April 3, 1962 B. L. OLIVER 3,027,910

FLOW CONTROL APPARATUS

Filed Sept. 10, 1956

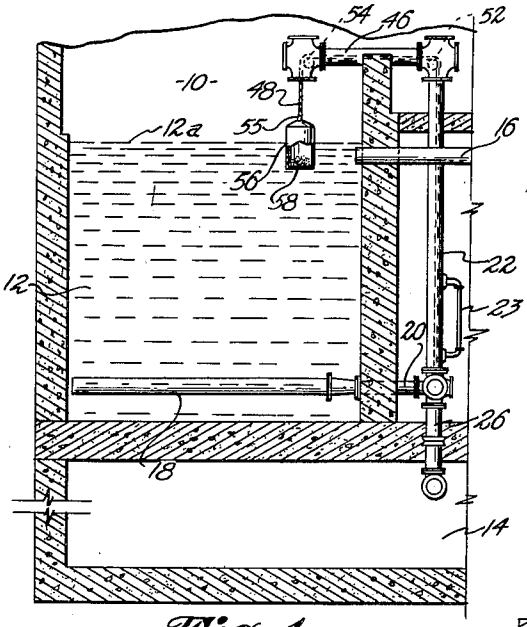


Fig. 1.

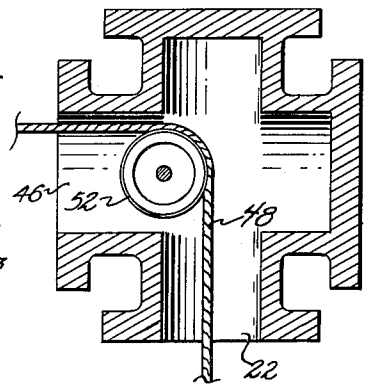


Fig. 3.

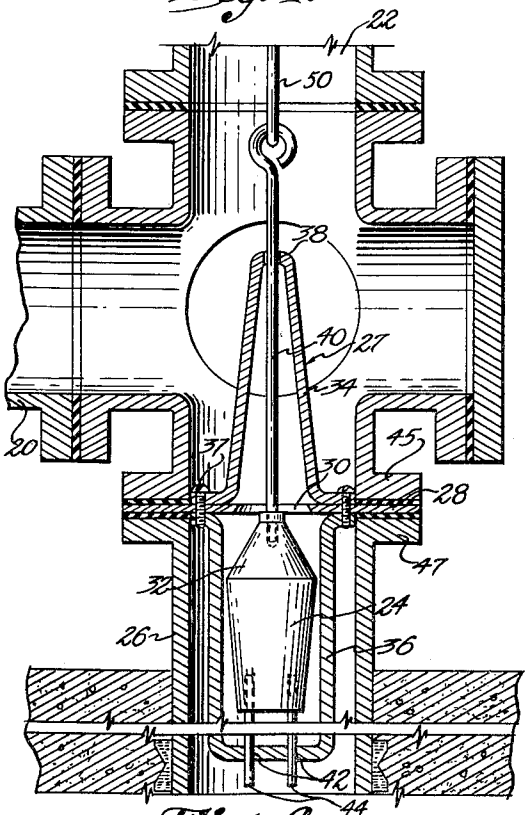


Fig. 2.

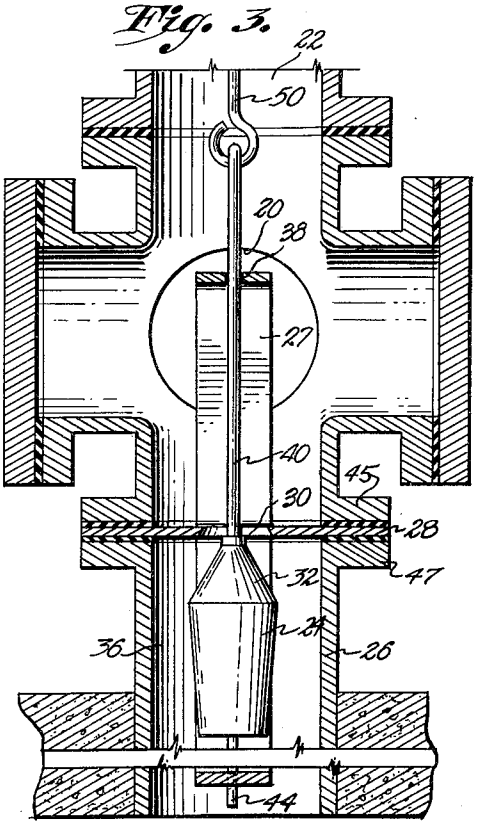


Fig. 4.

INVENTOR.
Burton L. Oliver
BY
ATTORNEY

United States Patent Office 3,027,910 Patented Apr. 3, 1962

3,027,910

FLOW CONTROL APPARATUS

Burton L. Oliver, 9839 E. 67th St., Kansas City, Mo.

Filed Sept. 10, 1956, Ser. No. 608,939
1 Claim. (Cl. 137—397)

This invention relates to the purification of water and particularly, to apparatus for controlling the flow of water through a sand and gravel filter basin, including as a part thereof an automatic valve operable in direct response to the rise and fall of the level of water in the basin.

The primary object of the present invention is to provide an assembly that may be quickly, easily and inexpensively installed within a conventional system using only the standard, flanged piping employed therein.

It is the most important object of the present invention to provide a control valve disposed within a vertical riser that communicates with the basin, whereby the sensitivity of the valve is controlled through the medium of the head of water within the riser.

Another important object of the instant invention is the provision of flow control apparatus constructed and arranged to cause the valve to respond, not only to the movement of a float on the level of water in the basin, but to the head of water in the basin and in the riser.

Another object is to make advantageous use of cable and pulley means to operably interconnect the float and the valve.

A further object is to normally bias the valve toward the closed position through use of a novel, easily adjusted counterweight forming a part of the float.

A still further object of the present invention is to employ the said riser, through use of a sight tube, as a means for determining when the filter is in need of cleaning.

In the drawing:

FIGURE 1 is a fragmentary, cross-sectional view through the clear well and filter basin of a conventional water purification system showing the flow control apparatus forming the subject matter of the instant invention.

FIG. 2 is an enlarged, fragmentary, detailed, cross-sectional view illustrating the valve per se.

FIG. 3 is an enlarged, cross-sectional view showing one of the pulleys at the uppermost end of the vertical riser; and

FIG. 4 is an enlarged, fragmentary, cross-sectional view similar to FIG. 2 but taken at right-angles thereto.

The water purification system contemplated by the instant invention and with which the improvements about to be described are adapted to be used, includes as a part thereof a filter basin broadly designated by the numeral **10** within which is normally contained a filling of sand and gravel (not shown) and through which water **12** is caused to flow for ultimate discharge into a clear well **14**, the water to be purified flowing into the basin **10** by way of inlet **16**. The clear water is received by a series of perforated laterals or manifolds **18** adjacent the bottom of the basin **10** which communicate with an outlet line **20**.

In accordance with the principles of the instant invention, a vertical, tubular riser **22**, exteriorly of the basin **10**, and provided with a sight tube **23** adjacent its lowermost end, is coupled directly with the outlet line **20**, it being noted that the clear water is free to form a column within the riser **22** and flow to the well **14** when valve **24** is open by way of a branch **26** depending from the riser **22** and the outlet **20**, and communicating with the well **14**.

A valve unit **27** in the lowermost branch **26** of riser

22 includes a horizontal plate **28** having a frusto-conical seat **30** presenting an opening through the plate **28** for flow of clear water when valve **24** is open. Valve **24** on the other hand, is provided with a frusto-conical upper portion **32** that fits in the seat **30** when valve **24** is closed.

Plate **28** has an uppermost U-shaped guide bracket **34** and a similarly shaped lowermost guide bracket **36** secured thereto by fasteners **37**. The bight of bracket **34** is perforated as at **38** to loosely and slidably receive upstanding stem **40** of the valve **24**. Similarly, the bight of the bracket **36** is provided with perforations **42** for loosely and slidably receiving guide pins **44** depending from the valve **24**. Line **20**, riser **22** and branch **26** are made from conventional, standard, flanged piping and plate **28** of unit **27** may be quickly and easily clamped in place between flanges **45** and **47** of branch **26**.

The uppermost end of the riser **22** is provided with a lateral extension **46** that terminates in overlying relationship to the level **12***a* of water **12** in the basin **10**, the riser **22** and its extension **46** receiving a cable **48**. The lowermost end of the cable **48** is provided with a fastener **50** for attaching the same directly to the stem **40** and extension **46** is provided with a pair of pulleys **52** and **54** over which the cable **48** is trained. The uppermost end of the cable **48** depends from the terminal end of the extension **46** and is attached to closure plug **55** of a hollow float **56** having a partial filling of sand **58** or the like serving as a counterweight.

It is seen that in operation, movement of the valve **24** toward and away from the closed position engaging seat **30**, is controlled by float **56**, which float **56** in turn rises and falls as the level **12***a* of water **12** varies. The counterweight **58** normally biases the valve **24** toward the closed position and manifestly, as the level **12***a* rises, the float **56** will in turn move upwardly to permit valve **24** to descend under the influence of its own weight, as well as the weight of the column of water in the riser **22** and the head of water **12** in the basin **10**.

Such minute control of the out-flow of the clear water from the basin **10** to the well **14**, is made necessary because of the fact that the rate of flow of the water through the sand and gravel, in the filter basin **10**, will vary and by the same token, the rate of flow of the water into the basin **10** by way of inlet **16** will likely change during continuous operation of the purification system.

Proper submergence of float **56** in the water **12** may be quickly and easily provided by merely removing plug **55** and varying the amount of sand **58** in the float **56**.

The need for cleaning of the filter through usual backwash methods can be determined by observing the sight tube **23**. If the level of water in riser **22** can be seen in the tube **23**, it is manifest that mud, sludge and other material have collected in the sand, gravel, rocks and other aggregate of the filter to such extent as to considerably reduce the rate of flow of the water **12** therethrough. Such collection does not affect the flow of water from riser **22** however, and therefore, the level of such water in riser **22** will ultimately fall to a point where it may be seen in the tube **23**.

The riser **22** has a still more important function however, in that the head of water therein tends to prevent flutter in the valve **24**. The variance in velocity of the water flowing from line **20** to branch **26** as its path of travel changes from vertical to horizontal, tends to produce such flutter and therefore, the water flowing from riser **22** to branch **26** at a constant velocity causes valve **24** to rise and fall slowly and steadily as it moves toward and away from seat **30**. Valve **24** is, therefore, extremely sensitive and operates to provide an accurate control of the flow of water **12** from basin **10** to well **14**, directly

responsive to the rise and fall of the water level 12*a* in basin 10.

Noteworthy also is the fact that there is provided a single, rather simple, inexpensive unit 27 that may be quickly and easily installed within conventional, standard, flanged piping commonly employed in water purification systems of the kind contemplated by the instant invention.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

In a water purification system having a filter basin for containing sand and gravel and through which water to be purified is caused to flow, said basin being provided with an outlet adjacent the bottom thereof for flow of filtered water therefrom, flow control apparatus comprising a vertical, tubular riser exteriorly of the basin, said riser registering with said outlet and extending above and below the latter, the upwardly extending portion extending above the basin; a horizontal extension on the uppermost end of the riser overlying the basin; a valve seat in the riser below the outlet; a vertically reciprocable valve in the riser below the seat movable vertically to and from a position engaging the seat, said valve being disposed in said riser below the head of water therein; pulley means in the extension; a cable attached to the valve, extending upwardly through the riser over the pulley means and through the extension terminating above the basin; and a float on the cable adapted to rise and fall with the level of water in the basin, said riser having a lowermost discharge end below the valve, said valve

being provided with guiding means coupling said valve with said riser for guiding and stabilizing said valve along its vertical path of reciprocable movement, the disposition of said valve below the head of water in said riser and below the seat and movable vertically to and from the seat, permitting said float rising with the level of water in said basin and the weight of the head of water in said riser to cooperate to move said valve vertically downwardly away from said seat, and the guiding means coupling said valve with said riser and the head of water in said riser cooperating to guide and stabilize the valve to prevent flutter thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

438,060	Chapline et al.	Oct. 7, 1890
470,782	Davis	Mar. 15, 1892
646,931	Greer	Apr. 3, 1900
717,018	Paul	Dec. 30, 1902
719,357	McClintock	Jan. 27, 1903
930,135	Blessing	Aug. 3, 1909
1,962,472	Anglemyer	June 12, 1934
2,540,361	Whitley	Feb. 6, 1951
2,684,830	Stephany	July 27, 1954
2,845,799	Emanuel et al.	Aug. 5, 1958

FOREIGN PATENTS

433/1910	Great Britain	Jan. 7, 1910