Sept. 30, 1941. J. M. TEAHEN 2,257,138

FLUSHING APPARATUS

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FIG.1.

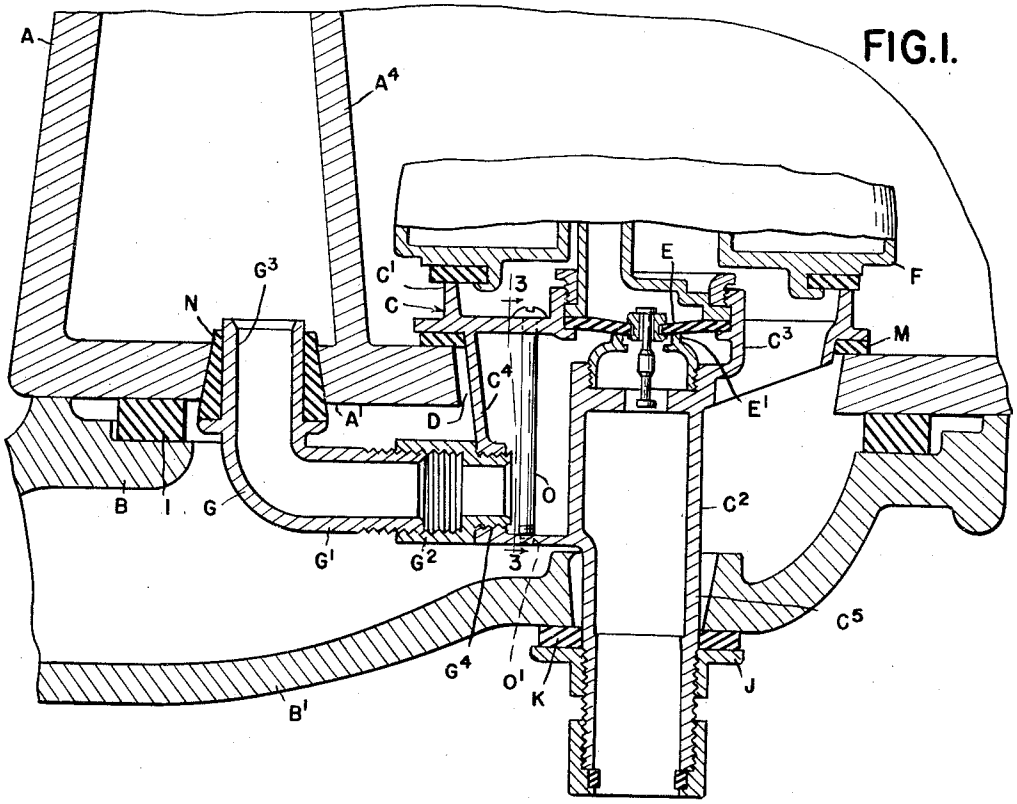
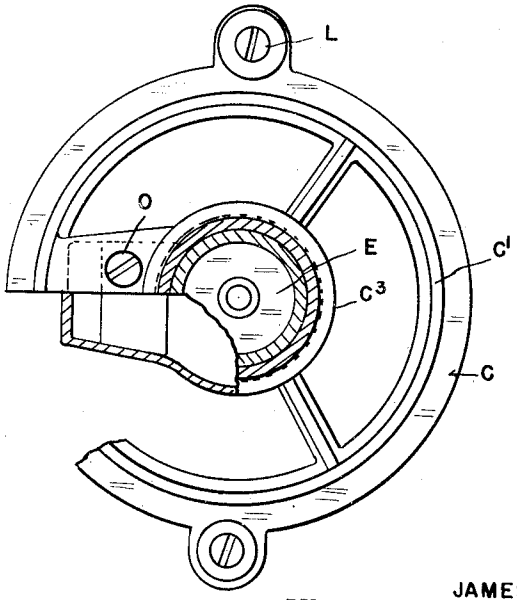


FIG.2.



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FIG.4.

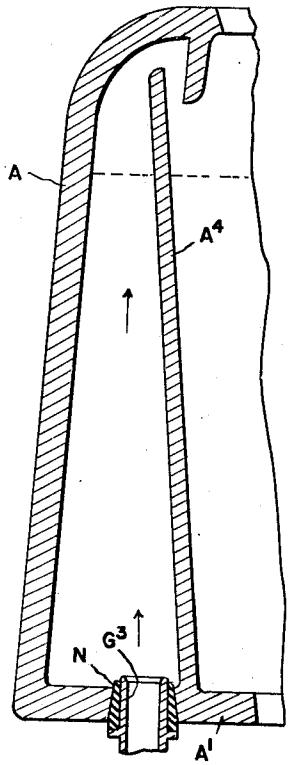
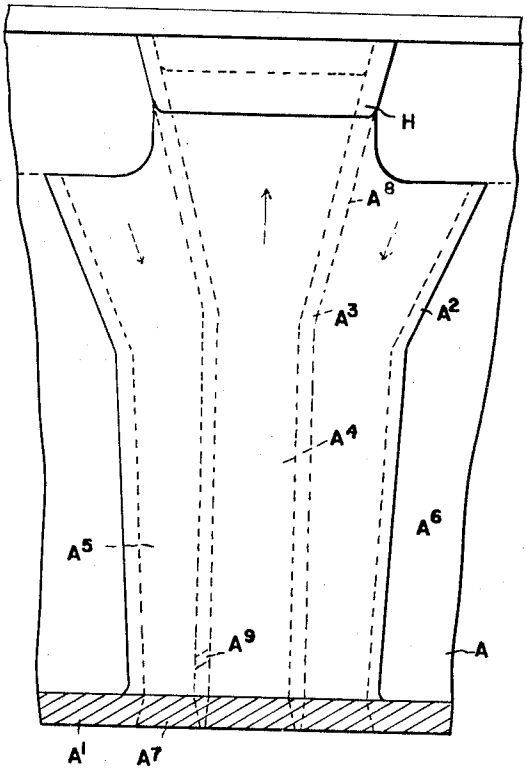


FIG.5.



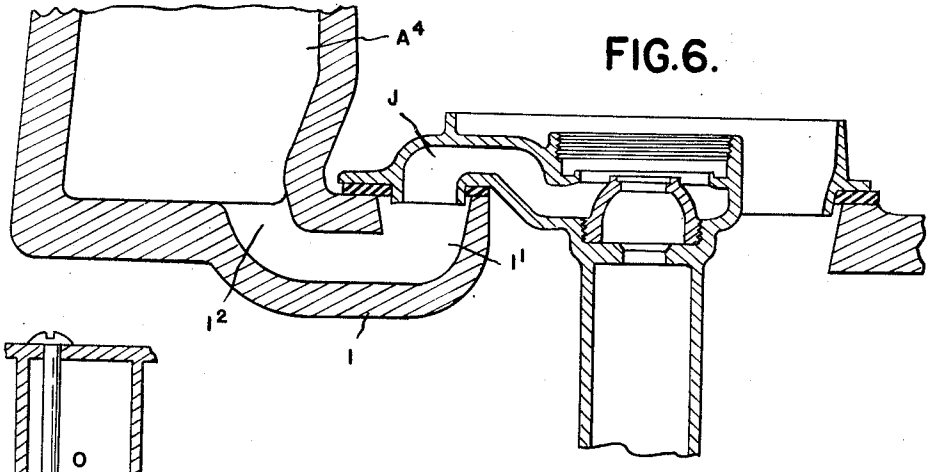


FIG.6.

FIG.3.

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FIG. 8.

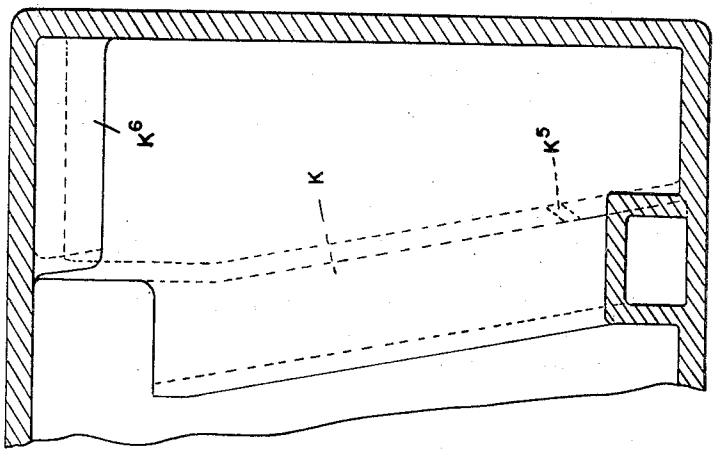
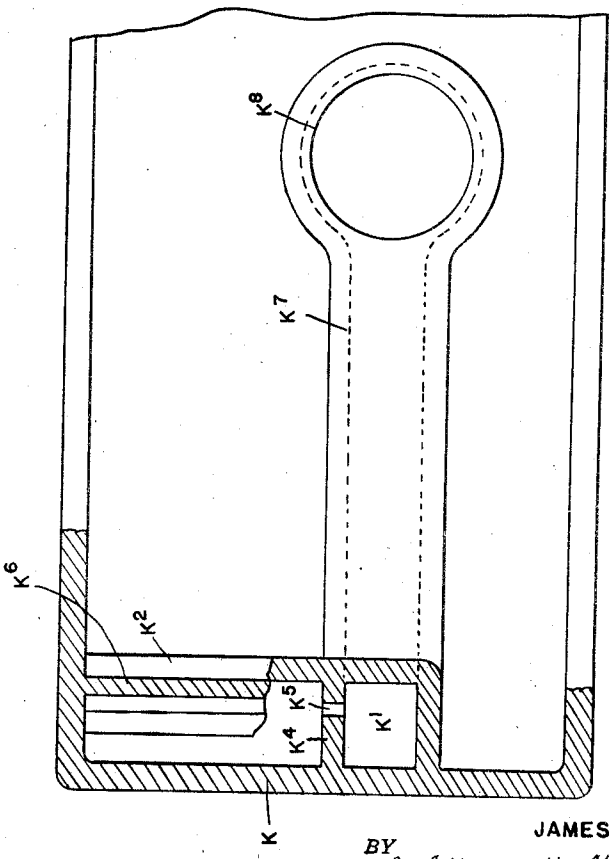


FIG. 7.



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Patented Sept. 30, 1941 2,257,138

UNITED STATES PATENT OFFICE

2,257,138

FLUSHING APPARATUS

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Application September 30, 1940, Serial No. 359,136

20 Claims. (Cl. 4—18)

The invention relates to flushing apparatus and forms a continuation in part of my former application for Patent Serial No. 279,965, filed June 19, 1939. More particularly, the invention relates to that type of flushing apparatus forming the subject matter of my former Patent No. 2,131,765 of October 4, 1938. In this construction, the valve for controlling the water inlet is arranged adjacent the bottom of the tank and forms a part of a combined water inlet and outlet fitting. The construction is also one in which the opening of the flushing valve automatically effects the opening of the water inlet valve, while the closing of the inlet valve is automatically effected when the tank has been filled to a predetermined level. It is one of the objects of the instant invention to improve the construction as just described: first, by rendering it impossible to draw any contaminated water back into the water inlet conduit in case of the existence of suction in the line and of an imperfectly closing inlet valve; and second, to obtain a substantially noiseless operation. It is a further object to obtain various other advantages and with these objects in view, the invention consists in the novel construction as hereinafter set forth.

In the drawings:

Figure 1 is a vertical section through a portion of the tank and the closet bowl on which it is supported being in the axial plane of the combined water inlet and outlet fitting;

Figure 2 is a plan view partly in section;

Figure 3 is a vertical section on line 3—3 of Figure 1;

Figure 4 is a section similar to Figure 1, showing the upper portion of the tank and water inlet supply way;

Figure 5 is an elevation of a portion of the wall of the tank, showing the water inlet and overflow conduits integral therewith;

Figure 6 is a view similar to a portion of Figure 1 showing a modified construction;

Figure 7 is a plan view of a tank showing another modification;

Figure 8 is a cross section through a tank showing still another modification.

As shown in my former patent above referred to, the tank A, which may be either integral with or supported upon a portion of the closet bowl B, is provided with a combined water inlet and outlet fitting C. This includes an annular seat portion C′ which is secured to the bottom of the tank surrounding the outlet orifice D therein and also includes a central depending portion C^2 connected by spokes with the portion C′ and forming a housing for the water inlet valve. This valve E is of the diaphragm type being normally held to its seat E′ by differential water pressures on opposite sides thereof. A flush valve F normally rests upon the seat C′ and is of such construction that when lifted from its seat it will also cause the opening of the diaphragm valve E. As this specific construction forms no part of the instant invention, it is unnecessary to describe the same in detail.

In general, when the valve F is lifted from its seat C′, water will flow from the tank into a conduit B′ integral with the bowl and at the same time the lifting of the valve F will cause the separation of the diaphragm E from its seat E′, permitting flow of water from the inlet conduit through a suitable connection into the tank.

In the specific construction illustrated in my former patent above referred to, the water discharged from the casing C^2 passes through hollow spokes and the annular portion C′ directly into the bottom of the tank. Such construction is, however, open to the objection that in case of suction in the water inlet line and also supposing that the valve E does not perfectly close, then water would be withdrawn from the tank and passed backward into the casing C^2 and inlet conduit connected therewith. There is also the possibility of the contamination of the water in the tank through its connection with the closet bowl, and consequently contamination of the water supply system. To avoid such result I have modified the construction as follows.

Surrounding the annular seat E′ within the casing C^2 is a chamber C^3 beneath the diaphragm E. This chamber C^3 is connected with a depending portion C^4 extending within the conduit B′ beneath the bottom A′ of the tank A. The tank A has formed integral with one of the walls thereof an inwardly extending hollow portion A^2 which is divided by vertically extending partitions A^3 into a plurality of separate passages. These passages are all open at their upper ends and are also individually connected with ports extending through the bottom A′. One of these passages A^4 preferably centrally arranged between adjacent passages A^5 and A^6 is connected by a conduit G with the depending portion C^4 of the casing C^2. Thus, the water which is discharged when the diaphragm E is separated from its seat will pass through the conduit G into the passage A^4 rising to the top thereof and overflowing into the tank. The outer passages A^5 and A^6 have their upper ends below the upper end of the passage A^4 and constitute overflow connections, preventing the

rise of the water within the tank to any greater height. The water, thus discharged, passes through ports A^7 into the conduit B' and from the latter into the bowl. Thus, there can never be any connection through which water in the tank can flow into the passage A^4 as the discharge end of the latter is always sufficiently high above the overflow connections A^5 and A^6.

With the specific construction illustrated, the hollow portion A^2 is wider at its upper end than at its lower end, and the upper portions of the partition walls A^3 are flared outward, as indicated at A^8. This enlarges the width of the passage A^4 at its upper end so that water will overflow therefrom in a comparatively thin sheet. There is also a depending flange H on the tank A adjacent to the upper end of the passage A^4 which serves to direct the overflow of water back against the outer surface of the wall forming the hollow portion A^2. This wall is also preferably slightly inclined so that the falling water will adhere thereto and will descend noiselessly into the tank.

To simplify manufacture the tank A is preferably separately formed from the bowl B and is supported on a rearwardly extending shelf portion containing the conduit B'. To form a waterproof joint, an annular gasket I is placed upon this shelf and surrounds all of the passages through the bottom A' of the tank. The fitting C in addition to forming the water inlet and outlet connections also constitutes a tie member for securing the tank to the shelf. Thus, as shown, the casing C^2 has a depending portion C^5 passing through an aperture in the conduit portion B', this depending portion being externally threaded to engage a correspondingly threaded clamping collar J. A gasket K is placed between this collar and the undersurface of the portion B' so that when the collar is tightened it will form a water seal and will also firmly clamp the tank to the bowl. The fitting C is initially secured within the tank, preferably by screws or bolts L passing through the bottom A', and a gasket M forms a water seal between the seat portion C' and the tank bottom. To permit of assembling the conduit G with the fitting C and tank, said conduit is preferably formed in two sections G' and G^2 having a threaded engagement with each other. The section G' is in the form of an elbow having an upwardly extending portion G^3 which passes through an aperture in the bottom of the tank and is sealed by a surrounding gasket N. During engagement of this section with the tank the section G^2 is screwed inward so as to clear the depending portion C^4 of the fitting C. It is then screwed in the reverse direction and simultaneously a threaded nipple G^4 is engaged with a threaded aperture in the portion C^4 and screwed to its seat. Thus the fitting C and conduit G can be readily assembled with the tank A, after which the tank is assembled with the bowl in the manner previously described.

In operation, it will be understood that the lifting of the flush valve F permits direct discharge of the water in the tank into the bowl. Also, this operation through connections, (not shown but of the type fully described in my Patent 2,131,765), vents the water chamber about the diaphragm E, so that this diaphragm rises from its seat and permits flow of water from the casing C^2 through the conduit G into the passage A^4. After this passage is filled with water, it will overflow against the flange H and will be directed against the wall of the portion A^2, flowing quietly in contact with the latter down into the tank. Just before the water in the tank reaches the overflow level or upper ends of the passages A^5 and A^6, the diaphragm E will be reseated. This is accomplished by means not herein described, but fully shown in my former patent above referred to. The passage A^4 near its lower end is connected by a restricted port A^9 with one of the overflow passages, such as A^5, so that the water within the passage A^4 will gradually discharge into the overflow and may be used as a refill for the closet bowl. This will reduce the height of the water within the passage A^4 to the level of the port A^9 at which height it will normally stand while the flushing apparatus is inactive. If, however, it is necessary at any time to drain the apparatus, this may be accomplished by the removal of a screw O, which is accessible from the top of the fitting C and normally closes a threaded port O' at the bottom of the depending portion C^4. As this port is at the lowest point in the water inlet connection, it will permit drainage of all water therethrough when the screw O is removed.

The forming of the walls of the inlet passage A as an integral part of the tank has the further advantage that being of vitreous material it is not subject to corrosion. For many years it has been the common practice to form flushing tank fittings of brass, but in certain localities the water used has a corrosive action on such metal. Thus, it has been found that the zinc content of the brass may be eaten away, rendering the walls of the fitting porous, so that in case of a water inlet fitting, there might be danger of the passage of contaminated water back into the service line. However, with a vitreous enameled construction, this danger is avoided for no water, which is suitable for use in a flushing apparatus, will have any detrimental chemical effect on such construction.

While I have above described my improvements in connection with the construction of my former Patent 2,131,765, it is obvious that certain of the features are independent of the particular construction of water inlet and water outlet valves and may be used with other types of apparatus.

In the modified construction shown in Figure 6, instead of connecting the water inlet valve with a conduit beneath the bottom of the tank leading to the passage A^4, I form this connection in part by a conduit I integral with the bottom of the tank. As shown, there is a discharge passage J integral with the combined inlet and outlet fitting C in the portion of said fitting which is within the tank. This passage J has its discharge end directed downward into a port I' through the bottom of the tank which connects with the conduit I. The latter also has a port I^2 through the bottom of the tank connecting with the passage A^4.

In Figure 7, I have illustrated another modification where the non-corrodible water inlet and water outlet conduits K and K' are formed integral with an end wall of the tank. As shown, a wall K^2, rising from the bottom and adjacent to an end wall of the tank, encloses both water inlet and water overflow passages, these being separated from each other by a partition K^4. A small port K^5 through this partition serves as a refill for the bowl similar to the port A^9 in the construction previously described. The wall K^2 is inclined to form a silent runway for the overflow water and a depending flange or lip K^6 serves to

direct the overflow towards this inclined wall. The outlet conduit K at its lower end connects with a conduit K^7 integral with the bottom of the tank and extending towards the center thereof where it terminates in a portion K^8 forming a seat for the flush valve fitting.

The construction shown in Figure 8 is similar to that in Figure 7 with the exception that the inlet and overflow conduits are integral with the side wall of the tank and are of greater width at the top than at the bottom. Various other modifications may be made but in all the functioning is essentially the same providing a silent inlet for the water and an overflow at a lower level which precludes the contamination of the water supply under any condition.

What I claim as my invention is:

1. In a flushing apparatus, the combination with a tank, of a water inlet valve having its discharge portion arranged beneath the bottom of said tank, and a conduit for receiving the discharge having a non-corrodible portion extending upward within said tank to a height above the high water level therein.

2. In a flushing apparatus, the combination with a tank, of a water inlet valve having its discharge portion arranged beneath the bottom of said tank, and a conduit for receiving the discharge having a non-corrodible portion extending upward within said tank to a height above the high water level therein, the upper end of said conduit being laterally extended to diminish the height of the water stream flowing thereover.

3. In a flushing apparatus, the combination with a tank, of a water inlet valve arranged beneath the bottom of the tank, a discharge conduit extending upward from said valve having a non-corrodible portion within said tank extending to a height above the high water level therein, the upper end of said conduit being laterally extended to diminish the height of the water stream flowing thereover, and means for directing the overflow stream against the surface of a descending wall in said tank to avoid noise in discharge.

4. In a flushing apparatus, the combination with a tank, of a water inlet valve arranged beneath the bottom of the tank, a discharge conduit extending upward from said valve having a non-corrodible portion within said tank extending to a height above the high water level therein, the upper end of said conduit being laterally extended to diminish the height of the water stream flowing thereover, and means for directing the overflow stream against the surface of a descending inclined wall in said tank to avoid noise in discharge.

5. In a flushing apparatus, the combination of a tank having an integral hollow portion in one of the walls thereof forming a water inlet passage rising to a height above the high level of water in the tank, and a water inlet valve having its discharge point arranged beneath the bottom of said tank and connected with said passage.

6. In a flushing apparatus, the combination of a tank having an integral hollow portion in one of the walls thereof partitioned to form an overflow passage and a water inlet passage, the latter rising to a height above the upper end of the former, and a water inlet valve having its discharge portion arranged beneath the bottom of said tank and connected to said water inlet passage.

7. In a flushing apparatus, a tank having formed integral with one of the walls thereof a hollow portion partitioned to form a central inlet passage and overflow passages on opposite sides thereof, said inlet passage rising to a greater height than said overflow passages and being flared at its upper end to increase the width and diminish the depth of the water stream overflowing the same.

8. In a flushing apparatus, the combination with a tank, of a combined water inlet and outlet fitting for said tank, a valve for said inlet having its discharge portion arranged beneath the bottom of the tank, and a conduit for receiving the discharge having a non-corrodible portion extending upward within said tank to a height above the high water level therein.

9. In a flushing apparatus, the combination with a tank, of a combined water inlet and outlet fitting for said tank, the inlet portion being arranged within the outlet portion and having its discharge portion arranged beneath the bottom of the tank, and a drain for the portion of said inlet beneath the bottom of the tank operable from within the tank

10. In a flushing apparatus, the combination with a tank, of a combined water inlet and outlet fitting for said tank, the inlet being within the outlet and having its discharge portion arranged beneath the bottom of the tank, a drain aperture for the portion of said inlet beneath the bottom of the tank, and a screw plug for said drain operable from the portion of said fitting within the tank.

11. In a flushing apparatus, the combination with a tank, of a water inlet conduit having a non-corrodible portion extending upward within said tank to a height above the high water level therein.

12. In a flushing apparatus, the combination with a tank and a water inlet valve, of a conduit for receiving the discharge from said valve having a non-corrodible portion extending upward within said tank to a height above the high water level therein, the upper end of said conduit being laterally extended to diminish the height of the water stream flowing thereover.

13. In a flushing apparatus, the combination with a tank, of a water inlet conduit having a non-corrodible portion extending to a height above the high water level within said tank, the upper end of said conduit being laterally extended to diminish the height of the water stream flowing thereover, and means for directing the overflow stream against the surface of a descending wall in said tank to avoid noise in discharge.

14. In a flushing apparatus, the combination with a tank, of a water inlet conduit having a non-corrodible portion extending to a height above the high water level in said tank, the upper end of said conduit being laterally extended to diminish the height of the water stream flowing thereover, and means for directing the overflow stream against the surface of a descending inclined wall within said tank to avoid noise in discharge.

15. In a flushing apparatus, a tank having an integral hollow portion in one of the walls thereof forming a water inlet passage rising to a height above the high level of water in the tank.

16. In a flushing apparatus, a tank having an integral hollow portion with one of the walls thereof partitioned to form an overflow passage and a water inlet passage, the latter rising to a height above the upper end of the former.

17. In a flushing apparatus, the combination with a tank, of adjacent water inlet and over-

flow conduits formed integral with one of the walls of said tank and rising from the bottom thereof, and a small port through the common wall of said conduits for forming a refill.

18. In a flushing apparatus, the combination with a tank and a water inlet valve, of a conduit having a portion integral with the bottom of the tank for receiving the discharge from said valve, and a connecting portion integral with a vertical wall of the tank and extending upward to a height above the high water level in said tank.

19. In a flushing apparatus, the combination with a tank having an outlet opening centrally located in the bottom thereof, of an overflow conduit integral with an end wall of said tank, and a conduit integral with the bottom of said tank connecting said overflow conduit to said outlet opening.

20. In a flushing apparatus, the combination with a tank having an outlet opening centrally located in the bottom thereof, of an overflow conduit integral with said tank and extending to said outlet opening, a valve controlled water inlet connection having a discharge portion for filling the tank, and a restricted connection between said discharge portion and overflow conduit for forming a refill.

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