W. E. HINSDALE.

FLUSH TANK MECHANISM.

APPLICATION FILED DEC. 14, 1917.

1,296,520.

Patented Mar. 4, 1919.

3 SHEETS—SHEET 1.

Fig. 1.

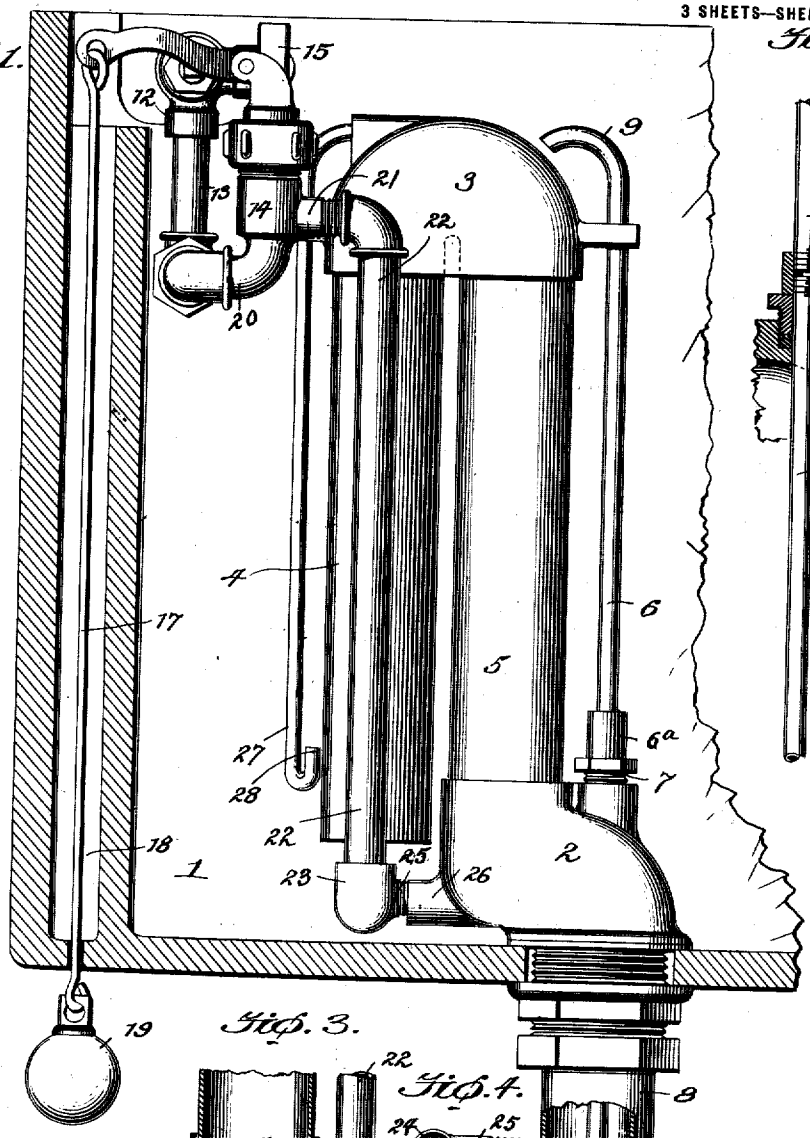


Fig. 2.

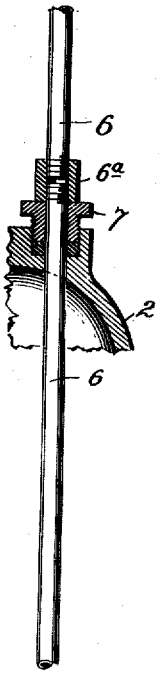


Fig. 3.

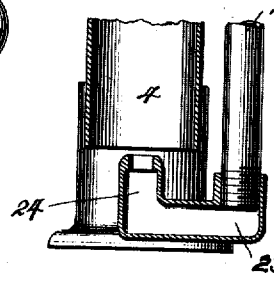
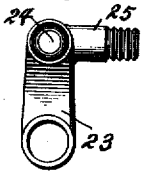
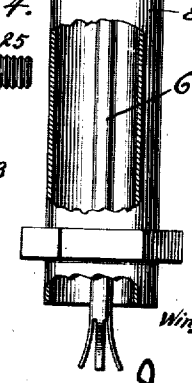


Fig. 4.





Witnesses

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3 SHEETS—SHEET 2.

Fig. 5.

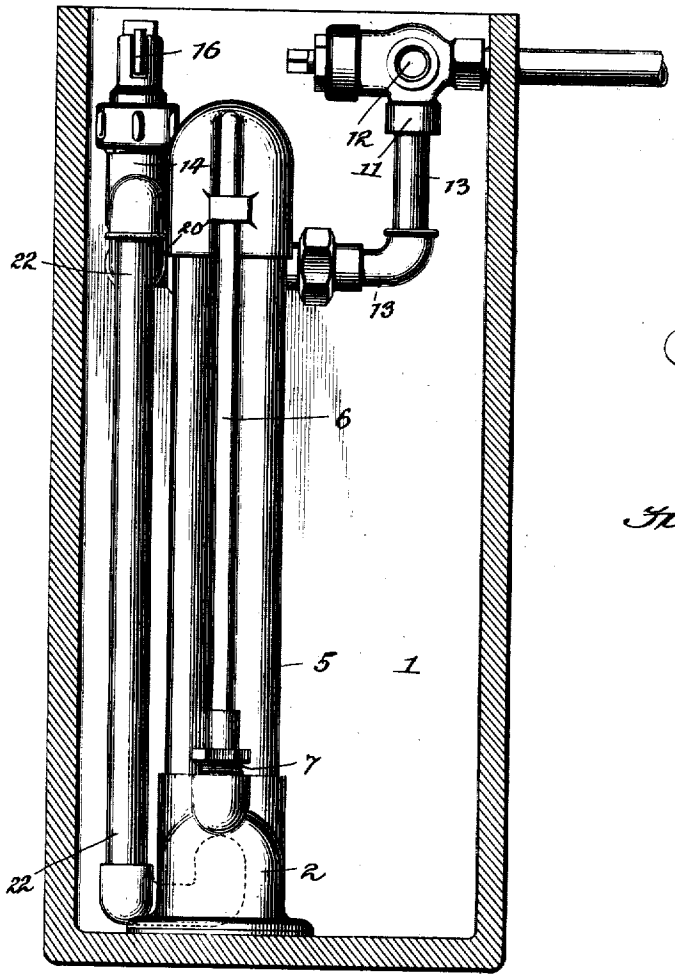


Fig. 6.

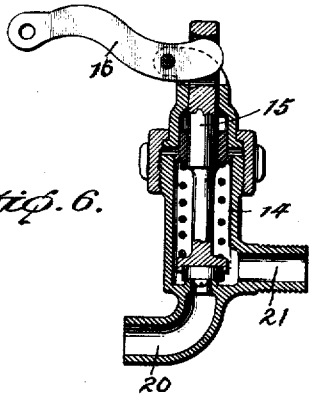
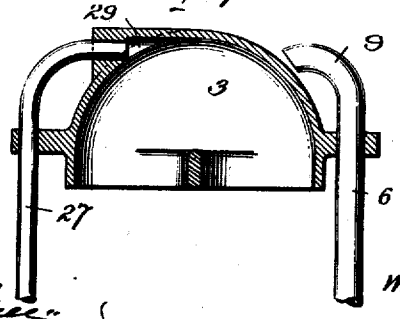


Fig. 7.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 8.

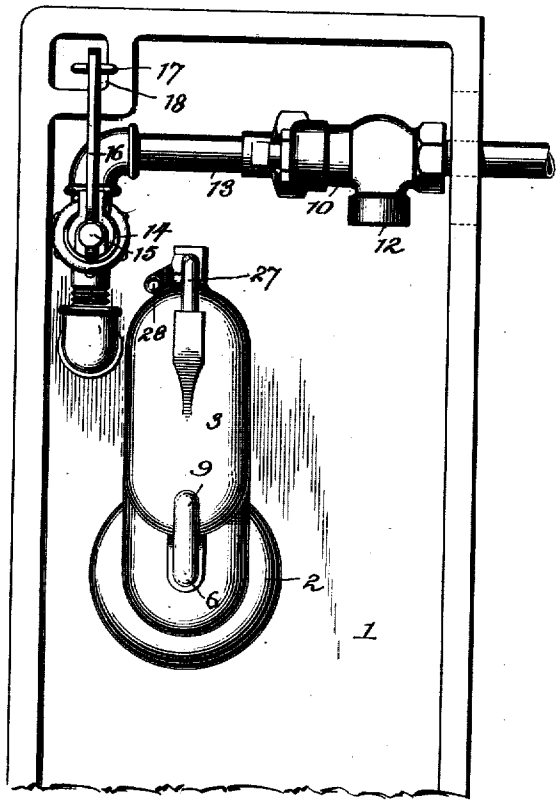
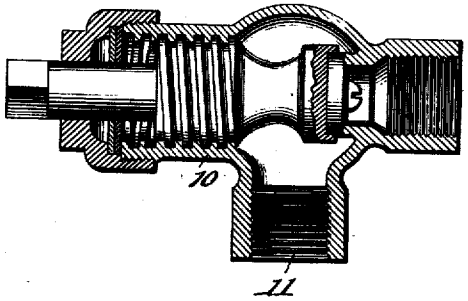


Fig. 9.



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UNITED STATES PATENT OFFICE.

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FLUSH-TANK MECHANISM.

1,296,520. Specification of Letters Patent. Patented Mar. 4, 1919.

Application filed December 14, 1917. Serial No. 207,102.

To all whom it may concern:

Be it known that I, WINFIELD E. HINSDALE, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented a certain new and useful Improvement in Flush-Tank Mechanisms, of which the following is a specification.

The present invention pertains to an improved flush tank mechanism, and more particularly to the production of an improved siphon discharge for the tank. The invention is applicable for use in connection with either high or low down tank constructions, but is more especially adapted for employment in conjunction with tanks of the latter type.

The invention has for its main object the production of a siphon which shall be positive in its action, both as to starting, as to continuous flow until the tank is emptied (or substantially so) and as to the stopping of the flow, and these without noise, which is usually due to the intermingling of air and water at the starting of the flow; the noise produced by the inrushing air through the water at the end of the discharge; or continued resiphoning action on the water in coming to the tank due to the faulty air break in the siphon.

With these and other objects in view, as will appear from the following description, reference will be had to the annexed drawings, wherein:

Figure 1 is an elevation of the structure, with the tank in section and broken away;

Fig. 2 a detail sectional view of an air tube employed for the escape of air trapped between the water level in the cistern and the water-level in the closet;

Fig. 3 a vertical sectional view of the jet nozzle fitting, showing its relation to the lower end of the up-leg of the siphon;

Fig. 4 a plan view of the nozzle;

Fig. 5 a transverse vertical sectional view of the tank, with the flushing mechanism in elevation;

Fig. 6 a vertical sectional view of the jet-starting valve and lever;

Fig. 7 a similar view of the siphon crown and the air-admission pipe;

Fig. 8 a top plan view of the mechanism; and

Fig. 9 a sectional view of the water inlet valve.

The flush tank is denoted by 1, and through the bottom thereof is passed and locked a siphon in which 2 is the outlet or base fitting, 3 the crown or head, 4 the up-leg, and 5 the down-leg. The outlet or base fitting 2 is offset to provide a retarding of the outflow through the siphon, and likewise to furnish means for the insertion of a two-part air tube or pipe 6, which is secured in a packing gland 7, mounted in the upper portion of the base fitting. The sections are secured together by a coupling 6^a, Fig. 2, which acts as a stop to prevent the tube from being passed downwardly too far. The lower part of said tube 6 extends through and in line with the axis of the lower fitting or pipe 8, while the upper end is turned down and inwardly, as indicated at 9, toward the crown or head 3 of the siphon. The tube 6 allows the escape of air which may be trapped between the water-level in the cistern or tank and the water-level in the closet to be flushed. Not all closets, however, are air-trapped, and with those which are not so trapped the base fitting 2 may be straight or in axial alinement with the down-leg 5, and the air tube or pipe omitted.

By securing the pipe 6 in place by the packing gland 7, it is susceptible of vertical adjustment for the varying needs of various closets with which it may be used, and by making it in two parts and jointing it above the packing gland, one is prevented from entering the tube too far into the inlet orifice of the closet. The lower extremity of the tube, see Fig. 1, is saw cut and spread or flared outwardly, forming what may be termed an open four-bladed funnel over which the water on its way to the closet passes, producing an air space or cone within said funnel, and allowing the air to freely enter until all the air is ejected upwardly through the tube from the closet interior above the fixed water-level of the closet. This escape of air allows a solid column of water to pass unimpeded from the siphon

to the closet, insuring force and speed in the water and a consequent sanitary working of the closet. The spreading of the lower end of the tube is of advantage. Where a plain tube, having its end cut off squarely is employed, the water passing by it immediately cuts off the ingress of air to the tube and to a great extent defeats the object and purpose of the tube. In a like manner, drilling the tube to produce vent holes is of questionable value, as the water rushing past them seals the holes against the ingress of air.

As will be noted, the upper end of the vent pipe is curved inwardly and downwardly, which returns any water that may be ejected therefrom back into the tank, thereby precluding such water from coming into contact with the tank cover (not shown) and eventually finding its way to the outer surface of the tank.

The control stop valve, shown in detail in Fig. 9, and denoted generally by 10, is provided with two outlets 11 and 12, the latter for connection of the usual ball-cock (not shown) through which the tank is filled in the usual manner. A pipe or connection 13 extends from outlet 11 to a jet valve 14 (Fig. 6), employed to start the siphon and to cause a flushing of the closet. The stem 15 of the valve coöperates with a lever 16, the outer end of which is connected to a pull rod or link 17 passing downwardly through a channel 18 formed in one corner of the tank, the rod having a pull ball or handle 19 attached thereto, as best shown in Fig. 1.

Pipe or fitting 13 is in communication with a port 20 of valve 14, said valve above its seat being provided with a laterally-extending port or nipple 21, to which in turn is connected a pipe 22. The lower end of this pipe is screwed into a fitting 23 having an upwardly-projecting nozzle 24, which stands slightly below and in axial alinement with the lower end or mouth of the uptake member 4 of the siphon. Fitting 23, in the form illustrated, is provided with a laterally-extending threaded lug 25, see Fig. 4, which is screwed into a boss 26 extending outwardly from the base fitting 2, Fig. 1, by which the nozzle may be properly centered and maintained in place.

As will be readily appreciated, the opening of valve 14, through the manipulation of the pull-ball 19, will cause a jet of water under full head to pass from nozzle 24 into the uptake leg of the siphon, and start the siphon, and such action once begun will continue until the water-level falls below the mouth of the intake leg 4, unless the siphon is broken in some other manner. Breaking of the siphon by allowing the water to fall below the mouth of the uptake leg, produces an objectionable noise, owing to the intermixing of air and water, and to avoid this I propose to employ an air-admission pipe or tube which will noiselessly break the siphon. Said pipe, denoted by 27, stands alongside the upleg 4, the lower end terminating short of the lower end of the leg and being formed with a return bend 28, as best shown in Fig. 1. The upper end of the pipe is curved laterally, and extends into a horizontally-disposed opening 29, formed in the top of the crown or head 3, Fig. 7. The pipe or tube enters the crown of the siphon at its highest point and in the line of travel of the flowing water at the point where the weight or pull of the water in operating the siphon is the greatest. It is evident that as soon as an expansive element, as air, is admitted to the crown, the siphon will be broken and the water will drop down both the uptake and downtake legs. The admission of the air in line with the travel of the water prevents the shutting up of the air-supply pipe, as would occur, should the point of admission be at a sharp angle to the line of passing water.

Should the inlet to the air admission pipe 27 be cut off square or even at an angle, or perforated for a distance above its lower end, it is evident that when the lowering water in the tank reaches the first point of air admission the air and water would mix and thereby cause more or less noise; also that the partial stoppage of the siphonic action would allow the water in the upleg 4 to fall back into the tank, resealing the point of admission of the air vent, with a resultant restarting of the siphon. Such retarded flow through the siphon would continue until the water in the downleg had dropped far enough to cause, by its overweight, a sudden pull on the upleg, at which moment air would be drawn in through the water in the cistern in sufficient quantity to break the discharge. The drawing of the air in through the water as now commonly takes place is the cause of much disagreeable noise. By using the return bend 28, however, the lowering water in the tank unseals the end of the air admission pipe, affording a free opening to the atmosphere, as the weight of the water in the siphon draws the small amount of water in the pipe or tube 27 into the siphon. As the length of the air admission pipe is shorter than the upleg of the siphon, the water column contained therein is lighter than that in said upleg; consequently, the main discharge column draws it out. While this is taking place water is still passing up the upleg and the water level in the tank is being lowered, and this continues until the mouth of the air pipe is uncovered and the water falls slightly below the same. Im-

mediately this transpires, air will pass through the pipe and break the siphon, the water in the upleg falling back into the tank, but being of insufficient quantity to raise the water-level to that point where it will seal the air admission pipe.

This effects a noiseless break of the discharge through the siphon, and without the admission of air to the siphon until the proper movement for the stopping of the flow.

By this method of breaking the siphon discharge I secure the desired result without the use of perforations in the pipe for the admission of air; without the use of mechanical float-operated vent or air admission valves, or devices other than the tube or pipe 27 and its upturned end 28.

By eliminating the air between the water-level in the tank or cistern and the water-level in the closet and within the fitting or extension 8, by the use of pipe 6, and by admitting air to the crown of the siphon by the employment of pipe 27 and its upturned end 28, I secure an operation of the siphon which is positive in its stop and start; that delivers a solid column of water, and is entirely noiseless in operation, and this without the employment of any movable parts whatever, or parts that from time to time require rewashering or adjustment.

The stop or control valve 10, while shown as having its inlet connection entering the cistern from the rear, is not necessarily so connected, as the connection may extend upwardly from the lower portion of the cistern or tank in the usual manner, only minor changes in common fittings being required to effect the change.

The making of the apparatus in metal is easily accomplished, but all the parts of the siphon proper may be made integrally of china, with such modifications of connections from jet valve to siphon and nozzle as the china construction may demand.

I am aware that siphons, as such, are old in the art, but I believe that the introduction of air into the crown of the siphon at its highest point, and at right angles to its central vertical line and in the path of and with the moving water is new, as is also the upturned lower end of the pipe arranged in the manner and relation as above set forth.

I am also aware that vent or air escape means have been used by others to effect egress of air between the water-levels in closets and their flushing cisterns, but so far as I am aware the arrangement above described is novel and is a marked improvement on such former devices.

So too, I am aware that jets have been used in conjunction with siphons, but the present arrangement is advantageous primarily in that the jet supply is independent of the cistern supply and, further, in that the jet nozzle mounting is at once simple and insures its proper placement with reference to the siphon.

Having thus described my invention, what I claim is:

1. In combination with a tank, a siphon therein; a fitting or pipe extending from the downleg thereof; and an air vent tube extending through the fitting and having its lower end spread or coned.

2. In combination with a tank, a siphon therein; a fitting or pipe extending from the down-leg thereof; and an air vent tube extending through the fitting, the lower end of the tube being split, with the ends of the split portion turned outwardly.

3. In combination with a tank; a siphon therein; a fitting or pipe extending from the down-leg thereof; and an air vent tube extending through the fitting, said tube being mounted for longitudinal adjustment.

4. In combination with a tank; a siphon therein; a fitting or pipe extending from the down-leg thereof; and an air vent tube extending through the fitting, the upper end of the tube being provided with a return bend whereby any water ejected through the tube will be returned to the tank.

5. In combination with a tank, a siphon therein; a fitting or pipe extending from the down-leg thereof; and an air vent tube, extending through the fitting the lower end of the tube being split, with the split portions turned outwardly, while the upper end of the tube is curved inwardly toward the siphon.

6. In combination with a tank; an offset base fitting; a siphon mounted upon and in communication with said fitting, said fitting likewise having an opening in the upper face thereof; a vent tube formed in two parts, the lower part whereof extends through the opening and fitting; and means for securing the tube in place.

7. In combination with a tank; an offset base fitting; a siphon mounted upon and in communication with said fitting, the fitting likewise having an opening formed in the upper face thereof; a vent tube extending through said opening, the lower end of the tube being split, with the split portions bent outwardly and the upper end of the tube being turned inwardly and directed toward the upper portion of the siphon; and a packing gland for securing the tube in place.

8. In a flushing apparatus for closets, the combination of a tank; a siphon; a base fitting for the siphon; a threaded lug extending outwardly therefrom; a jet nozzle secured to said lug with the nozzle underlying the mouth of the uptake member of the siphon; and a valve for controlling the supply of water to said jet nozzle.

9. In combination with a tank; an offset base fitting; a siphon mounted upon and in communication with said fitting, said fitting likewise having an opening in the upper face thereof; a vent tube formed in two parts, the lower part whereof extends through the opening and fitting; means for securing the tube in place; and an air admission pipe, said pipe opening into the upper portion of the siphon and having a return bend at its lower end.

10. In combination with a tank; an offset base fitting; a siphon mounted upon and in communication with said fitting, said fitting likewise having an opening in the upper face thereof; a vent tube formed in two parts, the lower part whereof extends through the opening and fitting; means for securing the tube in place; and an air admission pipe, said pipe opening directly into the uppermost portion of the siphon and having its lower end upturned and terminating at a point above the intake of the uptake leg of the siphon.

11. In combination with a tank; an offset base fitting; a siphon mounted upon and in communication with said fitting, the fitting likewise having an opening formed in the upper face thereof; a vent tube extending through said opening, the lower end of the tube being split, with the split portions bent outwardly and the upper end of the tube turned inwardly and directly toward the upper portion of the siphon; means for securing the tube in place; and an air admission pipe, the upper end of which opens into the extreme upper portion of the siphon with its mouth opening toward the path of movement of the water through the siphon.

12. In combination with a tank; an offset base fitting; a siphon mounted upon and in communication with said fitting, the fitting likewise having an opening formed in the upper face thereof; a vent tube extending through said opening, the lower end of the tube being split, with the split portions bent outwardly and the upper end of the tube turned inwardly and directly toward the upper portion of the siphon; means for securing the tube in place; and an air admission pipe, the upper end of which extends laterally into the extreme upper portion of the siphon; the lower end of the pipe terminating short of the lower end of the intake leg of the siphon and being provided with a return bend.

In testimony whereof I have signed my name to this specification.

WINFIELD E. HINSDALE.