E. W. BECK.

PUMP.

APPLICATION FILED NOV. 13, 1919.

1,380,181. Patented May 31, 1921.

3 SHEETS—SHEET 1.

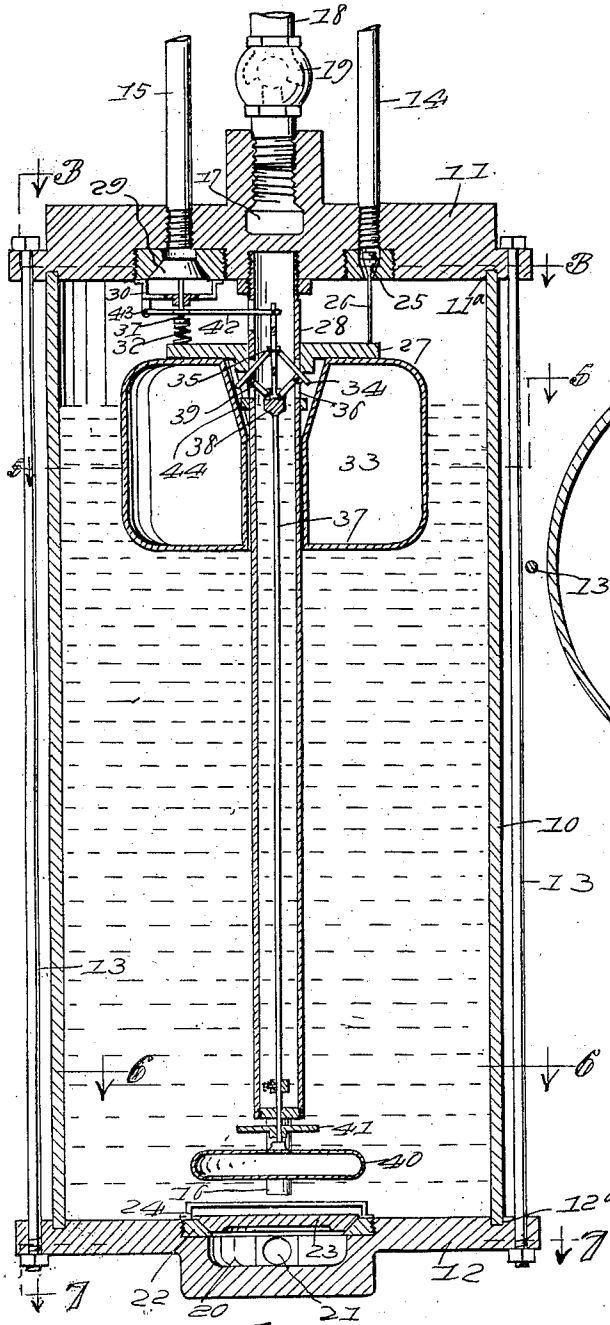


Fig. 1.

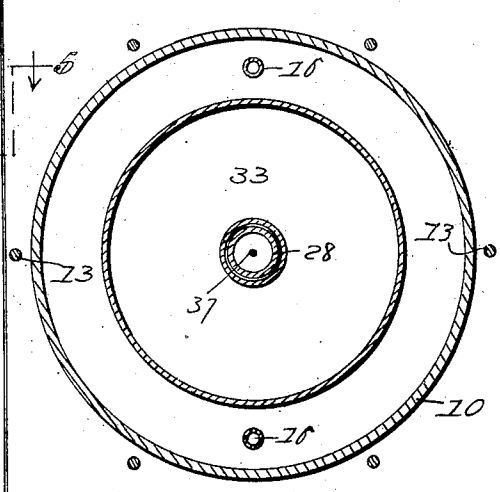


Fig. 5.

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3 SHEETS—SHEET 2.

Fig. 2.

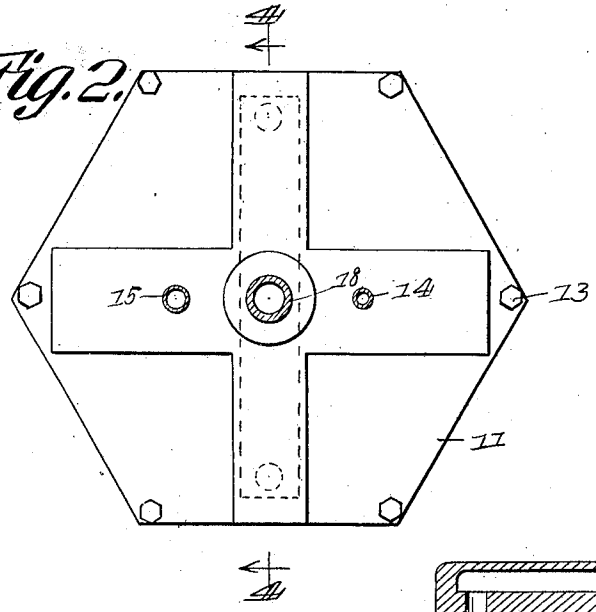
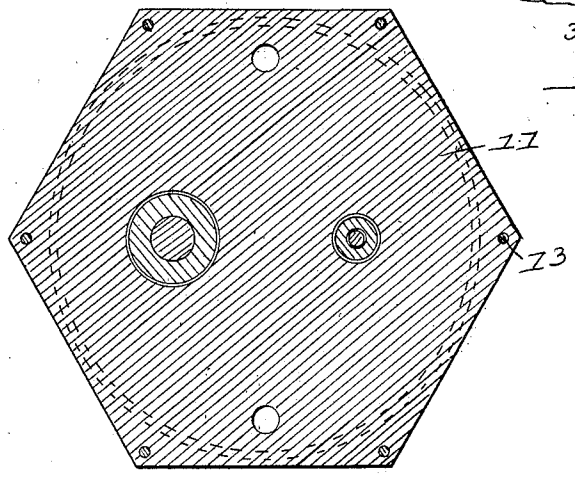


Fig. 3.



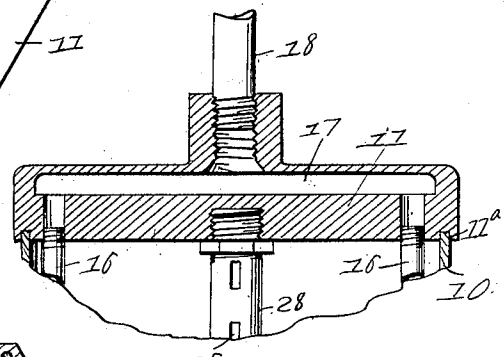


Fig. 4.

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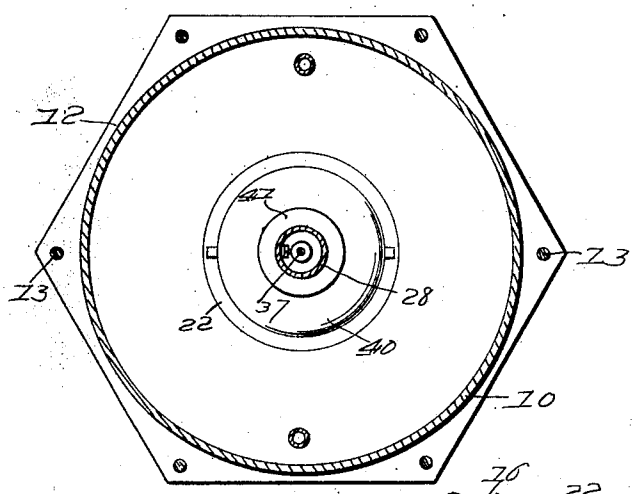
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3 SHEETS—SHEET 3.

Fig. 6.



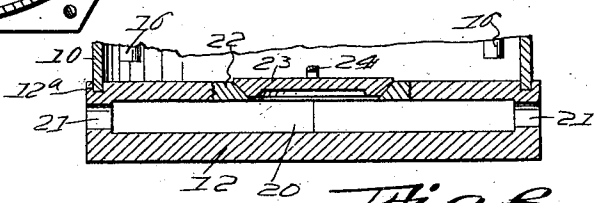
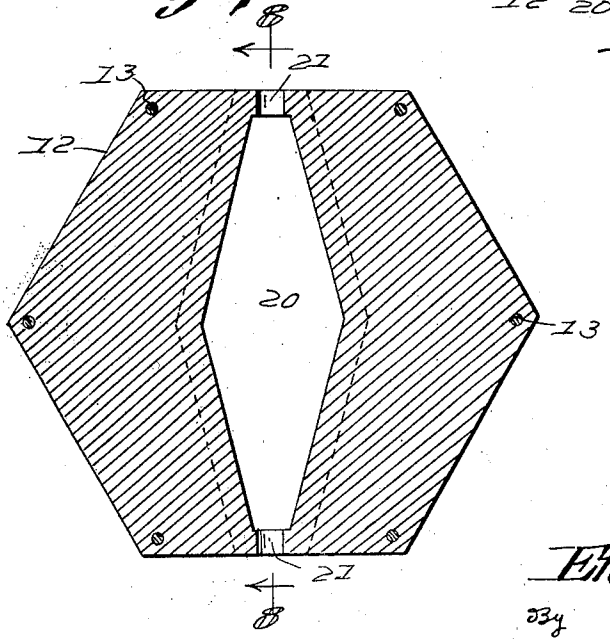


Fig. 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

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1,380,181. Specification of Letters Patent. Patented May 31, 1921.

Application filed November 13, 1919. Serial No. 337,750.

To all whom it may concern:

Be it known that ERASMUS W. BECK, a citizen of the United States of America, residing at Griffin, in the county of Spalding and State of Georgia, has invented new and useful Improvements in Pumps, of which the following is a specification.

The object of the invention is to provide a simple, efficient and relatively inexpensive pneumatically operated pump adapted to be submerged in the water of a well or other source of supply and dependent for the actuation of its movable elements entirely upon a supply of air under pressure under the control of means actuated by gravity and the level of the water within the pump reservoir or casing, and to this end the invention consists in a construction, combination and relation of parts of which a preferred embodiment is shown in the accompanying drawings, it being understood that changes in form, proportions and details may be resorted to within the scope of the appended claims without departing from the principle involved.

In the drawings:

Figure 1 is a vertical sectional view of the apparatus with the parts in the positions which they assume when the reservoir or casing is charged and the water therein is exposed to air pressure for the purpose of forcing it to the point of use.

Fig. 2 is a plan view of the same.

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

Fig. 4 is a detail vertical section taken on a plane at right angles to that of Fig. 1.

Figs. 5, 6 and 7 are horizontal sectional views on planes indicated by the lines 5—5, 6—6, and 7—7 of Fig. 1.

Fig. 8 is a vertical section of the lower part or inlet end of the reservoir or casing on a plane at right angles to that of Fig. 1.

The apparatus consists essentially of a submersible reservoir or casing 10 preferably having a cylindrical wall terminally fitted with upper and lower heads 11 and 12 held in place by exterior tie rods 13, the wall being stepped at its edges in suitable seats or grooves 11^a and 12^a formed in the inner or facing surfaces of said heads, and means mounted within the said reservoir or casing for controlling the communication therewith of the feed and exhaust pipes 14 and 15 of which the former is designed to extend to any suitable source of pneumatic pressure sufficient when the liquid content of the reservoir or casing is exposed thereto to expel the same through outlet pipes 16 having their open lower ends in communication with the interior of the reservoir or casing and their upper ends connected with a cored passage or channel 17 formed in the head 11 in communication with the water outlet or supply pipe 18. Arranged in the water outlet pipe is a check valve 19 to prevent back flow therefrom into the reservoir or casing while in the lower head 12 there is formed a cored inlet passage 20 having lateral inlet ports 21 and a valved communication with the interior of the casing formed, for example, by a removable seat 22 upon which is fitted an inwardly opening inlet valve 23 arranged in a suitable guard or cage 24. This inlet valve is adapted to be unseated to permit of the inflow of water to the casing or reservoir by the pressure of the latter when not held seated by internal pressure in the casing or reservoir due to the supply through the pressure feed pipe 14.

The communication between the pressure feed pipe and the interior of the casing is controlled by an inwardly closing valve 25 having a stem 26 arranged in the path of movement of a valve operating disk or member 27 fitted to slide upon a guide tube 28 or its equivalent, while communication between the pressure relief or outlet pipe 15 and the interior of the casing or reservoir is controlled by an inwardly opening valve 29 protected by a cage or guard 30 and having a stem 31 also adapted for engagement by the valve operating disk or element 27, said stem 31 preferably having a cushioning spring 32 so that the upward movement of the disk 27 is communicated yieldingly to the valve 29 in the valve closing direction.

Mounted in the casing or reservoir as upon the guide 28, which as above noted is preferably tubular and is arranged concentrically in the casing or reservoir, is a float 33 adapted to be controlled in its position by the depth of the water in the casing and designed upon the approach to its uppermost limit of movement to actuate the valve operating disk 27 to cause, through contact with the valve stems 26 and 31 the respective opening of the valve 25 and closing or seating of the valve 29 to the end that the escape of air from the casing or reservoir through the relief passage afforded by

the outlet pipe 15 is cut off while pressure from the feed pipe 14 is admitted to cause the discharge of the liquid contents of the casing or reservoir through the outlet pipes 16.

As the water in the casing or reservoir is discharged the float 33 follows the surface thereof but it is desired that the adjustment of the valves 25 and 29 shall be maintained notwithstanding the withdrawal of the float from contact with the valve operating disk 27, to the end that the arrangement of the latter can be preserved until the level of the water in the reservoir shall have been depressed to a plane near the bottom thereof, or in other words until the greater portion of the contents of the casing have been discharged, and therefore there is provided in connection with the apparatus a locking or holding means for maintaining said valve operating disk in its upper or valve actuating or positioning relation, said means consisting of arms 34 pivotally mounted as at 35 within the tubular guide 28 and adapted to extend terminally through slots 36 in the wall of said guide to occupy positions in the path of downward movement of said disk, and an operating rod 37 having a head 38 connected by links 39 with said locking arms and adapted when the operating rod 37 is moved upwardly to spread said arms into disk holding position.

Connected with the lower end of said operating rod is a buoyant element 40, permanently submerged in the contents of the casing or reservoir and tending to elevate said rod and hence to cause the spreading of the arms 34 and consequently the holding of the valve actuating disk 27 in its elevated position, while also attached to said operating rod is a stop or tappet 41 arranged in the path of downward movement of the float 33 and adapted to be engaged thereby when the float reaches the limit of its downward movement to depress or downwardly move said operating rod against the influence of the buoyant element 40, to retract the locking arms 34 and thus permit the valve actuating disk 27 to descend and release the stems of the valves 25 and 29.

Moreover in order to insure the unseating of the valve 29 which obviously might be held in position notwithstanding the withdrawal of the valve actuating disk 27 by the air pressure within the casing or reservoir, the operating rod 37 is extended upward beyond the locking device and is connected with a valve unseating lever 42 fulcrumed as at 43 upon a suitable support such as an ear upon the cage or guard 30 and intermediately connected with the stem 31 of the valve 29. Therefore when the float reaches the limit of its downward movement and contacts with the stop or tappet 41 to retract the locking device and release the valve actuating disk 27 it also pulls downward upon said rod sufficiently to positively unseat the valve 29 through the movement of the lever 42.

A stop 44 is preferably arranged upon the guide 28 in the path of downward movement of the valve actuating disk which in its depressed position maintains the locking device with its arms in a collapsed position, and this relation is maintained until, water having been admitted through the inlet channel 20, the inlet valve 23 having been unseated by the pressure of the water outside of the casing or reservoir when the air pressure within the latter is relieved by the unseating of the valve 29, rises to an extent sufficient to engage said disk and elevate it into valve actuating relation with the stems 26 and 31, whereupon the upward tendency of the buoyant element 40 spreads the arms of the locking device to secure the said disk with the valves in their adjusted positions.

What is claimed is:—

1. A pneumatic pump having water inlet and outlet passages, the former being valved, and pressure supply and exhaust valves controlling pressure inlet and relief ports, a float actuatable by the level of the water in the casing or reservoir, a valve actuating element movable to reverse the positions of said pressure inlet and exhaust valves and arranged in the path of movement in one direction of said float, a buoyantly actuated locking device for maintaining said valve actuating element in position to maintain said inlet and exhaust valves respectively in their open and closed positions, and means actuatable by said float at the limit of its movement in the opposite direction for actuating the locking device to release said valve actuating element.

2. A pneumatic pump having a casing or reservoir provided with inlet and exhaust passages of which the former is valved, and pressure supply and exhaust valves controlling inlet and outlet ports, a float for actuation by the liquid contents of the casing or reservoir, a valve actuating element arranged in the path of movement in one direction of said float for respectively opening and closing said supply and exhaust valves, a locking device for securing said valve actuating element in position to maintain said valves in their adjusted positions, and a buoyantly actuated operating rod for maintaining said locking device in position to engage said valve actuating element and having a tappet arranged in the path of movement in the opposite direction of said float.

3. A pneumatic pump having a casing or reservoir provided with inlet and outlet channels of which the former is valved, and pressure supply and exhaust valves controlling inlet and outlet ports, a float ac-

tuatable by the liquid contents of the casing or reservoir, a valve actuating element arranged in the path of movement in one direction of said float to respectively unseat and seat said supply and exhaust valves, a locking device for maintaining said valve actuating element with the valves in their adjusted positions, and a buoyantly actuated operating rod connected with said locking device for yieldingly retaining the latter in its operative position and connected with said exhaust valve, said operating rod being provided with a tappet arranged in the path of movement in the opposite direction of said float for movement thereby to disengage the locking device from the valve actuating element and open said exhaust valve.

4. A pneumatic pump having a casing or reservoir provided with inlet and exhaust channels of which the former is provided with an inwardly opening valve, pressure supply and exhaust ports in communication with said casing, supply and exhaust valves for controlling said ports and movable respectively and simultaneously to open and closed positions, a valve actuating lever in connection with said exhaust valve, a valve actuating element mounted for reciprocatory movement and adapted when moved in one direction to respectively open the supply valve and close the exhaust valve, a float actuatable by the liquid contents of the casing or reservoir and adapted at the limit of its movement in one direction to operate said valve actuating element to respectively unseat the inlet and seat the exhaust valve, a locking means for maintaining said valve actuating element in its adjusted position, and a buoyantly actuated operating rod connected with said locking device and said valve operating lever and provided with a tappet in the path of movement in the opposite direction of said float for simultaneously retracting said locking device and unseating the exhaust valve.

5. A pneumatic pump having a casing or reservoir provided with inwardly opening valved inlet and outlet passages, pressure inlet and exhaust valves, a reciprocable valve actuating disk in the path of movement of which are arranged the stems of said supply and exhaust valves, the latter having a cushioned contact for engagement by said disk, a locking device having pivotally mounted arms for swinging movement to occupy a position in the path of valve releasing movement of said valve actuating disk, a float actuatable by the liquid contents of the casing or reservoir, said valve actuating disk being arranged in the path of movement in one direction of said float, an operating rod connected with the arms of said locking device for moving the latter into and out of position in engagement with said disk, a permanently submerged buoyant element connected with said operating rod for yieldingly impelling the arms of said locking device into disk engaging positions, and a tappet carried by said operating rod in the path of movement in the opposite direction of said float for communicating disk releasing movement to the arms of said locking device.

In testimony whereof he affixes his signature.

ERASMUS W. BECK.