(No Model.) 2 Sheets—Sheet 1.

T. A. WALTHER.

AUTOMATIC HYDRAULIC PUMP.

No. 525,731. Patented Sept. 11, 1894.

Fig. 1.

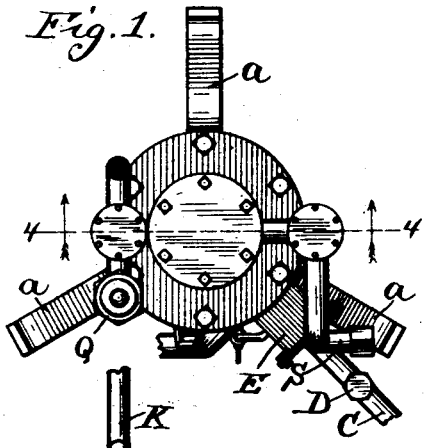


Fig. 3.

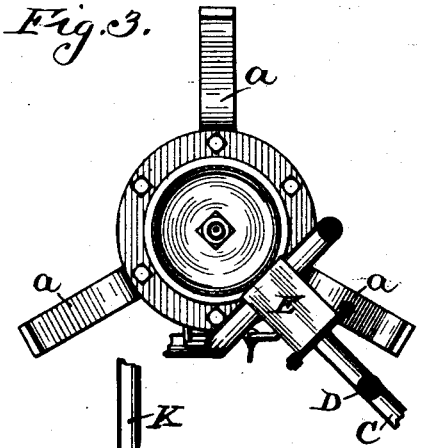


Fig. 2.

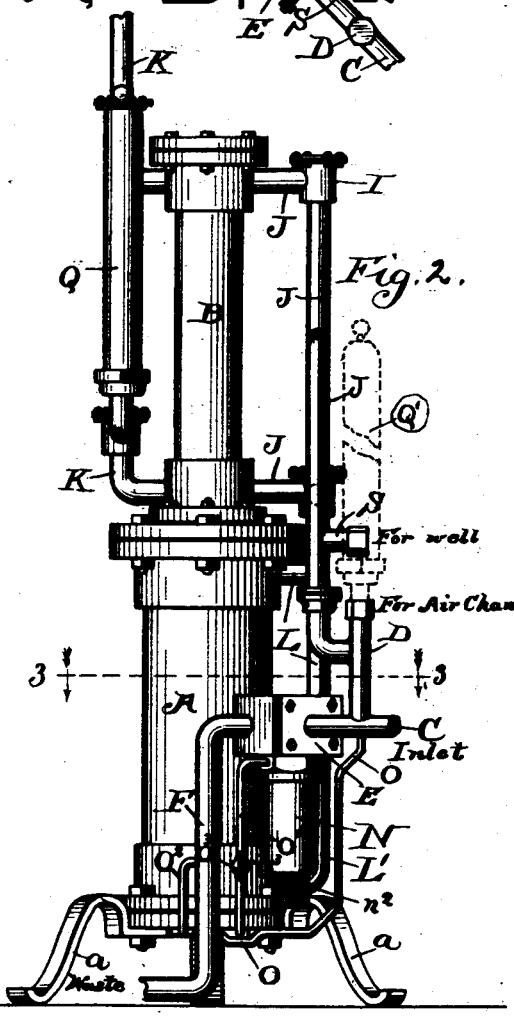
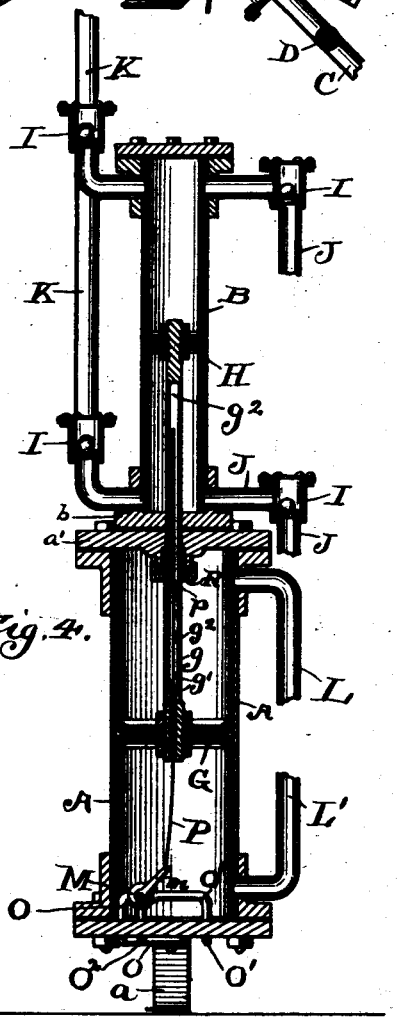


Fig. 4.



Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

T. A. WALTHER.

AUTOMATIC HYDRAULIC PUMP.

No. 525,731. Patented Sept. 11, 1894.

Fig. 5.

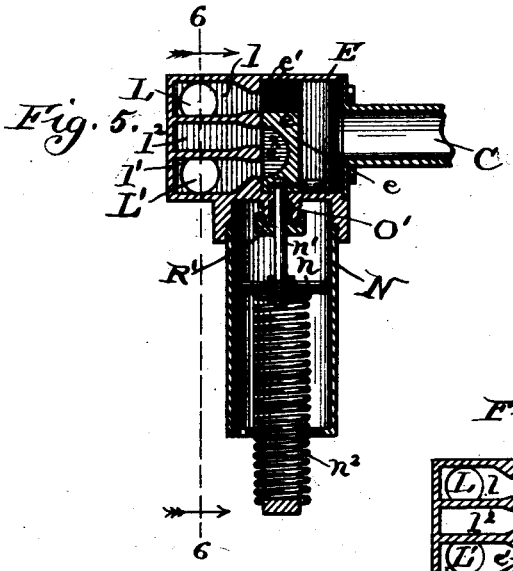


Fig. 6.

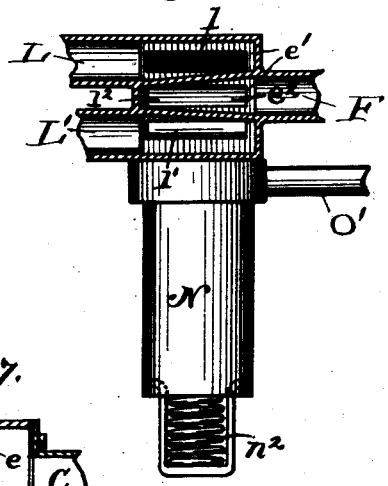


Fig. 7.

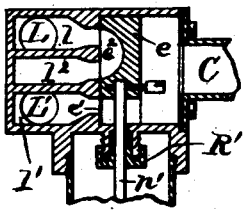


Fig. 8

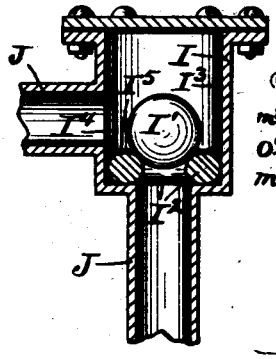


Fig. 11.

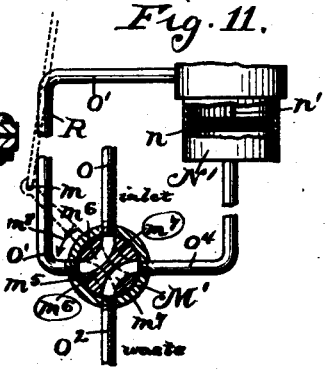


Fig. 9.

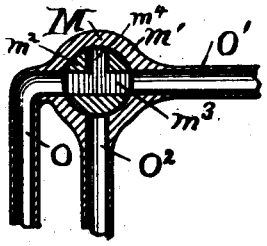
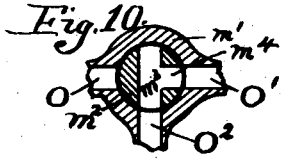


Fig. 10.



Witnesses:
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L. R. Noll.

Inventor:
Theodore A. Walther,
By Charles Turner Brown,
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UNITED STATES PATENT OFFICE.

THEODORE A. WALTHER, OF CHICAGO, ILLINOIS, ASSIGNOR OF TWO-FIFTHS TO CHARLES TURNER BROWN, OF SAME PLACE.

AUTOMATIC HYDRAULIC PUMP.

SPECIFICATION forming part of Letters Patent No. 525,731, dated September 11, 1894.

Application filed January 19, 1894. Serial No. 497,372. (No model.)

To all whom it may concern:

Be it known that I, THEODORE A. WALTHER, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Hydraulic Pumps, of which the following, when taken in connection with the drawings accompanying and forming a part thereof, is a full and complete description, sufficient to enable those skilled in the art to which it pertains to understand, make, and use the same.

My invention relates to hydraulic pumps designed to be attached to a water works system or to other water supplies whereby water under pressure is furnished, and thereby water, either from the same or a different water supply forced to a greater height than by the supply furnishing, under pressure, the water actuating the machine. And the object of my invention is to obtain a hydraulic pump which will be automatic in its action, that is to say a hydraulic pump whereby when a faucet is turned to allow water to run from the pipes containing water forced thereinto by the hydraulic pump embodying my invention, such hydraulic pump will be, at once, set in operation by the water furnished thereto under pressure, and so water will be forced to and will run from the open faucet.

A further and very important object of my invention is to obtain an automatic hydraulic pump which will be simple in construction, not liable to breakage or other injury, or to get out of repair; and will be economical in its waste of water, or in the water required to actuate it and which thereby runs to waste. And a still further object of my invention is to obtain an automatic hydraulic pump of the kind named whereof there shall be no moving parts exposed to view or to injury when in operation.

The manner in which the invention by me made to accomplish the results sought can be embodied in an automatic hydraulic pump is well illustrated in the drawings referred to, wherein—

Figure 1 is a top plan view of such machine; Fig. 2, a front elevation; Fig. 3, a horizontal sectional view on line 3—3 of Fig. 2, viewed in the direction indicated by the arrows; Fig. 4, a vertical sectional view on line 4—4 of Fig. 1, viewed in the direction indicated by the arrows; Fig. 5, a vertical sectional view, on an enlarged scale, of a slide valve entering into the machine as an element thereof; Fig. 6, an elevation of such slide valve on line 6—6 of Fig. 5; Fig. 7, a vertical sectional view of the main features of the slide valve on the same plane as in Fig. 5, but with the valve in a different position than in such Fig. 5; Fig. 8, a vertical sectional view of a check valve forming an element in the machine; Fig. 9, a vertical sectional view of a three way valve or stop cock forming an element in the machine, and Fig. 10 a vertical sectional view of the three way valve or stop cock illustrated in Fig. 9, with the movable plug thereof in a different position from which the same is illustrated in Fig. 9. Fig. 11 is a sectional view of a modified construction of the drawing cylinder and piston constituting the motor part or portion of the slide valve shown in detail in Figs. 5, 6 and 7, and of a four way cock working in combination therewith, such modified construction of the cylinder and piston requiring the substitution of such four way cock for the three way valve or cock illustrated in Figs. 9 and 10 and used in combination with the cylinder, piston, and spring illustrated in Figs. 1, 2, 5, 6 and 7.

The same letter of reference is employed to indicate a given part where more than one view thereof appears in the several figures of the drawings.

A is the larger and driving cylinder and B is the smaller and driven cylinder. Water extending through cylinder A actuates the device and then runs to waste and water passing through the cylinder B is driven or lifted to a height, when desired, dependent on the relative size of cylinders A, B and the pressure on the water admitted to cylinder A.

a a a are the supporting legs of the machine.

C is the supply pipe for cylinder A and where the water elevated by cylinder B is obtained from the same water supply, also the supply pipe for cylinder B, by means of branch pipe D.

E is a slide valve by which the water entering cylinder A through supply pipe C is directed to the proper side of the piston head contained in cylinder A, and to the waste pipe F.

G is the piston head in cylinder A and g is the piston rod extending through the adjacent heads a' and b of cylinders A and B into cylinder B. H is the piston head in such cylinder B.

I I I I are check valves interposed in the inlet and outlet pipes J J and K K whereby water is supplied to and conveyed from cylinder B.

L L′ are pipes extending from slide valve E to the ends of cylinder A and serve alternately as supply and discharge pipes, according to the position of the sliding block e in such slide valve E. The position of this sliding block e is determined by means of three way cock M, cylinder N and the connecting conduits or pipes O, O′ and waste pipe O^2.

The three way cock M is placed within the cylinder A and from the handle m of such cock, rod P extends upward into the hollow tube constituting the piston rod g. p is a collar on rod P.

The rod P is of such length that as piston rod g extends downward in cylinders A B and nearly reaches its determined lowest position such rod P will be pushed downward by the piston rod, the upper end of such rod P coming in contact with the bottom of the hollow portion of such piston rod g; and the ferrule p on such rod P is adjusted in such position on the rod that as the piston rod g approaches too near its extreme upward position such ferrule will come in contact with the shoulder formed by the part g', of the hole in the piston rod g being of lesser diameter than the part g^2 of such hole. The three way cock M is thus alternately turned into the positions illustrated in Figs. 9 and 10 of the drawings by the upward and downward movement of the piston rod. The position of the three way cock M determines, in the manner about to be described; the position of the sliding block of slide valve E, and hence the admission and escape of water to the two sides of the piston head G in cylinder A; and so controls the movement of such piston head G in cylinder A, provided of course, some one of the faucets connected with the pipe K is opened to allow of the escape of water therefrom and from cylinder B.

I is a chamber in slide valve E with which pipe L communicates and I′ is a chamber with which pipe L′ communicates. l^2 is a chamber in such slide valve which communicates with the discharge pipe F.

e is a sliding block adapted to slide or be slid on the seat e'. The sliding block e has passage way e^2 therein.

n is a piston head in cylinder N and n' is a piston rod connecting piston head n with sliding block e.

n^2 is a spring yieldingly holding the piston head n and sliding block e in their respective extreme upward positions.

The pipe O extends from supply pipe C through three way cock M and pipe O′ extends from three way cock M to and into cylinder N above the piston head n therein. The pipe O^3 extends from three way cock M to discharge pipe F. O^3, Fig. 2, is a stop cock in pipe O′. The three way cock M consists of handle m, the casing m' and plug m^2. Plug m^2 has therein way m^3 extending therethrough and cross way m^4.

When plug m^2 of three way cock M is in the position indicated by the handle m in Fig. 4 and illustrated in Fig. 9; water can and will extend from supply pipe C through pipe O to and through passage way m^3 in plug m^2 of three way cock M, thence through pipe O′ to and into cylinder N above the piston head n, thereby depressing such piston head, together with piston rod n' and sliding block e of valve E. When sliding block e is in this position, (being the position thereof illustrated in Figs. 5 and 6) chamber l is in communication with supply pipe C, and water can flow from such supply pipe C through valve E into chamber l, from thence into pipe L, and from thence into the cylinder A above the piston head G, and will thereby depress said piston head together with piston rod g and piston head H in cylinder B. This depression, however, of piston head G, piston rod g, and piston head H, cannot, of course, occur, unless a faucet is opened or other outlet made, whereby the water already contained in pipe K can escape therefrom, thus providing room for the water in cylinder B underneath piston head H to flow therefrom into the pipe K. The check valves I I in pipe K prevent any backflow of water from pipe K into cylinder B either above or below the piston head H: and the check valves I I in pipe J prevent the flow of water from the cylinder B into such pipe J J while permitting the inflow from the pipes J J into such cylinder B. And when the sliding block e is in the position therein illustrated in Figs. 5 and 6, that is the position last above referred to (and wherein water from supply pipe C can extend through valve E into chamber l and pipe L), chamber l' is in communication by means of passage way e^2 with chamber l^2 and through chamber l^2 with waste pipe F. Water, therefore, contained in cylinder A underneath piston head G can flow therefrom through pipe L′, chamber l', passage way e^2, and chamber l^2, to waste pipe E, from which it flows to waste.

When the piston heads G H, and piston rod g have moved downward so far as to turn, by means of rod P, the handle m of three way cock M, downward, the plug m^2 will be thereby turned into the position illustrated in Fig. 10, so cutting off the supply of water from supply pipe C to cylinder N and opening passage way through crossway m^4 and way m^3 in plug m^2 for the water already contained in cylinder

N to flow therefrom by way of pipe O′, the passage way in plug m^3 and pipe O^2, and the resilience of spring n^2 will elevate piston head n in cylinder N, together with the water there-over, and such water will flow from the cylinder in the way described. The elevation of the piston head n will raise sliding block e of slide valve E into the position illustrated in Fig. 7 and water under pressure will thereby be admitted from supply pipe C through chamber l' and pipe L′ into cylinder A, underneath piston head H, while the water contained in such cylinder above the piston head H will flow therefrom through pipe L, chamber l, passage way e^2, chamber l^2, and pipe F, to waste.

Q Q′ are respectively, air chambers.

R, is a stuffing box in cylinder A and R′ is a stuffing box in cylinder N.

The check valves I, are by me constructed, preferably, in the manner illustrated in Fig. 7, wherein, I′ is a ball of non-elastic material as say, glass; I′, a ring of elastic material, as say, rubber; and I^3 a tube having hole I^4 on one side thereof (for water to pass through) and shoulder I^5 at the lower end thereof. Shoulder I^5 serves to hold the elastic ring I^2 in place, and to compress it if desired.

In the modification of the cylinder N and the connections thereof illustrated in Fig. 4 of the drawings, the spring n^2 is dispensed with and water admitted to both sides of piston head n. In this modification the cylinder is lettered N′, the pipe extending from the four way cock M′ to the cylinder above the piston head n', is lettered O′ and the pipe extending from such four way cock to cylinder N′ below cylinder head n is lettered O^4. The waste pipe O^2 is retained, but the plug of the four way cock, lettered m^5, has therein passage ways m^6, and m^7. In this modification when plug m^5 is in the position illustrated in Fig. 11 water is admitted from inlet O, passage way m^6 and pipe O′ to cylinder N′ above the piston head n, and the water in such cylinder N′ is allowed to escape therefrom through pipe O^4, passage way m^7, and pipe O^2, and flow to waste. When the handle of four way cock M′ is depressed by rod P, in the manner hereinbefore described in relation to three way cock M, plug m^5 is moved in the direction indicated by the arrow m^8 until passage way m^6 connects pipe O′ to pipe O^2 as indicated by the dotted lines in Fig. 11, and passage way m^7 connects pipe O with pipe O^4. The movement of piston head n is thus reversed, the operation so far as the sliding block e and the remainder of the several parts of the machine being the same as when the sliding block e is raised by the resilience of spring n^2.

Heads a' and b of cylinder A B are firmly secured together so that water cannot escape from between them. It will therefore be seen that when water is contained in cylinder A above piston head G, under pressure, water will also be contained in cylinder B underneath piston head H under greater pressure. The tendency of water to pass or leak through stuffing box R will therefore be from cylinder B into cylinder A, and any water which may pass through such packing box will assist in forcing piston head G downward. And it will also be observed that when water under pressure is contained in cylinder A underneath piston head G, the water above such piston head is not under pressure, nor is the water in cylinder B underneath piston head H under pressure, and there is therefore at such time no tendency for water to pass in either direction (except by gravity) through the stuffing box R. The stuffing box R may therefore be comparatively loose on piston rod g and much friction in my device is thereby obviated. It will also be observed that when water is contained (under pressure) in cylinders N, and N′ above the piston head n, there is practically no tendency for water to pass in either direction through stuffing box R′, and when no water is contained (under pressure) above the piston head n, any water passing through such stuffing box may run to waste through pipe O′ and the connections thereto hereinbefore described. And too, by the disposition of the several parts, as described, no oiling or cleaning is required to the machine.

S is a pipe to which a pipe extending to a water supply designed for cylinder B alone may be attached. When pipe S is coupled to such other supply pipe, pipe J is uncoupled from pipe D and the end of such pipe J closed.

When the stop cock O^3 is closed the device is inoperative.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of a motor and a pump cylinder, a hollow piston rod common to both cylinders, piston heads on the ends of the rod, a cock in the motor cylinder, a rod extending into the hollow piston rod, a connection between the rod and the cock so that the movement of the hollow piston rod will control the cock, a water supply extending to the cock, and from the cock to a third cylinder, a water waste extending from the cock, a third cylinder having a piston rod and head, a slide valve actuated by the piston head and rod in the third cylinder, a water supply extending to the slide valve and from thence to the ends of the larger cylinder, and a water waste extending from the slide valve, a water supply extending to the pump cylinder, pipes extending from the pump cylinder to the place of delivery of the water passing therethrough, and check valves in the water supply extending into the pump cylinder and the pipes extending therefrom; substantially as described.

2. The combination of a motor and a pump cylinder, a hollow piston rod common to the cylinders, piston heads on the ends of the piston rod, a cock in the motor cylinder, a rod extending into the hollow piston rod, a con-

nection between the rod and the cock so that the movement of the hollow piston rod will control the cock, a water supply extending to the cock and from the cock to a third cylinder, a water waste extending from the cock, a third cylinder having a piston rod and head, a slide valve actuated by the piston rod and head in the third cylinder, a spring yieldingly holding the piston rod and head and the slide valve connected thereto in given position, and a water supply extending to the first named cylinders, respectively, the one to the motor cylinder extending through the slide valve: substantially as described.

3. The combination of cylinders arranged on a common axial line with a hollow piston rod common to both cylinders, piston heads on the ends of the hollow piston rod, a water supply and water waste cock within one of the cylinders, and a rod extending into the hollow piston rod connected with the cock so that the movement of the hollow piston rod controls the cock, and a water inlet, a water outlet, and a waste pipe extending into the cylinder within which the cock is placed and connected thereto; substantially as described.

4. The combination of cylinders arranged on a common axial line, a hollow piston rod common to both cylinders, piston heads on the ends of the hollow piston rod, a water supply and water waste cock within one of the cylinders and a rod extending into the hollow piston rod and connected with the cock so that the movement of such hollow piston rod controls the cock, a water inlet and a water outlet extending to the cock, a waste pipe extending from the cock, a third cylinder to which the water outlet of the cock extends, a piston head and rod in the third cylinder and a slide valve connected to such last named piston rod; substantially as described.

5. In an automatic motor, the combination of a motor cylinder having a piston head and a hollow piston rod therein, a second cylinder having a piston head and rod therein, a slide valve connected to the last named piston rod the position whereof determines the flow of water into and out of the motor cylinder, and a water supply and water waste cock within the motor cylinder with a rod extending into the hollow piston rod therein and connected to the cock, and water inlet and water outlet pipes extending into the motor cylinder and to the cock, and connecting the cock with the auxiliary cylinder; substantially as described.

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