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LIQUID TANK FILLING MECHANISM

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2 Sheets-Sheet 1

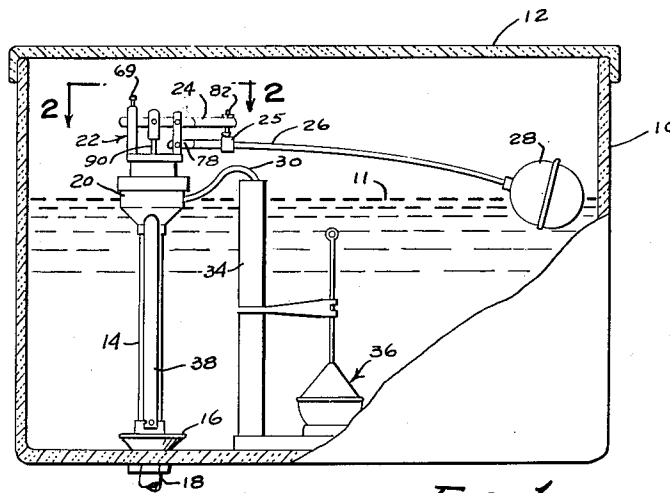


Fig. 1

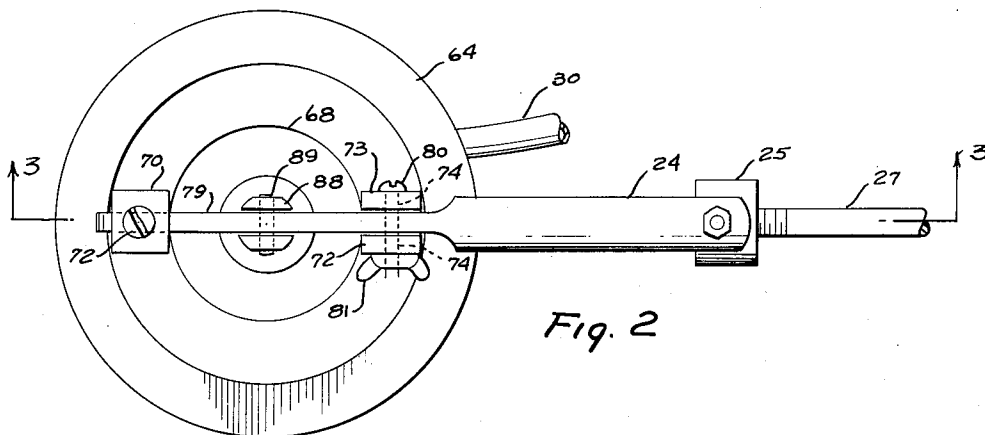


Fig. 2

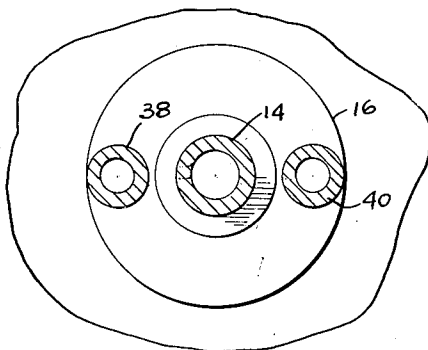


Fig. 5

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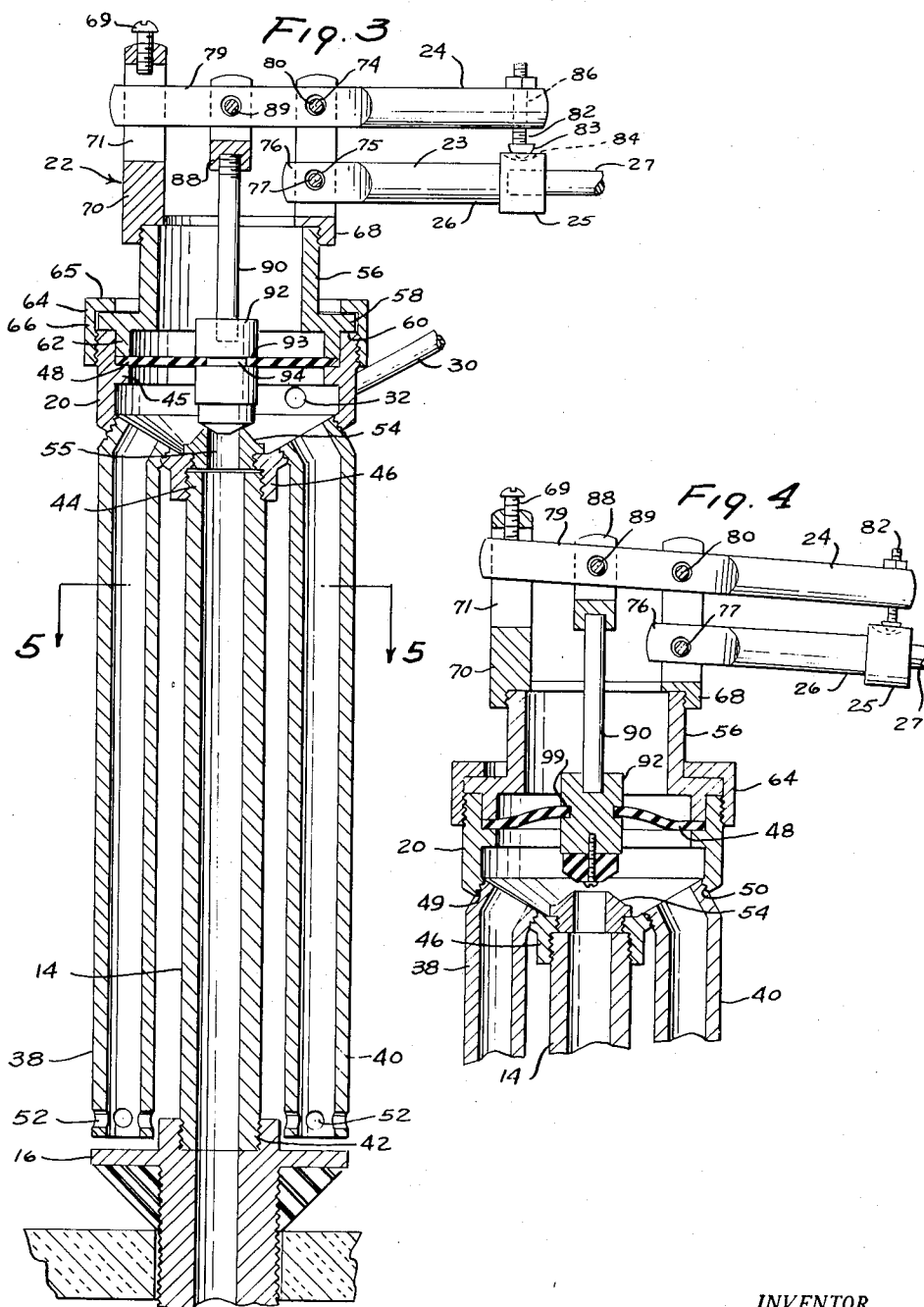
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LIQUID TANK FILLING MECHANISM

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5 Claims. (Cl. 137—426)

This invention relates to tank filling mechanisms and more particularly to a ball float operated liquid tank filling device.

It is an object of this invention to provide a valve actuating lever assembly capable of selective adjustment so as to control both the level of the liquid in the tank and the rate of flow of the liquid into the tank.

It is another object of this invention to provide a tank filling mechanism in which there is no possibility of corrosion of the working parts, hence the working parts cannot freeze due to corrosion.

It has been found that the present type of tank filling mechanisms in which a flexible washer, usually of leather, is placed between the valve and cylinder, is particularly prone to freezing due to corrosion of the working parts. Therefore, it is a still further object of this invention to provide flexible means interposed between the valve and the operating mechanism for the valve to prevent liquid from entering and contacting any of the operating elements to cause corrosion of these elements.

Yet another object of this invention is to provide a plurality of independent, external liquid outlet means so as to relieve pressure upon the flexible means which prevents the liquid entering the mechanism from contacting any of the operating elements thereof.

Other objects and advantages will become apparent from the following detailed description constituting the specification, and taken in conjunction with the accompanying drawings, in which:

Figure 1 is a front elevational view of a tank containing liquid, partially broken away to show a tank filling mechanism embodying this invention;

Figure 2 is a top plan view taken along line 2—2 of Figure 1;

Figure 3 is a cross sectional view taken on line 3—3 of Figure 2;

Figure 4 is a cross sectional view similar to Figure 3 but showing the valve and valve operating mechanism in position to permit liquid to flow through the open valve; and

Figure 5 is a cross sectional view taken on line 5—5 of Figure 3.

With reference to Figure 1, there is shown a tank 10, which may be of the flush type, and may be provided with a removable cover 12. The filling mechanism contained within the tank 10 generally comprises an inlet pipe 14 upstandingly supported upon the usual base 16 into which is tapped a pipe 18 connected to a source of water supply not shown. A valve housing 20 is supportingly carried upon the inlet pipe 14 and the valve body or housing 20 carries a lever assembly support, generally indicated at 22, upon which is carried a pair of generally parallel spaced levers 24 and 26. Lever 26 carries at its end remote from its pivotal connection to the support 22 a ball float of the usual type adapted to be supported adjacent the top of the water level in the tank 10. The ball float is indicated by reference numeral 28. A flexible tube 30 has one end threadingly engaged in a tapped and threaded hole 32 in the valve body 20 and its other end inserted into an overflow pipe 34. A tank draining valve of the usual type is generally indicated at 36 and may be operated by any suitable means, not shown. A pair of outlet tubes 38 and 40 are supported by and

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threadingly engaged with the valve body 20 and extend generally parallel and in spaced relation to the inlet pipe 14, and each of the tubes 38 and 40 terminate adjacent the bottom of the tank 10.

Referring specifically to Figures 3 and 4, the base 16 which is of standard construction and has one end connected to the water supply pipe is internally threaded at its other apertured end to threadingly receive the externally threaded end portion 42 of the inlet pipe 14 therein so as to support the pipe 14 in an upstanding position. The other end 44 of the pipe 14 is similarly provided with external threading onto which is secured the valve body 20 by the internal threading in the lower collar-like portion 46.

The valve body 20 is generally in the shape of a funnel and is provided with an integral inwardly extending ring 45 which forms a support for the peripheral portions of the circular flexible disc guide 48 which may be made from any suitable flexible material such as rubber, plastic or leather. Valve body 20 is further provided with a pair of oppositely disposed threaded apertures 49 and 50 into which the externally threaded ends of outlet tubes 38 and 40, respectively, may engage and be supported by the valve body 20. It will be noted that the threaded ends of tubes 38 and 40 are angularly disposed with relation to the central longitudinal axis of the remaining portion of the tubes and that the tubes 38 and 40 extend generally parallel and in spaced relation to the inlet pipe 14. Each of the outlet tubes 38 and 40 has a series of holes 52 adjacent its end remote from the valve body 20 and adjacent the bottom of the tank 10 permitting distribution of water near the bottom of the tank for a quieter filling thereof. A valve seat 54 is threadingly received in the collar-like portion 46 of the valve body 20 and abutting the end 44 of inlet pipe 14. It will be noted that the central aperture 55 is in communication with the interior of pipe 14. A tapped and threaded hole 32 is provided in the valve body 20 for connection to the flexible tube 30 which leads into the overflow pipe 34, as previously described.

The lever assembly support 22 comprises a generally cylindrical member 56 having the flange 58 extending away from and at right angles to the member 56, the flange 58 adapted to rest on the periphery of the valve body 20 as at 60. The flange 58 has integrally formed therewith a flange or ring 62 which extends perpendicularly intermediate the ends of flange 58 toward the ring 45 formed in the valve body 20. As will be seen in Figures 3 and 4, the flange or ring 62 terminates a short distance from the face of ring 45, the space between the terminating end of the flange 62 and the upper face of the ring 45 being approximately equal to the thickness of the flexible disc guide 48 so that cooperation between flange 62 and ring 45 will secure disc 48 in a generally horizontal plane within the valve body 20.

The member 56 is secured to the valve body 20 by a slip nut 64 which has its horizontal portion 65 contacting the flange 58 and its vertical portion 66 threadingly engaged on the outer surface of valve body 20 at the end remote from the connection of the valve body 20 to the pipe 14.

An annular collar 68 is threadingly engaged on the end of member 56 remote from the end secured by the slip nut 64. The collar 68 carries an integral upstanding post 70 on its periphery, post 70 being provided with an elongated slot or aperture 71 and carrying a volume control screw 69 medially of the end opposite the attachment to the member 56, screw 69 being adapted to have its shank portion enter the aperture 71. A pair of spaced parallel supports 72 and 73 are formed integrally with the collar 68 and oppositely disposed on its periphery to the post 70. The support ears or lugs 72 and 73 are of flat, generally

rectangular stock and are provided with registering holes 74 and 75 in spaced relation thereon and extending transversely thereof.

It will be seen that the lever assembly support 22 comprises the member 56 secured to the valve body 20 by slip nut 64 and the collar 68 threadingly carried by the member 56 and having oppositely disposed posts or supports adapted to pivotally support the levers 24 and 26. Levers 24 and 26 extend in parallel spaced relation to each other and in a plane perpendicular to the longitudinal plane through the pipe 14, valve body 20 and lever support 22. Lever 26 is actually composed of two parts, short rod 23 having an enlarged collar 25 integrally formed at one end thereof and a longer rod 27 of smaller diameter than the rod 26 and threadingly carried in an aperture formed in the end of the collar 25. The end of the short rod 23 opposite the collared end 25 is flattened as at 76 to be received between the upstanding ears 72 and 73 and be pivotally supported thereon as by a bolt 77 passing through the registering holes 75 and secured in that position by a wing nut 78. The end of the longer rod 27 of the lever 26 opposite to its connection in the collar 25 carries the ball float 28. It will be seen that the rise or fall in the liquid level of the tank will cause the lever 26 to move in an arcuate path about its pivot formed by the bolt 77. The lever 24, which may be termed a thrust lever, is flattened as at 79 for a considerable portion of its length so as to pass between the upstanding support ears 72 and 73 and extend through and slightly beyond the aperture 71 in the post 70. Lever 24 is adapted to move in an arcuate path about a bolt 80, serving as a pivot, and passing through the registering holes 74 in the support ears 72 and 73. The bolt 80 may be secured on the support ears as by a wing nut 81. The end of lever 24 remote from the post 70 has a water level adjustment screw 82 extending therethrough and generally parallel with the post 70 and the upstanding support ears 72 and 73, adjusting screw 82 having a head 83 which rests in a hollowed out section 84 on the periphery of the collar 25 and is biased into contact therewith since the unflattened end of the lever 24 is obviously of considerably greater weight than the flattened portion 79. Therefore, the lever 24 will tend to overbalance and move in an arcuate path about the pivot provided by the bolt 80 so as to bias the head 83 of the adjusting screw 82 into intersecting contact with the collar 25 on the lever 26. A lock nut 85 will keep the adjusting screw 82 in its extended relation to the lever 24. Since the aperture 86 adjacent one end of the lever 24 through which the adjusting screw 82 extends is threaded, adjusting screw 82 may be moved to any desired position so as to selectively space lever 24 from lever 26.

A valve adapter 88 is pivotally supported on the flattened portion 79 of the lever 24 centrally between the post 70 and the upstanding support ears 72 and 73 as by a bolt 89 extending through registering apertures in the adapter and lever and secured by any suitable type of nut. As best seen in Figure 2, the adapter 88 is provided with a longitudinal groove in which the flattened portion 79 of lever 24 is received. The adapter 88 normally extends perpendicularly along its longitudinal axis to the longitudinal axis of the lever 24 and has a tapped hole in its end remote from the pivotal connection to the lever 24 into which a valve stem 90 may be threadingly secured. The other end of valve stem 90 carries a valve body 92 which is adapted to close the inlet pipe 14 by seating in the valve seat 54. A circular groove 93 is provided intermediate the ends of the valve body 92 to form a neck 94, the groove 93 being adapted to receive the flexible disc 48 therein by having the central aperture 95 in said disc surround the neck 94 so that the disc is supported in its center intermediate the ends of the valve body member 92.

The detailed structural relation of parts has been described, and now the operation of the tank filling mechanism will be discussed. In Figure 3, the valve body 92 is

completely seated upon the valve seat 54 so as to close the opening of the inlet pipe 14. As the drain valve 36 is operated permitting the liquid 11 to drain from the tank 10, the ball float 28 will consequently be lowered imparting an arcuate path of movement to the lever 26. As lever 26 moves in its arcuate path, lever 24 will also move in an arcuate path about its pivot on the lever support 22 following the movement of lever 26, since the rounded end of lever 24 carrying the operatively contacting means, adjusting screw 82, is heavier than the flattened end 79 of this lever, and the operatively contacting means will be biased into contact with the recess 84 on the collar 25 of lever 26 within the limit of its movement as limited by the volume control adjusting screw 69. As lever 24 moves in its arcuate path, its flattened end received in the aperture 71 of the post 70 will move in a path opposite to that of the heavier end of the lever 24. In this movement, the flattened end 79 will carry with it the valve adapter 88, the connected stem 90 and the valve body 92 carried by the stem so as to lift the valve body from the seat 54 permitting liquid to be discharged from the inlet pipe 14 into the valve body 20 and assume the position shown in Figure 4. The liquid emerging, usually under pressure, will enter the valve body 20 but be prevented from contacting any of the operative parts of the valve operating arrangement, since the liquid will impinge upon the flexible disc guide 48 and will be unable to pass therethrough. Liquid discharged from the pipe 14 will then flow through the discharge tubes 38 and 40 and out of the holes 52 in said discharge tubes to permit the liquid to enter the tank 10 and again raise the liquid level therein. As the liquid level in the tank again rises, it will be obvious that the lever 26 will rise due to the rise of the ball float 28, and carry with it the lever 24 which in turn will cause movement of the valve body 92 so as to return it upon the seat 54 to again close the opening of inlet pipe 14 when the desired level in the tank has been attained.

In order to selectively control the desired liquid level in the tank, the adjusting screw 82 is moved so as to increase or decrease the distance between the lever 26 and the lever 24. The greater this distance between the levers, the lower the liquid level in the tank will be, and conversely, the smaller the distance between the levers 24 and 26, the higher the liquid level in the tank will be.

In order to selectively regulate and control the volume of liquid emerging from the inlet pipe 14, the volume control adjusting screw 69 is turned so as to have its shank enter the aperture 71 in the post 70 to a greater or less extent. Since in its path of arcuate movement the flattened portion 79 of the lever 24 will be limited by abutting the end of the shank of adjusting screw 69, it will be seen that by having the shank extend farther into the aperture 71 the degree of movement of the portion 79 will not be as great and as a consequence the valve body 92 will not be lifted as far off the seat 54 as when the shank of the adjusting screw 69 enters the aperture 71 to a lesser extent. Hence, in areas where water pressure is low, the adjusting screw 69 will be so set as to permit maximum movement of the end portion 79 of the lever 24, thus permitting the valve body 92 to be moved its maximum distance away from the seat 54. This will result in the tank 10 being filled more quickly than with a non-adjustable valve actuating arrangement. Conversely, in areas where high pressure is introduced into the liquid supply pipe 18, the adjusting screw will be moved so that a considerable portion of its shank will extend into the aperture 71.

From the foregoing, it will be evident that there has been provided a tank filling mechanism wherein a pair of levers controlling an inlet valve are mounted and supportingly carried by the inlet pipe, the first of the pair of levers adapted to move in an arcuate path and having a valve operatively connected thereto, while the second of said pair of levers is also adapted to move in an arcuate path intersecting the path of movement of the

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first lever causing said first lever to move the valve to control the flow of liquid passing through the inlet pipe to fill the tank. Also, operatively contacting means, carried by the first of said pair of levers, can be selectively adjusted so as to control the closing of the valve operatively connected to said first lever and thereby predetermine the liquid level desired in the tank. There is also provided adjustable volume control means whereby the distance to which the inlet valve may be opened can be regulated according to the liquid pressure present.

It is again emphasized that the liquid discharge from the inlet pipe cannot contact any of the operative parts, hence no corrosion results and freezing of these parts so as to render them inoperative cannot occur. Also, the outlet tubes are independently mounted and separate from the inlet pipe 14 and carry the liquid from the valve housing or body into the tank adjacent the bottom thereof.

While there is shown and described the preferred embodiment of the invention, it is to be understood that the structure is susceptible to change and modification within the practicability of the invention and therefore should be limited only by the scope of the claims appended hereto.

What is claimed is:

1. A filling mechanism for a tank containing liquid, comprising a liquid inlet pipe disposed within the tank and having an outlet through which liquid can be introduced into the tank, a valve body mounted on said pipe, a valve arranged in said body for movement into and out of closing relation with the pipe outlet to control the flow of liquid from said pipe into the tank, a pair of superimposed levers mounted on said body to move about vertically aligned parallel pivots in intersecting arcuate paths, one lever of said pair being biased into intersecting relation with the other lever of said pair and being operatively connected to said valve to move the valve into and out of its closing relation with said outlet, a float carried by said other lever responsive to the level of liquid in said tank to move said other lever in its arcuate path and impart movement to said one lever to thereby cause said valve to move into and out of its closing relation with said outlet as the level of liquid rises and falls in said tank.

2. A filling mechanism for a tank containing liquid, comprising a liquid inlet pipe disposed within the tank and having an outlet through which liquid can be introduced into the tank, a valve body mounted on said pipe, a valve arranged in said body for movement into and out of closing relation with the pipe outlet to control the flow of liquid from said pipe into the tank, a pair of superimposed levers mounted on said body to move about parallel pivots in intersecting arcuate paths to one side of said body, the uppermost lever of said pair being biased into intersecting relation with the lowermost lever of said pair and being operatively connected to said valve to move said valve into and out of closing relation with said pipe outlet, a float carried by said lowermost lever and responsive to the level of liquid in the tank to move said lowermost lever in the arcuate path and cause said uppermost lever to move in its arcuate path to thereby move said valve into and out of its closing relation with said outlet as the liquid level in the tank rises and falls.

3. A filling mechanism for a tank containing liquid, comprising a liquid inlet pipe disposed within the tank and having an outlet through which liquid can be introduced into the tank, a valve body mounted on said pipe, a valve arranged in said body for movement into and out of closing relation with the pipe outlet to control the flow of liquid from said pipe into the tank, a pair of superimposed levers mounted on said body to move about vertically aligned parallel pivots in intersecting arcuate paths, one lever of said pair being biased into intersecting relation with the other lever of said pair and being operatively connected to said valve to move the valve into and out of its closing relation with said outlet,

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a float carried by said other lever responsive to the level of liquid in said tank to move said other lever in its arcuate path and impart movement to said one lever to thereby cause said valve to move into and out of its closing relation with said outlet as the level of liquid rises and falls in said tank, adjustable means carried on said one lever and extending therefrom toward and biased into contact with the other lever for selectively spacing said levers from each other to control the amount of travel required for said valve to move into closing relation with said outlet and thereby limit the level of liquid in said tank.

4. A filling mechanism for a tank containing liquid, comprising a liquid inlet pipe disposed within the tank and having an outlet through which liquid can be introduced into the tank, a valve body mounted on said pipe, a valve arranged in said body for movement into and out of closing relation with the pipe outlet to control the flow of liquid from said pipe into the tank, a pair of superimposed levers mounted on said body to move about vertically aligned parallel pivots in intersecting arcuate paths, one lever of said pair being biased into intersecting relation with the other lever of said pair and being operatively connected to said valve to move the valve into and out of its closing relation with said outlet, a float carried by said other lever responsive to the level of liquid in said tank to move said other lever in its arcuate path and impart movement to said one lever to thereby cause said valve to move into and out of its closing relation with said outlet as the level of liquid rises and falls in said tank, adjustable volume control means carried by said body and movable into intersecting relation with the arcuate path of said one lever to limit the movement of said one lever in one direction to selectively control the distance said valve will be moved out of its closing relation with said outlet.

5. A filling mechanism for a tank containing liquid, comprising a liquid inlet pipe disposed within the tank and having an outlet through which liquid can be introduced into the tank, a valve body mounted on said pipe, a valve arranged in said body for movement into and out of closing relation with the pipe outlet to control one side of said body, the uppermost lever of said pair of superimposed levers mounted on said body to move about parallel pivots in intersecting arcuate paths to one side of said body, the uppermost lever of said pair being biased into intersecting relation with the lowermost lever of said pair and being operatively connected to said valve to move said valve into and out of closing relation with said pipe outlet, a float carried by said lowermost lever and responsive to the level of liquid in the tank to move said lowermost lever in its arcuate path and cause said uppermost lever to move in its arcuate path to thereby move said valve into and out of its closing relation with said outlet as the liquid level in the tank rises and falls, adjustable means carried on said uppermost lever and extending therefrom toward and biased into contact with said lowermost lever for selectively spacing said levers from each other to predetermine the amount of travel necessary for said valve to move into closing relation with said outlet and thereby control the level of liquid in said tank, and adjustable volume control means carried by said body and movable into intersecting relation with the arcuate path of said uppermost lever to limit the movement of said uppermost lever in one direction and selectively control the distance said valve will be moved out of its closing relation with said outlet.

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