March 9, 1954 C. E. MABBS 2,671,464

AUTOMATIC WATERER AND MEDICATOR

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Fig. 1.

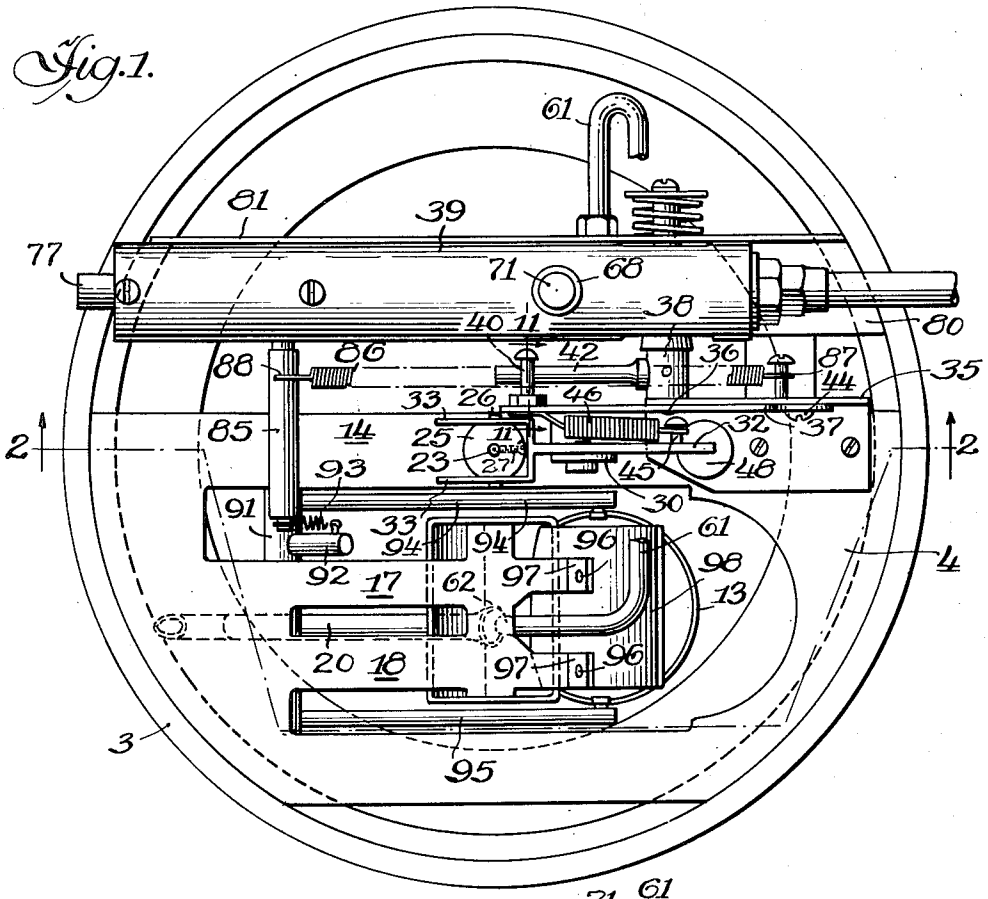
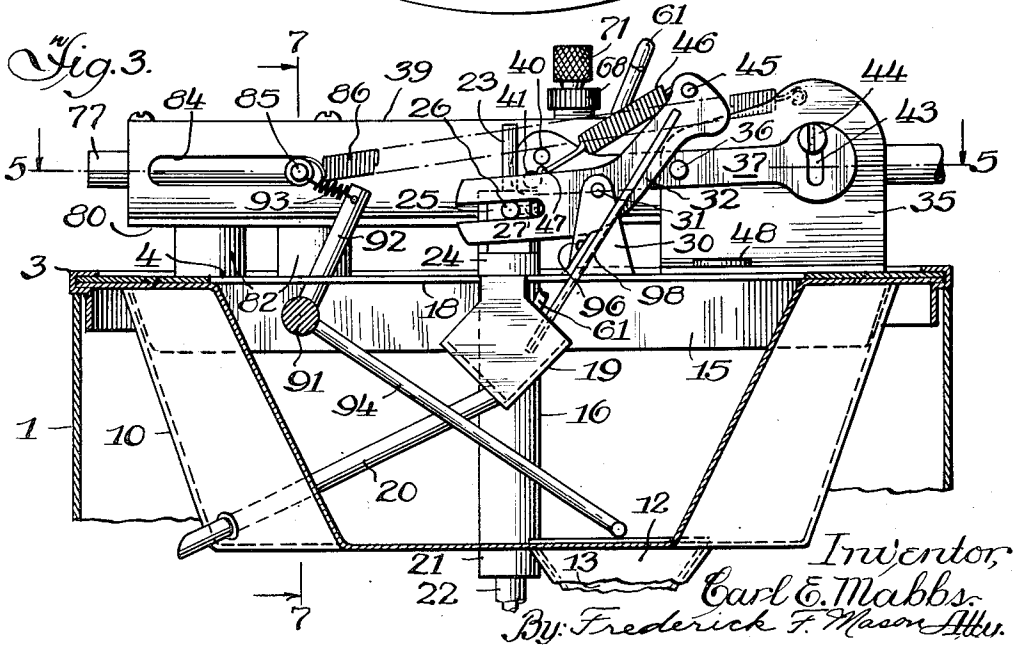


Fig. 3.



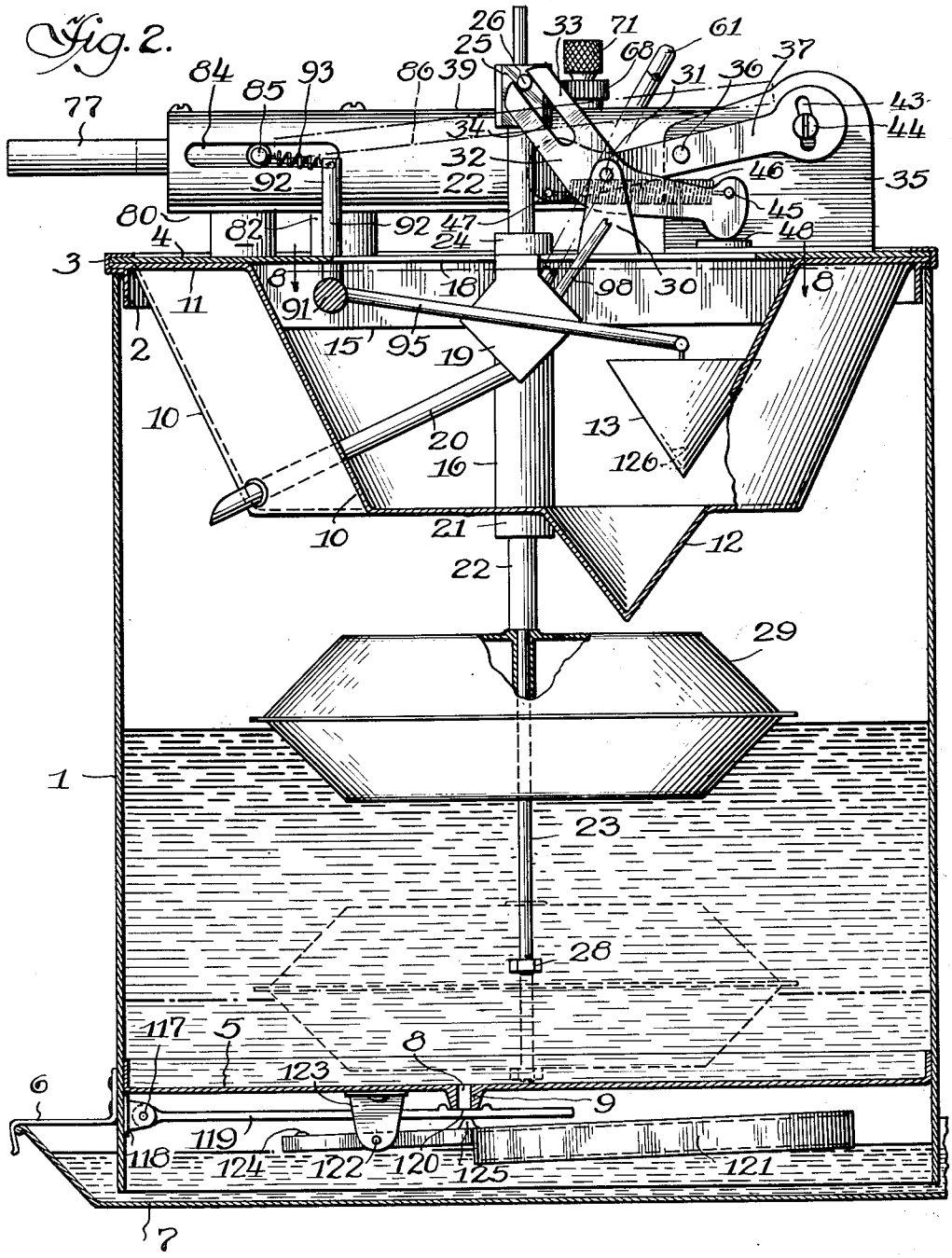
Inventor,
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AUTOMATIC WATERER AND MEDICATOR

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Fig. 2.



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Fig. 6.

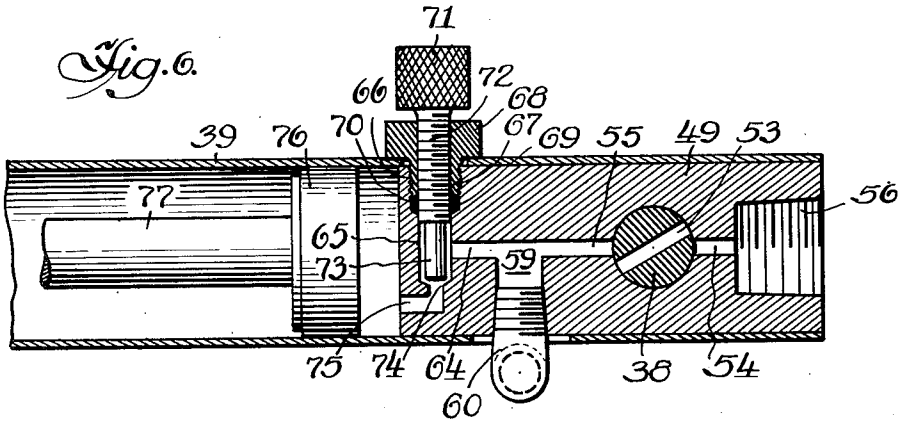


Fig. 12.

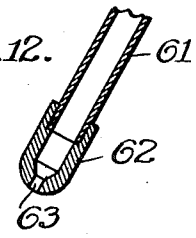


Fig. 13.

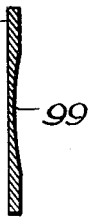
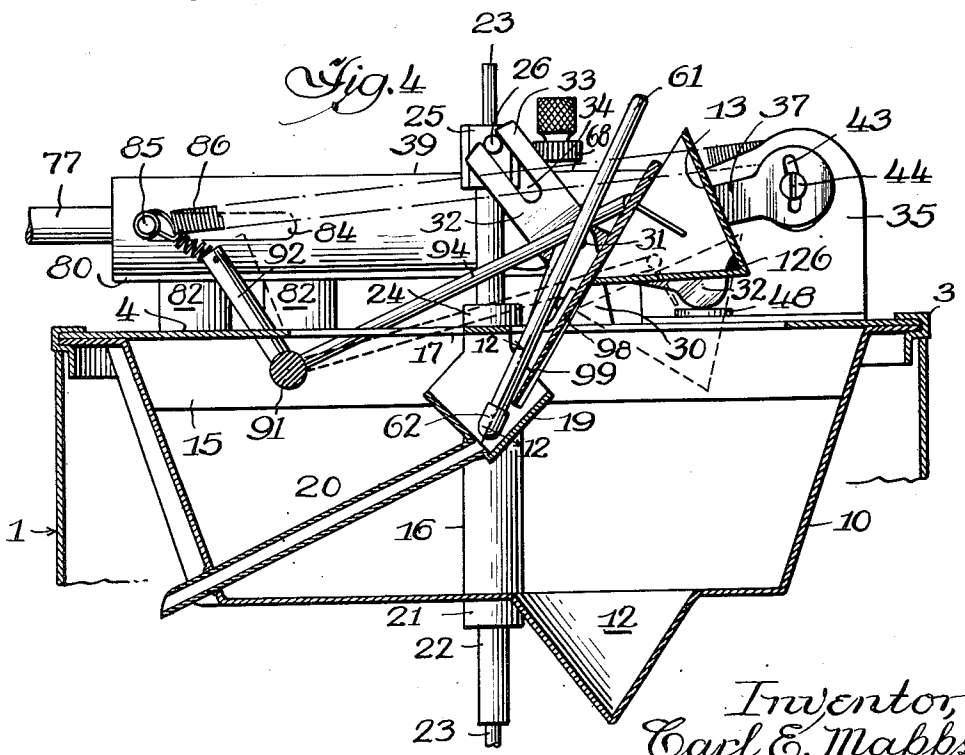


Fig. 4



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Fig. 5.

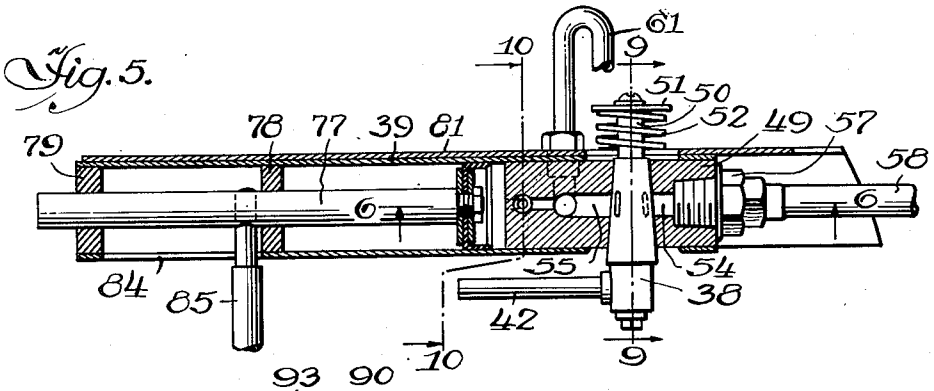


Fig. 8.

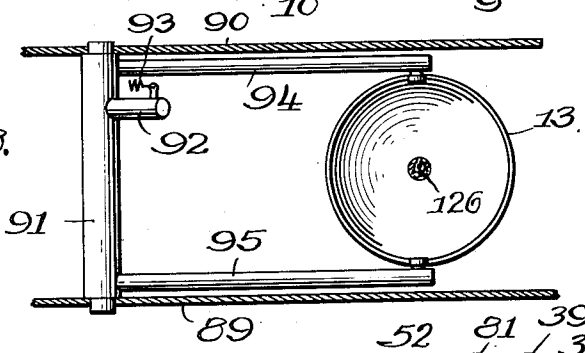


Fig. 9.

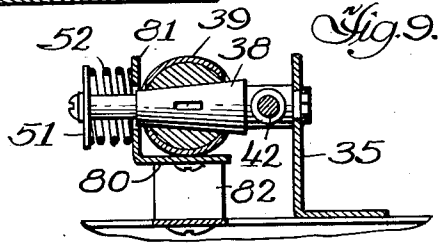


Fig. 7.

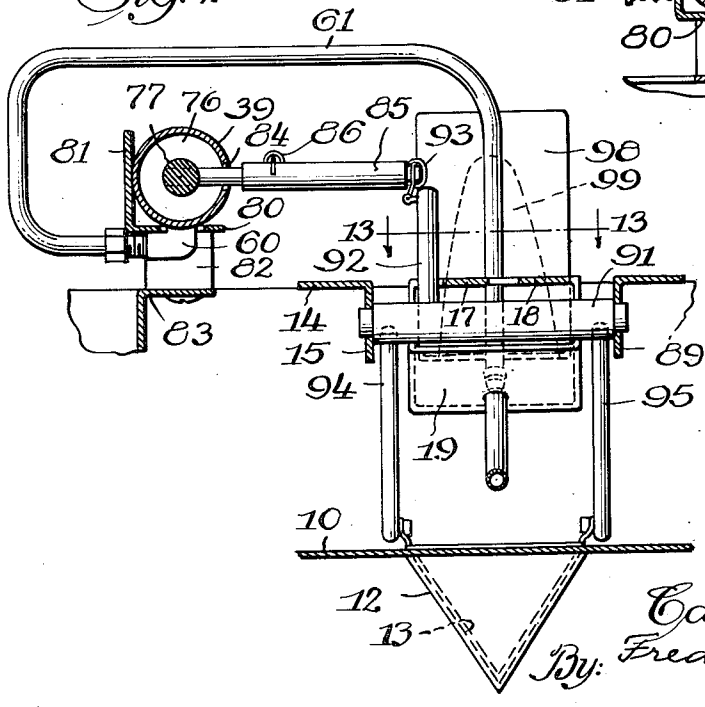


Fig. 10.

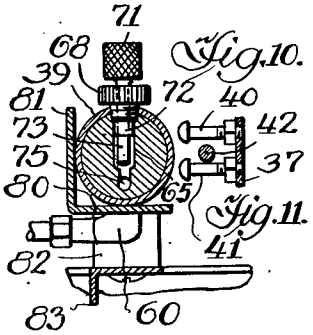


Fig. 11.

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Fig. 14.

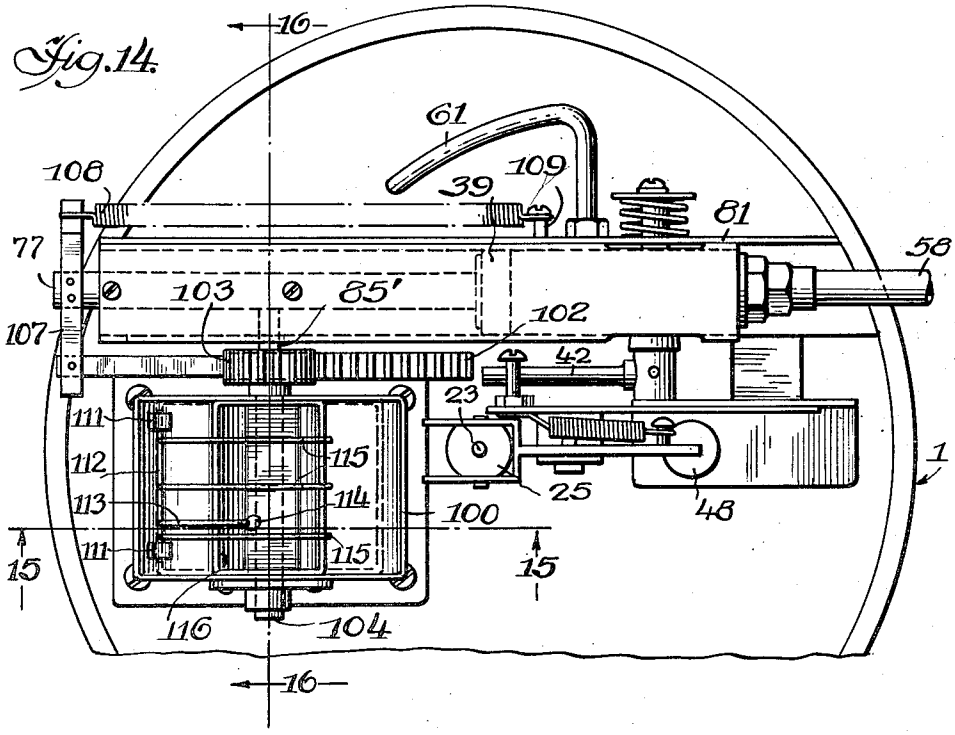


Fig. 15.

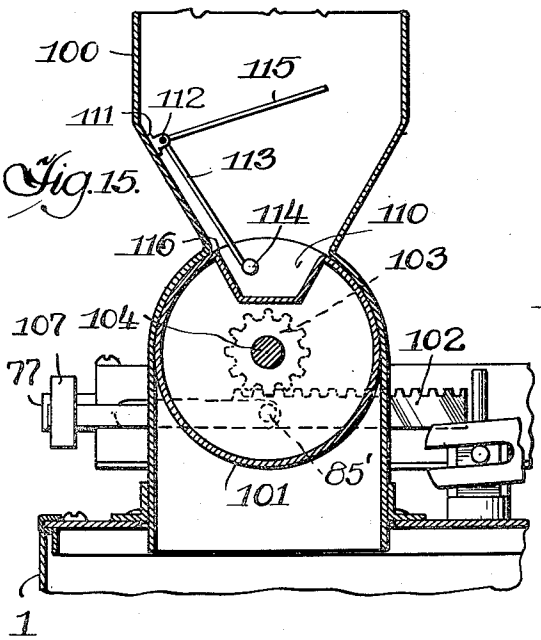
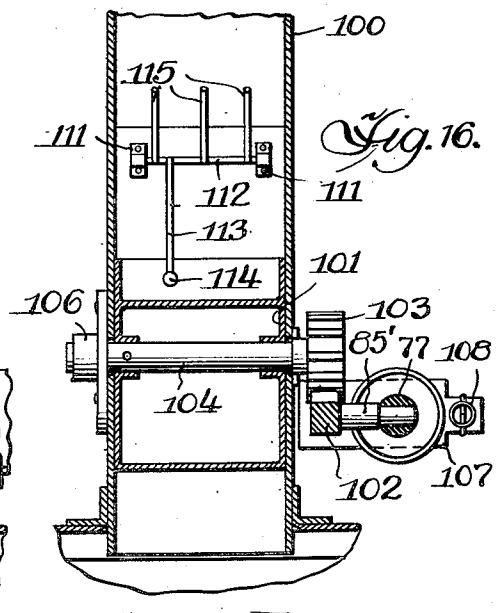


Fig. 16.



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Patented Mar. 9, 1954 2,671,464

UNITED STATES PATENT OFFICE

2,671,464

AUTOMATIC WATERER AND MEDICATOR

Carl E. Mabbs, Washington County, Ark.

Application June 13, 1950, Serial No. 167,891

20 Claims. (Cl. 137—111)

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This invention relates to an automatic waterer for providing drinking water to poultry and the like, and more particularly to such apparatus having automatically operative means for selectively adding a medicament to the drinking water whenever required. An important feature of the present invention is the provision of mechanism for automatically supplying drinking water and, when desired, medicament to the waterer, and utilizing the back-pressure of the water in the pipe leading into the tank for providing the power for operating the medicament dispensing mechanism. Also to provide for variation in the concentration of the medicament in the drinking water by varying the volume of water supplied.

While the present invention is particularly adapted for poultry, and while, for illustrative purposes, it is described herein as used for poultry, it is to be understood that it may be used in connection with other species of birds, animals, and any other uses to which it may be adaptable. Hence I wish the term "poultry," as used herein, to be interpreted broadly as including such other uses, if adaptable thereto.

Poultry, and particularly young birds, are subject to numerous diseases and disorders which will spread rapidly in a flock in the same house or location using common feed troughs and waterers. There are two usual methods of administering medicine to diseased or sick flocks, to wit, in the feed or in the water, either of which methods, prior to the present invention, is a labor consuming operation. Poultry are visual feeders, that is, they select their food by appearance rather than by its taste or smell. It is common knowledge that birds will fail to eat food in a different form than that to which they have been accustomed, until hunger urges them to eat food in a new form and appearance. This time lapse in food consumption from old to new form of food where a change, for example from pellets to mash, or otherwise, to obtain a blend of medication into the food, may mean the difference in the salvation of a poultry flock, or heavy losses from sickness.

On the other hand, medication can be administered to the drinking water without loss of time before medication is accomplished, provided there is no substantial change in the arrangement or design of the waterers in use. From this it is apparent that medication through drinking water is most desirable. Poultry consume large quantities of water. Prior to the present invention, it has been the belief of operators of large

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flocks that automatic waterers were not desirable because of the inability to medicate the water in an automatic waterer. Otherwise, automatic waterers would be preferred because of the saving in labor, and the more feasible supply of water.

The above difficulties have been overcome in the present invention, in which I have provided a new construction and arrangement of automatic waterer, capable of furnishing a properly medicated water when necessity demands, or plain water under ordinary operating conditions. With my improved apparatus the unit can be adapted to existing tank waterers, and to some types of automatic trough waterers. Greater medication efficacy can be accomplished by mechanically controlled metering and measuring devices than by manual measurements, and hence greater curative results will be obtained by the present invention, with resultant lower costs in the overall treatment of the flock.

Among the objects of the present invention are: to provide a novel and improved automatic waterer and medicator; to overcome the disadvantages and accomplish the advantages referred to earlier herein; to provide mechanism for automatically supplying drinking water, and when desired, automatically metered medicament proportioned to the amount of water supplied, and utilizing the power derived from the use of the back-pressure of the water discharge into the tank to provide the power for operating the medicating mechanism; to provide mechanism whereby either a liquid medicament or a powdered or granulated medicament may be used for medicating the drinking water; to provide a novel arrangement and construction of hydraulic cylinder for operation by back-pressure from the liquid discharge into the tank; to provide a novel metering or measuring device and connections for operating the same from the hydraulic cylinder; to provide new and improved means for supplying water from the tank to the drinking trough or pan; to provide a new and improved valve arrangement to regulate the rate of flow of water into the hydraulic cylinder and thus control the rate of pressure build-up in the cylinder; to supply drinking water having a constant medication concentration; to provide improved means for automatically measuring and dispensing into the reservoir of the waterer a definite amount of powdered or granulated medicament; to provide new and improved means for automatically measuring and dispensing into the reservoir of the waterer a definite amount of

liquid medicament; to provide a snap action mechanism for positively and quickly opening and closing the water supply valve at the desired times in each cycle of operation; and such further objects, advantages, and capabilities, inherently possessed by my improved device, as will later more fully appear.

My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while I have shown therein preferred embodiments I wish it understood that the same are susceptible of modification and change without departing from the spirit of the invention.

In the drawings:

Fig. 1 is a top plan view of a waterer and medicator embodying my invention.

Fig. 2 is a vertical longitudinal section on the zig-zag line 2—2 of Fig. 1, partly in elevation, and partly broken away, and showing the float in its uppermost position with the main valve operating connections tripped for cutting off the water supply to the hydraulic cylinder.

Fig. 3 is a fragmentary view similar to the upper portions of Fig. 2, and showing the main valve operating connections tripped in the opposite direction as they would be when the float is in its lowermost position, for supplying water from the supply line to the tank and to the hydraulic cylinder.

Fig. 4 is a fragmentary view similar to the upper portions of Fig. 2, but taken on a line passing substantially through the center of the medicament dispensing cup and showing the latter in its uppermost or discharge position.

Fig. 5 is a longitudinal section on the line 5—5 of Fig. 3, through the hydraulic cylinder member and associated parts.

Fig. 6 is an enlarged vertical section on the line 6—6 of Fig. 5.

Fig. 7 is a vertical section on the line 7—7 of Fig. 3.

Fig. 8 is a plan view looking down on the medicament cup and operating parts therefor as viewed from the line 8—8 of Fig. 2.

Fig. 9 is a transverse vertical section on the line 9—9 of Fig. 5, and showing the main valve in elevation.

Fig. 10 is a transverse vertical section on the line 10—10 of Fig. 5.

Fig. 11 is an end view of the pins, arm, and lever for operating the main valve of the hydraulic cylinder, and showing the lost motion play between the arm and the pins, as viewed from the line 11—11 of Fig. 1.

Fig. 12 is a fragmentary, enlarged, longitudinal section on the line 12—12 of Fig. 4, of the outlet end portion of the pipe and nozzle with restricted opening for discharging water from the main valve into the shell of the waterer and to create back pressure for operating the hydraulic cylinder.

Fig. 13 is a transverse section, on the line 13—13 of Fig. 7, of the emptying plate for conducting measured liquid medicament into the funnel member and the metered liquid conductor tube.

Fig. 14 is a fragmentary top plan view of the hydraulic cylinder and associated parts, connected up for operating a powdered or granular medicament dispenser.

Fig. 15 is a fragmentary vertical section on the line 15—15 of Fig. 14.

Fig. 16 is a fragmentary vertical section on the line 16—16 of Fig. 14.

General structure

In the form shown for illustrative purposes in the drawings, my invention is applied to a waterer tank 1 of any suitable size, and having a free upper edge upon which is seated a collar 2, having an outwardly extending annular grooved member 3, the groove or channel of which receives the outer edge of a frame work 4 having suitably formed cross plates and openings to accommodate the supporting and operating parts, as will be later more fully understood, see Figs. 1–4. The tank is formed a short distance above the bottom edge of its outer shell with a bottom 5 secured in any desired water tight manner to the shell. Fixed at any suitable circumferentially spaced distances around the shell adjacent its bottom edges, are a plurality (preferably three) of radially, outwardly extending, supporting arms 6, to be resiliently and removably gripped over the upper outer rim of a poultry drinking pan or trough 7, as is customary in poultry waterers. As seen in Fig. 2 the bottom edge of the tank shell is thus raised a distance above the bottom of the pan 7 to permit free passage of water from underneath the tank to the outer edges of the pan, to be accessible to the poultry for drinking. Also the pan may be detached from the waterer when desired. The tank bottom 5 is provided with an opening 8 passing through the bottom and the extension 9. This opening 8 is adapted to be opened and closed by a specially arranged float valve, as later more fully explained, to supply drinking water from the tank to the pan as required.

Fixed to the under surface of the frame work 4 is a medicament reservoir 10 in the form of a pan having an upper marginal flange 11 adapted to be positioned in the channel of member 3 between the adjacent shoulder of collar member 3 and the frame 4, the pan flange 11 and marginal edges of frame work 4 being secured in any desired manner in the channel of member 3 so that the pan, and operating mechanism may be removed from the tank 1 simply by lifting them upwardly bodily as a unit therefrom. This medicament reservoir is adapted to receive any suitable liquid medicament to be automatically metered and supplied to the water in tank 1. Formed in the bottom wall of the medicament reservoir 10 is a sump member or cup well 12 of the same shape and complemental size as the measuring or metering cup 13, adapted to be seated therein to such depth as to be able to receive substantially the last drop of medicament liquid in the medicament reservoir.

Extending a slight distance downwardly from the upper cross piece 14 of the frame and a slight distance to one side of the parallel diameter of the reservoir pan and extending from side wall to side wall of the reservoir pan, is a flange 15 for stiffening purposes. Fixed in liquid tight manner axially in the center of the bottom wall of the reservoir pan and extending upwardly and fixed to the under surface of the cross piece 14 is a guide tube 16 for a purpose later explained.

Fixed to depend from extensions on the flat arms 17 and 18 of the frame work 4, is an open-top liquid-receiving hollow funnel member 19 having sealed in its bottom portion the top of a tube 20, which tube adjacent its bottom end is sealed to the side wall of the reservoir pan 10 to extend therethrough, and somewhat therebeyond to conduct liquid medicament to the water in the waterer tank, see Figs. 2–4. Also,

as later more fully explained, the driking water to be supplied into the waterer tank passes into the funnel member 19 and through tube 20 into the tank. Guide tube 16 is sealed to the bottom of reservoir pan 10 by a clamp collar 21 threaded onto a threaded reduced end of the guide tube extending through the pan bottom. Clamp collar 21 has an inner axial bore in alignment with the bore in guide tube 16. However, any suitable means may be employed for sealing the tube 16 to the reservoir bottom as desired.

Automatic tank filling mechanism

The means for automatically filling the waterer tank with water will now be described. Longitudinally slidably mounted in the guide tube 16 is a control stem 22 formed with an axial longitudinal bore extending entirely therethrough, in which bore is fixed for longitudinal adjustment therein a float rod 23. Fixed to a reduced top end of guide tube 16 above cross piece 14 is a clamp collar 24 having a central longitudinal bore in alinement with the bore within guide tube 16, and through which the control stem is also slidable. Formed on the upper end of the control stem 22 and fixed thereto is a head 25 having two of its opposite sides flattened and each having fixed therein a short laterally extending pin 26. Head 25 is formed with a longitudinal central hole through which passes float rod 23. The float rod may be held in any desired position of longitudinal adjustment in control stem 22 and head 25 by a set screw 27, as seen in Fig. 3.

Referring to Fig. 2, float rod 23 is provided at its lower end with a lower float stop 28. Slidably mounted on float rod 23 is a float 29 which is free to slide, within restricted limits, longitudinally on the float rod as the level of the water within tank 1 raises or lowers. Fixed to cross piece 14 of frame work 4 is an upstanding bracket 30 in the top end of which is fulcrumed at 31 a bell crank 32 which at its outer end is free to abut against the upper side of the frame work when the float rod is moved upwardly to its upper limit, and which at its opposite end is formed with bifurcated fork members 33 each formed with a slot 34 to slidably receive pins 26 as the bell crank 32 is swung in one direction or the other by the raising or lowering of the float rod 23.

Fixed to, and upstanding from the cross piece 14 of frame work 4, is a bracket 35 to which is fulcrumed at 36 a lever 37. It is to be noted that the axis of fulcrum 36 is in alinement with the axis of rotation of the tapered stop cock plug or main valve member 38 of the hydraulic cylinder member 39, see Figs. 1–5. Fixed adjacent the inner end of lever 37, to extend laterally therefrom toward the hydraulic cylinder member 39, is a pair of vertically spaced apart pins 40 and 41, see Figs. 3 and 11. Loosely positioned between these pins, with some play or lost motion therebetween, is the free end of an arm 42 which at its other end is fixed to the plug of main valve 38 for opening and closing the same. As seen in Fig. 1, lever 37 is located to one side of bell crank 32, so as not to interfere therewith. Lever 37 at its outer end is enlarged in width and formed with a slot 43 to be movable over pin 44 fixed to extend from bracket 35. Slot 43 accordingly limits the amount of swinging movement of lever 37.

Connected to the outer end of bell crank 32 at 45 is one end of a coil tension spring 46 which at its other end is connected at 47 to the inner end of lever 37. As will be seen in Figs. 2 and 3, when the bell crank 32 is swung into the position of Fig. 2 by elevation of the float rod 23 and control stem 22 due to elevation of the float 29, the outer end of the bell crank will contact the top of the frame work and coil spring 46 will be below the fulcrum 36 of lever 37, thus causing the inner end of lever 37 to move downwardly under action of spring 46, which action, through pin 40, will swing valve arm 42 downwardly with a snap action and cause quick closing of the main valve 38. This not only affords a quick closing of the main valve, but also positively holds it closed against inadvertent opening until the float is again lowered into contact with the lower float stop 28 on the bottom of the float rod. The outer end of the bell crank 32 when down contacts a disk or strip 48, on the frame work, which disk or strip may be of any thickness desired for best results.

When the water in the waterer has been lowered until the float 29 contacts the lower float stop 28, and pushes the same downwardly, the float rod 23 and control stem 22 will correspondingly move downwardly and through pins 26 in slots 34 will cause the inner end of the bell crank to move downwardly and its outer end to move upwardly, which will carry the outer end of coil spring 46 upwardly at an angle until it is above fulcrum 36, as seen in Fig. 3. This position of the coil spring causes the inner end of the lever 37 to move upwardly and pin 41 to move the inner end of valve arm 42 upwardly, which results in the main valve 38 being opened with a snap action. Water will then be fed, as later explained, into the waterer tank, which will continue until the float 29 rises with the rising water level until the float strikes the bottom end of control stem 22 and raises it and pins 26 together with the inner end of bell crank 32, until the main valve 38 is snapped closed as explained earlier. The amount of swinging movement of the lever 37 may be limited by the length of the arcuate slot 43, or by stops, or any other limiting means desired.

The amount of downward movement of the control stem 22 and float rod 23 is limited by head 25 on the control stem striking the top collar 24 on the frame work. It is thus seen that the vertical distance of movement of the float is between the lower float stop 28 and the bottom end of the control stem 22 plus the additional movement of the float required to operate the parts described above for opening and closing the main valve. It should here be pointed out, however, that this distance may be increased or decreased, by adjusting the position up or down of the float rod in the control stem by loosening and tightening the set screw 27, as seen in Fig. 3. In other words, the float rod may be adjusted up or down in the control stem, and fixed in such adjusted position, as desired, to position the lower float stop 28 at any desired elevation, which controls the volume of water delivered per cycle of float movement and enables the proportioning of water to the medicament added.

The hydraulic cylinder

The main valve 38 is preferably tapered, and rotatably mounted in a complemental tapered hole in the valve casing 49 of the hydraulic cylinder member 39, as best seen in Fig. 5. In order to resiliently hold the main valve against leaking it is provided with an extended end 50 having a stop washer 51 between which and the side

of the valve body is mounted a compression coil spring 52 which urges the tapered valve into the tapered hole, but permits rotation of the valve without leakage. The tapered main valve 38 is, intermediate of its length, formed with a narrow slot or valve opening 53, which, when the valve is moved into the position shown in Fig. 6 is out of communication with the passageways 54 and 55 extending longitudinally in the valve casing 49 to close the valve, and when moved into communication therewith opens the valve. Screwed into the threaded opening 56 is a coupling 57 to which is connected a pipe line, hose line, or the like 58 connected with the usual city water supply, or such other source of water under pressure as may be available, to conduct water under pressure into passageway 54 to be controlled by the main valve 38.

Passageway 55 leads to, and communicates with, an enlarged downwardly extending opening 59 into which is screwed a coupling 60, to which, as seen in Fig. 7, is connected a pipe line 61 which leads into the funnel member 19. The free end of said pipe line, within the funnel member 19, has screwed, or otherwise fixed thereon, a nozzle 62, see Figs. 4 and 12, which has a restricted opening 63. This nozzle opening is of such smallness in diameter that it will introduce into the waterer tank 1, through the funnel member 19 and tube 20, a stream of water large enough to gradually fill the tank to its capacity, and yet small enough to create in the hydraulic cylinder a back pressure great enough to operate the single acting piston therein when valve 38 is open.

Referring to Figs. 5 and 6, and particularly Fig. 6, it will be seen that a passageway 64 connects opening 59 with the radially extending hole 65 of somewhat larger diameter than passageway 64. Hole 65 is enlarged at 66 and screw threaded to receive the threaded tubular neck 67 of the packing gland nut 68, which compresses the packing 69 against the angular shoulder 70 to prevent leakage to the outside. Before the packing gland and packing are inserted into the hole enlargement 66, a flow-regulating and shut-off valve 71 has its threaded stem 72 threaded into packing nut and gland 68. Stem 72 has a lower non-threaded, cylindrical, extension 73 extending downwardly into hole 65. Extension 73, as seen in Fig. 6 is of smaller diameter than hole 65 and has a slightly beveled lower end to seat against the annular beveled shoulder 74 to completely shut off, when desired, the flow of water through the right angled passageway 75, leading from hole 65 into the cylinder 39, when the shut-off valve 71 is screwed downwardly to this extent. The shut-off valve 71 may, when it is desired to operate the hydraulic cylinder, be screwed upwardly in packing nut 68 a desired distance to give desired pressure of water against piston head 76 in the cylinder.

It is thus seen that with the main valve 38 open, the shut-off valve 71 may be adjusted longitudinally in packing nut 68, to either completely shut off flow of water to the cylinder when it is not desired to use the same, or to permit flow of water to the cylinder in desired amounts and pressure. This provides a very effective control of operation of the hydraulic cylinder. As this pressure of water against the piston head 76 is back pressure caused by the restricted opening 63 in nozzle 62, it is seen that I have provided for both the filling of the waterer tank 1 and the operation of the hydraulic cylinder, from a single source, that is, the stream under pressure in the supply line 58. This filling of the tank 1 takes place automatically by the float and its connections with the main valve 38 as explained earlier herein.

Automatic medicator

The means for automatically adding a measured amount of liquid medicament to the water in tank 1 at each filling of the tank, will now be described. The piston head 76 has fixed thereto a piston rod 77 which is longitudinally slidable through central alined holes in the inner piston rod guide cylinder head 78 and the outer piston rod guide head 79, see Fig. 5. As seen in Figs. 1–4, the hydraulic cylinder 39 is securely mounted within the angle in the angle bar formed with a horizontal flange 80 and a vertical flange 81. Horizontal flange 80 is fixedly supported on any desired number of laterally spaced upstanding blocks 82 fixed to the angle cross bar 83 of the frame work 4 and of a height to position the hydraulic cylinder and its associated parts in the desired location for successful operation, see Fig. 7.

As seen in Figs. 5 and 3, the cylinder 39, between guide heads 78 and 79 is formed in its lateral inner side with an elongated slot 84 through which extends an arm or rod 85 fixed at its inner end to the piston rod. As the piston head and piston rod move longitudinally within the cylinder, arm 35 has a corresponding movement along slot 84. As stated, the piston head and piston rod are moved outwardly by the back pressure created by the restricted opening in the nozzle 62. To cause the piston head and piston rod to return to retracted position when the pressure in the cylinder is relieved by passage of water through the nozzle after the main valve is closed, there is provided a coil tension spring 86 fixed at one end at 87 to a pin fixed in bracket 35, and fixed at its other end at 88 to arm 85.

Pivotally mounted at its respective ends in flanges 89 and 15 of frame work 4, at a lower level than arm 85, see Fig. 7, is a shaft 91 having fixed thereto to extend upwardly therefrom an arm 92, which when moved will cause partial rotation of shaft 91. The upper end of arm 92 is connected to the outer end of arm 85 by a short coiled tension spring 93 which gives a slight resilient play between these arms when they are being moved in one direction by the piston rod, and in the other direction by the return spring 86. Fixed to shaft 91, one adjacent each end thereof, is a pair of parallel arms 94 and 95 which extend at approximately ninety degrees with relation to arm 92. Swivelly mounted between the free ends of arms 94 and 95 is the medicament measuring cup 13 adapted when lowered by rotation of shaft 91 to be seated in the sump or cup well 12 and filled with liquid medicament contained in medicament reservoir 10. This occurs when the piston rod 77 is retracted by spring 86.

Fixed by screws or the like 96 to the angularly upstanding free ends 97 of arms 17 and 18 of the frame work 4 is an emptying plate 98 having its lower end extending partway into the funnel member 19 and spaced inwardly from the adjacent side wall thereof, as seen in Figs. 3 and 4. Formed in the right hand face of emptying plate 98, as viewed in Fig. 4, is a shallow wide groove 99 progressively increasing in depth from zero in the upper portion of the plate to a maximum at the bottom thereof. As seen in dotted lines

in Fig. 7, this groove increases in width from top to bottom. When piston rod 77 is projected outwardly by the water system back pressure in the hydraulic cylinder 39 as main valve 38 is opened by float 29, as previously described, the filled medicament measuring cup 13, through the action of arms 85 and 92, shaft 91 and arms 94 and 95, will move upwardly against emptying plate 98. As soon as the rim of this cup contacts said plate it will progressively swing on its pivots and continue to move upwardly a slight distance further, until its top rim is in flat contact with the under face of plate 98 at which time the cup will have been emptied of its contents which have flowed down the under face of the emptying plate into the funnel member 19. The inclination of the emptying plate is of such a small amount with relation to the vertical that the stream of water on the plate coming from the cup will adhere to the plate till it reaches the bottom thereof and drops into the funnel member, from whence it will flow through tube 20 into tank 1. This introduces a metered amount of liquid medicament into the water in the tank for each cycle. By "cycle" is meant one filling and emptying of the tank within the limits for which the float rod is adjusted. After the metering cup has been raised to the position shown in Fig. 4, it will remain in that position until the float has nearly reached its upper limit of movement and the mechanism described above has caused the main valve 38 to close with a snap action. At this time, the water under back pressure behind the piston head and in the pipe 61 will more or less slowly pass through the restricted opening in the nozzle 62 until said back pressure water is relieved into the tank and the piston rod 77 has been retracted by the pull of spring 86. This retraction of the piston rod lowers the cup 13 into the cup well 12 to be again filled with medicament. When the poultry, or other drinkers, have by drinking from the drinking pan 7, lowered the water level to cause the float to again move the lower float stop 28 downwardly, the mechanism will be operated to open the main valve with a snap action and begin a new cycle. As will be understood from the above, when the medicament is not required to be introduced into the water in the tank, the operating of the medicating mechanism may be cut out by closing the shut-off valve 71 which prevents entry of water into the space back of the piston head, and thus discontinues the movement of the piston and the medicament mechanism. This, however, does not interfere with the operation of the mechanism for automatically introducing drinking water into the tank 1. Should the health of the flock later become such as to require the addition of medicament to the water, all that is necessary is to see that liquid medicament is in the medicament reservoir, and open the shut-off valve 71, which will again put the automatic medicating mechanism into operation by movement of the piston.

When it is desired to add a powdered or granular medicament to the drinking water in the tank, this can be done by use of the same hydraulic cylinder, and the same snap action mechanism for opening and closing the main valve, operated by the same float control and associated parts as described above. However, the liquid medicament reservoir and the liquid measuring cup apparatus is omitted, and in its place are substituted a powdered or granular medicament hopper 100, a dispensing drum 101, and associated parts for operating the drum from longitudinal movement of the piston rod 77. In the present modification, see Figs. 14–16, the arm 85' is fixed to the pitson rod to travel in a slot similar to the slot 84 in Fig. 3, and at its outer end is fixed to a rack bar 102 having teeth intermeshing with the teeth of gear 103 fixed to the end of shaft 104, upon which shaft is fixed the drum 101 to rotate therewith. One end of the shaft is journalled in the bearing member 106 fixed to the side wall of the casing in which the drum is mounted, and adjacent its other end it is journalled in the opposite side wall of said casing.

Rigidly fixed to the outer end of piston rod 77 is a cross-bar 107 to which the outer end of the rack bar 102 is attached to move therewith as the piston rod moves outwardly under the force of the water back pressure behind the piston head, and inwardly under the retraction force of the coil tension spring 108 which is attached at one end to the opposite end of cross-bar 107 and at its other end to pin 109 fixed in the vertical flange 81 of the cylinder support. Rotatable drum 101 is formed on its normally upper side with a measuring cavity 110 of a predetermined size to measure a given amount of powdered or granular medicament falling thereinto from hopper 100. This cavity is in registry with the opening in the tapered bottom of the hopper when the piston rod is in retracted position.

When the main valve of the hydraulic cylinder assembly is opened as explained earlier herein, the piston rod is moved outwardly and through the rack and pinion mechanism described above, the drum is rotated clockwise as viewed in Fig. 15, and traps in cavity 110 the measured amount of powdered or granular medicament and carries it around with the drum to a position to be dropped downwardly into the water in the tank 1. The force of the water discharged into the tank through nozzle 62 (Fig. 12), which nozzle in this modification is fixed to the lower end of pipe 61' below the supporting frame work, causes a circulation and agitation of the water in the tank and thoroughly mixes the powdered medicament in solution therein. When the tank is filled with the solution thus formed, the main valve is snapped closed through the medium of the float and associated parts, and the spring 108 causes retraction of the piston rod and rack bar, and returns the drum 101 and its cavity 110 to the position shown in Fig. 15 for another charge of powdered medicament into the measuring cavity. It is thus seen that a measured amount of powdered medicament is discharged into the water in tank 1 each cycle of operation.

In order to prevent the powdered medicament from bridging over above the cavity 110, there is provided on one of the inside walls of the hopper a pair of spaced bearing members 111 in which is journalled a shaft 112 to which is fixed a downwardly extending arm 113 having a weight 114 fixed to its lower end to urge this arm under gravity to move downwardly. Also fixed to shaft 112, to extend out into the hopper space, are a plurality of arms 115 which serve as stirrers or agitators to keep the powdered medicament loosened up and prevent it from caking. The movement of the stirring arms 115 is effected by the rear edge 116 of the cavity walls wiping against the weight 114 on the bottom of arm 113, as the drum is rotated clockwise in Fig. 15, and moving the arm 113 in a counterclockwise direc-

tion to be clear of the cavity, which results in simultaneous upward movement of the stirrer arms 115. When the drum is returned after dumping its charge into the tank, the weight of arm 113 again drops into the cavity with a corresponding downward movement of the arms 113 and 115.

While a powdered medicament has been referred to for use in hopper 100, it will be understood that granular medicament, and other suitable forms of dry medicament may be used in the hopper 100 as desired, for forming a medicament solution in the tank.

Float valve for tank bottom

An over-run float valve for controlling flow of water through the discharge hole 8 in the tank bottom is provided that will not only automatically feed water from the tank 1 into the drinking pan 7 and maintain it therein at an approximate level, but will also stop flow of water from the tank when the drinking pan is disconnected from the tank. In this connection, there is pivotally connected at 117 to bracket 118 fixed to the tank wall below the bottom 5, an arm 119 carrying a valve seat 120 positioned under discharge hole 8. Float 121 has its rearwardly extending arm pivoted at 122 adjacent the bottom ends of laterally spaced ears of bracket 123 fixed to the bottom face of the tank bottom 5 intermediate of hole 8 and bracket 118. The ears of bracket 123 are spaced apart a sufficient distance to permit free up and down movement of arm 119 therebetween and yet keep this arm in general alinement for operation of the valve seat 120 with relation to hole 8. The rearwardly extending float arm is formed on its upper surface with a pair of upstanding nodes or lugs 124 and 125 spaced apart longitudinally of the float arm equal distances on the opposite sides of pivot fulcrum 122.

In service, and with the drinking pan in place, float 121 is limited in its arc of travel by contact with the bottom of the drinking pan and that of the filled position where it would close valve 120 by action of the water present in the drinking pan. With pan 7 empty, water entering through orifice 8 would fill the pan and cause float 121 to rise and eventually bring node 125 into contact with arm 119, and continued upward pressure by the float would close valve 120 to shut off the water to pan 7. In normal operation this action of float 121 would keep the drinking pan filled for consumption without overflow. If for any reason the drinking pan is dislodged accidentally, or is intentionally removed, float 121 is then free to fall below the limit of the bottom of the drinking pan. If this condition comes about, node 124 comes in contact with arm 119 and the weight of the float closes valve 120 to prevent steady and uncontrolled flow until drinking pan 7 is again placed in proper position.

If desired, a weight 126 may be added to the bottom of medicament cup 13, to further insure its stability during operation. If desired, a bail may be added to the tank 1, for carrying purposes or to suspend it in position for use, and a cover applied over the operating parts to protect them from dust and dirt. Such bail and cover being conventional are not shown. The lost motion provided for between pins 40 and 41, between which main-valve operating arm 42 is loosely cradled, obviates the necessity of simultaneously overcoming the inertia of the static valve plug and the bell crank.

The medicament measuring cup 13 may be of any capacity desired for the particular installation in which it is used. I have found one cubic inch capacity to be satisfactory for the usual size automatic waterer, but, as is obvious, this can be made of a larger or smaller size as desired. The medicament cup, of whatever predetermined size it may be, is of constant and nonadjustable volume, but it is important to keep in mind that the length of travel of the float is adjustable so that the amount of water supplied at one cycle of the float can be varied to suit the desired amount of medicament per gallon of water. In other words, the concentration of the medicament in the drinking water is accomplished by varying the volume of water supplied. This can be closely controlled because of the positive opening and closing of the main valve 30 by the snap action mechanism referred to earlier herein, thus preventing any undesired leakage of water into the waterer to disturb said concentration.

The term "medicament" is used herein to include not only dry or liquid medicine, but also dry or liquid materials capable, when added to the drinking water, of imparting to it an increased nutritive or healthful value.

Having described my invention, I claim:

1. An automatic waterer and medicator, comprising in combination, a tank adapted to controllably feed water into a drinking vessel, float-controlled mechanism for discharging water under pressure into said tank and for stopping said discharge at intervals determined by the fall and rise of the water level in the tank, and further mechanism controlled by said float-controlled mechanism for automatically delivering a measured amount of medicament into the water in the tank at a time in the rise of the water level in the tank, the water discharged into the tank being provided from a supply line under pressure, and said further mechanism including a movable member operated by back-pressure from the discharge of water into the tank.

2. Apparatus as claimed in claim 1, in which said movable member comprises a piston movable under said back-pressure in a cylinder, and said further mechanism further includes medicament dispensing means operated by movement of said piston.

3. An automatic waterer and medicator, comprising in combination, a water tank, a drinking vessel for receiving water in controllable amounts from the tank, a hydraulic cylinder member having a piston and an extension having a valve casing and a main valve, a supply line for water under pressure and leading to said main valve, a pipe line receiving water under pressure from said main valve when open and leading into the tank, a nozzle on the tank end of said pipe and having a restricted opening to build up a back-pressure for operating said piston, medicament dispensing means for periodically adding to the water in the tank a measured amount of medicament, and means connected between them for operating the medicament dispensing means from movement of said piston.

4. Apparatus as claimed in claim 3, including a shut-off valve which when closed will prevent operation of the piston without interfering with discharge of water into the tank through said nozzle under control of the main valve.

5. Apparatus as claimed in claim 3, including a float in the tank, and mechanism connecting the float and the main valve for opening the

main valve with a snap action when the float is at its low level, and for closing said main valve with a snap action when the float is at its high level.

6. An automatic waterer and medicator, comprising in combination, a water tank adapted to be detachably mounted to a drinking vessel, a hydraulic cylinder member having a valve casing member at one end and a cylinder and piston at the other, a main valve in said casing member, a supply line for water under pressure leading to one side of the main valve, a pipe line leading from said casing member into the tank and having connection with the other side of the main valve, a nozzle on the outlet end of said pipe line and having a restricted opening, a passageway in the casing leading from said main valve to the cylinder back of the piston and connected with said pipe line, whereby back pressure from the restricted nozzle will move the piston when the main valve is open, and a regulating valve in the casing member for regulating the amout of back pressure admitted back of the piston.

7. Apparatus as claimed in claim 6, including a valve seat in said pasasgeway against which the regulating valve may be seated to completely cut off flow of water to the piston while water continues to flow into the tank.

8. An automatic waterer, comprising in combination, a tank, a framework on the top of the tank, a guide tube fixed in said framework, a control stem slidable in the guide tube, a float rod mounted in the control stem for longitudinal adjustment therein, a float stop adjacent the bottom of the float rod, a float slidable on the float rod, a first lever mounted on the work frame and articulated with said control stem, a valve casing mounted on the work frame and having a main valve oscillatable therein, a second lever fulcrumed in line with the axis of rotation of the main valve, means connecting said second lever to the main valve for rotating the main valve as the second lever is moved, and spring means connecting one end of the first lever with the oppoiste end of the second lever so that as the control stem is moved up and down by the float at its limits of movement the first and second levers will close and open the main valve with a snap action.

9. Apparatus as claimed in claim 8, in which said means for rotating the main valve from the second lever includes an arm fixed to the main valve, and a lost-motion connection between said arm and the second lever.

10. An automatic waterer and medicator, comprising in combination, a tank having a float therein a supporting frame on the tank, a liquid-medicament reservoir on said frame, a funnel member in the upper portion of said reservoir and having a tube passing through the reservoir wall into the tank, an emptying plate fixed to have its lower end positioned to direct liquid medicament into the funnel member, a measuring cup for raising said medicament from the reservoir to the emptying plate, and means for periodically raising and lowering said cup upon the float reaching the limits of its movement with the water level.

11. Apparatus as claimed in claim 10, in which said means includes a hydraulic cylinder member having a valve casing and a cylinder and piston, a main valve in the valve casing, a pipe line having communication at one end with the main valve and a restricted nozzle at its other end, said nozzle being positioned to direct its outlet into the funnel member, a passageway in the valve casing member for directing back-pressure water from the pipe line to back of the piston to move the piston, and mechanism connected with the piston and with the cup to raise and lower the cup as the piston is moved.

12. Apparatus as claimed in claim 10, in which the emptying plate is formed with at groove to assist in directing liquid medicament from the cup into the funnel member.

13. Apparatus as claimed in claim 10, in which the bottom of said reservoir is formed with a depressed cup well to receive the cup when lowered therein whereby to enable the cup to pick up approximately the last of the liquid medicament in the reservoir.

14. An automatic waterer and medicator, comprising in combination, a tank having a float and adapted to contain drinking water, a frame on the tank, a medicament container above the level of water in the tank, a hydraulic cylinder member having a main valve casing and a cylinder and piston, a main valve in said main valve casing, a pipe line leading from the main valve into the tank and having means for creating back pressure in the pipe line and main valve, said main valve casing having a passageway from the main valve to back of the piston for moving said piston by said back pressure, mechanism connecting the float and main valve for introducing water through said pipe line into tank and stopping the same as the float nears its lower and upper limits of movement, and means operated by longitudinal movement of the piston rod of the piston for discharging a measured amount of medicament from the medicament container into the water in the tank.

15. An automatic waterer and medicator, comprising in combination, a tank having a float to rise and fall with the water level in the tank, a hydraulic cylinder member having a valve casing and a cylinder and piston, a main valve in said casing for periodically introducing water into the tank, a pipe line leading from the main valve into the tank and having means for creating back pressure in the pipe line and main valve, said valve casing having a passageway from the main valve to back of the piston, said piston being operated by back-pressure from the stream of water entering the tank, a supporting frame on the tank, a medicament container on the frame, a drum rotatable underneath said container and having a measuring cavity to receive medicament from the container when in communication therewith, and means connected to the piston and drum for rotating the drum upon movement of the piston for discharging a measured amount of medicament into the water in the tank.

16. Apparatus as claimed in claim 15, including an agitator pivotally mounted in the container and having an arm extending into said cavity when the cavity is in communication with the bottom of the container whereby when the drum is rotated into and out of cavity filling position the agitator will be moved to loosen the contents of the container and prevent same from bridging over the cavity.

17. An automatic waterer, comprising in combination, a tank having side walls and a bottom formed with an outlet opening, a drinking vessel attached to the bottom edge of the tank, a valve seat arm pivotally mounted below said bottom and having a valve seat adapted to be moved

into and out of closing contact with said bottom at said opening, a float in said drinking vessel pivotally connected to the bottom below said valve seat arm, first means for closing said opening when the float is at its upper limit of movement with the drinking vessel in place, and second means for closing said opening when the float is at its lower limit of movement with the drinking vessel detached from the tank.

18. Apparatus as claimed in claim 17, in which said first means includes a node on the float at one side of the float fulcrum and said second means includes a node on the float at the opposite side of the float fulcrum.

19. An automatic waterer and medicator, comprising in combination, a tank, a main valve member for periodically supplying water into said tank, a float in said tank, a float rod upon which said float is vertically slidable, spaced apart stops on said float rod adapted to be contacted by the float in its upper and lower positions for movement of the float rod, means connecting the float rod and main valve member for opening and closing the valve member when the float is in its lower and upper positions respectively, and means for automatically introducing a constant amount of medicament into the water in the tank

once during each down and up cycle of movement of the float, the distance between said stops being adjustable so that the concentration of the medicament in the water in the tank may be varied by varying the volume of water supplied.

20. An automatic waterer and medicator, comprising in combination, a tank, a main valve, a float having up and down cycles, means for supplying a constant amount of medicament to the water in the tank each cycle, means for operating the valve from the float, and means for varying the effective height of travel of the float for varying the concentration of medicament in the water by varying the volume of water supplied.

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