Dec. 25, 1951 V. H. PRUITT ET AL 2,579,962

VALVE

Filed Aug. 20, 1948

Fig. 1

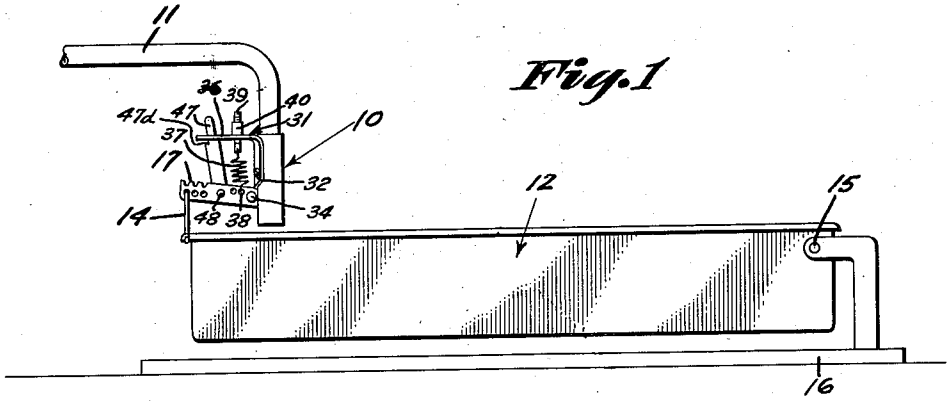
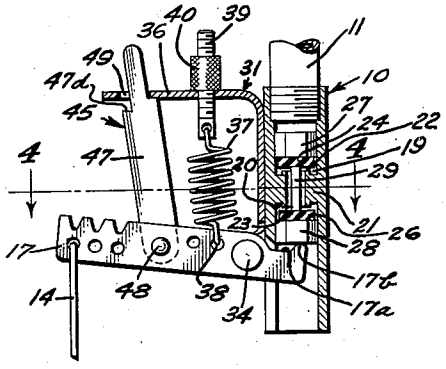


Fig. 2



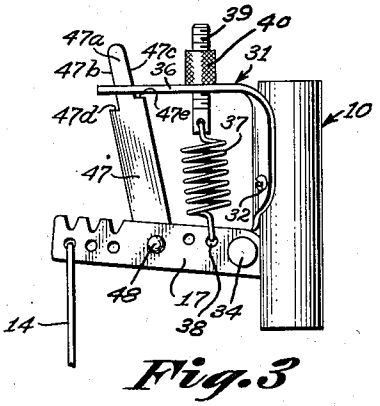
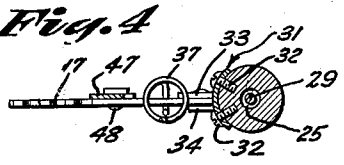


Fig. 3

Fig. 4



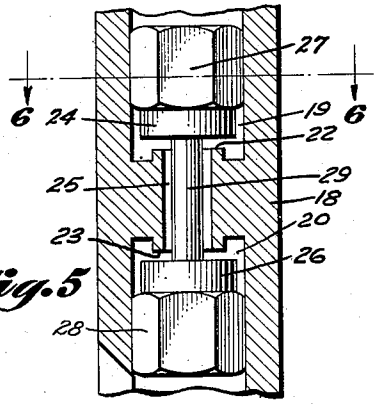
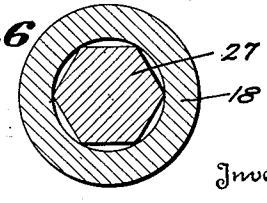


Fig. 5

Fig. 6



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VALVE

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Application August 20, 1948, Serial No. 45,263

10 Claims. (Cl. 137—68)

1

This invention relates to a watering device and more particularly to an automatic valve for use with a type of watering trough in which one end of the trough rests on the ground or any other suitable support, and in which the opposite end is connected with the valve so that the weight of the water in the trough automatically operates the valve and regulates the water level, and is an improvement in, or modification of, the invention set forth in Patent No. 2,512,839, issued June 27, 1950, from an application filed by Virgil H. Pruitt on October 22, 1946.

As in said patent, the present invention contemplates the use of a trough the weight of which, when empty, is insufficient to open the valve, and, also as in said patent, the invention employs an automatic gravity latch for temporarily locking the valve open at the beginning of the trough filling operation.

An important object of the present invention is to devise an improved construction and arrangement of gravity latch, in which, instead of being suspended from its upper end, as in said Pruitt patent, the latch is supported at its lower end, so that it falls away out of engagement by gravity when released.

Another object is to provide an improved valve including a novel arrangement of parts in which individual standard component parts are utilized whereby the advantages of mass production methods and automatic machines can be used in the manufacture and assembly of the valve.

Still another object of the invention is to provide a novel and improved valve in which the individual components of the valve mechanism are physically independent so that they are free to move in the valve chambers in such a way that the tendency of the valve to become clogged is reduced to a minimum, and so that they may be readily dis-assembled for cleaning.

Other and further objects will become readily apparent from the following description when considered in connection with the accompanying drawings, illustrating an embodiment of the invention, and in which:

Figure 1 is an elevational view of a watering device using a valve made in accordance with the present invention;

Figure 2 is a sectional elevational view of the automatic valve showing the valves held in the open position by the gravity latch;

Figure 3 is an elevational view of the valve showing the latch in the inoperative position;

Figure 4 is a horizontal section on line 4—4 of Figure 2.

2

Figure 5 is an enlarged partial sectional elevation of the valve parts; and

Figure 6 is a horizontal sectional view on line 6—6 of Figure 5.

Referring to the drawings wherein similar reference characters designate similar parts throughout the several views, the invention is shown as applied to a chicken watering trough of the type in which one end rests on the ground or is pivotally attached to a suitable support, and the opposite end is suspended by a suitable wire or chain to an arm on the control mechanism of the automatic valve for controlling the level of the water in the trough. As the water is taken from the trough, the reduction in weight permits the valve to open partially to permit additional water to flow into the trough. The increase in weight of the water in the trough then again closes the valve. The valve assembly comprises fundamentally a structure having two orifices in series with valves for controlling each of the orifices in which one valve is normally adapted to be closed under the influence of the pressure of the water source, and the other valve is adapted to be closed in the opposite direction by the valve control mechanism and against the pressure of the water source.

The valve assembly 10 is operably associated between a suitable water supply pipe 11 and the watering receptacle or trough 12. The lower end of the valve casing is so arranged as to direct the water into the watering trough 12 with a minimum of splashing. The end of the water trough adjacent the valve assembly 10 is suspended by a suitable wire or bail 14 from a valve actuating arm 17, the opposite end of the trough 12 being pivotally supported at 15 by bracket on a suitable support 16.

The valve assembly 10 comprises a valve housing 18 having what in effect is a two-way valve arrangement by which communication through the housing is shut off when the two-way valve is in either of two extreme positions; both of the valves being open at an intermediate position for a purpose which will be more readily apparent as this description proceeds. The valve housing 18 is provided with two aligned bores or passageways 19 and 20 extending inwardly from the opposite ends of the valve housing. The two bores are separated by a partition or solid portion 21, the opposite sides of which are provided with annular valve seats 22 and 23. The two valve seats being at the opposite sides of the partition 21 in effect constitute two orifices in series in the valve housing. The valves, per se, are in the form of

suitable resilient gaskets 24 and 26. Adjacent each of the outer sides of the gaskets are suitable identical rigid blocks or weights 27 and 28 which are more clearly shown in Figure 5. As shown in the latter figure, these weights or blocks are polygonal in shape and extend in an axial direction a sufficient amount so that they will not cant and become lodged in the respective bores 19 and 20. The blocks 27 and 28 are of such size as to have a loose fit inside of the valve housing and by reason of their polygonal shape sufficient area is provided between the blocks and the bores or passageways 19 and 20 to provide the desired rate of flow of water when both of the valves are open. In other words, the blocks have axially extending guiding edges at the corners of the polygon loosely engaging the inside of the passageways, and the portions of the blocks between such edges are spaced sufficiently from the walls of the passageways to permit the desired flow of water. An independent valve stem 29 is disposed within the restricted bore 25 of the partition or solid portion 21 and engages the opposed adjacent faces of the gaskets 24 and 26. The valve stem is smaller than the bore 25 so as to provide a fluid passage between the two orifices. Also the valve stem 29 is longer than the distance between the outer surfaces of the valve seats 22 and 23 so that when one valve member is against its associated seat the other valve member will be displaced from its associated seat. Therefore it will be apparent that there is an intermediate position in which both of the valves will be open to provide communication between the bores 19 and 20, as will be readily seen in Figures 2 and 5.

The drawings herein are scaled from a commercial design of a valve made in accordance with the present invention and it will be readily apparent that there is considerable clearance between the inner walls of the bores of the valve casing and the different parts of the valve, such as the blocks, the valve gaskets, and the intervening valve stem. Preferably all of the parts are physically independent of each other to facilitate assembly and to permit relative movement therebetween and are free to move in the valve casing which tends to prevent the formation of mineral deposits and to break loose or dislodge any foreign particles which may collect on the valve seats or in the connecting bore. Particularly, the valve stem 25 prevents the bore of the partition 21, which is the smallest opening in the valve housing, from becoming clogged. Also, since the valve gaskets are free to move from side to side of the valve casing, there is less tendency for the mineral deposits to become encrusted on the surfaces of the valve gaskets which come in contact with the valve seats.

Although the exact relation between the size of the blocks, the valve gaskets and the bore 25 of the partition is not extremely critical, there are certain relative limits for the best practical operation. It will be noted from the drawing that the bores 19 and 20 are preferably of the same diameter. It has been found that the area between the inside of the bores and the hexagonal blocks provides sufficient clearance to permit the necessary flow of water. It will be apparent that the diameter of the valve disks must be small enough to permit the water to flow around them but in no event should these valves be less than the combined sum of the radius of one of the bores 19, 20, plus the radius of the bore 25. It will be obvious that the diameter of these valve gaskets must be such that when the valve gaskets are against one side of the bores the opposite edge of the valve gaskets will completely cover the bore 25. It will also be apparent from the drawings that the downward movement of the lower valve gasket 26 and the associated weight 28 is limited by the head 17b on the valve control arm 17 against which the weight rests. Likewise the extent of movement of the upper valve 24 and its associated weight 27 is limited by the inner edge of the end of the supply pipe 11. The threads in the upper end of the valve casing 18 are so designed that the supply pipe 11 screws in the proper distance so that the valve 24 and the weight 27 cannot move far enough away from the valve seat 22 to permit the valve 24 becoming lodged in the passageway 20 nor to permit the valve stem 29 coming out of the bore 25.

The mass of the weights 27 and 28 is not critical but preferably is of such value as to reduce chattering of the upper valve 24. The primary purpose of these weights or blocks is to serve as backing members for the valve gaskets 24 and 26 and also as spacers. They are preferably made from standard fabrication metal stock in order to reduce cost.

As previously mentioned, suitable locking means are provided for holding the valves in an intermediate position to permit the water to flow into the trough, the locking means being responsive to gravity to revert to the inoperative locking position after sufficient water has flowed into the trough to lower the operating lever 17. To this end a suitable bracket 31 is suitably secured to the valve housing 18 by means, for example, of screws 32. Bracket 31 is provided with an ear 33 to which the valve operating lever 17 is pivotally connected by means of a suitable headed rivet 34. The inner end of the valve operating lever 17 is notched at 17a and the lever terminates in a head 17b which engages the lower weight 28. The bracket 31 is also provided with a horizontal arm 36 which extends at right angles to the part of the bracket which is attached to the valve housing 18. A suitable biasing spring 37, the lower end of which is hooked in a hole 38 in the valve operating lever 17, is adjustably anchored to the bracket arm 36 by means of a bolt 39 and a thumb nut 40.

It will be noted from the above description and by referring to the drawings, that the mechanism for operating the valves is carried entirely by the bracket 31 which is removably supported on the valve assembly 10 by means of the screws 32. Accordingly, when, as is occasionally necessary, it is desired to clean the valve, the bracket 31 and valve controlling mechanism can be completely removed from the valve assembly and the lower valve and the valve stem 29 can be completely removed from the valve assembly. Also, it will be readily understood that when the valve operating mechanism is removed, the valve 24 will close to shut off the water. This construction constitutes a great improvement in valves of this type.

The tension on the spring 37 can be varied by adjusting the position of the nut 40, the tension on the spring controlling the level of the water to be maintained in the trough 12, as will be apparent from the subsequent description. Since the valve assembly is usually mounted in the vertical position as shown, it will be understood that under the influence of gravity, the pressure of the water and the tension of the spring 37 (assuming the trough is empty) the upper valve

gasket 24 will close the upper orifice. It will also be seen from the drawings and the foregoing description that downward movement of the outer end of the valve operating lever 17 will cause both of the valves to be moved upward in unison, thereby moving the upper valve 24 from its seat and moving the lower valve 24 toward its associated seat. Therefore, when sufficient water accumulates in the trough to overcome the influence of the water pressure on valve 24 and the tension spring 37, the lower valve 26 will be closed against its associated orifice. Also, it will be seen that if the weight is taken off of the arm 17, the spring 37 will move the outer end of the arm 17 upwardly so that the valve 24 will close under the influence of the water pressure. By adjusting the tension on the spring 37, a suitable biasing force is applied to the lever arm 17 to oppose the weight of the trough and the water therein so that the level of the water in the trough at which the valve closes can be regulated.

When it is desired to clean the trough 12 it is usually necessary to remove the weight of the water and trough from the valve control lever arm 17. It will be apparent from the above description that when this is done the valve 24 will immediately close under the influence of the water pressure. As above stated, the clean empty trough, when the empty trough is hung on the arm 17 will not be of sufficient weight to open the valve 24 to fill the trough. For this reason the present invention provides a novel gravity latch mechanism 45 which can be used to temporarily lock the lever 17 in an intermediate position whereby both the valves 24 and 26 are in open position to permit the water to flow into the trough 12. The latch is so arranged that as soon as the weight of the water in the trough becomes sufficient to lower the outer end of the valve operating arm 17, against the tension of spring 37, the gravity latch will automatically fall to a position so that it can no longer prevent the valve 24 from closing. To this end this gravity latch comprises a latch member 47 which is supported on and loosely pivoted at 48 to the valve operating arm 17. The upper extremity 47*a* of the latch member 47 is made narrow by notches 47*b* and 47*c*. It will be noted that the notch 47*b* continues a greater distance from the upper end than does the notch 47*c*. The upper end of this latch 47 extends through a rectangular opening 49 in the bracket arm 36; the length of the opening 49 being less than the width of the main body of the latch member 47 so that the shoulder 47*d* limits the upward movement of the member 47 through the opening 49. The position of the shoulder 47*d* on the member 47 serves as a stop to prevent the spring 37 from raising the outer end of the arm 17 too high. The shoulder 47*e* is so positioned on the member 47 that when it engages the underside of the bracket arm 36, the valve operating lever arm 17 will be in such a position as to place the valves 24 and 26 in their intermediate open positions so that the water can flow into the watering trough. It is very important to note that the opening 49 in the arm 36 is displaced laterally with respect to the pivotal connection 48 between the valve operating lever arm 17 and the latch 47 so that the center of gravity of the latch member 47 will always be to one side of the pivotal connection 48 when the valve is mounted in the vertical position as shown in the drawings. This is important so that when the notch

47*e* becomes disengaged from the underside of the bracket arm 36, the upper end of the latch member 47 as shown in the drawings will move by gravity laterally to the left so that the shoulder 47*e* will clear the right-hand edge of the opening 49. This puts the latch member 47 in the inoperative locking position so that in the event the weight of the water in the trough should be removed from the arm 17, the valve 24 will be closed to cut off the flow of water. It will be apparent that the gravity latch can be very readily reset by merely pushing down on the valve operating lever 17 while at the same time pushing the upper end of the latch member 47 to the right as shown in the drawings so that the shoulder 47*e* engages the underside of the bracket arm 36. When the gravity latch is released and moves to its inoperative position, the valve actuating lever arm 17 is free to move up and down under the influence of the varying weight of the water in the trough 12 and the tension of the spring 37. The gravity latch will usually be set in the locked position after the cleaning of the trough when the trough will be empty and it will hold the valve open temporarily to permit sufficient water to flow into the trough to operate the latch device. The gravity latch made in accordance with the present invention is a very important feature.

Instead of relying on gravity, a suitable spring (not shown) could be provided for resiliently urging the latch member 47 in a counterclockwise direction about the pivotal connection 48 as viewed in Figures 2 and 3. With such a construction, when the arm 17 is moved downwardly so that the shoulder 47*e* of the latch member 47 is disengaged from the underside of the bracket 36, the upper end of the latch member 47 would move to the left and become inoperative thereafter when the arm 17 is again moved upwardly.

Although the invention has been described in considerable detail, it will be apparent to those skilled in the art that many variations are possible without departing from the inventive concept. It is therefore desired that the invention not be limited except insofar as is made necessary by the prior art and by the appended claims.

We claim:

1. A valve of the type described, comprising a casing, a plurality of aligned bores extending inwardly from the opposite ends of said casing, a restricted partition in said casing between said bores and having an opening therethrough forming a communication between said bores, valve seats on the opposite sides of said partition around said opening thereby constituting valve orifices and seats, a valve member associated with each of said orifices, an independent valve stem of greater length than said partition extending through the opening in said partition and operably associated between said valve members whereby the latter are caused to move in unison under certain conditions in such relation that when one valve is in closed position the other will be in open position, a valve control arm pivotally connected to said housing, one end of said arm being operably associated with one of said valves for positive movement thereof, and latch means pivotally intercoupled with said arm and adapted to be manually moved into frictional engagement with abutment means on said casing when said arm is in an unloaded condition to maintain the arm in valve opening position, said latch means being oriented relative to the pivotal coupling with said arm to be

gravitationally biased out of engagement with said abutment means on loading of said arm to a predetermined condition.

2. A valve assembly as described in claim 1 in which each of said valve members comprises a physically independent resilient disk and a physically independent rigid backing member.

3. A valve assembly as described in claim 1 in which each of said valve members comprises a physically independent resilient disk and a physically independent rigid backing member, the diameter of said resilient disks being at least as great as one-half the sum of the diameter of the bore of said casing and the diameter of the bore of said restricted partition.

4. A valve of the type described, comprising a casing, a plurality of aligned bores, extending inwardly from the opposite ends of said casing, a partition in said casing between said bores and having a restricted opening therethrough forming a communication between said bores, valve seats on the opposite sides of said partition around said opening thereby constituting valve orifices and seats, a valve member associated with each of said orifices, an independent valve stem of greater length than said partition extending through the opening in said partition and operably associated between said valve members whereby the latter are caused to move in unison under certain conditions in such relation that when one valve is in closed position the other will be in open position, a bracket attached to said valve casing, said bracket having a laterally extending arm and a laterally extending ear, a valve control arm pivotally connected to said ear and having one end thereof operably engaging one of said valves for moving the latter to closed position, means for resiliently biasing said arm for movement in the opposite direction, a latch member freely pivoted to said control arm, said latch member adapted to selectively engage said laterally extending bracket arm to hold said valve control arm in an intermediate position and maintaining both of said valves open simultaneously.

5. A valve of the type described, comprising a casing, a plurality of aligned bores, extending inwardly from the opposite ends of said casing, a partition in said casing between said bores and having a restricted opening therethrough forming a communication between said bores, valve seats on the opposite sides of said partition around said opening thereby constituting valve orifices and seats, a valve member associated with each of said orifices, an independent valve stem of greater length than said partition extending through the opening in said partition and operably associated between said valve members whereby the latter are caused to move in unison under certain conditions in such relation that when one valve is in closed position the other will be in open position, a bracket attached to said valve casing, said bracket having a laterally extending arm and a laterally extending ear, a valve control arm pivotally connected to said ear and having one end thereof operably engaging one of said valves for moving the latter to closed position, means for resiliently biasing said arm for movement in the opposite direction, a latch member freely pivoted to said control arm at a point on the opposite side of the pivotal connection with said ear, said latch member adapted to selectively engage said laterally extending bracket arm to hold said valve control arm in an intermediate position and

maintain both of said valves open simultaneously until said control arm is loaded to a predetermined condition.

6. A combination as set forth in claim 4 in which said bracket is detachably secured to said valve casing whereby said bracket and valve control mechanism can be bodily removed as a unit from said valve casing.

7. A combination as set forth in claim 4 in which said latch member is oriented when in bracket arm engaging condition to be responsive to gravity for returning to inoperative position when said valve control member is moved from the position in which it was locked.

8. A valve mechanism of the type described comprising a valve housing having aligned passageways extending inwardly from the opposite ends thereof, and a solid portion between said passageways having a restricted bore forming a communication between said passageways, valve seats formed on said solid portion at the opposite ends of and surrounding said bore, a valve member substantially smaller than said passageways associated with each of said seats, a separate, rigid block arranged to bear upon each valve member, said blocks being shiftable longitudinally of said passageways and having a plurality of axially extending guiding edges loosely engaging the inside thereof, and the portions of said blocks between said edges being spaced sufficiently from the walls of the passageways to permit the desired flow of water, said valve members being freely movable laterally, independently of said blocks, with respect to said seats, an independent valve stem of a length greater than that of said solid portion extending through said bore and operatively associated between said valve members whereby the latter are caused to move in unison under certain conditions in such relation that when one valve member is in closed position, the other will be in open position, said valve stem being of substantially smaller diameter than said bore, so as to provide a fluid passage between itself and the walls of the bore, a valve control arm pivotally connected to said housing, one end of said arm being operatively associated with one of said blocks for positively moving said blocks, valve members and stem when swung in one direction, on its pivot, means biasing said arm in the other direction, and a manually set latch operatively associated with said arm for temporarily locking the same against the force of said biasing means, with both valve members in open position, said latch being constructed to automatically return to inoperative position when said arm is moved further against the force of said biasing means.

9. A valve mechanism of the type described comprising a valve housing having aligned passageways, circular in cross-section extending axially inward from the opposite ends thereof, and a solid portion between said passageways having a restricted bore forming a communication between said passageways, valve seats formed on said solid portion at the opposite ends of and surrounding said bore, a valve member of substantially smaller diameter than said passageways associated with each of said seats, a separate rigid polygonal block arranged to bear upon each valve member and freely movable in said respective passageways, said blocks being of sufficient length axially to prevent canting and binding in said passageways, an independent valve stem of a length greater than that of said solid portion extending through said bore and

operatively associated between said valve members, whereby the latter are caused to move in unison under certain conditions, in such relation that when one valve member is in closed position, the other will be in open position, said valve stem being of substantially smaller diameter than said bore to afford a fluid passage between itself and the walls of the bore, a valve control arm pivotally connected to said housing and having its end shaped to project into one of said passageways and engage the polygonal block therein, whereby when swung on its pivot in one direction said arm serves to positively move both valve members, and means biasing said arm in the other direction.

10. A valve mechanism of the type described comprising an elongated valve housing adapted to be positioned vertically and having a fluid passageway extending therethrough, a pair of valve seats in said passageway, valve means cooperating with said seats to control the flow of fluid through said passageway, a valve control arm pivotally mounted on said housing and extending generally horizontally therefrom, one end of said arm being operatively connected with said valve means for positively moving the same when swung on its pivot in one direction, means biasing said arm in the other direction, said arm being movable to either one of two extreme positions in which said valve means serves to shut off the flow of fluid through said passageway, and to an intermediate position in which said valve means permits the flow of fluid, a second arm fixed to said housing and projecting therefrom substantially parallel with and above said control arm, and a latch member for temporarily locking said control arm in said intermediate position against the force of said biasing means, said latch member being freely supported at its

lower end on said valve control arm, its upper end comprising a narrow portion separated from the body of the latch member by a shoulder, said fixed arm having a rectangular opening of a length greater than the width of the said latch member below said shoulder, through which opening said latch member extends, whereby said shoulder may engage the end of said opening in said fixed arm, and is held in engagement therewith by the force of said biasing means, said opening being located to one side of the point of support of said latch member, so that said latch member occupies an inclined position when engaged, and is automatically movable laterally by gravity out of locking engagement with said second arm when said valve control arm is moved against the force of said biasing means from the position in which it was locked.

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