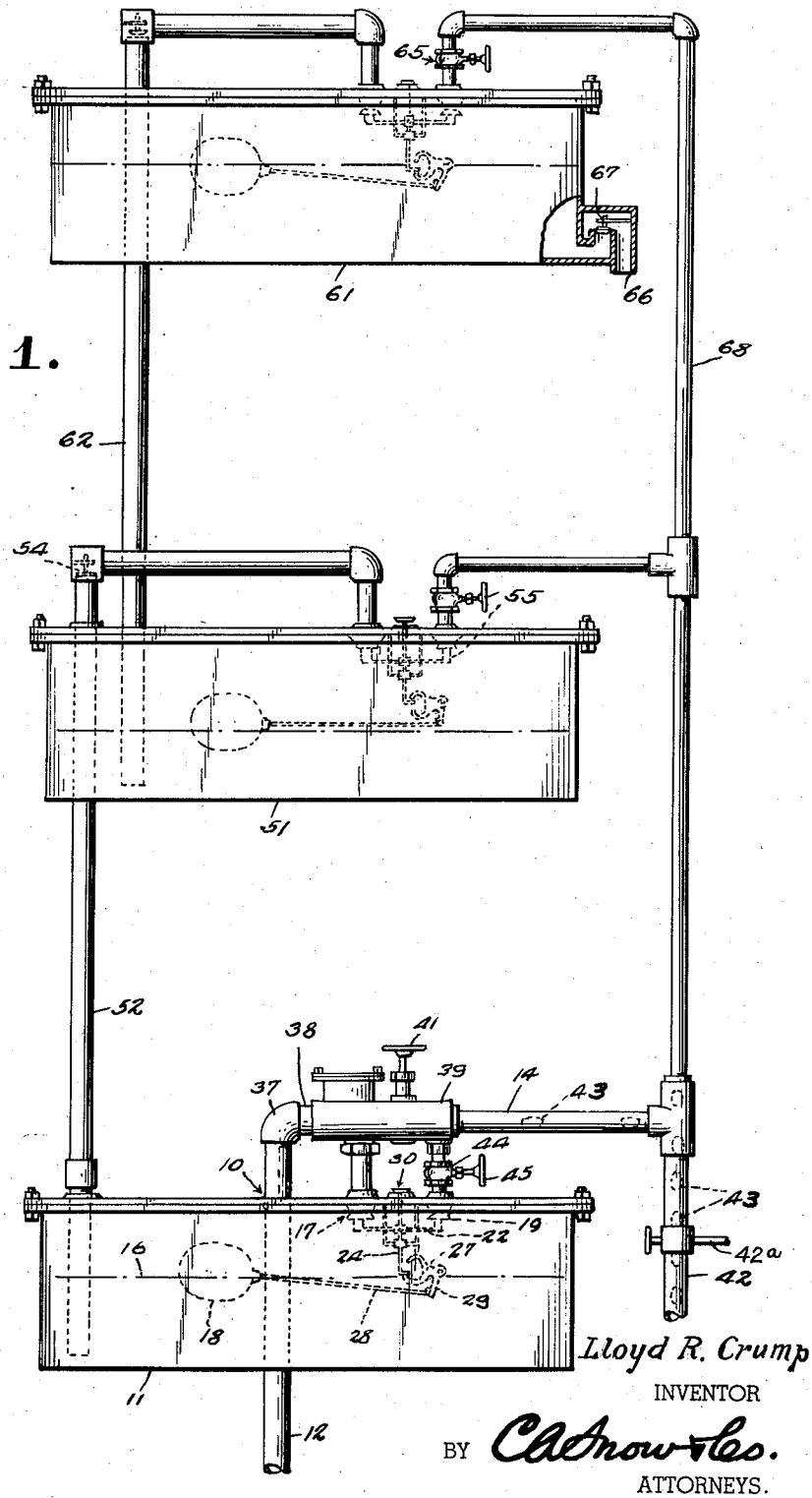
Oct. 14, 1958 L. R. CRUMP 2,855,860

SIPHON PUMP

Filed Oct. 26, 1954 2 Sheets-Sheet 1

Fig. 1.



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SIPHON PUMP

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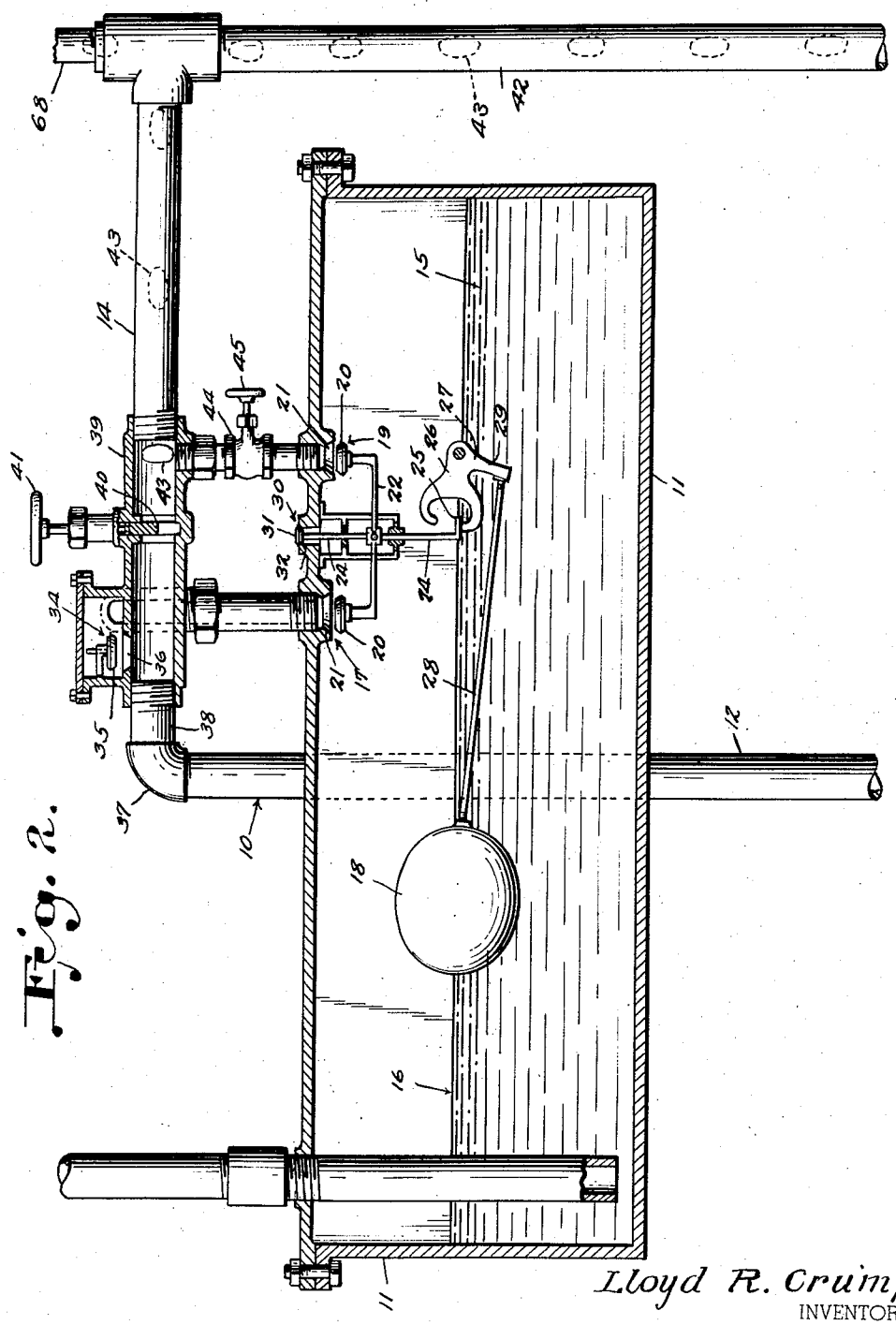

Fig. 2.

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SIPHON PUMP

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2 Claims. (Cl. 103—236)

This invention relates to an improved siphon pump for raising the level of water or other fluids to a level higher than can be accomplished by a regular siphon pump available on the open market at the present time.

It is an object of this invention to provide a novel improved siphon pump of the kind to be more particularly described hereinafter having a plurality of superposed or raised part siphon pumps arranged together in a co-assisting manner whereby one of the pumps assists another so that the resulting effect of the cascaded siphon pumps may be used at any height, above sea level, greater than by cascaded siphon pumps presently obtainable.

It is another object of this invention to provide a series of correlated or cascaded siphon pumps which may be used in place of a mechanical pump to raise the level of the fluid being pumped to any level within the realm of atmospheric pressure with the resulting effect of a great money saving to the builder or user of such pump.

The basic principle of this device is to remove a portion of water or liquid at the highest point of a siphon. Then by the use of the low pressure thus created in the siphon at this point, introduce atmospheric pressure at a point in the siphon in such a way as to further raise the water level. The system once in operation is automatic and uses only the flow of the siphon as energy.

Other and further objects and advantages of the invention will be hereinafter described and the novel features thereof defined in the appended claims.

In the drawings:

Fig. 1 is a side elevation, partly broken away, of a plurality of my novel syphon pumps arranged in cascade.

Fig. 2 is a side elevation, partly broken away and partly in section, of one of my improved novel siphon pumps separated from any cascade to which it may be attached.

This invention while relating to an improved siphon pump is actuated in much the same manner as the conventional type of siphon pump but uses atmospheric pressure in such a way as to raise the level of the water coming from the pump to a level much higher than that which can be attained by a present pump. The system when once in operation is automatic and uses only the flow of fluid in the siphon for the energy. The difference between the regular siphon and the present invention is that the fluid is removed and low pressure used at the highest point of the system. In a regular siphon as water flows through the siphon tube each gallon goes in one direction, up, another gallon shall come down regardless of the difference in pipe sizes.

In this siphon there will be a solid column of water up with an equal column of water plus air coming down, because of this more water goes up than comes down. It will be understood that the discharge side of the siphon terminates at a point substantially below the intake.

Referring now more particularly to the drawings, the numeral **10** designates generally an improved novel siphon pump constructed according to an embodiment of my invention. The novel pump **10** includes a fluid tank **11** for which fluid may be supplied at any conventional source of fluid supply as a creek, pond, lake or other suitable source of fluid supply.

Fluid is supplied to the fluid tank **11** through a fluid inlet tube **12** the upper end of which is communicated with the upper side or end of the tank **11** with the lower end of the inlet tube **12** submerged in the source of fluid supply, not shown in the drawings.

Tubes **14** and **42** are portions of the siphon. Water goes up tube **12**, through **14**, and down **42**. Water enters the tank **11** through the valve **34**. When the fluid is within the tank **11** a fluid level **16** is maintained therein, there being a fluid inlet valve **17** at the juncture of the fluid inlet tube and the tank **11** as clearly noted in Fig. 2 of the drawings. The fluid inlet valve **17** is a float controlled type of valve which valve is then controlled by the position of the float **18** within the filled tank **11**.

A similar air discharge valve **19** is located at the juncture of the tube **14** and the tank. This discharge valve **19** is also of a float control type so that the particular description of the inlet valve **17** and discharge valve **19** will be substantially the same. The valves thus described employ a valve core **20** which is engageable with a valve seat **21** for stopping the flow through the valve.

By the structure and arrangement of this invention both of the valves operate at the same time and by the same means, the float **18**. A connecting bar **22** is aptly connected to both of the valves **17** and **19** which connecting bar operates substantially as a stem for each of the valves controlled by the float **18**.

There is an elongated valve stem **24** connected to the connecting arm **22**, intermediate the length thereof and one end of the stem is connected or actuated by the float **18**. A portion of the stem extends above the connecting arm **22** with a portion extending therebelow and the downwardly extending portion of the stem is bent or formed with a foot **25** to be actuated in its up and down position by the U-shaped yoke **26** which is connected between the float **18** and both of the valves, the yoke **26** is provided with an arm **27** connected to the bight portion of the U-shaped yoke.

There is a connecting rod **28** connecting the float **18** to the yoke **26** at a perpendicularly arranged arm **29** on the yoke **26** intermediate the length of the arm **27** and spaced from the bight portion of the yoke. In this manner the level of the float within the tank will determine the opening and closing of the inlet and outlet discharge valves depending upon the buoyant relation of the float in the fluid within the tank.

Also actuated by the float **18** there is an air inlet valve **30** between the fluid inlet and air discharge valves **17** and **19** respectively which air inlet valve includes an air inlet valve core **31** and an air inlet valve seat **32** in which the core **31** is engageable.

There is provided an air check valve **34** intermediate the length of the fluid inlet valve **17**, this air check valve including a core **35** engageable within an air check valve seat **36** so that the water is only free to travel in one direction toward the connection of the fluid inlet tube **12** at the tank **11**.

An elbow **37** will connect a short length of tube **38** to one end of the inlet tube **12** above the tank **11** and the valve pipe **39** also at the upper end of the fluid inlet tube **12**, clearly shown in Fig. 2 of the drawings.

The valve pipe **39** is formed as a connecting pipe, transversely of the fluid tank **11**, for connecting the fluid inlet tube **12** to the tube **14** and then there is a gate valve **40**, intermediate the length of the valve pipe **39** to control the flow of liquid through the valve pipe **39** from the inlet tube **12**. This gate valve is under the control of a person operating this improved novel siphon pump by way of a handle **41** which is firmly attached to the gate valve **40**.

To control the discharge of air from the tank **11** there is provided a valve **44** between the tank and tube **14** which

is under the control of a handle 45 thereon, this handle being under the control of an operator using this novel type of siphon pump.

As this siphon pump may be used in places where it is desired to locate the level of the water lifted thereby a plurality of tanks may be arranged in a cascade arrangement with the tank 51 spaced above the first mentioned tank 11 and connected thereto by inlet tube 52 which projects into the tank 11 and is terminated therein so that the tank 51 will derive its source of fluid from the first mentioned tank rather than from an arbitrary source of supply for the liquid to be handled by the cascaded tanks for this pump.

This latter mentioned tank 51 is formed substantially in the same manner as the tank 11 having an air check valve 54 at the juncture of the inlet tube 52 to the second mentioned tank 51.

A second arrangement of float controlled valves for the water inlet and air outlet of this tank 51 are designated generally by the reference numeral 55 in the drawings although the structure and arrangement of the float and valves of the latter tank are substantially the same as those described above.

Above the tank 51 there is provided another tank 61 which in turn is connected to the tank 51 by an inlet tube 62 this latter tank 61 being under the control of an air valve 65 and other inlet and discharge valves as those described above for the other tanks.

This tank 61, being the highest in the cascade has a separate tube 66 extending from the bottom surface thereof from which the fluid in the latter tank may be drained when and as desired. A check valve 67 at the juncture of the drain pipe 66 in the uppermost tank 61 will provide for the filling of the uppermost tank after it has been drained.

All of the tanks, described above, make their air discharge into a common discharge pipe 68 which is connected to the outer end of all of the discharge tubes of the various tanks.

To put this pump into operation the following procedure is followed. Pipes 12 and 42 are the legs of the siphon with pipe 42 as the lower level leg. A suitable manually controlled valve 42*a* in pipe 42 may be connected to a conventional back vacuum pump (not shown) or the like, for the purpose of initially creating a partial vacuum in pipe 42 to start the operation of the pump. Valve 40 is normally controlled to turn the siphon on or off. With this valve open, the siphon is started by filling the two legs with water, a partial vacuum being created by opening the valve 42*a* to start the siphon action in a known manner. When a solid column of water flows up leg 12 and down leg 42, valve 44 is opened manually in tank A. This valve is a restricted air device, as too much air in the siphon will cause the water to fall in both legs. The volume of air 43 that the siphon will safely handle depends upon the size of the pipes used for the siphon and the difference in the siphon levels. As valve 44 is opened air rushes from the tank into the siphon depending upon the restriction of the valve or restriction placed in pipe. Leg 42 now has part air 43 and part water flowing down. A solid column of water flows up pipe 12. As air 43 makes up part of the volume of the column in leg 42, more water flows up tube 12 than flows down tube 42. The extra volume of water flows into tank 11 and is captured or stored. As tank 11 is filling, the float and lever begin to function. When the tank is full this lever closes valves 17 and 19 and opens 30. Valve 17 is the water inlet into tank. Valve 19 is the air inlet into the siphon, and valve 31 opens the tank to atmospheric pressure. At this point of operation a solid column of water flows up pipe 12 and down pipe 42. The restricted air valve 55 in tank 51 is now opened. Tank 51 is empty so the float is down and the lever has the water inlet and air outlet valves open and atmospheric pressure valve closed. As valve 55 in tank 51 is opened,

air rushes from tank 51 down pipe 68 into the siphon. Atmospheric pressure pushes the water from tank 11 up pipe 52 into tank 51. As tank 11 empties into tank 51 the float and lever of tank 11 drop. When tank 11 is empty the lever closes valve 30 from atmospheric pressure and opens 17 and 19. Tank 11 begins to refill. In case tank 51 has not been timed correctly and has not completely filled inlet and outlet valves of tank 51 remain open and the atmospheric pressure valve remains closed. Check valve 54 has dropped into place to isolate tank 11 from tank 51, which might be open to the air while tank 11 is refilling. Then tank 11 completely fills tank 51. The float and lever in tank 51 now closes the water inlet and air outlet valves and opens the atmospheric pressure valve bringing tank 51 to atmospheric pressure.

The restricted air valve in tank 61 is now opened. As valve 65 in tank 61 is opened air rushes from the tank down pipe 68 into the siphon. Atmospheric pressure pushes the water from tank 51 into tank 61.

When tank 61 is full, the float and lever close the valves and opens the tank to atmospheric pressure. The valve 67 opens when valve 30 of tank 61 is opened to atmospheric pressure and allows tank 61 to empty by gravity. The valve 67 closes upon the cessation of water flow from the tank, to enable a partial vacuum to be created in tank 61 to permit the refilling of the tank 61. The complete system is timed for best efficiency but is not necessarily a function of the pump.

While the specific details of one embodiment of this invention have been herein shown and described, the invention is not confined thereto as changes and alterations may be made without departing from the spirit and scope thereof as defined in the amended claims.

I claim:

1. A siphon pump comprising an inverted U-shaped pipe, the parallel legs of said pipe being vertical and one leg being shorter than the other leg and adapted to connect with a source of water and constituting an intake leg with the other leg constituting the discharge leg, manual valve means connected to said discharge leg for causing the filling of said discharge leg with fluid to cause a siphon action upon starting the pump, and said discharge leg terminating below said intake leg, the bight of said pipe being horizontal, a tank disposed adjacent said bight, a liquid intake pipe connected at one end to the top of said tank, said bight having an outlet port in the upper side thereof, a valve housing encompassing said port and connected to said intake pipe, a check valve in said housing normally closing said port, a second pipe connecting said bight and said tank at a point downstream relative to the direction of flow from said intake pipe, a manually operated valve in said second pipe, a valve seat at the lower end of said intake pipe and said second pipe, a pair of float operated valve plugs in said tank confronting said valve seats, a connecting bar secured between said pair of float operated valve plugs, a float rockably carried by said tank, an air inlet valve in said tank between said valve plugs operated by said float, said air inlet valve closing said tank to atmospheric pressure during filling of said tank, means including a U-shaped yoke connected between said float and said connecting bar for moving said valve plugs to open or closed position with movement of said float, a plurality of superposed tanks, and siphon means including said inlet pipe and said second pipe connected to said tanks and said U-shaped pipe.

2. A siphon pump as set forth in claim 1 wherein said siphon means includes a vertical intake pipe for each of said superposed tanks, and an air discharge pipe connected between said tanks and the discharge leg of said U-shaped pipe.

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