

J. H. FERGUSON.
HYDRAULIC PRESS.

APPLICATION FILED OCT. 14, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

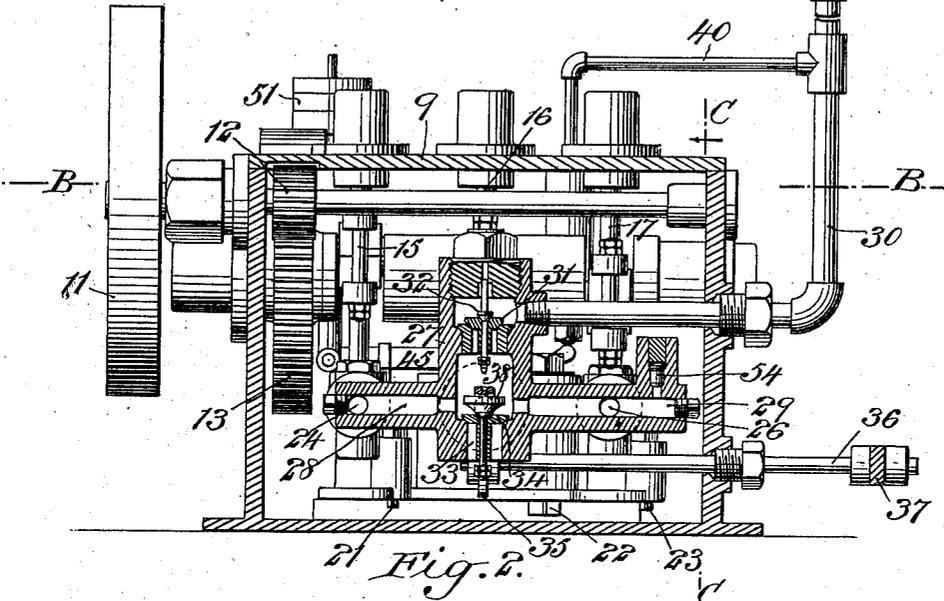
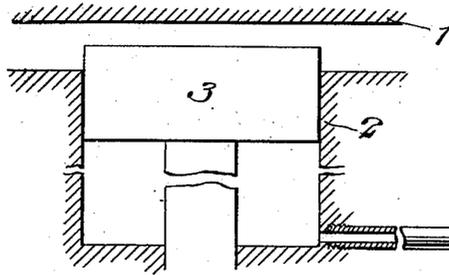
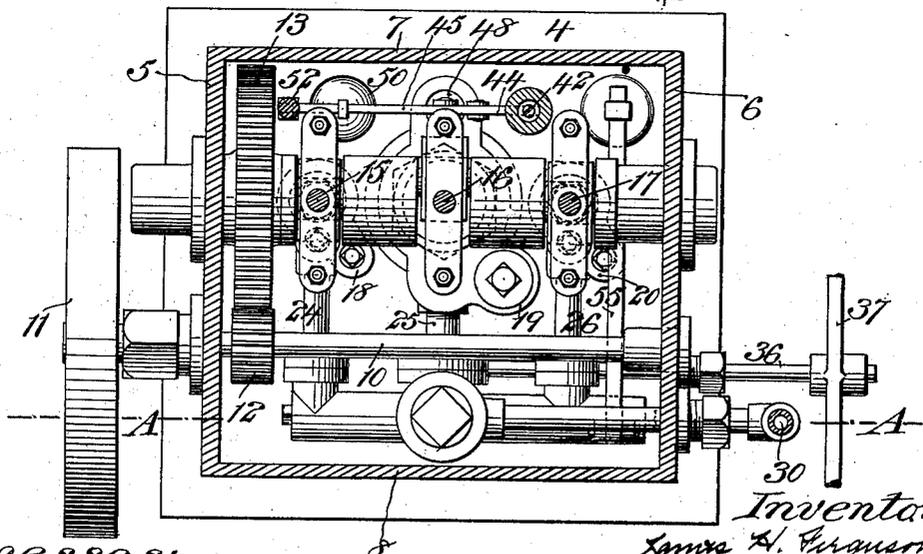


Fig. 2.



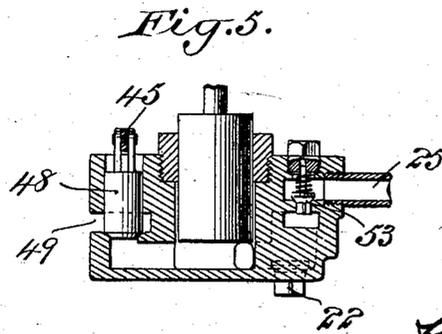
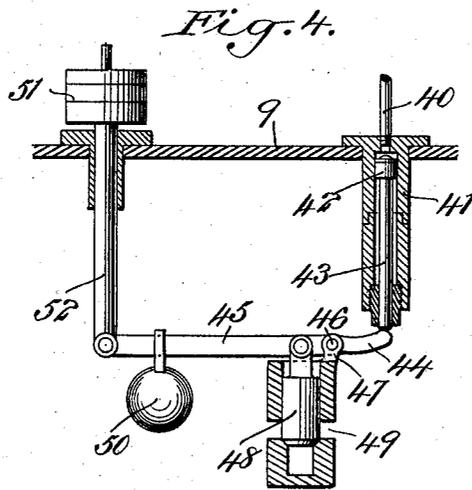
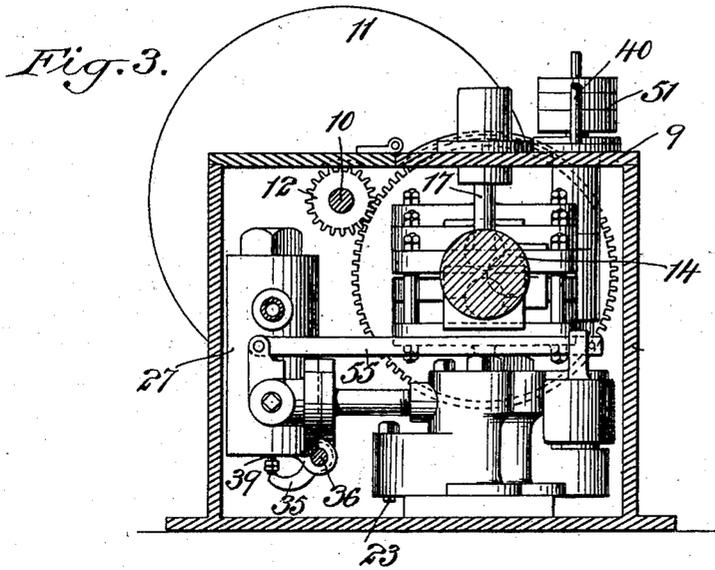
Witnesses:
George Barry Jr.
Henry Thumel

Inventor:
James H. Ferguson
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NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

JAMES H. FERGUSON, OF BROOKLYN, NEW YORK.

HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 748,358, dated December 29, 1903.

Application filed October 14, 1902. Serial No. 127,254. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. FERGUSON, a citizen of the United States, and a resident of the borough of Brooklyn, in the city and State of New York, have invented a new and useful Improvement in Hydraulic Presses, of which the following is a specification.

My invention relates to an improvement in hydraulic presses, and has more particularly for its object to provide certain improvements in the pump mechanism for a hydraulic press whereby the plunger of the press may be brought rapidly up to a predetermined point by a number of pumps, when one of the pumps will be automatically disconnected, thus permitting the remaining pumps to raise the plunger the remaining distance required at a much slower speed. This pump mechanism is particularly applicable for use in connection with hydraulic molding-presses for use in molding the forms for electrotype plates.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents the pump mechanism of a hydraulic press in vertical transverse section in the plane of the line A A of Fig. 2, the plunger and adjacent parts of the press being shown diagrammatically. Fig. 2 is a horizontal section taken through the pump mechanism taken in the plane of the line B B of Fig. 1 looking downwardly. Fig. 3 is a vertical section taken from front to rear through the pump mechanism in the plane of the line C C of Fig. 1 looking in the direction of the arrows. Fig. 4 is a detail view showing the parts for automatically throwing one of the pumps (in the present instance the middle pump) out of action, certain of the parts being shown in section to more clearly illustrate the device; and Fig. 5 is a vertical central section taken from front to rear through the said middle pump.

The parts of the hydraulic press represented diagrammatically herein are the stationary platen 1 and a suitable cylinder 2, within which the plunger 3 is fitted to reciprocate vertically.

My improved valve mechanism is constructed, arranged, and operated as follows: A liquid-tight casing is provided comprising a suitable base 4, side walls 5 and 6, a back

wall 7, a front wall 8, and a removable top or cover 9. A driving-shaft 10 extends across the interior of the casing near its top, which shaft is mounted in suitable bearings in the side walls 5 and 6 and is provided exterior to the side wall 5 with a suitable driving-pulley 11. Within the casing the shaft 10 is provided with a pinion 12, which meshes with a gear 13, fixed to the rotary crank-shaft 14. The rotary crank-shaft 14 is mounted in suitable bearings in the side walls 5 and 6 of the casing, and the piston-rods 15, 16, and 17 of three hydraulic pumps 18, 19, and 20 are connected in the usual manner to the cranks of the shaft 14.

In the accompanying drawings I have represented the middle pump 19 as being of considerably greater capacity than the side pumps 18 and 20.

The three pumps 18, 19, and 20 are provided with the usual liquid-inlets 21 22 23 in their bases. The liquid-outlets of the pumps are denoted by 24 25 26, which outlets all lead to a common distributor comprising a hollow vertical portion 27, with which the outlet 25 of the main pump directly communicates, and hollow horizontal branches 28 29, through which the outlets 24 26 of the auxiliary pumps 18 and 20 communicate with the interior of the hollow vertical portion 27 of the distributor. The interior of the distributor communicates with the chamber back of the plunger 3 of the hydraulic press through a pipe 30, and an automatically-operated valve 31 is interposed between the mouth of the pipe 30 and the liquid-outlets 24 25 26 of the pumps. To render the valve 31 more easily operated, I provide the said valve with a small primarily-operated valve 32 concentric therewith.

A valve-controlled port 33 opens from the interior of the distributor to the interior of the casing. A manually-operated valve 34 is fitted to open and close the port 33, which valve is adapted to be engaged by one arm 35 of a rock-shaft 36, which extends to the exterior of the casing and is there provided with a suitable operating handle or lever 37.

To render the valve 33 more easily operated, I preferably provide the said valve with a small concentric valve 38, the stem 39 of which is engaged by the arm 35 of the rock-

shaft 36, so that when the rock-shaft is turned to open the valve 34 the primary valve 38 will be first raised and then the valve 34 from their seats.

5 The automatically-operated valve 31, which controls the admission of the liquid to the plunger-chamber of the press, may be mechanically opened by the rock-shaft 36 because of the engagement of the head of the
10 valve 38 with the stem of the primary valve 32 as the shaft 36 is rocked by the hand-lever 37.

The means which I employ for automatically throwing one of the pumps out of action
15 after the plunger of the press has been rapidly raised to a point near the limit of its upward movement is constructed and arranged as follows: A branch pipe 40 leads from the
20 pipe 30 into communication with the top of a cylinder 41, depending from the cover 9 of the casing, which cylinder is provided with a piston 42 therein, which is normally held by weight at the limit of its upward movement within the cylinder. The lower end of the piston-stem 43 is engaged by the short arm 44 of a
25 weighted lever, the long arm 45 of which may be adjustably weighted in different ways. This lever is pivoted at 46 in a lug 47 of one of the pumps, in the present instance the
30 main or middle pump 19. A valve 48 is connected to the long arm of the lever adjacent to its fulcrum, which valve opens and closes a liquid-outlet port 49 of the main pump. In the present instance I have shown this valve
35 48 as held against its seat to close the port 49 by means of an adjustable weight 50, carried by the long arm of the valve-controlling lever and also by means of removable weights 51, carried by a rod 52, which extends from
40 the end of the long arm 45 of the said lever upwardly to the exterior to the casing, through the cover 9 thereof. It will thus be seen that the pressure of the valve 48 against its seat may be accurately determined by adding or
45 removing the weights 51 or by shifting the weight 50.

The outlet 25 of the middle pump is provided with a suitable automatically-operated
50 valve 53 to prevent a backflow of the liquid through the outlet 25 from the common distributor. The auxiliary pumps 18 and 20 are similarly provided with automatically-operated valves 53 in their fluid-outlets 24 and 26, which valves are not shown herein.

55 A safety-valve 54, controlled by a weighted arm 55, may be provided for the distributor, if so desired.

The operation of the mechanism is as follows: The three pumps are started by the
60 rotary driving-shaft 10 through the gearing 12 and 13 and pump crank-shaft 14. The three pumps acting in concert will force the liquid into the common distributor and from thence through the valve 31 and pipe 30 into
65 the chamber back of the plunger 3 of the press. It is of course to be understood that the port 33, leading from the distributor to

the interior of the casing, is closed during this operation. After the plunger has been forced upwardly to the required point near
70 the limit of its upward movement the back pressure of the liquid through the branch pipe 40 will force the piston 42 downwardly, thus raising the valve 48 away from its seat. This will open the outlet-port 49 of the main
75 pump, so that the said pump will be put out of operation. The auxiliary side pump will continue to force the plunger 3 of the press slowly upward until it reaches the desired
80 point to accomplish the work intended. If it is desired to hold the plunger at this point, the hand-lever 37 of the rock-shaft 36 is turned a sufficient distance to raise the valve 34, thus putting the auxiliary side pumps out of
85 operation as far as forcing the liquid into the chamber back of the plunger 3 of the press is concerned, for the reason that the liquid forced in the distributor will pass downwardly through the port 33 into the interior of the
90 casing, from whence it had been drawn by the pumps. When it is desired to permit the piston 3 to move downwardly, the rock-shaft 36 is still further rocked by the hand-lever 37 a sufficient distance to cause the primary valve
95 38 to engage the primary valve 32 of the valve 31 and raise the valves 32 and 31 away from their seats. This will permit the liquid within the cylinder 2 of the press to run back through the pipe 30, distributor, and
100 port 33 into the casing.

By the use of a valve mechanism constructed as above described I am enabled to provide a rapidly-operated hydraulic press without sacrificing any of the accuracy of the
105 press. This will increase the output of the press materially over those presses where a slow movement of the plunger is necessary throughout its entire upward movement.

It is evident that changes might be resorted to in the form, construction, and arrangement of the several parts without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structure herein set forth; but

What I claim is—

115 1. In a hydraulic press, a plunger, a plurality of pumps therefor, and means for automatically throwing a pump out of operation comprising a piston operated by the pressure of the liquid back of the plunger, an outlet
120 port in the pump intended to be thrown out of operation and a valve controlled by the said piston for said port.

125 2. In a hydraulic press, a plunger, a plurality of pumps therefor and means for automatically throwing a pump out of operation comprising a piston operated by the pressure of the liquid back of the plunger, an outlet
130 port in the pump intended to be thrown out of operation and a weighted valve controlled by the said piston for said port.

3. In a hydraulic press, a plunger, a plurality of pumps, a pipe connecting the pumps with the back of the plunger and means for

automatically throwing one of the pumps out of operation comprising a piston, a branch pipe for conveying the liquid to the face of the piston, an outlet-port for the pump and a weighted valve controlled by the piston for opening and closing said port.

4. In a hydraulic press, a plunger, a plurality of pumps therefor and means for automatically throwing one of the pumps out of operation comprising a piston, a branch pipe for conveying the liquid from the back of the plunger to the face of the piston, a weighted lever operated by the piston, an outlet-port in the pump and a valve for the port connected to the weighted lever.

5. In a hydraulic press, a plunger, a plurality of pumps therefor and means for automatically throwing one of the pumps out

of operation comprising a piston, a branch pipe for conveying the liquid from the space back of the plunger to the face of the piston, a weighted rocking lever operated by the piston, an outlet-port in the pump, a valve for the port connected to the weighted lever and means for adjusting the weights upon the lever whereby the valve is opened when a predetermined pressure of the liquid is exerted upon the face of the piston.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 25th day of September, 1902.

JAMES H. FERGUSON.

Witnesses:

FREDK. HAYNES,
HENRY THIEME.