

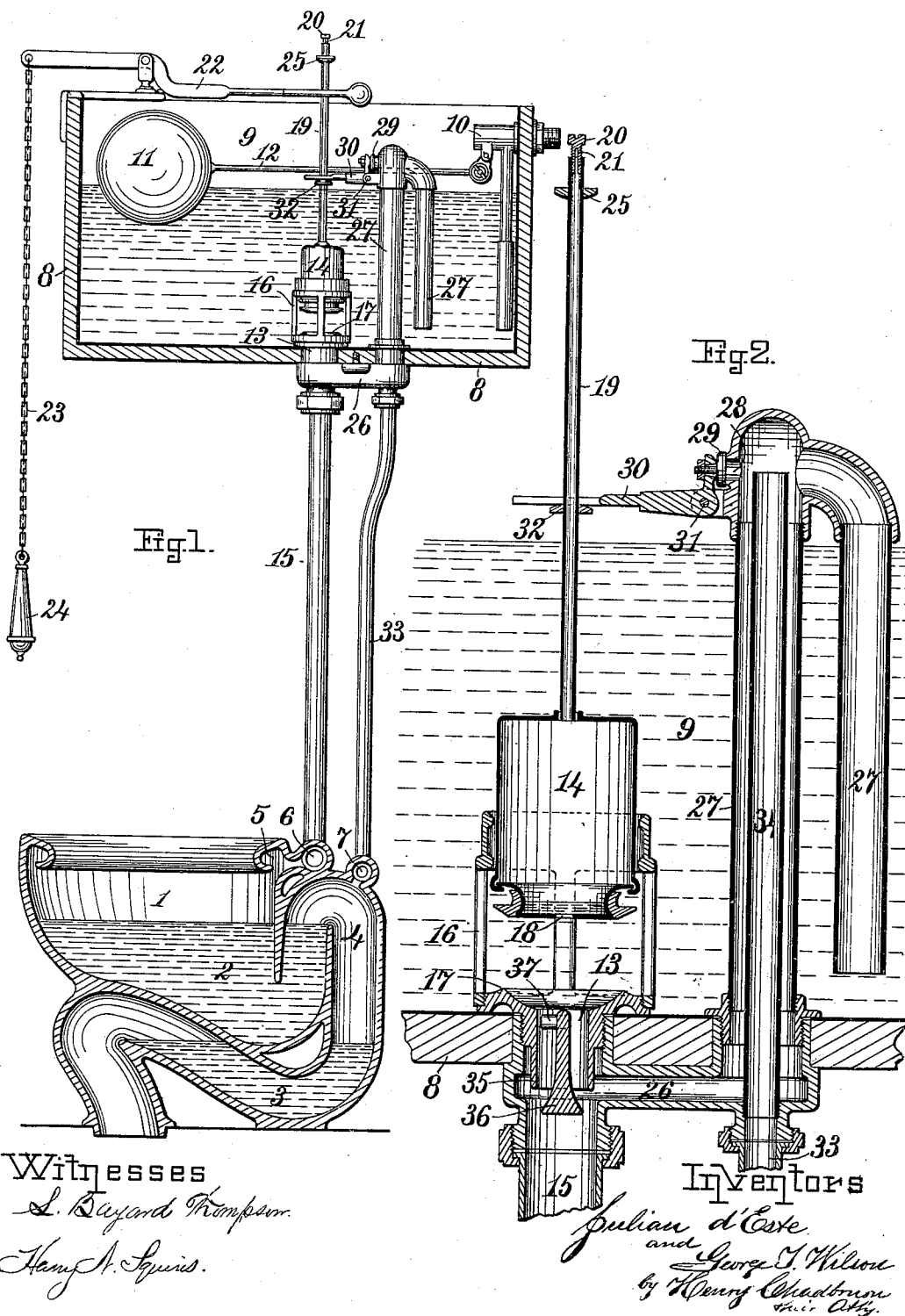
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Patented Nov. 22, 1898.

J. D'ESTE & G. T. WILSON.
CISTERN FOR WATER CLOSETS.

(Application filed May 6, 1897.)

(No Model.)



UNITED STATES PATENT OFFICE.

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CISTERN FOR WATER-CLOSETS.

SPECIFICATION forming part of Letters Patent No. 614,648, dated November 22, 1898.

Application filed May 6, 1897. Serial No. 635,282. (No model.)

To all whom it may concern:

Be it known that we, JULIAN D'ESTÉ, of Salem, in the county of Essex, and GEORGE T. WILSON, of Somerville, in the county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Cisterns for Water-Closets, of which the following, taken in connection with the accompanying drawings, is a specification.

10 This invention relates to improvements in cisterns for water-closets, and more especially to the valve mechanism contained within said cisterns, and is especially adapted to what is known in the art as a "pneumatic" water-closet.

15 The objects of the invention are to simplify the construction of the cistern and thereby to both lessen its cost, improve its operation, and lessen the liability of its getting out of order; to produce novel means located within a cistern which will cause a predetermined amount of water to be discharged therefrom in the flushing of the closet independent of the level of the water in the cistern, provided, 20 however, that there is that amount of water in the cistern when the flushing is commenced; to reduce the space required for the cistern, and to otherwise improve the cistern, as will appear from a further description of the invention.

25 The invention consists in the novel constructions, arrangements, and combinations of parts, substantially as hereinafter described and illustrated on the accompanying drawings, which form an essential part of this specification.

30 On the drawings, Figure 1 represents a detail sectional view of the closet and cistern. Fig. 2 represents a detail vertical section of the outlet-valve of the cistern and its adjacent mechanisms.

35 Like characters of reference refer to like parts wherever they occur on the different parts of the drawings.

40 The preferred form of water-closet to be used with this our improved cistern has been illustrated in the drawings and is that of any usual form of pneumatic closets. It consists of a bowl 1, an upper water seal 2, a lower water seal 3, and an air-space 4 within the

outlet-passage from the closet and located between said seals, which space normally contains air under ordinary atmospheric pressure. The closet is provided with the flushing-rim 5 and with an inlet-passage 6, which is in open connection with said rim. The closet is also provided with an inlet-passage 7, which is in open connection with the air-chamber 4.

45 The cistern is formed with the outer casing 8, as usual, which casing contains a single water-chamber 9, being provided with the inlet-valve 10, operated by the usual ball 11 and rod 12. It is also provided with the outlet-opening 13, (shown in Fig. 2,) which is opened or closed by means of the valve 14. A flushing-pipe 15 is in open communication with the outlet-opening 13 and with the flushing-inlet 6 of the closet, which pipe conveys the water from the cistern to the flushing-rim 5 when the valve 14 opens the outlet 13. A cage 16 is attached to the bottom of the cistern, which cage surrounds the valve 14 and forms a guide for the valve, so as to insure its proper seating upon its seat 17, which surrounds the outlet-opening 13. The valve 14 is made in the form of a float and is preferably spun into shape from thin sheet metal. This valve is provided on its under side with a free and unobstructed opening 18, and it is also provided on its upper side with a hollow valve-stem 19, which stem is provided with a screw 20, screwed into the upper end of the same. This screw is slotted, as at 21, which slot extends lengthwise of the screw and substantially the entire length of the same. It will be thus understood that the slot in the screw 20 forms a vent from the tubular valve-stem 19, which vent may be regulated in size by the adjustment of the screw. Any suitable and well-known vent may be substituted for the slotted screw 20, and, in fact, the pipe may be furnished with a plain perforation only, if so desired.

50 The cistern is provided with the usual lever 22, chain or rod 23, and handle 24 for the operation of the outlet-valve 14, and the valve-stem 19 is provided with a collar 25, which is engaged by the inner end of the lever 22 when the handle is pulled, thus causing the valve 100

14 to be raised from its seat and allowing the water within the cistern to be discharged through the flushing-pipe 15 and flushing-rim 5 in order to flush the closet. The lever 22 and the valve-stem are disconnected from each other, and the lever is weighted on its inner end, so that the lever will immediately drop back to its normal position, as shown in Fig. 1, as soon as the handle 24 is released; but the valve 14 being a float-valve will remain raised from its seat. As there is an opening in the under side of the valve 14 and a vent at the upper end of the stem 19, formed by means of the screw 20 or otherwise, it will be seen that when the valve is raised water from the cistern will commence to enter the float-valve through the opening 18 and will force the air which is within the cavity of the valve up through the valve-stem and out through the vent formed by the screw 20, and said water will enter in the same amount and at the same speed as the air will escape, which may be governed by the manipulations of the screw 20 or other device used as a vent. The valve 14 will float within the cistern until sufficient water has entered to cause it to have the same specific gravity as the water in the cistern, when the valve will gradually sink within the cage 16 and by seating itself upon the seat 17 will close communication between the cistern and flushing-pipe, thereby discontinuing the flow of water to the closet.

The outlet-opening 13 is provided with a branch passage 26, substantially as shown, which branch passage is in open communication with one end of an inverted-U-shaped tube 27, contained within the cistern, the opposite end of this tube being open and reaching nearly to the bottom of the cistern. The upper loop end of the tube 27 is somewhat above the normal level of the water in the cistern when the cistern is filled and is there provided with an opening 28, which is opened or closed by means of a valve 29, mounted upon one end of a bell-crank lever 30, fulcrumed at 31 to an ear on the U-shaped tube, the opposite end of said lever being preferably forked and embracing the valve-stem 19 above a collar 32, firmly secured on said stem, which collar engages the end of said lever and causes the valve 29 to close the opening 28 when the valve 14 and its attached stem are raised to flush the closet, as above described. The lever 30 is so balanced that when the collar 32 is withdrawn from contact with said lever said lever will move upon its fulcrum and by withdrawing the valve 29 from its seat will open the opening 28, and thereby establish free communication between the outside air and the air within the U-shaped tube. One end of an air-pipe 33 is attached to and in open communication with the inlet-opening 7 to the air-chamber 4 in the closet, the opposite end of said pipe being attached to and in open communication with an air-tube 34, contained within an arm of the U-shaped pipe, which tube preferably

extends upward within said pipe nearly to the loop in the same, substantially as shown in Fig. 2.

The object of the inverted-U-shaped pipe 27, with its inclosed pipe 34, is to provide, by simple, cheap, and effective means, an air-passage from the chamber 4 and connected passage 26, whereby the air in said chamber 4 may be partially exhausted and the siphon of the closet started, caused by the downward flow of the water in the flushing-pipe 15, and the object of the free end of the pipe 27 being open and extending nearly to the bottom of the cistern is to cause the end of the pipe 27 to be sealed by the water in the cistern, so as to accomplish the above object and to remain sealed until the level of the water is below the open end of the pipe 27; but when the water in the cistern reaches a level below the open end of the pipe 27 then air will be admitted to the pipe 27 and the siphon will be broken. This breaking of the siphon by the admission of air through the open end of the pipe 27 will take place before the valve 14 reaches its seat, thus insuring the discharge of a sufficient quantity of water through the flushing-pipe after the siphon is broken to properly fill the seal 2.

The operation of this our improved cistern when it is desired to flush the closet is substantially as follows: On the drawings the valve 14 has been shown as having been raised by the operation of the lever 22, and said lever has been shown as having returned to its normal position after raising the valve. The collar 32 has been shown as being in engagement with the bell-crank lever 30, and the valve 29 has therefore closed the opening 28 in the U-shaped pipe. These are the positions of the said parts at the time when the handle 24 has been pulled and released and it is desired to flush the closet. Just as soon as the valve 14 left its seat 17 water was discharged from the cistern through the outlet 13, flushing-pipe 15, and flushing-rim 5 into the bowl 1 of the closet. This flow of water through the outlet 13 tended to form a vacuum within this branch passage 26 and in the air passages and cavity connected with said branch passage, as the open end of the pipe 27 will be sealed by the water in the cistern and the opening 28 will be closed by the valve 29, as shown on the drawings. When the valve had been raised to a sufficient height to cause the valve 29 to close the opening 28, a partial vacuum was formed by the flow of water above mentioned, and the pressure of the air contained within the air-chamber 4 was consequently reduced from that of the atmosphere outside this confined space or spaces. This reduction of the pressure of the air in the air-chamber 4 allowed the greater pressure of the atmosphere which is brought to bear upon the water contained within the bowl 1 to force such water over the bridge of the seal 2 until a siphon had been formed which would carry the contents of the bowl 1

out through the outlet of the closet and through both the seals 2 and 3. As soon as the valve 14 left its seat water was admitted within the hollow chamber of said valve and continues to enter said chamber until the combined weight of the water and of the valve exceeds that of the water displaced by said valve, when the valve will begin to descend toward its seat, being guided into its descent by the cage 16. The descending of the valve 14 will cause the collar 32 to be withdrawn from contact with the bell-crank lever 30, which on account of its uneven balance will cause the valve 29 to be withdrawn from and to open the opening 28, thereby allowing air to enter the U-shaped pipe and its connections, and consequently will establish an equilibrium in the pressure of the air in chamber 4 and that of the atmosphere and will consequently break the siphon and stop the discharge from the bowl 1. As the siphon is broken and the discharge from the bowl stopped some time before the valve 14 reaches its seat and closes the outlet 13, there will always be sufficient water discharged from the cistern into the bowl 1 after the siphon has been broken to properly fill both seals of the closet, therefore leaving them filled with clear clean water.

In order to prevent any liability of failing to form a siphon by the flow of water through the opening 13, we prefer to provide said opening with a depending tube 35, which is located in the opening and projects downward about midway of the branch passage 26, and to also provide said outlet with a depending finger 36, located within the center of said opening and suspended by means of the cross-bar 37 or by other means, which extends across the opening 13. This finger projects downward within the opening 13 below the lower end of the tube 35 and the branch passage, and said finger is preferably flared outward at its lower end, substantially as shown in Fig. 2. The combined action of this tube 35 and finger 36 upon the stream of water as it flows through the outlet 13 is such that it spreads the stream of water, causing it to entirely fill the cross-sectional area of the outlet 13 and the flushing-pipe 15, and therefore forms, substantially, a water-piston within the flushing-pipe, which as it descends tends to form a vacuum in the branch passage 26 and its connections.

We wish it to be understood that the branch passage, its air-containing connections, and the valve 29 might be used with other forms of valves than the float-valve 14 shown without departing from our invention; but we prefer to use the latter parts with a valve which is retarded in its return to its seat, so as to give sufficient time for the proper operation of the closet and to use the entire device combined substantially in the manner above described.

By the construction of our device, in which the making and breaking of the siphon is governed by the operation of the outlet-valve

independent of the supply of the ball-cock or the level of the water in the cistern, we are enabled to secure a proper flushing of the closet independent of the amount of water contained within the cistern, always provided, however, that there is sufficient water contained in the cistern to properly flush the closet.

On the drawings the various parts of the device have been illustrated as being located in the most convenient relation to each other to properly show their connections and coöperations; but they may be placed in other positions and connected by other equivalent and well-known mechanisms within the scope of mechanical skill without departing from the spirit of our invention.

Having thus fully described the nature, construction, and operation of our invention, without endeavoring to describe or to illustrate the various devices or changes in the devices which may be employed to carry our invention out, we wish to secure by Letters Patent and claim—

1. In a cistern for a "pneumatic" water-closet having a single chamber therein, an outlet to connect with the flushing-pipe, a float-valve controlling said outlet, an opening to be connected to a chamber in the water-closet containing air in confinement, a branch passage between said outlet and opening, an inverted-U-shaped pipe having one of its ends connected to and in open communication with said branch passage and its opposite end open near the bottom of the cistern and sealed by the water in the cistern, a pipe connected to the opening which connects with the air-chamber in the closet, said pipe extending upward into one of the arms of the inverted-U-shaped pipe and forming open communication between the U-shaped pipe, a valve for the opening in the U-shaped pipe normally held open independent of the float-valve and closed by said float-valve when said float-valve is raised to flush the closet, whereby a siphon is created in the closet when the flushing-valve is opened but is broken before the flushing-valve reaches its seat, insuring a sufficient discharge of water to fill the seals within the closet after the siphon has been broken, for the purpose set forth.

2. In a cistern for a "pneumatic" water-closet, a flushing-outlet, a valve controlling said outlet, an opening to be connected with the air-chamber in the closet, a branch passage between the flushing-outlet and the said opening, a depending tube in the flushing-outlet having its lower end at the junction of the flushing-outlet and the branch passage, and a stationary depending finger within the flushing-outlet having its lower end flared outward and slightly below the junction of the flushing-outlet and the branch passage, so as to spread the water within the outlet, and tend to create a vacuum in the branch passage for the purpose set forth.

3. In a cistern for a "pneumatic" water-

closet, a flushing-outlet, a valve controlling
said outlet, an opening to be connected with
the air-chamber in the closet, a branch pas-
sage between the flushing-outlet and the said
5 opening, a depending tube in the flushing-
outlet having its lower end at the junction of
the flushing-outlet and the branch passage
and a stationary depending finger within the
flushing-outlet having its lower end slightly
10 below the junction of the flushing-outlet and
the branch passage so as to spread the water
within the outlet and tend to create a vacuum

in the branch passage, for the purpose set
forth.

In testimony whereof we have signed our 15
names to this specification, in the presence of
two subscribing witnesses, on this 22d day of
April, A. D. 1897.

JULIAN D'ESTÉ.
GEORGE T. WILSON.

Witnesses:

HENRY CHADBOURN,
J. EDWARDS MAKEPEACE.