

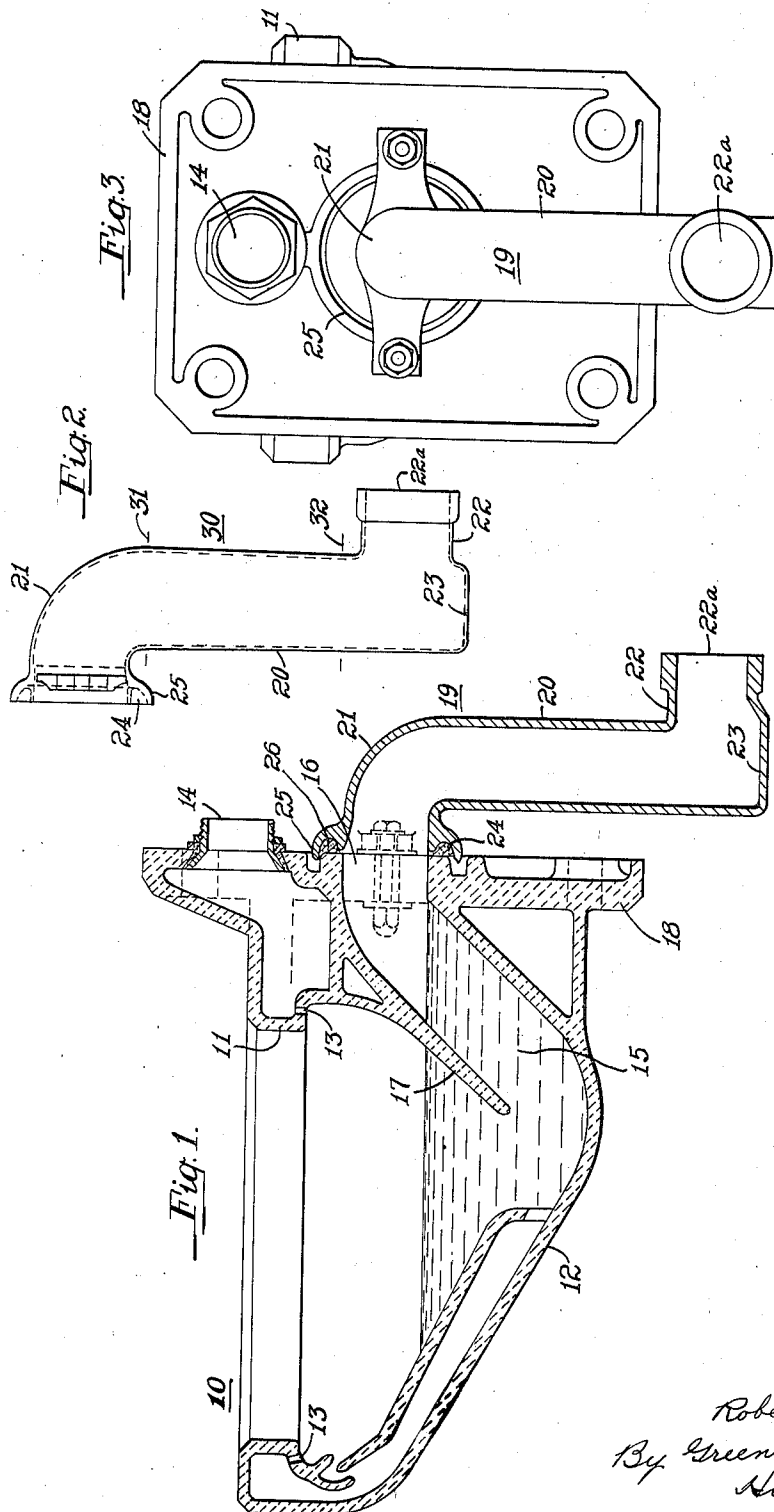
April 25, 1939.

R. C. BOYD

2,155,751

WATER CLOSET EVACUATOR

Filed April 21, 1936



UNITED STATES PATENT OFFICE

2,155,751

WATER CLOSET EVACUATOR

Robert C. Boyd, Louisville, Ky., assignor, by mesne assignments, to American Radiator & Standard Sanitary Corporation, New York, N. Y., a corporation of Delaware

Application April 21, 1936, Serial No. 75,573

4 Claims. (Cl. 4—69)

My present invention relates to water closet evacuators and more especially to the syphon down-leg construction thereof.

My present water closet evacuator is of that type wherein the evacuator forms the down-leg of a syphon system, the up-leg of such system being integral with the closet bowl. The syphon system is completed by connecting the evacuator by means of a suitable joint to the bowl. The syphon system is one which is utilized for evacuating waste from the bowl.

In evacuators of this type, a certain retardation of the flow of the water at the discharge end of the evacuator is necessary in order to cause the evacuator to fill sufficiently with water so that syphon action will be self-sustaining after it has once been initiated. It is, moreover, highly desirable, mainly for the purpose of economy, that the flushing action take place with a minimum quantity of water.

Existing types of evacuators have certain recognized disadvantages. These evacuators retard the flow of water at the discharge end by means of a constriction in the water passage or by curving the water passage between its ends and/or at the discharge end to impede the flow of the water. Combinations of these constructions are also used. These constructions, however, cut down the vigor and the resulting waste-removing properties of the flushing action and provide a bottle neck where waste matter is apt to lodge. In addition, the utilization of curved down-legs tends to thrust the water through the discharge orifice which I have found to be disadvantageous and where the discharge end of the down-leg is thus curved inefficient syphon action is obtained because the curvature does not act to fill the down-leg with water immediately in such manner as to produce good syphonic action.

One of the objects of my present invention is to improve the construction of the syphon down-leg of a closet evacuator so as to secure increased efficiency and improved results with simplicity of construction.

Another object of my invention is to provide an efficient syphon down-leg construction wherein the maximum effectiveness of the flushing water is realized and wherein any tendency towards stoppage or ineffectual flow retardation is eliminated.

A still further object of my invention resides in a method of handling the flushing water through the syphon down-leg so as to procure the maxi-

mum effect thereof with a minimum amount of water.

Other and further objects will be understood by those skilled in this art or will be apparent or pointed out hereinafter.

In the accompanying drawing:

Figure 1 is a vertical cross-section taken longitudinally through a closet and down-leg;

Figure 2 is an elevational view of a down-leg per se which is slightly tapered to cut down the water required; and

Figure 3 is a rear elevational view of the construction of Figure 1.

Like numerals designate corresponding parts throughout the various views.

In the drawing, the numeral 10 designates the closet bowl which may be of the general construction shown or any suitable construction. In general, it is constructed of vitreous material, such as vitreous china, and consists of a rim portion 11 and a bowl portion 12. The rim is hollow and is provided with a plurality of apertures 13 therethrough directed toward the bowl bottom so that flushing water which enters the rim through inlet connection 14 may pass therethrough for flushing purposes. The closet is likewise provided with a seal passage 15 terminating in a vertical orifice 16. The seal passage 15 is defined by the bowl 12 and the seal wall 17, as shown. The closet is provided with a suitable flange or the like 18 by means of which it may be suitably secured in desired position with respect to a wall or the like (not shown).

Connected to and communicating with the vertical orifice 16 of seal passage 15 is the syphon down-leg 19 which is, generally speaking, a metal pipe having novel structural characteristics. The central portion 20 of this syphon down-leg is straight and substantially vertically disposed, being connected to the vertical orifice 16 above mentioned by an elbow or curved portion 21. The bottom of the down-leg 19 has a right-angled portion 22, thereby providing a surface 23 normal to the direction of flow of the water passing through the down-leg. The down-leg terminates in a discharge opening 22a which communicates with a soil pipe or the like (not shown). The purpose of the surface 23 will be hereinafter pointed out and it is to be noted also that the surface 23 is dished slightly below discharge opening 22a and that the whole down-leg has a minimum number of curves and no water impeding constrictive portions whatever, that is to say, the water is enabled to fall substantially freely through the down-leg without being constricted

or directionally diverted as has been the custom in the past in devices of the present kind. Tests have proved that surface 23 is self-scouring and does not constitute a point of lodgment for waste matter.

The down-leg 19 is suitably constructed at its orifice end with an annular groove 24 and flange 25 to facilitate connection to the adjacent portions of the closet, packing ring 26 being provided to make a water-tight joint.

Flushing water enters through connection 14 and passes through rim 11 to bowl 12 via apertures 13, thus filling the bowl of the closet sufficiently full to cause overflow through vertical orifice 16, the water normally standing in the bowl to the level shown in Fig. 1. As the water level rises above that of Fig. 1 and therefore as the water spills through the vertical orifice 16, it falls substantially freely and rapidly through the down-leg 19 and impinges upon surface 23, which is normal to the direction of flow of the column of water. This surface 23 and its construction and arrangement causes a recoil of the water thus temporarily retarding it sufficiently to permit the down-leg to fill with water. That is to say, the descending column of water is momentarily checked by the surface 23 and this momentary checking is enough to cause the evacuator to fill sufficiently to insure maintenance of the syphon action. At the same time there is no thrusting action on the water toward the discharge opening 22a, such as is produced by a curved discharge end. Yet there is no such flow retardation as would adversely affect the flushing efficiency.

It is thus apparent that the full diameter of the discharge opening is available for water flow without any flow restricting devices and the construction of the bottom of the down-leg, i. e., the surface 23, is such as to bring about prompt filling of the down-leg with water and the consequent self-maintenance of the syphon action. The recoil above mentioned occurs only at the start of the flushing action and imposes no restriction during the subsequent action of the same and this constitutes a real advantage which has not heretofore been rendered possible by known constructions.

While the foregoing construction will operate with a practical minimum amount of water, nevertheless to render it operative with the absolute minimum of water, a slight taper can be given to the down-leg between the points indicated by the broken lines 31 and 32 of the down-leg 30 of Fig. 2. In a typical example the internal diameter of the down-leg is provided with a smooth taper between the lines 31 and 32 from

a diameter of say 3 inches to a diameter of 2½ inches, but below the line 32 there is no further taper. Such a construction may be used when it is necessary or desirable to keep the amount of water used down to the very minimum amount. Otherwise, the down-leg of Figure 2 is the same as that of Fig. 1 as is indicated by the use of the same numerals on corresponding parts.

I wish to point out, in addition, that due to the fewer turns in my evacuator there is less friction imposed on the flow of water and hence I obtain greater flushing efficiency. It will be observed that the syphon action is initiated without the usual constrictions, bends or dams near the discharge end and that the configuration of the down-leg is such as will not thrust the water toward the discharge opening.

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

1. In an evacuator of the kind described, a down-leg the upper end of which is curved in a gentle arc to turn through 90° matter passing therethrough, the central portion of which is vertical and unobstructed and the lower end of which is constituted of an abrupt right-angled bend, the inside bottom thereof forming a flat, uncurved surface normal to the axis of the said central portion and in vertical alignment therewith, whereby water entering the down-leg is non-turbulently passed to said normal surface whereat it is momentarily recoiled in a straight-line direction to initiate siphonic action without imparting lateral or angular thrust to such water.

2. In an evacuator of the kind described, a down leg having a substantially vertical internally unobstructed central portion, an upper end in the form of a smooth gentle arc turning through an angle of about 90° and a lower end constituted of an abrupt right-angled horizontally extending bend, the inside bottom thereof forming a flat, uncurved surface normal to the axis of the central portion and in vertical alignment therewith, the down leg being characterized by a substantially uniform passage therethrough and by having its upper and lower ends extending in diametrically opposite directions.

3. Structure as defined by claim 2 wherein the flat, uncurved surface is depressed below the remainder of the bottom of the lower end of the down leg, is connected thereto by a short smooth inclined portion and is self-scouring.

4. Structure as defined by claim 2 wherein the central portion of the down leg is slightly tapered between its upper and lower ends to minimize water consumption.

ROBERT C. BOYD.