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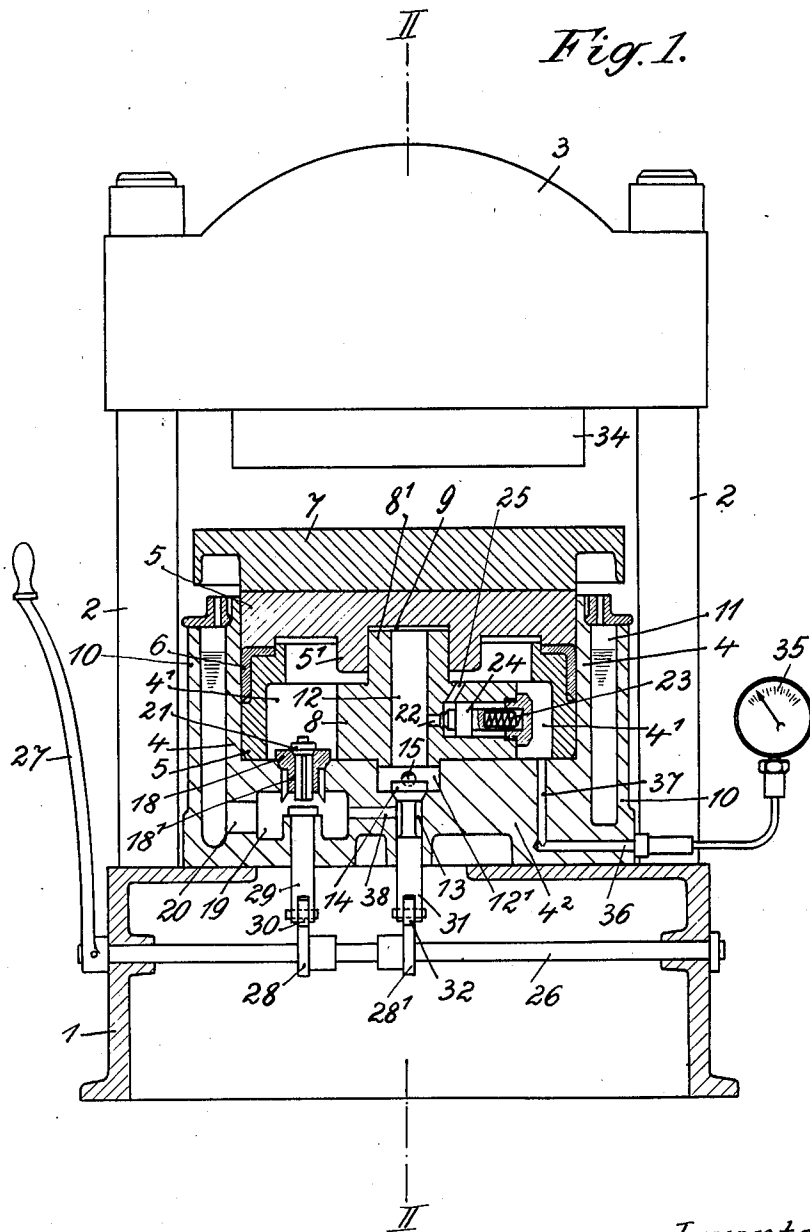
H. BRANDENBURG

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HYDRAULIC PRINTING AND STAMPING PRESS

Filed Sept. 24, 1929

2 Sheets-Sheet 1



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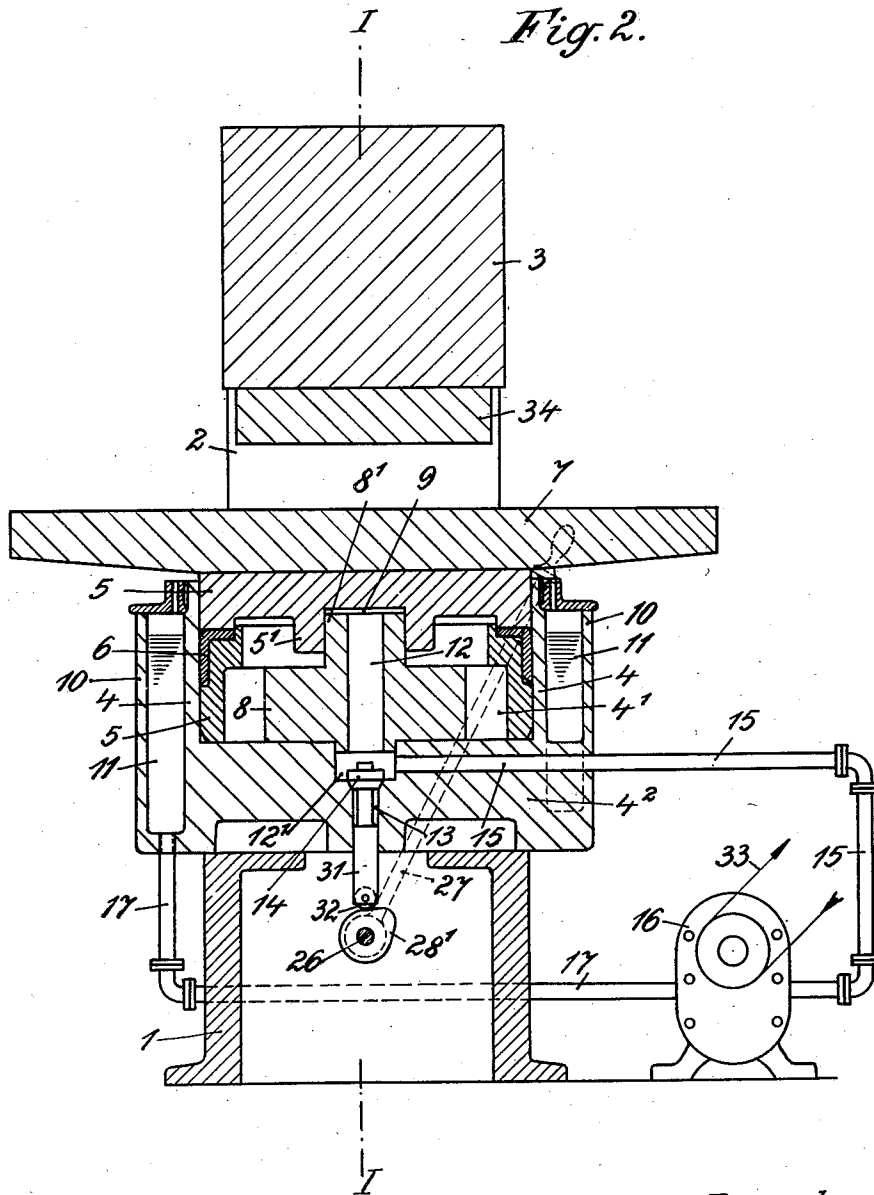
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UNITED STATES PATENT OFFICE

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HYDRAULIC PRINTING AND STAMPING PRESS

Application filed September 24, 1929, Serial No. 394,870, and in Germany January 10, 1929.

My invention relates to a hydraulic printing and stamping press, especially for the manufacture of stereotype matrixes; this press is of that type in which for lifting the table a piston having two differently large working surfaces is employed, and in which, in order to lift the pressing table quickly, first only the small piston surface is subjected to the action of the liquid under pressure.

The object of my invention, as regards presses of the just stated type, is to load the large surface of the piston mentioned only when the work-piece lying on the working table has come in contact with the counter surface, viz, the abutment plate, and now the printing or stamping operation proper is commencing. With the known presses this manner of working has not been attainable up to now.

In order to attain the object in view, there is, with my improved press, a non-return valve arranged in the pressure pipe which leads into the cylinder space for the large piston, that valve opening when an over-pressure arises in the cylinder space owing to the piston coming to a standstill. There is in this way attained that the liquid under pressure acts upon the entire area of the piston surface only when the printing or stamping commences. And in order, further, to attain quick emptying of the cylinder spaces for the large and the small piston and, thus, quick lowering of the pressing table after the working procedure has been carried out, said cylinder spaces are provided with comparatively large outlet valves which can be opened simultaneously by means of a lever or the like. As, however, the liquid pressure to which these valves are subjected is very high and, thus, opening them necessitates a correspondingly great power, I have provided a small auxiliary valve which has only a small surface and is opened first when the device for opening the outlet valves is actuated. In this way the pressure in the liquid space is first reduced and only then said device acts upon the large outlet valves which now can be opened without any difficulty. Said auxiliary valve can be used

also for the fine-regulation of the liquid pressure to which the piston is subjected.

The invention is illustrated diagrammatically and by way of example on the accompanying drawings on which Figure 1 is a vertical section through a printing and stamping press designed according to this invention, the section being taken in the line I—I of Fig 2, and Fig. 2 is a vertical section through the same press in the line II—II of Fig. 1.

On the drawings, 1 denotes the base of the press, 2 are standards extending upwardly therefrom, and 3 is the cross head which is supported by said standards and connected by them with said base. This latter supports the cylinder 4, in the space 4¹ of which a piston 5 is guided; this latter is provided with the tightening or packing ring 6 and supports, in turn, the pressing table 7 which receives the work-piece to be dealt with.

Centrally in the cylinder space 4¹ is fixed a member 8 having an upwardly extending cylindrical projection 8¹ overlapped by an annular flange 5¹ forming a part of the piston 5. In this way a second and smaller cylinder space 9 is provided into which said projection 8¹ extends and in which it constitutes a kind of piston.

The cylinder 4 is surrounded with a second jacket 10 and the annular space formed by and between the two jackets 10 and 4 is employed as a storing and collecting chamber 11 for the liquid or liquid substance, for instance oil, serving for lifting the table.

The stationary member 8 with its projection 8¹ has a vertical passage 12 which communicates at its lower end with a space or chamber 12¹ of a little larger diameter and, by the intermediary of this chamber, with another passage 13 normally separated from the chamber 12¹ by a valve 14. Into said chamber terminates a tube 15 by which it is connected with the pressure space of a pump 16 of any desired construction. This pump is also connected by a suction pipe 17 with the liquid receptacle 11 so that the liquid therein contained can be pressed into the chamber 12¹ and through the passage 12 into the small cylinder space 9.

In the bottom 4² of the cylinder 4 is an aperture which is normally closed by a valve 18 and which communicates at its lower end with a chamber 19 communicating with the liquid space 11 through a bore 20. In the valve 18 is a smaller valve 21, the purpose of which will be explained hereinafter.

From the bore 12 is branched off a lateral passage 22 normally kept closed by a non-return valve 24 subjected to the pressure of a compressive spring 23. When this valve is open the passage 22 communicates with the large cylinder space 4¹ through a bore 25.

In the base 1 of the press is supported a shaft 26 which can be turned by means of a hand lever 27 and to which are secured two cam-disks 28 and 28¹. The cam-disk 28 moves a valve tappet 29 located in the bottom 4² of the cylinder 4; at the lower end of this tappet is a roll 30 which bears upon the circumference of said cam. The object of said tappet 29 is to open the valves 18 and 21 at certain points of time. The valve 14 has a tappet-like and downwardly directed extension 31, the lower end of which is provided with a roll 32 running upon the circumference of the cam 28¹.

The manner of operation of the machine is as follows:

If a pressing or a stamping job is to be done and the table 7 is to be lifted for that purpose, the pump 16 is started, for instance by means of a belt 33, and now the pump sucks liquid from the receptacle 11 through the pipe 17 and presses it through the pipe 15, the chamber 12¹ and the bore 12 into the small cylinder space 9 whereby the piston is quickly lifted together with the table 7. The piston 5 exerts during this time a sucking action, the valve 18 is lifted, and liquid is sucked from the receptacle 11 through the bore 20 and the chamber 19 into the large cylinder space 4¹.

As soon as the work-piece present upon the table 7 contacts with the abutment plate 34 attached to the cross head 3, the further upward movement of the piston 5 ceases, but as the pump 16 continues to run, an over-pressure arises in the small cylinder space 9, and in the adjoining bore 12, in consequence of which the non-return valve 24 closing the passage 22 is opened. The liquid under pressure passes now through the bore 25 also in the large cylinder space 4¹ and acts, therefore, upon the entire area of the lower free surface of the piston 5. Thus, concerning the working procedure proper, the table with the working piece thereon is pressed against the abutment plate 34 with the full pressure available. The height of the pressure can be read at a gauge 35 of known design to which the pressure is communicated from the cylinder space 4¹ through the channels 36 and 37.

If, after the working procedure has been

finished, the table with the work-piece thereon is again to be lowered, the shaft 26 is turned by means of the hand-lever 27. Now the cam-disk 28 lifts the valve tappet 29, the upper end of which contacts with the lower end of the stem of the small valve 21, and lifts this latter, but as the surface of this valve is only very small in contradistinction to the outlet valve 18, the pressure to which said valve 21 is subjected is also only comparatively slight and correspondingly little power is sufficient to lift the said valve. As soon as that has been effected, a part of the liquid under pressure flows from the cylinder space 4¹ back into the store receptacle 11 through the chamber 19 and the bore 20.

When then the shaft 26 is further turned, the rod 29 contacts also with the lower end of the stem 18¹ of the valve 18 and lifts this valve. Simultaneously therewith the cam-disk 28¹ lifts by the rod 31 the valve 14. As in the meantime a considerable amount of the liquid under pressure has left the space 4¹ through the open valve 21, the pressure below the piston 5 is already considerably reduced and the two valves 14 and 18 can be opened without any considerable expenditure of power. The liquid from the space 9 passes through the open valve 14, channel 38, chamber 19, and bore 20 back into the storing receptacle 11.

When the table has arrived in its lower position, the shaft 26 is turned back into its original position by the hand-lever 27 whereby the cam disks 28 and 28¹ are caused to leave and release the valve rods 29 and 31 so that the valves 14, 18 and 21 can close.

The auxiliary valve 21 is, in the example shown, arranged in the main outlet valve 18. I wish it, however, to be understood that it can be arranged in the cylinder space 4¹ independent of said main valve. It is, however, also in this case essential that the control gearing is such that first the auxiliary valve 21 is, and only thereafter the outlet valves proper 14 and 18 are, opened.

I claim:—

1. A printing and stamping press, comprising, in combination, a frame and a pressing cylinder therein, this cylinder having two differently large chambers adapted to receive liquid under pressure; a casing surrounding said cylinder and forming together with it a storing space for liquid which is not yet under pressure; a pump connected with said storing space and said chambers; a piston in said cylinder and a pressing table carried by said piston, passages, of which one communicates with the larger of the said chambers, another with the smaller thereof; a non-return valve arranged in the first-mentioned chamber and adapted to open automatically when an over-pressure arises in said smaller chamber; main outlet valves so arranged as to permit the emptying of both chambers,

and an auxiliary outlet valve for the same purpose; cam-disks so arranged as to be adapted to open said valves and being so shaped that first said auxiliary valve and thereafter said main valves are opened, and means for turning said cam-disks.

2. A printing and stamping press, comprising a frame, a pressure cylinder therein, a piston having a central opening and movable in said cylinder, a pressing table carried by said piston, a stationary member extending from the bottom of said pressing cylinder, engaging said opening and forming a piston therein, said stationary member having liquid passages, of which one communicates with said opening and the other with said pressure cylinder, a casing surrounding said pressure cylinder and forming therewith a storing space for liquid which is not yet under pressure, a pump connected with said storing space and with the liquid passage which communicates with said opening, and a nonreturn valve arranged in the liquid passage which communicates with said pressure cylinder and adapted to open automatically when an over-pressure arises in said opening.

3. A printing and stamping press, comprising a frame, a pressure cylinder therein, a piston having a central opening and movable in said cylinder, a pressing table carried by said piston, a centrally located member extending into said pressure cylinder from the bottom thereof and having liquid passages, of which one communicates with the space of the said cylinder, an annular flange extending downwardly from the bottom of said piston and encompassing the upper part of said centrally located member and forming therewith a cylinder, the space of which is smaller than the first-mentioned cylinder space, another liquid passage in said centrally located member communicating with said smaller cylinder space, a casing surrounding said pressure cylinder and forming therewith a storing space for liquid which is not yet under pressure, a pump connected with said storing space and with the liquid passage which communicates with said smaller cylinder space, and a non-return valve arranged in the liquid passage which communicates with the space of said pressure cylinder space and adapted to open automatically when an over-pressure arises in said smaller cylinder space, main outlet valves so arranged as to permit the emptying of both spaces and an auxiliary outlet valve for the same purpose, and means for opening first said auxiliary valve and thereafter said main valves.

In testimony whereof I have affixed my signature.

HERMANN BRANDENBURG.