July 30, 1963 M. A. POWERS 3,099,286

REVERSIBLE VALVE CLOSURE MEMBER

Filed Jan. 22. 1960

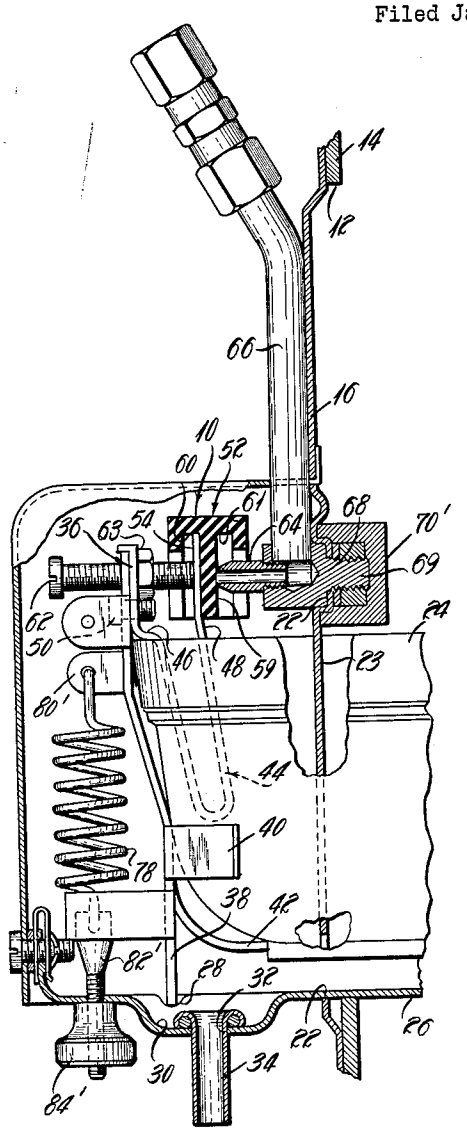


Fig. 1

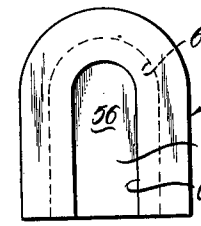


Fig. 2

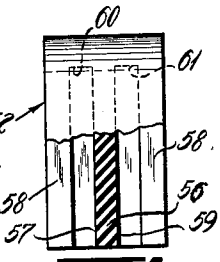


Fig. 3

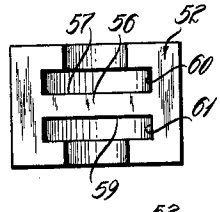


Fig. 4

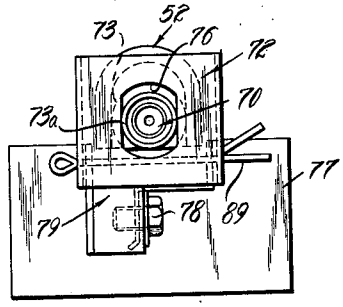


Fig. 6

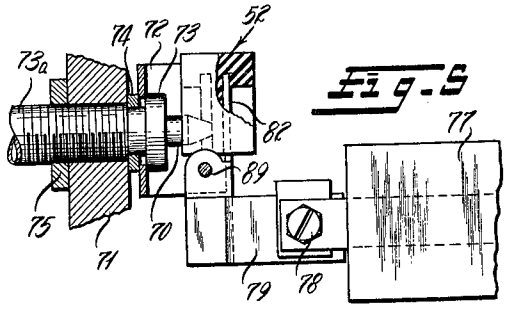


Fig. 5

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REVERSIBLE VALVE CLOSURE MEMBER

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5 Claims. (Cl. 137—315)

This invention relates to valves and is particularly directed to a novel valve seating arrangement particularly incorporating a special removable, multi-position, reversible, and replaceable closure element.

In its preferred embodiment the invention will be described as used in an automatic water flow control device for which it is peculiarly adapted but it is of more general application as the scope of the claims indicate.

It is the major object of the invention to provide a valve closure element that is of novel construction, presents a large number of seat engaging areas on each side, is reversible for substantially doubling its useful life, is readily removable for easy inspection and replacement.

A further object of the invention is to provide a novel one-piece valve closure element of rubber or like tough resilient material that is symmetrical for reversibility, with dual multi-purpose functions for each side.

It is a further object of the invention to provide a novel valve structure wherein a resilient valve closure element is mounted for special coaction with a liquid discharge nozzle.

A further object of the invention is to provide novel mounting bracket arrangements for a reversible valve closure element.

This is a continuation-in-part of my copending application for United States Letters Patent No. 761,314 filed September 16, 1958, and now Patent No. 3,048,163.

Further objects of the invention will appear in connection with the appended claims and the annexed drawings wherein:

FIGURE 1 is a fragmentary elevation in section showing a valve assembly according to a preferred embodiment of the invention as used in a humidifier;

FIGURES 2, 3 and 4 are front elevation, side elevation (partly in section) and bottom views of the removable and reversible valve closure element;

FIGURE 5 is a fragmentary side elevation, with part of the valve element shown in section, showing a further embodiment of the invention; and

FIGURE 6 is a front elevation of the device of FIGURE 5.

FIGURE 1 shows a humidifier assembly incorporating the valve structure of this invention indicated generally at 10 mounted in an aperture 12 through the wall 14 of a plenum chamber or hot air duct of a hot air furnace by means of an adaptor plate 16 suitably rigidly attached to wall 14.

Adaptor plate 16 has a cut-out section indicated at 22, the portion of the plate 16 remaining adjacent the inside of cut-out section 22 forming a downwardly extending shield 23. A generally rectangular water reservoir pan 24, preferably of heat resistant glass or other non-corrosive material, fits through cut-out section 22 and has one end thereof detachably mounted on a tiltable support bracket to be described hereinafter. The shield 23 is thus disposed transversely across the inside of water reservoir pan 24 and extends downwardly to a position closely adjacent the normal water level in the pan. An overflow pan 26 fitting in the bottom of cut-out section 22 and extending for a major portion of its length into the plenum chamber or air duct is rigidly secured to adaptor plate 16 by welds or other suitable means. Formed in the bottom of overflow pan 26 are elongated mounting grooves 28 for mounting a support bracket disposed in generally

parallel relation to adaptor plate 16 and leading to a sump 30 having a drain opening 32 in which there is inserted an overflow grommet 34 adapted to receive a length of tubing (not shown) for conducting overflow water to a suitable location for each installation.

A substantially vertical metal support bracket indicated generally at 36 and having legs 38 supported in the grooves 28 is pivotally or tiltably mounted in the bottom of overflow pan 26. The support bracket 36 has outwardly extending spaced side arms 40 and bottom arm 42 disposed below and between the side arms 40, the arms being adapted to receive and support the sides and bottom respectively of reservoir pan 24.

A generally U-shaped spring clip indicated at 44 and having spaced legs 46 and 48 has its leg 46 secured to the upper end of support bracket 36 by a screw 50 so that an end of reservoir pan 24 can be securely clamped between support bracket 36 and leg 46 when screw 50 is tightened.

A valve closure member indicated generally at 52 of synthetic rubber or like resilient material is slidably mounted on the upper end of a rounded tip tongue 54 formed on leg 48. The valve member 52 has a center planar web section 56, opposite sides of which form parallel flat selectively usable valve seat engaging surfaces 57 and 59. Extending outwardly on opposite sides from the planar section forming the valve seat engaging surfaces are generally inverted U-shaped hoods 58 having grooves or recesses 60 and 61 on the underside thereof adjacent the center planar section 56 either of which grooves are open at the lower end so as to be adapted to slidably receive tongue 54.

With tongue 54 in groove 60 as shown in FIGURE 1, the opposite side of the center planar section 56 forms a valve seat engaging surface at 59. The valve member 52 is reversible since tongue 54 may optionally be received in groove 61 so that surface 57 becomes the valve seat engaging surface. In addition, contact friction between tongue 54 and the slightly distended resilient valve member allows the valve member 52 to be positively positioned vertically, thus providing several fresh valve surfaces to be selectively exposed on each side of section 56, by simple adjustment from time to time. A desired space between legs 46 and 48 is maintained by a screw 62 threaded through upper portion of bracket 36 and leg 46 to abut against tongue 54, adjustment of which will be described in more detail hereinafter. A locknut 63 holds screw 62 adjusted. This locates seat engaging surface 59 in FIGURE 1 relative to the water discharge nozzle as will appear.

The weight of water reservoir pan 24 and its contents causes support bracket 36 to tilt in a direction to move the surface 59 of valve member 52 against the discharge end of a horizontally disposed nozzle 64 at the end of a water supply pipe 66. A valve (not shown) may be provided in the pipe 66 to limit the maximum velocity from nozzle 64 as desired. Nozzle 64 and the lower end of pipe 66 enter a hollow nozzle retainer 68 that has a threaded stud 69 extending through a hole in the adaptor plate and mounting clamping nut 70'. The discharge axis of nozzle 64 is essentially horizontal and fixed.

A coiled tensioned counterbalance spring 78, having one end connected to an ear 80' on support bracket 36 and an opposite end connected to the end of a bolt 82' extending through the bottom of overflow pan 26 and held in position by a nut 84', biases support bracket 36 in a tilting direction to the valve member 52 away from nozzle 64 when water in reservoir pan 24 falls below a predetermined level. Tension on spring 78 may be adjusted as desired by turning nut 84' to compensate for the weight of water reservoir pan 24 and its contents, thereby maintaining valve member 52 in a substantially balanced posi-

tion against nozzle 64. In the condition of balance flat surface 59 is vertical and perpendicular to the axis of nozzle 64. It also may be desirable to adjust the tension of spring 78 in accordance with the water pressure at nozzle 64, a high pressure resulting in less tension being required by the spring.

Referring to FIGURES 2–4 the hoods 58 have similar aligned side apertures 63 which are smaller than recesses 60 or 61 so that the hoods effectively extend laterally over the recesses. Member 52 is symmetrical about a vertical plane bisecting grooves 60, 61 in FIGURE 2 and about a vertical plane bisecting section 56 in FIGURE 3.

When valve member 52 is in a displaced position to open nozzle 64, hood 58 over the acting valve seat engaging surface deflects water being discharged from the nozzle 64 downwardly into the reservoir pan 24. Thus positive filling of reservoir pan 24 is assured because all water from the nozzle 64 is deflected into the reservoir pan 24 with none escaping in the form of a spray to fall outside. Another feature of the valve member 52 is that it is frictionally slidable up and down to new positions on the tongue 54 of spring clip 44. As the valve seat engaging surface which abuts the end of nozzle 64 becomes worn, the valve member 52 may be moved upward or downward on tongue 48 so that a new surface will abut the end of nozzle 64. When all available surface area on one side of the central planar section 56 has been worn, or damaged, the valve member 52 may be removed and reversed so that tongue 54 is inserted in the groove 61 adjacent the worn surface. Thus valve member 52 has a much longer usable life span than those valve members having only one seat engaging surface. Valve member 52 is novel in that it combines several advantages: (1) It is a single molded member providing a multiplicity of available valve surfaces. (2) It is readily removable for visual inspection and slips on and off readily without necessity of screws or any other means of attachment and without regard as to whether the same surface area is presented to the nozzle. (3) The recessed flange on each side serves alternately as a mounting retainer and water deflector into the reservoir. (4) The metal tongue backs up the valve seat engaging area at 56 and distributes the pressure of screw 62 over a wide area. (5) The hooded grooves combine with the rounded end tongues of easy mounting of member 52. (6) By simply making the tongue wider than the groove 60 (61) a reliable frictional adjustment that maintains itself is obtained. (7) The hoods help maintain surfaces 57 and 59 perpendicular to the nozzle axis.

The adjustment screw 62 permits positioning of valve member 52 in relation to the adjusted position of reservoir pan 24, thereby making it possible to obtain a substantially parallel valve seat engaging surface in relation to the discharge end surface of nozzle 64.

FIGURES 5 and 6 diagrammatically illustrate a further embodiment. Here the liquid discharge nozzle 70 is fixed to a support 71, and a U-shaped valve bracket 72 is axially rigidly clamped rearwardly of nozzle 70 between enlarged section 73 and a washer 74. A lock nut 75 holds the nozzle and bracket assembly fixed. Water supply enters through tube connection 73*a*.

A float 77 is mounted in a body of water or other liquid (not shown). Rigidly secured to float 77, as by bolt 78, is a valve arm bracket 79.

Bracket 79 carries a pivot pin 89 whereby bracket 79 and float 77 pivot about the axis of pin 89 as the water level changes. Bracket 79 has an upstanding flat tongue 82 which serves the same purpose as tongue 48 of FIGURE 1 for mounting valve member 52, so that valve member 52 moves toward or from the open end of nozzle 70 as the float changes level.

In both embodiments of the invention, while tongues 48 and 82 may be thinner than the associated mounting grooves 60 and 61, the tongues are slightly wider than those grooves so that they frictionally engage the vertical sides of the grooves to slightly distend the resilient closure member whereby they mount the closure member in any of a number of different adjusted positions for valve seat engaging without the necessity of screws or other fastening elements.

Thus in both embodiments above described I have provided a symmetrical molded valve closure element of synthetic rubber or some other resilient plastic such as nylon, which has adequate resiliency to seal but sufficient hardness and toughness to resist wear and which is adapted to sealingly press against the open end of a liquid discharge nozzle, and it has such ease of reliable adjustability and reversibility that it may present an infinite multiplicity of proper seat engaging surfaces to the nozzle end so that its life is considerable.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A unitary symmetrical reversible valve member integrally made of resilient non-metallic material and comprising a solid imperforate intermediate web section having on opposite sides substantially parallel valve closure surfaces, and means providing inwardly open guide recesses in said member extending for substantial distances around the outer peripheries of corresponding end portions of said surfaces, said recesses being discontinuous at the other ends of said surfaces and adapted to receive a mounting member in reversed positions of said valve member.

2. In a valve assembly having a rigid mounting member providing an upstanding tongue, a flexible valve closure member having an intermediate web section with valve seat engaging surfaces on opposite sides, and hood means on said member providing inwardly open guide recesses extending peripherally part way around said surfaces and opening from the same end of said seat member to said surfaces, whereby said tongue may extend endwise into the open end of one or the other of said recesses for mounting the valve closure member to present the seat engaging surface of the other recess in operative position in the valve assembly.

3. In a valve assembly, a mounting member having an upstanding tongue, a valve closure member having an intermediate section with valve seat engaging surfaces on opposite sides and spaced recesses extending peripherally part way around said surfaces and opening from the same end and opposite sides of said seat member to said surfaces, said tongue extending endwise into one of said recesses for mounting the valve closure member to present the seat engaging surface of the other recess in operative position, a relatively fixed liquid discharge nozzle adapted to engage said other seat engaging surface, and means for relatively adjusting said nozzle and other surface so that different areas of said other surface are disposed for seating contact with said nozzle.

4. In a valve assembly, a mounting member having an upstanding tongue, a valve closure member having an intermediate section with valve seat engaging surfaces on opposite sides and spaced recesses extending peripherally part way around said surfaces and opening from the same end and opposite sides of said seat member to said surfaces, said tongue extending endwise into one of said recesses for mounting the valve closure member to present the seat engaging surface of the other recess in operative position, a relatively fixed liquid discharge nozzle adapted to engage said other seat engaging surface, and means for relatively adjusting said nozzle and other surface so that

different areas of said other surface are disposed for seating contact with said nozzle, said valve member being vertically symmetrical and reversible.

5. In a valve assembly, a mounting member having a rigid upstanding tongue, a non-metallic valve closure member having an intermediate web section with valve seat engaging surfaces on opposite sides and spaced recesses extending peripherally part way around said surfaces and opening from the same end and opposite sides of said seat member to said surfaces, said tongue extending endwise into one of said recesses for mounting the valve closure member to present the seat engaging surface of the other recess in operative position, a relatively fixed liquid discharge nozzle adapted to engage said other seat engaging surface, means for relatively adjusting said

nozzle and other surface so that different areas of said other surface are disposed for seating contact with said nozzle, and additional means for adjusting the position of said valve closure element carried by said tongue toward and away from said nozzle.

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