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54 Flush water distributor for a water closet bowl.

57 A flush water distributor for a water closet bowl is in the form of an insertable bush (1) including a cylindrical hollow body made of a resilient material. One end of the bush has an opening (3) for receiving flush water and the end region at the other end of the bush has two distribution outlet openings (12 and 13) which are arranged to direct water issuing there-through in two streams inclined at predetermined equal angles to the central axis (9) of the bush at its outlet end.

The distributor is insertable in a through opening of corresponding cross-section in the water closet bowl and flush water distribution openings therefore do not have to be provided integrally in the cast bowl.

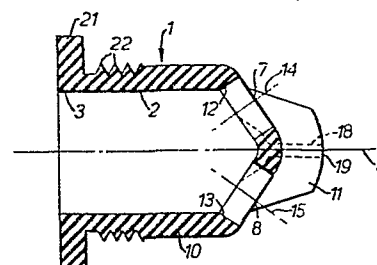


FIG. 2.

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FLUSH WATER DISTRIBUTOR FOR A WATER CLOSET BOWL

This invention relates to a flush water distributor for a water closet bowl and to a water closet bowl having a flush water distributor inserted therein.

Known designs of water closet bowl are provided integrably cast in the bowl itself with specially directed openings for distributing the flush water which enters the back of the bowl at a single inlet, into the two streams of water to be directed respectively around the rim at both sides of the bowl. Thus, in the production of known bowls for low-level water closet suites, a bowl is cast in a mould provided with a loose core piece which forms the inlet passage in the back of the bowl where the pipe from the cistern tank will be connected; after casting and while the cast article is still in the soft green condition when the mould is first opened, an operator manually has to punch or cut two holes at the downstream end of the inlet passage to form the distribution openings for directing flush water around the rim at each side.

This last operation has disadvantages: it is difficult to make the punched or cut openings cleanly, the openings must each be aligned at a precise angle to ensure that the flush water is distributed to the rim properly, and there is also a risk that the blank which should be removed during punching or cutting, inadvertently becomes lodged in the rim instead of being removed. The correct cutting of clean openings is therefore time consuming and dependent on operator skill and care; openings

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which have jagged edges or which are not precisely aligned lead to deficient flushing.

According to the present invention there is provided a flush water distributor for a water closet bowl
5 comprising a cylindrical hollow bush made of a resilient material such as a synthetic plastics or a rubber, one end of the bush having an opening for receiving flush water and the end region at the other end, termed the outlet end , of the bush having two distribution openings
10 which are arranged to direct water issuing therethrough from the bush in two streams inclined at predetermined equal angles to the central axis of the bush at its outlet end.

The two distribution openings in the end region at the
15 outlet end of the bush are conveniently provided in an end wall of the bush at its outlet end, which end wall preferably includes two wall portions inclined at equal and opposite angles to the central axis at the outlet end of the bush, the wall portions being inclined towards
20 each other away from the inlet end of the bush, the two distribution openings each comprising a bore extending through the respective wall portion generally perpendicularly to the wall portion. Each wall portion is preferably of a thickness such that the bore forming the respective
25 distribution opening has an axial extent sufficient to produce an adequate directional effect on the flush water stream passing therethrough. Alternatively, the bores may be formed in locally thickened regions in the end wall portions.

30 The distributor preferably has a circular cross-section bore with a straight central axis and is preferably of fairly short axial length i.e. having an overall length of not more than two or three times its internal diameter. Such a distributor is suitable for
35 a so-called low-level water closet suite in which the cistern tank is mounted a short distance above the water closet bowl and is connected for supplying flush water to the rim of the bowl by a short length of pipe including

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a 90° bend, the downstream end of the pipe fitting horizontally into the back of the water-closet bowl. In such a water closet suite, a flush water distributor in accordance with the invention is advantageously provided in the back
5 of the water closet bowl in an inlet passage in the cast bowl, which passage is adapted to receive the distributor in the manner of a bush, the end of the pipe from the cistern tank being inserted into the open end of the bush.

The provision of the flush water distributor bush
10 in the water closet bowl facilitates the manufacture of the bowl because it avoids the necessity, inherent in known designs, of providing in the cast bowl itself the specially directed openings for distributing the flush water.

15 With an insertable distributor according to the invention, the inlet passage in the back of the bowl can be cast as a through passage and no subsequent punching or cutting operation is required. In the finished cast bowl, the distributor can simply be inserted into the inlet
20 passage, the preformed distributor incorporating the correctly aligned distribution openings; this would usually be done by the plumber during installation.

Whilst the distributor according to the invention is of advantage particularly for the production of low-level
25 water closet suites, it could be useful also for high-level suites and also for certain designs of close-coupled suites in which the cistern tank rests on a back portion of the bowl. It is also conceivable that the distributor could be longer than two or three times its internal
30 diameter and include an elbow bend between its ends.

The distributor according to the invention is conveniently moulded, whereby such distributors can be mass-produced cheaply and accurately, thereby ensuring consistent and efficient flushing characteristics for
35 all the bowls in which they are fitted. The distributor may include one or more ribs or other sealing means on its outer surface for making a water-tight seal against the inside of the inlet passage of the bowl. The distribut-

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or may also incorporate means for ensuring that it is inserted into the inlet passage in the bowl with a correct alignment about its central axis; such means may comprise for example a cooperating lug and recess
5 on the distributor and in the inlet passage, or the alignment may be ensured by making the distributor and the inlet passage of corresponding non-circular cross-sections.

A flange is preferably provided on the inlet end of
10 the distributor to prevent the distributor being pushed too far into the inlet passage of the bowl. The flange may be annular or it may be part annular so that the ends of the flange abut lugs on the back of the bowl to ensure correct alignment about the axis.

15 The distributor preferably has an internal step or shoulder, conveniently moulded integrally in the central bore of the bush, to serve as a stop to prevent the connecting pipe which extends from the cistern tank from being inserted into the bush too far.

20 For most designs of water closet bowls for low-level suites, a small bleed hole is provided in the casting in addition to the flush water distribution openings to provide, during flushing, a small jet of water into the middle of the discharge opening at the bottom of the bowl
25 and also to ensure that after flushing, water does not remain trapped in the inlet passage.

Advantageously, a bleed hole is provided integrally in the distributor according to the invention, the bleed hole comprising a passage of smaller cross-section than
30 the water distribution openings, extending from the part of the inside of the bush which will be lowermost when the distributor is inserted in a water closet bowl, in a downward and inward direction relative to the bowl. Conveniently, the bleed passage is provided in a nose
35 formed integrally with the end wall in which the distribution openings are provided.

The invention may be put into practice in a number of ways but one specific embodiment will now be described

by way of example with reference to the accompanying drawings in which:

Figure 1 is a side view of a flush water distributor for a water closet bowl, in accordance with the invention,

5 Figure 2 is a plan view taken on the line II-II in Figure 1,

Figure 3 is an end view looking in the direction of arrow A in Figure 1; and

Figure 4 is a rear view of a water closet bowl adapted to receive the distributor shown in Figures 1 to 3.

The flush water distributor shown in Figures 1 to 3 is in the form of a hollow cylindrical bush 1 having a bore 2 of circular cross-section which extends from an open end 3 at the inlet end of the distributor through most of the length of the bush 1, the other end of the bore 2, at the downstream or outlet end of the distributor being bounded by an end wall 5. The end wall 5 comprises three portions: two wall portions 6 and 7 which are inclined towards each other away from the inlet end of the distributor at equal and opposite angles to the axis 9 of the bush, and which are of similar wall thickness to that of the cylindrical wall 10 of the bush defining the bore 2; and the third portion of the end wall 5 comprises a nose 11 extending axially beyond the end wall portions 7 and 8 below the axis 9 as seen in Figure 1.

In the end wall portions 7 and 8 there are two circular, distribution openings 12 and 13 respectively, the axes 14 and 15 of which are generally perpendicular to the respective wall portions 7 and 8 so that the axes 14 and 15 are therefore inclined at equal and opposite angles to the central axis 9 of the bush. In the nose 11 there is a through passage 18 of relatively small cross-section extending from an inner end level with the bottom of bore 2, downwardly to an open end 19.

At the other end of the distributor, the bush 1 has an annular, radially outwardly directed flange 21, and adjacent this flange the outer periphery of the bush has a plurality of circumferential ribs 22. The

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remainder of the cylindrical exterior of the bush is plain.

The complete distributor is made as an integral moulding of a semi-rigid synthetic rubber or plastics.

5 In use, the distributor is inserted in a plain cylindrical passage 24 in the back of a water closet bowl 25, which at its inner end opens behind the rim 26 of the bowl; this will usually be done by the plumber when he installs the water closet suite. Means (not shown) 10 will be provided for ensuring that the distributor is correctly aligned with its plane of symmetry B-B (see Figure 3) arranged vertically. The distributor is fully inserted so that the flange rests against the end wall of the inlet passage 24 and the outer edges of the 15 ribs 22 resiliently seal against the inside of the inlet passage 24 in the bowl. The end of a pipe leading from a cistern tank is then inserted into the open end 3 of the distributor; a small step or shoulder (not shown) may be provided inside the bore 2 to limit the amount 20 by which the pipe can be inserted.

During flushing, water enters the bush from the cistern tank through the connecting pipe inserted in the end 3 and at the other end of the bore the water is divided mainly into two diverging streams passing through 25 the distribution openings 12 and 13, these openings 12 and 13 having sufficient axial extent and being so directed that the flush water is distributed equally and effectively around the rim at both sides of the bowl. The axes 14, 15 of the openings 12 and 13 may be in a common 30 horizontal plane or they may be slightly inclined upwardly or downwardly depending upon the design of the flush rim.

A small portion of the flush water will pass through the bleed passage 18 and out of the open end 19 in the nose 11 to form a small jet of water which falls directly 35 down into the middle of the discharge opening at the bottom of the bowl; this improves the flushing characteristics. The bleed passage 18 also ensures that after flushing has finished no water will remain trapped in the

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bore 2 of the distributor.

In a specific construction for a low-level water closet suite with a flush of approximately nine litres, the distributor had an internal bore of 36 mm diameter, the two distribution openings were each of 22.5 mm diameter and 11 mm axial length, and the bleed passage was of 4.5 mm diameter. The axes of the distribution openings were each inclined at approximately 40° to the central axis of the bore.

It will be appreciated that although the openings 12 and 13 have a certain axial length equivalent to the thickness of the end wall 5, the axial length of the openings 12 and 13 may be increased by extending the openings 12 and 13 outwardly by projections to form divergent passages, provided the projections do not extend so far as to, or do not otherwise, prevent the bush from being inserted into the hole 24 in the back of the bowl. Preferably, any projections do not extend laterally beyond the profile of the exterior of the cylindrical portion of the bush as viewed axially, though this is not essential since even if they do extend laterally a short way, the resilient flexibility of the material would still permit the bush to be inserted into the hole 24.

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CLAIMS

1. A flush water distributor for a water closet bowl comprising a cylindrical hollow bush made of a resilient material such as a synthetic plastics or a rubber, one end of the bush having an opening for receiving flush water and the end region at the other end, termed the outlet end, of the bush having two distribution openings which are arranged to direct water issuing therethrough from the bush in two streams inclined at predetermined equal angles to the central axis of the bush at its outlet end.

2. A distributor as in claim 1, in which the two distribution openings in the end region at the outlet end of the bush are provided in an end wall of the bush at its outlet end.

3. A distributor as in claim 2, in which the end wall includes two wall portions inclined at equal and opposite angles to the central axis at the outlet end of the bush the wall portions being inclined towards each other away from the inlet end of the bush, the two distribution openings each comprising a bore extending through the respective wall portion generally perpendicularly to the wall portion.

4. A distributor as in claim 2 or claim 3, in which each wall portion is of a thickness such that the bore forming the respective distribution opening has an axial extent sufficient to produce an adequate directional effect on the flush water stream passing therethrough.

5. A distributor as in claim 2 or claim 3, in which the bores are formed in locally thickened regions in the end wall portions.

6. A distributor as in any preceding claim, having a circular cross-section bore with a straight central axis and of fairly short axial length i.e. having an overall length of not more than two or three times its internal diameter.

7. A distributor as in any preceding claim, having one or more ribs or other sealing means on its outer

surface for making a water-tight seal against the inside of the inlet passage of the bowl.

8. A distributor as in any preceding claim, incorporating means for ensuring that it is inserted into the inlet passage in the bowl with a correct alignment about its central axis.

9. A distributor as in any preceding claim, having a flange provided on the inlet end of the distributor to prevent the distributor being pushed too far into the inlet passage of the bowl.

10. A distributor as in any preceding claim, having an internal step or shoulder, conveniently moulded integrally in the central bore of the bush, to serve as a stop to prevent the connecting pipe from the cistern tank from being inserted into the bush too far.

11. A distributor as in any preceding claim, having a bleed hold comprising a passage of smaller cross-section than the water distribution openings, extending from the part of the inside of the bush which will be lowermost when the distributor is inserted in a water closet bowl, in a downward and inward direction relative to the bowl.

12. A water closet bowl having a flush water distributor as in any preceding claim.

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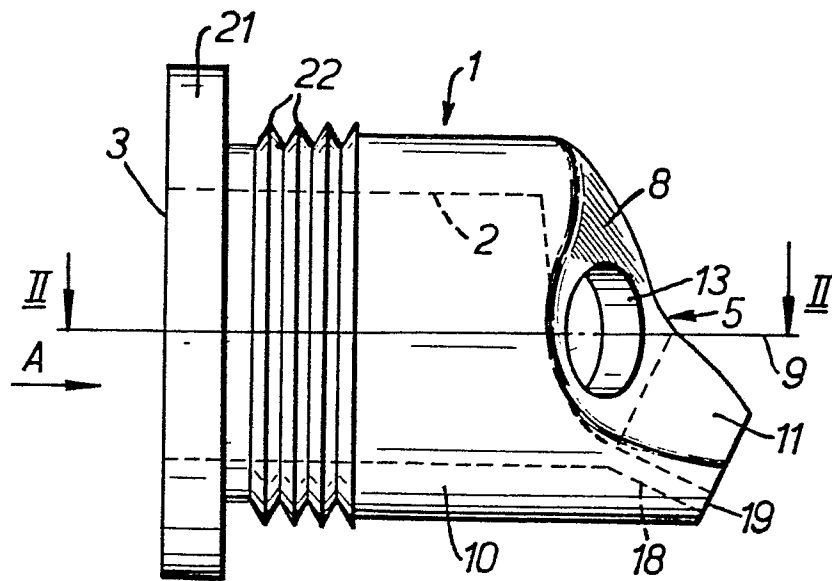


FIG. 1.

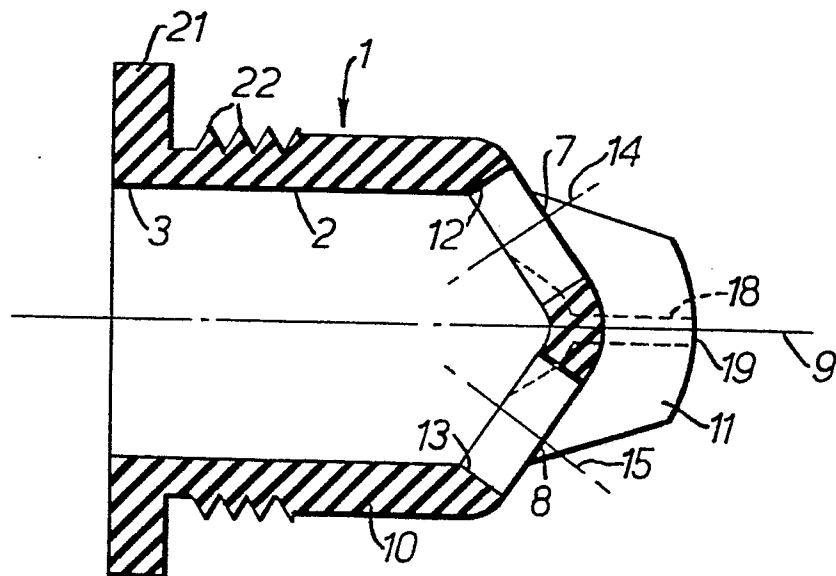


FIG. 2.

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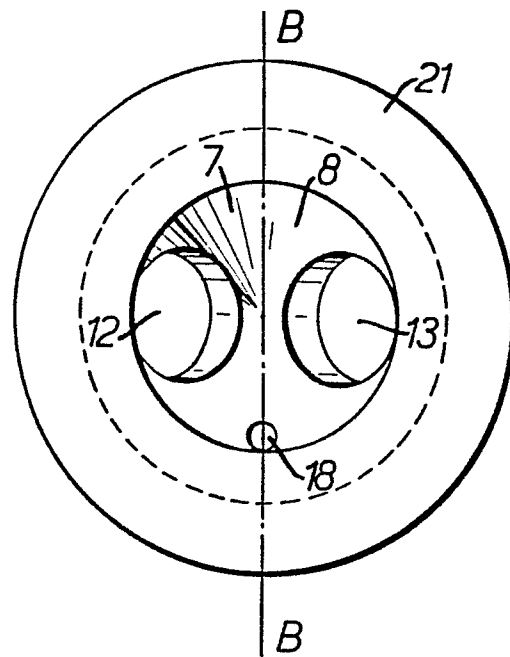


FIG. 3.

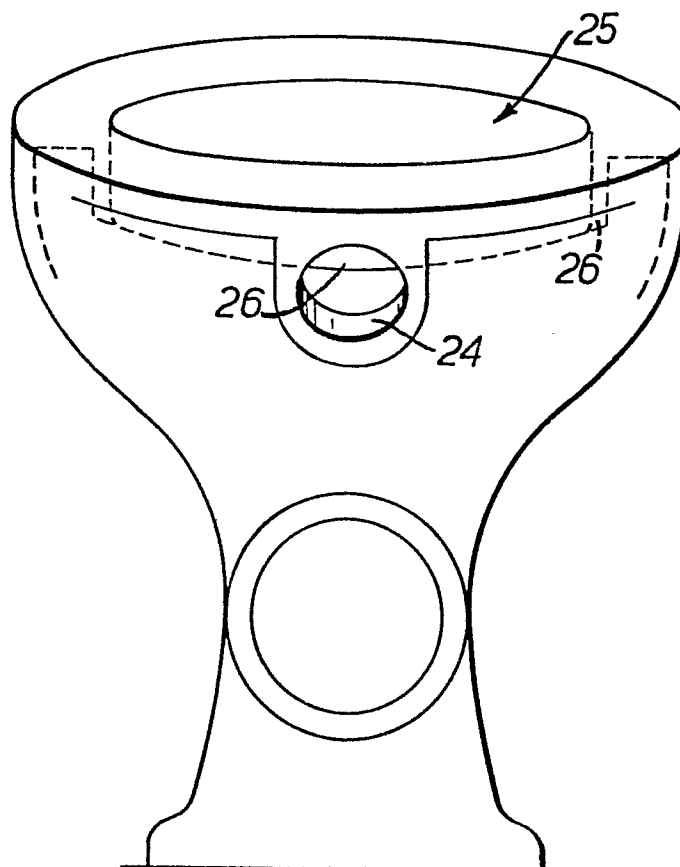


FIG. 4.



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	DE - U - 1 959 497 (KERA-WERKE) * fig. 1 to 3 * --	1	E 03 D 11/00 E 03 D 11/13
A	DE - U - 1 975 694 (ANNAWERK KERA-MISCHE BETRIEBE) * fig. 1 to 6 * --		
A	CH - A - 351 913 (GEBERT & CIE.) * fig. 1 and 2 * --		TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
A	US - A - 1 797 450 (J.R. SMITH) * fig. 1 to 4 * ----		E 03 D 11/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search Berlin		Date of completion of the search 15-08-1980	Examiner PAETZEL