April 4, 1939. E. CANNON 2,152,837

PREFILL VALVE FOR HYDRAULIC PRESSES

Filed April 9, 1937 3 Sheets-Sheet 1

Fig. 1.

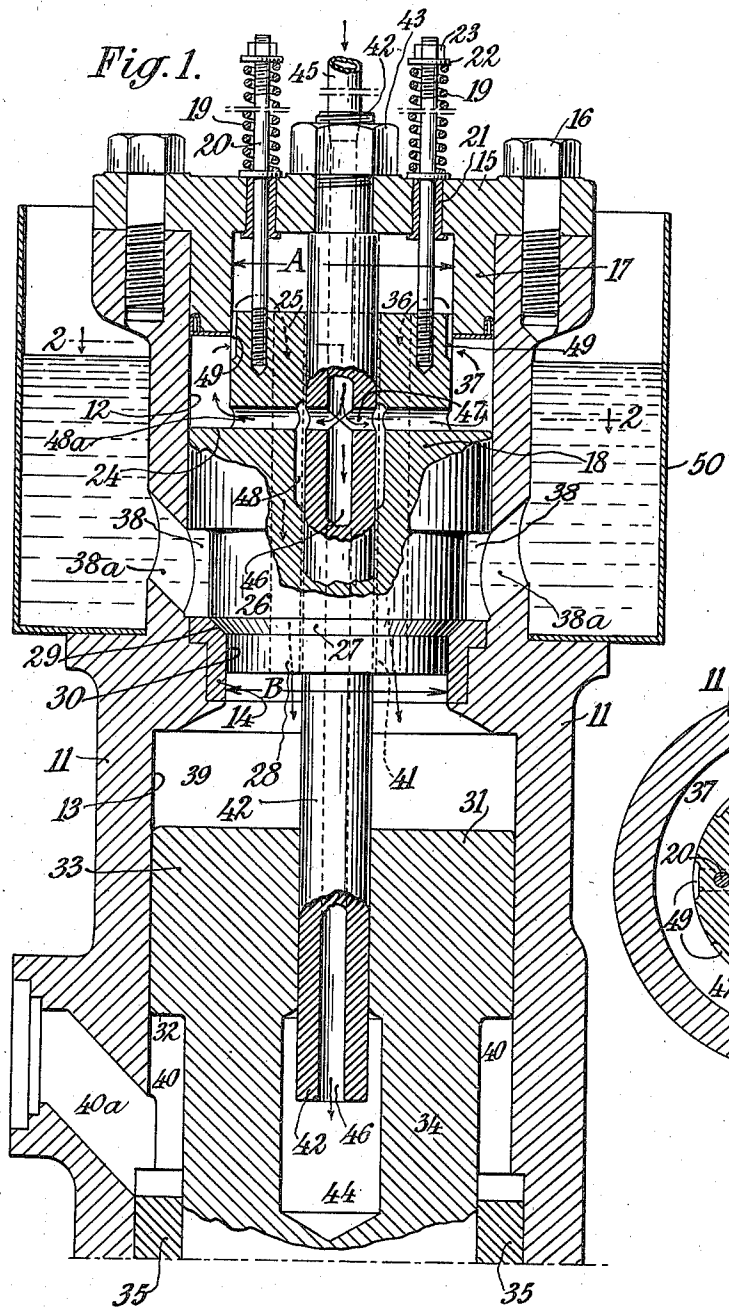
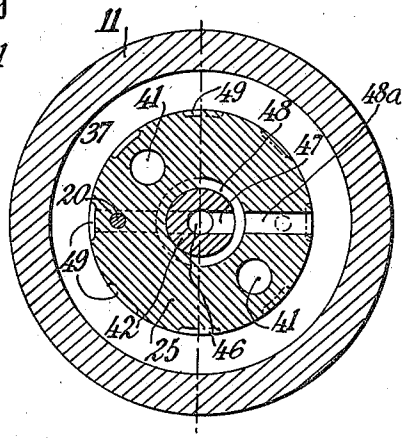


Fig. 2.



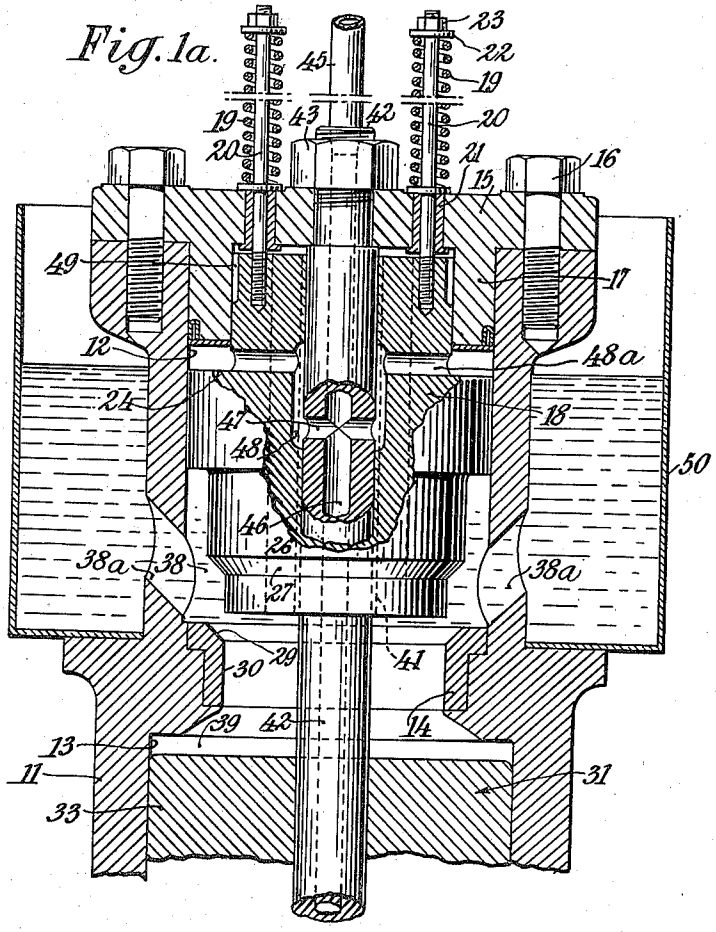
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PREFILL VALVE FOR HYDRAULIC PRESSES

Filed April 9, 1937 3 Sheets-Sheet 2

Fig. 1a.



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Filed April 9, 1937 3 Sheets-Sheet 3

Fig. 3.

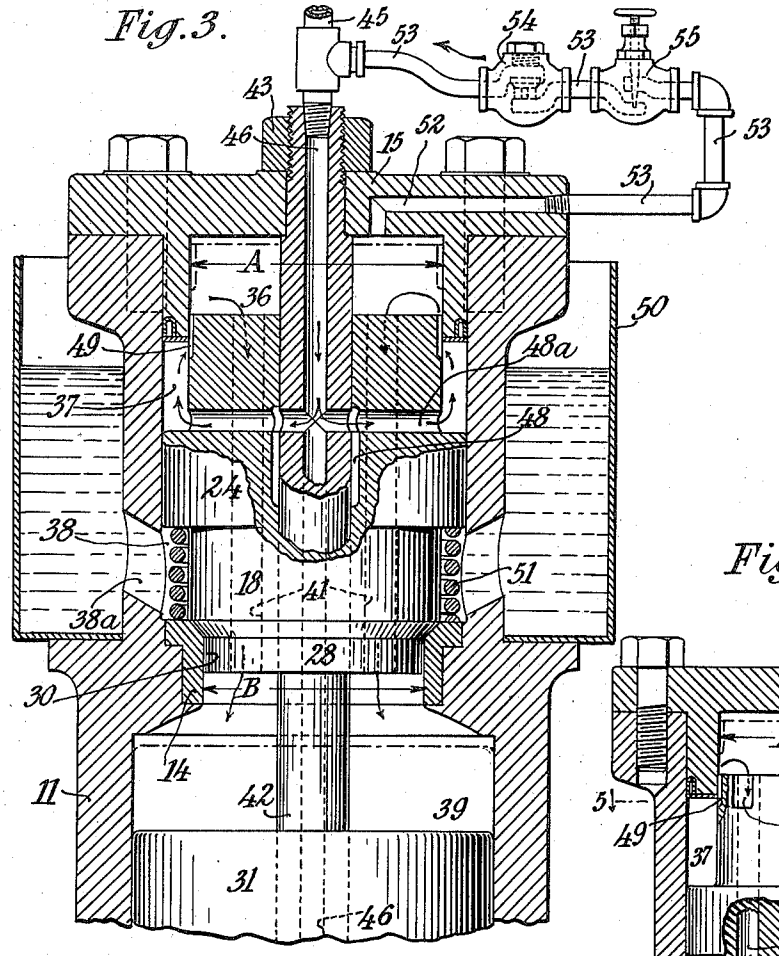


Fig. 4.

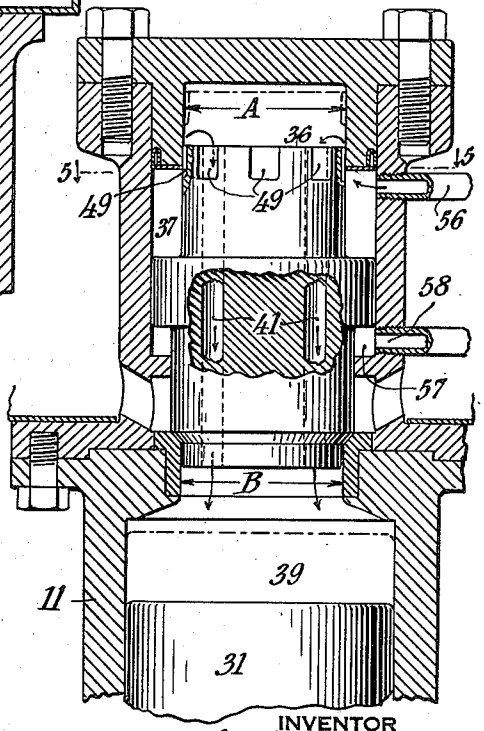
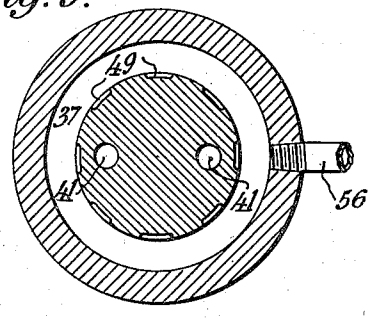


Fig. 5.



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UNITED STATES PATENT OFFICE

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PREFILL VALVE FOR HYDRAULIC PRESSES

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Application April 9, 1937, Serial No. 135,844

22 Claims. (Cl. 121—38)

The present invention relates to improvements in prefill valves (otherwise known as surge valves) for hydraulic presses, which valves are employed for permitting the rapid filling and exhaustion of the ram chamber of hydraulic presses with oil or other fluid during the operation thereof. This invention more particularly relates to a type of prefill valve which is adapted to be closed by hydraulic pressure and which embodies means for passing a working pressure into the ram chamber of a press, after the prefill valve is closed, to cause the ram to perform the desired work.

The invention may be advantageously employed either in prefill valves having quick ram-advance means directly associated therewith, as disclosed in my co-pending application, Serial No. 105,005, filed October 10, 1936, and issued as Patent No. 2,127,324 on August 16, 1938, or in hydraulic press structures wherein means, independent of the prefill valve, are provided for quickly effecting initial advance, of the ram and die carried thereby, toward the work.

In my co-pending application, Serial No. 121,528, filed January 21, 1937, I have disclosed hydraulic press structures having hydraulically closed prefill valves, including a quick advance chamber for quickly advancing the ram to the work, a valve-closing chamber, and a ram chamber for imposing a working pressure upon the ram. The said structure and other presses having several hydraulic chambers are ordinarily provided with separate fluid inlets for each of said chambers, except that a single inlet has been employed to serve both the valve-closing chamber and the ram chamber, means being provided to by-pass fluid pressure from the former chamber to the latter and the by-pass being controlled by a spring-loaded check valve to insure the proper sequence of operation of the several said chambers. The piping and connections for several inlets require somewhat complicated control arrangements which should be dispensed with as far as possible. Check valves require adjustment, readjustment and renewal of broken springs on occasions and they may, for these reasons, be dispensed with to advantage.

An important object of this invention is the provision of a prefill valve wherein a single inlet may serve all or several of the chambers hereinbefore referred to. To this end, I employ a fluid supply tube extending into the prefill valve and ram and having openings at various points therealong which may be in constant fluid communication with both the quick advance chamber and the valve closing chamber and which may be brought into fluid communication with the ram chamber through one or more passages which are controlled by the movement of the valve closure element, said passage or passages being open only when the valve closure element is in a substantially closed position. Where the quick ram-advance means are separate from the prefill valve, the fluid supply tube is not used, the single inlet being provided in the valve-closing chamber and the fluid being passed from the latter to the ram chamber through passages which are open only after the valve closure element is in a substantially closed position.

Another object of the invention is to obviate the need for a check valve in the passages for communicating fluid pressure to the ram chamber, this being accomplished by passages which are controlled by the movement of the valve closure element.

Still another object of the invention is the provision of a hydraulic press and prefill valve therefor, of the general character described, which is adapted to impose a preliminary pressure upon material being processed before subjecting it to the ultimate high working pressure, and this without employing any separate high pressure inlet valves and pressure switches for the purpose.

The foregoing and other objects may be accomplished by my present invention which, for illustrative purposes, is described in the following specification and illustrated in the accompanying drawings, in which:

Figure 1 is a substantially central vertical section of a prefill valve illustrating a preferred embodiment of my invention and showing the valve element in closed position.

Fig. 1*a* is a substantially central vertical section of the prefill valve illustrated in Fig. 1, the valve element, however, being shown in open position.

Fig. 2 is a horizontal section on the line 2—2 of Fig. 1.

Fig. 3 is a substantially central vertical section of a prefill valve illustrating a modification of my invention.

Fig. 4 is a substantially central vertical section of another form of prefill valve illustrating a further modification of my invention.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4.

Referring to the structure illustrated in Figs. 1 and 2, a substantially cylindrical casing 11 is provided with substantially coaxial bores 12 and

13 forming chambers which communicate through an annular valve seat element 14 which is tightly fitted or otherwise retained within a neck portion of the said casing intermediate the said bores. The bore 12 is capped by a head 15, suitably secured to the casing 11 by bolts 16, and a circular flange 17, preferably formed integrally with the head 15, fits accurately within the upper end of the bore 12, thus somewhat restricting the diameter of the upper end of the said bore.

A reciprocating valve element or piston 18 is accurately fitted within the bore 12 and is normally held in a raised or open position, as shown in Fig. 1*a*, by the tension of two or more spiral compression springs 19 coacting with bolts 20. The latter extend through bushings 21 in the head 15, and are screwed into the top of the piston 18. The springs 19 are disposed about protruding upper ends of the bolts 20 and normally hold the piston 18 in a raised position by exerting an expansive force between the head 15 and washers and nuts 22 and 23, respectively, the latter being screwed onto upper threaded portions of the bolts 20. The said threaded portions are long enough to permit any desired tensioning of the springs 19 by suitable adjustment of the nuts 23.

The piston 18 is substantially cylindrical in form and has an annular shoulder 24, located intermediate its ends, said shoulder being accurately fitted within the bore 12. An upper extension 25 of the piston fits accurately inside the flange 17, and a lower extension 26 has an annular oblique seating surface 27 and a substantially vertical seating surface 28, formed complementally to and adapted to coact with oblique and vertical seating surfaces 29 and 30, respectively, on the valve seat element 14.

A ram 31 is accurately fitted within the bore 13 and is provided with a shoulder 32 to form an upper ram portion 33 and a lower ram portion 34 of reduced diameter, the latter being accurately fitted within a ring 35 fixed into the casing 11 at the lower end of the bore 13.

With reference to the structure disclosed in Figs. 1 and 2, the area 36 above the upper extension 25 of the piston is hereinafter referred to as a balancing chamber, the area 37 above the shoulder 24 of the piston is referred to as a valve-closing chamber, the area 38 within the bore 12 immediately above the valve-seat element 14 is referred to as a surge chamber, the area 39 between said element 14 and the ram 31 is referred to as a ram work-chamber, and the area 40 between the shoulder 32 of the ram and the ring 35 is referred to as a ram-return chamber. A port 40*a* is provided to permit filling and exhaustion of the latter chamber. It will be perceived that the several said chambers will vary in volume with the reciprocating movement of the piston 18 and the ram 31, in the operation of the press.

At least one, and preferably two or more, longitudinal passages 41 are provided in the piston 18 to afford fluid connection between the areas at the top and bottom thereof. These passages permit the exhaustion and filling of the balancing chamber 36 as the valve opens and closes, and also permit the maintenance of a uniform working pressure in the chambers 36 and 39 when the valve is closed.

The means I employ to transmit fluid pressure to the several parts of the structure comprise a preferably straight fluid-supply tube 42 and various passages therefrom to the different parts of the device. A recessed and threaded upper end of the tube 42 extends through the head 15 and is secured thereto by a nut 43. The said tube extends downwardly into and through the balancing chamber 36, the piston 18, the ram work-chamber 39, thence through the upper portion 33 of the ram 31 and terminates and opens into a quick-advance chamber 44 inside said ram. The piston and ram, of course, are provided with suitable axial bores to receive the tube 42, the latter being accurately fitted within such bores to prevent any substantial leakage of fluid therebetween.

A pipe 45 leading from a supply of fluid under pressure is threaded into the upper end of the tube 42 and a longitudinal passage 46 in the latter serves to conduct fluid to the quick advance chamber 44. One or more lateral passages 47 in the tube 42 afford fluid connection between the passage 46 and an annular connecting chamber 48 in the interior of the piston 18 and the latter chamber communicates with the valve-closing chamber 37 through one or more lateral passages 48*a* in said piston. The chamber 48 is axially elongated and is so arranged that it is in communication with the lateral holes 47 in the tube 42 at all times during the operation of the press, and hence, a constant fluid communication is maintained between the passage 46 and the chamber 37.

One or more grooves or passages 49 are formed in the side surface of the upper extension 25 of the piston. These grooves extend to the top of the piston and are in constant communication with the chamber 36. They do not communicate with the chamber 37 when the piston is in its uppermost or open position, as they are then entirely covered by the circular flange 17, but as the piston descends and approaches its lowermost or closed position, the lower ends of said grooves clear the lower edge of the flange 17, thus establishing communication with chamber 37 whereby to permit the passage of fluid, under pressure, from chamber 37 into the connected chambers 36 and 39.

A tank 50 may preferably be suitably mounted upon the casing 11 and disposed to substantially surround the prefill valve mechanism, although said tank may be at a remote point, if desired. This tank may contain a fluid supply at or slightly above atmospheric pressure, one or more relatively large surge ports 38*a* being provided in the casing 11 to permit the surge of the fluid in the tank to and from the surge chamber 38 and the ram work-chamber 39 during the operation of the press.

The disclosed device lends itself either to high speed or to relatively slow operation, the sequence of movement of the several working parts being different in each instance.

In normal rapid operation the cycle may be considered as commencing with the piston 18 and the ram 31 in their uppermost positions, as shown in Fig. 1*a*, the piston being held up by the tension of the springs 19 and the ram being held up by suitable back pressure maintained in the chamber 40 through the port 40*a*. The fluid in other parts of the device may preferably be substantially at atmospheric pressure, although it may be somewhat higher if desired.

Fluid, under a suitable working pressure, may be pumped through the pipe 45, into the passage 46 in the tube 42. Both the quick advance chamber 44 and the valve closing chamber 37, as has been explained, are in constant fluid communi-

cation with said passage, but the effective area of the chamber 44 and the back pressure in the chamber 40 may be so related to the effective area of the chamber 37 and the tension of the springs 19 that the pressure required to advance the ram 31 is less than the pressure required to close the prefill valve. Therefore, as fluid is pumped into the tube 42, the ram 31 is forced downwardly by the relatively low pressure established in the chamber 44, to a position where a die (not shown) at the lower end of the ram initially engages the material being processed. As the ram moves downwardly, it sucks fluid, from the tank 50, through surge ports 38a into the surge chamber 38, thence through the valve seat element 14, into the ram chamber 39.

The die may initially press and, to some extent, impart a preliminary form to the material as a result of the pressure established in the chamber 44, but the advance of the ram is, nevertheless, substantially arrested, whereupon the continued pumping of fluid under pressure into the tube 42, raises the pressure within the chamber 37 to a point where the hydraulic force being exerted upon the upper surface of the shoulder 24 of the piston is sufficient to cause the latter to move downwardly to a closed or seated position, as shown in Fig. 1.

It will be observed that, as the piston 18 descends, the grooves 49 establish fluid communication between chambers 36, 39 and 37 before the downward stroke of the piston has been completed. If, as in previous common practice, the valve were not closed until the completion of the stroke, pressure could not be suitably maintained in said chambers as it would be dissipated by escaping into the tank 50. This difficulty is obviated, however, in my present structure, wherein the vertical seating surfaces 28 and 30 coact to substantially close the valve before the completion of the stroke and before the grooves 49 are uncovered by the circular flange 17.

Upon the closing of the valve there is established a course, indicated by arrows, which passes working pressure from the pipe 45 into the passage 46, through holes 47 in the tube 42, into connecting chamber 48, thence through lateral passages 48a, into chamber 37, and through grooves 49, into chambers 36 and 39 which are in constant fluid communication through longitudinal passages 41.

It will be perceived that chambers 36, 37 and 39 are all in fluid communication and collectively form a substantially closed area when the valve is closed. The valve is so designed and adjusted that the downward hydraulic force exerted upon the piston, in chambers 36 and 37, predominates the upward hydraulic force exerted upon the bottom of the piston in the chamber 39 and the upward force exerted on the piston by the springs 19 and hence the valve is held closed to permit the maintenance of pressure in all said chambers to an extent sufficient to cause the ram 31, and dies carried thereby, to perform the desired work upon the material being processed.

The return stroke of the ram 31 is accomplished by the introduction of fluid under pressure into the ram-return chamber 40, to raise the ram, while releasing the pressure in the pipe 45 to permit the commencement of exhaustion therethrough of the chambers 36, 37, 39 and 44 as the piston 18 commences to move upwardly toward its open position.

Upon the grooves 49 being covered and closed as the piston moves upwardly, chambers 37 and 44 continue to exhaust through the pipe 45, but the fluid remaining in chamber 36 is displaced by the continued upward movement of the piston and passes downwardly through the passages 41 where it merges with fluid from the chamber 39, which, as a result of the complete unseating of the piston by its continued upward movement, is free to be forced out through surge ports 38a into the tank 50, and is so discharged by the upward movement of the ram. Thus the piston 18 and the ram 31 return to their uppermost positions, completing a cycle of relatively high speed operation.

The described structure may be easily and quickly adapted to slow operation, to permit the setting of dies, making of adjustments, etc., by increasing the back pressure in the ram-return chamber 40 on the advance stroke, as more fully described and claimed in my co-pending application, Serial No. 179,657, filed December 14, 1937, or by reducing the tension of the springs 19 by suitable mechanical means, or by a combination of these expedients. The effect of these modifications is to transpose the responsive characteristics of the piston 18 and the ram 31 to the common unit pressure available to each from the passage 46, so that instead of the pressure in the chamber 44 causing the ram 31 to descend, before the descent of the piston 18, thus rapidly filling the chamber 39 by the suction of fluid from the tank 50, the piston 18 is caused to close, as a result of the pressure in the chamber 37, while the ram 31 remains in its raised or uppermost position.

With the tank 50 cut off from the chamber 39 by the closing of the valve, said chamber may be filled only by the passage of fluid under pressure through the course indicated by arrows, that is, through passages and chambers 46, 47, 48, 48a, 37, 49, 36, 41, and thence into chamber 39 in the order named. As the chamber 39 is of relatively large volume, the ram may be caused to descend slowly by the relatively slow introduction of fluid into the chamber 39 through the pipe 45 and through the aforesaid course.

Where slow descent of the ram 31 has been accomplished by the use of suitable back pressure in the chamber 40, the return stroke of the ram will be accomplished as heretofore explained in connection with rapid operation, the ram being raised by introduction of fluid under pressure into the chamber 40 while exhausting the several other chambers in the manner hereinbefore described. Under this arrangement the return stroke is relatively rapid, and even where the tension of the springs 19 has been reduced to derive slow descent of the ram, this rapid return may also be achieved, if desired, by releasing the pressure in pipe 45 and exhausting the chamber 37 therethrough, to open the valve, before raising the ram.

It will be seen that, if desired, a rapid initial advance of the ram may be achieved by employing a relatively low back pressure in the chamber 40 until the die on the ram has approached a desired point near the work, whereupon the back pressure may then be raised by suitable means to arrest the rapid descent of the ram. The valve will then close and a slow final advance of the ram may then be effected by introduction of fluid into the ram work-chamber 39 through the course indicated by arrows, as aforesaid.

Referring to Figs. 1 and 4, the effective cross-sectional interior area of the flange 17, as indicated at A, should be the same as, or slightly less

than the effective cross-sectional area of the inner end of the valve seat element 14, as indicated at B. The latter arrangement facilitates the opening of the valve and yet, despite the slight inequalities in said cross-sectional areas, the variation in the combined volume of chambers 36 and 39, during the portion of the stroke of the piston 18 when the vertical seating surfaces 28 and 30 are in engagement and the grooves 49 are closed off, may be so slight that, on the closing stroke of the said piston, the ram 31 may yield sufficiently to compensate for the slight increase in such combined volume until the said grooves open into chamber 37, and on the opening stroke of said piston a partial vacuum may be formed in said chambers until the seating surfaces 28 and 30 become disengaged.

The structure illustrated in Fig. 3 differs from that of Fig. 1 in the employment of a single spiral spring 51 instead of the springs 19. The spring 51 is disposed about a lower reduced portion of the piston 18 and normally holds the latter in a raised or open position by the expansive force which it exerts between the valve seat element 14 and the bottom surface of the shoulder 24 on said piston.

Although, in the structure of Fig. 1, the return stroke of the piston 18 is somewhat cushioned due to the time element involved in the exhaustion of chamber 36 through the passages 41, an additional cushioning effect may be achieved in a structure as illustrated in Fig. 3. In the latter structure, the diameter A is greater than the diameter B. Therefore, when the grooves 49 are closed off from the chamber 37, the vertical seating surfaces 28 and 30 still being in engagement, pressure may be locked in the chambers 36 and 39, since any further upward movement of the piston would be, in effect, an attempt to decrease the volume of fluid in said latter chambers because of the difference in the areas of the top and bottom of the piston. This situation may be turned to advantage, however, by readily controllable means which may be provided to relieve the pressure in the chambers 36 and 39 while the valve moves upwardly to the point where the seating surfaces become completely disengaged. A passage 52 in the head 15 opens at one end into the chamber 36, and its other end is connected by piping 53 to the pipe 45, suitable fittings being used in such connection.

A check valve 54 and an adjustable needle throttle valve 55 are connected in series in said piping, the former valve to assure uni-directional flow in the direction indicated by the adjacent arrow, and the latter to permit adjustment of the rate of flow therethrough. Fluid may be exhausted from the chambers 36 and 39, through the pipe 53, into the pipe 45 (which at that stage of operation is on exhaust pressure), and the rate of exhaustion may be finely regulated by the throttle valve 55, to give a desired cushioning effect to the opening of the valve by causing a relatively gradual drop in pressure in the chambers 36 and 39, thus eliminating any harmful shock or structural stresses which may be encountered if the pressure drop, in said chambers, is too sudden.

Figs. 4 and 5 illustrate a valve structure which may be advantageously employed where no means for quick advance of the ram are embodied in the valve or in the ram itself. In this structure, fluid under pressure may be introduced directly into the chamber 37 by a pipe 56 to close the valve, and when the valve is fully closed, such fluid, under relatively high pressure, may pass through grooves 49 into chambers 36 and 39 to cause the ram to accomplish the desired work. In this modification, the springs 19 or 51 are omitted, and replaced by an annular valve-opening chamber 57.

The valve may be urged toward an open position, as desired, by the controlled introduction of fluid into the chamber 57 through a port 58. The fluid in the chamber 57 is permitted to exhaust through said port as the valve is closed.

It will be understood that the fluid supply pipe 56, as well as being in constant fluid communication with the chamber 37, may also be in constant fluid communication with an auxiliary ram work-chamber or chambers actuating auxiliary rams employed independently of the prefill valve structure for effecting rapid initial advance of the ram 31. Under such an arrangement the chamber 37 and the said auxiliary chambers may be arranged to respond to the preessure carried by said supply pipe 56 in a desired sequence for either slow or rapid advance of the ram 31, similarly to the hereinbefore described operation of the structure illustrated in Fig. 1.

Although my invention has been described and illustrated herein as applied to a vertical valve, it may be employed in valves which may be otherwise positioned.

The inventive principles involved in my invention may be employed in a variety of structural combinations, and hence, the particular disclosures herein and in the accompanying drawings are to be considered as illustrative only and not in any sense as limiting the invention. Such variations in the application of said principles should, therefore, be considered as being within the invention as defined in the following claims.

What I claim is:

1. A hydraulic press or the like and a prefill valve therefor, comprising a reciprocating valve element a hydraulic ram work-chamber at one end of said valve element and a hydraulic pressure-balancing chamber at the other end thereof, a passage affording fluid connection between said chambers, a source of supply of fluid at relatively low pressure, a passage affording fluid connection between said source of supply and the ram work-chamber, said latter passage being controlled by said valve element, a hydraulic valve-closing chamber adapted to coact with said valve element to move the latter to a closed position wherein the said latter passage is closed, a fluid inlet to the valve-closing chamber for passing fluid thereinto at relatively high pressure, and a passage which, when the valve element is substantially in said closed position, affords substantially unimpeded fluid connection between the valve-casing chamber and the pressure balancing chamber, whereby to permit introduction of fluid at relatively high pressure into the latter chamber and the connected ram work-chamber, through the valve-closing chamber.

2. A hydraulic press or the like and a prefill valve therefor, according to claim 1, the first passage mentioned in said claim being in the reciprocating valve element.

3. A hydraulic press or the like and a prefill valve therefor, according to claim 1, the said valve-closing chamber being adapted to coact with an intermediate portion of the valve element to move the latter to a closed position.

4. A hydraulic press or the like and a prefill valvet herefor, according to claim 1 wherein the opening and closing of the passage, con-

necting the valve-closing chamber and the pressure-balancing chamber, is controlled by the movement of the valve element so that when the valve element is substantially in closed position, said passage is open, and vice versa.

5. A hydraulic press or the like and a prefill valve therefor, according to claim 1 wherein the passage connecting the valve-closing chamber and the pressure-balancing chamber comprises one or more grooves in the valve element, extending from an outer surface thereof which partly defines the pressure-balancing chamber to an intermediate surface thereof which partly defines the valve-opening chamber, said groove or grooves being substantially covered when the valve element is in an open position and sufficiently uncovered when the valve element is in a closed position to permit substantially unimpeded passage of fluid pressure from the valve-closing chamber to the pressure-balancing chamber whereby to establish a working pressure in the latter and in the connected ram work-chamber.

6. A hydraulic press or the like and a prefill valve therefor, according to claim 1 further characterized in having a separate hydraulic chamber for moving the valve element from a closed to an open position.

7. A hydraulic press or the like and a prefill valve therefor, according to claim 1 further characterized in having spring means coacting with the valve element for normally urging the latter toward an open position.

8. A hydraulic press or the like and a prefill valve therefor, comprising a ram work-chamber, a surge tank, a passage affording fluid communication between said tank and chamber, a reciprocating valve element adapted when in closed position to substantially close said passage, coacting seating surfaces on said element and at said passage, arranged parallel to the line of movement of said element and adapted to initially substantially close said passage before the completion of the closing movement of said element, coacting oblique seating surfaces on said element and at said passage adapted to perfect the closure of said passage upon the completion of the closing movement of said element, a pressure-balancing chamber at one end of the valve element, the ram work-chamber being at the other end thereof, a longitudinal duct in said element affording fluid communication between the pressure-balancing chamber and the ram work-chamber when the valve element is in closed position, a valve closing chamber, a fluid inlet to the latter, and a passage connecting the valve-closing chamber and the pressure-balancing chamber when the valve element is substantially in closed position whereby to permit fluid under pressure to be passed through the valve closing chamber into the ram work-chamber, the latter passage being controlled by the movement of the valve element and arranged to completely open after the first-mentioned passage is initially substantially closed but before such closure has been perfected.

9. A hydraulic press or the like and a prefill valve therefor, comprising a ram, a reciprocating valve element arranged coaxially thereto, a hydraulic valve-closing chamber, a hydraulic quick advance chamber inside said ram, and a tube for supplying fluid to both said chambers, said tube extending through said valve element and into said quick-advance chamber and having openings affording continuous fluid communication between the interior of said tube and both said chambers.

10. A hydraulic press or the like and a prefill valve therefor, according to claim 9, the valve element having an interior elongated, annular chamber and a passage connecting said annular chamber to the valve-closing chamber, the said annular chamber being disposed opposite an opening in said tube for affording fluid supply to the valve closing chamber and being of such axial length that it is in fluid communication with such opening during the entire stroke of said valve element.

11. A hydraulic press or the like and a prefill valve therefor, according to claim 9 wherein the valve element and the ram are arranged to be moved in response to different pressures of the fluid from said tube.

12. A hydraulic press or the like and a prefill valve therefor, comprising a ram, a reciprocating valve element arranged coaxially thereto, a ram work-chamber, a hydraulic quick-advance ram chamber inside said ram, a valve-closing chamber, a tube for supplying fluid pressure to all said chambers, said tube extending through said valve element and into said quick-advance ram chamber and having openings affording continuous fluid communication between the interior of said tube and the two latter chambers, and means controlled by the movement of said valve element, affording fluid connection between the valve-closing chamber and the ram work-chamber.

13. A hydraulic press or the like and a prefill valve therefor, according to claim 12, further characterized in having spring means coacting with the valve element for normally urging the latter toward an open position, the tension of said spring means being a factor affecting the operating sequence of the ram and valve element.

14. A hydraulic press or the like and a prefill valve therefor, comprising a ram, a reciprocating valve element arranged coaxially thereto, a ram work-chamber, a surge tank, a passage affording fluid communication between said tank and chamber, the said valve element being adapted when in closed position to substantially close said passage, coacting seating surfaces on said element and at said passage arranged parallel to the line of movement of said element and adapted to initially substantially close said passage before the completion of the closing movement of said element, coacting oblique seating surfaces on said element and at said passage adapted to perfect the closure of said passage upon the completion of the closing movement of said element, a valve closing chamber, a quick-advance ram chamber inside said ram, a tube for supplying fluid to the two last mentioned chambers and the ram work-chamber, said tube extending through said valve element and into said quick-advance ram chamber and having openings affording continuous fluid communication between the interior of said tube and both the said quick-advance ram chamber and the valve-closing chamber, and means, controlled by the movement of the valve element, affording substantially unimpeded fluid connection between the valve closing chamber and the ram work-chamber.

15. A hydraulic press or the like and a prefill valve therefor, according to claim 14, wherein the ram work-chamber comprises areas at opposite sides of the valve element in fluid communication through a passage in the said element, said

areas being substantially similar in diameter whereby the interchange of fluid between said areas, when the latter is moving in positions wherein it substantially closes the said passage, involves the displacement of fluid in one of said areas to substantially the same extent as it involves the replacement of fluid in the other area.

16. A hydraulic press or the like and a prefill valve therefor, comprising a ram, a hydraulic ram work-chamber adapted to impose fluid pressure upon said ram, an inlet for passing fluid under pressure into said chamber, a surge port for permitting the surge of fluid into and out of said chamber, a movable valve element adapted to control the passage of fluid through said inlet and surge port and adapted in an intermediate position of movement to prevent substantial egress of fluid from said chamber through either said inlet or said port, the device being further characterized by having a duct affording fluid connection between said chamber and said inlet and adapted to exhaust fluid from said chamber when the valve element is in position to prevent the surge of fluid through the surge port and when the pressure in the said chamber is in excess of the pressure in the said inlet.

17. A hydraulic press or the like and a prefill valve therefor, according to claim 16, the said duct having a check valve associated therewith for preventing passage of fluid through said duct into the ram work-chamber.

18. A hydraulic press or the like and a prefill valve therefor, according to claim 16, the said duct having a throttle valve associated therewith for permitting adjustment of the rate of flow of fluid through said duct.

19. A hydraulic press or the like and a prefill valve therefor, according to claim 16, the said duct having a check valve and a throttle valve associated therewith said valves being respectively adapted to prevent passage of fluid through said duct into the ram work-chamber and to permit adjustment of the rate of flow of fluid from the ram work-chamber through said duct.

20. A hydraulic press or the like and a prefill valve therefor according to claim 16, wherein the ram work-chamber comprises areas above and below the valve element, connected by a passage extending through said valve element.

21. A hydraulic press or the like and a prefill valve therefor, comprising a ram, a hydraulic ram work-chamber, a source of supply of fluid at relatively low pressure, a passage affording fluid communication between said chamber and said source of fluid supply, a movable valve element having an inner end portion which extends across said passage and is subjected to pressure from within the ram work-chamber when the valve element is in closed position, a valve-closing chamber, partly defined by a surface on said valve element adapted to receive pressure opposing such pressure on the said inner end portion of the valve element, a source of supply of fluid at relatively high pressure connected with said valve-closing chamber and a fluid course affording substantially unimpeded fluid connection between said chambers when the valve element is in said closed position, said course being controlled by the movement of the valve element.

22. A hydraulic press or the like and a prefill valve therefor, according to claim 21, the said fluid course comprising one or more grooves in the valve element.

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