

July 7, 1953

E. A. WARD

2,644,472

FLUSHING DEVICE

Filed Sept. 7, 1951

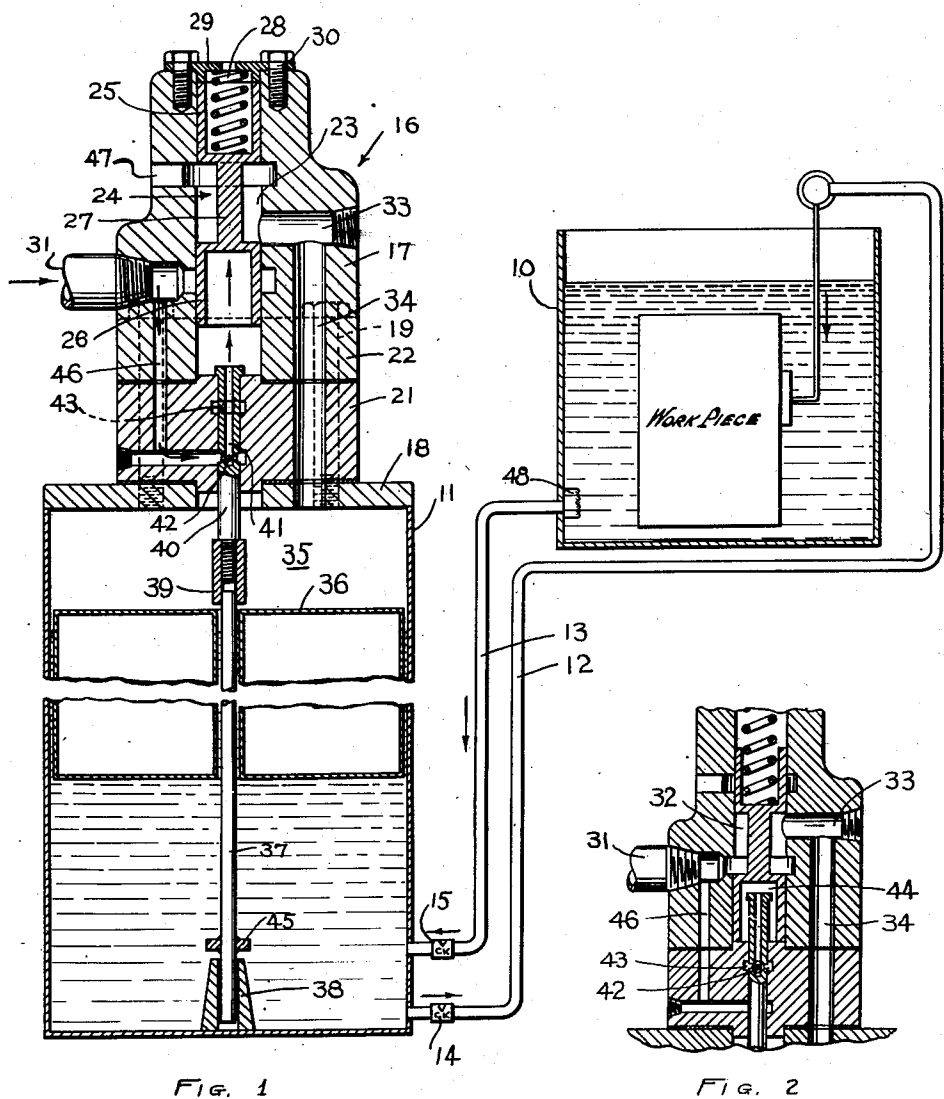


FIG. 1

FIG. 2

INVENTOR.
 EDGAR A. WARD.
 BY *Marvin W. Gady*
 ATTORNEY.

UNITED STATES PATENT OFFICE

2,644,472

FLUSHING DEVICE

Edgar A. Ward, Schenectady, N. Y., assignor to
American Locomotive Company, New York,
N. Y., a corporation of New York

Application September 7, 1951, Serial No. 245,488

5 Claims. (Cl. 134-56)

1

This invention relates to a flushing apparatus, and more particularly to automatic flushing apparatus for cleansing work pieces, such as cylinder heads, by supplying cleansing fluid under pressure from a reservoir to a flushing tank containing such a work piece or work pieces and then emptying the tank back into the reservoir and thereafter continuously repeating the cycle.

The principal object of the invention is to provide flushing apparatus which operates automatically for cleansing work pieces, such as cylinder heads. A further object is to provide such automatically operated flushing apparatus in which a tank containing work pieces to be cleansed is repetitively supplied with cleansing fluid from a reservoir in response to air pressure applied to a float positioned on the surface of the reservoir fluid, such pressure being cut off by means of a slide valve controlled by a pilot valve which is operated by the float so that the supply of fluid to the tank is interrupted at predetermined intervals and the return gravity flow of fluid from the tank to the reservoir is permitted after each such interruption. Another object is to provide automatic flushing apparatus in which compressed air from an outside source flows through a control unit to force a float in a reservoir downwardly to supply cleansing fluid from the reservoir to a work tank containing work pieces, such control unit having a slide valve therein operatively connected to the float so that upon predetermined downward movement of the float the valve responds to cut off the supply of compressed air against the float and hence the supply of flushing fluid to the tank, the valve acting at the same time to permit venting of the reservoir chamber, so that the float will return to its original position and the tank will empty into the reservoir by gravity for the beginning of another cycle.

Other and further objects of the invention will become apparent from the specification when read in light of the accompanying drawings and appended claims.

In the drawings, Fig. 1 is an elevational sectional view of the apparatus of the invention showing the tank emptying into the reservoir, the reservoir being at the same time vented and the compressed air which actuates the float being cut off, and;

Fig. 2 is an elevational sectional view of a portion of the control unit in which compressed air is under supply to the float and the pilot valve is in up position to vent the chamber under the slide valve.

2

Referring now to Fig. 1, a flushing tank 10 is supplied with cleansing fluid from reservoir 11 through pipe 12. Such fluid is placed under pressure in the reservoir, in the manner later to be described, and is ejected into the tank at high velocity to flush a work piece, say a cylinder head, which is shown diagrammatically in the drawing. After one flushing operation, the fluid flows back by gravity through pipe 13 to the reservoir. The cycle is thereafter repeated automatically. Check valves 14 and 15 are conventional. The former opens and the latter closes when the fluid in the reservoir is under pressure. Their settings are automatically reversed after the supply phase of the cycle is completed so that the return flow of fluid to the reservoir is permitted.

A control unit, generally indicated at 16, comprises a housing 17 secured to reservoir casing 18 by bolts 19. For purposes of assembly, housing 17 is made in two parts, a base 21 and a main body 22. An axial bore 23 extends through the main body 22 and terminates at the top face of the base. Bore 23 forms a cylinder in which there reciprocates a slide valve, generally indicated at 24. Valve 24 comprises two open-ended cylindrical portions or cups 25 and 26 which are connected by stem 27. Spring 28 is arranged in the upper valve cup 25 and is seated under compression at its upper end against cap 29 secured to housing 17 by screws 30. Normally slide valve 24 is urged by spring 28 to its down position against base 21 (see Fig. 2).

When slide valve 24 is in down position, compressed air from an outside source (not shown) enters through inlet 31 and passes through chamber 32 surrounding the valve stem, duct 33, and passageway 34 to chamber 35 in reservoir 11. Such pressure is sufficient in the chamber to force the float 36 downwardly against the fluid in the reservoir, thus forcing the fluid through check valve 14 and pipe 12 into flushing tank 10. Float 36 completely covers the fluid surface.

Guide rod 37, disposed along the vertical center line of the reservoir, is slidable at its lower end in a locating boss 38 loosely bored for its reception. Secured to the upper end of the rod is an internally threaded thimble 39 into which is threaded the lower end of pilot valve 40. Valve 40 is cylindrical and is provided with an axial bore 41 extending from its top face downwardly approximately half the length of the valve. A plurality of radial ports 42 are in communication with bore 41 at its lower end.

As shown in Fig. 2, when slide valve 24 is in

3

down position and compressed air is first admitted to the reservoir 11, pilot valve 40 is in its up position. Ports 42 in valve 40 are then in communication with a vent 43 so that the chamber 44 formed by lower cup 26 of the slide valve is at atmospheric pressure. Spring 28 is thereby enabled to maintain the slide valve in such down position. As float 36 moves downwardly in response to the compressed air pressure, it engages flange 45 on rod 37. Such flange, at the time of engagement, is in a higher position than shown in Fig. 1, since pilot valve 40 (see Fig. 2) is then in its up position held there by the differential pressure on the bottom of rod 37, the pressure acting thereon being a combination of the compressed air pressure in chamber 35 and the static head of water in reservoir 11. As float 36 continues to move downwardly against flange 45, rod 37 and pilot valve 40 are drawn down with it, first cutting off communication between chamber 44 and vent 43 through ports 42 and then establishing communication through the ports between air inlet 31 and chamber 44. Compressed air is then supplied through inlet 31, passageway 46, ports 42, and bore 41 to chamber 44, forcing slide valve 24 upwardly against opposition of spring 28. When slide valve 24 reaches its up position, compressed air to the float is cut off and chamber 35 is vented through passageway 34, duct 33, chamber 32 and port 47. Pressure upon float 36 is then atmospheric, check valve 15 opens, and check valve 14 closes so that fluid in tank 10 begins its return flow through screen 48 and pipe 13 in response to the gravity head. Float 36 then rises and engages thimble 39 to lift pilot valve 40 until the ports 42 reach the vent 43. The compressed air that is trapped in chamber 44 escapes through bore 41, ports 42, and vent 43 so that the slide valve 24 will drop in response to the urging of spring 28 and then the cycle will begin again.

It is to be understood only one embodiment of my invention is shown herein and that my invention is not to be limited to the precise construction shown and described herein. There is to be included in the invention alternative construction fairly within its scope and whatever equivalents fall fairly within the spirit of the appended claims.

What I claim is:

1. Flushing apparatus comprising a flushing tank, a sealed reservoir, reversible fluid transmission means for fluid flow from the reservoir to the tank when pressure is applied to fluid in the reservoir and for its return flow into the reservoir by gravity when such pressure is relieved, a float disposed upon and covering the surface of fluid in the reservoir, said float assuming its first position when the reservoir is substantially full of fluid and being adapted to move downwardly from such first position against the reservoir fluid in response to pressure thereby to force fluid from the reservoir to the tank, a pressure control unit having a passage to transmit compressed air from an outside source into the reservoir against the float, and a valve in such passage normally spring urged to open position to permit the movement of compressed air therethrough, said valve being responsive to the action of the float so that when the latter is in its first position said valve remains open and when the float has moved downwardly to a predetermined position in response to the action of the compressed air, said valve will close to cut off the compressed air from the float and to vent

4

the reservoir thereby terminating the flow of fluid from the reservoir to the tank and permitting the return flow of fluid from the tank to the reservoir by gravity.

2. Flushing apparatus comprising a flushing tank, a sealed reservoir, reversible fluid transmission means for fluid flow from the reservoir to the tank when pressure is applied to fluid in the reservoir and for return flow into the reservoir by gravity when such pressure is relieved, a float disposed upon and covering the surface of the fluid in the reservoir, said float assuming its first position when the reservoir is full of fluid and being adapted to move downwardly from such first position against the reservoir fluid in response to pressure thereby to force fluid from the reservoir to the tank, a pressure control unit having a passage to transmit compressed air from an outside source into the reservoir against the float, a valve in such passage normally spring urged to open position to permit the movement of compressed air therethrough, said valve being adapted to close in response to air pressure, a second passage in communication with the first passage, a second valve in the second passage to control the flow of compressed air therethrough, and means connecting the float and the second valve, the arrangement of the float and the valves being such that when the float is in its first position the first valve is open but when the float has been moved downwardly by compressed air the second valve opens to permit compressed air to pass through the second passage to close the first valve to cut off the compressed air from the reservoir and to vent the reservoir thereby terminating the flow of fluid from the reservoir to the tank and permitting the return flow of fluid from the tank to the reservoir by gravity.

3. Apparatus to apply intermittent pressure to a body of fluid in a sealed reservoir comprising a hermetically sealed reservoir to hold a body of fluid, a float disposed upon and covering the surface of such fluid body, said float being in its first position when the reservoir is substantially full of fluid and being adapted to move downwardly from such first position in response to air under pressure to force fluid from the reservoir, and a pressure control unit to supply compressed air intermittently against the top surface of the float to force the float against the fluid body, said unit comprising a housing, a first passage therein to transmit compressed air from an outside source to the reservoir and against the float, a first valve in the passage normally spring urged to open position to permit the movement of compressed air therethrough, said valve being adapted to close in response to air pressure, a second passage in communication with the first passage, and a second valve in the second passage connected to the float and movable therewith, said second valve being adapted to open when the float has been moved downwardly to a predetermined position by the action of the compressed air through the first passage thereby permitting compressed air to flow through the second passage to close the first valve, thus cutting off the supply of compressed air against the float, said second valve being further adapted to close when the float has moved to its first position thus permitting the first valve to open to allow the passage of compressed air therethrough.

4. Apparatus to supply intermittent pressure to a body of fluid in a sealed reservoir comprising a float disposed upon and covering the surface

of such fluid body, said float assuming its first position when the reservoir is substantially full of fluid and being adapted to move therefrom in response to the pressure of compressed air to force such body of fluid from the reservoir, a pressure control unit having a passage to transmit compressed air from an outside source into the reservoir against the float to force the latter from its first position against the reservoir fluid, a valve in the passage normally spring urged to open position to permit the movement of compressed air therethrough, said valve being adapted to close in response to air pressure, a second passage extending from the first passage to said valve, a vent from said second passage, a valve in the second passage which in its first position permits the transmission of compressed air through the second passage to the first valve to close the latter and which in its second position cuts off the supply of compressed air through the second passage to the first valve permitting the latter to open in response to spring urging, and means connecting the float and the second valve so that when the float moves to its first position, the second valve assumes its second position thereby causing the first valve to open to allow compressed air to act upon the float to force it from its first position against the reservoir fluid and so that when the float moves to a predetermined position the second valve assumes its first position to cause the first valve to close thus relieving the pressure of the compressed air upon the float.

5. Flushing apparatus comprising a tank in which an article may be disposed for cleansing by the flushing action of a fluid, a sealed reservoir for such fluid, fluid transmission means extending from the reservoir to the tank, valve

means in such transmission means to permit the passage of fluid therethrough when the reservoir fluid is under pressure, said valve means being adapted to permit the return flow of such fluid by gravity when such pressure has been relieved, a float disposed upon and covering the surface of the reservoir fluid, said float being in up position when the reservoir is substantially filled and being adapted to move downwardly against such fluid to force it from the reservoir when air pressure is applied thereto, and a pressure control unit having a passage therethrough to permit the flow of compressed air from an outside source into the reservoir against said float, a valve in said passage normally spring urged to open position, said valve being adapted to close in response to air pressure, a second passage in communication with the first passage, a second valve in the second passage, said second valve, when in open position, being adapted to permit the flow of compressed air from the first passage through the second passage to close the first valve thereby cutting off the flow of compressed air against the float, and means connecting the float and the second valve so that the second valve will open when the float reaches a predetermined down position in response to the pressure fluid flowing through the first passage and so that the second valve will close when the float returns to up position as the cleansing fluid returns to the reservoir by gravity from the cleansing tank.

EDGAR A. WARD.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,243,446	Terlesky et al.	May 27, 1941