

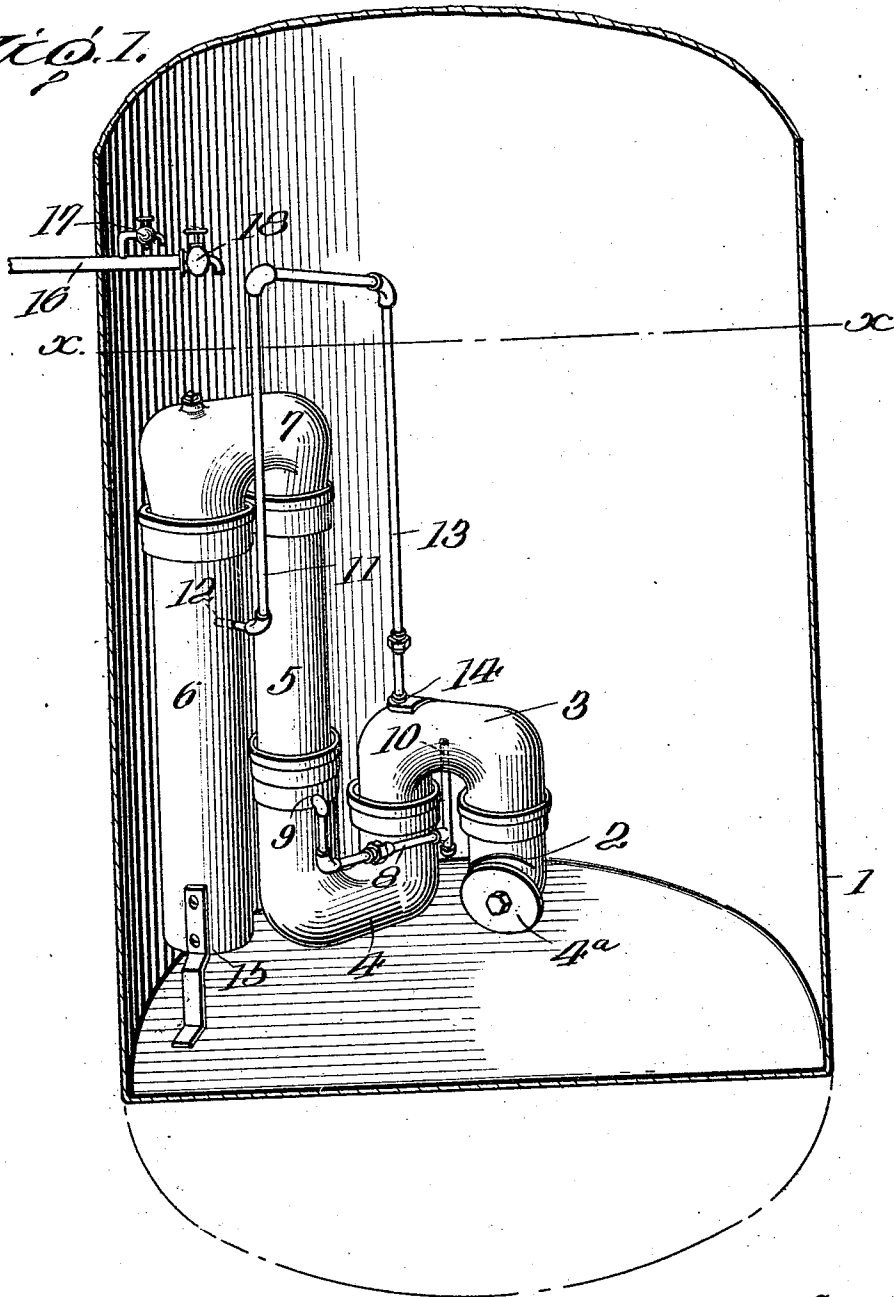
H. D. MOISE.
 AUTOMATIC FLUSHING APPARATUS.
 APPLICATION FILED FEB. 9, 1922.

1,413,484.

Patented Apr. 18, 1922.

3 SHEETS—SHEET 1.

FIG. 1.



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Fig. 2.

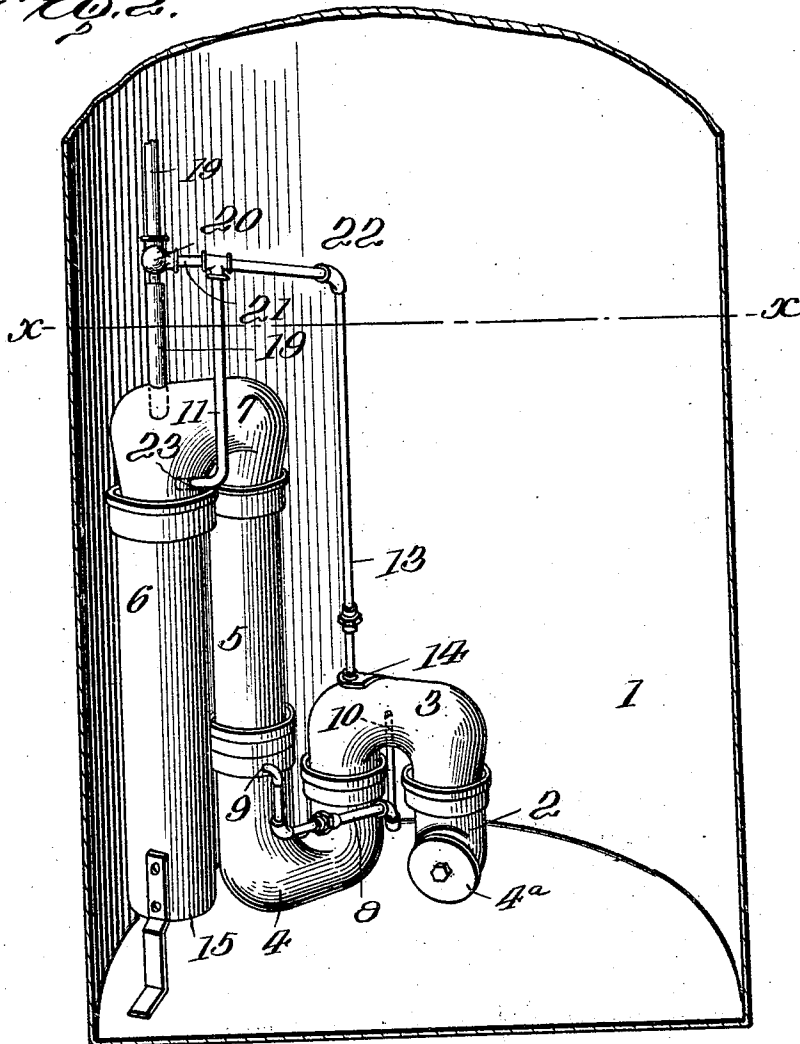
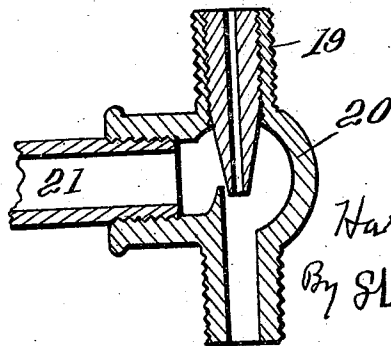


Fig. 3.

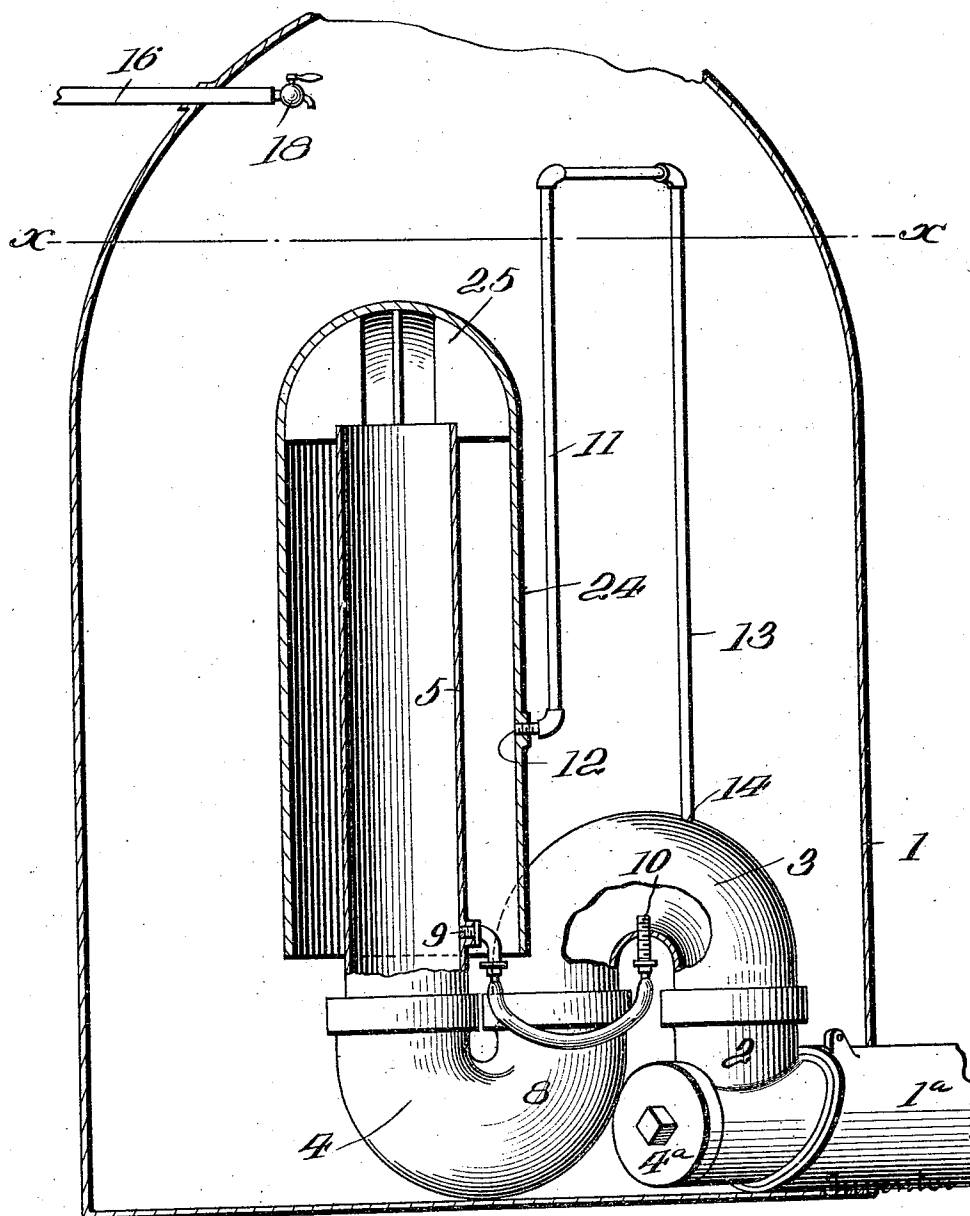


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3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

HARMON D. MOISE, OF SUMTER, SOUTH CAROLINA, ASSIGNOR OF SIXTY PER CENT
TO RICHARD B. BELSER, OF SUMTER, SOUTH CAROLINA.

AUTOMATIC FLUSHING APPARATUS

1,413,484.

Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed February 9, 1922. Serial No. 535,341.

To all whom it may concern:

Be it known that I, HARMON D. MOISE, a citizen of the United States, residing at Sumter, in the county of Sumter, State of South Carolina, have invented certain new and useful Improvements in Automatic Flushing Apparatus, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in an automatic siphoning apparatus, and more particularly a siphoning apparatus which is adapted to be used for the periodical flushing of sewers, closets, and the like.

In my prior application, Serial No. 510,023, filed October 24, 1921, I have shown an automatic siphoning apparatus which is adapted to be placed in the ordinary tank constructed for the ordinary hand-flushing of sewers, and when so installed provides an automatic flushing apparatus which periodically flushes the sewer. This apparatus is of unit construction and may be placed in the tank without requiring any reconstruction of the tank whatever. Said apparatus includes an arrangement of pipes whereby ready access may be had to the sewer through the ordinary manhole closing the tank. Said apparatus also includes a blow-off pipe which is so disposed relative to the water sealing U-pipe of the siphoning apparatus, that the air in the siphon will be discharged through the blow-off pipe almost instantaneously when the water reaches a predetermined level in the tank.

The present invention is particularly adapted to a siphoning apparatus such as shown in my prior application, and has for one of its objects to provide an air pipe which is connected to the siphon and so disposed as to permit air to escape from the siphon until a predetermined liquid level is reached in the tank so that, by increasing the length of the legs of the siphon below the connection of this pipe with the siphon, the body of flushing water which is utilized for flushing the sewer may be varied.

Another object of the invention is to provide an air pipe of the above type which is so connected with the siphoning and sewer pipes that the flushing water will seal the air pipe and prevent air from entering

through the air pipe to the siphon during the flushing of the tank, and thus insure that no air enters the siphon to break the siphonic action during flushing.

Still another object of the invention is to provide a siphoning flushing apparatus of the above type wherein the air pipe is so disposed and arranged that, when the liquid in the tank reaches a predetermined level, air may enter through the air pipe to the siphon, thus breaking the siphonic action at a point so as to insure the proper sealing of the flushing apparatus.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings:—

Figure 1 is a view, partly in perspective and partly in section, showing somewhat diagrammatically the flushing apparatus embodying my improvements;

Fig. 2 is a similar view, but showing a slightly modified form of the invention; and

Fig. 3 is an enlarged section of the air jet portion of the supply pipe.

Fig. 4 is a view similar to Fig. 1, but showing another type of air bound siphon.

The invention in its broadest aspect resides in a siphoning apparatus which is automatic in its action and which insures that a constant volume of liquid will accumulate between successive siphoning actions. The apparatus also consists in devices which insure that once a siphonic action starts, it will continue to a predetermined point without any liability of being impeded or interrupted by air entering the siphon.

The invention will possibly be best understood by a description of the apparatus as applied to the flushing of sewers, it being manifest, of course, that I do not consider my siphon is limited to this use, but it may be used for the siphoning of liquids of any character wherein it is desired to bring about an automatic siphoning of a given volume of liquid at predetermined intervals during the time that liquid is being supplied to the tank. The invention, as illustrated in the drawings, shows a siphonic apparatus as of unit form adapted to be placed in a tank which has been constructed for the hand-flushing of sewers. In such tank construction, the sewer pipe extends into the tank ad-

jacent the bottom thereof, and otherwise the
 tank is substantially free from pipes or ap-
 paratus. My unit siphoning apparatus is at-
 tached to the sewer pipe preferably by
 5 means of a T-connection so as to provide for
 the free access to the sewer pipe for cleaning
 of the same. An inverted U-pipe is con-
 nected to the upright of the T-pipe connec-
 tion, and this inverted U-pipe in turn is
 10 connected to the vertical discharge member
 or leg of the siphon. This vertical dis-
 charge member or leg of the siphon may be
 located within an intake member or bell, or it
 may be connected to a separate intake mem-
 15 ber or leg by means of an inverted U-pipe.
 The intake member extends to a point ad-
 jacent the bottom of the tank.

A blow-off pipe connects the vertical dis-
 charge leg of the siphon with the inverted
 20 U-pipe leading therefrom at the point of or
 beyond the overflow, and preferably projects
 a short distance into this inverted U-pipe.
 This blow-off pipe is so proportioned and
 arranged as to discharge the air from the
 25 siphon almost instantly when a predeter-
 mined volume of water is reached in the
 tank, and this, of course, starts the siphonic
 action. The blow-off pipe is entirely outside
 of the siphon pipes and is readily accessible
 30 for repairs or cleaning should the same be-
 come necessary.

The improved flushing apparatus also in-
 cludes an air pipe which is connected to the
 intake member between the lower end there-
 35 of and the point where the intake member
 communicates with the discharge leg of the
 siphon. Said pipe extends upwardly to a
 point above the maximum level of the water
 in the flushing tank, and thence downwardly
 40 and is connected to the sewer pipe, prefer-
 ably to the inverted U-pipe at the upper side
 thereof. This air pipe accomplishes two
 functions. It furnishes air to the siphon so
 as to insure a constant volume of air being
 45 trapped in the siphon after each flushing
 operation. In order to accomplish this, air
 passes through the pipe from the sewer into
 the intake member at the end of the flushing
 operation. Air escapes through the pipe
 50 during the initial filling of the tank until
 a predetermined level is reached, when the
 water covers the end of the pipe and thus
 traps air in the siphon. This insures a
 requisite volume of air in the siphon. The
 55 air pipe being connected to the inverted U
 of the sewer pipe will be sealed, all the time
 the flushing water is passing through the in-
 verted U-pipe, and this insures that no air
 can enter the pipe during full flushing to im-
 60 pede or break the siphonic action. Prefer-
 ably the intake member of the siphon extends
 downwardly to a point relative to the sewer
 pipe so that the flushing water gradually de-
 creases toward the end of the flushing op-
 65 eration, and as soon as the inverted U-pipe

and sewer pipe are relieved from full vol-
 ume of passing water, air enters through
 this air pipe to break the siphon.

Referring more in detail to Figs. 1 to 3 of
 the drawings, my improved siphoning appa- 70
 ratus is shown as placed in a tank 1 which,
 as noted above, may be the ordinary tank
 used for hand-flushing or, of course, it may
 be built for the purpose. The sewer pipe
 extends into the tank near the bottom there- 75
 of, and a T-pipe 2 is attached thereto. Said
 T-pipe has an upright portion which is con-
 nected to the inverted U-pipe 3 in the usual
 way. The extreme inner end of the T-pipe
 is closed by a suitable closure 4^a. This cap 80
 is so arranged that direct access may be had
 to the sewer pipe for cleaning when desired.
 as is usual in connection with hand-flushing
 tanks, so that the connection of my unit
 flushing apparatus to the sewer does not in 85
 any way prevent the ready access to the
 sewer-pipe. The inverted U-pipe 3 is in turn
 connected to a U-pipe 4, and this U-pipe 4 is
 connected to the vertical discharge leg 5 of
 the siphon. Associated with this vertical 90
 discharge leg 5 is an intake leg 6. Said intake
 leg 6 is connected to the discharge leg 5 by an
 inverted U-pipe 7.

While I have described these pipes as 95
 made in separate sections, it will be under-
 stood, of course, that any of the pipes may
 be formed integral and cast together. It
 will also be understood that instead of hav-
 ing the intake leg at one side of the discharge
 leg, it may surround the same or, that is, be 100
 of the bell-shaped type, and when I refer in
 the description and claims to an intake leg,
 it is to be understood as meaning either a
 bell-shaped leg surrounding the discharge 105
 leg or a leg at one side thereof as illustrated
 in the drawings. The detail structure is
 purely for the purpose of illustrating the
 principle of the invention and is not in any
 way considered to impose limitations upon
 the spirit of the invention which is set forth 110
 in the appended claims.

A blow-off pipe 8 is connected at 9 to the
 discharge leg and is connected at 10 to the
 inverted U-pipe 3. Said connection 10 ex- 115
 tends above the overflow portion of the U-
 shaped pipe 3. This blow-off pipe is located
 so that its lowest part is above the inside
 of the upper central portion of the U-shaped
 pipe 4, and its purpose is to discharge the
 air from the siphon when the water reaches 120
 a predetermined level in the flushing tank
 before the air can pass out through the pipe
 4. The blow-off pipe may be curved or of
 any other desired shape. Said blow-off pipe
 is shown, described and claimed in detail in 125
 my co-pending application above referred to.
 Attached to the intake leg 6 is a pipe 11.
 Said pipe 11 communicates at 12 with said
 intake leg. The pipe 11 extends upwardly
 to a point above the maximum level of the 130

water in the flushing tank which is indicated by the line X—X. Said pipe then extends downwardly as at 13, and communicates at 14 with the upper portion of the inverted U-shaped pipe 3. The lower end 13 of the intake leg 6 is preferably disposed at the point slightly below the upper or top level of the main sewer pipe.

The tank as shown in Fig. 1, is preferably formed with a supply pipe 16. Said pipe 16 is provided with a main discharge faucet 17 and an auxiliary discharge faucet 18. The auxiliary discharge faucet is for the purpose of supplying water gradually to the tank so that said tank will be filled once in long periods, such as twelve hours, twenty-four hours, forty-eight hours or the like. The main valve 17 is for filling the tank quickly so that the tank may be readily tested to see if the flushing apparatus is working properly, or the liquid may be supplied to the tank in any way.

In Fig. 4 of the drawing, I have shown my improvements embodied in a flushing apparatus having a bell-type of air-bound siphon. The main sewer pipe 1^a extends into the tank 1 and has a T-pipe 2, one opening of which is closed by the closure 4^a. Attached to the other opening of the T-pipe is the inverted U-pipe 3, to which is connected the U-pipe 4. The pipe 4 in turn is connected with an upstanding pipe 5 which I have heretofore referred to as the discharge leg of the siphon. Surrounding the pipe 5 is a bell 24 which is supported on the pipe 5 by a spider 25. The blow-off pipe 8 is connected to the discharge leg at 9 and to the U-pipe 3 at 10. The air pipe 11 is similar to that described above. It is connected at 12 to the bell, extends above the maximum level X—X of water in the tank, and has a section 13 connected at 14 to the U-pipe 3.

The operation of my device is, as follows: Assuming that the pipe 4 and the blow-off pipe 8 are provided with water seals after flushing operation and the tank is filling with water. The water gradually rises in the intake leg 6 of the siphon forcing air out through the pipe 11 into the sewer. When the water covers the point 12 where the pipe 11 is attached to the intake leg, then said pipe is sealed so that no further air can escape therethrough. As the water further accumulates in the tank, it will trap air in the siphon and the increased volume of water will put said air under slight compression, also force the air over into the discharge leg 5 which in turn will force the water downwardly in the sealing pipes 4 and the blow-off pipe 8. When the water level in the tank outside the siphon reaches a predetermined point, the pressure is sufficient to force all the water out of the blow-off pipe 8. As soon as the water is forced out of the blow-off pipe 8, then the air in the siphon will al-

most instantly escape through said blow-off pipe and as the air escapes from the siphon, the water of course, will rise in the intake leg, pass over into the discharge leg, and start the siphoning action. It will readily be seen that the height of the siphon may be readily varied and thereby the point of connection of the pipe 11 raised or lowered relative to the height of the tank, and thus the volume of water utilized for flushing varied. The trapping of the air for bringing about the siphonic action does not occur until the water covers the point 12 on the intake leg, where the pipe 11 it attached.

As soon as the flushing water starts to pass out through the siphon, the inverted U-pipe 3 will be filled with water and thus the end of the pipe section 13 will be sealed which prevents any air from working back through the pipe 11 into the siphon to slow up or break the siphonic action.

In the form of the invention where the intake leg 16 extends downwardly into the tank to a point below the upper surface of the main sewer pipe, the water passing through the siphon will gradually stop and as soon as the sewer and the inverted U-pipe 3 are not entirely filled with water, then air can pass back through the pipe 11 from the sewer into the intake leg 6 and this will break the siphonic action. Air entering at the point 12 to break the siphonic action will divide the water then in the siphon, so that the water in the intake leg 6 will drop back into the tank while the water in the discharge leg 5 will pass out through into the sewer, filling and sealing the U-pipe 3 and the blow-off pipe 8.

In the form of the invention shown in Fig. 2, I have provided an air injection pipe similar to that shown in my prior application referred to above. In this form of the invention, water is supplied to the tank by means of a pipe 19 which enters the siphon directly above the intake leg 6. The pipe 19 is provided with an air jet 20 which is connected by means of a pipe 21 to the upper portion 22 of the pipe 11. The pipe 11 is now attached at the point 23 to the intake leg 6. The operation of this device it is thought will be obvious from the description which is given above, when taken in connection with my prior application. Water with air entrained therein passes into the siphon pipes and the air will escape through the pipe 11. This insures that the siphon will be furnished with a full supply of air. The water rises in the intake leg until the point 23 is reached, and when said point is reached, the water level in said intake leg ceases to rise. Air carried in by the entering water will be in part compressed in the siphon holding down the level of the water to the point 23 so that the excess air escapes through the pipe 11. In other

words, there is sufficient surplus air in order to maintain for a time the level of the water at the point 23. When the water in the tank reaches the flushing level X—X, then the pressure of the air in the siphon becomes sufficient as to force all of the water out of the blow-off pipe, then the air in the siphon is permitted to escape almost instantly, and this starts the siphonic action. As above noted, as soon as the siphon begins to flush the tank, the end of the pipe 13 is sealed, and this not only prevents air from passing back through the pipe 11 into the siphon, to break the siphonic action during flushing, but it also stops further entrained air from entering with the water as the air jet receives its air solely from the pipe 13. This provides a means so that all possible chances of air getting into the siphon to cause the breaking or impeding of the siphonic action is avoided.

It is obvious that the arrangement of the pipes may be greatly varied without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters-Patent, is—

1. In an air-bound siphon having intake and discharge members, means for maintaining a water or other liquid seal in said discharge member after flushing, and an air pipe connected to the intake member of the siphon at a point below the overflow level between the intake and discharge members and positioned to trap the quantity of air required to operate the siphon, said air pipe extending upwardly beyond the flushing level of the siphon, and then downwardly into the discharge pipe beyond the liquid seal thereof, said air pipe operating to allow air to escape from the intake member of the siphon as the tank fills and the flushing liquid rises therein until the liquid rises above the level where the said pipe enters said intake member and allowing, after the flush, the air from the discharge pipe beyond the seal to enter and recharge the siphon.

2. In an air-bound siphon having intake and discharge members, means for maintaining a water or other liquid seal in said discharge member after flushing, and an air pipe connected to the intake member of the siphon at a point below the overflow level between the intake and discharge members and positioned to trap the quantity of air required to operate the siphon, said air pipe extending upwardly beyond the flushing level of the siphon, and then downwardly into the discharge pipe beyond the liquid seal thereof, said air pipe operating to allow air to escape from the intake member of the siphon as the tank fills and the flushing liquid rises therein until the liquid rises above the level

where the said pipe enters said intake member and allowing, after the flush, the air from the discharge pipe beyond the seal to enter and recharge the siphon, and a blow-off pipe connected to the discharge member adjacent to opposite ends of the liquid seal therein and so disposed as to permit air from the siphon to escape therethrough to start the siphonic action when a predetermined level of liquid is reached, said blow-off pipe being connected to the discharge member at the level of the top of the water seal retained therein so as to insure said blow-off pipe being filled with water for sealing the same.

3. An air-bound siphon including in combination an inverted U-pipe having a connection with the main discharge pipe of the sewer, a sealing U-pipe connected with the inverted U-pipe, said siphon having a substantially vertical discharge member connected with the U-shaped sealing pipe, and a substantially vertical intake member connected with said vertical discharge member, an air pipe connected to the intake member at a point below the overflow level between said intake member and said discharge member and positioned to trap the quantity of air required to operate the siphon, said air pipe extending upwardly beyond the flushing level of the siphon and then downwardly into the discharge pipe beyond the sealing U-pipe, said air pipe operating to allow air to escape from the intake member of the siphon as the tank fills and the flushing liquid rises therein until the liquid rises above the level where said air pipe enters said intake member and allowing, after the flush, the air from the discharge pipe beyond the seal to enter and recharge the siphon, said main sewer pipe including a T-pipe having a substantially vertical portion with which the U-pipe is connected, and said siphon pipes being so disposed as to give ready access to the removably plugged end of the T-pipe connection with the main sewer pipe, and a removable plug for closing said open end of the T-connection.

4. In an air-bound siphon having intake and discharge members, means for maintaining a water or other liquid seal in said discharge member after flushing, and an air pipe connected to the intake member of the siphon at a point below the overflow level between the intake and discharge members and positioned to trap the quantity of air required to operate the siphon, said air pipe extending upwardly beyond the flushing level of the siphon, and then downwardly into the discharge pipe beyond the liquid seal thereof, said air pipe operating to allow air to escape from the intake member of the siphon as the tank fills and the flushing liquid rises therein until the liquid rises

above the level where the said pipe enters said intake member and allowing, after the flush, the air from the discharge pipe beyond the seal to enter and recharge the siphon, and a water supply pipe having connection with the intake side of the siphon for discharging water into the intake member thereof, said water supply pipe having an air jet connection with the discharge pipe beyond the liquid seal thereof so that air may be entrained and carried into the siphon during the filling of the tank and whereby said air intake jet is sealed during the flushing operation by the water passing through the discharge pipe.

5. In an air-bound siphon having an intake and discharge member, means for maintaining a water or other liquid seal in said discharge member, an air pipe connected with the intake member of the siphon at a point below the over-flow level, between the intake and discharge pipe, positioned to trap the quantity of air required to operate the siphon, extending upward beyond the flushing level of the siphon, and then downwardly into the discharge pipes beyond the liquid seal thereof; said pipe having the dual function of allowing the air to escape from the intake member of the siphon as the flushing liquid rises therein until the liquid rises above the level where said air pipe enters said intake member, and thus permitting the length of the siphon below this point, and so the quantity of liquid discharged to be varied at will; and of allowing after the flush, the air from the discharge pipe beyond the seal to enter and recharge the siphon at a point insuring the gradual breaking of siphonic action and the complete refilling of the liquid seals of the siphon.

6. A flushing apparatus for sewers comprising an inverted U-pipe having a connection with the main discharge pipe of the sewer, a sealing U-pipe connected with said inverted U-pipe, said siphon having a vertical discharge leg connecting with the U-shaped sealing pipe, a vertical intake leg connecting with said vertical discharge leg, an air pipe connected to said intake leg at a point below the overflow point between the intake leg and the discharge leg of the

siphon, said air pipe extending upwardly to a point above the maximum level of water in the tank, and thence downwardly and connected to the upper portion of the inverted U-shaped discharge pipe, a water supply pipe having connection with the intake side of the siphon for discharging water into the intake leg of the siphon, said water supply pipe having an air jet connection with the pipe connected with the U-pipe so that air may be entrained and carried into the siphon during the filling of the tank, said air intake jet being sealed during the flushing operation by the water passing through the U-pipe.

7. A flushing apparatus for sewers comprising an inverted U-pipe having a connection with the main discharge pipe of the sewer, a sealing U-pipe connected with said inverted U-pipe, said siphon having a vertical discharge leg connecting with the U-shaped sealing pipe, a vertical intake leg connecting with said vertical discharge leg, an air pipe connected to said intake leg at a point below the overflow point between the intake leg and the discharge leg of the siphon, said air pipe extending upwardly to a point above the maximum level of water in the tank, and thence downwardly and connected to the upper portion of the inverted U-shaped discharge pipe, a sealing blow-off pipe connected to said inverted U-shaped pipe and extending slightly above the overflow point thereof and to the discharge leg at the level of the water seal in the discharge leg of the siphon, said blow-off pipe being so disposed that the water seal therein is slightly shallower than the water seal in the large U-shaped pipe or siphon, a water supply pipe having connection with the intake side of the siphon for discharging water into the intake leg of the siphon, said water supply pipe having an air jet connection with the pipe connected with the U-pipe so that air may be entrained and carried into the siphon during the filling of the tank, said air intake jet being sealed during the flushing operation by the water passing through the U-pipe.

In testimony whereof, I affix my signature.

HARMON D. MOISE.