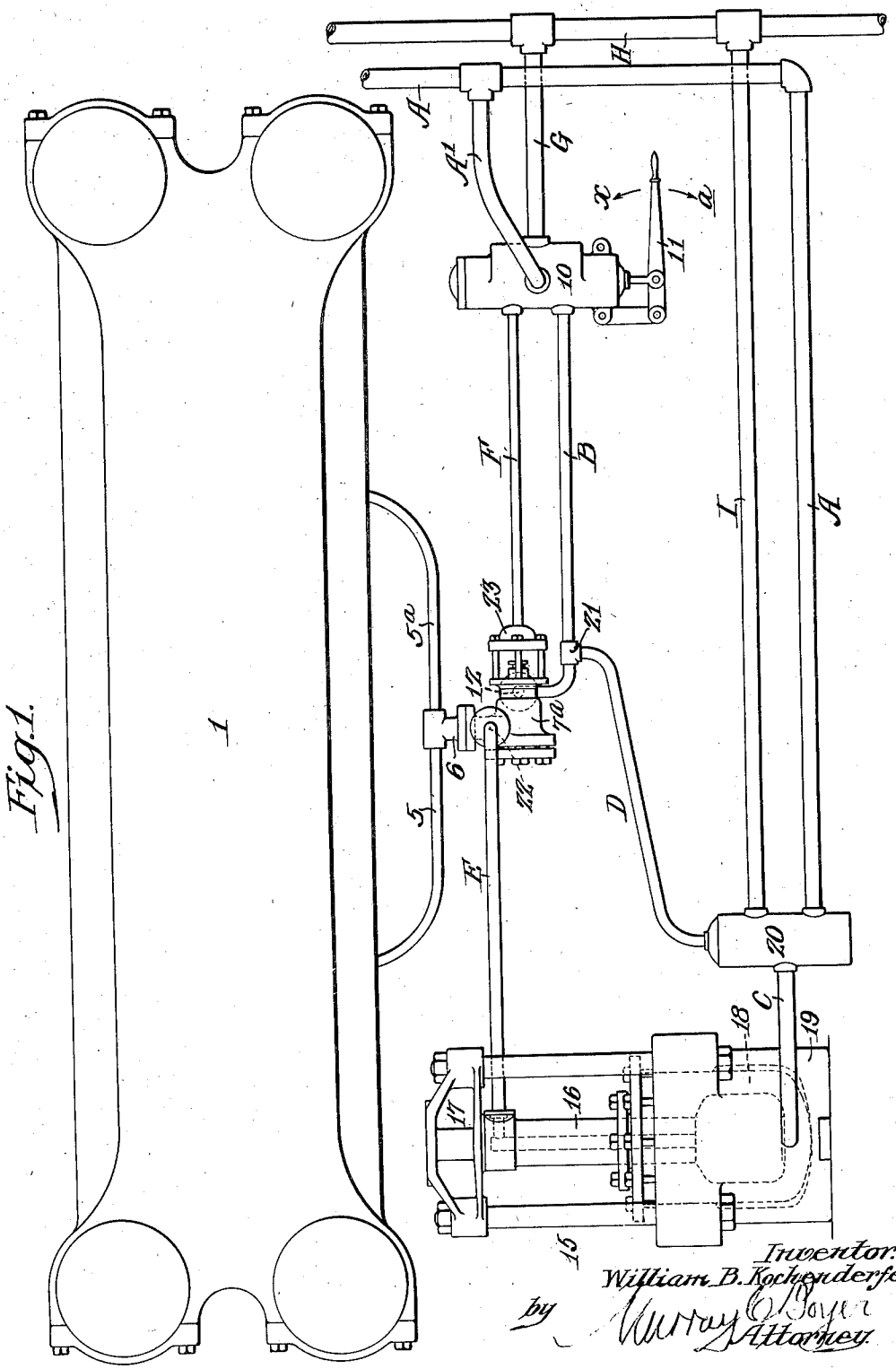
Aug. 18, 1925. 1,549,883

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VALVE MECHANISM FOR CONTROLLING THE OPERATION OF TWO-PRESSURE HYDRAULIC PRESSES

Filed Feb. 16, 1922 3 Sheets-Sheet 1



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Filed Feb. 16, 1922 3 Sheets-Sheet 2

Fig. 2.

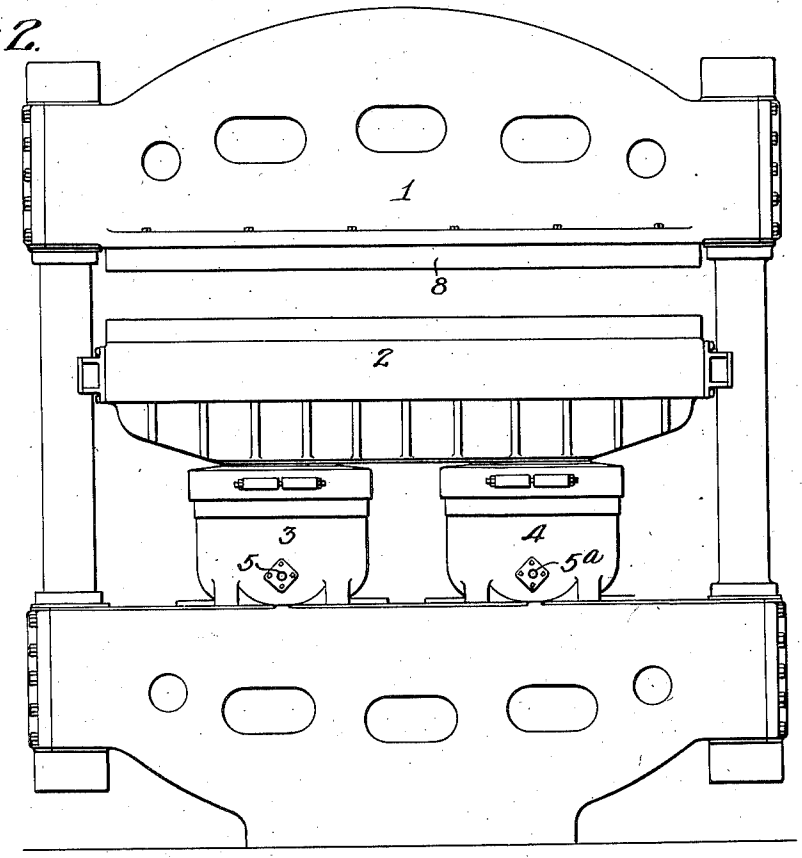
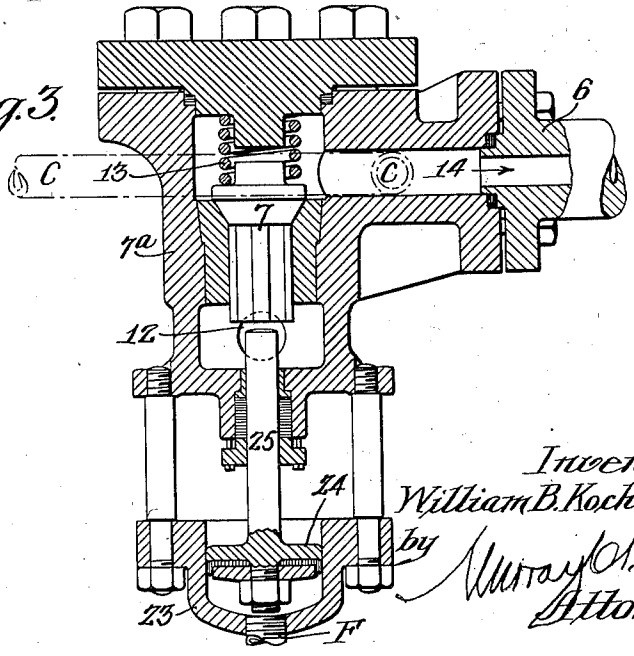


Fig. 3.



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Filed Feb. 16, 1922 3 Sheets-Sheet 3

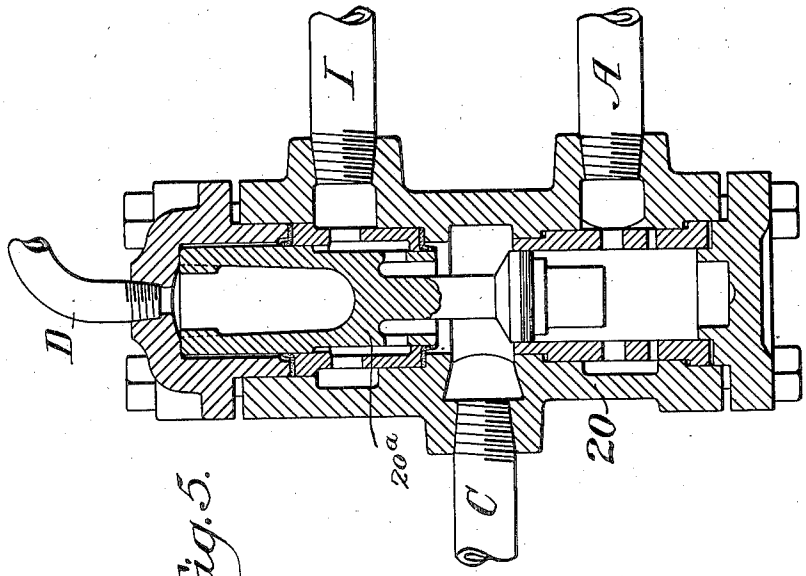


Fig. 5.

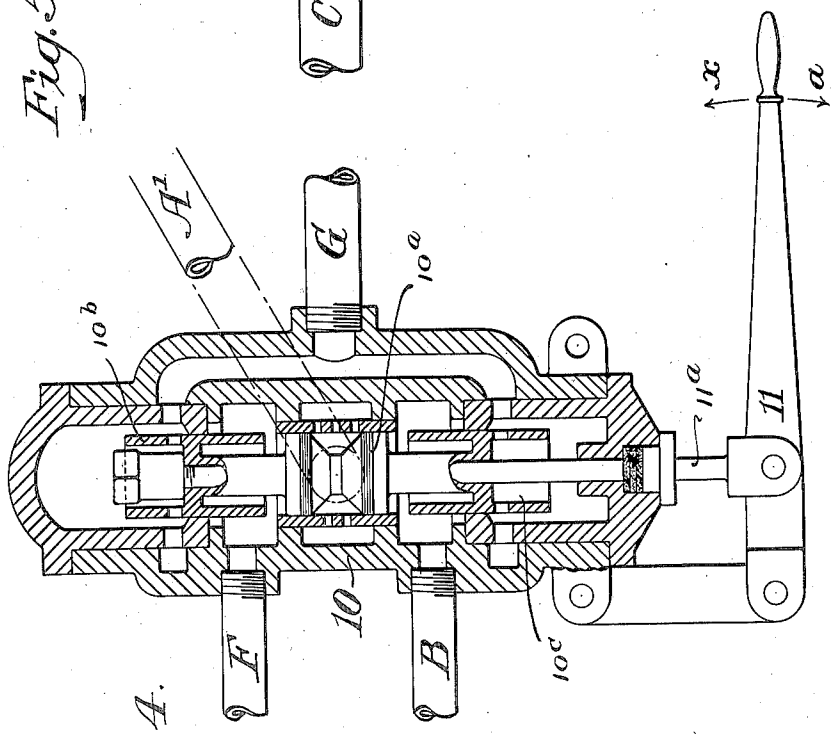


Fig. 4.

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UNITED STATES PATENT OFFICE.

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VALVE MECHANISM FOR CONTROLLING THE OPERATION OF TWO-PRESSURE HYDRAULIC PRESSES.

Application filed February 16, 1922. Serial No. 536,946.

To all whom it may concern:

Be it known that I, WILLIAM B. KOCHENDERFER, a citizen of the United States, and a resident of Camden, Camden County, New Jersey, have invented certain new and useful Improvements in Valve Mechanism for Controlling the Operation of Two-Pressure Hydraulic Presses, of which the following is a specification.

My invention relates to the arrangement of valves for controlling pressure passing to the cylinder (or cylinders) of a hydraulic press, wherein the initial operation of the platen is effected by low pressure fluid, and when this builds up, high pressure is automatically supplied for the final operation of the press.

One object of my invention is to provide a system with a single, manually-controlled, valve; the same being moved by a suitable lever to open position or to a position wherein low pressure will be admitted to the cylinder or cylinders of the hydraulic press; the subsequent application of pressure being under the control of automatically controlled valves whereby pressure may build up in an intensifier through the medium of which high pressure is introduced into the press cylinder. In addition, my arrangement includes means whereby such high pressure passes to the press cylinders from the intensifier without having to pass through a valve-controlled passage.

These and other features of my invention are more fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1, is a diagrammatic view in plan of a press, with the relative position of the valves, piping, and intensifier.

Fig. 2, is a view in elevation of one form of hydraulic press to which my invention may be applied.

Fig. 3, is a sectional elevation of a check valve which I may employ with my improved construction.

Fig. 4 is a sectional elevation, largely diagrammatic, of a controlling valve which I may employ with my improved construction, and

Fig. 5, is a sectional elevation, largely diagrammatic, of an automatic three-way valve which I may employ.

In Fig. 1, of the drawings, 1 may represent a press frame having the usual platen 2, and in the present instance the platen is shown as arranged for movement by pistons or plungers, disposed in a pair of cylinders 3 and 4, to which motive fluid may be admitted simultaneously via pipes 5 and 5^a, from a common connection 6, after passing a check valve 7 in the line to which said connection 6 is attached. The platen is arranged to carry work which may be raised into contact with a fixed abutment or stop 8, disposed in the upper part of the press. It will be understood, of course, that the principles involved in my present arrangement or construction may be applied to single cylinder hydraulic presses, or to presses having more than two cylinders.

The casing of a manually-controlled valve is indicated at 10; a sectional view of such valve structure, largely diagrammatic, being clearly illustrated in Fig. 4. When this valve, indicated at 10^a, is opened to the line pressure, which may be effected by movement of an operating lever 11, (connected to said valve 10^a, by a stem 11^a), in the direction of the arrow *a*, low pressure from a source of supply may enter said valve casing 10, from a main A, via pipe A'; passing thence through a pipe B to the casing 7^a, of the check valve 7, and entering said casing 7^a through an opening 12. The valve 10^a has end portions 10^b and 10^c, which control the inlet and exhaust to and from pipes B and F, said pipes when open to exhaust communicating with a pipe G connected to the exhaust line; movement of the valve 10^a in the direction of the arrow *a*, permitting exhaust from F to G, and movement of said valve in the direction of the arrow *x*, permitting exhaust from B to G. The low pressure passing through pipe B raises the check valve 7 against the tension of a spring 13, and passes to an outlet 14, leading to the connection 6, and thence to the pipes 5 and 5^a, communicating with the cylinders 3 and 4; such pressure raising the pistons or plungers therein until the platen 2 carries the work into contact with the abutment or stop 8.

In order to provide the necessary high pressure to complete the operation of the press, I provide an intensifier 15, which may be of any usual type and in the present instance comprises a fixed ram 16, properly mounted in a suitable frame 17, and fitting a hollow piston or plunger 18, containing

low pressure fluid which piston or plunger is mounted in a cylinder 19, and is adapted to rise under the influence of pressure entering the cylinder 19 via a pipe C; passage to which pipe C from the main A being controlled by an automatically operating two-pressure floating valve disposed in a casing 20.

A sectional elevation of this valve structure, largely diagrammatic, is shown in Fig. 5.

One end of the valve casing 20 is connected with the line B by a pipe D; the line B being provided with a T-connection 21 from which said pipe D leads in advance of the connection with the check valve casing 7^a, and as the low pressure builds up in the cylinders 3 and 4, a sufficient quantity is by-passed through pipe D and entering the valve casing 20, acts against the larger end of the floating valve contained therein and overcomes the pressure from the main A tending to lift said valve and hold it in the closed position to cut off flow to the pipe C. When this floating valve is shifted, pressure from the main A may flow through the valve casing 20, to the pipe C and thence to the cylinder 19 of the intensifier; lifting the piston or plunger 18, therein and forcing the fluid within said piston or plunger into the ram 16 and out through a pipe E to the check valve casing 7^a; such pressure entering the check valve casing at the point 22, beyond the check valve 7, and passing through the outlet 14, of said casing to the connection 6, and thence to the pipe 5 and 5^a leading to the cylinders 3 and 4; the check valve 7 meanwhile closing under the action of the spring 13 before the high pressure fluid begins to flow.

The intensifier may be of any usual type, comprising a hollow piston or plunger normally filled with liquid, or which fills with liquid exhausing from the cylinders 3 and 4, and the high pressure effected by the intensifier, due to the movement of the piston or plunger 18, in the manner common to the structures of this type, forces the fluid under steadily increasing pressure into the pipe E and delivers the same through the check valve casing 7^a, without passing the check valve, to the connection 6 communicating with the twin delivery pipes 5 and 5^a.

When it is desired to release the pressure, the lever 11 connected to the valve within the casing 10, is moved in the direction of the arrow *x*, whereupon pressure may pass from the valve casing 10 via pipe F to a cylinder 23 carried by the check valve casing 7^a, as shown in Fig. 3, and operate a piston 24 therein; the latter having a stem 25, which, when moved by the piston 24, engages the check valve 7 and opens the same against the tension of the spring 13; permitting fluid to pass from the cylinders 3 and 4, via the twin delivery pipes 5 and 5^a, to the connection 6, through outlet 14 and past the check valve 7, thence to the pipe B, valve casing 10, and pipe G to the exhaust line H. At the same time the pressure will exhaust from the valve casing 20 through the pipe D to pipe B permitting the automatic valve 20^a in said casing 20 to shift under the influence of pressure from the main A, engaging its smaller end and opening the cylinder 19 to exhaust, via pipe C, valve casing 20, and pipe I to the exhaust line H.

It will be clearly understood from examination of the arrangement I have provided, that the whole work may be effected by the operation of a single, manually-controlled, valve, that indicated at 10^a and contained within the casing 10, for instance; the operation of the intensifier supplying the high pressure to the press cylinders being wholly automatic and not depending upon the operator for its proper and effective control. It will also be understood that the intensifier will be of a capacity that will supply the desired amount of high pressure for any work within the capacity of the press.

I claim:

1. In mechanism for controlling the admission of high and low pressure to the cylinder of an hydraulic press, the combination of a supply main, a manually-operated valve controlling delivery from said main to the press cylinder, a check valve through which such pressure passes to said cylinder, an automatic valve operated after low pressure in the press cylinder builds up; pressure to actuate said automatic valve being tapped from the low pressure line in advance of the check valve, an intensifier receiving low pressure directly from the main through said automatic valve after the latter has been actuated, and means for delivering the high pressure developed by such intensifier to the press cylinder around the check valve through the same connection admitting low pressure to said cylinder from the manually-operated valve.

2. In mechanism for controlling the admission of high and low pressure to the cylinder of an hydraulic press, the combination of a supply main, a manually-operated valve controlling delivery from said main to the press cylinder, a spring-controlled check valve through which such pressure passes to said cylinder, a valve automatically operated after low pressure in the press cylinder builds up; pressure to actuate said automatic valve being tapped from the low pressure line in advance of the check valve, an intensifier receiving low pressure directly from the main through said automatic valve after the latter has been actuated, means for delivering the high pressure developed

by such intensifier to the press cylinder around the check valve through the same connection admitting low pressure to said cylinder from the manually-operated valve, and blind pressure means for operating the check valve to exhaust the cylinder; said means being brought into action by reversing the position of the manually-controlled valve.

3. In valve mechanism for controlling the admission of high and low pressure to the cylinder of an hydraulic press, the combination of a supply main, a manually-controlled valve connected thereto, a system of piping disposed between said valve and the press cylinder; said system initially conveying low pressure fluid to the press cylinder via a check valve, an automatic valve disposed in the low pressure line and normally closed, means for by-passing the low pressure from a point in advance of the check valve after the pressure in the cylinder builds up to shift said automatic valve whereby low pressure may pass to an intensifier, and means for delivering high pressure developed by such intensifier around the movable element of the check valve.

4. In valve mechanism for controlling the admission of high and low pressure to the cylinder of an hydraulic press, the combination of a supply main conveying low pressure, a line for conveying such low pressure from the main to the cylinder, a manually-controlled valve for placing said main and the cylinder line in communication, a check valve in said line through which said pressure passes to the cylinder, an intensifier for developing high pressure from the low pressure line, a line conveying low pressure from the manually-controlled valve to the intensifier, an automatically operating two-pressure floating valve controlling the passage of such pressure to the intensifier and exhaust therefrom, and a by-pass for conveying low pressure from a point in advance of the check valve to actuate the two-pressure floating valve; said valve when so shifted admitting low pressure to the intensifier and causing it to deliver high pressure to the cylinder around the check valve.

5. In mechanism for controlling the admission of high and low pressure to the cylinder of hydraulic presses, the combination of a source of supply, a manually-controlled valve admitting the same to the pipe system, means for delivering the pressure to the cylinder of the press, a check valve through which such pressure passes, an automatic valve operated after low pressure in the press cylinder builds up; pressure to actuate said automatic valve being tapped from the low pressure pipe in advance of the check valve, an intensifier receiving low pressure directly from the main after said automatic valve is actuated, means for delivering the high pressure developed by such intensifier to the press cylinder around the check valve through the same connection admitting low pressure to said cylinder, means for directing pressure from said manually-controlled valve to shift the check valve and open the cylinders to exhaust, and a piston and piston rod for contacting with the check valve to open the same; shifting of the manually-controlled valve opening the casing of the automatic valve to exhaust whereby the latter may shift and open the intensifier to exhaust.

6. In mechanism for controlling the admission of high and low pressure to the cylinder of an hydraulic press, the combination of a supply main, a manually-operated valve controlling delivery from said main to the press cylinder, a check valve through which such pressure passes to said cylinder, an automatic valve operated after low pressure in the press cylinder builds up; pressure to actuate said automatic valve being tapped from the low pressure line, an intensifier receiving low pressure directly from the main through said automatic valve after the latter has been actuated, and means for delivering the high pressure developed by such intensifier to the press cylinder through the same connection admitting low pressure to said cylinder from the manually-operated valve.

In witness whereof I have signed this specification.

WM. B. KOCHENDERFER.