(No Model.) 2 Sheets—Sheet 1.

J. WEEKS.

HYDRAULIC APPARATUS.

No. 468,104. Patented Feb. 2, 1892.

Fig. 2.

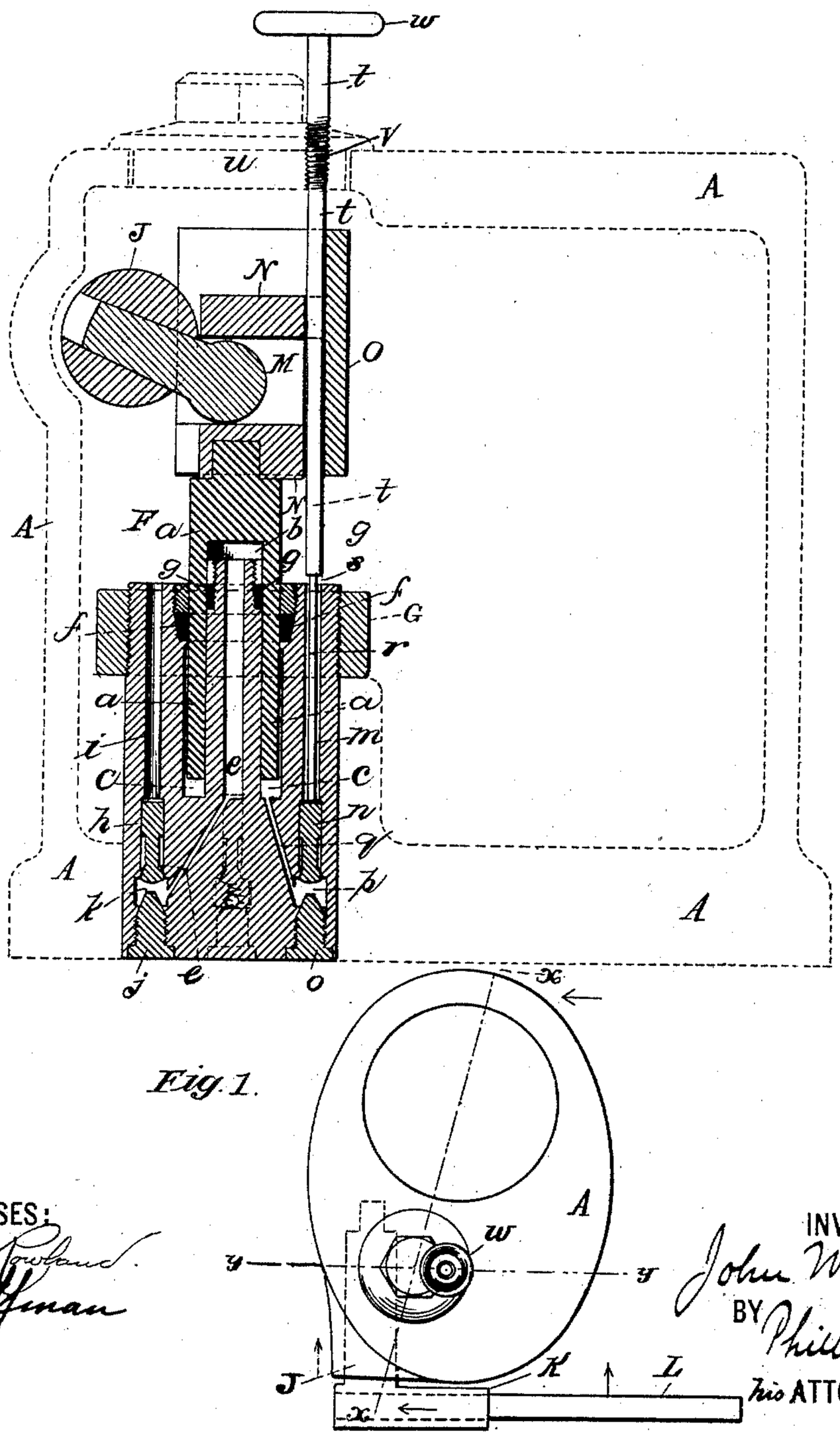

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

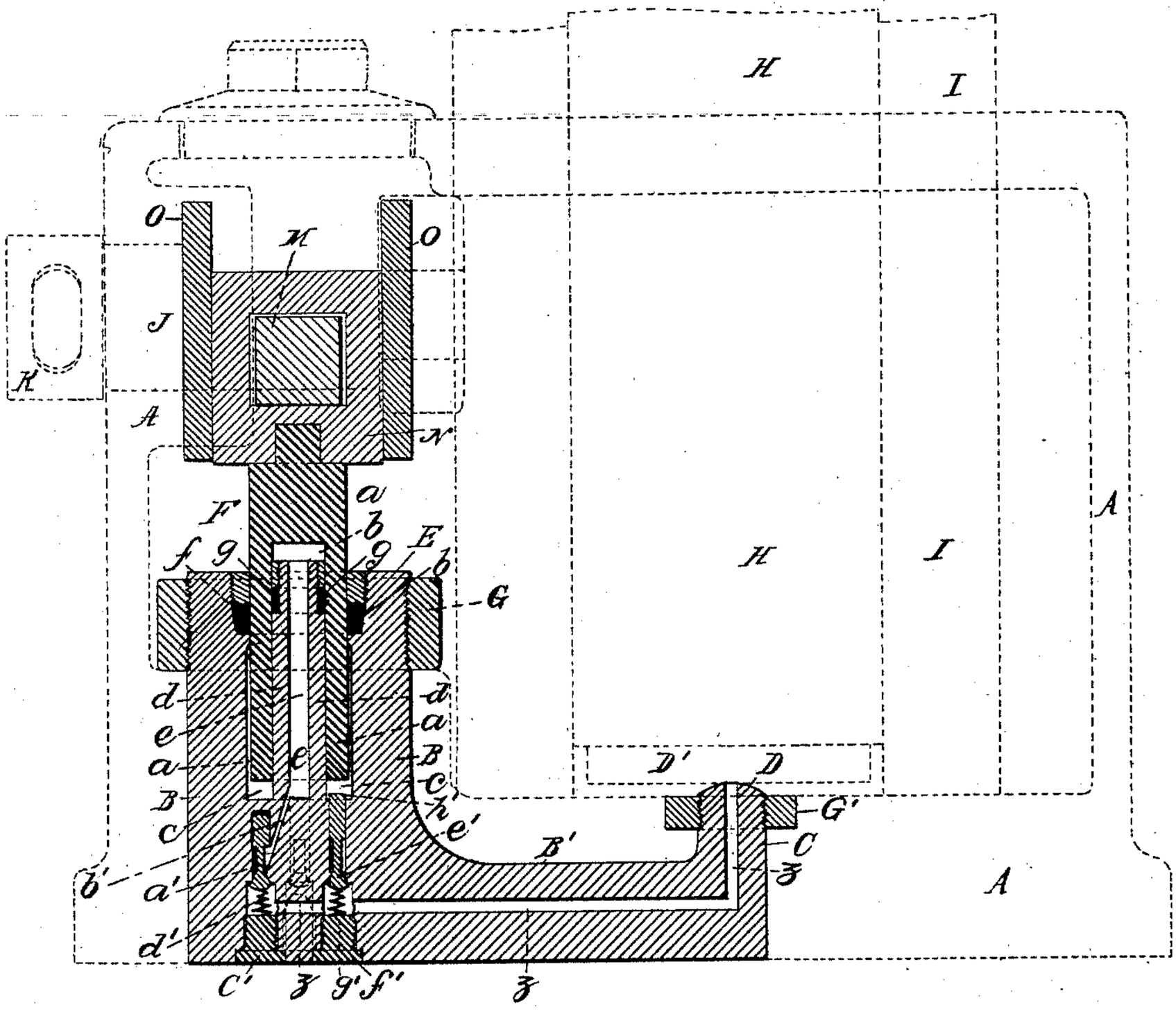
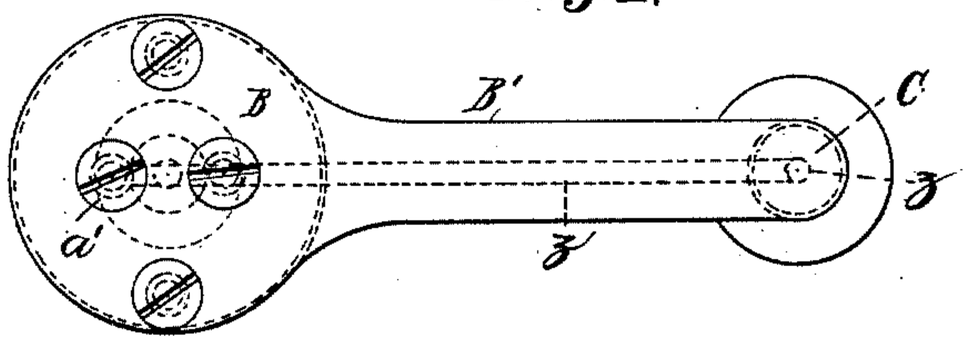


Fig. 4.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOHN WEEKS, OF NEW YORK, N. Y., ASSIGNOR TO RICHARD H. DUDGEON, OF SAME PLACE.

HYDRAULIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 468,104, dated February 2, 1892.

Application filed June 16, 1891. Serial No. 396,442. (No model.)

To all whom it may concern:

Be it known that I, JOHN WEEKS, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Hydraulic Apparatus, of which the following is a specification.

My invention relates to improvements in hydraulic jacks, lifts, presses, riveting-machines, punches, shears, &c.; and it consists, broadly stated, in arranging two pumps, which are preferably concentric with each other and which are both in the same transverse plane, so that they may both be operated by a plunger not materially longer than the pump-barrel of each pump, and the pumps and their coacting parts are so arranged that both may be simultaneously used, if so desired, or one pump be thrown out of action, leaving the other one only in operation. By this construction I am enabled to use both of the pumps during that part of the work where quick movement is required without any great power, and also for doing light work relatively, of course, to the capacity of the machine, and when I desire to do heavy work, approaching, perhaps, the maximum capacity of the apparatus, I utilize both pumps to bring the tool, whatever it may be, and material into position and then disconnect the large pump and use the small one only, which exerts great power to effect the heavy operation desired.

In the drawings hereof I illustrate my apparatus as applied to the well-known Dudgeon horizontal hydraulic jack. This is selected as an example only, because, as above stated, my invention is applicable to jacks of all forms and also to practically all kinds of hydraulic mechanism where pumps are employed.

Figure 1 represents a plan view. It is designed simply to indicate the section-lines upon which the other figures are taken and is therefore not a detail drawing, the parts being indicated thereon only. Fig. 2 is a vertical section on the line *y y* of Fig. 1. Fig. 3 is another vertical section on the line *x x* of Fig. 1. Fig. 4 is a view from the under side of the casting or block in which the pump is located and through which the connection between the pumps and the force-chamber for the ram is made.

A is the base and frame of the jack. It is made, as is well understood, in a single casting, in which the various parts are placed. B is a pump-block provided with a lateral extension B′ and vertical projection C. This piece of metal is set into a correspondingly-shaped recess made in the casting A. The upper end of the projection C (shown at D) enters the force-chamber D′ of the ram, and the upper end of the pump-block proper (shown at E) enters the reservoir F in the pump-section of the frame A. This piece of metal is held in position by the flattened rings or nuts G and G′. H is the ram. I is the ram-cylinder. J is the spindle, upon the outer end of which is the socket K, in which enters the pumping-lever L, all as usual. M is a knuckle, which is connected to the spindle J, as usual, and works in the head N of the pump-piston, also as usual. O is a guideway for the head of the piston. All of these parts are or may be varied in form and construction, as preferred.

Referring now to the pump proper, in which my invention is embodied, *a* is what may be called the "piston" of the pump. It is a cylindrical piece of metal bored out centrally, leaving the recess *b*. Consequently the lower portion of this plunger is tubular, the upper end, however, being closed.

c is an annular space bored out from the pump-block, leaving, however, a vertical standing part *d*, which is itself bored centrally, as at *e*.

f is a packing between the pump-block and the outer walls of the plunger *a*, and *g* is a packing between the inner walls of the tubular plunger *a* and the outer wall of the part *d*.

h is a valve placed at the lower end of a hole *i*, bored vertically through the pump-block opening into the reservoir F of the jack. The valve is admitted to this position by a bonnet *j*, screwed into the pump-block from beneath. This valve has a stem which is three sided, as usual, so that the water can pass by the flattened sides of the stem, and the valve is seated as usual in such cases.

k is a valve-chamber from which a channel

l is bored through the pump-block, which connects with the recess or chamber *e* of the smaller pump. *m* is another hole likewise bored through the pump-block, connecting with the reservoir F, and at its lower end there is another valve *n*, in all respects the same as the valve *h*. This valve is inserted in its position by means of the bonnet *o*, and from its valve-chamber *p* there extends another passage-way *q*, bored through the pump-block, which connects with the chamber *c* of the larger pump. Above the stem of the valve *n* is a small steel rod *r*, which is fastened to or made part of a steel rod *t*, which is placed vertically in line with the hole *m*. It extends upwardly in front of the guide O for the head of the piston, and passes through the screw-cap of the reservoir-chamber *u*, and at this portion it is threaded, as shown at *v*, and at the upper part there is a small hand-wheel or handle *w*, whereby the rod may be turned, and consequently run up or down by the action of the threads *v*.

The two valves which I have already described—to wit, valve *h* and valve *n*—are what I call the "suction-valves," because through them it is that the liquid comes from the reservoir to the pumps, the external or large one and the internal or small one, respectively. I will now describe the valves which are respectively the delivery-valves from these two pumps; but before describing them I will state that they are arranged, as shown in Fig. 4, in such manner that they connect with the passage *z*, which is made through the part B′ and C and connects the pumps with the force-chamber of the ram. These two valves are as follows: *a′* is a valve, substantially the same as the valve *h*, having a spindle for its guidance and a seat at its lower end. It is connected with the pump-chamber *e* of the small pump by means of a channel *b′* made in the pump-block. This valve is inserted in its place by means of a threaded bonnet *c′*, set into the pump-block B from the under side, and there is a small spiral spring *d′*, which holds this valve up in its seat until it is forced off by the pressure of the liquid. The channel *z*, as before stated, connects with the valve-chamber of this valve. It will be especially observed that the upper end of the opening, through which the stem of this valve works, is closed and does not connect with anything, excepting through the passage-way *b′*. This valve, as before intimated, is the discharge-valve for the small pump. The discharge-valve for the larger pump is shown at *e′*. It is the same in all respects as the one just described, *f′* being the bonnet and *g′* the spiral spring. The stem, however, of this valve, as shown at *h′*, extends upwardly and projects into the pump-chamber *c* of the larger pump. It is so made for the purpose of lowering the jacks or releasing the mechanism from its work by allowing a backflow of the liquid in a manner about to be explained.

The operation of the apparatus is as follows: Referring first to Fig. 2, the liquid, whatever it may be, is placed in the reservoir F in a manner well understood and the pumping-lever L is operated, as also well understood. At each upward movement of the plunger *a* a vacuum is formed in the pump-chamber *c* of the exterior or larger pump, and likewise of course in the pump-chamber *e* of the interior or smaller pump. Thereupon the liquid rushes down from the reservoir F through the holes or passages *i* and *m*, displacing the valves *h* and *n*, into the valve-chambers *k* and *p* of these valves, and thence upwardly through the passages *l* and *q* into the pump-chambers *e* and *c*, respectively. The downstroke now being made, the valves just described are both of them seated, cutting off return of the liquid to the reservoir F.

Referring now to Fig. 3, under the stress of the downstroke the liquid passes from the pump-chambers *e* and *c*, respectively, down through the passage *b′* and by the flattened sides of the valve-stem *h′*, displacing the valves *a′* and *e′*, compressing the springs *d′* and *g′* into the passage *z*, and thence into the force chamber of the ram. Upon the succeeding upstrokes of the pump the springs *d′* and *g′* seat the two valves *a′* and *e′*, respectively. While the pump is used as just stated above, the large and small pumps being used in co-operation, the movement of the ram is somewhat rapid, but the power not so very great, because the large pump is in operation. When it is desired to exert great power, it is necessary to relieve the pumping-lever of the resistance of the large or external pump, utilizing only the smaller pump, which has relatively much less resistance and consequently affords very much greater power. To do this the hand-wheel *w* (see Fig. 2) is turned. The spindle *t* and rod *r* by reason of the threads *v* are run down, and the lower end of the rod pressing against the upper end of the valve-spindle depresses the valve *n* and holds it off of its seat. Consequently the large pump cannot now offer resistance to the pump-lever L because it simply draws the liquid in from the reservoir through the passages *m* and *q* and through the valve *n* and returns it again immediately upon the downstroke through the same openings into the reservoir F. Thus there is no pumping action now performed by the large pump, since the delivery-valve *e′* does not leave its seat. The small pump, however, continues to operate as before, exerting its great power, but with slower movement upon the ram.

In order that the ram or other equivalent part of the device, whatever it may be, may be relieved of the action of the pumps—in other words, in order that the backflow of the liquid from the force-chamber of the ram to the reservoir may be afforded—the upper end *h′* of the delivery-valve *e′* of the large pump, as before stated, extends into the pump-chamber *c* of the large pump. If, therefore,

in a manner well understood, the plunger *a* be depressed to its utmost limit, which is ordinarily effected by turning over the pump-lever L, so that the lug on its under side which is not shown because it is very well understood, does not come in contact with a suitably-located lug or stop on the side of the reservoir, then the lower end of the piston *a* will come in contact with the upwardly-projecting stem *h'* and depress the valve *e'* off from its seat. Thus a backflow of the liquid will be afforded through the passage *z* in the pump-block and its projections, already described, through the valve *e'* into the pump-chamber *c*, and thence downwardly through the passage *q* and valve *n*, which of course is forced off of its seat by the rod *t*, as already described, and thus back again to the reservoir.

It will be observed that my invention possesses features of novelty which I believe have never heretofore been attained in mechanism of this character, that it is simple and effective in operation, not likely to get out of order, compact in construction, and relatively inexpensive, and that I can use the same device rapidly for light work, or work requiring but little power, and yet effectively for work requiring great power.

I do not limit myself to the details of construction shown and described, because it will be apparent to those who are familiar with this art that various modifications may be made in the apparatus and still the essentials of my invention be employed.

I claim—

1. The combination, in a hydraulic apparatus, of two pumps, both located in substantially the same transverse plane, and a plunger not necessarily longer than the bore of each pump, which operates both of them, substantially as set forth.

2. The combination, in a hydraulic apparatus, of two pumps, both located in substantially the same transverse plane, a plunger not necessarily longer than the bore of each pump, which operates both of them, a separate suction-valve for each pump, connecting with a reservoir in the apparatus, and a separate discharge-valve for each pump, connecting with the force-chamber of the apparatus, substantially as set forth.

3. The combination, in a hydraulic apparatus, of two pumps, both located in the same transverse plane and concentric one with the other and of different pumping capacities, a plunger not necessarily longer than the bore of each pump, and ducts connecting the pump-chambers with a reservoir located in the apparatus and with ducts connecting the pump-chambers with a force-chamber, substantially as set forth.

4. The combination, in a hydraulic apparatus, of two pumps arranged in substantially the same transverse plane, a plunger not necessarily longer than the bore of each pump, which operates both of them, suction and discharge valves for the pumps, and means operated from the exterior of the apparatus whereby the suction-valve of one of the pumps may be prevented from reseating itself, substantially as set forth.

5. The combination, in an hydraulic apparatus, of two pumps arranged in the same transverse plane, a plunger which operates both of the pumps, a suction and a discharge valve for each pump connecting, respectively, with a reservoir and a force-chamber within the machine, and means whereby the discharge-valve of one of the pumps may be depressed from its seat by the pumping-lever acting through the piston, thus permitting a backflow into the pump-chamber, substantially as set forth.

6. In a hydraulic apparatus, a pump-block having two pump-chambers therein arranged in substantially the same transverse plane, and a single plunger not necessarily longer than the bore of each pump, adapted to operate both of them, substantially as set forth.

7. In a hydraulic apparatus, a pump-block having two pumps concentric with each other and arranged in substantially the same transverse plane, and a single plunger not necessarily longer than the bore of the pumps, and suction and discharge valves for each pump, substantially as set forth.

8. The combination, in a hydraulic apparatus, of two pumps, both located in substantially the same transverse plane, a plunger not necessarily longer than the bore of the pumps, a suction and a discharge valve for each pump, and means operated from the exterior of the apparatus, whereby the suction and discharge valves of one of the pumps may both be held off their seats, thus establishing a backflow through the said pump-chamber, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 4th day of June, A. D. 1891.

JOHN WEEKS.

Witnesses:
PHILLIPS ABBOTT,
J. E. HOFFMAN.