J. H. FERGUSON.

HYDRAULIC PRESS.

APPLICATION FILED DEC. 24, 1904.

901,086. Patented Oct. 13, 1908.

2 SHEETS—SHEET 1.

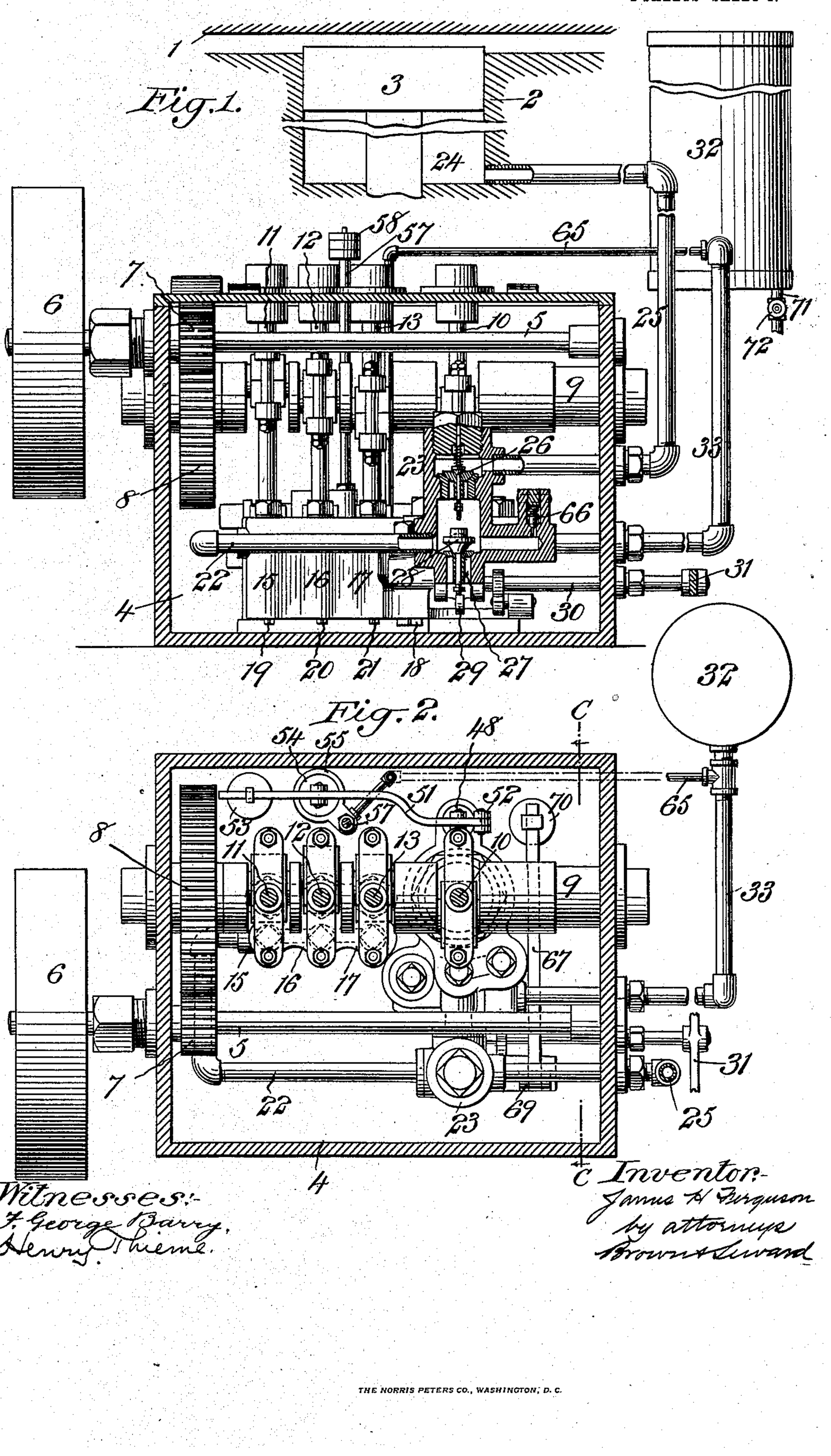


Fig. 1.

Fig. 2.

Witnesses:-
F. George Barry.
Henry S. Thieme.

Inventor:-
James H. Ferguson
by attorneys
Brown & Seward

J. H. FERGUSON.

HYDRAULIC PRESS.

APPLICATION FILED DEC. 24, 1904.

901,086.

Patented Oct. 13, 1908.

2 SHEETS—SHEET 2.

Fig. 3.

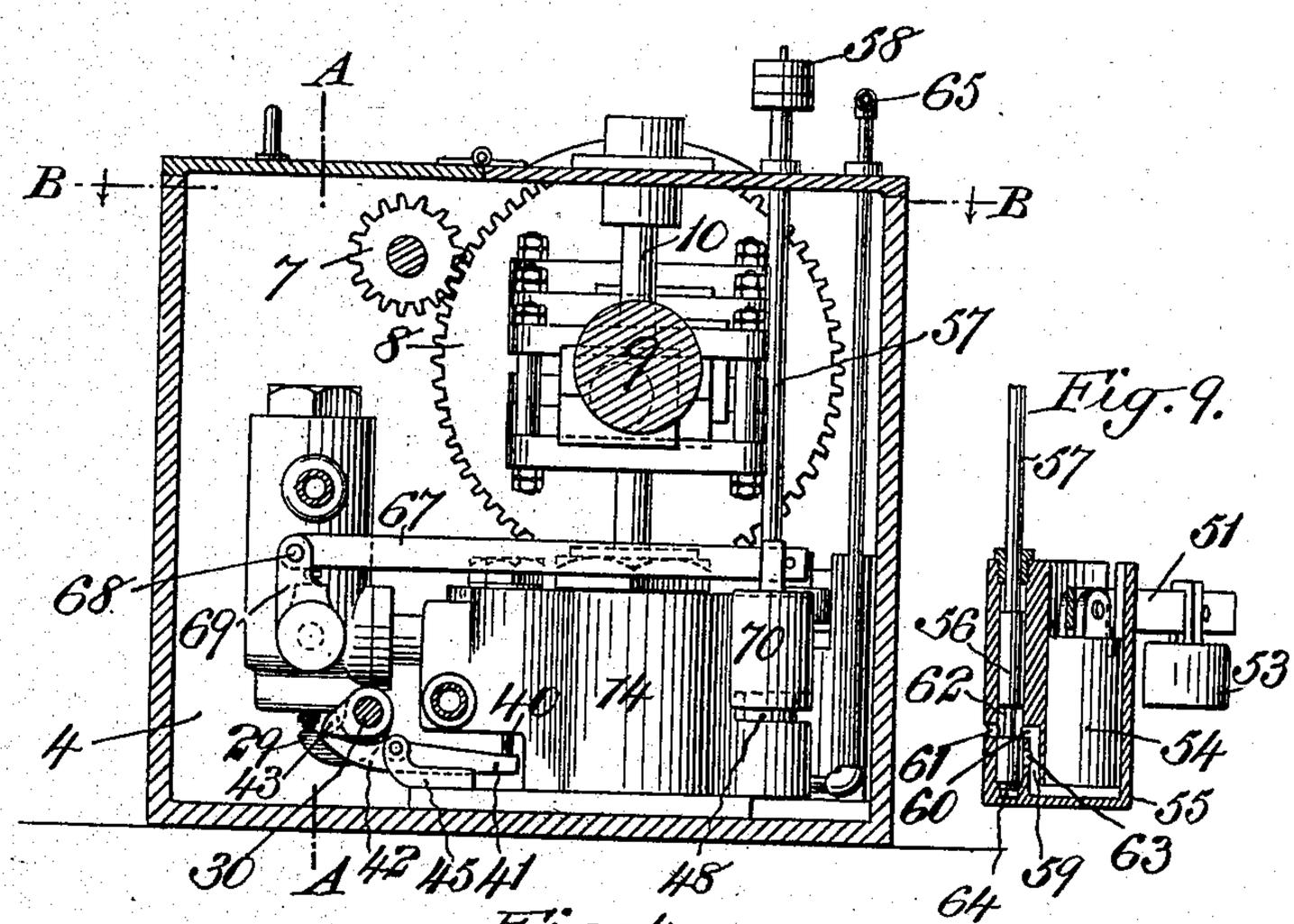


Fig. 9.

Fig. 4.

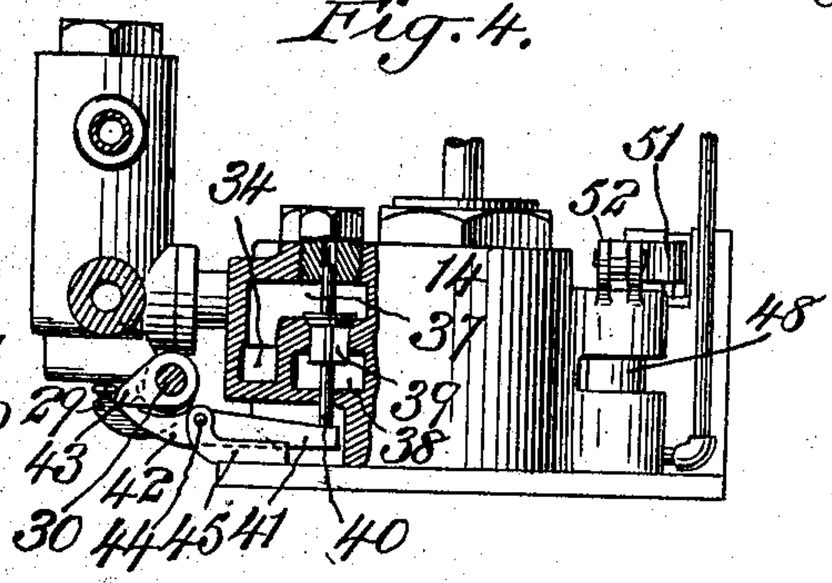


Fig. 6.

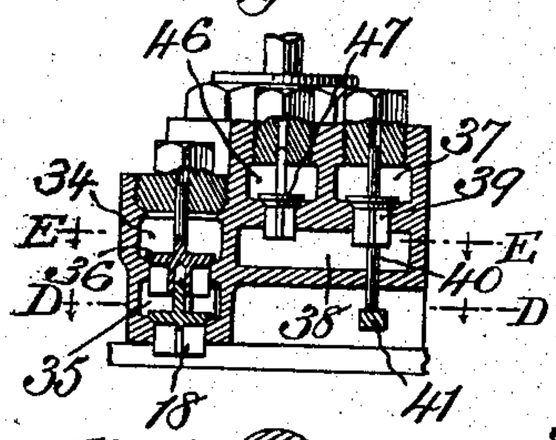


Fig. 7.

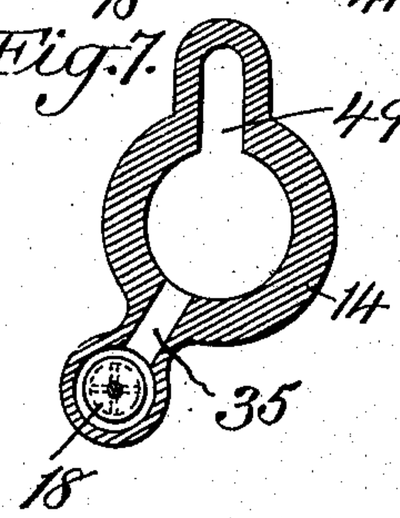


Fig. 8.

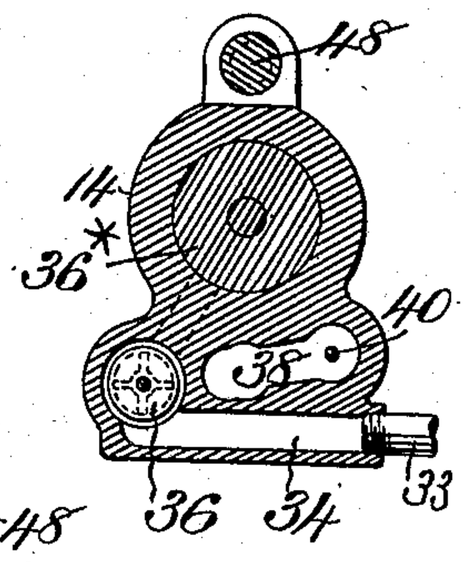
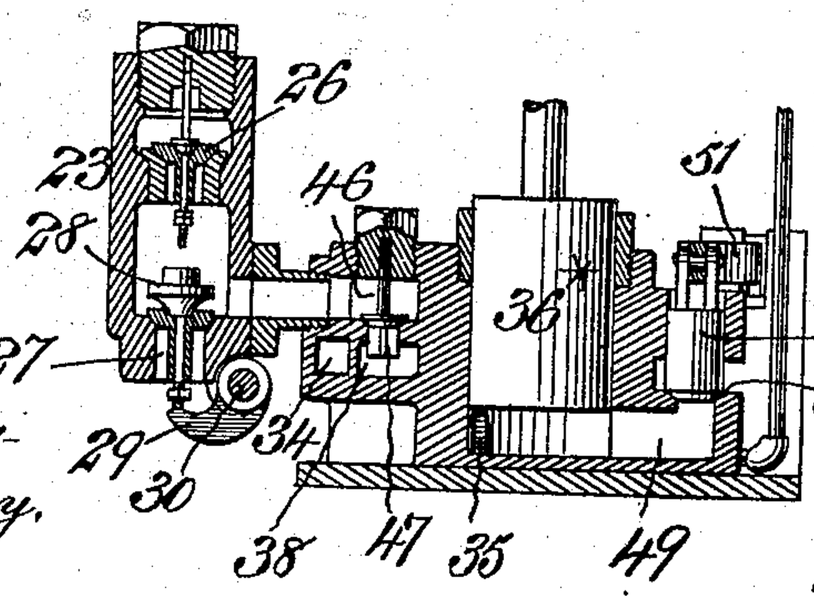


Fig. 5.



Witnesses:-

J. George Barry.

Henry Thieme.

Inventor:-

James H. Ferguson

by attorneys

Brown & Seward

UNITED STATES PATENT OFFICE.

JAMES H. FERGUSON, OF NEW YORK, N. Y., ASSIGNOR TO THE LOVEJOY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

HYDRAULIC PRESS.

No. 901,086. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed December 24, 1904. Serial No. 238,195.

To all whom it may concern:

Be it known that I, JAMES H. FERGUSON, a citizen of the United States, and 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.

The object of this present invention is to provide certain improvements in the mechanism of a hydraulic press whereby the plunger may be brought rapidly and with an even movement up to a predetermined point. This pump mechanism is particularly applicable for use in connection with hydraulic molding presses for use in molding the forms for electrotype plates.

In the accompanying drawings, Figure 1 represents the pump mechanism of a hydraulic press in vertical transverse section taken in the plane of the line A—A of Fig. 3, the plunger and adjacent parts of the press being shown diagrammatically. Fig. 2 is a horizontal section taken through the pump mechanism in the plane of the line B—B of Fig. 3, 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. 2, Fig. 4 is a detail side view partially in section of the main pump and its adjacent parts, Fig. 5 is a vertical central section through the same, Fig. 6 is a transverse section through the main pump in the line of the several admission valves, Fig. 7 is a transverse section taken in the plane of the line D—D of Fig. 6, Fig. 8 is a transverse section taken in the plane of the line E—E of Fig. 6, and Fig. 9 is a detail vertical section through the valve for automatically throwing the main pump out of operation.

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

4 designates a liquid-tight casing. A driving shaft 5 extends across the interior of the casing near its top, which shaft is provided with a suitable driving pulley 6. Within the casing 4, the driving shaft 5 is provided with a pinion 7 which meshes with a gear 8 fixed to a rotary crank shaft 9 suitably mounted in the casing. The piston rod 10 of the main hydraulic pump and the piston rods 11, 12, and 13 of the auxiliary hydraulic pumps are connected in the usual manner to the cranks of the shaft 9. The main pump 14 is of considerably greater capacity than any one of the auxiliary pumps 15, 16 and 17. The inlet of the main pump is denoted by 18 and the inlets of the auxiliary pumps by 19, 20 and 21. The three auxiliary pumps have a common outlet pipe 22 which leads to a common distributer 23. The interior of the distributer 23 communicates with the chamber 24 back of the plunger 3 of the hydraulic press, through a pipe 25 and an automatically operated valve 26 is located within the distributer 23 between the points where the pipes 22, and 25 open into the said distributer. A port 27 opens from the interior of the distributer to the interior of the casing and a manually operated valve 28 is arranged to open and close the port 27, which valve is adapted to be engaged by one arm 29 of a rockshaft 30 which extends to the exterior of the casing and is there provided with a suitable operating handle or lever 31. The automatically operated valve 26 which controls the admission of liquid to the plunger chamber of the press may be mechanically opened by the engagement therewith of the valve 28 when it is raised by the upward movement of the arm 29 of the rockshaft 30, to the limit of its movement.

To produce an even movement of the plunger 3, I provide an accumulator 32 located at some convenient point with respect to the pumps into which accumulator the liquid within the casing 4 is forced by the main pump 14. Communication is established between the main pump 14 and the distributer and between the accumulator and the distributer as follows. A pipe 33 leads from a horizontal port 34 in the main pump casing to the accumulator. This port 34 is brought into and out of communication with the inlet port 35 by a valve 36 operated by pressure. This valve 36 is in alinement with the inlet valve 18 of the main pump. The inlet port 35 leads to the main pump cylinder below its piston 36.*

The horizontal port 34 is at all times in open communication with a branch port 37, communication from which branch port is opened and closed with a bridge port 38 by means of a positively operated valve 39, which valve is provided with a stem 40.

One arm 41 of a two-armed lever 41, 42, is engaged with the valve stem 40, the other arm 42 of which lever being engaged by a cam 43 fixed to the rockshaft 30. The rock lever 41, 42 is pivoted at 44 on a suitable support 45 carried by the base of the pump. Communication is opened and closed between the bridge port 38 and the discharge port 46 by an automatic valve 47. This discharge port 46 is at all times in open communication with the interior of the distributer 23 between the valves 26 and 28.

A pressure relief valve mechanism is provided for the accumulator 32, which valve mechanism is arranged to throw the main pump out of operation when pressure in the accumulator reaches a predetermined point. This valve mechanism is constructed and arranged as follows. A weight controlled valve 48 is arranged to open and close the interior of the main pump cylinder below the piston 36* to the exterior of the cylinder. This valve 48 is fitted to slide in the main cylinder casing and controls communication between the branch port 49 leading from the said piston chamber to an outlet port 50. A weighted lever 51 is pivoted at 52 to the main pump casing, to which lever is attached the valve 48. A weight 53 is adjustably carried by the lever 51. This weight 53 tends to hold the valve 48 closed. When the valve 48 is opened, the main pump will work idly or in other words, will be out of operation. A piston 54 is mounted to reciprocate vertically in a casing 55 and is attached to the lever 51 between its fulcrum and the weight 53. An auxiliary weighted valve 56 is also fitted to slide vertically in the casing 55. This auxiliary valve 56 is provided with a rod 57 which preferably extends through the top of the casing 4 and may there be provided with the desired weights 58 which tend to hold the valve closed. A port 59 leads from the space beneath the piston 54 to the face of the auxiliary valve 56 at two different points one above the other. The upper branch of the port 59 is denoted by 60 and is normally in open communication with a port 61 leading to the exterior of the casing through a peripheral port 62 in the auxiliary valve 56. The lower branch 63 of the port 59 is normally closed when the valve 56 is closed but when the valve 56 is raised, this branch 63 is brought into open communication with a port 64 to which a pipe 65 leads from the accumulator 32. In the present instance, this pipe 65 leads from the pipe 33 adjacent to the accumulator. When the branch 63 of the port 59 is open to the port 64, the branches 60 and 61 of the said port will be closed.

A safety or relief valve 66 is provided in the distributer 23 for relieving the pressure when it becomes too great therein, which relief valve 66 is normally held closed by a lever 67 fulcrumed at 68 in a suitable support 69 and provided with an adjustable weight 70.

I have shown a pipe 71 and a cock 72 carried by the accumulator 32 for attachment of any suitable means for supplying air pressure to the interior of the accumulator.

The operation of the press is as follows. The accumulator is preferably provided with an air pressure greater than atmospheric pressure. This may be obtained by attaching a suitable pneumatic pump to the accumulator. The pumps are then started. The three auxiliary pumps will be out of operation because the valve 28 is open at this point in the operation of the press. The main pump will force the liquid directly into the accumulator until the pressure in the accumulator rises to a point which will raise the auxiliary valve 56 by back pressure through the pipe 65, thus raising the piston 54 and opening the relief valve 48, thereby rendering the main pump ineffective. The shaft 30 is rocked a sufficient distance by the operating handle 31 to first permit the valve 28 in the distributer to close by the disengagement of the lever arm 29 therefrom and then raise the valve 39 by the engagement of the cam 43 of the rock shaft with the arm 42 of the rock lever 41, 42, the arm 41 of which engages the said valve 39. The accumulator is then brought into communication with the distributer and from thence to the back of the press plunger. The auxiliary pumps are also rendered effective because of the closure of the valve 28. This will cause the plunger 3 of the press to rise rapidly and smoothly and as soon as the pressure in the accumulator falls sufficiently to permit the auxiliary valve 56 to close, the main pump will also be rendered effective. The operation of the main pump will serve to restore the pressure within the accumulator and the pump will again be rendered ineffective as soon as the pressure is restored. It will thus be seen that the pressure from the accumulator and the pressure from the auxiliary pumps is being fed to the back of the press plunger. When the pressure back of the press plunger reaches a predetermined height, an automatic relief therefor is provided through the weighted valve 66 hereinbefore described.

When it is desired to manually release the press plunger, the shaft 30 is rocked in a direction which will permit the arm 29 to raise the valve 28 in the distributer and also lift the valve 26, thereby opening communication from the space back of the plunger to the interior of the casing.

What I claim as my invention is:

1. In a hydraulic press, a plunger, an accumulator for supplying pressure thereto, a pump for supplying pressure to the accumulator, a relief valve for the pump, a weighted auxiliary valve operated by pressure in the accumulator and means controlled by the

auxiliary valve for opening and closing the pump relief valve for rendering the pump ineffective and effective.

2. In a hydraulic press, a plunger, an accumulator for supplying pressure thereto, a pump for supplying pressure to the accumulator, a relief valve for the pump, a weighted lever attached to the relief valve, a piston attached to the weighted lever and a weighted auxiliary valve for controlling the passage of pressure from the accumulator to the piston to open and close the pump relief valve and thereby render the pump ineffective and effective.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 19th day of December 1904.

JAMES H. FERGUSON.

Witnesses:

FREDK. HAYNES,

HENRY THIEME.