C. C. WAKEFIELD.

PUMP.

APPLICATION FILED JULY 11, 1908.

945,648.

Patented Jan. 4, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

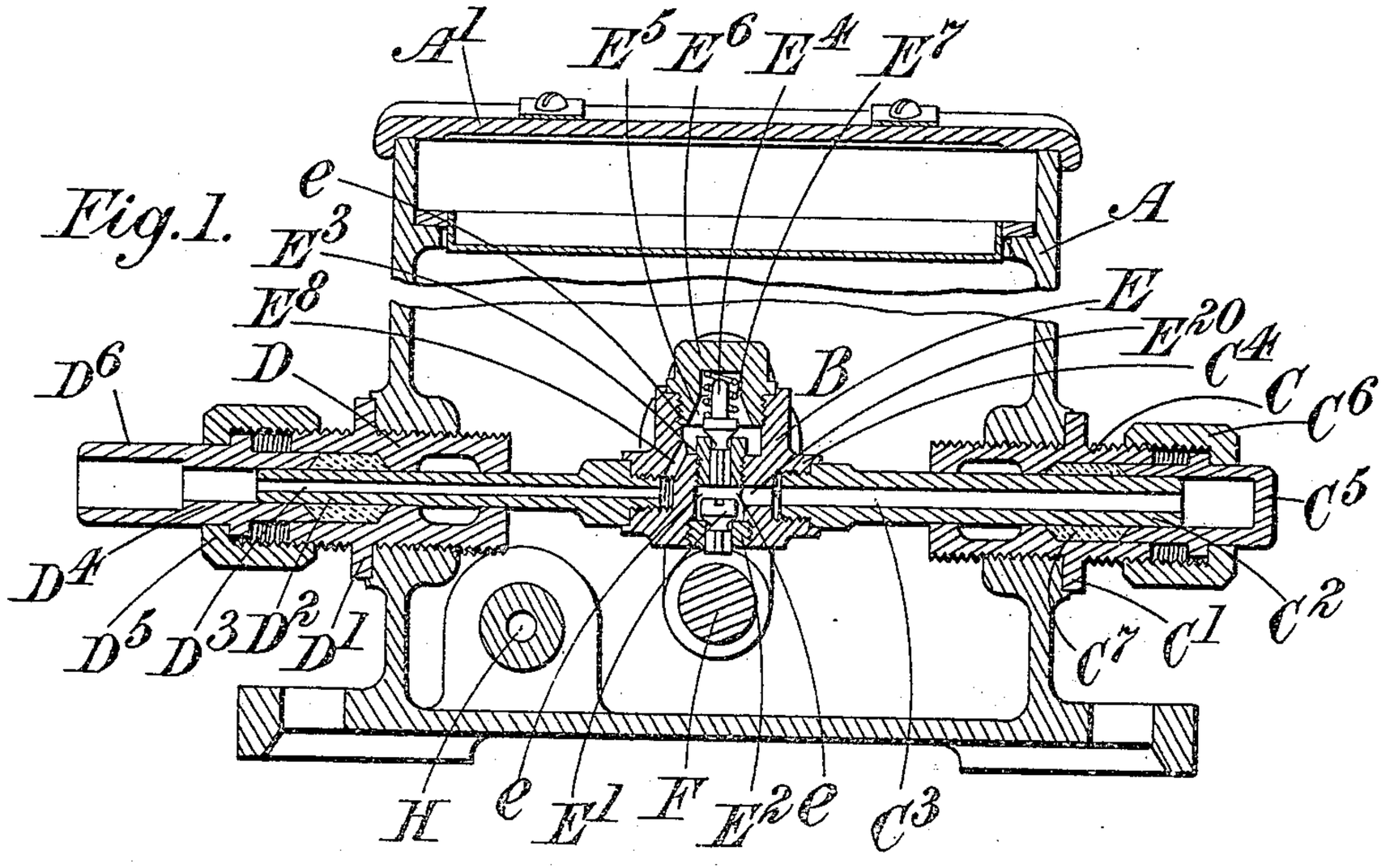

Fig. 2.

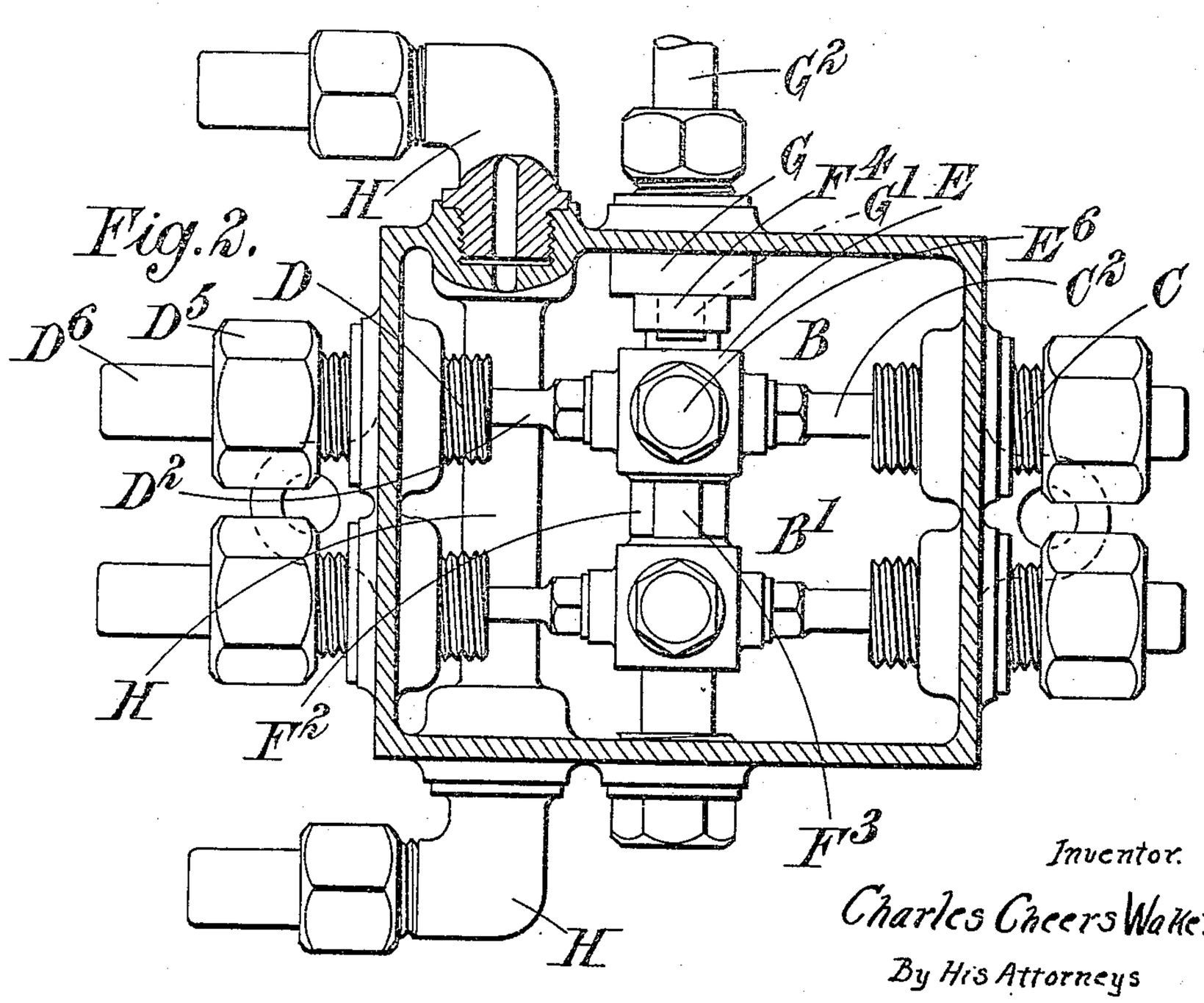

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Fig. 3.

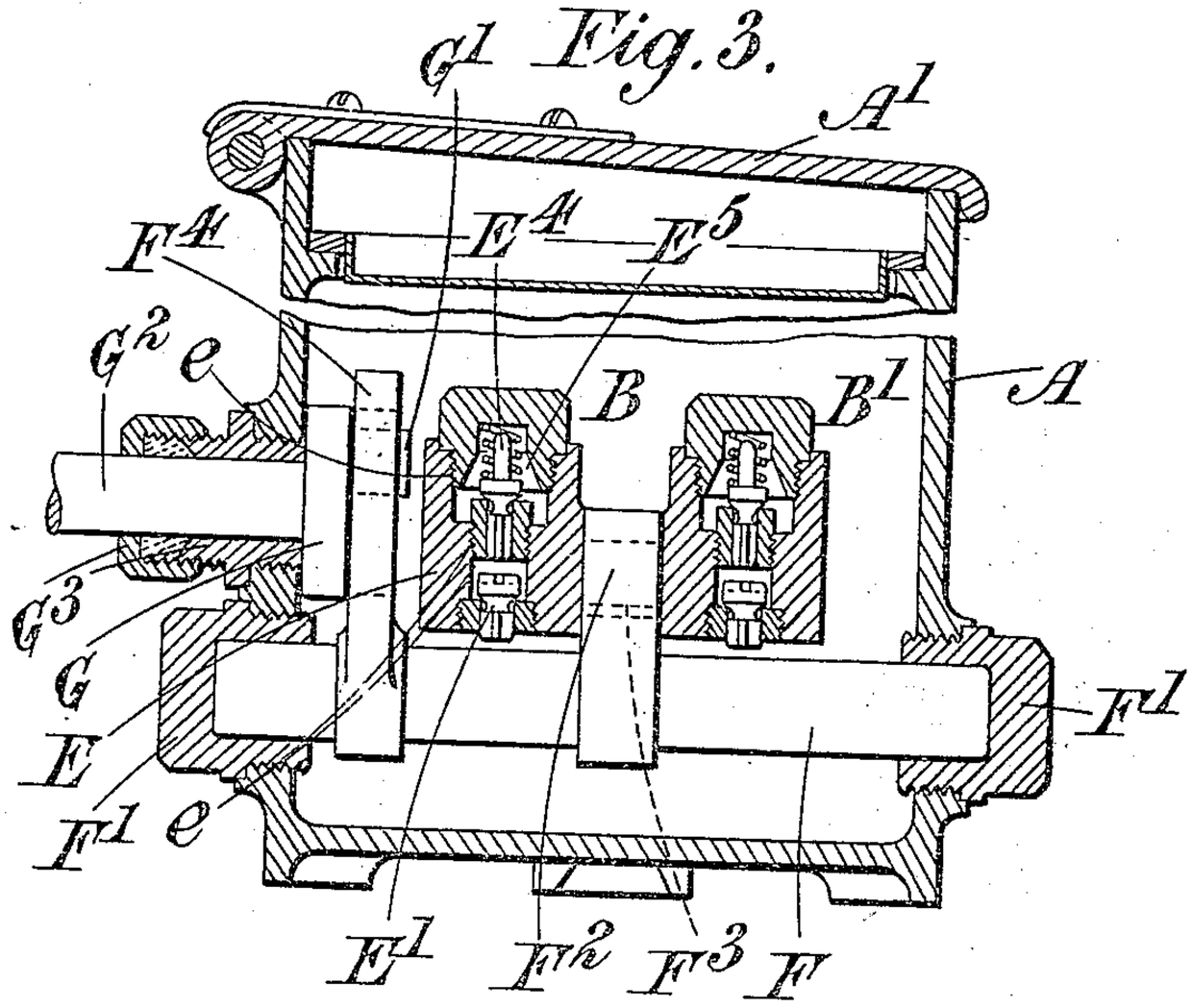


Fig. 4.

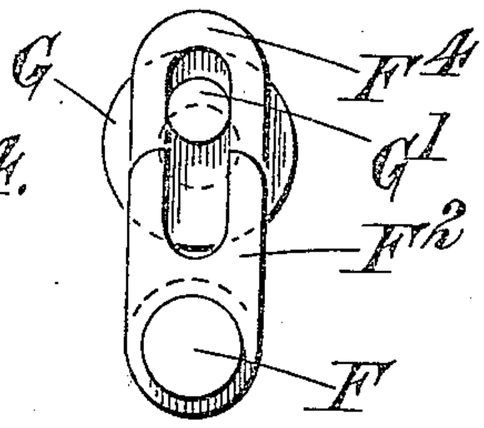
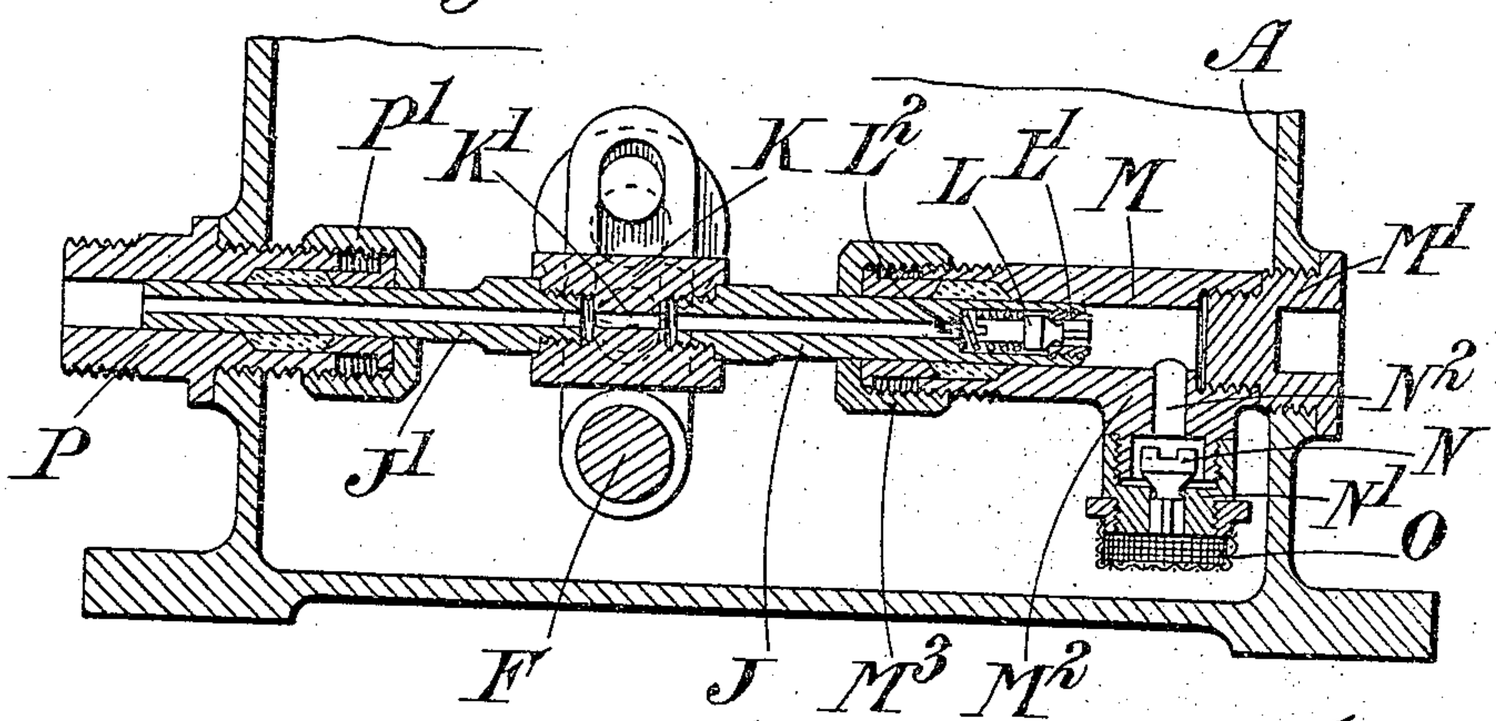


Fig. 5.



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PUMP.

945,648. Specification of Letters Patent. Patented Jan. 4, 1910.

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To all whom it may concern:

Be it known that I, CHARLES CHEERS WAKEFIELD, a subject of the King of England, and residing in London, England, have invented certain new and useful Improvements in or Relating to Pumps, of which the following is a specification.

This invention is for improvements in or relating to pumps and has for its object to provide an improved form of double-acting pump that may give a continuous discharge.

The pump comprises two barrels having different capacities and whose plungers work in opposite phase that is, while one plunger is performing its delivery stroke the other is performing its suction stroke. The two barrels are connected in such manner that the contents of the larger barrel are discharged through the smaller barrel and the quantity of liquid discharged from the larger barrel is sufficient to fill the smaller barrel during the suction stroke of its plunger and at the same time maintain a full discharge from the delivery nozzle or conduit. As the plunger of the smaller barrel then performs its delivery stroke the liquid, with which the barrel is full from the larger barrel, is discharged while the other barrel is being recharged from the source of supply.

According to one method of carrying out this invention a non-return valve is provided to control the flow from the source of supply to the larger barrel and a second non-return valve is provided to control the delivery from the larger barrel to the smaller one. One or both of these valves is preferably carried by the plungers themselves.

In the accompanying drawings:—Figure 1 is a section through a pump constructed according to this invention such section being taken on a plane that passes through the center of one pair of plungers, Fig. 2 is a plan of the pump; Fig. 3 is a central transverse section through the same; Fig. 4 is an end view of a detail, and Fig. 5 is a view similar to that of Fig. 1 showing a modified form of pump.

Like letters indicate like parts throughout the drawings.

The pump illustrated in the drawings is arranged as a force feed lubricator but obviously it may be used for other purposes and the details may be varied accordingly.

A reservoir A is employed to contain the liquid to be pumped and this may communicate with any convenient source of supply or it may be filled at intervals, access being had to the interior by way of the hinged lid or cover A^1.

In the apparatus shown in the drawings two pumps B and B^1 are employed but as they are quite separate, except that they are mounted within the one reservoir A and driven from a member common to both, and moreover are duplicates of each other, one only need be described. The pump comprises two barrels C and D respectively. These are oppositely disposed and entered through opposite walls of the reservoir A. Each is made in the form of a cylindrical member screw-threaded on its exterior and having a flange C^1 or D^1 thereon. The walls of the reservoir are screw-threaded to receive the barrels which latter are entered from outside and screwed home until the flanges referred to bed against the exterior of the reservoir. Operating in the barrels are plungers C^2 D^2 and these are connected together by a block or valve-box E. The effective portion of the barrel C has twice the capacity of the effective portion of the barrel D. Both plungers are bored through as at C^3 and D^3 and communication is established between the bores of the plungers and a vertical channel *e* that is formed through the block or valve casing E. At the bottom of the channel *e* is mounted a valve E^1. This finds a seating on a screw-threaded ring E^2 that is entered in the end of the channel. The plunger C^2 is screwed into the casing at C^4 the central line of the plunger being slightly above the valve E^1. A transverse passage E^{20} communicates between the vertical channel *e* in the valve-box and the bore C^3 of the plunger. This passage is situated on the inner side of the valve E^1 and the valve permits flow into the casing E but prevents egress therefrom. Above the valve E^1 a screw-threaded ring E^3 is entered in the vertical channel *e* of the casing E and provides a seating for a second non-return valve E^4. This valve permits flow from the bore C^3 of the plunger into a chamber E^5 that is formed by an enlargement of the channel *e* through the casing and is closed in by a screw-threaded cap E^6. A spring E^7 bears upon the valve E^4 at one end and against the under side of the cap at the other end, whereby the valve is retained

upon its seating. A passage E^8 connects the bore D^3 of the plunger D^2 with this chamber E^5.

The barrel C is closed at its outer end by a cap C^5 that is held in place by a screw-threaded locking ring C^6. The cap C^5 is arranged to slide into the interior of the barrel and to take over the exterior of the plunger so that it constitutes a gland whereof the packing is indicated at C^7. The barrel D is provided with a smaller gland piece D^4 and locking ring D^5 but instead of this gland portion constituting a cap it has on its outer end a nipple D^6 whereto a conduit may be connected for conveying the liquid that is pumped, to any point at which it is required to be delivered. Although the parts C and D have been referred to as the barrels it will be noted that these gland members C^5 and D^4 actually provide the chambers into which the liquid is first sucked and then expelled.

To operate the pump a rocking shaft F is employed. This is mounted in recesses formed in the walls of the casing A. The recesses are provided by screw-threaded caps F^1 that are entered into the walls from outside the casing and take over the ends of the rocking shaft. The rocking shaft carries a bifurcated arm F^2 that engages a cross pin F^3 whereby the valve boxes or casings of the two sets of pump plungers B B^1 are connected. The rocking shaft also carries a slotted arm F^4 that is engaged by a pin G^1 eccentrically mounted on a disk G. The disk G is carried by a shaft G^2 that extends through the wall of the reservoir A and may be rotated by any suitable mechanism either continuously or step-by-step as required. A suitable gland G^3 is provided to prevent the escape of liquid past the shaft G^2.

In assembling the parts the plungers C^2 D^2 are first introduced into the reservoir A. This is readily done before the barrels C D are in place as the orifices provided for the barrels afford considerable latitude of movement so that one plunger can be passed through from the interior of the reservoir and then the other can be brought into line with the opposite orifice and advanced through the same. The barrels are then screwed into place the plungers being entered therein and finally the gland portions with their locking rings are secured on the exterior of the barrels.

The arrangement of the valve E^4 above the valve E^1 and the provision of a channel *e* right through the casing E permits ready access to either or both of the valves.

The operation of this device is as follows:—As the shaft G^2 rotates the pin G^1 causes the slotted arm F^4 to oscillate. This movement is communicated to the pump plungers by the rocking shaft F and the forked arm F^2. The reservoir A is filled with liquid so that the valve casings and plungers are submerged. As the plungers move from right to left of Fig. 1 liquid is thus sucked in past the valve E^1 and traversing the bore C^3 of the plunger C^2 fills the unoccupied portion of the barrel C. On the reverse movement the liquid that has thus entered the larger barrel is forced in the opposite direction along the bore C^3 of the plunger C^2 and as the valve E^1 now closes against it it is forced past the valve E^4 into the chamber E^5 whence by the passage E^8 it escapes along the bore D^3 of the plunger D^2. This plunger is performing its suction stroke but the difference in capacity of the two barrels C and D is such that the liquid delivered fills the barrel D and at the same time maintains a full delivery from the nipple D^6. At the next reciprocation from right to left of Fig. 1 the liquid contained in the barrel D is discharged so that the delivery is maintained while the plunger C^2 draws a further charge into the barrel C. It will thus be seen that a very simple construction of pump is provided wherein the valves are carried by the double ended plunger C^2 D^2 and the barrels themselves provide the requisite guides for the reciprocating parts.

A conduit H is shown passing through the reservoir. This is connected to a suitable steam supply for the purpose of warming the liquid contained in the reservoir as is sometimes desirable, particularly if the apparatus is used for pumping lubricant.

In Fig. 5 a modified form of the apparatus is shown wherein one valve is carried by the pump plungers and the other valve is supported by a fixed member. The plungers J J^1 are connected to a block K and the bore of the plungers is extended through this block as shown at K^1. In the end of the larger plunger J a valve L is mounted. It bears against a detachable seating L^1 in the end of the plunger and is retained against the same by a spring L^2. The cylinder M wherein this plunger operates is secured to the wall A^1 of the reservoir by a screw-threaded plug M^1 and it has a depending lug M^2. Within this lug a nonreturn valve N is mounted. This rests upon a detachable seating N^1 that has a screw-threaded extension to receive a filtering cap O. A passage N^2 affords communication between the interior of the barrel M and the valve N. The inner end of the barrel M is closed by a gland M^3. The barrel P of the plunger J^1 is similar in construction to the barrels C and D already described except that the gland P^1 is placed on that end of the barrel which is within the reservoir instead of on the exterior end. The rocking shaft F and its associated parts are employed as before for reciprocating the plungers. In assembling the parts of this apparatus the cylinder M is first secured in place the glands of both barrels are then placed on the

plungers and the plunger J is entered into its barrel while the plunger J^1 extends through the opening in the wall of the reservoir A^1 prior to the introduction of the barrel P. The barrel P can then be screwed home into place and the glands of both barrels adjusted.

In both constructions the rocking shaft is introduced before the plungers but as the manipulation of this is obvious it requires no description.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a pump, the combination of a liquid containing casing, a reciprocatory plunger working through opposite walls of the case and bored to form two pumping chambers of different diameters, a check valve controlling communication between the two chambers, and a check valve controlling communication between one of the chambers and the casing, substantially as described.

2. In a pump the combination of, a barrel, a second barrel having approximately twice the capacity of the first, plungers allotted one to each barrel both plungers being bored through and the bore of one having communication with the bore of the other, a non-return valve carried with the plungers and controlling the bore therethrough to permit flow of liquid from the larger barrel to the smaller, means for operating the plungers in opposite phase, and a non-return valve controlling the inlet of the larger barrel, substantially as set forth.

3. In a pump the combination of, a barrel, a second barrel opposed to the first and having approximately twice the capacity of the same, a valve-box, plungers extending from opposite sides of the valve-box and allotted one to each barrel, the plungers being bored through and a channel provided in the valve-box for connecting the bores of the two plungers, a non-return valve in the valve-box that controls the passage of liquid through the channel from the larger barrel to the smaller, a non-return valve controlling the inlet of the larger barrel, and means for reciprocating the valve box and plungers, substantially as set forth.

4. In a pump the combination of, a barrel, a second barrel opposed to the first and having approximately twice the capacity of the same, a reservoir for the liquid to be pumped, a valve-box situated within such reservoir and having a channel therein that communicates with the reservoir, plungers extending from opposite sides of the valve box and allotted one to each barrel, a conduit connecting the channel in the valve-box with the inlet to the larger barrel, a non-return valve controlling the channel of the valve-box to permit passage of liquid from the reservoir to the larger barrel, a conduit connecting the outlet of the larger barrel with the inlet of the smaller barrel, a non-return valve that permits passage of liquid from the larger to the smaller barrel, and means for reciprocating the valve box and plungers substantially as set forth.

5. In a pump the combination of, a barrel, a second barrel opposed to the first and having approximately twice the capacity of the same, a valve box, plungers extending from opposite sides of the valve-box and allotted one to each barrel, the plungers being bored through and a channel provided in the valve box for connecting the bores of the two plungers, a non-return valve in the valve box that controls the passage of liquid through the channel from the larger barrel to the smaller, a reservoir for the liquid to be pumped, a non-return valve controlling an inlet that provides communication between the reservoir and the channel in the valve-box, and means for reciprocating the valve-box and plungers, substantially as set forth.

6. In a pump the combination of, a barrel, a second barrel opposed to the first and having approximately twice the capacity of the same, a valve-box, plungers extending from opposite sides of the valve box and allotted one to each barrel, the plungers being bored through and communicating with each other through a channel that extends through the valve-box in a direction approximately at right angles to the bore of the plungers, a reservoir for the liquid to be pumped and having communication with one end of the channel in the valve box, a non-return valve at this end of the channel to permit passage of liquid into the valve-box, the bore of the larger plunger communicating with the channel at a point beyond this valve, a second non-return valve situated in the channel beyond the point at which this bore communicates with it and permitting the passage of liquid from such bore, a conduit connecting the bore of the second plunger with the channel at a point beyond this second valve, a detachable cap beyond this second valve closing the end of the channel and means for reciprocating the valve-box and plungers, substantially as set forth.

7. In a pump the combination of, a reservoir for the liquid to be pumped, two barrels of cylindrical form each screw-threaded on the exterior and screwed into correspondingly threaded orifices provided in opposite walls of the reservoir, one barrel having approximately twice the capacity of the other, a double ended plunger operating in the two barrels and bored through to provide communication between the interior of the two barrels, a non-return valve controlling the passage of liquid from the larger barrel to the smaller, a non-return valve controlling communication between the inlet to the larger barrel and the interior of the reser-

voir, and means for reciprocating the double ended plunger, substantially as set forth.

8. In a pump the combination of, a reservoir for the liquid to be pumped, two barrels of cylindrical form each screw-threaded on the exterior and screwed into correspondingly threaded orifices provided in opposite walls of the reservoir one barrel having approximately twice the capacity of the other, a double-ended plunger operating in the two barrels and bored through to provide communication between the interior of the two barrels, a non-return valve controlling the passage of liquid from the larger barrel to the smaller, a non-return valve controlling communication between the inlet to the larger barrel and the interior of the reservoir, a cap entered in the outer end of the larger barrel and fitted to receive the plunger the barrel having an interior shoulder that is opposed to the end of the cap whereby a packing space is formed, a nut that takes over the outer end of the barrel and engages the cap, a sleeve fitted in the outer end of the smaller barrel and fitted to receive the plunger operating therein a recess for packing being provided between the end of this sleeve and shoulder within the barrel, a nut that screws on to the outer end of the barrel and engages a shoulder on the sleeve, and means for reciprocating the double-ended plunger, substantially as set forth.

9. In a pump the combination of, a reservoir for containing the liquid to be pumped, opposed barrels carried thereby, one barrel having approximately twice the capacity of the other, a double-ended plunger extending across the interior of the reservoir and cooperating with the barrels, means for discharging the contents of the larger barrel into the smaller during the suction period of the latter, means to prevent return of the liquid from the smaller to the larger barrel, a rocking shaft disposed within the reservoir approximately at right angles to the double-ended plunger, and having its ends entered in fluid bearings whereof one is formed in a plug screw-threaded on its exterior and entered from without the reservoir into a correspondingly threaded orifice in the wall of the reservoir, means for rocking this shaft and means for operatively connecting it with the double-ended plunger for the purpose of reciprocating the latter, substantially as described.

10. In a pump, the combination of a liquid-containing casing, a reciprocatory plunger working through opposite walls of the casing and bored to form two pumping chambers of different diameters, a check valve controlling communication between the two chambers, a check valve controlling communication between the casing and one of the chambers, a rock-shaft, and a crank upon the rock-shaft and connected to the plunger for reciprocating the same, substantially as described.

11. In pumps, the combination of a liquid containing receptacle, two pump barrels of different capacity mounted in the walls of the receptacle, plungers operating in the barrels each being bored through lengthwise and extending into the liquid in the receptacle, a valve box carried by the projecting ends of the plungers and moving freely with them in the liquid, the valve-box containing a valve that admits the liquid in the receptacle to the bore through the plunger of the larger barrel, and a second valve that permits passage of the liquid from the bore of the larger plunger to that of the smaller, the smaller barrel having a discharge outlet, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES CHEERS WAKEFIELD.

Witnesses:
H. D. JAMESON,
R. I. WILLIAMS.