April 7, 1953 F. MASTNOCK 2,633,865

AUTOMATIC GATHERING VALVE

Filed Jan. 12, 1948 2 SHEETS—SHEET 1

Fig. 1.

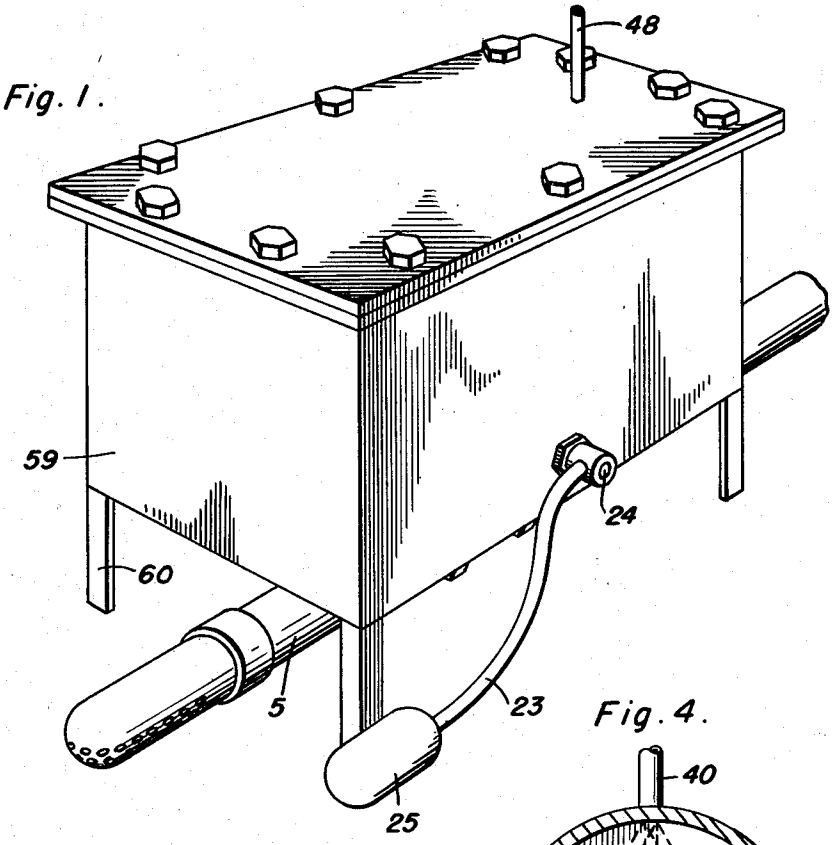


Fig. 3.

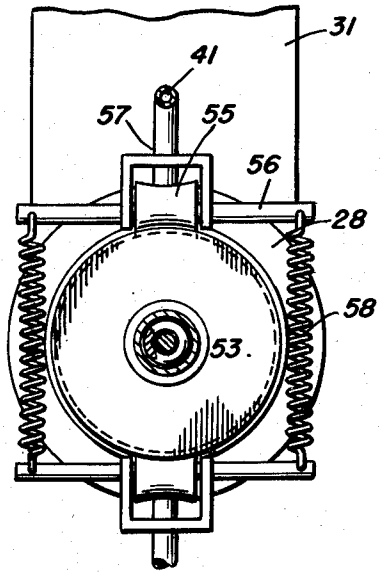
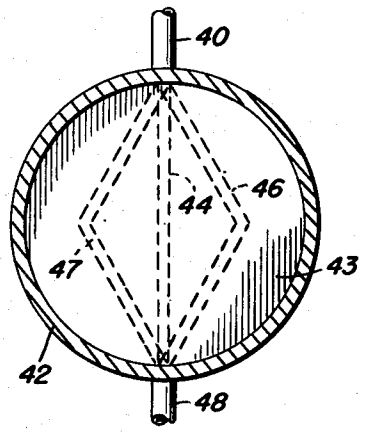


Fig. 4.



Frank Mastnock
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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AUTOMATIC GATHERING VALVE

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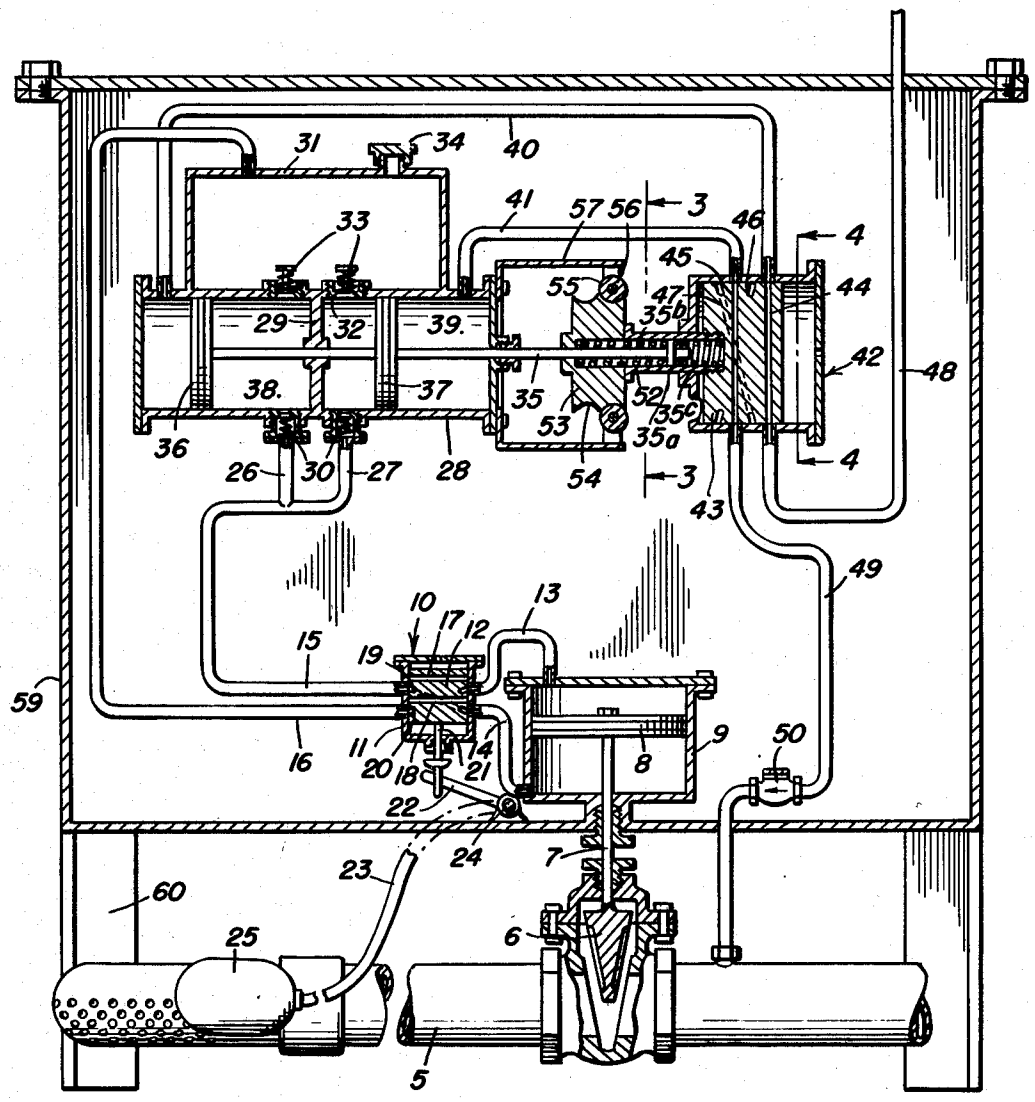


Fig. 2.

Frank Mastnock
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

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AUTOMATIC GATHERING VALVE

Frank Mastnock, Meadow Lands, Pa.

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3 Claims. (Cl. 137—413)

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The present invention relates to new and useful improvements in automatic gathering valves to simplify the functions of the drainage system in coal mines or other drainage systems in such a manner that the valves will be entirely automatic and adequate to meet any conditions under which the same are used.

An important object of the invention is to provide an automatic gathering valve used in connection with gathering pumps and in which the valve is controlled by the suction of the pump.

A further object of the invention is to provide float control means to render the suction means inactive without interfering with the continuous operation of the pump.

A still further object is to provide a compression chamber and plunger for the cut-off valve of an intake pipe for a drainage system and providing a suction operated pump connected to the intake pipe and arranged whereby pressure from the pump will hold the cut-off valve in either open or closed position and further to provide a float control valve to control the opening and closing of the cut-off valve.

A still further object is to provide an automatic gathering valve for draining the drainage system of simple and practical construction, which is efficient and reliable in operation, relatively inexpensive to manufacture and install in operative position and which is otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of the protective housing for the gathering valve;

Figure 2 is an enlarged vertical sectional view thereof;

Figure 3 is an enlarged fragmentary sectional view of the snap lock for the suction operated valve and taken substantially on the line 3—3 of Figure 2; and

Figure 4 is a vertical sectional view of the suction valve taken substantially on the line 4—4 of Figure 2.

Referring now to the drawings in detail, wherein for the purpose of illustration I have disclosed a preferred embodiment of the invention the numeral 5 designates the intake pipe of a drainage system to which the usual suction pump (not shown) is connected. A gate type cut-off valve 6 is provided for the pipe 5 and includes an upwardly extending valve stem 7 having a plunger 8 attached to its upper end working in a compression chamber or cylinder 9.

A four-way valve designated generally at 10 includes a cylindrical valve housing 11 and

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plunger type valve body 12, working therein. Upper and lower pipes 13 and 14 connect one side of the housing 11 respectively to the upper and lower portions of the compression chamber 9 and upper and lower pipes 15 and 16 opposed respectively to the pipes 13 and 14 lead from a diametrically opposite side of the housing 11. The valve body 12 includes upper and lower horizontal apertures 17 and 18 and diagonal apertures 19 and 20 to alternately provide communication between pipes 15 and 16 with pipes 13 or 14 during vertical movement of the valve 12.

A valve stem 21 extends downwardly from the valve 12 through the valve housing 11 and at the lower end of which stem an arm 22 is freely attached, the arm 22 being connected to a float arm 23 by means of a shaft 24 journaled to the lower portion of compression chamber 9. A float 25 is attached to the lower end of float arm 23.

The pipe 15 is provided with branches 26 and 27 connected respectively to a pump chamber 28 at the opposite sides of a central partition 29 therein. Each branch pipe is provided with a check valve 30.

The pipe 16 leads to the top of a reservoir 31 supported on top of the chamber 28 and connected to the opposite ends of the pump chamber by ports 32 controlled by check valves 33. A vented filler cap 34 is provided for the reservoir 31.

A plunger rod 35 is slidable in the partition 29 and projects outwardly at one end of chamber 28, the plunger rod having plungers or pistons 36 and 37 working in the chamber 28 at opposite sides of the partition 29.

The partition 29 thus forms pump chambers 38 and 39 in the opposite ends of the chamber 28 and in which the pistons 36 and 37 respectively work, the ports 32 leading to the respective pump chambers adjacent the inner ends of the latter.

Pipes 40 and 41 lead from the outer ends of the respective pump chambers 38 and 39 to a suction valve designated generally at 42. The valve housing 42 is positioned horizontally and includes a plunger type valve 43 having vertical passages 44 and 45 therein as well as diagonal passages 46 and 47 to provide a four-way valve similar to valve 10. A vent pipe 48 and a suction pipe 49 are attached to the valve housing 42 at a side thereof diametrically opposite to the pipes 40 and 41 and opposed thereto. The suction pipe 49 is attached to the intake pipe 5 at the suction side of the valve 6 and the suction pipe 49 is provided with a check valve 50.

A tube 52 is slidable at one end in valve housing 42 and threaded to the valve 43, the other end of the tube being connected to a collar 53 for uniform movement with the valve. The pis-

ton rod 35 is slidable in the collar and tube and provided with a fixed flange 35a at opposite sides of which are positioned coil springs 35b and 35c in the tube to provide a yieldable connection between piston rod 35 and valve 43.

The collar 53 is provided with a pair of annular grooves 54 in which snap rollers 55 are alternately seated, the rollers being positioned at diametrically opposite sides of the collar and journaled on rods 56 supported in brackets 57 attached to the adjacent end of chamber 28, the rods for the respective rollers being connected to each other by coil springs 58 to yieldably hold the rollers in the grooves 54.

The entire apparatus is enclosed in a protective housing 59 above the intake pipe 5 and supported on legs 60. The shaft 24 projects outwardly from one side of the housing 59 to the outer end of which the float arm 23 is attached to position the float 25 outwardly of the housing. The suction pump connected to the intake pipe 5 is continuously operated to constantly maintain suction in pipe 49.

The level of the drainage water raises and lowers float 25 to thus raise and lower valve 12.

With the valve 43 in the position as shown in Figure 2 of the drawings the vertical passage 45 in the valve will connect the suction pipe 49 with the chamber 39 while the vertical passage 44 in valve 43 will connect the chamber 38 with the vent 48. The pistons 36 and 37 accordingly will be moved toward the right, the piston 36 pumping the fluid from chamber 38 through branch pipe 26, pipe 15 and passage 19 to the chamber 9 under plunger 8 when the valve 12 is in its raised position to thus hold the gate valve 6 open.

Fluid above the plunger 8 in chamber 9 will be returned to the reservoir 31 by pipe 13, passage 20 and pipe 16.

Upon completion of the movement of pistons 36 and 37 toward the right the valve 43 will likewise be moved toward the right to connect pipe 41 with vent 48 by passage 47 and to connect pipe 40 with suction pipe 49 by passage 46.

The movement of pistons 36 and 37 will then be reversed to return the latter toward the left whereupon fluid from chamber 39 will be pumped by piston 37 through branch pipe 27 and pipe 15 into the chamber 9 under plunger 8 to likewise hold the gate valve 6 in its open position.

Accordingly the pistons 36 and 37 will continue to reciprocate to compress fluid in the lower portion of chamber 9 to hold the gate valve 6 in its raised position and to maintain the intake pipe 5 open as long as sufficient water remains around the intake end of pipe 5 to maintain the float 25 in a raised position.

When the float 25 is lowered the valve 12 will be moved downwardly to connect the pressure pipe 15 with pipe 13 by the upper horizontal passage 17 and thus build up pressure in the chamber 9 above the plunger 8 whereby to close the gate valve 6. Fluid from the lower portion of chamber 9 is returned to reservoir 31 by pipe 16.

The snap action rollers 55 and springs 35b and 35c hold the valve 43 momentarily in its opposite positions while suction is being built up in the chambers 38 and 39 before the valve moves into a reverse position to reverse the movement of the pistons.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. An automatic gathering valve for the suction intake pipe of drainage systems and comprising a gate valve in the pipe, a pressure chamber, a plunger working in the chamber and connected to the valve, fluid pressure pipes connected to the chamber above and below the plunger, a float controlled reversing valve for the pressure pipes to oppositely actuate the plunger, a fluid motor operated pump connected to the pressure pipes, and including tandem pump chambers each having a piston working therein, suction pipes connecting one end of each of the pump chambers to the intake pipe, and a reversing valve for the suction pipes and connected to the pistons for actuation thereby.

2. An automatic gathering valve for the suction intake pipe of drainage systems and comprising a gate valve in the pipe, a pressure chamber, a plunger working in the chamber and connected to the valve, fluid pressure pipes connected to the chamber above and below the plunger, a float controlled reversing valve for the pressure pipes to oppositely actuate the plunger, a fluid motor operated pump connected to the pressure pipes, and including tandem pump chambers each having a piston working therein, suction pipes connecting one end of each of the pump chambers to the intake pipe, a reversing valve for the suction pipes and connected to the pistons for actuation thereby, and delayed action means for the pistons and their reversing valve.

3. An automatic gathering valve for the suction intake pipe of drainage systems and comprising a gate valve in the pipe, a pressure chamber, a plunger working in the chamber and connected to the valve, fluid pressure pipes connected to the chamber above and below the plunger, a float controlled reversing valve for the pressure pipes to oppositely actuate the plunger, a fluid motor operated pump connected to the pressure pipes, and including tandem pump chambers each having a piston working therein, suction pipes connecting one end of each of the pump chambers to the intake pipe, a reversing valve for the suction pipes and connected to the pistons for actuation thereby, and delayed action means for the pistons and their reversing valve, said delayed action means comprising a double-grooved collar connected to and movable with the pistons, and snap rollers alternately seated in the grooves of the collar.

FRANK MASTNOCK.

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