set forth.

40. In an automatic press the combination with the compression-chamber, for a platen moving compressively therein, means for actuating the platen, a movable top, a movable bottom, a drainage-rack carried by the said bottom a carriage for said movable bottom, means for moving said movable bottom and liquid-carrying tank and means for moving the said top, as and for the purpose set out, a liquid-arresting tank carried by the said movable bottom.

41. In an automatic mechanism, the combination of a prime shaft, a clutch-jaw splined thereto a longitudinal extension of the said prime shaft, a clutch-jaw follower fixed thereto, means connected with a moving part of the mechanism to actuate the said clutch-jaw on its spline, means for locking the said clutch-jaw to and holding it in engagement with said clutch-jaw follower and means for unlocking the said clutch-jaw follower from its driver at a predetermined rotation of the supporting-shaft of the follower, as and for the purpose set forth.

42. In an automatic mechanism, the combination of a prime shaft a clutch-jaw splined thereto, a longitudinal extension of the said shaft, a clutch-jaw follower fixed thereto, means for normally forcing the said jaws apart, means connected with a moving part of the mechanism for forcing the said jaws together, means for locking the said jaws together after being so pressed and means for unlocking the said jaws at a predetermined rotation of the mechanism, as and for the purpose set out.

43. In an automatic mechanism the combination of a prime shaft a clutch-jaw splined thereto, a longitudinal extension of the said shaft, a clutch-jaw follower fixed thereto, means for normally forcing the said jaws apart, means connected with a moving part of the mechanism for forcing the said jaws together, means for locking the said jaws together after being so pressed, means for unlocking the said jaws at a predetermined movement of the mechanism, a secondary clutch-jaw and follower carried by the prime shaft, one of the said jaws splined to the said shaft and the other loosely mounted thereon but fixed as to longitudinal motion, a connection between the said former and the said latter clutch, whereby as the former becomes unlocked the latter becomes locked.

44. The combination in an automatic press of a compression-chamber, a platen moving therein, a prime shaft, a movable bottom for the said compression-chamber, a secondary shaft, means for locking the said prime shaft to the secondary shaft, a connecting mechanism between the said two-shafts and movable bottom and means controlled by the movement of the press for actuating the said shaft-locking means whereby the bottom is automatically opened at a predetermined time.

45. In an automatic press comprising a compression-chamber, a platen moving therein, a movable bottom, a clutch whose jaws are normally disengaged, a connecting mechanism between the said bottom and the said clutch, means controlled by a moving part of the mechanism for automatically engaging the said clutch-jaws, as set out.

46. In an automatic press having a compression-chamber, a platen moving therein, a movable bottom, a clutch whose jaws are normally disengaged, a connecting mechanism between the said bottom and the said clutch, means controlled by a moving part of the mechanism for automatically engaging the said clutch-jaws, a movable top for the said chamber, a secondary clutch, a connecting mechanism between the said top and the said secondary clutch, whereby after the said bottom is opened and closed said primary clutch will be unlocked and the bottom-operating mechanism stopped and the secondary clutch will be engaged with its operating mechanism and therethrough the top opened and closed, as and for the purpose set out.

47. In an automatic press having a compression-chamber and a series of racks therein, said racks forming a series of compartments, means for suspending the said racks in the said chamber vertically and means for cleaning the said racks.

48. In an automatic press having a compression-chamber, a series of racks in the said chamber, a series of compartments formed by the said racks, means for supporting the said racks vertically, means for cleaning the said racks from impacted residuum, said means consisting of mechanism for rapidly reciprocating the racks, substantially as described for the purpose set forth.

49. A rack-cleaning mechanism for an automatic press comprising supporting means for the racks and means for reciprocating the said

rack-supporting means connected with a common source of power.

50. A rack-cleaning mechanism for an automatic press comprising in combination with a series of racks supporting-rods for the said racks, means for uniting the said rods and means for connecting the said rod-uniting means with a common source of power, whereby a reciprocal motion is imparted to the rack-support and therethrough the racks.

51. In a hydraulic press having a compression-chamber and in combination therewith a movable bottom, a carriage for the said bottom and a liquid arrester and conveyer carried by the said carriage.

52. In a hydraulic press the combination of a compressing-chamber, a platen moving therein, a prime shaft, a secondary shaft, means for locking the latter to the former, means connected to or with a moving part of the mechanism for actuating the said locking means and means for unlocking the said locking means at a predetermined rotation of the prime shaft.

53. In an automatic press having a pressing-chamber and a platen moving therein, means for actuating the platen, a movable top, a movable bottom, a prime shaft, a connection between the said shaft and the said movable top, means connected with a moving part of the mechanism for locking the said prime shaft to the said bottom-actuating means and means for locking said prime shaft to said top-actuating means, whereby at a predetermined movement of the platen the bottom of the chamber is automatically opened and thereafter closed, and the top is automatically opened and thereafter closed, as and for the purpose set forth.

54. In an automatic press having a pressing-chamber, a platen moving therein, means for actuating the said platen, a movable bottom for said chamber, a prime shaft, a connecting mechanism between the said prime shaft and the said movable bottom, a lock interposed between the said prime shaft and the said movable bottom, means connected with a moving part of the machine for actuating the said lock, thereby locking the said shaft to said bottom-actuating mechanism, whereby at a predetermined movement of the platen said bottom will be opened and closed.

55. The combination in an automatic press having a compression-chamber, a platen moving therein, means for actuating the said platen, one or more movable walls, forming thus in part the platen-incasing chamber, a prime shaft, a mechanical connection between the said prime shaft and the said movable walls or wall, a lock therebetween, means actuated by a moving part of the mechanism for actuating the said lock, thereby locking the said prime shaft with the wall-actuating mechanism, as and for the purpose set forth.

56. The combination in an automatic press of a compressing-chamber, a platen moving therein, a series of partitions forming compartments into which the said chamber is divided, a lid for the said chamber common to all of said compartments, a bottom for the said chamber, means for moving said bottom and a residuum-conveyer, whereby as the bottom is automatically moved the residuum is automatically discharged into the said conveyer, as and for the purpose set out.

57. The combination in an automatic press of a compression-chamber, a platen moving in the said chamber, a movable lid or top for said chamber, means for moving the said top independently of the motion of the platen and means for locking the top-moving means while the platen is moving compressively.

58. The combination in an automatic press of a compression-chamber, a platen moving therein, means for actuating the said platen, a movable lid, a movable bottom for said chamber, means for cleaning the walls of the said chamber and a residuum collector and conveyer.

59. 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, a platen moving therein, means for actuating the platen, a movable lid, a prime mover and a mechanical connection between the said prime mover and the lid, as and for the purpose set forth.

60. The combination in an automatic press of a compression-chamber, a platen movable therein compressively, a movable lid, a bin, the said lid forming the bottom of the bin, a series of compartments in said chamber, a prime mover, a mechanical connection between the said prime mover and the said lid, means controlled by the platen for engaging the said mechanical connection with the prime mover, but when so controlled, moving independent of the compressive motion of the platen, as and for the purpose set forth.

61. In an automatic press having a compression-chamber in combination with a movable bottom, a liquid-collector carried by the said bottom, an outlet-pipe carried by the said liquid-collector, a secondary pipe telescopically connected with the former, as and for the purpose set forth.

62. The combination in an automatic press of a compression-chamber, a platen moving therein compressively, means for actuating the said platen, means for predetermining the maximum pressure of the platen, means for varying this pressure, a movable bottom for the said chamber, a prime mover, a mechanical connection between the said bottom and the prime mover, whereby the bottom is moved while the platen is stationary and the bottom is stationary while the platen is moved.

63. In a hydraulic press the combination of a platen, hydraulic means for actuating the platen, a compression-chamber, a lid for said chamber, automatic means for operating the said lid independently of the platen, a bottom

for said chamber, automatic means for actuating the said bottom, a series of partitions forming compartments for said chamber and automatic means for cleaning the walls of the said compartments.

64. The combination in a hydraulic press of a compression-chamber, a platen moving therein, a pump, means to arrest the compressive action of the platen automatically, variably at a predetermined pressure, means to return the platen to its normal position automatically, means to automatically fill the compression-chamber while the platen is at rest, means to automatically discharge the contents of the compression-chamber of the residuum, means for automatically starting the pump after chamber-filling and means for automatically cleaning the compression-chamber.

65. In an automatic hydraulic press the combination of a compression-chamber, a hydraulically-actuated platen moving in the said cylinder, means for arresting the compressive action of the platen at a predetermined pressure limit, a pump, a water connection between the said pump and the cylinder actuating the platen-ram, automatic means for discharging the water from the said cylinder after the limit of pressure has been reached, automatic means for closing the water-outlet from the said cylinder after the said cylinder has returned to its normal position and automatic means to start the pump, as and for the purpose set forth.

66. In an automatic hydraulic press the combination of the hydraulic cylinder, a platen, a ram, a pump, a compression-chamber, a top for said chamber, automatic means to arrest the compressive action of the platen, automatic means to return the platen to its normal position, automatic means to open the lid while the platen is in its normal position of rest, automatic means to close the lid while the platen is at rest and automatic means to start the platen in its compressive action after the lid is closed.

67. In an automatic hydraulic press the combination with the platen of a hydraulic cylinder, a pump, a compression-chamber, automatic means to start the pump, automatic means to stop the pump after a predetermined pressure has been reached, a bottom for the said chamber, automatic means to open the bottom of the said chamber after pressure when the platen and pump are inactive, automatic means to close the said bottom, a top for said chamber, automatic means to open the said top after the bottom is closed and automatic means to close the said top, as and for the purpose set out.

68. The combination in a hydraulic press of a compression-chamber, a platen moving therein, said chamber having a movable top and a movable bottom, automatic means for opening the said top, automatic means for filling said chamber after said top is opened, automatic means for closing the said top after filling, automatic means to start the compressive action of the platen after the said top is closed, and automatic means for locking the said top closed while the platen is moving compressively.

69. The combination in an automatic press of a compression-chamber, a platen moving therein, a movable lid or top, means for moving the said top automatically, a movable bottom for the said chamber, a prime mover, a mechanical connection between the said bottom and the prime mover, a lock between the said prime shaft and the bottom-actuating means and means for actuating the said lock at a predetermined position of the platen.

70. The combination in a hydraulic press of a compression-chamber, a platen moving therein, a prime mover, means for predetermining the maximum pressure in the chamber, means for arresting this pressure at maximum, a movable wall and means for moving the wall whereby the chamber is filled and means for automatically actuating the wall-moving means.

71. The combination in a hydraulic press of a compression-chamber, a movable platen, means for predetermining the maximum compressive action of the platen, means for automatically arresting the pressure at its predetermined maximum and means for automatically returning the platen to its normal position.

72. The combination in a liquid-extracting press of a compression-chamber, an inlet to said chamber, an outlet from the said chamber, means for automatically feeding material into the said chamber, means for compressing material while in the said chamber, means for predetermining the degree of pressure material shall have while in the said chamber, means for varying this predetermination and means for discharging the material from the said chamber after any degree of predetermined maximum pressure.

73. The combination in a hydraulic press of a compression-chamber, a movable platen, movable exterior walls for said chamber, a series of compartments variable in size dividing the said chamber and means for cleaning the said compartments, whereby the said walls are moved while the said platen is at rest, thus facilitatating the filling and discharging of the said chamber, and the said compartments are cleaned also while the said platen is at rest.

74. The combination in a hydraulic press of a compression-chamber, a movable platen, a primary movable wall, means for moving the said wall while the platen is at rest whereby the said chamber is filled, a secondary movable wall, means for moving the said wall after platen-pressure and when the platen is again at rest, means for automatically starting the said platen in compressive action after the said

secondary wall is at rest, as and for the purpose set forth.

75. A compression-chamber for an automatic press comprising a primary exterior moving wall on the moving of which the chamber is filled, a secondary exterior moving wall, on the moving of which the chamber is emptied, a platen moving in the said chamber, a prime mover, means interposed between the said prime mover and the said walls whereby motion is communicated thereto and automatic mechanism whereby a predetermined position of the platen controls the action of the primary wall, and a predetermined position of the primary wall controls the action of the secondary wall, as and for the purpose set forth.

76. In an automatic liquid-extracting press having a pressing-chamber, means producing and controlling pressure in the said chamber, means for feeding material into the said chamber automatically, means for predetermining the degree of pressure in said chamber at maximum, means for varying this maximum and means for withdrawing the pressure automatically.

77. In an automatic liquid-extracting press having a pressing-chamber, means for producing compressive action in the said chamber, an inlet for the said chamber, an outlet from the said chamber and means for arresting the pressure at any desired predetermined maximum.

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Witnesses:
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