May 16, 1944. A. FALASCONI 2,349,150

HYDRAULIC CONTINUOUS PRESS FOR CONCRETE AND THE LIKE

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Fig. 1

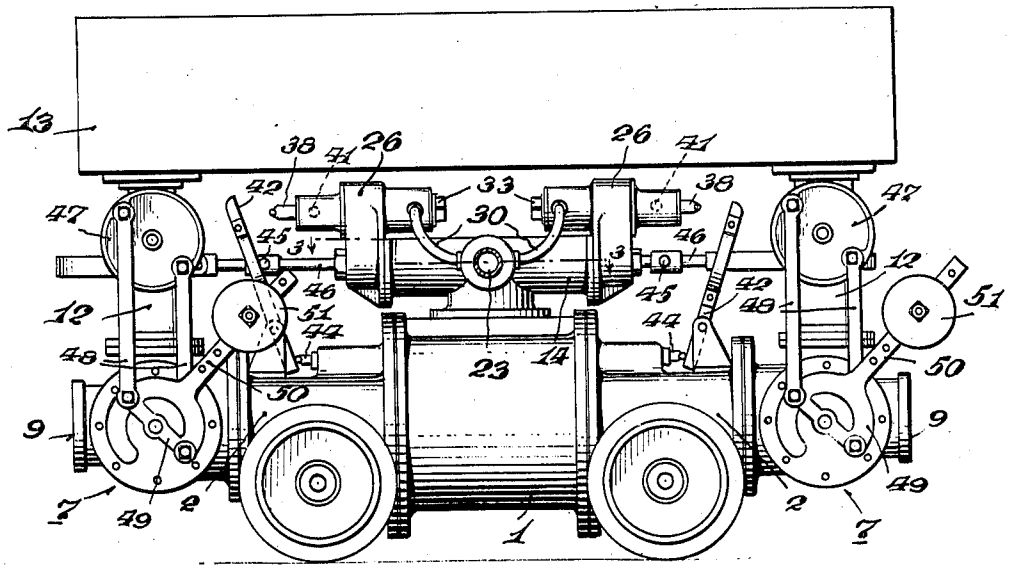

Fig. 2

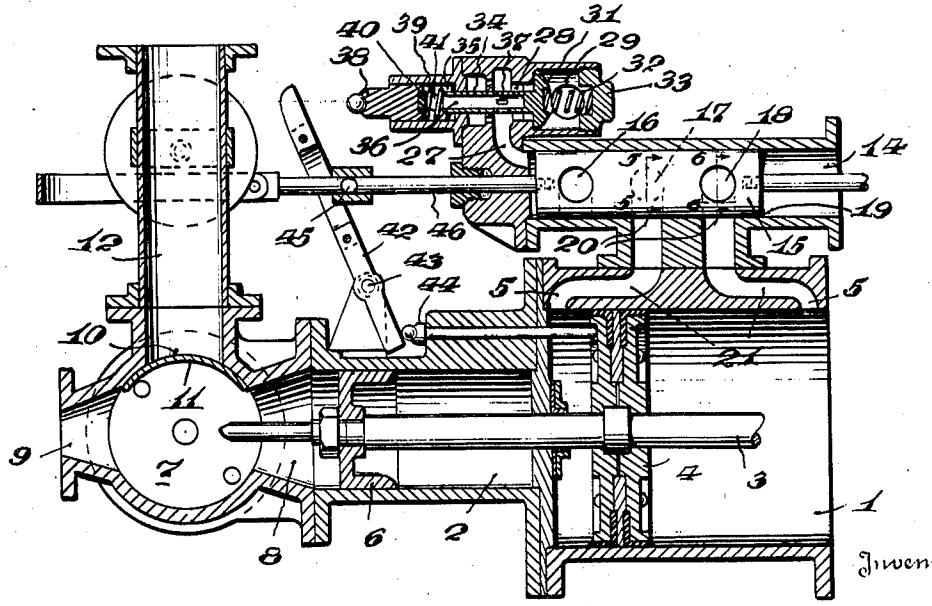

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Fig. 3

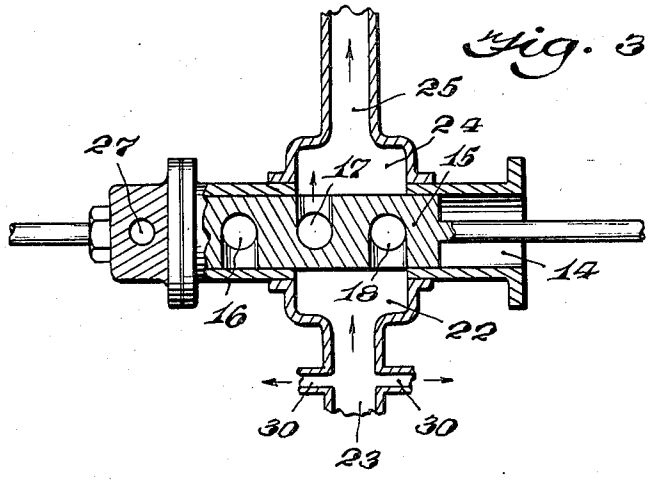


Fig. 4

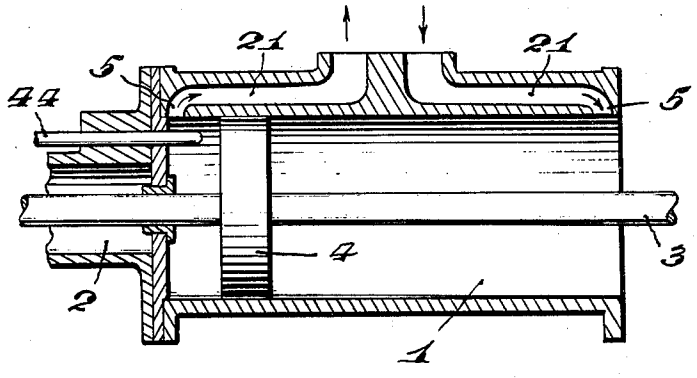
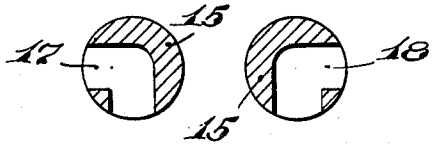


Fig. 5 Fig. 6



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UNITED STATES PATENT OFFICE

2,349,150

HYDRAULIC CONTINUOUS PRESS FOR CONCRETE AND THE LIKE

Alberto Falasconi, Fermignano, Italy; vested in the Alien Property Custodian

Application June 22, 1940, Serial No. 341,835
In Italy July 4, 1939

7 Claims. (Cl. 103—51)

The present invention relates to a press actuated with compressed liquids or gases, with continuous operation, adapted for the conveyance and the application of cement, mortars, concrete and the like.

In the drawings:

Fig. 1 is a side elevation of the device.

Fig. 2 is a fragmentary vertical section of the left side of the operating mechanism of the device.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1.

Fig. 4 is a vertical sectional detail of the driving cylinder.

Fig. 5 is a vertical section on the line 5—5 of Fig. 2.

Fig. 6 is a vertical section on the line 6—6 of Fig. 2.

As illustrated in the drawings, the device has a large cylinder 1 and a pair of smaller cylinders 2, one on either side of the cylinder 1, the three cylinders being coaxial, and having a common piston rod 3. A double-face piston 4 is mounted on rod 3 slidable in cylinder 1. At each of its ends cylinder 1 has a port 5 for the introduction of the fluid under pressure to reciprocate the piston 4. A piston 6 is mounted on the rod 3 in each of the cylinders 2. On the outer end of each cylinder 2, there is provided a valve 7 to control the supply to and discharge from each cylinder 2 of the material. Each valve 7 has a casing having the horizontal co-axial ports 8 and 9, the former communicating with the cylinder 2 and the latter suitable for the discharge of the material from the device. The casing also has a port 10 between the ports 8 and 9, with a vertical axis. Suitably journaled in the casing is a rotatable valve-gate 11 adapted to open and close the ports 9 and 10 alternatively. Supply tubes 12 connect an elevated reservoir 13, for the material, with the ports 10 of the valves 7.

Suitably mounted above the cylinder 1, there is a cylinder 14 in which there is a reciprocable piston 15 provided with three conduits 16, 17 and 18. Each of these conduits has a vertical and horizontal portion (Fig. 5). The vertical portions of all of the conduits have their ends opening through the bottom 19 of the piston 15. The conduits 16 and 18 towards the ends of the piston 15 respectively, have the ends of their horizontal portions opening on one side of the piston 15, and the conduit 17, between conduits 16 and 18, has the end of its horizontal portion opening on the opposite side of the piston 15 (Fig. 3). The cylinder 14, in which the piston 15 reciprocates, has in its bottom 19 two ports 20 connected by conduits 21 with the ports 5 in cylinder 1 (Fig. 2). The ports 20 are so related that when the piston 15 is reciprocated to the left end of the cylinder 14 (Fig. 2), the open lower ends of conduits 17 and 18 register with the ports 20 and communicate through conduits 21 with ports 5 in cylinder 1, and when the piston 15 is at the right end of cylinder 14, the open lower ends of conduits 16 and 17 register with the ports 20.

Suitably mounted on one side of cylinder 14 (Fig. 3) is a chamber 22 in communication through the wall of cylinder 14 with the open ends of the horizontal portions of conduits 16 and 18 through the side of piston 15 when the piston 15 is at the left and right ends of the cylinder 14, respectively. A conduit 23 supplies the fluid under pressure to the chamber 22. Suitably mounted on the other side of the cylinder 14 is a chamber 24 in communication through the wall of cylinder 14 with the open end of the horizontal portion of conduit 17 through the side of piston 15 when the piston 15 is at either the right or left end of the cylinder 14. A conduit 25 is adapted to evacuate fluid from the chamber 24.

The means for reciprocating piston 15 in the cylinder 14 will now be described, it being understood that the device has two units for driving the piston 15 to the right and to the left respectively. As these two units are identical, the details of only one are shown in the drawings (Fig. 2) and it is to be understood that the following descriptions of the details of structure of the unit on the left end of the cylinder 14, illustrated in the drawings, applies also to the details of structure of the other unit on the right end of the cylinder 14. As illustrated in Figs. 1, 2 and 3, the left unit comprises a suitable housing 26 secured to the left end of the cylinder 14, and having therein a conduit 27 connected at one end with the interior of the cylinder 14 and at the other end with a bore 28 connected with a chamber 29 into which the fluid under pressure is supplied by a pipe 30 connected with supply pipe 23 (Fig. 1). A valve 31 in chamber 29 serves to close the bore 28 when pressed to the left by spring 32 bearing on cap 33 for the chamber 29. The valve 31 has a stem 34 passed through the bore 28 and spaced therefrom to form an annular passage from the chamber 29 to the conduit 27. The stem 34 has its left end received in chamber 35 and has a bore 36 communicating through slots 37 with the conduit 27 and opening at the end of stem 34 into the chamber 35. A percussor 38 is slidably mounted in chamber 35, being urged

to the left by spring 39 and having on its inner face a suitable stopper 40 for closing the end of the bore 36 when the percussor 38 is moved to the right against spring 39. A discharge conduit 41 is provided to evacuate fluid from the chamber 35. The percussor 38 is actuated by a lever 42 suitably fulcrumed at 43 and rocked by rod 44 actuated by piston 4 in the cylinder 1. The lever 42 is adapted to bear against a pin 45 on a rod 46 of the piston 15 whereby the initial movement of piston 15 is produced by action of lever 42.

The rods 46, extending on opposite sides from the reciprocating piston 15, are suitably connected by crank arms with rotatable discs 47 connected by links 48 with discs 49 mounted on the casings of the valves 7 for rotating the valve-gates 11 and provided with arms 50 on which are adjustably mounted counter-weights 51.

The operation of the device will now be explained. Fluid under pressure from any suitable source such as a centrifugal pump is supplied by pipe 23 to the chamber 22. When the piston 15 is at the left end of the cylinder 14 (Figs. 2 and 3), communication is established through conduit 18 of piston 15 from the chamber 22 to the right hand conduit 21 of cylinder 1, and the fluid is thereby conducted to cylinder 1 and exerts pressure on the piston 4 to move it to the left end of cylinder 1, thereby evacuating fluid from cylinder 1 through the left hand conduit 21, and the conduit 17 to chamber 24 and pipe 25 for discharge from the device. The movement of piston 4 causes rod 3 to move piston 6 in cylinder 2 to the right of cylinder 1, so that cylinder 2 is charged with material from hopper 13 through tube 12 and valve 7, its valve-gate being so disposed as to open port 10 and close port 9. The movement of rod 3, as above described, causes the piston 6 in cylinder 2 to the left of cylinder 1 to discharge material through valve 7, its valve-gate 11 being in position to open port 9 and close port 10 (Fig. 2), thereby delivering a charge of material as desired.

It will be noted that when the piston 4 approaches the end of its travel to the left (Fig. 4), it moves the rod 44, in the left end of cylinder 1, which rocks lever 42 which moves piston rod 46 to the right, thereby initiating movement of piston 15. The lever 42 also causes percussor 38 to move to the right, closing the end of bore 36 with stopper 40 and moving stem 34 to unseat valve 31, permitting the fluid under pressure in chamber 29 to flow through bore 28 and conduit 27 into cylinder 14 at its left end and move piston 15 to the right end of cylinder 14. This shift of piston 15 brings conduit 16 in communication with chamber 22 and conduit 21 on the left of cylinder 1, so that the fluid under pressure is conducted from chamber 22 to cylinder 1 to move piston 4 to the right end of cylinder 1. When piston 15 is at the right end of cylinder 14, the conduit 17 connects the conduit 21 at the right side of cylinder 1 with chamber 24 so that as the piston 4 moves to the right the fluid is evacuated from cylinder 1 to chamber 24 and discharged through pipe 25.

It is to be noted that as piston 15 is moved by the above described action of the fluid admitted from chamber 29 of one actuating unit, it evacuates the fluid in cylinder 14 on the other side of piston 15, through conduit 27, slots 37, bore 36, chamber 35 and pipe 41 of the other unit.

It is obvious that reciprocation of the rods 46 by the movements of piston 15, as above described, actuate the discs 47 which through links 48 move the discs 49 to rotate the valve-gates 11 of the valves 7 to alternately open and close the ports 9 and 10, to permit charging of the cylinders 2 with the material, and the discharge of the material therefrom.

Having now fully described my invention, I claim:

1. In a continuous operation press, particularly adapted for the transportation and the application of mortars, concrete, and like building materials, and having three coaxial cylinders, a piston rod and three coaxial pistons fixed on said piston rod and reciprocable respectively in said cylinders, one piston being the driving piston, and the other two being smaller driven pistons for pumping the mortar, thereby increasing the pressure of discharge above the pressure of the driving fluid, the combination of a cylindrical distributor controlling the reciprocation of the larger piston, said cylindrical distributor including a piston reciprocating in said cylindrical distributor and being traversed by three channels bent through an angle of 90° which are all of equal diameters and spaced apart longitudinally at a distance equal to two diameters of one channel, the cylinder of the driving piston having admission ports, the lower orifices of the distributor piston being directed downwards and aligned in the direction of the admission ports of the cylinder of said driving piston of the press, the inlet openings of said channels being dephased at both ends of said cylinder.

2. A press according to claim 1, having the walls of the cylindrical distributor pierced by three pairs of apertures having diameters and mutual spacing apart corresponding to the diameters and mutual spacing of the channels of the distributor piston, said piston being substantially twice the diameter of an aperture, two of said apertures being disposed at the lower portion of said cylindrical distributor and communicating with the cylinder of the driving piston, two more of said apertures being located at the sides for admitting driving fluid to said last mentioned cylinder, while the remaining two apertures are disposed substantially opposite the last mentioned apertures for the discharge of said fluid, and two of the channels of the distributor piston communicating with the exterior of said press through the corresponding apertures at each stroke of the piston when the intermediate channel of the three in said piston serves for the discharge of the fluid in either extreme position of the driving piston.

3. A press according to claim 1, having two percussors individually located at the ends of the driving piston cylinder in the path of the driving piston so as to be alternately operated by contact with the ends of said driving piston, two valves respectively controlling the entry and discharge of driving fluid to and from the driving cylinder, two levers individually operating said valves and disposed adjacent to and actuated by the percussors at the respective ends of the strokes of the driving piston, discharge channels being disposed in the distributor cylinder, and hollow stems on said valves with side ports communicating with the interiors of said stems and in a predetermined rest position of each valve registering with the discharge channels in order to allow escape of spent driving fluid from said distributor cylinder.

4. A press according to claim 1, having each of

the smaller cylinders alined with the cylinder of the driving piston provided with a suction and discharge valve connected thereto for the concrete, or the like, said valve including a partially rotatable valve member rotatable through an angle of substantially 90° about an axis disposed transversely of the axis of said cylinders, and means for transmitting motion from the distributor piston to the suction and discharge valves including a connecting rod operated by the distributor piston, and a crank device operating each valve member, and being in turn actuated by said connecting rod.

5. A press according to claim 1, having each of the smaller cylinders alined with the cylinder of the driving piston provided with a suction and discharge valve connected thereto for the concrete, or the like, said valve including a partially rotatable valve member comprising a cylindrical rotor forming a shutter sector, and a valve casing for said valve with three apertures, one being directed upwardly to communicate suction to the interior of the valve casing, a second communicating with the interior of the respectively adjacent smaller cylinder, and the third forming a discharge port for the concrete or the like, and said rotor or shutter sector including a pair of spaced side disks having a metal plate rigidly connecting said disks and having cutting edges, and said sector also being rotatable through an angle of substantially 90° in order to alternately cut off and close the third aperture or discharge port, and the first mentioned aperture at respectively predetermined phases.

6. A press according to claim 1, having each of the smaller cylinders alined with the cylinder of the driving piston provided with a suction and discharge valve connected thereto for the concrete, or the like including a partially rotatable valve member rotatable through an angle of substantially 90° about an axis disposed transversely of the axis of said cylinders, and means for transmitting motion from the distributor piston to the suction and discharge valves and effective to continue operation by the effect of the driving fluid driving the driving piston after being mechanically started to operate independently of the driving fluid, said means including in part, a connecting rod operated by the distributor piston and a crank device operated by said connecting rod and in turn operating each valve member.

7. A press according to claim 1, having each of the smaller cylinders alined with the cylinder of the driving piston provided with a suction and discharge valve connected thereto for the concrete, or the like, said valve including a partially rotatable valve member rotatable through an angle of substantially 90° about an axis disposed transversely of the axis of said cylinders, and means for transmitting motion from the distributor piston to the suction and discharge valves including a connecting rod operated by the distributor piston and a crank device operating each valve member, and being in turn actuated by said connecting rod, adjustable arms on each valve member and counterweights on said arms together ensuring a balanced and continuous operation of the apparatus as a whole.

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