Dec. 25, 1934. H. R. TROTTER 1,985,845

POWER CYLINDER PRECISION PROOF PRESS

Filed April 6, 1931 7 Sheets-Sheet 1

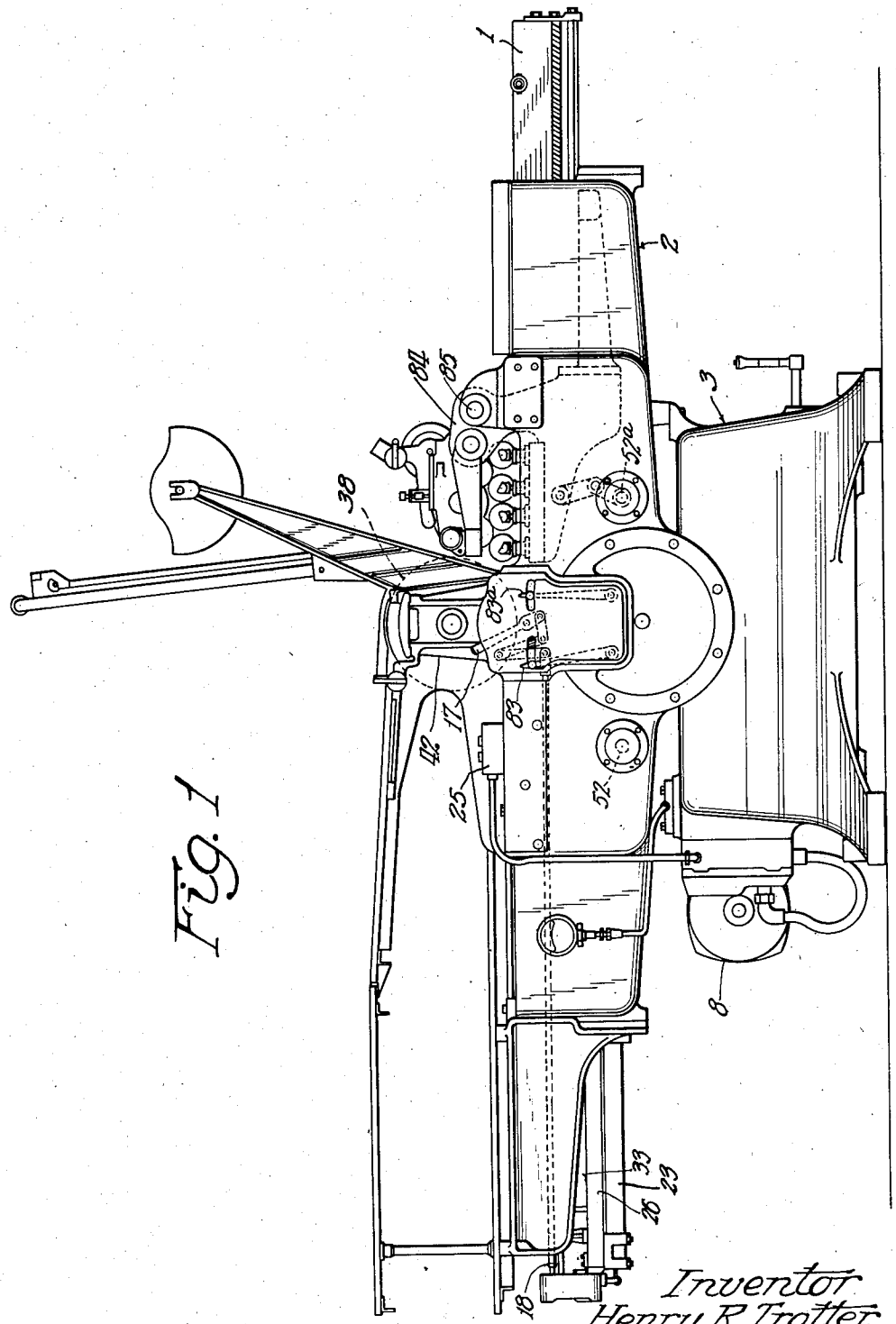


Fig. 1

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POWER CYLINDER PRECISION PROOF PRESS

Filed April 6, 1931 7 Sheets-Sheet 2

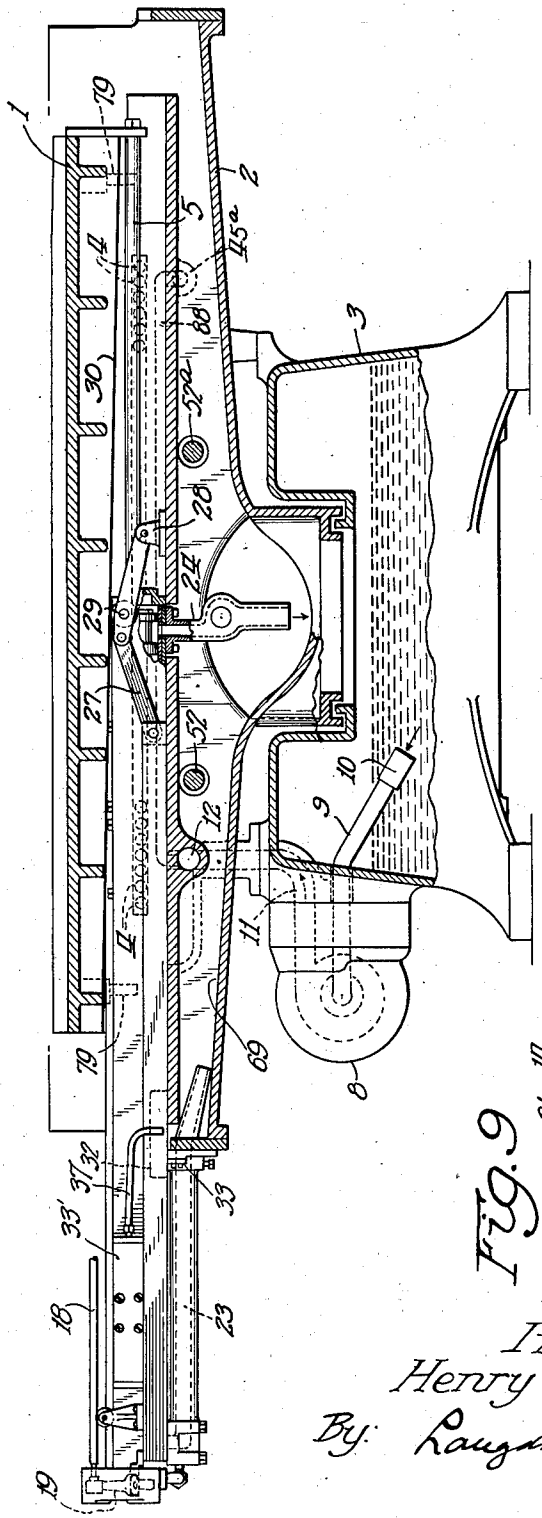


Fig. 2

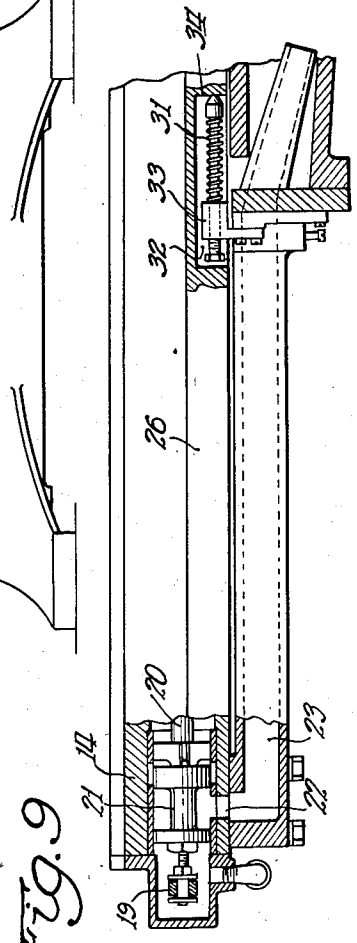


Fig. 9

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POWER CYLINDER PRECISION PROOF PRESS

Filed April 6, 1931 7 Sheets-Sheet 3

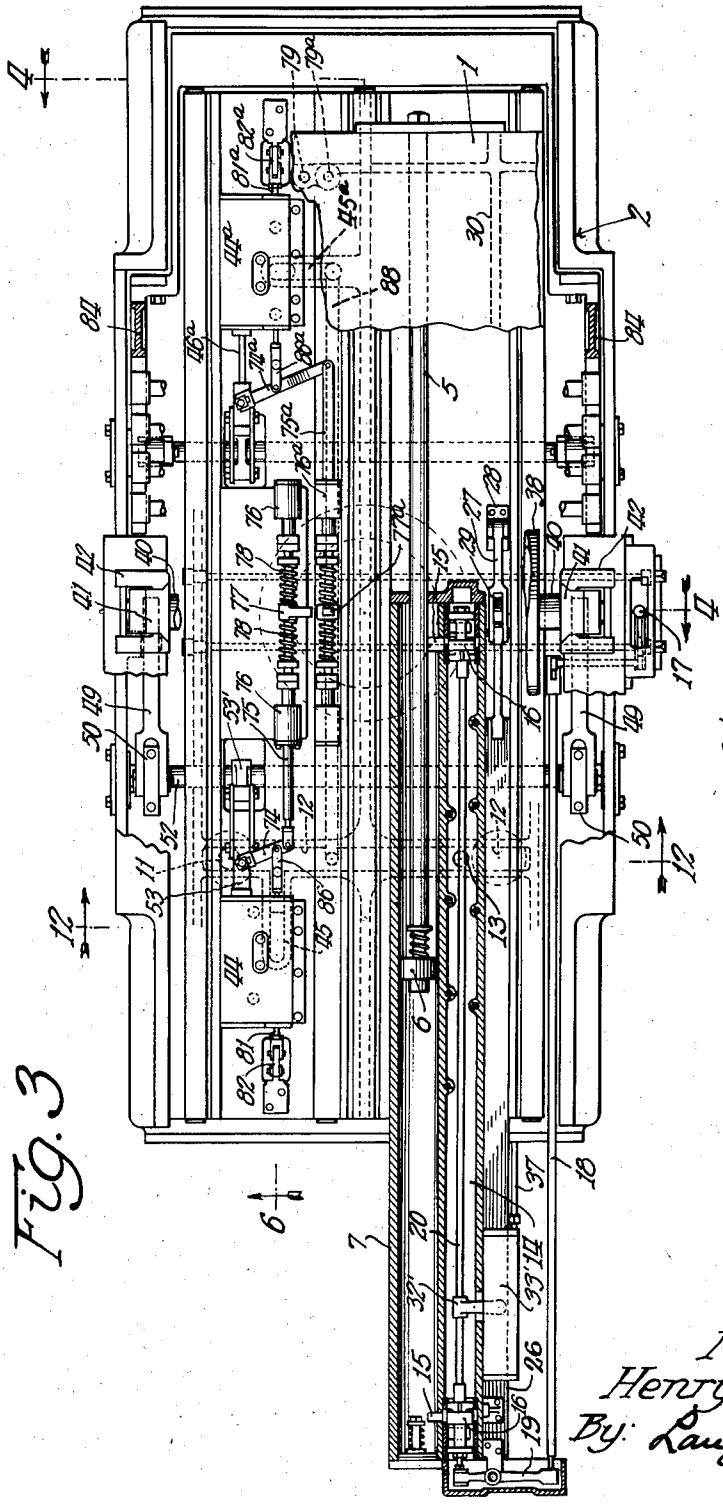


Fig. 3

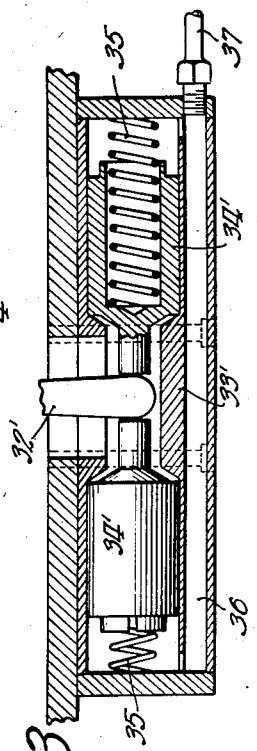


Fig. 13

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POWER CYLINDER PRECISION PROOF PRESS

Filed April 6, 1931 7 Sheets-Sheet 4

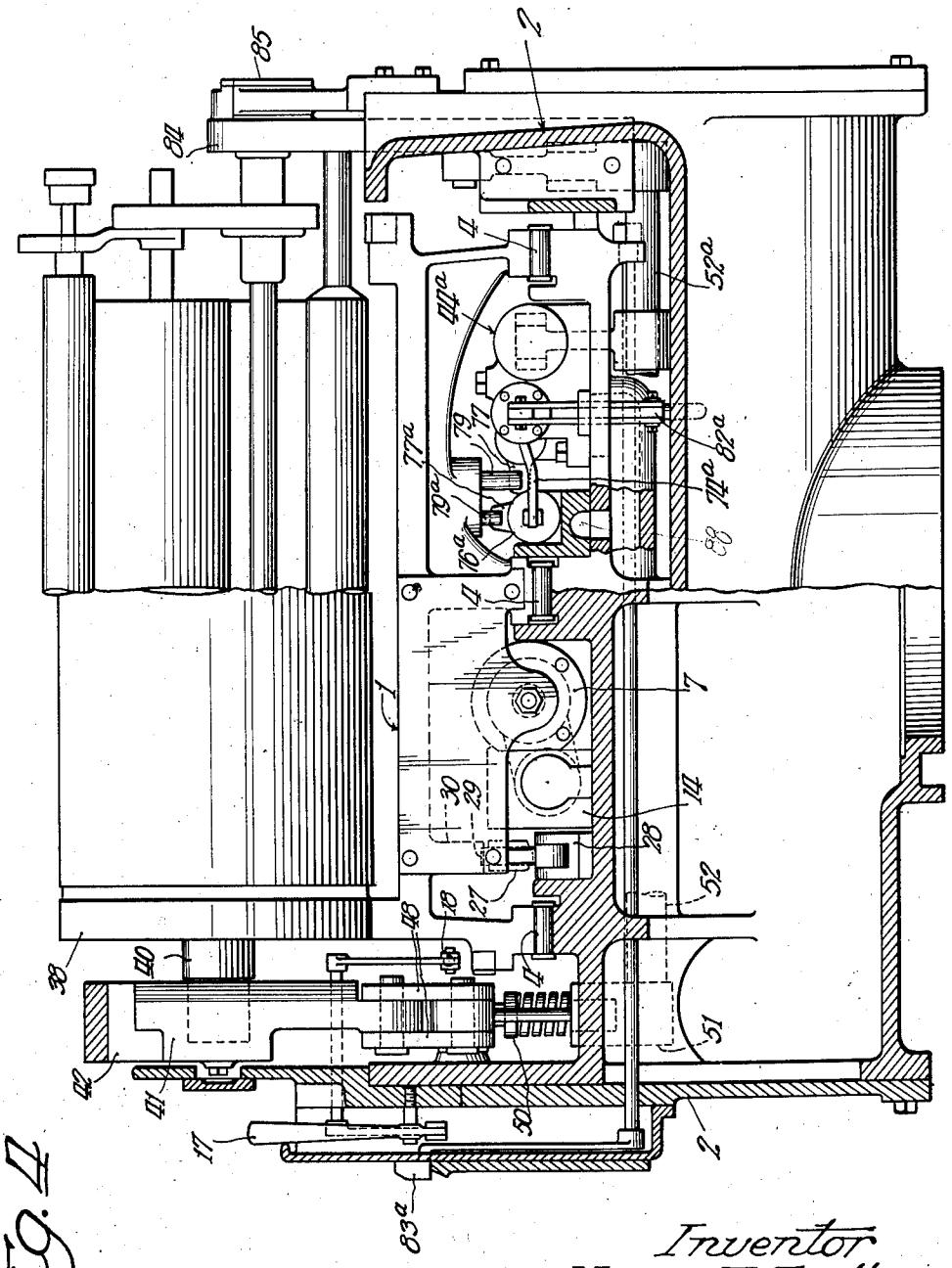


Fig. 1.

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POWER CYLINDER PRECISION PROOF PRESS

Filed April 6, 1931 7 Sheets-Sheet 5

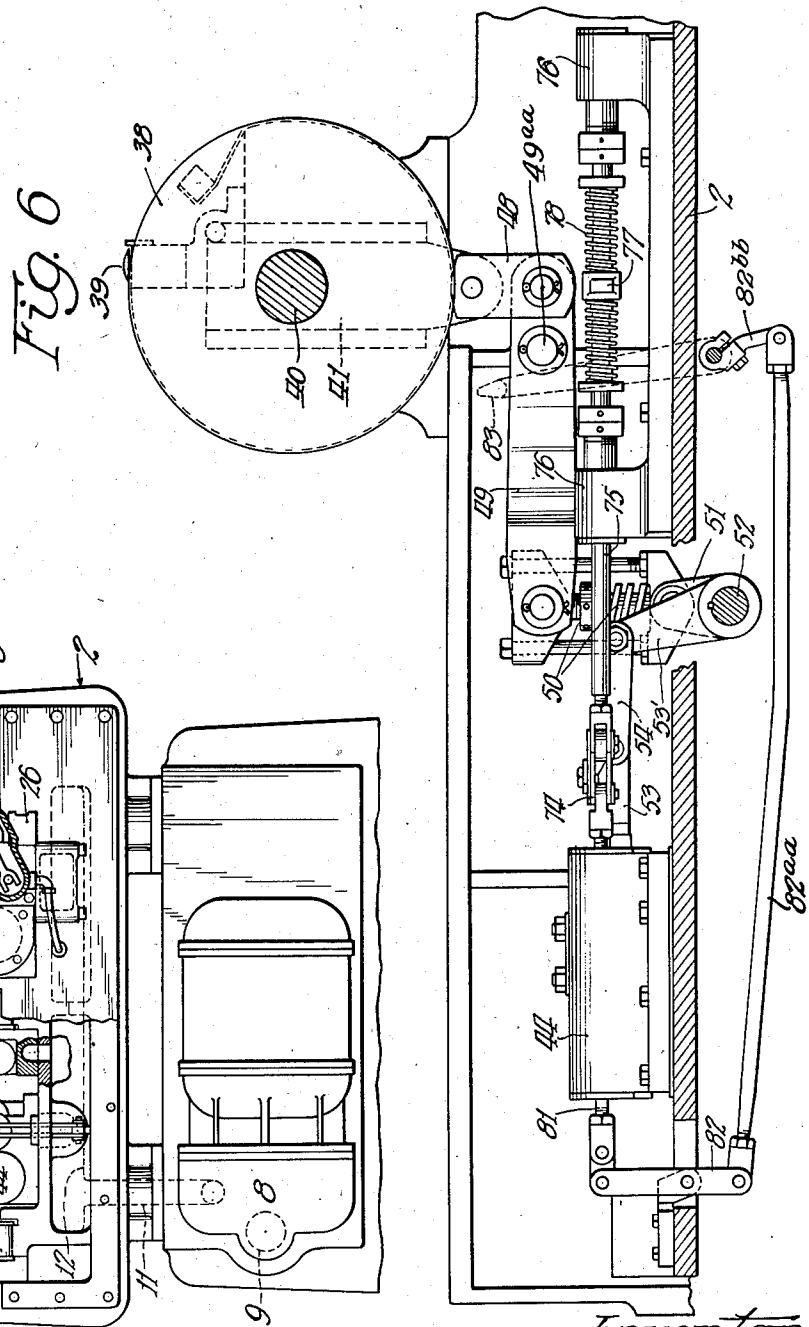


Fig. 6

Fig. 5

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POWER CYLINDER PRECISION PROOF PRESS

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Fig. 7

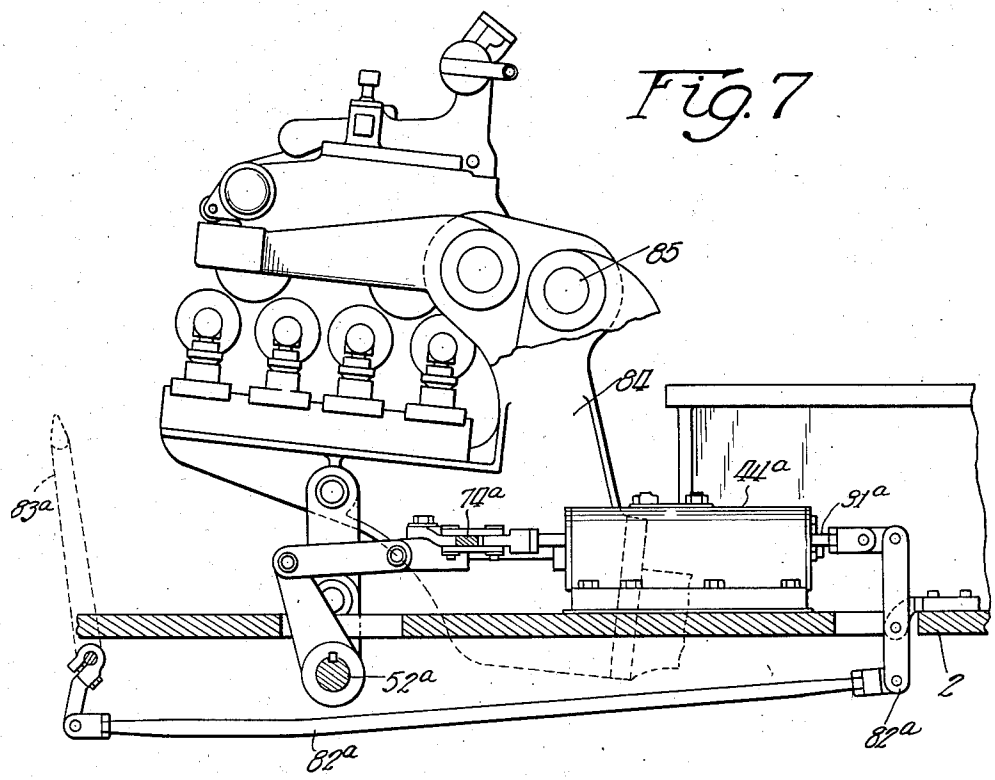
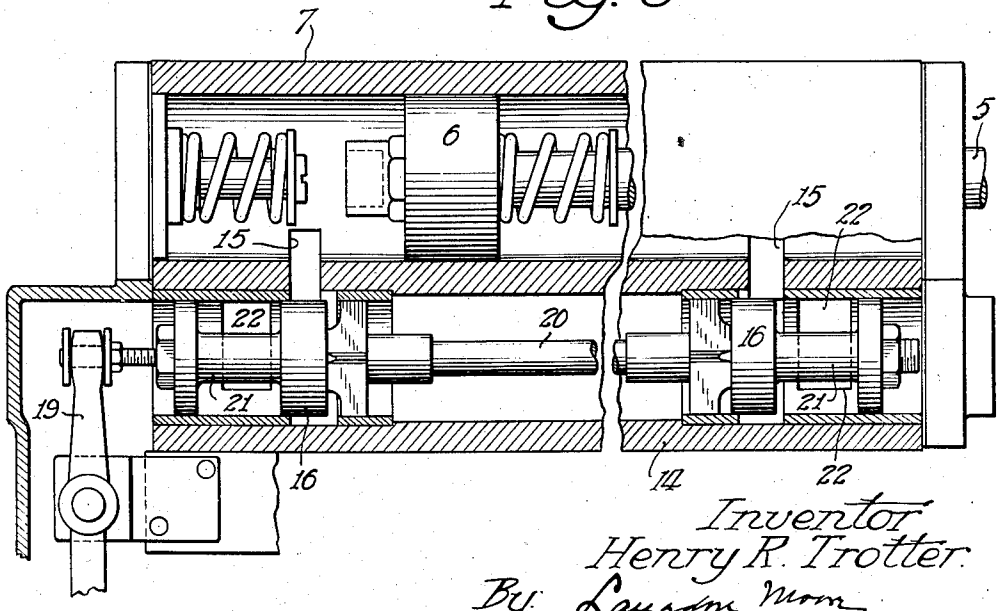


Fig. 8



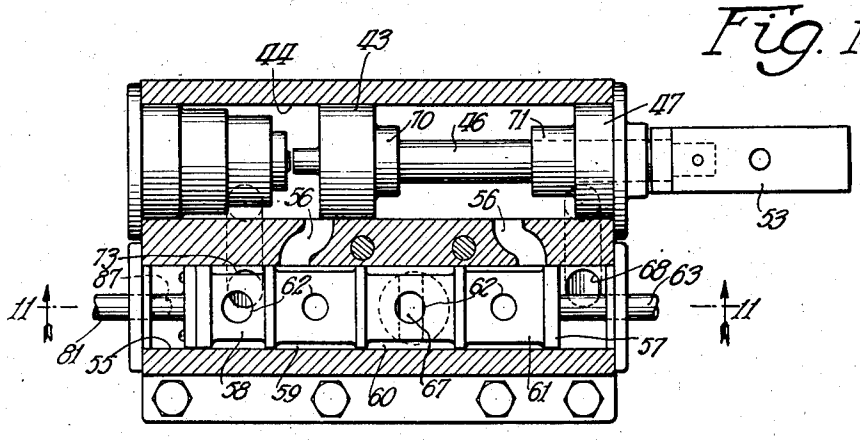
Inventor
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Dec. 25, 1934. H. R. TROTTER 1,985,845

POWER CYLINDER PRECISION PROOF PRESS

Filed April 6, 1931 7 Sheets-Sheet 7

Fig. 10



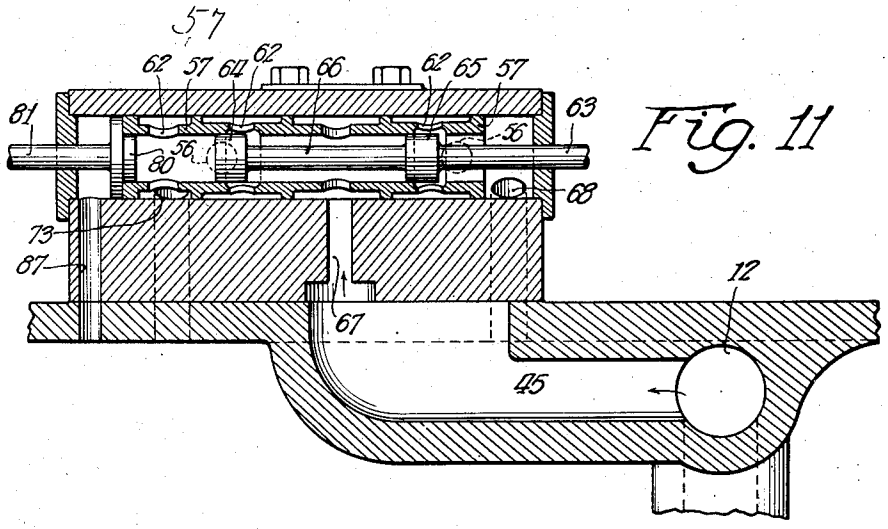
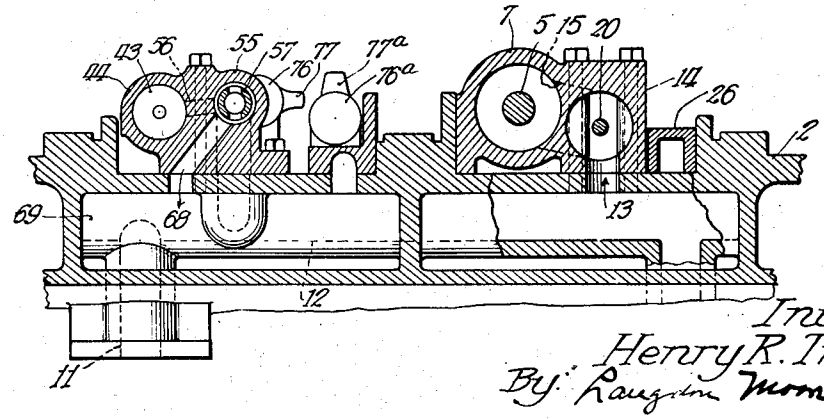


Fig. 11

Fig. 12



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Patented Dec. 25, 1934 1,985,845

UNITED STATES PATENT OFFICE

1,985,845

POWER CYLINDER PRECISION PROOF PRESS

Henry R. Trotter, Chicago, Ill., assignor to Hacker Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application April 6, 1931, Serial No. 527,952

25 Claims. (Cl. 101—284)

This invention relates to improvements in printing presses and more particularly to power cylinder precision proof presses.

Proof presses must necessarily be precise, particularly in proofing multi-color photo engraved plates before delivery to the printer for duplication in quantity; also presses of this character must be flexible, adapted to be operated at any desired speed, and yet capable of being readily stopped at any place during their movement, and for this reason heretofore presses of this character have been generally operated by hand.

It is an object of this invention to provide a press of this character which is power driven and will respond instantly to the slightest movement of a manually operated control lever so that the operator is relieved of manual labor and the operator's energy and skill is conserved for the skill and judgment which the job requires, resulting in better and faster production. By this improved construction, the bed will follow the slightest movement of the relatively small control lever, forward or backward, fast or slow, from creep to run, will stop any where and reverse any where. The power is desirably transmitted by oil resulting in a small number of parts and minimum of wear and the device is so constructed as to be foolproof.

In addition, the lifting and depression of the cylinder is either hand or automatically controlled, as desired, but is advantageously operated by the same power which operates the bed; likewise, the inking rolls may be either hand or automatically controlled in a like manner.

With these and other objects in view reference is made to the accompanying sheets of drawings which illustrate a preferred embodiment of the invention, with the understanding that minor detail changes may be made without departing from the scope thereof.

In the drawings—

Figure 1 is a view in side elevation of the preferred embodiment of this invention.

Figure 2 is a similar view with the front of the frame, cylinder and inking rolls removed, illustrating the remainder of the frame and bed partly in section and partly in elevation.

Figure 3 is a top plan view, partly in section, illustrating a fragmentary portion of the bed and with the cylinder and inking rolls removed.

Figure 4 is a view partly in end elevation and partly in section taken on the line 4—4 on Figure 3.

Figure 5 is an enlarged detail view in elevation looking at the left end with parts broken away and illustrated in section.

Figure 6 is an enlarged fragmentary detail view partly in side elevation and partly in section illustrating the cylinder operating mechanism, taken on line 6 of Figure 3.

Figure 7 is a similar view illustrating the operating mechanism for the inking rolls.

Figure 8 is an enlarged detail view with parts broken away, partly in top plan and partly in section, taken on the line 8—8 on Figure 5.

Figure 9 is an enlarged detail view in side elevation, with parts broken away and partly in section, of the left hand end of the frame.

Figure 10 is an enlarged detail view, partly in central horizontal section, of the valve mechanism for operating the cylinder.

Figure 11 is a view in section taken on the line 11—11 on Figure 10.

Figure 12 is a view in vertical section taken through the valve casings for operating the cylinder and bed, taken on line 12—12 of Figure 3.

Figure 13 is an enlarged detail view in central horizontal section taken through the control handle locking device.

The preferred form of this invention as illustrated upon Figure 1 includes a reciprocating bed 1 mounted upon a fixed frame 2 which in turn is supported upon a base 3. Referring to Figures 2, 3 and 4, the bed is mounted to travel upon rollers 4 carried upon the frame 2.

The bed 1 is reciprocated upon the frame by means of the piston rod 5 secured at one end to one end of the bed and mounting at the other end a piston 6 adapted to travel within the cylinder 7 fixed to the frame 2. The piston 6 is caused to reciprocate within the cylinder 7 by oil pressure. The base 3 is preferably formed to provide an oil reservoir having an electrically operated oil pump 8 mounted on one side thereof with an intake 9 entering the oil reservoir below the normal surface of the oil and terminating in a check valve 10 to prevent oil draining from the pump. The discharge of the oil pump is led through a discharge passage 11 communicating with a transverse passage 12 in the frame which in turn communicates through port 13 to a cylindrical valve casing 14 extending along one side of the cylinder 7 throughout its length. Adjacent each end, the cylinder 7 is provided with a port 15 communicating with the corresponding end of the cylindrical valve casing 14. Oil under pressure from the pump is admitted first to one side and then to the other side of the piston 6 in the cylinder 7 by means of similarly constructed valve mechanism, which is illustrated in detail in Figure 8. The port 15 at one end is adapted to be opened and closed by a pilot valve 16 responsive to movement of the hand operated control lever 17 through the control rod 18 and pivoted floating lever 19 connected to the pilot valve 16. A similar pilot valve is arranged to open and close the corresponding port 15 at the opposite end of the cylinder and valve casing respectively, the two pilot valves being connected by a connecting rod 20 of such length that as one

pilot valve closes its respective port 15, the other pilot valve simultaneously opens its respective port 15. Each pilot valve is provided with a reduced portion 21 which acts as a port as the pilot valve uncovers port 15 to cause said port 15 to communicate with an exhaust port 22. The respective exhaust ports 22 each communicate with a return passage communicating with the oil reservoir in the base 3. The return of the oil from the exhaust port 22 at the end of the frame 2 is by means of the passageway 23 provided in the frame on the underside of the valve casing 14 and the exhaust port 22 at the other end connects with the conduit 24 returning the oil to the reservoir in the base 3.

The operation of the motor operated oil pump 8 is controlled by the switch 25 in the motor circuit mounted on the frame adjacent the hand operated control lever 17. When the motor circuit is closed the oil pump conveys oil under pressure to the cylindrical valve casing 14. By operation of the control lever 17 pressure is then admitted to one side of the piston 6 through one of the ports 15 and at the same time the other port 15 is placed in communication with its corresponding exhaust port 22, whereby motion is imparted to the piston and the bed in one direction. In order to automatically cause the power admitting port to be closed before the bed reaches the end of its movement in that direction, the floating lever 19 is pivotally mounted intermediate its ends upon a follow up bar 26 mounted to reciprocate in guides upon the frame adjacent the side of the valve casing 14. The other end of the follow up bar is connected by two toggle links 27 to a bracket 28 fixed upon the frame 2. One of the toggle links 27 mounts a roller 29 adapted to be engaged by a cam or incline portion 30 on the underside of the bed 1 so constructed that as the bed approaches its end of travel adjacent the floating lever the cam 30 will travel over the roller 29 to straighten the toggle and impart movement to the pivot of the floating lever in that direction. The control lever 17 having been moved to operate the pilot valves 16 to cause movement of the bed in that direction remains in that position, the end of the floating lever connected to the control rod 18 remains stationary, and the movement of the follow up bar in that direction imparts a rotation in that direction to the floating lever about its end connected to the stationary control rod, whereby the positions of the pilot valves are changed to gradually close the port 15 at the other end of the cylinder and open the port in the end which is being approached by the piston, so that the pressure is equalized on each side of the piston before it can strike the end of the cylinder 7, whereupon rotation of the hand operating lever 17 in the opposite direction will cause the pilot valve adjacent to the floating lever to uncover the port 15 admitting pressure to that side of the piston causing the bed to travel in the opposite direction and as the cam 30 travels over the roller 29 the toggle 27 may break and allow the follow up bar to be moved in the direction the bed is traveling. This movement is imparted to the follow up bar by means of the coil spring 31 mounted within a recess 32 upon the underside of the follow up bar bearing at one end upon the bracket 33 secured upon the frame and at the other end upon the shoulder 34 of the follow up bar. Before the bed reaches the end of its movement the follow up bar will have retracted the pivot of the floating lever 19 thereby causing the pilot valves to equalize the pressure on the opposite sides of the piston 6 before the piston can engage that end of the cylinder 7.

It is therefore readily seen that by a very slight manipulation of the operating lever 17 the pilot valve may be manipulated to cause the piston 6 to be reciprocated as desired and the movement of the piston automatically controlled before it can contact with the end of its cylinder. By the proper manipulation of the operating lever 17 the speed of the reciprocation, as well as the direction of the reciprocation, of the bed is controlled at will and furthermore the movement of the bed may be stopped at any desired position.

After initial operation both the cylinder 7 and the valve casing 14 are filled with oil at all times, the check valve 10 preventing drainage from the system through the pump when idle. In order to prevent manual movement of the bed when the pump is idle, a locking device for the pilot valve connecting rod 20 is provided as illustrated in Figures 3 and 13, respectively. The pilot valve connecting rod 20 is provided with a locking member 32' which projects therefrom through an opening in the wall of the cylindrical valve casing 14 into a casing 33' secured at one side thereof, as shown in detail in Figure 13. This casing is provided with oppositely disposed valve seats on each side of the extremity of the locking member 32' and also supports spring pressed valves 34' having projections passing through the respective valve seats adapted to engage the opposite sides of the locking member 32' and hold it in locked position by means of the tension of the springs 35, whereby when the motor is idle and the pressure within the system is equalized, the piston 6 is immovable and likewise the bed 1. Upon the operation of the motor the pressure within the valve casing 14 is increased and this pressure is sufficient to overcome the tension of the coil springs 35, whereby both valves 34' are retracted allowing the locking member 32' to move in either direction when the control lever 17 is operated. The ends of the casing 33' on the far side of the respective valves 34' are connected to a passageway 36 upon the underside of the casing 33' which in turn is connected by a pipe 37 to return any oil which may have seeped by the valves 34' to the oil reservoir in the base 3, as shown in Figure 2.

In reciprocating bed printing presses the plate is secured at one end of the carriage and the paper is attached to the cylinder which rotates as the bed reciprocates in one direction and impresses the paper upon the plate as it passes under the cylinder and it is necessary to either raise the roller or depress the bed upon the return motion of the bed so that the roller is out of contact with the inked plate. The present invention contemplates automatic or manually operated devices for lifting the cylinder 38. As shown in Figures 1, 3, 4 and 6, the cylinder 38, of conventional type for this kind of a press provided with a paper gripper 39, is mounted upon a shaft 40 which extends beyond each end thereof and is mounted to rotate in bearings 41 mounted to slide vertically in guides 42 rigidly secured to the frame 2. The vertical movement is imparted to the bearings 41 by means of a piston 43 mounted to reciprocate in a cylinder 44 supported upon the frame 2 which is placed in communication with the transverse oil passage 12 in the frame through the branch 45 therefrom. The piston 43 is mounted upon a piston rod 46 reciprocating through a stuffing box 47 at one end of the cylinder and connected through a series of links, cranks, shafts and levers to each of

the vertically reciprocating bearings 41. As shown in Figure 6 the cylinder bearings 41 are connected upon the underside by links 48 to one end of a lever 49 pivoted at 49*aa* adjacent thereto upon the frame, the other end of the lever being connected by a pivoted and guided spring link 50 to the free end of a crank 51 rigidly secured to the transverse shaft 52. As the construction is the same on each side of the shaft, rotation of the shaft 52 raises and lowers the cylinder 38. The shaft 52 is provided with a rigidly extending crank 53' which in turn is connected at its free end by the link 54 to an extension 53 of the piston rod 46, so that as the piston 46 is caused to reciprocate, the cylinder will be raised and lowered from the bed in conjunction therewith.

Figures 10 and 11 illustrate in detail the valve mechanism for operating the piston 43. In the position shown in Figure 10, the piston has been operated to allow the cylinder to assume its lowermost position and the piston is at the end of its stroke. A cylindrical valve casing 55 is preferably formed integral with the cylinder 44 which valve casing is connected to the interior of the piston cylinder by ports 56 arranged so that the piston 43 partially covers one port at the end of its stroke in one direction and partially covers the other port at the end of its stroke in the other direction. A hollow sleeve 57 is mounted to reciprocate within the valve casing 55 and is provided with four spaced apart reduced portions 58, 59, 60 and 61 each of which are provided with oppositely disposed openings 62, whereby the interior of the sleeve is placed in communication with each responsive cut away portion upon the exterior of the sleeve. The purpose of this sleeve will be hereinafter described. The position of the sleeve as illustrated in Figure 10 may be called the normal position in which the port 56 from the space upon the right hand side of the piston 43 communicates with the reduced portion 61 of the sleeve and the port 56 upon the opposite side of the piston communicates through the port 56 with the reduced portion 59 of the sleeve. A pilot valve carried on the end of a pilot valve operating rod 63 is mounted to reciprocate within the sleeve, said pilot valve formed with pistons 64 and 65 separated by reduced portion 66 separating the pistons, so that they will simultaneously close alternate openings 62 within the sleeve 57. When the oil pump is operated oil under pressure is led through the passages 11 and 12 and through branch 45 to an inlet passage 67 opening into the valve casing 55 to communicate with the reduced portion 60 of the sleeve 57. In the position shown in Figure 11, piston 64 of the pilot valve has partially uncovered the opening 62 of the reduced portion 59 and piston 65 has completely closed the communication between the pistons and the opening 62 in the reduced portion 61, whereby the oil under pressure entering about the reduced portion 60 passes through the openings 62 therein to the interior of the sleeve 57 and thence by way of the partially uncovered openings 62 into the reduced portion 59 of the sleeve and from there through the port 56 to the left hand side of the piston 43, so that pressure accumulating on that side of the piston will force it toward the stuffing box 47. The port 56 adjacent the stuffing box communicates with the reduced portion 61 of the sleeve 57 and as the pilot valve piston 65 partially uncovers the opening 62 in that reduced portion, the oil will flow therethrough into the interior of the sleeve on the right hand side of the piston 65 and enter into the space at the right of the sleeve 57 which space is provided with an oil exhaust passage 68 opening into a chamber 69 provided in the frame thereunder, which chamber is inclined and will discharge the oil into the reservoir 3. The pressure on the left hand side of the piston 43 causes the piston to move to the right until the projection 70 thereon engages the projection 71 upon the stuffing box 47 which will cause the piston 43 to partially close the port 56 at that end, but the contact of the projection 70 and 71 will prevent the entire closing thereof. The pilot valve operating rod 63 is then automatically moved to the right, as hereinafter described, to close the opening 62 in the reduced portion 59 from communicating with the reduced portion between pistons 64 and 65 but allow communication between the reduced portion 59 and the left hand side of the piston and at the same time uncover port 62 in the reduced portion 61 to communicate with the reduced portion between the piston 64 and 65 and close the communication between port 62 and the right hand end of the interior of the sleeve, whereby the pressure of oil entering through the passage 67 and interior of the sleeve 57 between the pistons will flow through the opening 62 in the reduced portion 61 of the sleeve and through the port 56 communicating therewith to the right hand side of the piston and impart a movement in the opposite direction thereto. The port 56 on the left hand side of the piston is in communication with the reduced portion 59 of the sleeve 57 and through the aperture 62 therein to the interior of the sleeve at the left hand side of the pilot valve piston 64. The reduced portion 58 of the sleeve is in position to be in communication with a second oil exhaust 73 also communicating with the chamber 69 to return the oil flowing through the port 62 to the left of the piston 64 to the oil reservoir.

It is therefore seen that by reciprocating the pilot valve operating rod the piston 43 will be reciprocated to raise and lower the cylinder 38. This reciprocation when operated automatically should be in unison with the travel of the bed. As illustrated in Figures 3, 4 and 6 the pilot valve operating rod 63 is connected through pivoted links 74 and 86 to the end of an actuating rod 75 which, in turn, is mounted to reciprocate in spaced apart bearings 76 upon the frame 2, mounting the actuating rod in line with the direction of reciprocation of the bed. Intermediate the bearings 76 the actuating rod is provided with a horizontally extended actuating member 77 which is normally maintained equidistant from the bearings by coil springs 78 interposed therebetween. The underside of the bed adjacent each end is provided with a depending actuating member 79 in line with the actuating member 77 upon the pilot valve actuating rod 75, so that as the bed approaches the end of its stroke in each direction the bed actuating member 79 will engage and carry with it the pilot valve actuating member 77, thereby imparting movement to the pilot valve to reverse the position of the piston to raise or lower the cylinder as the case may be. The pivoted link 74 is pivoted at one end to the pilot valve actuating rod 75 and at the other end to the extension 53 of the piston rod 46 with the other link 86 pivoted at one end to one side of the center of the first link and at the other end to the end of the pilot valve operating rod 63, whereby a floating pivot is provided which acts in the

manner of the floating lever 19, heretofore described, in moving the pilot valve pistons 64 and 65 to equalize the pressure on each side of the piston 43 as it approaches the end of its stroke and maintain it in that position until the travel of the carriage reverses the position of the valve through actuating members 77 and 79.

By this construction, it is readily seen that the same power which causes the carriage to reciprocate causes the cylinder to be automatically raised and lowered upon each reciprocation of the bed, in other words, as the bed approaches the end of its travel to the right, in which position the plate may be positioned or removed, the cylinder is lowered, so that as the bed travels to the left and passes thereunder, the full weight of the cylinder will cause impression to be made upon the sheet or paper carried on the cylinder and as the bed reaches the end of its travel to the left, the cylinder will be automatically raised so that upon its return in the opposite direction, the cylinder will be spaced apart from the plate.

It is desirable to provide a manual means for raising and lowering the cylinder independent of the automatic means and to accomplish this service the reciprocable hollow sleeve 57 is provided. Referring to Figures 11 and 6 it is seen that the end of the sleeve 57 opposite that through which the pilot valve enters is provided with a closure 80 and this end is secured to a sleeve operating rod 81 which through a series of pivoted links and levers 82, 82*aa*, 82*bb* is caused to reciprocate in unison with a manually operated control lever 83 upon the front of the frame adjacent the bed control lever, as shown in Figure 1. The normal relation of the cylinder piston 43 and the pistons 64 and 65 of the pilot valve when the cylinder is at either end of its movement is such that the pressure is equalized within the cylinder 44 on each side of the piston 43, so that the pistons 64 and 65 of the pilot valve must be moved from the position shown in Figure 11 to completely cover the opening 62 in the reduced portions 59 and 61 of the sleeve 57. As heretofore said, the position of the sleeve 57, as shown in Figure 11, is the normal position when the device is to operate automatically. It is therefore readily seen that by moving the sleeve in one direction or the other, while the pistons 64 and 65 remain in normal stationary position, the ports 62 will be caused to move over the stationary pistons 64 and 65, whereby pressure will be admitted to one side of the piston 43 in the cylinder 44 and simultaneously the exhaust upon the other side will be opened, and the pressure will cause the piston to reciprocate in accordance with the position to which the sleeve 57 has been moved. It is preferable to provide a drain 87 for any oil seeping to the left of the closure 80 opening into the chamber 69 thereunder.

The provision of the manually controlled means allows the cylinder to be raised or depressed whenever desired, irrespective of the position of the bed.

The ink rolls of commercial form are carried upon a frame 84 pivoted on each side at 85 to the frame 2 as shown in Figures 1, 4 and 7. The ink roll frame is caused to rotate about its pivot to raise or lower the rolls by means similar to that employed for raising and lowering the cylinder 38, as shown in Figure 3, the oil under pressure being led from the transverse passage 12 through a passage 88 to a passage 45[a] communicating to the interior of the casing 44[a]. As these parts correspond to those already described, it is not thought necessary to repeat a description of the detail and operation thereof and they are indicated by similar reference numerals with the letter "*a*" superposed thereon. As illustrated, it is seen that the raising and lowering of the ink rolls may be automatically controlled by the travel of the bed or may be manually operated, whenever desired, independent of the automatic mechanism.

It will be understood that the pump 8 is of the centrifugal type and delivers no more than a predetermined maximum pressure, so that no relief valve is required even though the bed is kept standing still while the pump is running.

What I claim is:

1. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, a toggle mechanism connected with said valves, a cam surface extending along the underside of the bed engageable with the toggle mechanism to also control the valves and means for alternately returning the fluid on the other side of the piston to the reservoir.

2. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, and means including a toggle mechanism connected with the valves and an inclined surface extending along the bottom of the bed engageable with the toggle mechanism for automatically operating said valves to equalize the pressure on opposite sides of the piston as the bed approaches its ends of travel.

3. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, and means including a toggle mechanism connected with the valves and an inclined surface extending along the bottom of the bed engageable with the toggle mechanism for automatically operating said valves to equalize the pressure on opposite sides of the piston as the bed approaches the end of travel determined by the position of the manual control.

4. In a fluid operating mechanism for a printing press having a reciprocating bed cooperating with an impression cylinder and with ink rolls mounted upon a press frame including the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, said impression cylinder carried in bearings mounted to reciprocate in unison above the

frame, an additional fluid cylinder upon the frame, a piston therein, means operated by the piston to reciprocate the cylinder bearings, means including valves for alternately admitting fluid under pressure on one side of the last named piston and alternately returning the fluid on the other side to the reservoir for automatically reciprocating the cylinder bearings actuated by the reciprocation of the bed.

5. In a fluid operating mechanism for a printing press having a reciprocating bed cooperating with an impression cylinder and with ink rolls mounted upon a press frame including the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, said impression cylinder carried in bearings mounted to reciprocate in unison above the frame, an additional fluid cylinder upon the frame, a piston therein, means operated by the piston to reciprocate the cylinder bearings, means including valves for alternately admitting fluid under pressure on one side of the last named piston and alternately returning the fluid on the other side to the reservoir for automatically reciprocating the cylinder bearings actuated by the reciprocation of the bed, and additional manually controlled means to operate said last named valves to raise or lower the cylinder bearings irrespective of the position of the automatic means.

6. In a fluid operating mechanism for a printing press having a reciprocating bed cooperating with an impression cylinder and with ink rolls mounted upon a press frame including the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, said ink rolls carried upon a frame pivotally mounted upon the press frame, an additional fluid cylinder upon the press frame, a piston therein, means operated by the piston to rotate the ink roll frame about its pivots, means including valves for alternately admitting fluid under pressure on one side of the last named piston and alternately returning the fluid on the other side to the reservoir for automatically reciprocating the ink roll frame about its pivot actuated by the reciprocation of the bed.

7. In a fluid operating mechanism for a printing press having a reciprocating bed cooperating with an impression cylinder and with ink rolls mounted upon a press frame including the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, said ink rolls carried upon a frame pivotally mounted upon the press frame, an additional fluid cylinder upon the press frame, a piston therein, means operated by the piston to rotate the ink roll frame about its pivots, means including valves for alternately admitting fluid under pressure on one side of the last named piston and alternately returning the fluid on the other side to the reservoir for automatically rotating the ink roll frame about its pivots actuated by the reciprocation of the bed, and manually controlled additional means to operate said last named valves to raise or lower the ink rolls irrespective of the position of the automatic means.

8. In a fluid operating mechanism for a printing press having a reciprocating bed cooperating with an impression cylinder and with ink rolls mounted upon a press frame including the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, said cylinder carried in bearings mounted to reciprocate in unison above the frame, an additional fluid cylinder upon the frame, a piston therein, means operated by the piston to reciprocate the cylinder bearings, means including valves for alternately admitting fluid under pressure on one side of the last named piston and alternately returning the fluid on the other side to the reservoir for automatically reciprocating the cylinder bearings actuated by the reciprocation of the bed, said ink rolls carried upon a frame pivotally mounted upon the press frame, a third fluid cylinder upon the press frame, a piston therein, means operated by the piston to rotate the ink rolls frame about its pivots, means including valves for alternately admitting fluid under pressure on one side of the said third piston and alternately returning the fluid on the other side to the reservoir for automatically reciprocating the ink roll frame about its pivot actuated by the reciprocation of the bed.

9. In a fluid operating mechanism for a printing press having a reciprocating bed cooperating with an impression cylinder and with ink rolls mounted upon a press frame including the combination of, a fluid reservoir with a motor operated fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to the bed, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, means for alternately returning the fluid on the other side of the piston to the reservoir, means for automatically operating said valves to equalize the pressure on opposite sides of the piston as the bed approaches its end of travel independently of the position of the manual control, said ink rolls carried upon a frame pivotally mounted upon the press frame, an additional fluid cylinder upon the press frame, a piston therein, means operated by the piston to rotate the ink roll frame about its pivots, means including valves for alternately admitting fluid under pressure on one side of the last named piston and alternately returning the fluid on the other side to the reservoir for automatically reciprocating the ink roll frame about its pivots actuated by the reciprocation of the bed, and manually controlled means to operate said last named valves to raise or lower the ink rolls irrespective of the position of the automatic means.

10. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of, a fluid reservoir with a motor operated fluid pressure pump having an intake connected to said reservoir, a fluid cylinder, a piston therein connected to the bed, a valve casing contiguous to

the fluid cylinder, a connection between the discharge side of the pump to convey fluid under pressure to the valve casing, ports provided at each end of the fluid cylinder communicating with the valve casing, pilot valves mounted to reciprocate within the valve casing arranged to close one port when the other is opened, the valve casing provided with ports adapted to communicate through the port closed on the valve casing side to the interior of the fluid cylinder, means connected to the said valve casing ports for returning fluid from the fluid cylinder to the reservoir, a manual control for operating the pilot valves to admit fluid under pressure on one side of the piston and return the fluid on the other side to the reservoir, whereby the bed is caused to reciprocate, an inclined cam surface extending along substantially the entire underside of the bed, and a cam follower engageable with said surface to automatically control the pilot valves and to limit reciprocation of the bed and means maintaining the said follower in constant engagement with said cam surface.

11. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of, a fluid reservoir with a motor operated fluid pressure pump having an intake connected to said reservoir, a fluid cylinder, a piston therein connected to the bed, a valve casing contiguous to the fluid cylinder, a connection between the discharge side of the pump to convey fluid under pressure to the valve casing, ports provided at each end of the fluid cylinder communicating with the valve casing, pilot valves mounted to reciprocate within the valve casing arranged to close one port when the other is opened, the valve casing provided with ports adapted to communicate through the port closed on the valve casing side to the interior of the fluid cylinder, means connected to the said valve casing ports for returning fluid from the fluid cylinder to the reservoir, a manual control for operating the pilot valves to admit fluid under pressure on one side of the piston and return the fluid on the other side to the reservoir, whereby the bed is caused to reciprocate, said manual control including a lever connected to the pilot valves at one end and intermediate its ends mounted upon a floating pivot, and means actuated by the bed as it approaches its ends of travel to move the floating pivot to operate the pivot valves to equalize the pressure on opposite sides of the bed operating piston to first retard and then stop the motion thereof.

12. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of a fluid reservoir with a motor operated fluid pressure pump having an intake connected to said reservoir, a fluid cylinder, a piston therein connected to the bed, a valve casing contiguous to the fluid cylinder, a connection between the discharge side of the pump to convey the fluid under pressure to the valve casing, ports provided at each end of the fluid cylinder communicating with the valve casing, pilot valves mounted to reciprocate within the valve casing arranged to close one port when the other is opened, the valve casing provided with ports adapted to communicate through the port closed on the valve casing side to the interior of the fluid cylinder, means connected to the said valve casing ports for returning fluid from the fluid cylinder to the reservoir, a manual control for operating the pilot valves to admit fluid under pressure on one side of the piston and return the fluid on the other side to the reservoir, whereby the bed is caused to reciprocate, said manual control including a lever connected to the pilot valves at one end and intermediate its ends mounted upon a floating pivot, and means actuated by the bed as it approaches its ends of travel to move the floating pivot to operate the pivot valves to equalize the pressure on opposite sides of the bed operating piston to first retard and then stop the motion thereof, said means including a follow up bar mounted adjacent the valve casing and carrying the floating pivot at one end having means at the other end cooperating with means upon the bed to impart movement of a lesser degree in a corresponding direction as the bed reciprocates.

13. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination of a fluid reservoir with a motor operated fluid pressure pump having an intake connected to said reservoir, a fluid cylinder, a piston therein connected to the bed, a valve casing contiguous to the fluid cylinder, a connection between the discharge side of the pump to convey fluid under pressure to the valve casing, ports provided at each end of the fluid cylinder communicating with the valve casing, pilot valves mounted to reciprocate within the valve casing arranged to close one port when the other is opened, the valve casing provided with ports adapted to communicate through the port closed on the valve casing side to the interior of the fluid cylinder, means connected to the said valve casing ports for returning fluid from the fluid cylinder to the reservoir, a manual control for operating the pilot valves to admit fluid under pressure on one side of the piston and return the fluid on the other side to the reservoir, whereby the bed is caused to reciprocate, said pilot valves spaced apart on a connecting rod having a locking member thereon projecting through an opening in the valve casing, a casing secured to the valve casing about said opening provided with two aligned valve seats on each side of said locking member having spring pressed valves seated thereon provided with projections engaging said locking member when the fluid pump is idle, whereby the pilot valves are held in stationary positions so that the fluid pressure is equalized within the fluid cylinder preventing movement of the bed until the fluid pump places the fluid in the valve casing under pressure, which pressure overcomes the tension of the spring pressed locking valves to permit movement of the pilot valve connecting rod.

14. In a fluid driving means for a power operated printing press having a frame with a bed cooperating with an impression cylinder forming a printing couple thereon the combination of a hollow base supporting the frame and providing a fluid reservoir with a fluid pressure pump, a fluid pressure cylinder upon the frame, a piston therein connected to one member of the printing couple, valves for alternately admitting fluid under pressure to one side of the piston, and ducts in the frame for alternately returning the fluid on the other side of the piston to the reservoir.

15. In a fluid driving means for a power operated printing press having a frame with a bed cooperating with an impression cylinder forming a printing couple thereon the combination of a hollow base supporting the frame and providing a fluid reservoir with a fluid pressure pump, a fluid pressure cylinder upon the frame, a piston

therein connected to one member of the printing couple, valves for alternately admitting fluid under pressure to one side of the piston, ducts in the frame for alternately returning the fluid on the other side of the piston to the reservoir, and means including a cam and cam follower in constant engagement with said cam for automatically operating said valves to equalize the pressure on opposite sides of the piston as the member of the printing couple approaches its end of travel.

16. In a fluid driving means for a power operated printing press having a frame with a bed cooperating with an impression cylinder forming a printing couple thereon the combination of a hollow base supporting the frame and providing a fluid reservoir with a fluid pressure pump for delivering fluid at a predetermined maximum pressure, a fluid pressure cylinder upon the frame, a piston therein connected to one member of the printing couple, manually controlled valves for alternately admitting fluid under pressure on one side of the piston, ducts in the frame for alternately returning the fluid on the other side of the piston to the reservoir, and means including a cam and cam follower in constant engagement with said cam for automatically operating said valves to equalize the pressure on opposite sides of the piston as the member of the printing couple connected thereto approaches the end of travel determined by the position of the manual control.

17. A power printing press comprising, in combination, a hollow base, a reciprocable bed carried thereby, a liquid reservoir in the base, a cylinder and piston driving mechanism for the bed; means carried by the base for supplying fluid from the reservoir under pressure to the driving mechanism; means for returning the liquid to the reservoir; and an impression cylinder carried by the base and cooperating with the bed to form a printing couple and including fluid operated mechanism for reciprocating the impression cylinder above the bed actuated by the bed reciprocating mechanism.

18. A printing press comprising, in combination, a hollow base; a bed carried thereby; an impression cylinder carried by the base, said bed and impression cylinder being relatively reciprocable to form a printing couple; a liquid reservoir in the base; power driven means carried by the base for supplying liquid under pressure to drive the printing couple; and means carried by the base for returning the liquid to the reservoir and including fluid operated mechanism for reciprocating the impression cylinder above the bed actuated by the bed reciprocating mechanism.

19. In a printing press including a relatively reciprocable bed and impression cylinder providing a printing couple, the combination comprising hydraulic mechanism for operating the couple; a liquid reservoir; a pump for supplying liquid continuously at a predetermined maximum pressure; a manually operable control for selectively supplying the liquid under pressure to the mechanism; automatic means actuated by the operation of the couple for cutting off the supply of liquid to the mechanism; and means for returning the liquid to the reservoir and including fluid operated mechanism for reciprocating the impression cylinder above the bed actuated by the bed reciprocating mechanism.

20. In a power printing press including a reciprocable bed and fluid control means therefor, the combination of a plurality of valves controlling said fluid and mounted on a common connecting rod; a reciprocable follow up bar; a floating lever pivoted intermediate its ends on said bar and pivoted at one of its ends to said connecting rod; a hand control lever articulated with the other end of the floating lever; a toggle articulated with the follow up bar; an inclined cam surface extending along the under side of the bed; and a spring urging the follow up bar in one direction and the toggle into contact with the cam surface, whereby the follow up bar reciprocates with the bed and is also manually reciprocable.

21. In a power printing press including a reciprocable member and fluid control means therefor, the combination of a system of valves for controlling the fluid; a lever in actuating relation with all of said valves; a floating support for the lever controlled by movement of the member; and a hand lever articulated with the floating lever for actuating the floating lever independently of the floating support.

22. A power printing press comprising, in combination, a hollow base, a reciprocable bed carried thereby, a liquid reservoir in the base, a cylinder and piston driving mechanism for the bed, means carried by the base for supplying fluid from the reservoir under pressure to the driving mechanism, means for returning the liquid to the reservoir, an impression cylinder carried by the base and cooperating with the bed to form a printing couple, and means actuated by the fluid in the driving mechanism for preventing movement of the bed when the driving mechanism is idle.

23. A printing press comprising, in combination, a hollow base, a bed carried thereby, an impression cylinder carried by the base, said bed and roller being relatively reciprocable to form a printing couple, a liquid reservoir in the base, power driven means carried by the base for supplying liquid under pressure to drive the printing couple, means carried by the base for returning the liquid to the reservoir, and means actuated by the fluid in the driving mechanism for preventing movement of the bed when the driving mechanism is idle.

24. In a printing press including a relatively reciprocable bed and impressing cylinder providing a printing couple, the combination comprising hydraulic mechanism for operating the couple, a liquid reservoir, a pump for supplying liquid continuously at a predetermined maximum pressure, a manually operable control for selectively supplying the liquid under pressure to the mechanism, automatic means actuated by the operation of the couple for cutting off the supply of liquid to the mechanism, means for returning the liquid to the reservoir, and means actuated by the liquid in the hydraulic mechanism for preventing movement of the bed when the pump is idle.

25. The structure of claim 20 wherein the common connecting rod mounting the plurality of valves is provided with a locking device actuated by said fluid to prevent movement of said rod and thereby prevent movement of the bed when the power is idle.

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