March 28, 1961 H. J. TURNER ET AL 2,976,543

GASKET FERRULE

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Fig. 2

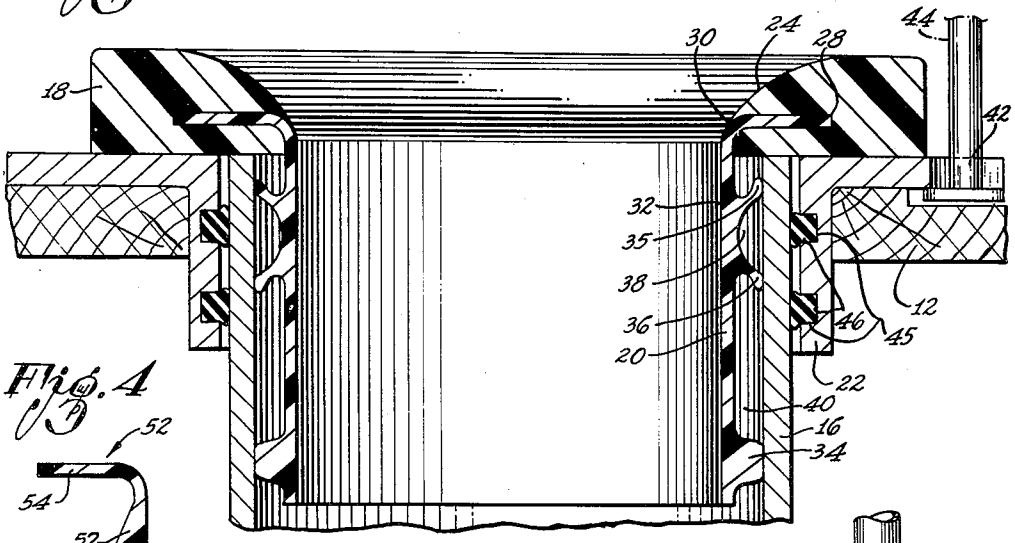


Fig. 4

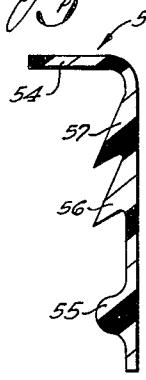


Fig. 1

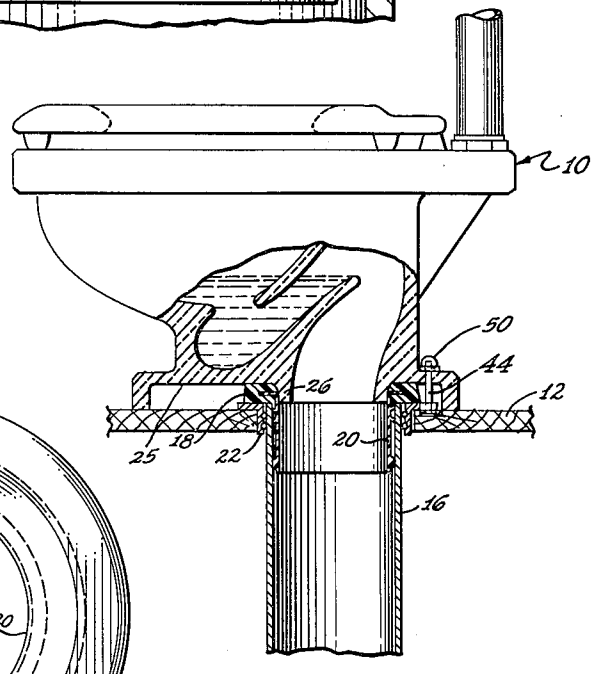
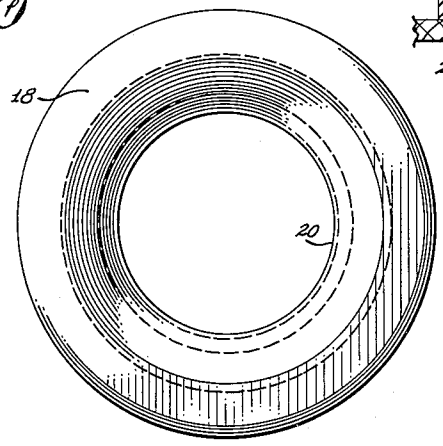


Fig. 3



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GASKET FERRULE

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This invention relates to plumbing installations, with special reference to toilet bowl installations and is directed to means for providing a fluid-tight joint between the base of a toilet bowl and an associated soil pipe.

A conventional installation of rough plumbing for a toilet bowl provides a terminal nipple that extends upwardly from the bell of the last cast-iron soil pipe section to a level flush with or slightly above the floor level. In the subsequent completion of the finished plumbing the toilet bowl is set over the nipple with sealing means interposed between the nipple and the base of the toilet bowl.

For many years, the prevailing practice has been to use sealing means for this purpose in the form of a ring of wax, putty, rubber or like material. In one common practice, a cast-iron collar is placed around the upper end of the soil pipe nipple to form therewith an annular space to receive the sealing material. The cast-iron collar has a radial flange with two diametrically opposite slots to receive a pair of flat-headed bolts, which bolts engage the collar flange from below and are anchored at their upper ends to the toilet bowl base to clamp the sealing ring under sealing pressure.

It has been found that such sealing arrangements are not permanently effective and that the consequent unsanitary seepage of moisture usually results in deterioration of the adjacent floor structure and floor covering. One reason for the development of leakage is found in slight changes that occur in a building structure arising from such causes as settling of the building and shrinkage of building materials. Another reason is that the sealing material commonly deteriorates in the course of time, especially when the sealing material is putty or the like.

One suggestion that has been advanced to solve this problem is to use a sealing assembly which comprises a wax sealing ring or gasket and a ferrule or thin-walled sleeve that extends downward therefrom to telescope into the upper end of the soil pipe nipple, the sleeve having a radial flange at its upper end embedded in the wax sealing ring. Such a sealing assembly has a serious disadvantage in that liquid inside the soil pipe tends to move upward by capillary attraction between the sleeve and the soil pipe nipple to result in the constant presence of liquid at the underside of the wax ring. The collected moisture tends to seep out from under the sealing ring because the flat lower face of the sealing ring distributes the pressure created by the weight of the bowl over a relatively large area and seepage is actively encouraged by fluctuation of the downward load imposed on the floor by the toilet bowl.

An attempt has been made to minimize this disadvantage by off-setting the lower end of the ferrule or flanged sleeve radially inward for correspondingly substantial increase in the space between the lower end of the sleeve and the surrounding soil pipe nipple to preclude capillary attraction. The upper part of the flanged sleeve fits closely in the nipple, however, and liquid reaches this upper region to be trapped by capillary attraction when splashing occurs in the soil pipe and whenever the soil

pipe becomes clogged and fills with liquid. Moreover, the drastic reduction in the diameter of the lowered end of the flanged sleeve forms a highly undesirable flow restriction that defeats the primary purpose of using a soil pipe of substantial diameter.

Another disadvantage is that the radially inwardly offset lower end of the flanged sleeve forms an overhanging annular space which functions as a trap to collect and retain active gases of low density. Such gases react chemically with the metal of the soil pipe nipple with a corrosive effect and the corrosion may ultimately break through the nipple wall.

The present invention meets this general problem of sealing a toilet bowl joint by making the ferrule or flanged sleeve of the assembly of suitable flexible inert plastic material and by further providing at least one auxiliary anti-capillary sealing ring in the narrow annular space between the flanged sleeve and the surrounding nipple. Such an auxiliary sealing ring may be a separate member, but in the preferred practice of the invention, a plurality of auxiliary sealing rings are employed which are integral parts of the ferrule or flanged sleeve. A further feature of the preferred practice of the invention is that at least one of the integral auxiliary sealing rings forms a downwardly flared circumferential sealing lip that presses outward into sealing contact with the surrounding soil pipe nipple in response to fluid pressure exerted against the underside of the lip. Thus, if the soil pipe becomes clogged and full of liquid and if a cupped rubber plunger is used to create fluid pressure to dislodge the clogging obstacle, the downwardly flared lip of the flanged sleeve blocks upward leakage of the pressurized fluid into the annular space above the lip.

The preferred practice of the invention is further characterized by the use of a flanged cast-iron collar that surrounds the upper end of the soil pipe nipple and is provided with additional sealing rings embracing the external surface of the nipple. The additional sealing rings may be conventional O-rings seated in inner circumferential grooves of the flanged collar.

The wax sealing ring of the assembly, which may be termed the primary sealing ring, extends radially outward over a substantial radial zone of the flanged collar and the flanged collar is provided with the usual diametrical slots or recesses to receive the usual bolts for clamping the primary sealing ring between the flanged collar and the toilet bowl in a fluid-tight manner. Any seepage past the upper rim of the soil pipe nipple is blocked against radial outward flow by the clamped portion of the primary sealing ring and is blocked against downward flow along the outside of the nipple by the additional O-rings of the flanged collar.

The various features and advantages of the described invention may be understood from the following detailed description considered with the accompanying drawing.

In the drawing, which is to be regarded as merely illustrative:

Figure 1 is a side elevation, partly in section, showing a standard toilet bowl connected to a soil pipe with the joint made fluid-tight by a sealing assembly embodying one practice of the invention;

Figure 2 is an enlarged vertical section of the sealing assembly employed in Figure 1;

Figure 3 is a plan view of the wax primary ring of the sealing assembly; and

Figure 4 is a radial sectional view of a second form of flanged sleeve with integral auxiliary sealing rings that may be employed in the practice of the invention.

Figure 1 shows how a conventional toilet bowl 10 may be connected to a terminal nipple 16 of a conventional soil pipe and sealed by means embodying the invention. The sealing means in this particular practice of

the invention is an assembly that is best shown in Figure 2. This sealing assembly comprises a primary sealing ring or gasket **18**, a flanged downwardly extending ferrule or sleeve **20** and, preferably, further includes a cast-iron collar **22**.

The primary sealing ring **18** may be made of suitable material such as wax in a well known manner and is of ample radial dimension to overlie the top edge of the nipple **16** and a substantial radial zone of the cast-iron collar **22**. Thus the inner diameter of the primary sealing ring **18** is less than the inner diameter of the nipple **16** and the outer diameter of the primary sealing ring is substantially in excess of the outside diameter of the nipple. The primary sealing ring **18** is slightly funnel shaped with an inner and upper curved surface **24** which conforms with the shape of the corresponding portion of the toilet bowl **10**. As shown in Figure 1, the corresponding portion of the toilet bowl **10** includes a bottom wall **25** and an integral bottom flange **26** that nests into the wax primary sealing ring **18**.

The upper end of the ferrule or sleeve **20** is formed with a circumferentially radially outward flange **28** that is embedded in the primary sealing ring **18**. The shoulder **30** of the radial flange **28** merges with the curved surface **24** of the primary sealing ring **18** to provide a smooth transition from inside the primary sealing ring to inside the cylindrical wall **32** of the sleeve **20**. In this particular embodiment of the invention the flanged sleeve **20** is made of a suitable smooth flexible and chemically inert plastic material such as polyethylene and the flanged sleeve is molded with suitable external auxiliary sealing rings for effective contact with the inner circumferential surface of the surrounding nipple **16**.

In this instance, a lower circumferential rib **34** constitutes one of the integral auxiliary sealing rings and an upper pair of oppositely directed circumferential lips **35** and **36** constitute additional auxiliary sealing rings. The unrestrained outside diameters of these various auxiliary sealing rings is preferably appreciably larger than the inside diameter of soil pipe nipples so that the sealing rings are slightly constricted by the nipples. The slightly oversizing of the sealing rings insures sealing contact and also compensates for slight variations in size of the soil pipe nipples.

The two oppositely directed circumferential lips **35** and **36** define a circumferential groove **38** which may under some conditions function in the manner of a circumferential suction cup for adherence of the lips **35** and **36** to the surface of the nipple **16**. In any event the oppositely directed lips **35** and **36** tend to function in the manner of check valves to prevent ingress of liquid into the circumferential groove **38** either from below or above the groove. The lower circumferential rib **34** fits snugly into the interior of the nipple **16** and not only provides a sealing action but also serves to center and align the flanged sleeve with the interior of the nipple.

The cylindrical wall **32** of the flange sleeve **20** may be relatively thin, say on the order of $\frac{1}{16}$ or $\frac{5}{32}$ of an inch in thickness, and the overall thickness of the installed flanged sleeve, including the circumferential rib **34** and the circumferential lips **35** and **36**, may be on the order of $\frac{3}{16}$ of an inch. With such dimensions the annular space **40** between the cylindrical wall **32** of the sleeve and the surrounding nipple **16** is too liberal to create capillary attraction. On the other hand, the overall radial thickness of $\frac{3}{16}$ of an inch does not restrict the flow passage through the nipple **16** to any significant degree.

The flanged cast-iron collar **22** has the usual plurality of peripheral recesses or slots **42** to receive fastening means such as the usual bolts **44**. The flanged cast-iron collar **22** in this instance is formed with a spaced pair of inner circumferential grooves **45** which seat corresponding sealing rings such as O-rings **46**, the O-rings embracing the soil pipe nipple **16** in a fluid-tight manner.

The manner in which the invention serves its purpose may be readily understood from the foregoing description. To carry out the procedure of installing the toilet bowl, first the flanged cast-iron collar **22** is telescoped over the upper end of the soil pipe nipple **16** with the O-rings **46** effectively gripping the soil pipe nipple in a sealing manner. Next the assembly comprising the wax ring **18** and the attached flanged sleeve **20** is mounted on the upper end of the soil pipe nipple **16** with the sleeve telescoped into the nipple and with the wax ring overlying the rim of the soil pipe nipple and a substantial radial zone of the radial flange of the collar **22**.

The next step is to place the two bolts **44** in upright positions in the two corresponding slots **42** of the cast-iron collar **22** with the flat heads **48** of the bolts under the radial flange of the collar as shown in Figure 2. Then the toilet bowl is placed in the position shown in Figure 1 with the bottom flange **26** of the toilet bowl telescoped into the wax ring **18** and with the bottom wall **25** of the toilet bowl resting on the upper surface of the wax ring. The bolts **44** extend upward through apertures in the base of the toilet bowl and cap nuts **50** are screwed onto the bolts to draw the cast-iron collar **12** upward thereby to clamp the wax ring **18** between the cast-iron collar and the bottom of the toilet bowl in a fluid-tight manner. Finally the screws **14** for anchoring the toilet bowl base to the floor **12** are tightened.

The described construction precludes the possibility of liquid migrating to the top rim of the soil pipe nipple from the interior of the soil nipple by capillary attraction. The sealing rings in the form of the circumferential rib **34** and the circumferential lips **35** and **36** of the flanged sleeve **20** are barriers that make effective contact with the minute surface irregularities of the soil pipe nipple **16** in a fluid-tight manner.

It is apparent that the flanged sleeve **20** may be molded in one piece in an economical manner on a quantity basis and it is further apparent that the wax ring **18** may also be molded in an inexpensive manner with the radial flange of the sleeve embedded therein. It is also to be noted that if it is necessary to remove and replace the toilet bowl, the wax ring **18** together with the flanged sleeve **20** may be removed in a simple and expeditious manner without the necessity of any clean-up operation to remove residual portions of the sealing material.

Figure 4 shows a sleeve **52** having a flange **54** which may be substituted for the previously described sleeve **20**, the flange **54** being embedded in the wax ring **18** in the usual manner. The sleeve **52** has sealing rings integral therewith in the form of a lower circumferential rib **55** and two downwardly directed circumferential lips **56** and **57**. The two downwardly extending lips **56** and **57** are of triangular cross-sectional configuration and are relatively thick throughout their major portions as shown so that the lips keep their shape and keep pointing downward when the flange sleeve is forced downward into a soil pipe nipple. The tips of the lips **56** and **57** are relatively sharp and thin, however, for the purpose of making effective sealing contact with the inner surface of the soil pipe nipple. It is apparent that the two lips **56** and **57** will function as check valves and that the sealing pressure of the lips against the surrounding soil pipe nipple will increase in response to rise of fluid pressure against the under surfaces of the lips.

While we have illustrated our invention as applied to the installation of a conventional toilet bowl, it will be obvious to those skilled in the art that the invention may be applied to other particular purposes in plumbing installations. It is also apparent that our description in specific detail of preferred practices of the invention will suggest various changes, substitutions and other departures from our disclosure within the spirit and scope of the appended claims. For example, the primary sealing ring and the flanged sleeve attached thereto may be made of various suitable materials. It is also apparent

that the sealing rings around the flange sleeve, whether separate from the sleeve or integral with the sleeve, may be of various shapes and relative dimensions within the scope of the invention.

We claim:

1. A sealing assembly for sealing the connection between a toilet bowl outlet and a soil pipe nipple extending upwardly through flooring and terminating substantially flush with the upper surface of said flooring, said assembly comprising: an annular member of wax-like material having its lowermost inner diameter less than the inner diameter of the nipple and having its outer diameter substantially in excess of the outer diameter of said nipple; a ferrule of chemically-inert yieldable plastic material having a substantially constant inner diameter, the outer diameter of said ferrule being less than the inner diameter of said nipple; an out-turned annular flange carried by the upper end of said ferrule, said flange being imbedded in said annular member; and a plurality of spaced apart annular sealing elements integrally carried exteriorly by said ferrule, each of said sealing elements having a diameter greater than the inner diameter of said nipple, whereby insertion of the ferrule in said nipple forces said sealing elements into compression sealing engagement with the inner surface of said nipple, thereby holding water against movement upwardly of said ferrule between the same and said nipple.

2. A sealing assembly particularly adapted for installing a toilet bowl outlet in a soil pipe nipple extending upwardly through flooring and terminating flush with said flooring, said assembly comprising: a wax gasket ring, said ring having its lowermost inner diameter less than the inner diameter of the nipple, and said ring further having its outer diameter substantially in excess of the inner diameter of the said nipple; a ferrule of chemically-inert yieldable material, said ferrule being formed as a cylindrical sleeve-like body with an upper horizontally radiating flange, said flange being imbedded in said wax gasket ring; a circumferential rib integrally formed adjacent the lower end of said ferrule having a diameter greater than the inner diameter of said nipple; and a plurality of spaced apart annular lips integrally formed with said ferrule intermediate said radiating flange and said circumferential rib of a diameter at least as great as the diameter of said circumferential rib, said circumferential rib and spaced apart annular lips sealingly engaging with the inner surface of said nipple when the ferrule is telescopically mounted in said nipple to form a plurality of sealing elements barring movement of water upwardly of the nipple in the annular space between said ferrule and the inner wall surface of said nipple.

3. A sealing assembly for sealing the connection between a toilet bowl outlet and a soil pipe nipple extending upwardly through flooring and terminating substantially flush with the upper surface of said flooring, said assembly comprising: an annular member of deformable wax-like material having its lowermost inner diameter less than the inner diameter of the nipple and having its outer diameter substantially in excess of the outer diameter of said nipple; a ferrule of chemically-inert plastic material having a substantially constant inner diameter with an outer diameter less than the inner diameter of said nipple; an annular outwardly extending flange concentrically carried by the upper end of said ferrule, said flange being imbedded in said annular member to pendantly mount said ferrule concentric to said annular member; and a plurality of axially spaced annular deformable sealing elements circumscribing said ferrule, said elements being integrally formed with said ferrule and being of a diameter greater than the inner diameter of said nipple whereby insertion of the ferrule in said nipple compressively engages said sealing elements against the inner surface of said nipple to form a plurality of seals between the lower end of said ferrule and said annular member.

4. A sealing assembly particularly adapted for installing a toilet bowl outlet in a soil pipe nipple extending upwardly through flooring and terminating substantially flush with said flooring, said assembly comprising: a gasket ring of relatively soft and readily deformable material to be placed concentric with said nipple, the lowermost inner diameter of said ring being substantially less than the inner diameter of the nipple, the inner circumferential surface of the ring being flared upwardly and outwardly from said diameter, the outer diameter of said ring being substantially in excess of the inner diameter of said nipple; and a resilient ferrule of chemically-inert plastic material, said ferrule being in the form of a cylindrical sleeve-like body having an upper horizontally radiating flange integral therewith, said flange being imbedded in said gasket ring, the outer diameter of said sleeve-like body being less than the inner diameter of the nipple to permit reception of the sleeve-like body in said nipple; and means integrally formed with said sleeve-like body for sealingly engaging with the inner surface of said nipple and forming a positive seal between the interior surface of said nipple and the exterior surface of said sleeve-like body for sealing the annular space therebetween to prevent water from rising between the sleeve-like body and said nipple.

5. A sealing assembly for sealing the connection between a toilet bowl outlet and a soil pipe nipple extending upwardly through flooring and terminating substantially flush with the upper surface of said flooring, said gasket comprising: an annular member of wax-like material to be mounted concentric to said nipple having its lowermost inner diameter less than the inner diameter of the nipple and having its outer diameter substantially in excess of the outer diameter of said nipple; a ferrule of substantially chemically-inert yieldable plastic material having a substantially constant inner diameter with an outer diameter less than the inner diameter of said nipple; an out-turned annular flange carried by the upper end of said ferrule, said flange being imbedded in said annular member; and a plurality of annular sealing elements integrally projecting exteriorly of said ferrule, said sealing elements being spaced apart axially of said ferrule between the lower end thereof and said flange and being of a diameter greater than the inner diameter of said nipple whereby insertion of the ferrule in said nipple forces said sealing elements into sealing engagement with the inner cylindrical surface of said nipple below said annular member to positively bar movement of water upwardly around said ferrule.

6. A sealing assembly for sealing the connection between a toilet bowl outlet and a soil pipe nipple extending upwardly through flooring and terminating substantially flush with the upper surface of said flooring, said assembly comprising: an annular member of wax-like material having its lowermost inner diameter less than the inner diameter of the nipple and having its outer diameter substantially in excess of the outer diameter of said nipple; a ferrule of chemically-inert yieldable plastic material having a generally cylindrical configuration with a constant inner diameter substantially equal to the lowermost inner diameter of said annular member, the outer diameter of said ferrule being less than the inner diameter of said nipple, said ferrule having an upper end portion imbedded in said annular member to pendantly mount said ferrule from said annular member with the inner diameter of said ferrule concentric with said lowermost inner diameter of said annular member; at least one annular sealing element carried exteriorly by said ferrule of a diameter greater than the inner diameter of said nipple, whereby insertion of the ferrule in said nipple places said annular member concentrically in engagement with the upper end of said nipple and forces said sealing element into radially compressive sealing engage-

ment with the inner surface of said nipple at a point below said annular member, thereby holding water against movement upwardly of said ferrule between the same and said nipple.

References Cited in the file of this patent

UNITED STATES PATENTS

986,905	Carlson	Mar. 14, 1911
1,201,400	Watrous	Oct. 17, 1916
2,092,358	Robertson	Sept. 7, 1937
2,265,615	Stalter	Dec. 9, 1941
2,750,216	Thies	June 12, 1956

FOREIGN PATENTS

674,007	Great Britain	June 18 1952