

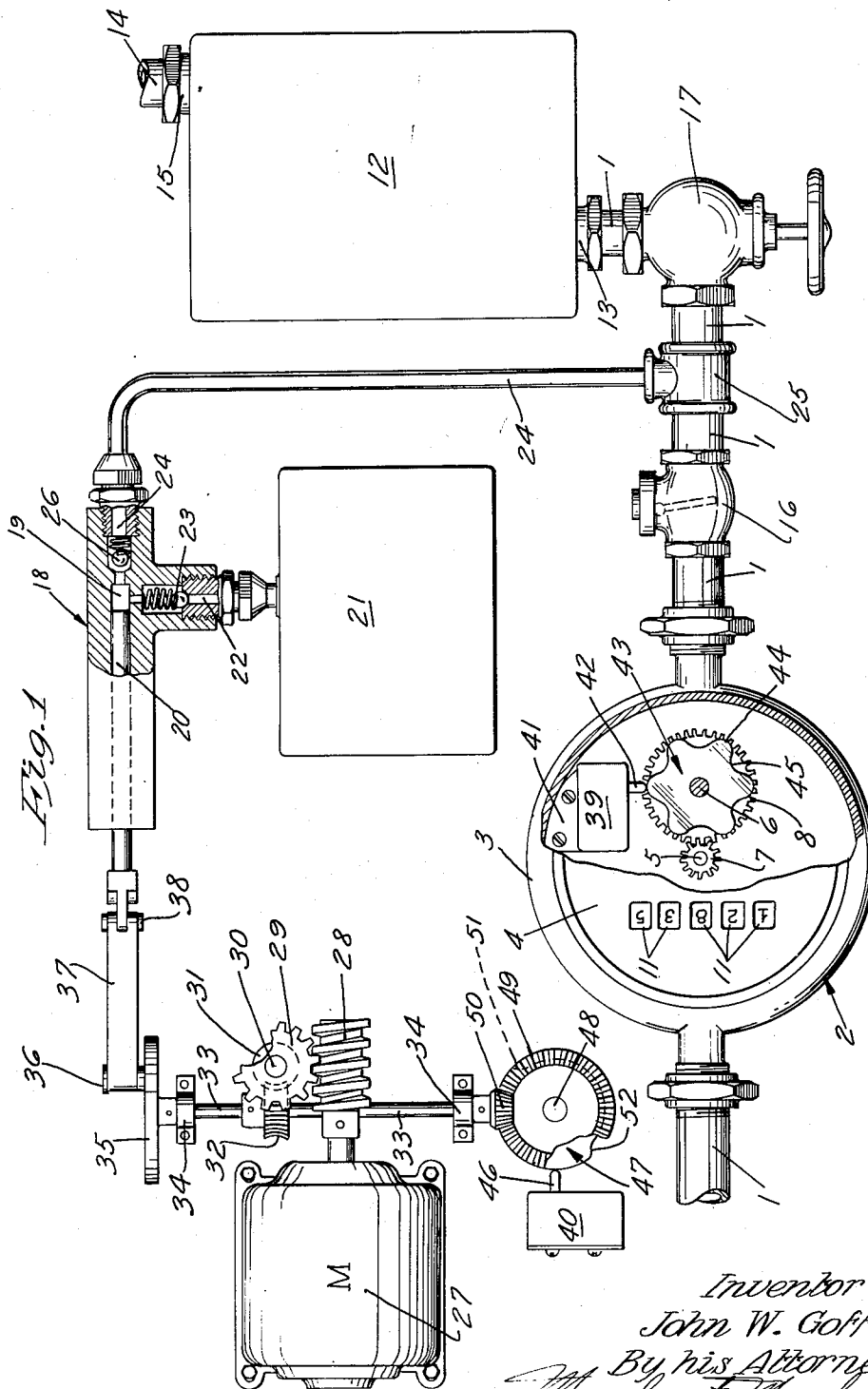
Sept. 16, 1952

J. W. GOFF
APPARATUS FOR INJECTION OF LIQUID MEDICINE
INTO DRINKING WATER IN A CONDUIT

2,610,643

Filed Oct. 19, 1949

2 SHEETS—SHEET 1



Inventor
John W. Goff
By his Attorneys
Merchant & Merchant

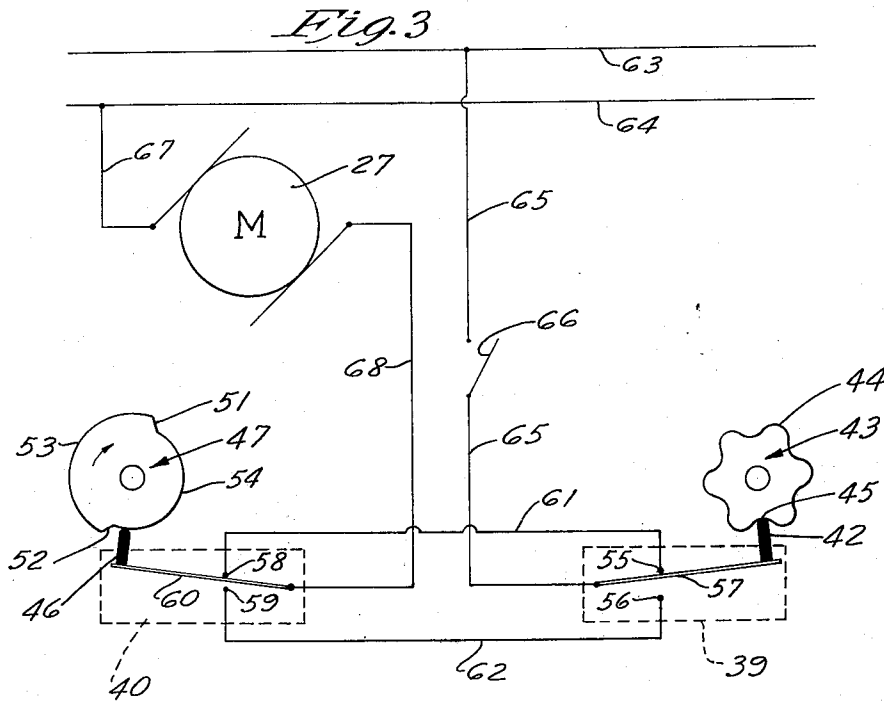
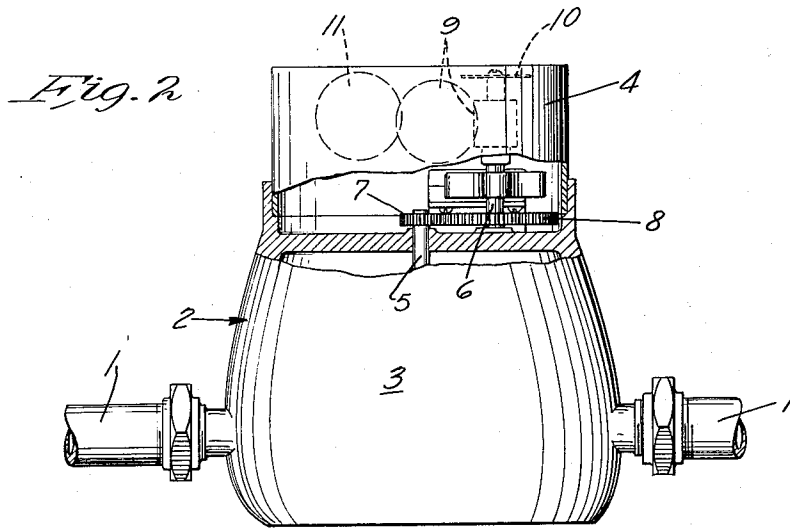
Sept. 16, 1952

Filed Oct. 19, 1949

J. W. GOFF
APPARATUS FOR INJECTION OF LIQUID MEDICINE
INTO DRINKING WATER IN A CONDUIT

2,610,643

2 SHEETS—SHEET 2



Inventor
John W. Goff
By his Attorneys
Merchant & Merchant

UNITED STATES PATENT OFFICE

2,610,643

APPARATUS FOR INJECTION OF LIQUID
MEDICINE INTO DRINKING WATER IN
A CONDUIT

John W. Goff, St. Paul, Minn.

Application October 19, 1949, Serial No. 122,345

2 Claims. (Cl. 137-99)

1

My invention relates generally to apparatus for injecting measured amounts of one type of fluid into other fluid in transit through a conduit.

More specifically, the invention consists of apparatus controlled by the flow of fluid through said conduit for injecting other liquid thereinto in exact predetermined amounts.

In the watering of certain domestic animals, such as poultry and the like, it is sometimes desirable and necessary to add certain medications to the drinking water in accurately measured proportions. In some instances, where water consumption is relatively rapid, an appreciable amount of time is consumed in the manual mixing of sufficient water and medicine to provide an adequate supply. Hence, the principal object of my invention is the provision of apparatus for automatically supplying to the drink liquid a relatively accurate proportion of fluid to be mixed therewith and mixing the same.

Another highly important object of my invention is the provision of automatic means whereby the supply of medicine or mix to be added to the drink liquid is controlled by the quantity of the drink liquid supplied.

A still further object of my invention is the provision of switch means operated by the flow of water toward a mixing tank for energizing motor-driven pumping mechanism, whereby to deliver medicine to the water, and other switch means for deenergizing the pumping mechanism, operated by said pump mechanism.

Still another object of my invention is the provision of apparatus as set forth which is simple and inexpensive to manufacture and install, which is efficient in operation and durable in use.

Other highly important objects and advantages of my invention will become apparent from the following detailed specification, appended claims and attached drawings.

Referring to the drawings in which like characters indicate like parts throughout the several views:

Fig. 1 is a view in plan of my novel mixing apparatus, some parts being broken away and some parts being shown in section;

Fig. 2 is a fragmentary view in side elevation of the liquid-flow-measuring device of my invention, some parts being broken away and some parts being shown in section; and

Fig. 3 is a wiring diagram.

Referring with greater particularity to the drawings, the numeral 1 indicates a service fluid conduit or pipe adapted to be connected to a source of water under pressure, not shown. Interposed in the service conduit 1 is a conventional

2

water meter 2 comprising a base portion 3 and a head 4. The base portion 3 comprises the usual fluid velocity operated motor having a motor shaft 5 connected to a countershaft 6 by a pinion 7 having meshing engagement with a gear 8. The pinion 7 and gear 8 are fast on adjacent end portions of the shafts 5 and 6, respectively. Countershaft 6 drives fluid-volume-indicating mechanism, shown by dotted lines in Fig. 2, and indicated by the numeral 9, which drives fluid-volume-indicators 10 and 11.

The service conduit 1 feeds drinking water to a mixing tank 12 through an inlet 13. A conduit 14 is connected to an outlet 15 in the mixing tank 12 and may be assumed to connect the mixing tank 12 to a drinking container in the nature of a trough or the like, not shown. Interposed in the service conduit 1 between the meter 2 and the mixing tank 12 is a conventional check valve 16 and a manually operated shut-off valve 17.

For injecting a predetermined quantity of medicine or the like to the drinking water as the water flows through the service conduit 1, I provide an injection pump 18 including a cylindrical chamber 19 and a pump piston 20. The pump 18 receives medicine from a reservoir 21 through conduit means 22 in which is interposed a spring-closed check valve 23. The pump 18 is adapted to deliver measured quantities of medicine to the service conduit 1 through an injection conduit 24 communicating with the service conduit 1 by means of a connection 25 between the check valve 16 and the shut-off valve 17. A spring-pressed check valve 26 is contained in the outlet portion of the pump housing 18.

The pump piston 20 is driven by an electric motor 27 through connections including a worm 28 on the shaft of the motor 27, a cooperating worm wheel 29 fast on a jackshaft 30, a second worm 31 also fast on the jackshaft 30, and a cooperating worm wheel 32 pinned or otherwise secured to a shaft 33 journaled in bearings 34. Crank wheel 35 is rigidly secured to one end of the shaft 33 and is provided with a crank pin 36 to which is pivotally secured one end of a pitman arm 37 having its other end pivotally secured to the outer end of the piston plunger 20, as indicated at 38.

Operation of the motor 27 is controlled by a pair of two position switches 39 and 40 and actuating mechanism therefor now to be described. The switch 39 is mounted in the head portion 4 of the water meter 2 by means of a bracket or the like 41 and is provided with an actuator member 42 which is engageable with a cam 43 rigidly secured to the countershaft 6 of

the meter 2 for common rotation therewith. As shown, the cam 43 is generally star-shaped, having alternate rise portions 44 and dip portions 45. The switch 40 is provided with an actuator 46 which is engageable with a cam 47 fast on a rotary shaft 48 which has rigidly secured thereto a bevel gear 49. The bevel gear 49 has meshing engagement with a bevel pinion 50 pinned or otherwise secured to the end of the shaft 33 opposite the crank wheel 35 thereof. It will be seen, by reference to Figs. 1 and 3, that the cam 47 is provided with a pair of diametrically opposed camming portions 51 and 52 with intervening "dwell" surfaces 53 and 54.

By reference to Fig. 3, it will be noted that the switch 39 comprises a pair of stationary contacts 55 and 56 and a movable contact arm 57 to which the cam-engaging member 42 is secured. Likewise, the switch 40 includes stationary contacts 58 and 59 and a movable contact arm 60 on which the cam-engaging member 46 is mounted. The contacts 55 and 58 are interconnected by a lead 61 and the contacts 56 and 59 are interconnected by a lead 62.

A source of potential is indicated by power lines 63 and 64, the former of which is connected to the switch arm 57 by a lead 65 having interposed therein a manually-operated control switch 66, and the latter of which is connected to the motor 27 by a lead 67. Another lead 68 extends from the motor 27 to the movable switch arm 60 of the switch 40.

Operation of my improved injecting apparatus is carried out in the following manner, to wit: Assuming that the valve 17 is open and the switch 66 is closed, water flows through the service conduit 1 in the meter 2 toward the mixing tank 12, causing the fluid motor mechanism within the meter 2 to impart rotary movement to the countershaft 6 and the cam 43 thereon. It will be appreciated that the rotary movement of the cam 43 is relatively slow. When the cam has rotated to a position where the switch-actuating member 42 has moved to one extreme or the other of its movement, as shown in Fig. 3, to one of the dip portions 45 of the cam, the switch arm 57 engages one of the stationary contacts of the switch 39. For the purpose of the present example, the switch arm 57 engages the stationary contact 55 to close a first circuit from the power line 63 through lead 65 and interposed switch 66, lead 61 closed switch contacts 58 and 60, leads 62 and 67 to the power line 64, whereby to energize the motor 27. Operation of the motor 27 causes the pump piston to reciprocate within the chamber 19 of the pump 18, the suction stroke thereof permitting closing of the check valve 26 and opening the check valve 23 to permit the medicine or like fluid to be drawn into the chamber 19 from the reservoir 21. The pressure stroke of the piston 20, in a direction from the left toward the right with respect to Fig. 1, permits the check valve 23 to close and opens the check valve 25, forcing medicine through the injection conduit 24 to the service conduit 1, whereby to mix the medicine with the water flowing through the injection conduit 24 to the service conduit 1. By further reference to Fig. 3, it will be seen that the actuating member 46 is in engagement with the "dwell" portion 54 of the cam 47. Operation of the pump will continue until the cam 47 has rotated in a clockwise direction sufficiently to cause engagement between the actuator member 46 and the cam surface 51, whereby to break contact between the stationary contact 58 and the contact arm 60. The first

circuit to the motor 27 is then broken and the motor 27 deenergized to stop the pumping operation. It should be noted that the cam 43 rotates at a much slower speed than the cam 47 so that the circuit is not broken between the contacts 55 and 57 of the switch 39 until after the circuit is broken in the switch 40. The switch 40 is of the type wherein the movable contact arm 60, upon engagement of the actuator 46 thereof with either of the cam surfaces 51 or 52, will snap from one switch-closed position to the other. After the switch arm 60 has been moved into engagement with the contact 59, continued rotation of the cam 43 will cause the switch arm 57 to engage the stationary switch contact 56, thereby establishing a second circuit through the motor 27 through the leads 65, 62, 68 and 67. The motor 27 will then rotate the cam 47, whereby to open the second circuit after a second predetermined quantity of medicine has been re-injected into the service conduit 1 by the pump 18. Assuming that the flow of water through the service conduit 1 is constant, the amount of medicine injected thereinto by the pump 18 may be varied in a number of different ways such as, for instance, changing the stroke of the piston plunger 20 by moving the crank 36 radially inwardly or outwardly of the crank wheel 35. When it is desired to supply water to the tank 12, without an injection of medicine, it is but necessary to open the manual control switch 66 to render the circuits through the motor 27 and switches 39 and 40 inoperative. The check valve 16 interposed in the service conduit 1 between the connection 25 and the water meter 2 prevents medicated water from entering the water meter 2 and possible consequent damage to the mechanism thereof when the shut-off valve 17 is closed.

My invention has been thoroughly tested and found to be fully adequate for the accomplishment of the objectives set forth and while I have disclosed a commercial embodiment of my apparatus, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention as defined in the claims.

What I claim is:

1. In an apparatus of the class described, a service conduit adapted to be connected at one end to a source of water under pressure and at its other end to a drinking container, a reservoir adapted to contain a treating solution, an injection conduit leading from the reservoir to the service conduit, an injection pump interposed in said injection conduit, an electric motor for operating the pump, two circuits for said motor, first and second switches associated with and jointly controlling each of said circuits, said switches having corresponding closed positions wherein they are serially connected in and close one of said circuits and having other corresponding closed positions wherein they are serially connected in and close the other of said circuits, a fluid flow operated actuator for the first switch for shifting the same alternately and repeatedly from one of its said closed positions to another thereof, said fluid flow operated actuator comprising a fluid velocity operated motor associated with the service conduit and driven by fluid flowing therethrough and an actuator for the second switch shifting the same alternately and repeatedly from one of said positions to another thereof and comprising said electric motor, the electric motor operated actuator for the second switch shifting the said second switch from one

closed position to another at a rate greater than that of the first switch, whereby the pump operating motor will start responsive to each shifting of one of the switches and will stop responsive to each such shifting of the other of the switches. 5

2. The structure defined in claim 1 in further combination with a mixing tank connected to the service conduit at a place beyond the injection conduit.

JOHN W. GOFF. 10

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,808,804	Baldner -----	June 9, 1931
2,251,939	McCoy -----	Aug. 19, 1941