

Nov. 2, 1948.

W. SHALLENBERG

2,452,874

PUMPING SYSTEM

Filed Oct. 24, 1945

2 Sheets-Sheet 1

Fig. 1

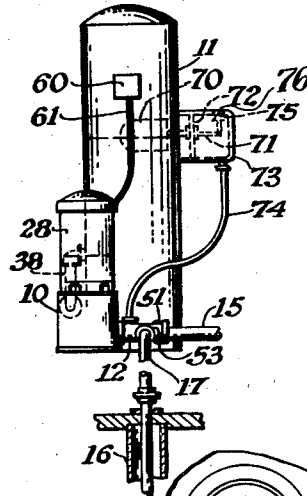
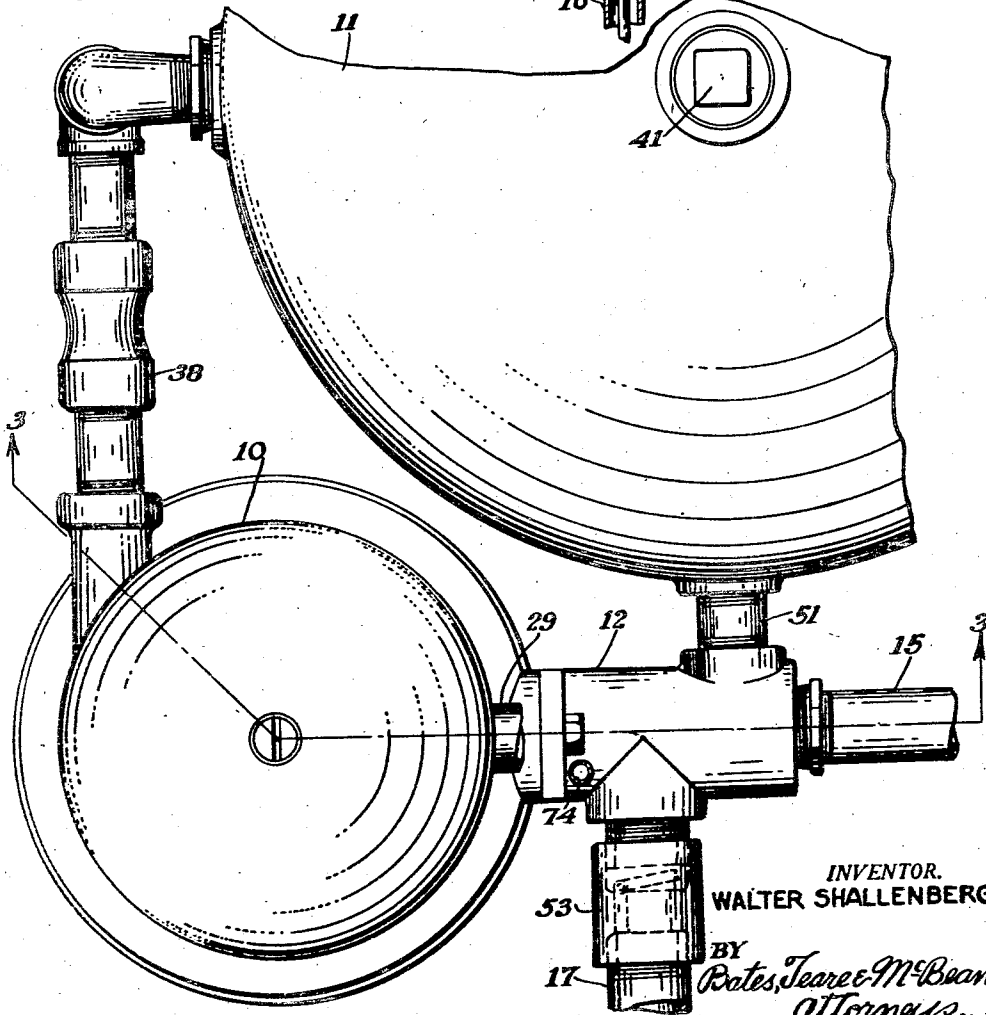


Fig. 2



INVENTOR.
WALTER SHALLENBERG.

BY
Rotes, Teare & McBean.
Attorneys.

Nov. 2, 1948.

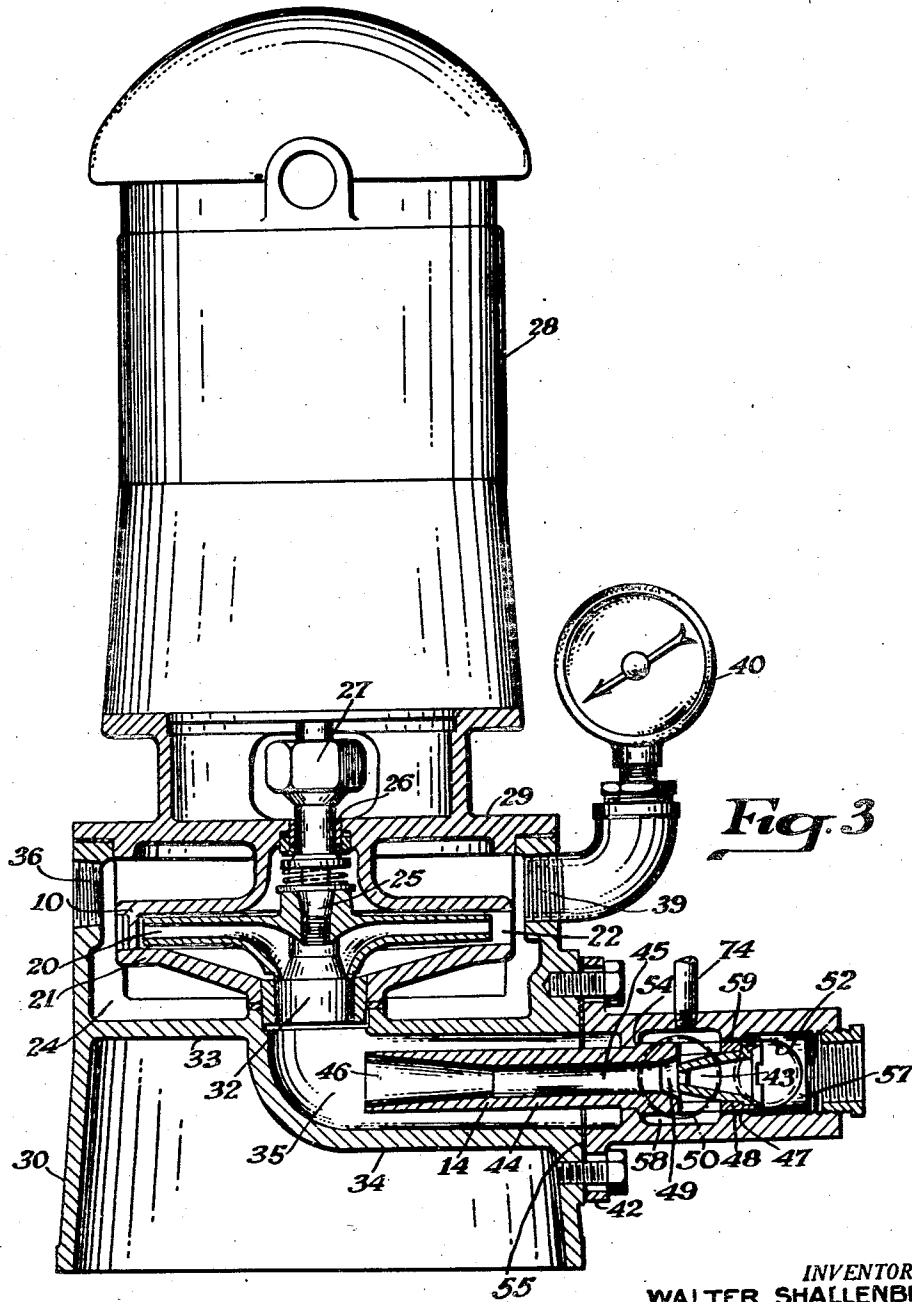
W. SHALLENBERG

2,452,874

PUMPING SYSTEM

Filed Oct. 24, 1945

2 Sheets-Sheet 2



INVENTOR.
WALTER SHALLENBERG.

BY *Bates, Teare & McBean*
attorneys.

UNITED STATES PATENT OFFICE

2,452,874

PUMPING SYSTEM

Walter Shallenberg, Salem, Ohio, assignor to The Deming Company, Salem, Ohio, a corporation of Ohio

Application October 24, 1945, Serial No. 624,269

8 Claims. (Cl. 103—5)

1

This invention relates to a fluid pumping system, and more particularly to a pumping system adapted for use in household water and similar fluid supply systems. These, therefore, are the general objects of the present invention.

Another object of this invention is to provide an improved pumping system of the type utilizing a fluid pressure storage tank and an intermittently operating fluid pump, particularly adapted for use with shallow wells and capable of efficient and economical operation at relatively high pressure, and at the same time provide a compact system which will be inexpensive to manufacture and install.

Other objects and advantages of the present invention will become more apparent from the following description, reference being had to a preferred embodiment of the invention illustrated in the accompanying drawings. The essential features of the invention will be summarized in the claims.

In the drawings, Fig. 1 is an elevation of my improved pumping system; Fig. 2 is a fragmentary plan view on an enlarged scale of the system, a portion of the fluid pressure storage tank being broken away; and Fig. 3 is a vertical section as indicated by the offset line 3—3 on Fig. 2.

The pumping system of the present invention includes a motor driven pressure pump 10 which supplies fluid under pressure to a pressure storage reservoir or tank 11. Water supplied to the tank passes therefrom through a manifold 12 which distributes a portion of the water to a jet pump 14 and another portion thereof to a service line 15 or household water supply conduit. The jet pump 14 is carried by the manifold 12 and serves to draw fluid from a well, indicated at 16, and discharge it into the intake of the pressure pump 10. In such a system the capacity of the pump is increased thereby permitting the use of a smaller pump and storage structure. Likewise, the improved system develops a comparatively high pressure, because the pressure of the pressure storage tank passing through the jet, increases the pressure at the intake of the pressure pump which, in turn, produces a higher discharge pressure. Indeed I have found that the natural pressure developed by a centrifugal pump is for practical purposes doubled by the use of my improved system.

The pressure pump 10, as illustrated, is of the rotary or centrifugal type, and comprises an impeller 20 mounted in the usual impeller casing 21 provided with one or more peripheral discharge

2

passages 22. The impeller casing is mounted in substantially the center of a housing 33 which provides a pump discharge chamber 24, the walls of which are spaced from the walls of the impeller casing. The impeller 20 is carried by a shaft 25 which extends upward through a suitable bushing 26 carried by the top wall 29 of the discharge chamber and which is drivingly connected by a coupling 27 with the armature shaft of a motor 28 mounted atop the housing 33.

As illustrated, the upper wall of the pump housing 33 and the upper wall of the impeller casing 21 are integral and are secured in contact with the lower portions of the housing and impeller casing respectively by suitable bolts (not shown) but which pass through the upper wall 29 of the housing and engage the side walls thereof. The housing 33 is provided with a downwardly extending skirt 30 which forms a hollow base or support for the pump. The eye or suction inlet 32 of the impeller casing registers with an opening in the bottom wall of the housing. This opening communicates with a passageway 35 which extends horizontally through a boss-like formation 34 of the housing.

The discharge chamber 24 of the pressure pump is connected directly with the pressure storage tank 11. As shown in the drawings, the wall of the discharge chamber 24 is provided with a threaded opening 36 which is connected by a conduit 38 with the pressure tank 11, at a point approximately a foot above the bottom of the tank. The casing or housing 33 also may be provided with another opening 39 which is shown in Fig. 3 as in communication with a pressure gauge 40. The pressure gauge may, if desired, be removed to facilitate the priming of the pump when it is first placed in operation. This is, however, not essential as the pressure tank is provided, at its upper end, with a suitable plug 41 which may be removed and the system primed by partially filling the tank 11. Once the system is primed and placed in operation, the fluid in the tank 11 will maintain the pump primed at all times.

As heretofore mentioned, the fluid flows from the tank 11 to a manifold 12 which distributes a portion of the fluid to a jet pump 14 interposed between the manifold and the pressure pump and the remaining fluid to the service line 15 or water supply system of the dwelling in which the unit is used. The manifold 12 comprises a substantially tubular body having, at one end, a flange 42, which is arranged to be secured to the wall of the pump housing with its axis in registration

3

with the axis of the intake passageway 35 of the pressure pump.

The jet pump 14 is supplied with fluid energy from the pressure tank and acts to assist the pressure pump in drawing fluid from the well through the suction line 17, thereby boosting the pressure at the intake of the pressure pump 10. This jet pump is best shown in Fig. 3.

As illustrated, the jet pump is mounted in the manifold 12 and comprises a jet nozzle 43 and a jet tube 44 into which the nozzle discharges. The jet nozzle 43 is mounted within and intermediate the ends of the manifold 12.

The nozzle is preferably carried by the jet tube 44. This jet tube has the usual internal bore comprising an intermediate cylindrical portion 45 and a flaring portion 46 leading therefrom. The jet tube is provided with an extension 48 which is threaded, as shown at 47, and screws snugly into an intermediate web 59 of the manifold which divides the manifold into a pressure chamber 57 and a suction chamber 58. The extension 48 carries the jet nozzle 43. The nozzle is forced tightly into the extension 48 of the jet tube and may be provided with a tapered surface to coact with similar tapered surfaces in the jet tube. The jet tube is preferably formed with a shoulder 54 which engages the end wall 55 of suction chamber of the manifold.

The jet tube is provided with lateral openings 49 communicating with the suction chamber 58 of the manifold which in turn communicates with the suction inlet 50 of the manifold (shown in dotted lines on Fig. 3). The suction inlet or opening 50 is preferably threaded and is connected to the suction conduit 17. As indicated diagrammatically in Fig. 2, a check valve 53 is placed in the conduit 17 at a point closely adjacent the manifold 12. This valve serves to prevent the escape of fluid from the pumping system into the well 16.

The pressure chamber 57 of the manifold has a threaded passageway extending axially relative to the nozzle to which the service line 15 of the water system is secured. This chamber is also provided with a second threaded opening 52, extending radially from the manifold, and which is connected with the lower end of the pressure tank 11 by a conduit 51. This conduit preferably lies considerably below the pressure inlet to the tank and in the same horizontal plane as the axis of the jet pump.

The pump motor 28, which drives the centrifugal pump, is automatically controlled for intermittent operation dependent upon the fluid pressure in the tank 11. To this end, an automatic pressure switch 60 is connected with the tank 11 in such manner as to be subjected to the pressure of the fluid within the tank. Such pressure switches are common in the art, and hence not illustrated in detail. Suffice it to say that a suitable arrangement is such that the pressure switch will act to stop the motor whenever the fluid pressure in the tank reaches, for instance, 40 pounds, and to start it again when the pressure falls to 20 pounds. The switch 60 may be connected to a source of power in the usual manner and to the motor 28 as, for instance, by a cable 61.

Water systems of this general type, for continuous operation, are dependent upon the pressure tank being charged at all times with air. It is commonly known water drawn from the service line 15, draws with it a certain amount of air from the tank. Hence there is provided simple means for maintaining a predetermined minimum

4

quantity of air in the pressure tank. As shown in the drawings, a float 70 is placed in the tank 11. This float may be carried by a rod 71 extending through a suitable opening in the wall of the tank and secured to a flexible diaphragm 72. This diaphragm seals the opening in the tank and also forms one wall of a chamber 73 which is placed in communication with the suction chamber 58 of the manifold 12 by a conduit 74. When the water in the tank rises to an extent so as to rock the float clockwise (Fig. 1) the rod 71 moves open a valve member 75 to admit air into the chamber 73 through a vent 76, whereupon the suction created in the manifold chamber 58 draws air into the pump forcing it through the pressure pump, and as all fluid from the pressure pump passes directly to the pressure tank, the tank becomes charged with air.

From the foregoing description it will be seen that I have provided a pumping system which is compact and which may be readily installed. Due to the action of the jet pump in boosting the pressure at the pressure pump inlet, the outlet pressure of the pump is increased, as is its fluid capacity. Therefore, I am able to utilize relatively small pump pressure tank structures.

I claim:

1. A pumping system having a fluid service line, a rotary pump having a suction inlet, a discharge chamber surrounding said pump, a pressure tank having an inlet and an outlet, a discharge conduit from the discharge chamber to the inlet of the pressure tank, a manifold, a jet pump carried by said manifold and discharging into the inlet of the pressure pump, a connection between the outlet of the pressure tank and said manifold, a connection between said manifold and the fluid service line, whereby a portion of the fluid supplied to the pressure tank returns to the jet pump to supply energy thereto and another portion flows to the fluid service line, a suction line connected to said manifold, a check valve in said suction line closely adjacent to the jet pump, a motor adapted for intermittent operation, a connection between said motor and said pressure pump, and means responsive to the fluid pressure in said tank to control the operation of said motor.

2. In a pumping system, a rotary pressure pump having a suction inlet, a discharge chamber surrounding said pump, a pneumatic pressure and storage tank, a discharge connection for said pump, said discharge connection communicating with the storage tank at a point above said chamber, a manifold connected to the rotary pump, a jet pump carried by said manifold and arranged to discharge into the suction inlet of the rotary pump, and comprising a jet nozzle and a jet tube positioned in a horizontal plane below the rotary pump, a connection between the jet nozzle and the pressure tank, said last-named connection lying in substantially the same horizontal plane as that of the jet pump, and a connection from the jet pump to a suction line, said manifold being provided with a threaded opening for connection with the fluid service line.

3. A pump mechanism for a fluid pressure system having a fluid pressure service line and a fluid pressure storage tank, said mechanism comprising a rotary pump having discharge and inlet openings, the discharge opening being arranged to be connected with the pressure tank, a manifold having two chambers divided by an intermediate wall, a jet pump carried by said manifold and discharging into the inlet of the rotary pump, said jet pump comprising a jet nozzle and a jet

5

tube, said nozzle communicating with one of said chambers, connections between the last named chamber and both the fluid service line and the pressure tank, said tube communicating with the nozzle and with the other chamber, and a connection between said last-named chamber and a fluid suction line.

4. A booster pump for a pumping system having a suction line together with a pressure pump having a suction inlet and discharging into a pressure storage tank which in turn is connected with a fluid supply line, said booster pump comprising a manifold, arranged and adapted to be secured to the pressure pump adjacent the suction inlet thereof, said manifold having a transverse wall dividing the manifold into a suction chamber and a pressure chamber, a jet tube mounted in said manifold and arranged to discharge into the pressure pump inlet, a passageway from said jet tube to said suction chamber, a connection between said chamber and the suction line, a jet mounted in the manifold and discharging into said jet tube, said jet arranged to receive its fluid pressure from said pressure chamber, a fluid connection to said pressure chamber adapted to be connected to the pressure tank, and a second connection to the pressure chamber adapted to be connected to the fluid supply line, said last-named connection being axially positioned relative to the jet pump.

5. A booster pump for a pumping system having a suction line together with a pressure pump having a suction inlet and discharging into a pressure storage tank which in turn is connected with a fluid supply line, said booster pump comprising a manifold, the discharge end of which is arranged and adapted to be secured to the pressure pump adjacent the suction inlet thereof, said manifold having a transverse wall intermediate its ends, a jet tube mounted in said wall and having its discharge extending beyond the discharge end of said manifold, said manifold having a suction chamber at its discharge end and surrounding said tube and a pressure chamber, a passageway from said tube to said suction chamber, a connection between said suction chamber and the suction line, a jet mounted in the manifold and discharging into said jet tube, said jet communicating with said pressure chamber for its source of fluid pressure, said pressure chamber having an opening adapted to be connected to the pressure tank and a second opening adapted to receive the fluid supply line, and wherein the jet, the jet tube and the fluid supply line are in substantially axial alignment with each other.

6. A booster pump for a pumping system having a suction line together with a pressure pump having a suction inlet and discharging into a pressure storage tank which in turn is connected with a fluid supply line, said booster pump comprising an open-ended substantially cylindrical manifold, the discharge end of which is arranged and adapted to be secured to the pressure pump adjacent the suction inlet thereof and with its

6

axis in a substantially horizontal plane, said manifold having a transverse wall intermediate its ends, said wall being provided with an axially extending opening and arranged to divide the manifold into a suction chamber and a pressure chamber, a jet tube mounted in said wall and closing the openings in the wall and in the discharge end of the manifold, said tube being smaller in external diameter than the internal diameter of said manifold whereby said suction chamber surrounds said tube, a passageway from said tube to said suction chamber, a connection between said suction chamber and the suction line, a jet carried by the jet tube and discharging into the jet tube, said jet having an inlet communicating with said pressure chamber for its source of fluid pressure, a connection between the pressure chamber and said tank, and a connection between said pressure chamber and the fluid supply line, said last-named connection being axially positioned relative to the jet inlet.

7. In a shallow well pumping system, a pressure pump with a suction inlet, said pump having a discharge chamber and a base below it, a pressure tank, a discharge passageway from the discharge chamber to the pressure tank, a jet pump carried by the base of the pressure pump discharging into said suction inlet, a fluid service line, a triple connection between the pressure tank the jet pump and the fluid service line, whereby a portion of the fluid supplied to the pressure tank returns to the jet pump to supply energy thereto, a suction line connected to the jet pump, and a check valve in said suction line closely adjacent to the jet pump.

8. In a shallow well pumping system, a pressure pump having an impeller and a casing providing a suction inlet to the impeller and a discharge chamber, a pressure tank, a discharge conduit from the discharge chamber of the pressure pump to the pressure tank, a jet pump extending into the said pump casing and discharging into the suction inlet of the pressure pump, a connection from the pressure tank dividing and continuing in part to the jet pump and in part to a fluid service line, whereby a portion of the fluid supplied to the pressure tank returns to the jet pump to supply energy thereto, and a connection from a suction line to the jet pump, said connections to the jet pump being in a substantially horizontal plane and below the conduit between the pressure pump and said tank.

WALTER SHALLENBERG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,196,453	Horvath	Apr. 9, 1940
2,257,507	Mann	Sept. 30, 1941
2,291,746	Nelson et al.	Aug. 4, 1942