Sept. 17, 1957 H. H. HOBBS 2,806,671

LIQUID VALVE

Filed Jan. 7, 1953

FIG_6

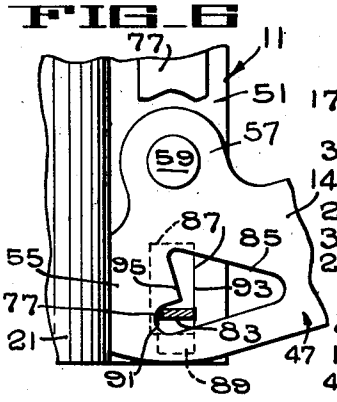


FIG_7

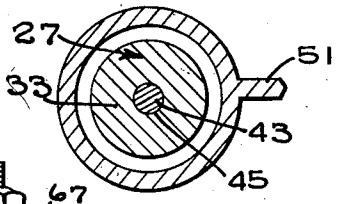


FIG_1

FIG_2

FIG_3

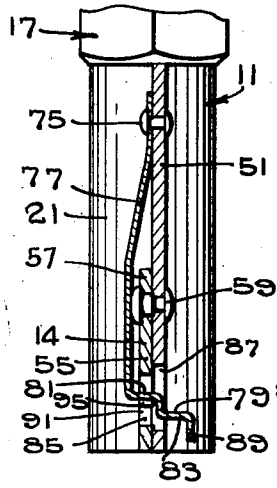
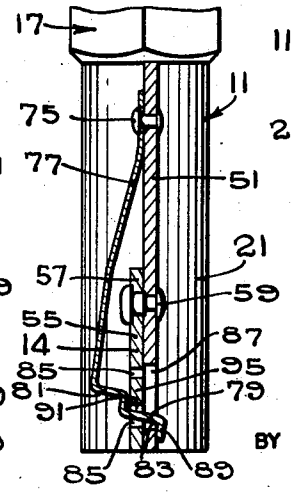


FIG_4



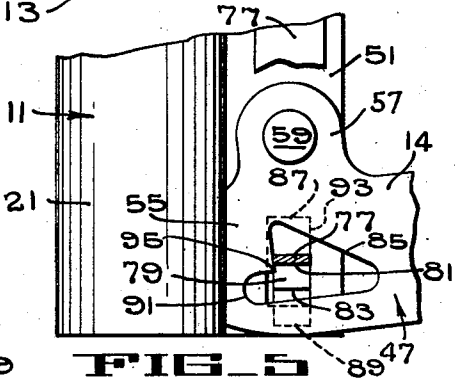


FIG_5

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LIQUID VALVE

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8 Claims. (Cl. 251—72)

This invention relates to an automatic liquid control valve of the type operated by variations in the weight of liquid contained in a receptacle supported thereby, said valve being particularly intended for use with poultry watering troughs and the like.

One object of the present invention is to provide a valve of the type described, which may be easily and quickly assembled.

Another object of the present invention is to provide a valve of the above mentioned type from which the parts subject to the most wear may be removed and replaced by new parts without disconnecting the valve from the liquid supply line or moving said valve from its normal position.

Another object is to provide an automatic, storage reservoir refilling valve which does not require that pressure in the supply line be interrupted before the parts of the valve most subject to wear can be removed for inspection and repair or replacement.

A further object of the present invention is to provide an improved valve of the above referred to type which may be locked in open position until a predetermined weight of liquid has been supplied to the receptacle associated therewith whereupon the valve is automatically unlocked so as to thereafter be responsive to variations in the weight of liquid in said receptacle.

These and other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

Fig. 1 is an elevation of the liquid valve of the present invention.

Fig. 2 is an enlarged longitudinal section of the valve shown in Fig. 1, certain parts being shown in elevation; the moving parts of said valve being shown in a different operational position than in Fig. 1.

Fig. 3 is a vertical section taken along line 3—3 of Fig. 2.

Fig. 4 is a vertical section taken along line 4—4 of Fig. 1.

Fig. 5 is an enlarged fragmentary elevation of a portion of Fig. 2, certain parts being broken away.

Fig. 6 is an enlarged fragmentary elevation of a portion of Fig. 1, certain parts being broken away.

Fig. 7 is a transverse section taken along line 7—7 of Fig. 2, certain parts being omitted.

The present liquid control valve assembly **11** (Fig. 2) is adapted to maintain a predetermined water level in a poultry watering trough **13**, or the like, which has only been partially shown, and one end of which is suspended from an actuating lever **14** pivoted to said valve assembly and the opposite end of which rests on the ground at a point such that water released from the valve assembly **11** will be received by said trough. The valve assembly **11** is attached to and supplied with water from a downwardly extending water pipe **15** positioned near the ground. The valve assembly **11** comprises a valve housing **17** threadably connected to the water pipe and including a body portion **18** having a depending nose **19** to which a

tube **21** is threadably secured. The upper end of the body portion **18** is provided with a bore **23** communicating with the water pipe **15**. The bore **23** is in axial alignment with the tube **21**, but spaced therefrom by the nose or partition **19**.

The valve housing **17** is provided with two valves **26** and **27** disposed at opposite ends of the partition **19**. Said valves **26** and **27** are similar in construction comprising raised valve seats **28** and **29**, respectively, on the partition for cooperation with cylindrical valve heads or members **31** and **33**, respectively, loosely positioned within the bore **23** and the interior **25** of the tube **21**. The valve heads **31** and **33** are each formed adjacent their corresponding valve seat with protruding annular rims **35** and **37**, respectively, adapted to receive resilient circular pads or washers **38** and **39**, respectively, made of rubber, or like material. Said pads are retained within the rims **35** and **37** by rolling the outer edges of said rims inwardly over the margin of the pads, as shown at **40** (Fig. 2). Said pads **38** and **39** assure a water tight seal between the valve heads and their respective valve seats.

The valve seats **28** and **29** are in communication with each other through a liquid flow passage **41** provided in the nose **19**. Interposed between the washers or pads **38** and **39** of the valve heads **31** and **33** is a valve stem **43**, press-fitted into a central hole **45** in the pad and body of the valve head **33** and extending upwardly through the passage **41** into abutting engagement with the pad **38** of the valve head **31**. The stem **43** is of such a length that when the lever **14** is actuated to move the valve head **33** to the position shown in Fig. 2, the head **31** will be raised from its seat **28**, so that both valves **26** and **27** are open. The diametral relationships between the heads **31**, **33** and the bore **23** and interior tube diameter **25**, respectively, and between the stem **43** and the passage **41** are such that liquid may easily and quickly flow from the bore **23** into the trough **13** when the valves **26** and **27** are in the filling position described above and shown in Fig. 2. However, when the lever **14** is actuated to permit valve head **33** and stem **43** to drop to their lowermost position the free upper end of the stem **43** will be positioned within the passage **41** so that the valve head **31** of the valve **26** is free to close, i. e., to sealingly engage the valve seat **28** under the influence of its own weight and the water pressure exerted downwardly thereon by the water supplied to the bore **23** from the pipe **15**, thereby preventing the flow of water from the valve assembly **11**. The above described closed position of the valve **26** automatically shuts off the water supply to the trough when the latter is removed from the valve assembly for cleaning purposes.

Water is, of course, also prevented from leaving the valve assembly **11** when the valve **27** is closed. This closed position of the valve **27** is obtained when the actuating lever **14** forces the valve head **33** upward under the weight of the water in the trough until the washer **39** is firmly seated on the valve seat **29**, while at the same time valve **26** is opened and the valve head **31** moved to its fully raised position by the stem **43**.

The valves **26** and **27** are controlled by the actuating lever **14** which forms a part of an actuating mechanism **47** supported by a fin-like bracket **51** (Fig. 2) extending laterally from one side of the tube **21** preferably as an integral part thereof. The lower end of said tube **21** is slotted at **53** adjacent said bracket **51** and immediately below the valve head **33** to allow the entrance into the lower portion of said tube of a valve head supporting arm **55** formed on one end of the valve actuating lever **14**. The lever **14** is formed with an ear **57** extending upward from its upper edge, and a rivet **59** extending through the ear **57** and the bracket **51** supports the lever **14** for pivotal movement about an axis so situated that

the arm 55 can be completely withdrawn from the bore 25 of the tube 21 by turning the lever 14 counterclockwise (Fig. 2) about the axis of the rivet 59 to the position indicated by broken lines in Fig. 2. The opposite end of the lever 14 is elongated to form a receptacle support arm 60 provided with a series of holes 61 into one of which the hooked end 63 of a tension spring 65 is inserted. The opposite end of the spring is attached to an adjusting device 67 mounted on a horizontal extension 69 of the bracket 51. The spring 65 constantly urges the lever 14 in a counterclockwise direction (Fig. 2) about its fulcrum 59. The support arm 60 is provided with a series of notches 71 for receiving a bail 73 secured to one end of the trough 13, whereby the bail end of said trough may be freely suspended while the opposite end of the trough rests on the ground at a point such that liquid released from the valve 11 will be received by said trough.

Riveted to the bracket 51 at 75 is a spring latch 77 having its lower end 79 bent somewhat like a Z (Figs. 3 and 4) to form two vertically spaced, horizontally offset ledges 81 and 83. The lower end 79 of the latch 77 is adapted to project through a somewhat triangular opening 85 (Fig. 5) provided in the lever 14 below the pivot 59 and also through an elongated rectangular opening 87 in the bracket 51. The spring latch 77 is biased to move toward the left, as viewed in Figs. 3 and 4, and a tongue 89 extending downwardly from the lower ledge 83 normally prevents the withdrawal of said latch from the openings 85 and 87 by its abutment with the bracket 51 below the lower margin of the opening 87, as shown in Fig. 4.

When the latch 77 is in the position shown in Figs. 1, 4 and 6 with its tongue 89 contacting the bracket 51, its lower ledge 83 is positioned within the lower portions of the openings 85 and 87 and the lever 14 is free to pivot about its fulcrum 59 downwardly against the tension of spring 65 and upwardly to the position shown in Fig. 1.

When an empty trough 13 is hung by its bail 72 on the lever 14 or when no trough at all is supported by the same the spring 65 will pull the notched end of said lever 14 upwardly until the corner 91 (Fig. 6) of the opening 85 bears against the adjacent side of the ledge 83 whereupon further upward motion of said lever will be prevented since the opposite side of the ledge 83 simultaneously bears against the edge 93 of the opening 87. When the lever 14 is in this position, its arm 55 is lower than the showing thereof in Fig. 2, resulting in a lowering of the valve head 33 which in turn causes the upper end of the valve stem 43 to withdraw into the passage 41 while at the same time the valve head 31 is released to rest on the seat 28 in sealing engagement therewith thereby preventing the flow of water from the valve assembly 11.

When it is desired to fill the trough 13 supported on the lever 14 as above described, the notched end of the lever 14 (Fig. 2) is manually pushed downwardly and the spring latch 77 is manually pushed toward the lever 14 until the ledge 81 (Figs. 3 and 5) clears a shoulder 95 formed above the corner 91 in the triangular opening 85 and comes to rest within the upper portions of the openings 85 and 87. The lever 14 and latch 77 may then be released from manual pressure but will remain in their newly assumed, i. e., interlocked, positions since the urge of the spring 65 will clamp the ledge 81 (Fig. 5) of the latch between the shoulder 95 and the edge 93 of the rectangular opening 87 preventing its withdrawal therefrom under the urge of its outward bias, thereby also preventing return of the lever 14 counterclockwise to the position shown in Fig. 1 and closing of the valve 31. This positioning of the lever 14 places the valve assembly 11 in its open or filling position with the heads 31 and 33 in an intermediate position, as shown in Fig. 2, so that liquid from the pipe 15 flows into the trough 13.

As the water continues to flow into the trough 13 the weight of the trough and the water therein will eventually overcome the upward tension of the spring 65 and the support arm 60 of the lever 14 will be slowly pulled downwardly as the weight of the trough increases. During the initial downward movement of the lever 14 the shoulder 95 will be rotated clockwise (Fig. 2) away from the ledge 81 of the latch 77 thus releasing it and allowing it to fly or snap outwardly under its own tension from its position within the openings 85 and 87. The latch thereby assumes the previously described position shown in Fig. 4, which allows limited rocking of the lever 14 about the pivot 59 in either direction, so that the actuating mechanism 47 may thereafter be completely responsive to the weight of water in the trough 13.

Further filling of water into the trough 13 soon raises the arm 55 against the pull of the spring 65 sufficiently to force the valve head 33 upwardly into sealing relationship with the valve seat 29 thereby closing the valve 27 and preventing the flow of additional water into the trough 13. The quantity of water in the trough 13 which will cause the valve 27 to close may be regulated as desired by adjusting the tension of the spring 65 by means of the take-up device 67. As the water in the trough is consumed by poultry, evaporates, or spills, the total weight of water in the trough is reduced permitting the spring 65 to raise the support arm 60 and to lower the arm 55. The weight of the valve heads 31 and 33 and the water pressure exerted downwardly thereon then cause said valve head 33 to follow the arm 55 thereby opening the valve 27 and allowing water to flow into the trough 13 to replenish the supply therein. When the trough 13 again contains the desired amount of water the lever 14 will be rotated clockwise (Fig. 2) to close the valve 27 and stop the flow of water into the trough.

Thus the trough 13 may be left unattended for long periods of time, an occasional inspection being necessary only to clean the trough 13 of foreign matter which may collect therein. Upon removal of the trough 13 from connection with the valve 11 for such a cleaning, the valve 11 will immediately and automatically close under the action of spring 65, as previously described thereby preventing the undesired discharge of water.

In actual practice it has been found that the sealing pad 39 on the valve head 33 wears out more quickly than the corresponding pad 38 on the head 31 due, it is believed, to the accumulation of grit and the like carried by the water upon the upper surface of pad 39 which abrades and wears the pad wtih repeated opening and closing of the valve 27, under the pressure of a full trough of water. Therefore, to permit quick replacement, the present valve is so constructed that the head 33 and stem 43 may be readily removed for replacement of the sealing pad 39 without removing the valve assembly 11 from the supply pipe 15 or moving it from its normal depending position.

To remove the head 33, the spring latch 77 is withdrawn from between the openings 85 and 87 and the lever 14 is pivoted counterclockwise (Fig. 2). This results in lowering both valve heads 31 and 33, causing the upper head 33 to establish sealing engagement with the upper valve seat 28 and thus avoid any necessity of shutting off the water supply before disassembling the valve 11. Owing to the fact that the pivot 59 about which the lever 14 turns is located within the upwardly extending ear 57, when the lever 14 is pivoted counterclockwise as viewed in Fig. 2, to the position thereof illustrated in broken lines in that figure, the arm 55 is withdrawn from the interior 25 of the tube 21 and from contact with the valve head 33 so that the same and the attached valve stem 43 will drop out the open end of the tube 21. After the worn pad has been replaced the head 33 and the attached stem 43 are reassembled

in the valve 11 by grasping the head 33 and inserting the stem 43 into the passage 41. The head 33 may be pushed well into the tube 21 by hand or with the aid of a nail, pencil or the like where it can again be contacted for support and control by returning the arm 55 to its normal position within the tube 21. The insertion of the lower end 79 of the latch 77 through the openings 85 and 87 completes the replacement operation.

While I have described a preferred embodiment of the present invention it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the spirit and scope of the appended claims.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is:

1. In a liquid valve for controlling the flow of liquid from a source of liquid under pressure, the combination of operating means for the valve, and a latch adapted to be set in position to lock said valve operating means in valve open position, said latch being spring biased in a direction away from said set position to automatically release said valve operating means upon movement thereof toward valve closed position.

2. In a liquid valve having a housing provided with a liquid passage and valve means for controlling the flow of liquid through said passage, an automatic valve controlling device comprising a lever fulcrumed adjacent one side of said housing and having an arm operatively associated with said valve means and a load carrying arm for supporting a receptacle beneath said liquid passage, said lever being provided with an aperture having one of its walls recessed to provide a shoulder; spring means adapted to urge said lever into a valve closed position; a spring latch member secured to said housing adjacent the aperture in said lever and having a latching abutment adapted to be urged against the spring action of said latch member into interlocking engagement with a slot in said housing and the shoulder of the aperture in said lever when said lever is pivoted to valve open position, said latching abutment being releasable upon the spring means pressure being overcome by a predetermined load to allow the spring bias of said latch member to withdraw said abutment from its locking position.

3. An automatic liquid valve comprising a valve housing having a liquid passage therein, valve means associated with said passage, a pivotally mounted valve control lever connected with said valve means for movement thereof, means urging said control lever toward a valve closed position, a clamping surface provided on said control lever, a stationary stop means adjacent said clamping surface on said lever and having a clamping surface opposed to said lever clamping surface, and a latch having a ledge adapted to be clamped between said clamping surfaces when said lever is pivoted into a valve open position to lock said lever in valve open position, said latch being spring biased to automatically withdraw said ledge from latching contact with said clamping surfaces upon movement of said lever counter to the urge of the control lever urging means, said latch also having an abutment adapted to be positioned between the clamping surface on said control lever and the clamping surface of said stop member when said ledge is withdrawn from latching contact with said clamping surfaces for maintaining said control lever in connection with said valve means when no load counter to the urge of the control lever urging means is applied to said lever.

4. An automatic liquid valve comprising a valve housing having a liquid passage therein, valve means associated with said passage, pivotally mounted valve control lever connected with said valve means for movement thereof, means urging said control lever toward a valve closed position, a clamping surface provided on said control lever, a stationary stop means adjacent said clamping surface on said lever and having a clamping surface opposed to said lever clamping surface, a latch having a ledge adapted to be clamped between said clamping surfaces when said lever is pivoted into a valve open position to lock said lever in valve open position, said latch being spring biased to automatically withdraw said ledge from latching contact with said clamping surfaces upon movement of said lever counter to the urge of the control lever urging means, said latch also having an abutment adapted to be positioned between the clamping surface on said control lever and the clamping surface of said stop member when said ledge is withdrawn from latching contact with said clamping surfaces for maintaining said control lever in connection with said valve means when no load counter to the urge of the control lever urging means is applied to said lever, and means to prevent the spring bias of said latch from withdrawing said abutment from between said clamping surfaces.

5. A liquid valve comprising a valve housing, said housing having a passage therethrough, valves associated with each end of said passage for controlling the flow of liquid through said passage, a valve stem of greater length than said passage rigidly connected to one of said valves and extending through the passage for loose engagement with the other of said valves whereby both valves may be simultaneously disposed in an open position and when one valve is in closed position the other will be in open position, a movable valve control lever operatively associated with said valves for movement thereof, means urging said control lever toward a position which will cause one of said valves to close said passage, a first clamping surface on said control lever, a second clamping surface on said housing opposite the first clamping surface, and a latch adapted to be clamped between said clamping surfaces when said lever is moved into a position in which said valves are in an open position to lock said lever in valves open position, said latch being spring biased for automatic withdrawal from contact with one of said clamping surfaces upon movement of said lever counter to the urge of the control lever urging means to unlock said lever.

6. A valve comprising a valve housing having a passage therein, a movable valve element associated with said passage for controlling flow through the same, operating means pivoted on said housing and having an end portion extending into said housing in operative engagement with said element, a latch movable to a first latching position wherein it maintains said valve operating means in a valve open position, said latch including spring means urging said latch from said first latching position to a second latching position wherein the valve operating means is in a valve closed position, said latch being movable to a third position wherein it releases the operating means for pivotal movement of said end portion out of said housing.

7. In a valve assembly having a housing provided with a passage and a valve head for controlling flow through the passage, an automatic valve controlling device comprising a lever fulcrumed adjacent said housing and having an arm operatively associated with the valve head and a load supporting arm, means on said housing providing a fixed abutment, means on said lever providing an abutment movable toward the fixed abutment when the lever moves in a valve opening direction, and a latch member supported from the housing and movable into a latching position between said abutments to hold the lever in a predetermined position, said latch member including spring means urging the latch member from said latching position, and yieldable means urging the lever toward valve open position with sufficient force to grip the latch between the abutments and thereby retain the latch in said latching position.

8. A valve comprising a valve body having a passage therein, a valve head associated with said passage for

controlling flow through the same, pivotally mounted valve operating means operatively connected to said head and movable to a first position wherein the valve is closed, to a second position wherein the valve is retained in an open position within the body, and to a third position wherein the valve head is released for removal from the body, and a latch adapted to be set in position to lock said valve operating means in valve open position, said latch being spring biased in a direction away from said set position to release said valve operating means upon movement thereof toward valve closed position.

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