

May 19, 1931.

F. G. ECKSTINE

1,805,733

METERING VALVE

Filed Oct. 10, 1928

Fig. 1.

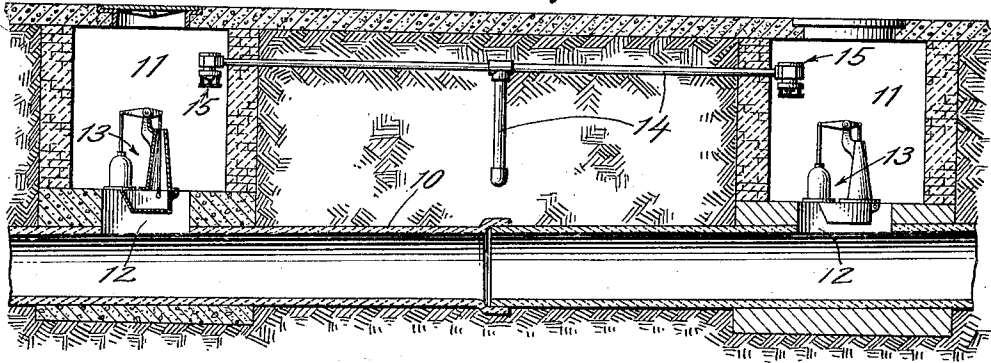


Fig. 2.

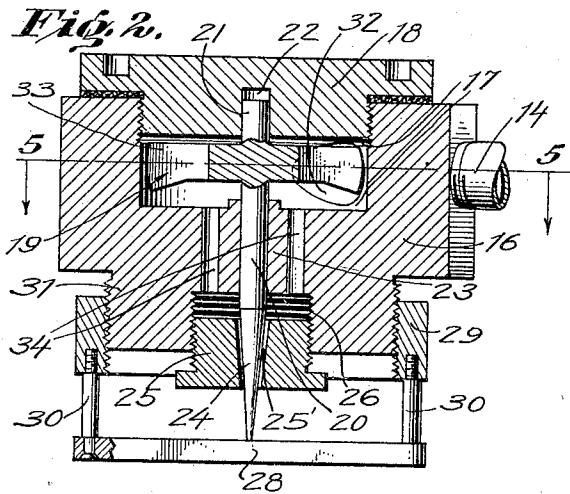


Fig. 3.

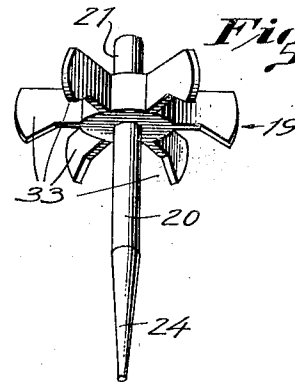


Fig. 4.

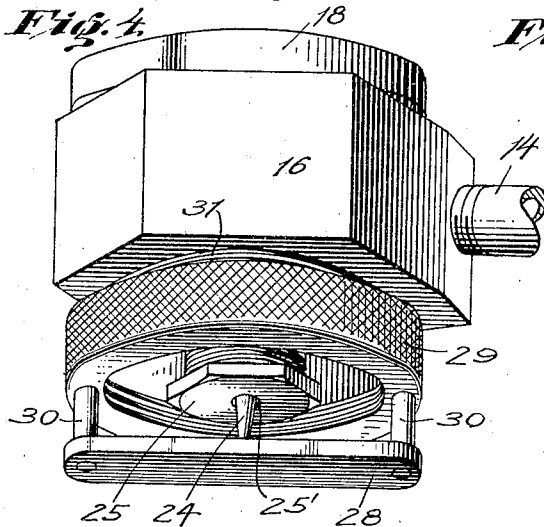
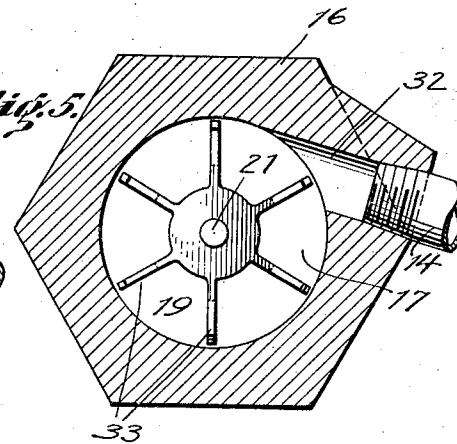


Fig. 5.



INVENTOR.
FRED G. ECKSTINE

BY
Townsend, Loftus & Abbott.
ATTORNEYS.

UNITED STATES PATENT OFFICE

FRED GEOFFERY ECKSTINE, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO
CHARLES BENEDICT, OF LOS ANGELES, CALIFORNIA

METERING VALVE

Application filed October 10, 1928. Serial No. 311,513.

This invention relates to a valve structure and particularly pertains to a metering valve.

In the operation of various hydraulic apparatus it is desirable to maintain a constant flow of liquid to a container and to provide other means for causing the container to become automatically evacuated when a predetermined quantity of liquid has been placed within the container. This is especially desirable in connection with sewage systems in which flush tanks are disposed in predetermined spaced relation to each other along a sewer, and are caused to successively discharge a given quantity of water into the sewer at predetermined intervals. In devices of this character it has been found that the inflow valve regulating the flow of liquid passing to the flush tank, very often becomes clogged with extraneous solid matter, resulting in a depleted flow of liquid so that the sewage in the sewer will not be flushed out, and will immediately begin the creation of sewer gas with the result that quite often workmen entering a sewer when it is in this condition have met with disastrous results. It is the principal object of the present invention, therefore, to provide a metering valve through which water may be delivered to a flush tank and by which valve the volume and rate of flow of the water may be accurately maintained in said valve, embodying a structure whereby it will be circulating at all times and will thus insure that the size of the orifice through which the liquid passes will be at all times clean and will be of the area at which it has been adjusted.

The present invention provides the structure of a housing connected with a water supply pipe and by which pipe water or other liquid is delivered to the housing and caused to flow therethrough. Said housing being provided with a discharge orifice for the liquid, and within which orifice means are embraced to cause the orifice at all times to be maintained clean and clear; said means operating mechanically by impulse provided by the flowing liquid.

The present invention is illustrated by

way of example in the accompanying drawings in which:

Fig. 1 is a view in diagram indicating the application of the present invention.

Fig. 2 is an enlarged view in central vertical section through the valve, showing all of the principal parts.

Fig. 3 is an enlarged view in perspective showing the valve stem and the rotary runner therefor.

Fig. 4 is a view in perspective showing the assembled valve.

Fig. 5 is a view in transverse section through the valve structure as seen on the line 5-5 of Fig. 2.

Referring more particularly to the drawings, 10 indicates a sewer fitted with flush tanks 11. These tanks are provided with discharge openings 12 in their lower wall through which openings the contents of the flush tank may be discharged into the sewer. A suitable valve mechanism 13 is provided to automatically open the discharge opening 12 when a predetermined volume of liquid is within the tank 11. The liquid which in this case is water is supplied to the flush tanks through a water supply pipe 14, which connects with metering valves 15, with which the present invention is particularly concerned.

Referring more particularly to Figs. 2 and 4 of the drawings, it will be seen that the metering valve comprises a housing 16, having a center chamber 17 therein, the mouth of said chamber being internally threaded to receive a closure plate 18. The chamber 17 accommodates a propeller 19 mounted upon a valve stem 20. This valve stem has an extending portion 21 rotatably positioned within a bearing opening 22 in the plate 18. The opposite end of the stem extends through a bearing opening 23 in the housing 16 and terminates in a conical end member 24 which extends through an adjustable valve seat 25. This seat has a frusto conical opening 25' therethrough, and the seat is threaded into opening 26 in the housing 16.

A cross-head 28 extends diametrically across the end of the housing and provides

a bearing surface for the end of the conical valve member 24. This cross-head is secured to an adjusting sleeve 29 by suitable standards 30. The adjusting sleeve is threaded onto a circular boss 31 formed as a part of the housing 16.

Liquid is delivered to the structure by the pipe 14, which as shown in Fig. 5, is threaded into a tangentially disposed passageway 32 which communicates with the chamber 17 within the valve housing. It will thus be seen that the water delivered to the chamber 17 will impinge against the radial vanes 33 of the rotary propeller 19, and will thus cause the propeller and the valve stem 20 to simultaneously and continuously rotate as water continues to flow through the valve structure. The inflowing water may then pass through ducts 34 to the frusto-conical opening 25' of the valve seat 25. The water will flow around the valve stem 24 and outwardly, and will be discharged at the lower end of the opening 25' in the valve seat 25.

It will be evident that by rotating the adjusting sleeve 29 the cross-head 28 may be moved toward or away from the housing to thus raise or lower the valve stem and vary the area of the discharge opening occurring between the valve stem and the wall of the passageway 25' through which it extends.

It will thus be seen that by the construction here disclosed, it is possible to accurately regulate the volume of liquid passing through the valve by the adjustment of the cross-head 28 and the sleeve 29, and it will also be evident that a most desirable result will be obtained by reason of the fact that the valve stem at all times rotates to prevent the accumulation of solids or semi-solids in and around the discharge openings and causing any extraneous matter to be set in motion at this point so that the liquid will wash it away and insure that the discharge opening will at all times be clean and clear.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in the combination, construction and arrangement of parts by those skilled in the art, without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. A valve structure comprising a valve housing formed with a discharge orifice in the wall thereof, a valve stem extending into said orifice and spaced from the wall thereof and means whereby a fluid passing through the housing and the orifice will continuously rotate the valve stem.

2. A valve structure comprising a valve housing having a discharge orifice in the wall thereof, a valve stem extending there-

through, and spaced from the wall of the orifice, and means associated therewith whereby a fluid flowing through the housing will cause continuous rotation of the valve stem.

3. A valve structure comprising a valve housing having a discharge orifice in the wall thereof, a valve stem extending there-through, means associated therewith whereby a fluid flowing through the housing will cause continuous rotation of the valve stem, and means for longitudinally adjusting the valve stem to vary the effective discharge area of the orifice.

4. A valve structure comprising a housing, a chamber therein, a liquid inlet pipe in communication therewith, a discharge orifice through the wall thereof, a valve stem within said orifice and spaced from its wall, and means whereby liquid flowing through said chamber to the orifice will act to rotate the valve stem.

5. A valve structure comprising a housing having a chamber therein, a liquid supply pipe in communication therewith, an orifice formed through the wall of said chamber and having a tapered wall, a valve stem extending through the orifice and having a tapered portion agreeing with the taper of and spaced from the wall, and a propeller member within the chamber and mounted upon the valve stem whereby a flow of liquid from the inlet pipe to the outlet orifice will cause rotation of the propeller and the valve stem.

6. A valve structure comprising a housing having a chamber therein, a liquid supply pipe in communication therewith, an orifice formed through the wall of said chamber and having a tapered wall, a valve stem extending through the orifice and having a tapered portion agreeing with the taper of the wall, a propeller member within the chamber and mounted upon the valve stem whereby a flow of liquid from the inlet pipe to the outlet orifice will cause rotation of the propeller and the valve stem, and means for adjustably maintaining the valve stem with relation to the orifice whereby a predetermined area of discharge opening will be established.

7. A valve structure comprising a housing, a chamber formed therein, a liquid inlet pipe in communication therewith, an impulse propeller disposed within said chamber and against the blades of which incoming liquid may impinge to rotate the propeller, a valve stem providing an axis for the propeller and adapted to rotate therewith, a tapered valve seat adjustably disposed in one wall of the said chamber and through which seat the valve stem extends, said stem having a tapered portion agreeing in inclination with that of the tapered valve seat, an adjusting mem-

ber against which the valve stem rests and a threaded sleeve carrying said adjusting member and adapted to be mounted upon the housing in a manner to support the valve stem in a predetermined relation to its seat whereby the effective opening through the valve seat will be established.

8. A valve structure comprising a housing, a chamber within said housing, a fluid inlet in said chamber, a frusto-conical discharge orifice within a member, vertically adjustable relative to said housing, a propeller within said chamber, an axial shaft to rotatably support said propeller, one end of said shaft being journaled in a wall of said housing while its opposite end is adapted to seat within said frusto-conical discharge orifice, means to vary the effective area of said discharge orifice between said shaft and orifice, and ducts to convey fluid from said chamber, and through said housing, to a point adjacent the upper surface of said adjustable member.

9. A valve structure comprising a housing, a chamber within said housing, a fluid inlet in said chamber, a frusto-conical discharge orifice within a member, vertically adjustable relative to said housing, a propeller within said chamber, an axial shaft to rotatably support said propeller, one end of said shaft being journaled in a wall of said housing while its opposite end is adapted to seat within said frusto-conical discharge orifice, and ducts to convey fluid from said chamber and through the base of said housing, to a point adjacent the upper surface of said adjustable member, and means to vary the effective area of said discharge orifice between said shaft and orifice, said means comprising a vertically adjustable annulus threaded to said body and a bridge supported by said annulus, upon which the lower portion of the tapered end of said shaft bears.

10. In combination with a device adapted to be attached to a water main and having inlet and outlet orifices, a revolvable propeller within said device, driven by water moving through said device, said propeller being mounted upon a shaft having one end extending through said outlet orifice and spaced therefrom and adapted to revolve therein, to clear said orifice of foreign matter when said propeller revolves.

FRED GEOFFERY ECKSTINE.