Nov. 8, 1955 J. D. LANGDON ET AL 2,722,944

VALVE MUFFLER AND REFILL

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FIG. 1

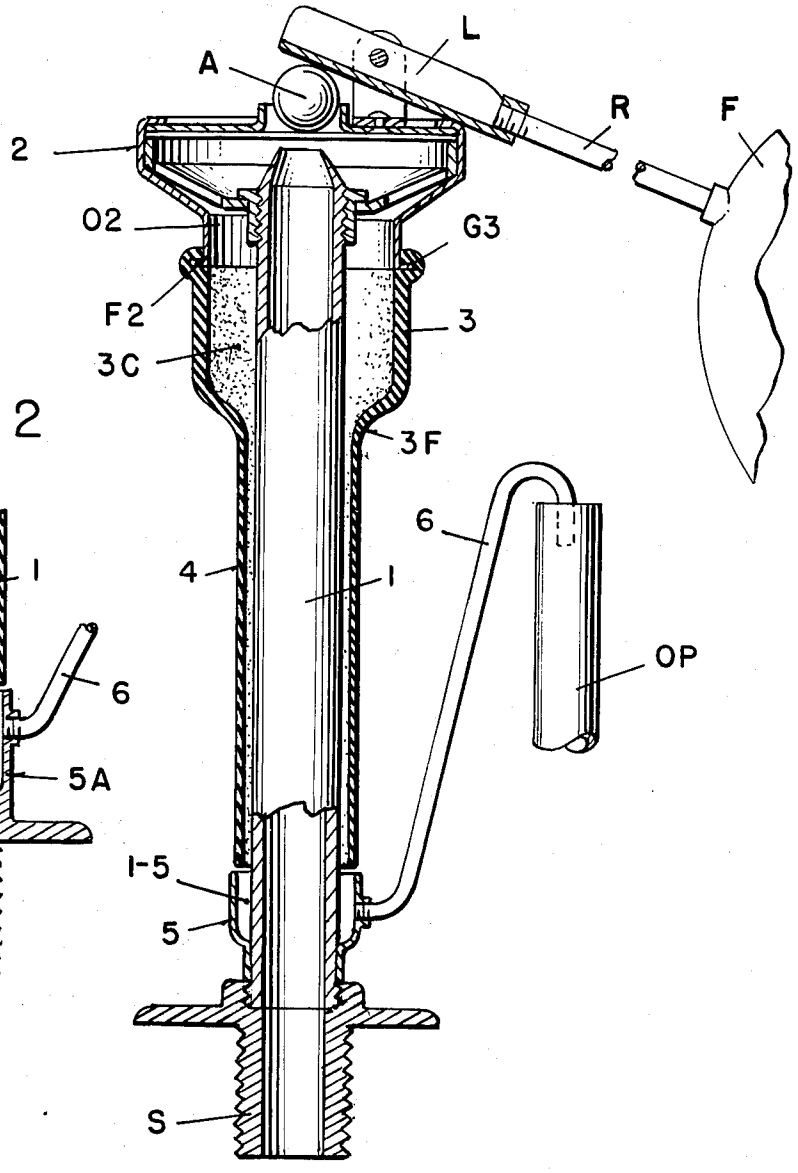
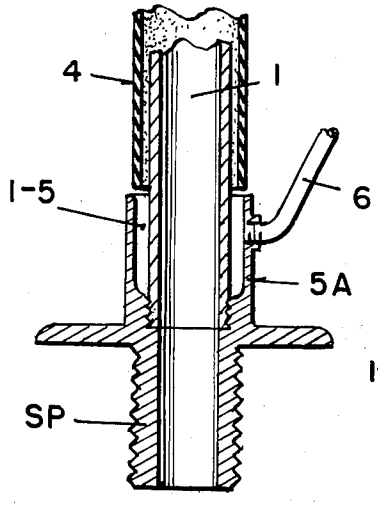


FIG. 2



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FIG. 3

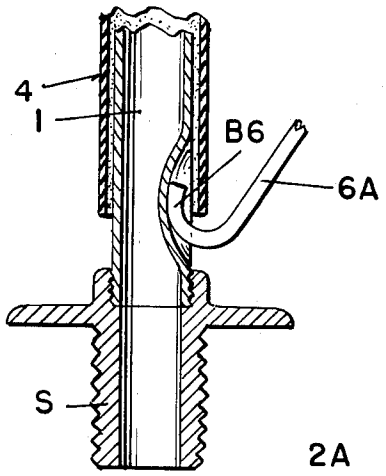
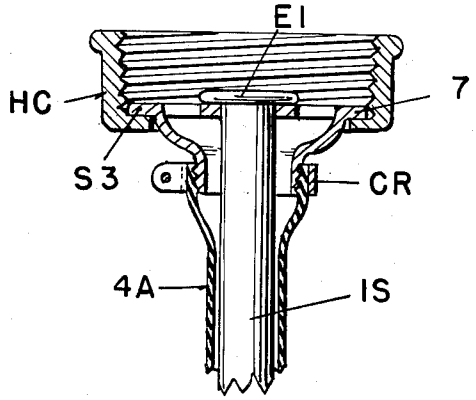


FIG. 7



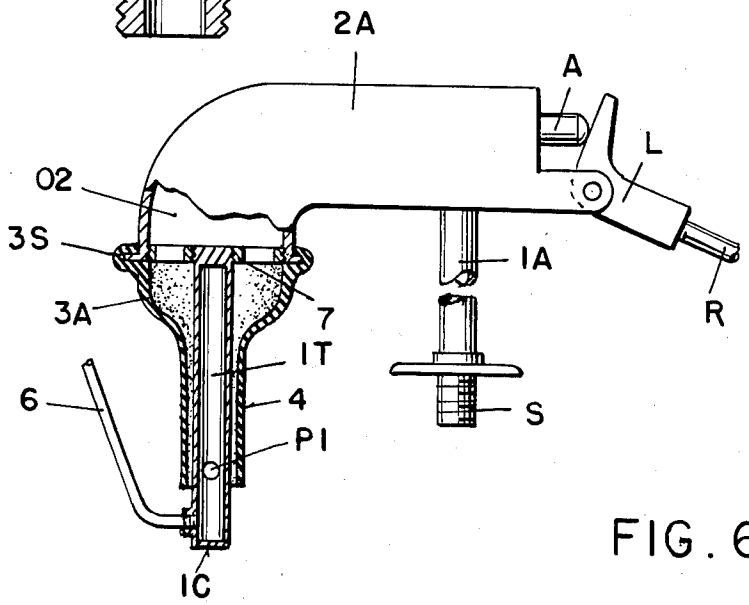


FIG. 4

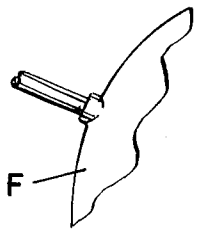


FIG. 5

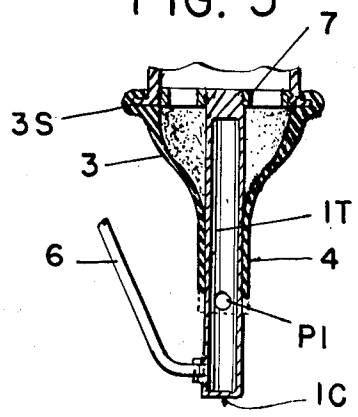
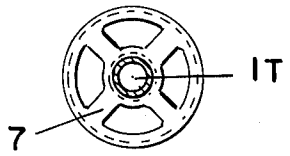


FIG. 6



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United States Patent Office 2,722,944 Patented Nov. 8, 1955

2,722,944

VALVE MUFFLER AND REFILL

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Application September 19, 1949, Serial No. 116,498

7 Claims. (Cl. 137—437)

The invention pertains to ball cocks and tank valves particularly for use with flushing defecators and the like and has for its primary objects the muffling of valve noise and provision of a siphon proof refill for the trap of a defecator after flushing.

Another object is the provision of siphon proof conduit construction for attachment to a source of pressure fluid supply.

A further object is to prevent contamination in a source of liquid supply when a subatmospheric pressure exists in the source of supply by providing a self-closing attachment between a source of contamination and the supply source.

Other and further objects will appear during the progress of the specification as illustrated by the drawings; showing several different reductions to practice which may be changed within the scope of the claims.

Of the drawings:

Fig. 1 is an elevation of a longitudinal median section of a preferred form of the invention, as assembled with a valve.

Fig. 2 is an elevation of a sectional fragment of the lower portion of the assembly as of Fig. 1 showing an alternative form of the invention.

Fig. 3 is a sectional fragment of the lower portion as of Fig. 1 showing an alternative form of attaching a refill tube 6A.

Fig. 4 is an elevation of an alternative form of the invention and the outlet end of a valve head partly cut away in median section.

Fig. 5 is a modification of the cut away portion shown in Fig. 4.

Fig. 6 is a detail of the spider 7 looking up the tube 1T in transverse section.

Fig. 7 is an elevation of an alternative form of the invention showing a solid core 1S, the sleeve 4A attached to a hose coupling, being shown in median section.

To aid in describing the invention the conventional or old elements and parts are indicated by letter characters only. Similar elements essential to the invention are designated by similar characters thruout the drawing, the parts contributing to the novel features of the organization of the invention by which the new results are obtained are designated by numerals with letter added to indicate various departures in form shown by different figures of the drawing.

Letter characters indicate generally old elements which have functional and illustrative value only, to aid in describing the invention and designate: a valve actuator A impinged by a pivotally attached operating lever L connected by a rod R to a float F and mounted on head 2; whereby changes in the predetermined water level control the opening and closing of a valve equipped with the invention when installed in a tank.

The overflow standpipe OP is commonly used in all types of tank usually attached to a defecator toilet bowl or the like and provides means to limit the liquid level in the tank and carry away surplus water in case the valve

fails to function properly and also serves as a conduit for liquid from refill tube as at 6, Fig. 1, or similar tubes in the other figures. After flushing a defecator and evacuating a tank a trap provided in a defecator will be refilled with liquid by the refill tube 6.

The spud S is of the type commonly used to attach a valve or ballcock into a tank.

The clamp ring CR as of Fig. 7 is of a type commonly used to assemble a hose on the pivoted nipple of a hose coupling HC. The parts indicated by the designating characters essential to the invention are:

The supply tube riser or inlet 1, the casing or valve head 2, the casing outlet O2, rubber nipple 3, soft rubber hush sleeve 4, annular cup or sleeve member 5, clearance space 1—5, and refill tube 6 are designated by the same numerals in such figures as illustrate substantially the same form of structure.

Fig. 1 shows a spud S attached to a supply or tubular riser forming an inlet 1 supporting a valve head or casing 2 having an annular outlet portion O2 surrounding inlet tube 1. The outlet portion O2 has an outwardly projecting flange F2 at its distal end encompassed by the internal groove G3 recessed into and surrounded by the beaded upper end of cylindrical nipple 3 made of distortable material capable of returning to normal shape. A soft rubber sleeve 4 of material similar to nipple 3 surrounds inlet riser 1 and extends downwardly to meet the upper end of the wall of cup 5 surrounding said inlet riser 1 in this instance forming a core for an annular passage surrounded by the tube 4. The wall of cup 5 surrounds core 1 to form the annular receptacle 1—5 between riser or core 1 and the wall of the cup. A refill tube 6 is attached thru the wall of cup 5 and communicates with the annular receptacle 1—5.

The lower portion of cup 5 preferably forms a tight fitting sleeve to hold cup 5 in operative position.

The lower end of the enlarged upper portion of nipple 3 is provided with a funnelled end 3F preferably provided with the lower end forming an annular baffle to offer maximum resistance to the flow of liquid under pressure thru the annular chamber 3C formed between riser 1 and the wall of nipple 3; whereby the latter is urged downwardly during the flow of pressure fluid therethru.

The sleeve 4 being extended from the baffle formed by lower end of nipple 3 is moved downwardly by the effect of pressure fluid against the baffle end of nipple 3 thus connecting the flexible sleeve 4 with annular cup 5 to enhance the flow of liquid from nipple 3 creating a continuously enclosed passage for liquid between the lower end of sleeve 4 and upper end of sleeve 5 and increasing liquid pressure in space 1—5 and 3C forcing water to flow thru refill tube 6 communicating with overflow standpipe OP.

Fig. 2 is a sectional fragment of the lower portion of the valve assembly and illustrates a special spud SP, the upper end of which has cylindrical wall 5A surrounding the annular space 1—5 between riser 1 and wall 5A which is in effect the same as cup 5 of Fig. 1. The arrangement of parts and the operation of the organization is substantially the same as that of Fig. 1.

Fig. 3 is a median section of a fragment of an alternative form of lower portion of assembly. Refill tube 6A has its lower end B6 curved and recessed into wall of inlet riser 1, the open lower end B6 of refill tube 6A is encompassed by sleeve 4 and must be located low enough so that a greater wall area of sleeve 4 is exposed to atmospheric pressure above open end B6 of refill 6A in order to prevent liquid effected by atmospheric pressure from entering valve 1 when subatmospheric pressure exists therein. The area of sleeve 4 above refill opening B6 is collapsed against outer wall of riser 1 when subatmospheric pressure exists inside nipple 3. If area of the inner wall of sleeve 4 is greater below open end B6 of refill 6A sleeve 4 is liable

to permit liquid subject to atmospheric pressure to enter the valve when a subatmospheric pressure exists therein such as may occur if a foreign body is lodged between valve A and the adjacent valve seat.

Fig. 4 is an alternative form of the invention applied to a different form of valve head or casing 2A wherein outlet O2 is located laterally of riser 1A. The outlet O2 has nipple 3A secured at 3S in the same manner as nipple 3 is secured to casing 2 of Fig. 1.

The tube 1T is closed at both ends and forms a core and depends from a spider 7 threadedly inserted into outlet O2 of casing 2A. The tube 1T is perforated near its lower closed end 1C and refill tube 6 communicates tube 1T at a point below port P1 or from closed end 1C, the latter form not shown.

When liquid under pressure is passing thru sleeve 4 which extends across port P1, liquid is urged into port P1 and tube 1T and passes into refill tube 6 thence into overflow OP as shown by Fig. 1.

Fig. 5 is substantially the same as Fig. 4, except that sleeve 4 when in repose terminates above port P1 and forms a "shutter" which is lowered over port P1 when pressure fluid is passing thru nipple 3, thus constricting pressure fluid within area of sleeve 4 which encompasses wall portion of tube 1T thru which port P1 is perforated, and forcing a flow of fluid thru refill tube 6.

Fig. 6 is a detail view of spider 7 and tube 1T looking up.

Fig. 7 shows a hose coupling having spider 7 therein with a core 1S made tubular or solid; end E1 of core 1S being closed and secured thru spider 7. The device may be made of any material suitable to any adaptation, and forms a backflow preventer suitable to be coupled to any pressure fluid outlet which it is desired to protect against contamination when source of pressure fluid is subjected to subatmospheric pressure.

The core 1S, made of comparatively stiff material acts as a seat for wall of hose or sleeve 4A made of soft distortable material capable of resuming normal shape. Sleeve 4A normally rests against core 1S. Pressure fluid entering thru spider 7 to sleeve 4A distends the latter and passes out the distal end thereof.

When subatmospheric pressure exists within coupling HC sleeve 4A is collapsed against core 1S creating a check valve effect thruout entire length of device. A backflow preventing hose can be produced by using a flexible core 1S running length of sleeve 4A, the hose being in effect a check valve over its entire area.

Having described the invention and the operation thereof, the following claims are made:

1. A valve muffler and refill combination including a valve head having inlet and outlet ends, means for attaching the inlet to a liquid supply source, a core surrounded by liquid passage means and secured within and projecting from the outlet, a tubular sleeve of rubber-like material secured to said head, surrounding the projecting end of said core and circumscribing an annular passage extension for the outlet passage; wherein a refill tube has an intake end secured in position with the passage therethru contiguous to said annular passage, at least a portion of the sleeve of rubber-like material intervening between the refill intake and said head whereby external atmospheric pressure will deform the intervening portion of the rubber-like sleeve between said outlet end of said head and the intake end of said refill at such times as negative pressure exists within said head, thereby eliminating communication between said head and said refill intake.

2. A valve of the kind described having an inlet and an outlet provided with a sleeve made of deformable material extending from the outlet and forming the outer wall of an annular passage surrounding a core forming the inside wall of the passage, the intake end of a refill tube conjoining with said core, said sleeve wall normally disposed in close proximity to the refill intake, same being confluent with the passage surrounding the core, at least at such times as liquid is flowing thru both passages, said sleeve forming a muffler extension from the valve outlet, the passage inside the sleeve confluent with the passage of said refill conjointly tending to slow up and muffle sound of a velocity liquid head flowing from the valve.

3. A valve muffler and refill for combination with a valve head having an inlet end for connection to a liquid supply source, an annular outlet passage surrounding a depending axially secured core, same encased by a tubular extension made of deformable material, a refill tube secured to said core for conducting liquid to a discharge point other than that of a terminus provided for the annular passage; wherein one end of said refill is provided with an intake end secured in place beyond the outlet end of the head, facing toward the inside of and communicating with a portion of said annular passage that is encased by deformable material, a portion of the tubular extension surrounding said core and intervening between the head and the refill intake, whereby, negative pressure existing within said head atmospheric pressure will collapse the deformable tube against said core and thereby preclude passing of fluid thru said annular passage and said refill intake.

4. A device as defined by claim 3 wherein the core is formed by a pipe constituting an intake extension for the head.

5. A device as defined by claim 3 wherein the core is constituted by an axial extension secured within the outlet end of the head.

6. A device as defined by claim 3 wherein the core is formed by a tubular core having a closed upper end, depending from and secured within the outlet portion of the head, the refill intake being perforated thru the core wall facing the inner wall of the deformable tube, same being extended beyond the perforation, the refill tube being contiguous with the tubular core whereby liquid entering said tubular core will be conducted thru said refill tube.

7. A combination including a valve casing forming a a valve head having an inlet and an outlet and being mounted on a standpipe having a passageway continuous with the inlet, said outlet being contiguous with an annular passage surrounding a core disposed inside of and extended from within the outlet passage; wherein the outlet is provided with a sleeve made of flexible deformable material extended from the casing outlet and constituting an outer wall for an elongated annular passage around the core, a refill tube provided with an intake end attached to said core, the refill intake confluent with the annular passage and encased by the deformable wall same surrounding passage at least at such times as fluid under pressure flows thru said sleeve and refill, a portion of said sleeve intervening between said casing and the refill intake and adapted to deform and collapse against said core under influence of atmospheric pressure, said sleeve together with said core forms check valve means to prevent backflow of fluid when a subatmospheric pressure exists within the casing under abnormal conditions of pressure as may occur when a valve closing mechanism provided for the inlet seat fails to function.

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