

(No Model.)

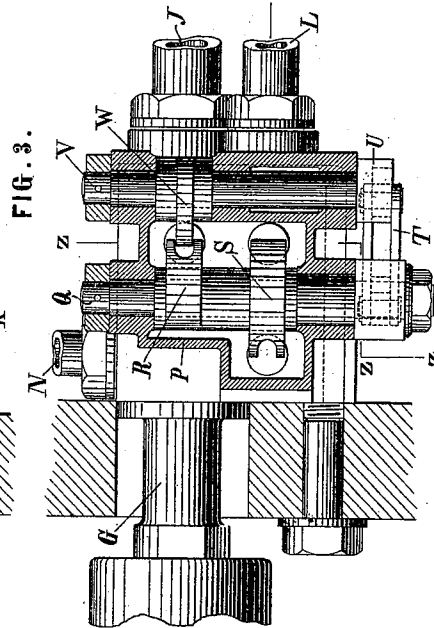
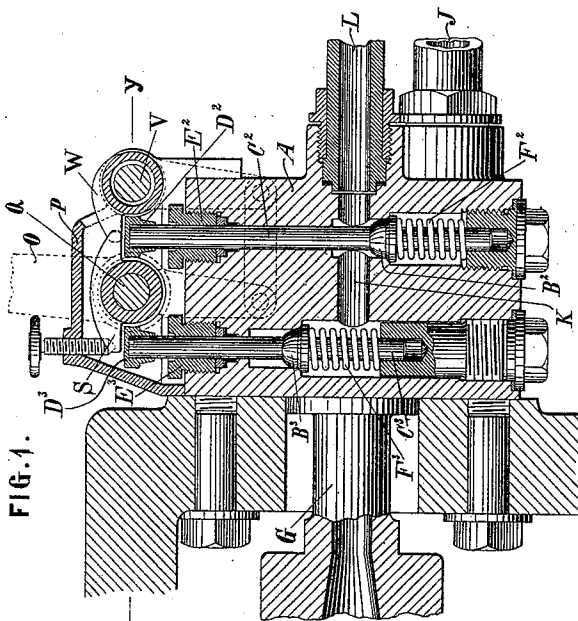
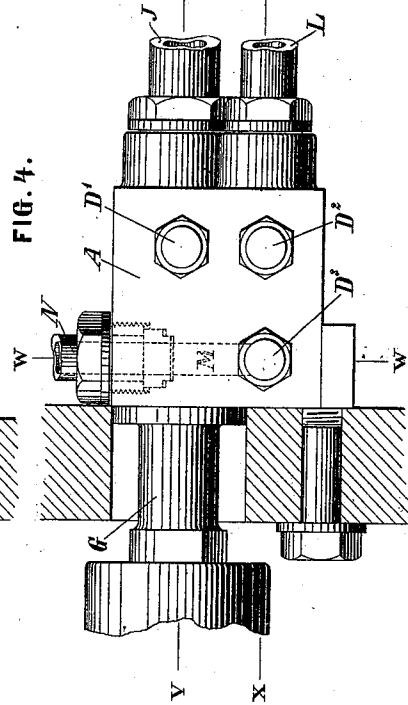
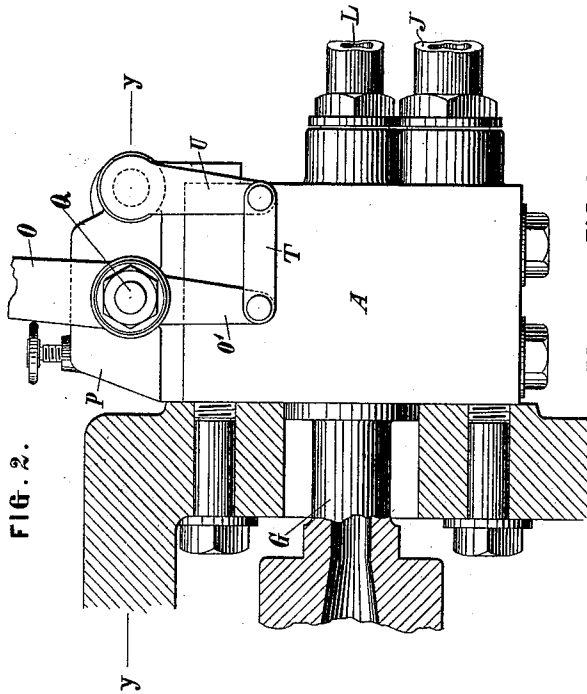
3 Sheets—Sheet 1.

A. KAMPF.

CONTROLLING VALVE FOR HYDRAULIC PRESSURE.

No. 518,149.

Patented Apr. 10, 1894.



Witnesses:
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FIG. 7.

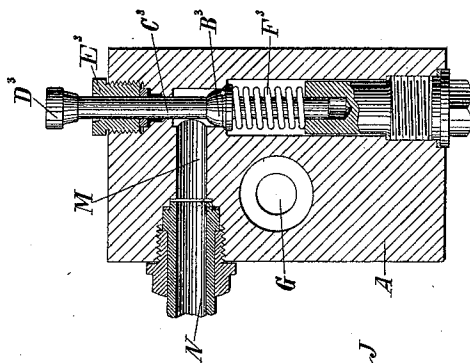


FIG. 6.

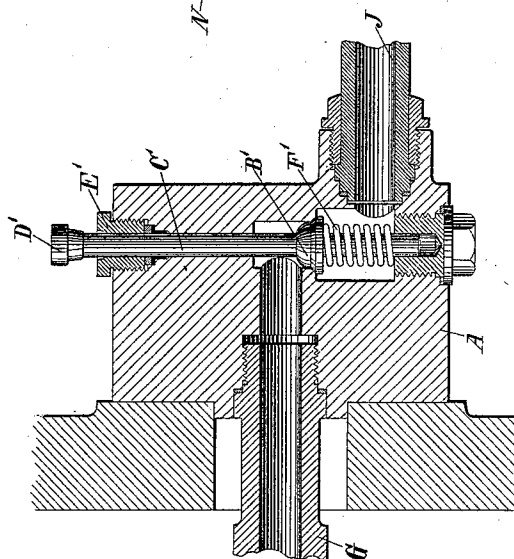
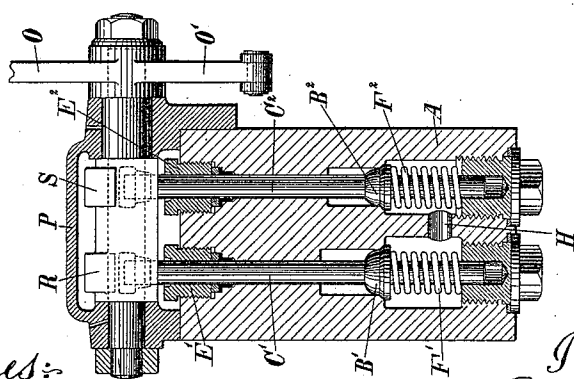


FIG. 5.



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(No Model.)

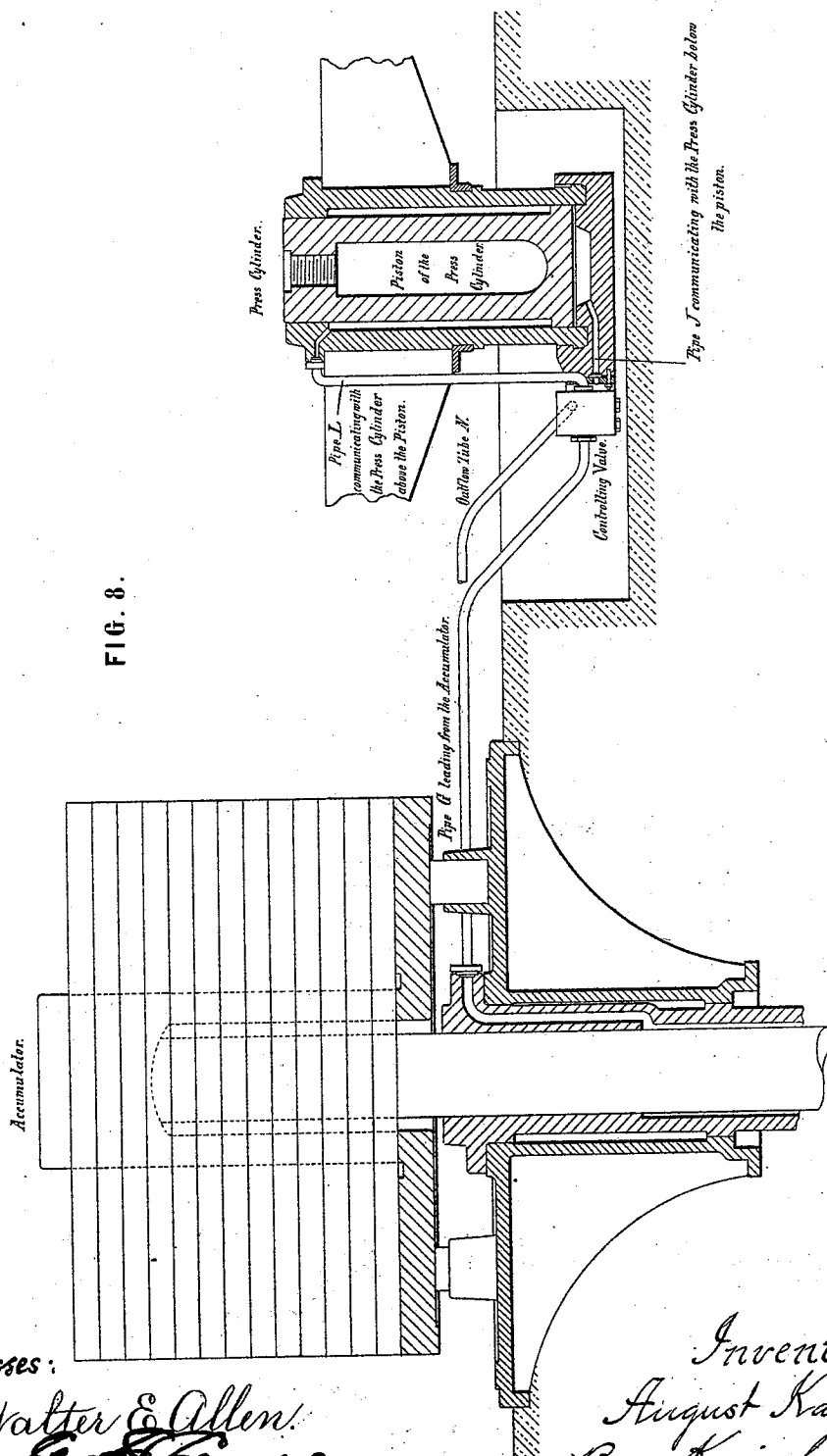
3 Sheets—Sheet 3.

A. KAMPF.

CONTROLLING VALVE FOR HYDRAULIC PRESSURE.

No. 518,149.

Patented Apr. 10, 1894.



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UNITED STATES PATENT OFFICE.

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CONTROLLING-VALVE FOR HYDRAULIC PRESSURE.

SPECIFICATION forming part of Letters Patent No. 518,149, dated April 10, 1894.

Application filed January 28, 1893. Serial No. 460,103. (No model.)

To all whom it may concern:

Be it known that I, AUGUST KAMPE, a subject of the King of Prussia, and a resident of Magdeburg, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements Relating to Controlling-Valves for Hydraulic Presses, of which the following is a specification.

This invention relates to valves, and passages, and means for operating the valves that serve to distribute the liquid under pressure to hydraulic presses of the kind or class which have a double-acting, so-called differential, piston. By this arrangement of valves and mechanism the liquid under pressure which is taken from an accumulator and conveyed below the weighted piston to effect the lifting of the load, is usefully conducted back into the accumulator during the downward movement of the press piston. For this purpose the annular space above the piston formed by the specially thick piston rod is put in communication with the accumulator when the piston is required to descend so that the load on the piston in conjunction with the downward pressure of the liquid thereon is greater than the upward pressure of the liquid on the lower side of the piston, whereby the said piston is caused to descend and press the liquid below the same back again into the accumulator. When the piston is required to be raised, the space above the same is placed in communication with an outflow tube and the space below the piston remains in communication with the accumulator, whereupon the pressure of liquid prevailing below the piston being greater than the load and the frictional resistance together the piston is caused to ascend.

The present invention also provides for securely holding the piston at any desired height, by simultaneously closing the cylinder spaces above and below the piston and thus locking the water in the said spaces. The valves for closing and opening the communications between the press cylinder and the accumulator and outflow tube are operated by means of a single lever.

In the accompanying drawings, Figure 1 represents a longitudinal section of a valve box constructed according to the present in-

vention, the section being taken on the line xx , Figs. 3 and 4. Fig. 2 shows the valve box in elevation. Fig. 3 is a horizontal section on the line yy , Figs. 1 and 2. Fig. 4 is a plan view of the box, the cover, lever, and lever axes, hereinafter described, being removed. Fig. 5 is a transverse section on the line z, z , Fig. 3. Fig. 6 is a longitudinal section on the line v, v Fig. 4, and Fig. 7 is a transverse section on the line w, w , Fig. 4. Fig. 8 is a view illustrating the relative position of the valve block in use.

Like letters denote corresponding parts throughout the drawings.

A is the valve casing or box in which are arranged three valves B^1 , B^2 and B^3 , in positions indicated in Fig. 4 by the heads D^1 , D^2 and D^3 of the valve rods or stems C^1 , C^2 and C^3 , shown in Figs. 1, 5, 6 and 7. The said valves are shown opening downward. Leakage around the valve rods C^1 , C^2 , C^3 is prevented by stuffing boxes E^1 , E^2 , E^3 mounted in the casing A. The valves are loaded by springs F^1 , F^2 , F^3 and are thereby forced against their seats when clear of the opening levers hereinafter described.

G is a pipe which leads from the accumulator and, as shown in Fig. 6, terminates in the chamber above the valve B^1 . The chamber below the said valve communicates by an aperture H, Fig. 5, with the chamber below the valve B^2 , and by a pipe F, Figs. 1, 2, 3, 4 and 6 with the press cylinder at a point below the piston thereof. It will thus be seen that the space below the press piston communicates with the accumulator when the valve B^1 is open. The chamber above the valve B^2 communicates by a channel K, Fig. 1, with the chamber below the valve B^3 , and by a tube L, Figs. 1 to 4, with the annular space above the piston of the press. The chamber above the valve B^3 communicates by a channel M, Fig. 7, with the outflow tube N. All three valves are adapted to be opened by a hand lever O, which is fixed upon a shaft Q supported in the cover P of the casing A. On the said shaft Q are fixed a one-armed lever R and a two-armed lever S shown clearly in Fig. 3.

The hand lever O is provided with a downwardly projecting short arm O' , Fig. 2, which

is connected by a link T with a lever U, fixed on a shaft V which is likewise supported in the cover P of the casing A. A one-armed lever W, Fig. 3, is fixed on the shaft V. The ends of the lever S are situated above and in line with the heads D² D³ of the spindles C², C³, while those of the levers R, W are situated just above the head D' of the spindle C'. In the middle position of the lever O the levers R, S and W are clear of the said heads D', D² and D³ as shown in Fig. 1. When however the upper end of the lever O is moved to the left, the left arm of the lever S presses upon the valve rod C³ and opens the valve B³, at the same time compressing the spring F³, thereby opening the communication by way of the channels K and M and the tube L between the annular space above the piston of the press and the outflow tube N. At the same time the lever W is pressed down by the arm O' of the lever O which acts through the link T, lever U, and shaft V, and opens the valve B', thereby placing the space below the piston of the press, through the tubes F and G, in communication with the accumulator. While the valves B' and B³ are thus opened, the valve B² remains closed, as in the described movement of the lever O the right arm of the lever S recedes still farther from the head D² of the valve rod C², and the communication of the accumulator with the space above the piston thus remains interrupted. Therefore the full accumulator pressure now prevails below the press piston while the liquid in the annular space above the said piston is free to flow off through the overflow N. Consequently the piston and with it the load will be raised. When the lever O is brought back to its middle position the valves B', B³ are closed by their respective springs F³ and thus all three valves are closed, their heads D' D² D³ being clear of the levers S and W. The cylinder space below the press piston is thus shut off by the valve B' from the accumulator, and the space above the piston is shut off by the valve B² from the accumulator, and by the valve B³ from the outflow tube N, consequently the liquid in the cylinder is imprisoned both above and below the piston and the piston is thus securely maintained at the height to which it has been brought to rest. When the upper end of the lever O is moved to the right beyond the middle position, the lever R presses down the valve rod C' and the right hand arm of the lever S simultaneously presses down the valve rod C². The valves B' and B² being thus opened, both ends of the press cylinder are thereby placed in communication with the accumulator, while the outflow tube N is closed by the valve B³. The accumulator pressure now prevails above as well as below the piston, and as the pressure above the piston in conjunction with the load resting on the latter is greater than the pressure below the piston together with the frictional resistances, the piston moves downward and forces the liquid underneath it back

into the accumulator. During a complete upward and downward stroke therefore of the press piston only so much liquid under pressure is used as will fill the annular space above the piston. This liquid flows off through the pipe N in the upward movement of the piston.

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. In a hydraulic press, the combination with three passages arranged to establish communication between the lower end of the press cylinder and the source of power, between the upper end of the press cylinder and the source of power, and between the upper end of the cylinder and the overflow; the three valves B', B² and B³ located in the respective passages and a pair of rock shafts having radial arms both located to engage the valve B', and one of said rock shafts having arms respectively located and movable in opposite directions to engage the valves B² and B³, substantially as and for the purpose set forth.

2. The herein described means for controlling hydraulic presses, consisting of passages arranged to establish communication between the source of power and the respective sides of the press-piston, a passage establishing communication between an overflow and the upper side of the press-piston, power, upper cylinder and overflow valves controlling the source of power, the passage above the piston and the overflow respectively, and operating shafts provided with projections and coupled together, movable in opposite directions, said projections being arranged, some to move in one direction into engagement simultaneously with the power valve and the upper cylinder valve, and others movable in the opposite direction for engagement with said power valve and the overflow valve, substantially as and for the purposes explained.

3. In combination with the herein described controlling valve having suitable passages and the accumulator, upper cylinder and overflow, valves controlling the same; of the operating connections for said valves, consisting of the pair of rock-shafts having each an arm projecting in one direction therefrom for engagement respectively with the accumulator and one of the other of the three valves, and one of said shafts also having a pair of arms projecting oppositely from its arm first mentioned and adapted respectively to engage said accumulator valve and the remaining valve, as and for the purposes explained.

4. In combination with the accumulator-passage, the upper and lower cylinder-passages communicating with the accumulator-passage, the overflow communicating with the upper cylinder, and the accumulator, the overflow, and the upper cylinder valves arranged to respectively control the accumulator passage, the overflow and the communication between the upper cylinder and the accumulator passage; means for controlling said valves, consisting of the shafts Q and V, with means for operating them, the lever W on shaft V

controlling the accumulator valve, and the levers R, S on shaft Q the lever S having a pair of arms controlling respectively the overflow and upper cylinder valves, and the lever 5 R having an arm controlling the accumulator valve, substantially as and for the purposes explained.

5. In combination with the accumulator passage, the upper and lower cylinder passages communicating with the accumulator passage, the overflow also communicating with the upper cylinder passage, and the accumulator, the overflow and upper cylinder-valves, respectively controlling the accumulator passage the overflow passage and the communication between the upper cylinder and accumulator - passage; the herein described means for controlling said valves, consisting

of the pair of rock-shafts, Q and V, having turning levers, O, O' and U, with the connecting link T which cause said shafts to oscillate simultaneously, the one-armed lever W fixed upon the shaft V and projecting over the accumulator valve; and the levers R, S fixed upon the shaft Q, the lever S having a pair of arms projecting on one side over said overflow valve, and the upper cylinder valve, and the lever R having an arm projecting from the opposite side over the accumulator valve, all substantially as and for the purposes set forth. 20 25 30

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