

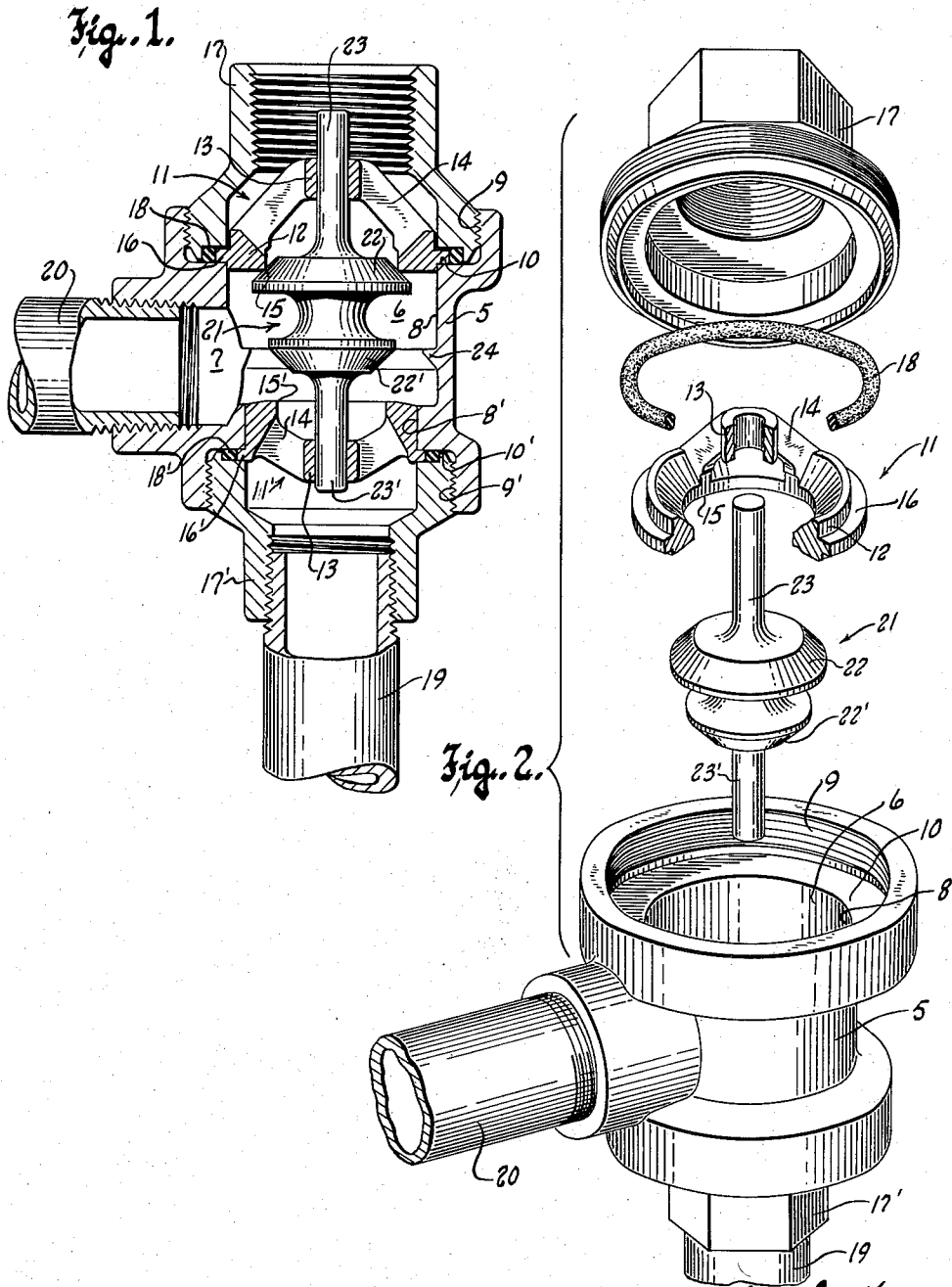
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ANTI-SIPHON ANTI-BACKFLOW VALVE

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1

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ANTI-SIPHON ANTI-BACKFLOW VALVE
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This invention relates to valves and refers more particularly to anti-siphon anti-backflow valves of the types used in situations where protection must be provided against the flow of contaminated water back into the supply system. One instance where such backflow could occur and for which the valve of this invention was especially designed, is in connection with drinking cups provided in dairy barns. These cups usually consist of a bowl connected to the water supply system below the water level in the bowl, by a valve operable by pressure which the cow exerts with its muzzle against a lever located in the bowl. Since farms are generally equipped with individual water systems, pressure failures are not uncommon and, when they occur, there is a strong possibility that water from the drinking cups of the barn is apt to flow back or be siphoned into the supply system, unless some means is provided to prevent this occurrence.

It is recognized that anti-siphon anti-backflow valves per se are not new, but valves of this type heretofore available, have not lent themselves well to the particular installation above outlined, especially since they were not capable of being easily and quickly disassembled for cleaning purposes, and also because they were not entirely reliable.

The present invention, therefore, has as its purpose to provide an anti-siphon anti-backflow valve which is simply constructed and easily disassembled for cleaning, and, in addition, is unfailingly reliable in operation.

Another object of this invention is to provide a valve of the character described which consists of but a few easily manufactured parts.

Still another and very important object of this invention is to provide a valve of the character described wherein the valve seats are not only renewable, but in fact easily and quickly entirely replaceable, to which end the valve is so constructed that the valve seat unit is readily and easily disassembled from the valve body.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claim.

The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof and in which:

FIGURE 1 is a view in longitudinal section through the valve embodying this invention, and illustrating the same connected in a supply line; and

FIGURE 2 is an exploded perspective view of the various components of the valve.

Referring now more particularly to the accompanying drawing, the numeral 5 designates the body of the valve which, as shown, has a substantially T-shaped formation with the head thereof providing a main passage 6 which must be vertical when the valve is in position of use, and the stem of the T providing a lateral branch passage 7. The opposite ends of the passage 6 are open and are bored, as at 8-8', and counterbored as at 9-9', the junctions between the bores and counterbores providing oppositely facing shoulders 10-10'. The bores and

2

counterbores are exactly coaxial, and attention is directed to the fact that the upper bore 8 and its counterbore 9 are of larger diameter than the lower bore 8' and counterbore 9'.

5 Readily removably received in the upper and lower ends of the vertical passage 6, are upper and lower valve seat units 11 and 11', respectively. Each of these valve seat units comprises a spider having an annulus 12, a hub 13, and radiating arms 14 connecting the hub and annulus. 10 The outer diameter of the annulus is of a size to be snugly, though freely, received in its respective bore 8-8', so that the two units are held in exactly coaxial alignment with their hubs facing in opposite directions and the inner edges of the annuli facing one another to provide upper 15 and lower valve seats 15-15'.

The axial position of the valve seat units is defined by circumferential flanges 16-16' extending from their annuli and clamped against the shoulders 10-10' by tubular retaining members 17-17' threaded into the 20 counterbores 9-9'. Leak proof connections between the valve seat units and the valve body are provided by O-ring type gaskets 18-18' confined between the retaining members and the shoulders. Accordingly, the only communication between the lateral branch 7 of the valve 25 which constitutes the liquid outlet, and either the upper or lower ends of the main branch 6, is through the ports defined by the annuli 12, and these ports are controlled by a valve spool indicated by the numeral 21.

An important feature of this invention is that the upper 30 port, formed by the annulus of the upper valve seat unit, is larger than the lower port. In fact, it has been found that the upper port should be at least one and one-half times as large as the lower port. Unless this difference in port areas is maintained, there is danger that the 35 valve will not respond properly to a condition demanding closure of the lower port. For instance, if the port areas are substantially the same, and certainly if the upper port has a smaller area than the lower port, the valve spool tends to "float" in an unseated condition permitting contaminated water to be drawn into the supply 40 system when the pressure thereof drops.

Assurance that the valve seat units will be correctly assembled into the valve body with the unit having the largest port at the top, is obtained by the difference in 45 diameters of the bores 8-8' and the corresponding difference in size of the two units.

The valve pool 21 has two oppositely facing upper and lower valve discs 22-22', respectively cooperable with the valve seats 15-15'. The spool is freely movably 50 supported between the valve seats by stems 23-23' projecting from the discs and slidably received in the bores of the hubs 13 of the valve seat units. The two discs are, of course, rigidly connected together, and their seating surfaces are conical, as shown, while the valve seats 15-15' preferably have sharp knife edges. 55 The axial distance between the two discs is substantially less than the distance between the upper and lower valve seats so that only one disc can be seated at a time.

To assure prompt and easy action of the valve, the 60 entire valve spool unit including its stems, is of such proportions and weight that the specific gravity thereof is substantially equal to that of the liquid with which the valve is to be used.

The valve spool unit may be made of many different 65 materials, but thermo-plastics are exceptionally well adapted to the purpose, and because of its high impact strength, Super Dylon is particularly good.

Prompt lifting of the valve spool to its position allowing liquid flow through the valve body and completely 70 blocking the upper port is assured by an inwardly extending lip 24 on the inside of the valve body. This lip is located to be substantially opposite the lower valve disc

22' when the valve spool is in its lifted position, and, by virtue of its sloping underside, directs the incoming water upwardly against the underside of the valve spool.

Attention is directed to the fact that the lower valve seat 15' is at an elevation above the bottom of the lateral branch passage 7. Because of this construction, it follows that water flowing along the bottom of the branch 7 cannot drain by gravity back into the inlet. This feature is especially significant in the event of imperfect seating of the lower valve disc when the valve spool is in its lower position disconnecting the liquid inlet and outlet.

The tubular retaining members 17—17', and also the lateral passage 7, are internally threaded to permit the attachment of pipes thereto and, when the valve is in service, the lower end of the vertical passage is connected to a water supply pipe 19, and the lateral passage is connected to a water outlet pipe 20. The upper retaining member 17 need not have a pipe connected thereto, but to protect the valve against having something drop into it, a goose neck air vent (not shown) is preferably secured thereto.

Operation

When the valve is in service, it must be mounted in the position shown in FIGURE 1 with its main through passage 6 exactly vertical and with the larger valve seat 15 uppermost. When so arranged, water entering through the line 19 holds the valve spool unit in its raised position shown in FIGURE 1, tightly closing the air vent and allowing the water to flow out through the discharge line 20, as long as the pressure is normal. The instant the pressure of the incoming water drops below the normal minimum and backflow or siphoning becomes likely, the valve spool unit immediately leaves the upper seat 15 allowing air at atmospheric pressure to rush into the water outlet line 20 and thereby block backflow even before the valve spool seats itself upon the lower seat 15' to close off communication between the liquid inlet and outlet. Drainage of contaminated water from a drinking cup or other receptacle supplied by the line 20, back into the supply system, is thus precluded.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art, that this invention provides an anti-syphon anti-backflow valve which not only is entirely unprecedented in reliability and simplicity of construction, but, in addition, consists of but a few parts which may be easily and completely disassembled.

What is claimed as my invention is:

An anti-siphon anti-backflow valve, comprising: a hollow body having a straight through vertical passage with an upwardly opening counterbore at its top, the bottom of the counterbore forming an upwardly facing shoulder; means at the lower end of the body defining a water inlet and providing for the attachment of the body to a water supply pipe; means on the body defining a water outlet leading from the side of the body directly adjacent to and below said shoulder; means in the lower portion of the body providing an upwardly facing horizontal valve seat between the water inlet and outlet, concentric with the up-

wardly opening counterbore and at a level between the top and bottom of the water outlet, the diameter of the port through said valve seat being considerably smaller than the diameter of the counterbored upper end of the vertical passage; a spider having a bored hub and an annulus connected with the hub by radiating spaced arms, the peripheral portion of the annulus being seated upon the upwardly facing shoulder and the inner portion of the annulus extending into the vertical passage and providing a downwardly facing horizontal valve seat substantially at the level of the shoulder and normal to the axis of the bore through the hub of the spider and coaxial with said axis and with that of the upwardly facing valve seat, the diameter of the port through said downwardly facing valve seat being decidedly greater than the diameter of the port through the upwardly facing valve seat, and the radiating spaced arms of the spider extending upwardly and inwardly from the annulus to locate the bored hub of the spider at a substantial elevation above the top of the annulus; a tubular retainer detachably secured in the counterbore and bearing down upon the annulus to clamp the same against the shoulder and thereby readily removably hold the spider in place; a molded plastic valve spool having a one piece body with a large diameter upper portion shaped to have sealing engagement with the downwardly facing valve seat and a smaller diameter lower portion shaped to have sealing engagement with the upwardly facing valve seat, said large diameter upper portion being the largest diameter part of the spool and said large and small diameter portions being coaxial and spaced apart a distance less than the diameter of the large diameter upper portion and less than the axial distance between the valve seats so that the valve spool can engage only one of the seats at a time, the large diameter of the port through the downwardly facing valve seat and its close proximity to the water outlet assuring large unrestricted communication between the open top of the vertical passage and the water outlet upon disengagement of the large diameter upper portion of the valve spool from its seat; and a stem projecting coaxially up from the valve spool and slidably received in the bore of the spider hub to guide and constrain the valve spool to axial vertical motion, the plastic material of which the valve spool is made having a specific gravity not in excess of that of water.

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