United States Patent [19]

Bryant

[11] **3,785,750**

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[54] **WELLPOINT SYSTEM**

[76] Inventor: **Cameron C. Bryant,** 8504 Izard Street, Omaha, Nebr. 68114

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[51] **Int. Cl.** **F04b 49/00**

[58] **Field of Search** 417/84, 85, 87, 200, 417/211.5, 279

[56] **References Cited**

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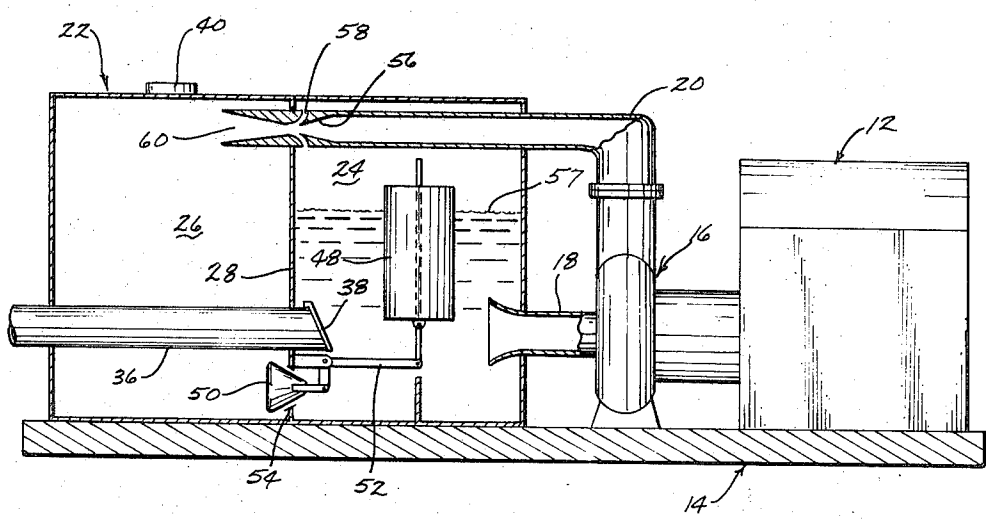
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Primary Examiner—William L. Freeh
Attorney—Zarley, McKee et al.

[57] **ABSTRACT**

A wellpoint system for removing fluid from the earth is disclosed comprising a motor driven centrifugal pump having a pump chamber divided into a suction chamber and a discharge chamber by a bulkhead. A discharge pipe extends from the discharge side of the pump through the suction chamber and into the discharge chamber. A venturi is provided in the discharge pipe in communication with the suction chamber so that a suction is created in the suction chamber as fluid passes through the discharge pipe into the discharge chamber. A plug valve is mounted in the bulkhead and is controlled by a float positioned in the suction chamber so that the lowering of the float will open the plug valve. A suction line extends from the wellpoint header system and is in communication with the suction chamber. A normally closed flap valve is provided on the suction line within the suction chamber to permit the pump chamber to be initially filled.

11 Claims, 3 Drawing Figures



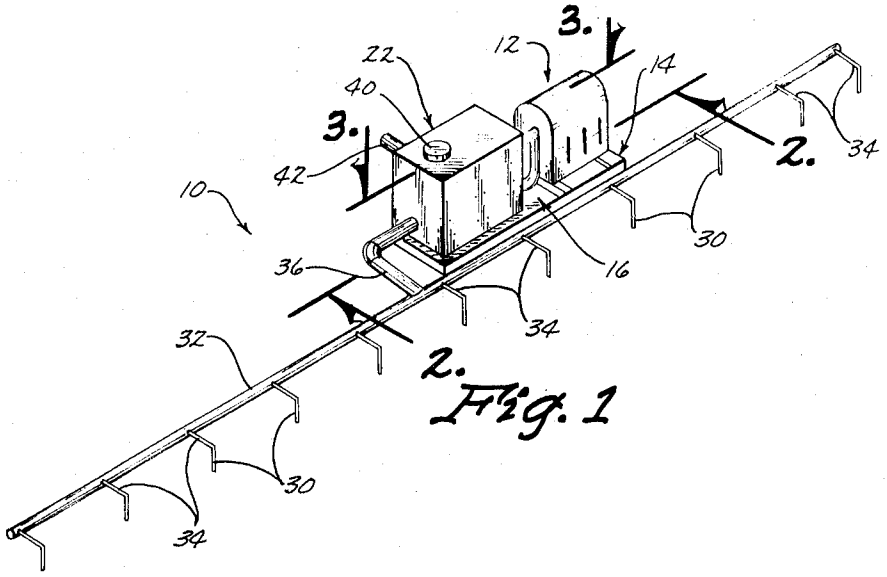


Fig. 1

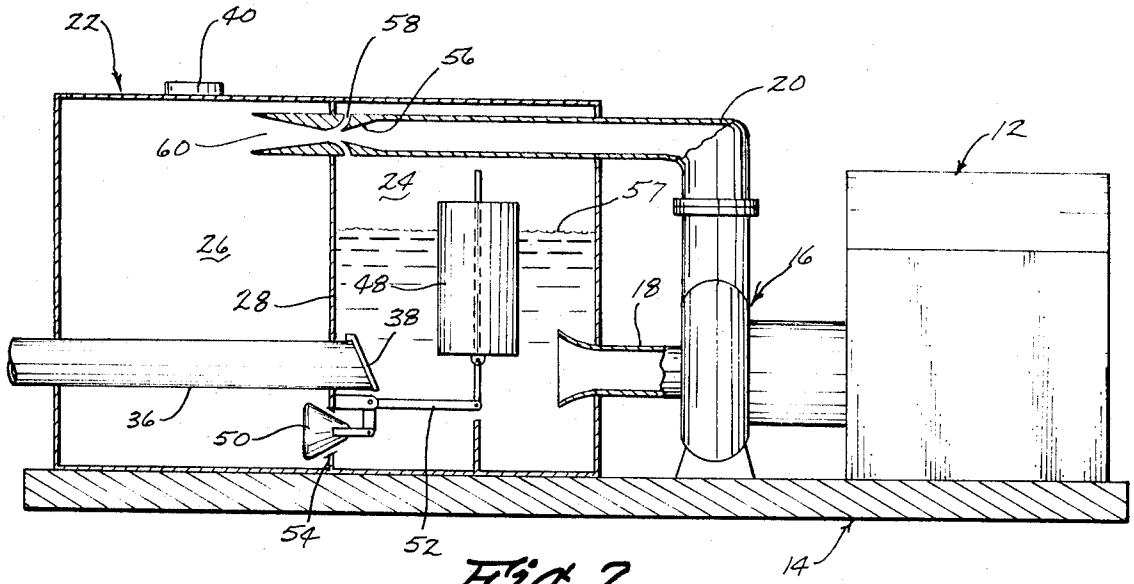


Fig. 2

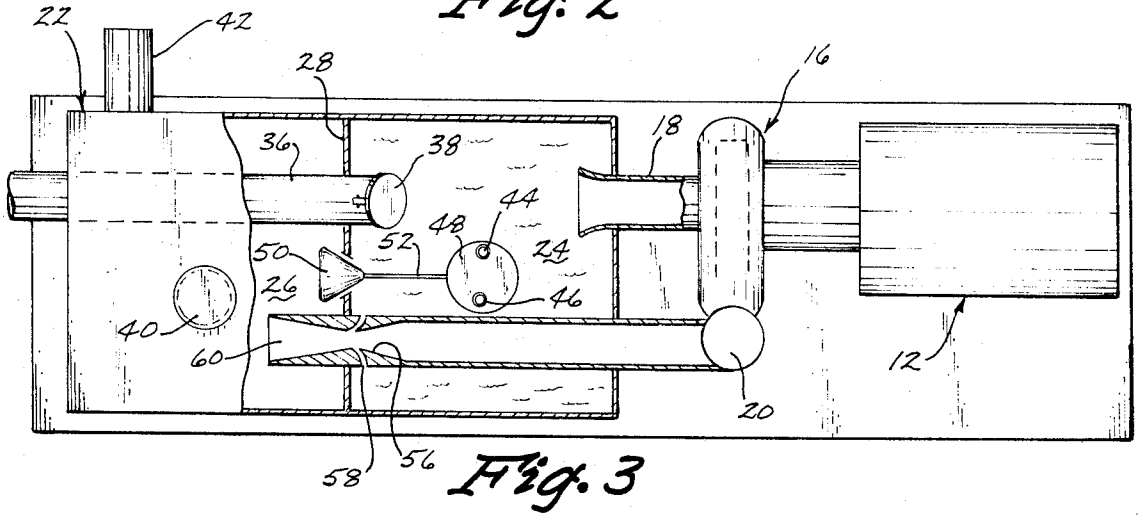


Fig. 3

WELLPOINT SYSTEM

Normally when a sewer, pipe line, or other subsurface structure is to be constructed, it is necessary that all water or other liquid be removed from the area prior to excavation so that the construction can be performed on stable soils. A common method of "dewatering" such construction areas is to sink a plurality of wellpoints around the area and drawing water upwardly therethrough into a manifold connected to a pump. Heretofore, most wellpoint systems utilize a motor or engine driven pump which operates in conjunction with a mechanical vacuum pump so connected to remove the air and create a vacuum for lifting the liquid. A further system is a venturi and nozzle arrangement wherein the pump recirculates water through the venturi thereby creating a vacuum without mechanical vacuum pumps but at a great loss in efficiency.

Therefore, it is a principle object of this invention to provide an improved wellpoint system.

A further object of this invention is to provide a wellpoint system having improved efficiency.

A further object of the invention is to provide an apparatus for removing water or other liquid from the earth by creating a vacuum at the pump so that water is removed by suction.

A further object of the invention is to provide a wellpoint dewatering system which eliminates mechanical vacuum pumps and a high loss of system efficiency which is inherent in a nozzle and venturi system.

A further object of the invention is to provide a simple, reliable, and economical dewatering system capable of operating for long periods of time without constant attendance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view illustrating the wellpoint system of the present invention:

FIG. 2 is an enlarged sectional view seen along lines 2—2 of FIG. 1; and

FIG. 3 is an enlarged sectional view seen along lines 3—3 of FIG. 1.

The numeral 10 refers generally to the wellpoint system of this invention. An electric motor or internal combustion engine 12 is mounted on a platform 14 to provide the necessary portability for the invention. A centrifugal type pump 16 is operatively connected to the motor 12 and has an intake or suction line 18 extending therefrom and a discharge line 20 extending from the discharge side thereof.

The numeral 22 refers to a pump chamber divided into a low pressure or suction chamber 24 and a high pressure or discharge chamber 26 by a watertight bulkhead 28.

The numeral 30 refers to a plurality of conventional wellpoints connected to a suction header 32 by hoses or pipes 34. The wellpoints 30 are sunk into the earth around or adjacent the area to be excavated so as to draw the water or other liquid therefrom. Suction header 32 is connected to a suction line 36 which extends through the chamber 26 into the chamber 24.

Suction line 36 has a normally closed flap valve 38 pivotally mounted thereon as illustrated in FIG. 2.

A closeable fill opening 40 is provided on the chamber in communication with the discharge chamber 26 to permit water or liquid to be initially placed therein. A discharge pipe 42 extends from the discharge chamber 26 as illustrated in FIG. 3.

A pair of upstanding rods 44 and 46 extend upwardly from the floor of chamber 24 and have a float 48 vertically slidably mounted thereon. Float 48 is operatively connected to a plug valve 50 by a linkage 50 so that the opening 54 in bulkhead 28 will be closed by the plug valve 50 when float 48 reaches a predetermined height and so that the opening 54 will be opened when the float 48 is lowered to a predetermined position. For purposes of description, the numeral 57 refers to the water level within the chamber 24. As seen in FIGS. 2 and 3, discharge pipe 20 extends through the chamber 24 into the chamber 26. A venturi 56 is provided in the pipe 20 within chamber 24 as are the venturi openings 58. The nozzle end 60 of the pipe 20 is in communication with the interior of chamber 26.

The operation of the pumping system is as follows. Before the pump 16 is started, the pump chamber 22 is filled through the fill opening 40 to the float control level 57 in both chambers 24 and 26. The flap valve 38 prevents the escape of fluid into the line 36 during the initial filling of the chambers. The fill opening 40 is then closed and the power source 12 energized to activate the pump 16. Pump 16 pumps liquid from the suction chamber 24 into the discharge chamber 26 through the venturi 56 creating a vacuum at the venturi openings 58. During the priming of the system, as liquid is removed from the low pressure chamber 24, float 48 lowers and opens the plug valve 50 allowing liquid from the high pressure chamber 26 to enter and replenish the liquid supply to the chamber 24 and the pump 16. As air is evacuated through the nozzle 60 and the venturi, suction is maintained at the openings 58 and increased until the liquid from the wellpoints 30 travels through the suction header 32 into the pump suction line 36 and through the flap check valve 38 into the suction or low pressure chamber 24. As the supply of liquid from the wellpoint increases, the float 48 curtails the amount of recirculation necessary by closing the plug valve 50. As the quantity of liquid from the wellpoints approaches centrifugal pump capacity, the plug valve 50 closes the opening 54 which eliminates all recirculation and the inefficiency due to recirculation.

In experimental tests, the pump has been found to maintain a high efficiency in water handling and removes large quantities of air from the suction system where leaks, and trapped air, etc. exist.

While the drawings illustrate the power source 12 being located outside of the chamber 22, it is possible to provide an electric submersible pump within the chamber 24 if desired.

Thus it can be seen that an improved wellpoint system has been provided. It can also be seen that the wellpoint system described herein provides a much more efficient pumping system for a wellpoint system than that is possible with existing apparatus. The wellpoint system disclosed herein exhibits improved efficiency over existing devices since recirculation is prevented during volume flow pumping operations. Thus it can be seen that the apparatus accomplishes at least all of its stated objectives.

I claim:

1. A wellpoint system comprising,

a pump means having an intake side and a discharge side,

a power means connected to said pump means for operating said pump means,

a first housing defining a discharge compartment,

a second housing defining an intake compartment,

said intake side of said pump means being in fluid communication with said intake compartment,

a discharge pipe means in fluid communication with said discharge side of said pump means, said discharge pipe means extending through said intake compartment into said discharge compartment,

a venturi formed in said discharge pipe means in said intake compartment and being in communication therewith to create a vacuum in said intake compartment as fluid passes therethrough into said discharge compartment,

a plurality of wellpoints,

a collector pipe means in fluid communication with said wellpoints and in fluid communication with said intake compartment,

said intake and discharge compartments having a fluid passageway means extending therebetween,

a valve means in said fluid passageway for opening and closing said fluid passageway means,

and fluid level sensing means in said intake compartment connected to said valve means for opening and closing said valve means.

2. The wellpoint system of claim 1 wherein said fluid level sensing means comprises a float means.

3. The wellpoint system of claim 2 wherein said intake compartment has upper and lower ends, said venturi being positioned in the upper end of said intake compartment.

4. The wellpoint system of claim 2 wherein said pump means is a centrifugal pump.

5. The wellpoint system of claim 2 wherein a closable fill opening is provided at the upper end of said discharge compartment.

6. The wellpoint system of claim 2 wherein a normally closed valve means is mounted on the end of said collector pipe means in said intake compartment.

7. The wellpoint system of claim 6 wherein said normally closed valve means comprises a flap valve.

8. The wellpoint system of claim 2 wherein said first and second housings are positioned adjacent each other and have a bulkhead means positioned therebetween.

9. The wellpoint system of claim 8 wherein said fluid passageway means is formed in said bulkhead means.

10. The wellpoint system of claim 9 wherein said float means is responsive to changes in fluid levels in said intake compartment to open said valve means when the fluid level in said intake compartment lowers to a predetermined level and closes said valve means when the fluid level in said intake compartment rises to a predetermined level.

11. The wellpoint system of claim 9 wherein said valve means comprises a plug valve.

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