

UNITED STATES PATENT OFFICE.

DAVID STEELE WALLACE, OF DENVER, COLORADO, ASSIGNOR TO THE WALLACE PLUMBING IMPROVEMENT COMPANY, OF SAME PLACE.

WATER-CLOSET.

SPECIFICATION forming part of Letters Patent No. 577,900, dated March 2, 1897.

Application filed May 12, 1896. Serial No. 591,286. (No model.)

To all whom it may concern:

Be it known that I, DAVID STEELE WALLACE, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Water-Closets; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in siphon water-closets; and the objects of my invention are, first, to provide a perfect siphon-closet without a force-jet; second, to provide a siphon-closet in which the flushing-water is all discharged into a bowl from a continuous hollow rim and is directed by the peculiar construction of the rim to flow in a continuous stream down the sides of the bowl; third, to provide means whereby the discharging flushing-water will drive the air imprisoned in the discharge-pipes of the closet out and will form a seal or lock across the discharge-passage and prevent any air returning into the pipes to impair the suction of the siphon; fourth, to provide a closet adapted to normally hold a large volume of flushing-water. I attain these objects by the mechanism illustrated and described in the accompanying drawings and following specification, in which—

Figure 1 represents a central cross-section of my improved siphon water-closet. Fig. 2 represents a central cross-section of the same with a slightly different arrangement of the discharge-passage. Fig. 3 represents a plan view of Fig. 2. Fig. 4 represents a perspective view of a fragment of Fig. 1. Fig. 5 represents a perspective view of a fragment of Fig. 1. Fig. 6 represents a fragment of a round discharge-conduit. Fig. 7 represents also a fragment of a round discharge-conduit.

Similar letters of reference refer to similar parts throughout the several views.

Referring to Fig. 1, B designates the base-flange of the closet.

C designates the bowl of the closet, which

I make very deep, in order that it may hold a large amount of water. I provide the bowl with a rim D, which is curved inward and downward and formed with a continuous water-passage E within it. This water-passage extends around the bowl and communicates with a water-inlet passage F, which is formed in a rearward-projecting portion G. This projection forms a connecting-nipple, by which a flushing-pipe from a flushing-tank may be connected. The flushing-tank, owing to the closet being able to create a siphon without the assistance of a jet, is set preferably with its bottom on a level with the top of the closet against a supporting wall or partition, or it can be secured directly to the rearward-projecting portion, as shown in patent to me, No. 558,130, issued April 14, 1896, by forming lateral wings on the extension, as shown in that patent. In the present case I prefer to secure the tank to a partition or wall, and the discharge-pipe from it is necessarily very short, and as the water flows into the closet practically without a head or pressure it is essential that this connecting-pipe be as large as possible, in order that a large stream may flow to the inlet of the closet. For this reason I connect the conveying-pipe of the flushing-tank to the outside of the projecting nipple extension G of the closet, using a yielding or elastic terminal end to the connecting-pipe, which may be either lead or rubber, which is placed over the nipple and bound thereto by clamps or wire, and in order to prevent the pipe from working off the nipple I provide its exterior end with a raised annulet, bead, or cinchure, which acts as a circumferential key or abutment and secures the connection against displacement from the nipple when once it is bound to it. This nipple is preferably oval or elliptical in cross-section, as is also the passage F, as shown in the end perspective view in Fig. 2.

I make a continuous water-discharge passage from the water-passage in the rim by separating the introverted and depending lip G' of the rim from the interior surface of the bowl by a narrow space H, and in order to make the flow of water from the rim into the bowl perfectly noiseless I extend the introverted end G' of the rim down the sides of the

bowl a considerable distance, which acts to compel the water to flow from the rim noiselessly down the sides of the bowl. This is a new and very important feature in siphon-closets, as the water runs continuously from the commencement of flushing until the bowl is again refilled, and the noise made by the water, which in closets at present in use have the rims formed to allow a large portion of the water to spurt to the central portion of the bowl, is objectionable and annoying, especially in private residences. The siphon-closets in use also use a jet of water independent of the regular flushing-supply to start and maintain the siphon, which very materially increases the noise.

I dispense entirely with a jet, as I am able to make, by a peculiar arrangement of the discharge-passages, a more perfect siphon without a jet than with one, and I am also enabled to make with this arrangement of discharge-passages, in coöperation with the construction of the flushing-rim above referred to, a perfectly noiseless closet, which is the desideratum of plumbing science. From the bottom of the bowl a commodious passage I extend centrally upward back of the rear wall J of the bowl to near the top of the closet, where it is turned upon itself downward. The downward portion may be arranged parallel to the upward portion and extend under the bowl and forward from its center, or it may extend directly down from the top of the upward portion to just above the base, where a sharp backward and then a downward turn is given in either case. These passages and also the water-inlet passages are preferably formed in an integral projecting portion, which is adapted to contain them and which extends rearward from the bowl. These passages may be of any form of cross-section desired, except at the points K and L, where the direction of the flow is changed in passing through them. At these points I make the bottom of the passages perfectly flat and straight across, as shown in Figs. 2, 4, and 5, while the sides and top may be semicircular or square in cross-section, but I preferably make it semicircular. The forming of a perfectly straight horizontal sharp-edged transverse turning-point at the turns in the discharge-passage causes the water to flow in a broad sheet over them at these points, which completely fills the breadth of the passages from the moment flushing commences until it ends. As the water completely fills the breadth of the passages at these points, although it may be only a quarter of an inch deep at the start and end of flushing, it will at the start drive all the air out of the passages below the first turn K. When the water reaches the turn L, the edge of which and a portion of the bottom of the passage adjacent to it is also flat and straight across, as shown in Fig. 4, the water again spreads out the full width of the passage and drops in a broad sheet onto the third turn M, from which it flows into the outlet. This thin

sheet of water, which is the forerunner of the full flush, forms a siphon perfect enough to draw a volume after it large enough to completely fill the passages, and then all the air remaining between the turns above the thin sheet of water is driven out, and from that instant a perfect and complete siphon is established, which completely and noiselessly empties the bowl. Having once established a perfect siphon, it is necessary to maintain it, which I do by means of these straight flat edges at the turns, and especially by forming a short sharp double turn with a flat straight transverse edge L adjacent to the outlet of the discharge-passage. This sharp double turn is formed wholly below the bottom of the bowl, and by its use I am able to form a complete air-tight water seal and also a long siphon-leg and runway from the first turn K. If I used a jet, I would not have room enough between the under side of the bowl and the base in which to form it, and for this reason closets using a jet are confined to a short siphon-leg. The longer the siphon-leg the greater will be the strength of the suction. At this sharp turn L the water is forced, owing to the flat walls of the passage, to completely fill the breadth of the passage and forms a perfect air-tight seal.

In Figs. 6 and 7 I illustrate the approximate form of the cross-section of discharge-passages of water-closets in general use. It will be seen that water flowing over an edge of this form constantly flows and rolls over itself toward the center, which is the lowest point, and in leaving an end of a passage it tapers toward a point more or less, as shown in Fig. 6, and leaves a space on each side of the water for air to pass above it into the pipes, which impairs the suction. This is one of the reasons that it is necessary to employ a jet of water in closets having discharge-pipes of the usual curved form of cross-section to start and maintain a siphon. Another and principal reason is a construction of the discharge-passage which does not permit the first beginning of a flushing-discharge of water to form a water seal against the air at or near the end of the passage.

It is not so difficult to maintain a siphon after it has once been established; but it is an entirely different thing to so form a discharge-passage that it will create and establish of itself without aid or force and with but a thin film of water, generally varying from one-sixteenth to one-eighth of an inch thick, flowing gently over the first partition K and running through the passage, to so construct that passage in all its parts that this first small amount of water will create a siphon. It is also easy enough to establish a siphon by using a jet powerful enough to drive a volume of water from the bowl the instant a flushing starts large enough to completely crowd the passage full of water, and it requires elements coöperating with the flat straight edge at the first overflow partition or

end of the short siphon leg or point K to create or call into being a siphon. These elements are, first, a long siphon-leg having as near as possible a straight smooth run; second, a flat straight floor portion at and adjacent to the lower end of the run with a straight transverse edge the full breadth of the passage, and, third, a construction of passage at this point which will direct the water, even though the quantity flowing through the passage be almost as thin as a knife-blade in depth, to form a perfect air-tight water seal and lock of itself, and this point is the principal point in the passage, as the transverse edge must act in conjunction with the form of the passage at this point to establish the water-lock. To form a water lock or seal at this point with the small quantity of water which first flows over the edge of the first partition at the commencement of flushing, it is necessary that the passage be approximately concentric to the transverse edge L at the end of the long leg I of the siphon and be of such a form that this first small overflow will be forced to, first, spread out over the entire width of the passage before it reaches the edge; second, to strike an abutment which will cause it to double upon itself in the form of a loop, and, third, to then strike a second abutment which for an instant will cause it to check itself or back up, rebound upon itself, so to speak, and form a solid block of water just below the flat edge. This the water does, for as it shoots from the transverse edge L across the passage it strikes the short curve M, which curves it quickly around and it bounds across the passage and strikes against the top part of the opposite curve under the straight flat edge L, which forms an abutment and dashes it back against itself and against the edge portion of the short curve and the opposite side of the downward passage adjacent to this edge, from which it drops into the soil-pipe, the water being forced to cross the passage three times in a continuous zigzag line in a space of three or four inches and is thus forced by the peculiar contour of this passage to form a perfectly dense solid body of water, which forms a perfect seal against the admission of air.

My improved closet creates and maintains a perfect siphon of great strength without the use of a jet and its flushing is noiseless.

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

1. In a siphon water-closet, the combination of a bowl and supporting-base, means for flushing said bowl, a discharge-passage extending first upward from said bowl and adapted to cooperate therewith to form a trap and then downward under said bowl to form a long siphon-leg, then reversed upon itself by a short, sharp backward and then a short, downward turn at the end of said siphon-leg between the bottom of said base and the bottom of said bowl, with a straight, transverse

turning edge or partition, and flat portions forming the floor of the passage at and adjacent to said edges at the turns at the top and bottom of said siphon-leg, substantially as described.

2. The combination in a single-trap water-closet, of a trapped bowl having a flushing-rim and a supporting-base, a siphon discharge-passage comprising a short and long siphon-leg, a partition between said siphon-legs having a straight, transverse edge and a flat floor portion at and adjacent to the edge, with the long siphon-leg having a flat floor portion along the lower part of the long siphon-leg terminating in a straight, transverse terminal edge extending across the full width of said passage, a semicircular reverse or backward curve or turn in said passage concentric to said flat, straight edge at the lower end of said long siphon-leg, an opposing curve in the wall of the passage opposite said reverse concentric curve and leading downward and backward from the terminal edge of the long siphon-leg, and a downward passage through said base from said opposing curve and from said concentric curve at an approximately perpendicular point below the straight transverse terminal edge of the lower end of the long siphon-leg, whereby the water in passing through the tortuous passage is forced to form itself at the lower end of the long siphon-leg into an air-tight lock or seal.

3. The combination of a single-trap bowl having a flushing-rim and a supporting-base, with a siphon discharge-passage having a long siphon-leg curving under the bowl and a flat floor portion at the lower end of said siphon-leg terminating in a straight, transverse edge, a vertically-arranged semicircular concentric reverse and backward curve to the direction of the siphon-leg circling around said terminal edge, a curved wall in said passage extending downward and rearward from said terminal edge and arranged opposite and to oppose the lower portion of said semicircular curve and a sharp, downward turn in the direction of said passage through said base from the vertical diameter of said semicircular curve, as set forth.

4. In a siphon water-closet the combination of the bowl, a flushing-rim forming a part thereof, an integral rearward extension and supporting-base, a water-passage opening into and through said extension and communicating with the flushing-rim, a round or oval projecting portion on said rearward extension adapted to form a connecting-nipple and containing the water-passage to the flushing-rim, and a band annulet or cincture around the end of said projecting connecting-nipple, with a siphon-passage through said base having a flat floor portion and straight transverse terminal edge at the lower end of its long siphon-leg and a reverse turn in said discharge-passage around the said terminal edge of the siphon-leg, a sharp, downward turn in said passage through said base from the end of said

reverse curve in approximately a vertical plane below the terminating edge of the floor of the long siphon-leg, and through its terminal edge, and a straight, transverse terminating edge to the partition between the short and long siphon-legs of said discharge-passage, substantially as described.

5. The combination with the bowl, its flushing-rim and supporting-base, means for flushing said rim, with a siphon discharge-passage provided with a short and long siphon-leg and having at the lower portion of said long siphon-leg a flat, straight transverse floor extending to and terminating the long siphon-

leg in a straight, transverse edge, a semicircular sweep of said passage around said terminal edge, a backward and downward curved relief-space directly under said terminal edge and a sharp, downward exit-course to said discharge-passage directly below said terminal edge, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID STEELE WALLACE.

Witnesses:

ISAAC HUBER LABAGH,

CHARLES GUSTAVUS HOLME.