June 18, 1929. J. OLIPHANT 1,718,178

PORTABLE PUMPING AND COMPRESSOR MECHANISM

Filed March 6, 1925

Fig. 1.

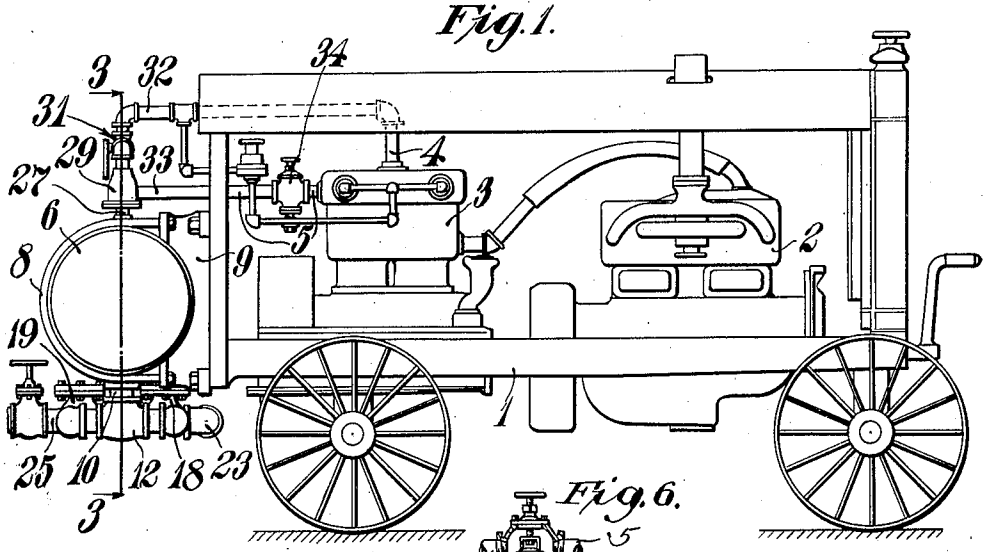


Fig. 6.

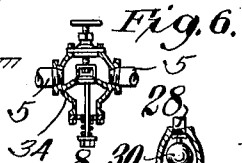


Fig. 2.

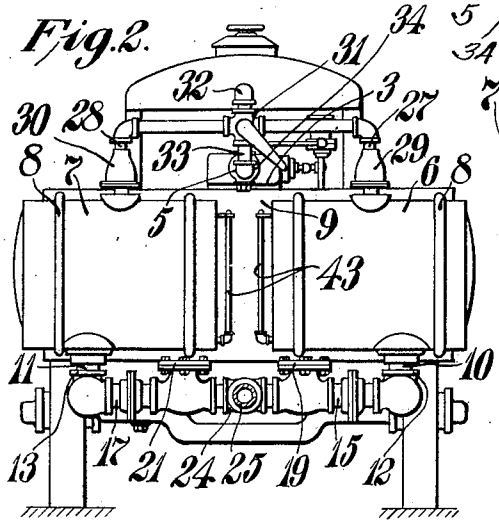


Fig. 3.

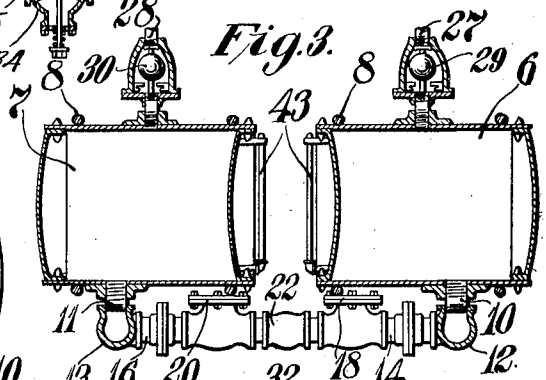


Fig. 5.

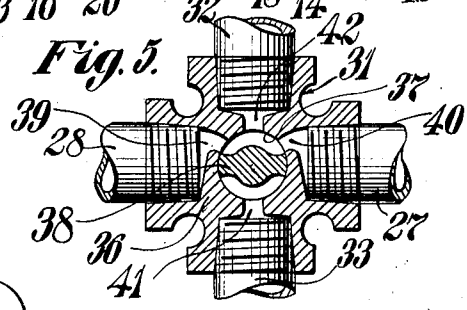
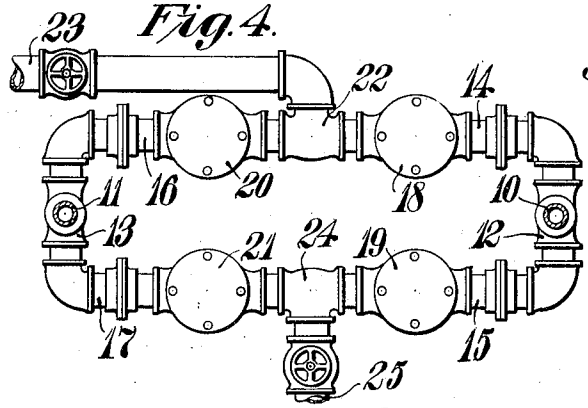


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PORTABLE PUMPING AND COMPRESSOR MECHANISM.

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This invention relates to portable fluid pressure mechanism.

It has for its object to provide an improved portable fluid pressure mechanism. As is well known, general contractors who do excavating which requires the use of pneumatically operated tools employ generally a portable compressor outfit carrying an air receiver to provide ample storage for compressed air used in actuating the several pneumatic tools. Where an excavation is being made, or is already present, it sometimes happens that the weather or other conditions may cause said excavation to become filled with water. Obviously before any work can be done it is necessary to spend usually a considerable amount of time to pump the water from the excavation. In contracting work it is of course highly desirable to use the minimum amount of equipment for the reason that it has to be transported from place to place. If under the above conditions it is necessary for the contractor to have a distinct pumping plant, it will be obvious that the same may be used only preliminarily to further work and that after the pumping operation it would remain idle with all of the depreciating and deteriorating effects thereon. An object of my invention is accordingly to provide improved portable means which combines in one unit, elements adapted for use in either a portable fluid pressure pumping system or for actuating pneumatic tools, although it will be obvious that other uses may be made of the compressed air. A further and more specific object of my invention is to provide improved means whereby air reservoir means when not used for operating the pneumatic tools or for air storage can be used as a fluid displacement pumping tank. Another object of my inventon is to provide improved means whereby the pumping system can be of the type employing alternately operable displacement tanks. A still further object of my invention is to provide in a portable compressor outfit improved means for increasing the compressor efficiency during a pumping operation. Another object is to provide improved means whereby fluid to be pumped will be forced into the displacement tanks due to the use of a connection leading from the displacement tanks directly to the compressor intake. It is also an object of the invention to provide improved means for utilizing the air which has just discharged liquid from one tank by allowing said air to flow to the other tank which is just ready to be discharged, and when the pressure of the air in the plurality of tanks has been equalized, to then connect the tank from which the liquid has been discharged to the suction side of the compressor and connect the liquid filled tank with the compressor discharge side to force the liquid therefrom.

In the accompanying drawings I have shown for purposes of illustration one form which my invention may assume in practice.

In these drawings,—

Fig. 1 is a side elevation of the portable outfit.

Fig. 2 is a rear elevation thereof.

Fig. 3 is a vertical transverse section through the tank mechanism on line 3—3 of Fig. 1.

Fig. 4 is a plan view of the piping system.

Fig. 5 is a sectional view of the valve mechanism for controlling flow of fluid to and from the compressor and between the tanks.

Fig. 6 is a vertical section through an automatic valve.

In the illustrative embodiment of my invention I have shown a standard type of portable compressor outfit comprising a usual wheel supported frame 1 carrying a motor 2 for driving a compressor 3 which has fluid pressure discharge and suction pipes 4 and 5 respectively and both of which are common to all of the compressor cylinders, herein two. Mounted upon the rear of the compressor outfit are receiver means, herein two tanks 6 and 7, supported in any suitable manner such as by U-bands 8 and a suitable concave seat member 9. Connected to the lower sides of each tank are pipes 10 and 11 terminating in T's 12 and 13 to the opposite sides of which are connected respectively pipe connections 14, 15 and 16,

17 which terminate in check valve housings 18, 19, and 20, 21. The valves 18 and 20 in turn are connected to a T 22, to which a suitable valve controlled inlet pipe 23 is connected, while a T 24 is connected to the valves 19 and 21 and has a suitable valve controlled discharge conduit or pipe 25. The valves 18—21 are of the ordinary check valve type, the valves 18 and 20 thereof opening in accordance with the suction respectively in the tanks 6 or 7, while the valves 19 and 21 open only in accordance with pressure in the tanks 6 and 7 respectively. Connections 27 and 28 have communication with the tanks 6 and 7 respectively and are controlled by suitable fluid operated check valves 29 and 30 which open only during admission of pressure fluid to their respective tanks. The connections 27 and 28 terminate in a four-way valve 31 from which leads a connection 32 joined to the compressor discharge connection 4. A connection 33 leads from the lower side of the valve to the compressor suction pipe 5. A suitable automatic relief valve 34 is disposed within the line 5 to permit replenishing of air that might escape from the system during pumping. It is also possible to open this valve completely when the outfit is not used as a pumping system. For this purpose the valve element 44 has secured thereto a yoke 45 which has a lost motion connection with a manually controlled valve stem 46. Thus when the valve stem is lifted upwardly the valve will be held in open position and air will be continuously supplied to the line 5 through inlet ports 47. When the valve is adjusted to the position illustrated in Fig. 6, a vacuum in the line 5 will cause the valve elements to be automatically relieved. This general type of valve is well known and applicant lays no claim to its novelty per se.

As shown in Fig. 5, the valve mechanism 31 comprises a four-way valve casing 36 having a central bore 37 within which a rotatable valve member 38 is disposed. Passages 39 and 40 disposed above the axis of the valve member 38 communicate with the bore 37 and pipes 27 and 28. As shown in Fig. 5 the arrangement of pipes 27 and 28 and valve 38 permits flow of fluid between the tanks, which operation is employed both when the tanks are used as air reservoirs and as displacement pumping tanks. Passages 41 and 42 allow communication respectively with the bore 37 of pipes 32 and 33, these passages being in the center so as to allow flow of pressure fluid from the compressor to either tank but not to the suction side of the compressor. Suitable liquid gages 43 are mounted upon the adjacent ends of the respective tanks permitting the operator to tell at what time to shift the valve 31 during a pumping operation. It will be clear that other registering mechanism could be used or in fact the same could be entirely done away with, the operator telling when to shift the valve by the operation of the compressor or in any other suitable manner. Liquid is prevented from flowing into the connections 27 and 28 by float check valves 29 and 30 which will rise as liquid flows into the casings thereof.

In the operation of the device it will be assumed that the outfit is to be used as a pumping system either preliminarily to further work in an excavation or merely for the purpose of pumping out such places as basements, ditches, or the like. By backing the outfit close to the trench rather than alongside thereof, only a fraction of the total weight of the outfit is directly adjacent the trench and this reduces to a minimum any danger of caving in the trench. Also the advantage of having the tanks on the rear end is that a shorter suction hose would be possible with the outfit in backed position. It will also be clear that my improved portable outfit may be used entirely as a pumping mechanism. In this case a suitable discharge pipe either rigid or flexible will be connected at one of its ends to the inlet pipe 23 while the other end will of course be disposed in the water or other liquid to be pumped. The automatic valve 34 will be suitably adjusted so as to remain closed except when the compressor is not sufficiently supplied with air. The valve 38 will then be manually turned 45° from the position shown in Fig. 5 to allow communication only between the compressor discharge pipe 4 and the tank 6 by way of pipe 32, passages 42 and 40, and pipe 27. This position of the valve allows fluid to flow from the tank 7 through pipe 28, passages 39, 41, and pipes 33 and 5 to the compressor cylinders. The pressure in the tank 7 is accordingly reduced below atmospheric pressure which permits liquid to flow through pipe 23 and valve 20 to the tank 7. The valve 18 is closed by pressure within the tank 6 while the valve 21 will be closed due to the suction within the tank 7. When the tank 7 has completely filled or as much as the operator might desire, which will be judged by the level of the liquid in the gage 43, he will shift the valve 38 to the position shown in Fig. 5. This will allow flow of fluid from the tank 6 to the tank 7 and when the pressures in each tank are substantially equal according to his judgment, he will further turn the valve 38 to connect passages 39, 42 and 40, 41. It will be clear that air now drawn by the compressor will be from the tank 6 by way of connections 27, 33, and 5 and forced within the tank 7 to displace liquid therein through the line 25. During this operation the tank

6 will be filling with liquid. By using the air already under pressure in the tanks a high efficiency in the operation of the compressor is obtained. When the tank 7 is completely discharged the operator will then shift the valve to the first position described thereby pumping liquid from tank 6, the cycle of operation just described being the same as in connection with the tank 7. During pumping of the tank 6 it will of course be understood that the valve 18 will open during flow of liquid to the tank 6 while the valve 20 will be closed, the operation of the valves 19 and 21 being also reversed.

When it is desired to use the tanks as air reservoirs the pipes 23 and 25 will be closed by the valves therein. The valve 38 will be turned to the position shown in Fig. 5 to connect the respective tanks while the automatic valve 34 will be completely opened to allow free flow of fluid to the compressor. Thus, obviously, fluid may simultaneously be stored in both tanks and the necessary additional fluid admitted to the compressor through the automatic valve 34. Obviously suitable tools may be attached to the outlet 25 or the fluid in the tanks may be directed to any other means desired. It will also be clear that in my improved mechanism either one or both of the tanks may be utilized for transporting material which may be pumped therefrom when desired.

While I have in this application specifically described one form which my invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a portable compressor outfit, a wheel supported frame having mounted thereon a compressor, a driving motor, and a tank, pipe connections between said compressor and said tank, valve means adapted either continuously to connect said tank to the compressor discharge whereby it may serve as a receiver for storage of compressed air or intermittently to connect said tank to the suction and discharge sides of said compressor for operation as a displacement tank in a liquid displacement pumping system, and liquid inlet and outlet connections to said tank.

2. A portable compressor and pump mechanism comprising a portable frame, a compressor mounted thereon, a plurality of tanks mounted on said frame and adapted to be connected directly with said compressor, means for connecting said compressor with said tanks including valve means disposed in said connecting means and operable either to establish continuous communication between said compressor and tanks whereby the latter serve as receiver tanks or to establish intermittent communication between the compressor and said tanks alternately whereby they may serve as elements in a displacement liquid pumping system, and flow control mechanism for controlling inlet and outlet of liquid from said tanks.

3. A portable compressor and pump mechanism comprising a portable frame, a compressor mounted thereon, a plurality of tanks mounted on said frame, connections between said compressor and said tanks, valves disposed in said connections operable either to establish continuous simultaneous communication between said tanks and said compressor whereby the latter serve as receiver tanks or alternately to establish intermittent communication between the compressor and tanks whereby they may serve as elements in a liquid displacement pumping system, and flow control mechanism for controlling inlet and outlet of liquid from said tanks.

4. A portable outfit comprising a compressor having a wheeled support, a receiver tank mounted on said support upon an end of said outfit, suction and discharge connections between said compressor and receiver tank, liquid inlet and outlet means connected to said receiver tank, and valves in said connections and liquid inlet and outlet means for enabling said elements to be used as elements in a liquid displacement pumping system.

5. A portable outfit comprising a compressor having a wheeled support, a combined liquid displacement and gaseous fluid storage tank mounted upon an end of said outfit, suction and discharge connections between said compressor and receiver tank, liquid inlet and discharge means below said tank, and valves in said connections and liquid inlet and outlet means cooperating with said connecting means and tank for enabling said elements to be used as elements in a liquid displacement pumping system.

6. A portable outfit comprising a compressor having a wheeled support, a plurality of tanks mounted upon an end of said outfit, connections for establishing continuous communication between said compressor and tanks whereby the latter may serve as receiver tanks for the storage of compressed fluid, means including liquid inlets and outlets on opposite sides of each of said tanks, and valves in said connections and liquid inlets and outlets cooperating with said connecting means and tanks for enabling said elements to be used as elements in a liquid displacement pumping system.

7. In a portable liquid pumping and air supplying outfit, a portable frame, a driving motor mounted thereon, a compressor on

said frame connected to said driving motor for driving by the latter, and liquid pumping means including a fluid actuated liquid pump mounted on the frame and connected with the compressor and operative to draw in a liquid and to discharge it under pressure, said outfit including a discharge connection through which liquid may be discharged from said liquid pump or compressed fluid may be led off for general purposes.

In testimony whereof I affix my signature.

JOHN OLIPHANT.