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(54) **Improvements in or relating to water closets.**

(57) W.C. bowl 1 has an integral flat extension portion 1a of bifurcated form. Extension portion 1a is a support platform for cistern 2. Right-angled pipe connection 5 forms an adjustable connection between the cistern 2 and bowl 1 such that the relative forward/rearward positioning thereof can be varied to suit. One end of pipe connection 5 is adjustably slidably received within seal 3 fixed in aperture 1b formed in the w.c. bowl 1.

EP 0 508 807 A2

This invention relates to improvements in or relating to water closets and is more particularly concerned with the relative location of a w.c. bowl and cistern of the water closet.

Generally, when a water closet is installed, the cistern and bowl are mounted in a fixed relative relationship with one another with a connection being provided between the cistern and bowl for delivering water from the cistern to the bowl to thereby flush the bowl when required. Sometimes, after installation it becomes necessary to replace the bowl and/or the cistern and it tends to be disadvantageous that the bowl and/or cistern have to be replaced in practically identical relative alignment with one another at the same location. At the time of replacement it may be that an identical bowl and/or cistern can no longer be obtained or, for example, the fixing points for the bowl into the floor may no longer be convenient or the cistern may have changed in design such that it is now spaced from a rear supporting wall when correctly aligned with the water closet bowl, instead of fitting neatly against the wall. Thus, all sorts of difficulties may be encountered in replacing a w.c. bowl and/or cistern owing to the requirement of precise alignment of the bowl and cistern. Moreover, even on original installation of the water closet, difficulties may be encountered on fitting, because of the requirement that the bowl has to be precisely aligned with the cistern in a single relative position in order to provide a properly sealed water delivery connection between the cistern and bowl. This problem tends to be more acute with close-coupled water closets (water closets in which the cistern is fitted low down relative to the w.c. bowl and supported at the rear thereof in such manner that any water delivery connection between the cistern and bowl is substantially obscured from view). On the original installation of a low level, but not close-coupled, water closet, in general, a water delivery connecting pipe depends downwardly from the cistern and is bent at 90° to form a water inlet delivery pipe portion that extends through a suitably dimensioned aperture in the rear of the toilet bowl, said pipe portion being sealed thereto at the aperture. On such installation the pipe can be cut to allow the initial position of the bowl to be selected to some extent relative to the cistern but no such facility would be available on replacement of the bowl and/or cistern without providing a replacement connecting pipe and in any event, difficulties may still arise in fitting replacement parts in practice.

In close-coupled suites only one relative position of the cistern and bowl is satisfactory and there is no connecting pipe portion that could be cut or recut to account for any variation in this relative positioning.

Additionally, the production costs of the w.c. bowls utilised in close-coupled suites are relatively expensive and an expensive part of the process is the production of an integrally moulded ceramic chamber at the rear of the bowl into which water from the cistern is directed before being directed around the flushing rim of the bowl, said cistern being supported directly above the chamber. The disadvantages of such water closets are discussed in Patent Specification No. 2152962, which is under the ownership of the present Applicant, the content of which is hereby incorporated into the present application by reference.

Patent Specification No. 2152962 shows an arrangement in which a cistern can be close-coupled to a w.c. bowl without necessarily forming the bowl with an integral ceramic chamber receiving flushing water and above which the cistern is supported. Instead, Patent Specification No. 2152962 envisages the provision of a less-expensive separately formed mounting bracket component which is attachable to the rear of the bowl and on which the cistern may be supported. However, this arrangement still tends to be disadvantageous in that the cistern has to be precisely relatively aligned with the bowl in one selected position and, as previously stated, this can lead to problems and at the very least to inconvenience. Additionally, there may be other disadvantages in this arrangement but it is not thought necessary to discuss other disadvantages here in detail.

It is an object of the present invention to at least alleviate one or more of the aforementioned, or other disadvantages associated with water closets.

According to the present invention there is provided apparatus comprising a w.c. bowl and cistern, said bowl and cistern preferably being of the close-coupled type, the relative position of the cistern and bowl being adjustable to enable water to be delivered from the cistern into the bowl when the bowl is located in one of a plurality of selectable or adjustable positions relative to the cistern.

Usually, the bowl will be connectable relative to the cistern so that the cistern is adjustable forward and/or rearwardly relative to the bowl.

It is believed that the forward and/or rearward adjustment facility provided will be sufficient to meet any needs of variation in the required relative positioning of the bowl and cistern both during original installation and on replacement of the bowl/or cistern if necessary. Nevertheless, it is possible that a relative sideways and/or up/down adjustment of the cistern and bowl could be provided if required.

Preferably, the cistern and bowl are adjustable over a range of possible relative positions inbetween a most forward position and a most rearward position.

In one embodiment of the present invention the cistern is flow connected to the bowl by means of a connection pipe or duct slidingly received in a seal mounted in an aperture in the w.c. bowl. Owing to the sliding fit of the pipe connection or duct in the seal the relative position of the bowl and cistern can be varied and during the variation of position the pipe connection moves further into or further out of the seal. Thus,

the exterior surface of the pipe connection or duct is sealingly engaged in watertight manner with the interior surface of the seal over a range of relative axially displaced positions of the seal and pipe connection-/duct. Where the invention is concerned with a close-coupled water closet, in order to support the cistern and in order to obscure the pipe connection/duct from view (at least from the front of the water closet) the w.c. bowl may include a rearward extension for supporting the cistern. The extension may be formed with a slot to allow the pipe connection/duct from the cistern to pass downwardly therethrough. Preferably, the pipe connection/duct is angled, usually through 90° so that a generally horizontal pipe portion of the pipe connection/duct extends into said seal mounted in said aperture which may be defined in a generally vertical wall portion at the rear of the w.c. bowl. The cistern may be clamped relative to the bowl by clamping bracket means arranged to clamp onto the rearward extension, said extension forming a mounting platform for the cistern. The rearward extension is, preferably, integrally moulded with the bowl and thus will usually be of ceramic material. The slot in the rear extension is long enough to allow for adjustment of the pipe connection/duct in the seal over a range to suit.

In one embodiment, the clamping bracket means comprises an upper clamping bracket portion and a lower clamping bracket portion, said upper clamping bracket being positively retained to the cistern and the lower clamping portion being clamped to the underside of the rearward extension and the upper clamping portion by fastening means, preferably in the form of a captivated threaded bolt and locking sleeve. The upper clamping bracket portion may comprise a ring which is passed over a threaded pipe that depends downwardly from the cistern, said ring being locked to the cistern by means of a locking nut, said bolt being passed through receiving holes in the upper clamping portion and lower clamping portion, said lower clamping portion being clipped onto the pipe connection-/duct underneath the rear extension. Said pipe connection/duct may include a locking ring engaged on the pipe connection/duct and threadably engaged with the threaded pipe which downwardly depends from the cistern. A rubber seal may be provided in-between the downwardly depending pipe and the pipe connection/duct, said seal preferably being retained in a recess in the interior of the locking ring.

The seal is preferably in the form of a sealing sleeve having flange means that grips the material of the bowl that defines said aperture and said seal may be fitted with a water spreader device arranged inside the toilet bowl. Said connection pipe/duct and/or said seal and/or said spreader device may all be of plastics.

Advantageously, adjustment of the cistern relative to the bowl may be undertaken simply by releasing the locking sleeve thereby allowing freedom of relative forward and rearward movement of the cistern and bowl to a new position at which the locking sleeve may be tightened.

Overall, embodiments of the present invention may offer a very simple cost-effective manner of flow-coupling a water closet cistern to a water closet bowl in an adjustable manner in which the relative position of the cistern and bowl can be adjusted easily. In order to achieve this, use may be made of a generally standard manner of retaining a pipe connection to the underside of a cistern by means of a downwardly depending externally threaded pipe that receives a locking ring attached to a connecting pipe portion, the arrangement being modified by part of clamping bracket means being retained to the cistern by a nut on the downwardly depending threaded pipe and part of the clamping bracket means being urged to grip onto the w.c. bowl (more specifically onto the underside of a rear extension platform) and retained to said first bracket means portion by fastening means preferably in the form of a captivated bolt and locking sleeve.

Thus, embodiments of the present invention may offer a deceptively simple manner of flow-coupling the cistern to the w.c. bowl which, nevertheless, offers significant advantages and versatility in installation which may be particularly valuable in replacement of the w.c. bowl or cistern at a later date.

Many advantages of the present invention will be evident from the following description and drawings:

An embodiment of apparatus in accordance with the present invention will now be described, by way of example only, with reference to the accompanying FIGURES of the drawings, in which:

FIGURE 1 shows a cut-away sectional side view showing part of a w.c. and part of a cistern of a close-coupled water closet;

FIGURE 2 shows a view similar to FIGURE 1 in which the relative position of the cistern and w.c. bowl has been selectively changed; and

FIGURE 3 shows a diagrammatic, exploded detailed view of parts connecting the cistern to the rear of the w.c. bowl.

Referring to the FIGURES of the drawings, a w.c. bowl 1 (only the upper rear part of which is shown in FIGURES 1 and 2) consists of a moulded vitreous china water closet basin having a flat rearward extension portion 1a (see FIGURE 3). The moulding of the bowl 1 is simplified in comparison with bowls normally utilised in close-coupled suites since it is not provided with the usual box-like extension housing a chamber which is in use positioned directly beneath the cistern for receiving water therefrom. The production of such w.c. bowls tends to be expensive and the production costs of the design of w.c. bowl 1, as illustrated, are significantly lower even though the design includes the upper flat rear extension portion 1a, of bifurcated form. Advantageously, the integrally moulded exten-

sion 1a forms a support platform for the cistern 2 (rather than suppport being provided by a separately formed bracket portion) such as for example illustrated in Patent Specification No. 2152962). The intregrally moulded extension 1a forms a strong support for the cistern 2 in a manner to be described.

As should be evident from a comparison between FIGURES 1 and 2 the relative position of the bowl 1 and cistern 2 can be varied to suit, the extremes of forward/rearward relative positioning of the cistern and bowl being depicted in FIGURES 1 and 2. The cistern 2 and bowl 1 may be connected in any relative position that lies in between the positions shown in FIGURES 1 and 2, the arrangement thus offering a range of possible connecting positions of the cistern relative to the bowl.

FIGURES 1 and 2 show a rear circular aperture 1b into which seal in the form of a multi-flanged sealing sleeve 3 has been inserted. As should be evident from FIGURES 1 and 2 the sleeve 3 is positively and permanently fixed in the aperture 1b and is not adjustable axially relative to the aperture 1b. Three axially spaced flanges 3a,3b,3c sealingly grip the ceramic material defining the aperture 1b in a manner which should be evident from FIGURES 1 and 2, a further flange 3d of the sleeve 3 being of greater diameter than aperture 1b and limiting the depth of insertion of the sleeve 3 into the aperture 1b in the manner as shown in FIGURES 1 and 2. Forward end 3e of the sleeve 3 has a widened diameter portion which receives a water spreader device 4 (shown in dashed lines) which may be generally of a known type and more particularly may be of the type shown in Patent Specification No. 2152962. The rearward end of sleeve 3 slidingly receives horizontal pipe portion 5a of right-angled pipe connection 5 that, in use, delivers water from the cistern 2 to the w.c. bowl 1 via the spreader device 4. The spreader device 4, sleeve 3 and pipe connection 5 are all of plastics and as shown in FIGURE 1, the horizontal pipe portion 5a extends only a short distance X into the sleeve 3 and yet a seal is effected inbetween the outer diameter of the pipe portion 5a and the inner diameter of the sleeve 3, merely by a friction push fit. If desired, of course, the inner wall of the sleeve 3 and/or outer wall of the horizontal pipe portion 5a could be recessed to locate an arrangement of rubber ring seals if required. In any event, the engagement between the pipe connection 5a and the sleeve 3 in FIGURE 1 should provide a sufficient seal when delivering water from the cistern into the bowl 1. This position represents the extreme forward position of the bowl 1 relative to the cistern 2 in which a seal may still be effected between the pipe connection 5 and sleeve 3 whilst water is delivered from the cistern to the bowl.

However, in some instances the relative positioning of the bowl 1 and cistern 2 shown in FIGURE 1 may not be easy to duplicate when replacing the bowl and/or cistern for any reason or even on original installation. Therefore, the relative position of the bowl and cistern is adjustable in the direction of the arrows Y (forward to rearward positioning) and the horizontal pipe portion 5a may be introduced further into the sleeve 3 (thereby moving the cistern forward relative to the bowl) as far as the extreme position in FIGURE 2. Any intermediate position of the pipe portion 5a within the sleeve 3 is possible in order to correctly align the cistern 2 and bowl 1 appropriately (for example in order to fix the cistern closely to a rear wall whilst maintaining the same floor position for a differently sized bowl).

In order to take account of the relative movement of the pipe connection 5 and sleeve 3, slot 1c is defined in the bifurcated extension portion 1a as will be apparent from FIGURE 3. FIGURE 2 shows pipe connection 5 moved to the inner end of the slot 1c whilst FIGURE 1 shows the pipe portion 5a at an outer end of the slot 1c. As shown in the FIGURES the slot 1c has an open end although it would be possible in an alternative embodiment to arrange for the slot to be closed if preferred.

Assembly of the cistern 2 onto the basin 1 should be generally self-explanatory from the FIGURES. An externally threaded cistern exit pipe 6 depends downwardly from the bottom of the cistern 2, said pipe 6 passing through the slot 1b and being sealingly retained to vertical portion 5b of pipe connection 5 by means of internally threaded, knurled locking ring 7 having a thread which co-operates with the external thread of pipe 6. Annular rubber seal 8 is positioned in between the end of pipe 6 and pipe portion 5b and is seated in an internal recess in the locking ring 7 in a manner which should be evident from FIGURES 1 and 2 of the drawings. As the locking ring 7 is tightened up on pipe portion 6 the rubber seal 8 is squeezed inbetween pipe 6 and and pipe portion 5b to effect a watertight seal. In order to positively retain the cistern 2 to the bowl 1, the cistern 2 is locked to the rearward extension portion 1a by clamping means 9. Clamping means 9 consists of a two-part clamping bracket 9a,9b, retaining bolt 9c, locking sleeve 9d and flanged lock nut 9e.

In order to retain the cistern 2 to the extension portion 1a, ring portion R of upper clamping bracket 9a is passed over the threaded pipe 6 before lock nut 9e is screwed on to pipe portion 6, whilst locking bolt 9c is captivated in elongate slot S provided on horizontally depending portion H of bracket portion 9a. Locking bolt 9c has a captivating square located under domed head D, thereby preventing rotation of the bolt when properly seated in slot S. Thus nut 9e can be tightened on pipe 6 to retain clamping portion 9a thereto in a manner which should be evident from the drawings.

Lower clamping portion 9b has a "C" shaped gripping portion C which grips beneath the bifurcated

limbs L1 and L2 of the extension portion 1a. The threaded shank of bolt 9C passes through round aperture E in clamping portion 9b and the two clamping portions 9a and 9b are releasingly retained to one another via bolt 9c and locking sleeve 9d in a manner which should be clear from the drawings. Thus ring R of clamping portion 9a is locked inbetween the underside of the cistern 2 and flange f on locking nut 9e, and C shaped portion C of clamping portion 9b grips the underside of limbs L1 and L2 retaining the cistern in place.

In order that the cistern 2 is low enough in relation to the bowl 1, the underside of the cistern is shaped or recessed at 2a in order to accommodate ring portion R and bolt 9c as shown.

Thus the attachment of the cistern 2 relative to the bowl 1 can be achieved quickly and easily and a forward and rearward position of the bowl relative to the cistern can be adjusted automatically simply by loosening the locking sleeve 9d thereby allowing the limbs L1 and L2 to move relative to the clamping portion 9a and 9b. Once the new relative positioning of the cistern bowl has been selected the clamping portions 9a,9b can be tightened together once more by means of the locking sleeve 9d being tightened as appropriate.

Thus it should be possible to replace any close coupled horizontal outlet w.c. bowl that adheres to current British standards and low cost high volume production is envisaged for this arrangement owing to the connection parts being simply produced all from plastics and basically being of three part construction (i.e. spreader device 4, sleeve 3 and connecting part 5). It is advantageous that the position of the cistern 2 and bowl 1 can be adjusted by means of the single screw locking sleeve 9d.

It is believed that other advantages of the arrangement should be readily apparent and the connecting pipe 5 and sealing sleeve 3 could be utilised without the spreader device 4, if desired, in other arrangements.

It is to be appreciated that the present invention offers many improvements, at least some of which might be patentable individually or in combination. Any individual feature as aforementioned or as shown, or as implicit herein or combinations thereof or functions or methods apertaining thereto may be patentably inventive and any specific term as used herein should not be construed as unnecessarily or unduly limiting; the scope of such a term should extend to, or may be replaced or supplemented by, any reasonable equivalent or generic expression. The singular may include the plural and vice versa where sensible. Therefore, further according to the present invention there is provided an adjustable connection for connecting a cistern to a w.c. bowl so that, in use, water can flow from the cistern into the bowl, said connection allowing the relative position of the cistern and w.c. bowl to be adjusted to one of a plurality of selectable or adjustable positions relative to the cistern, in which water can be delivered from the cistern into the bowl. Said adjustable connection may comprise a connection pipe or duct slidingly received or receivable in a seal mountable in an aperture in the w.c. bowl. Preferably, said adjustable connection includes clamping bracket means arranged to clamp the cistern to the w.c. bowl.

Claims

1. Apparatus comprising a w.c. bowl and cistern, the relative position of the cistern and bowl being adjustable to enable water to be delivered from the cistern into the bowl when the bowl is located in one of a plurality of selectable or adjustable positions relative to the cistern.

2. Apparatus as claimed in Claim 1 in which said bowl and cistern are of the close-coupled type.

3. Apparatus as claimed in Claim 1 or 2 in which the bowl is connectable relative to the cistern so that the cistern is adjustable forward and/or rearwardly relative to the bowl, preferably over a range of possible relative positions inbetween a most forward position and a most rearward position, and/or possibly in which a relative sidweways and/or up/down adjustment of the cistern and bowl is provided.

4. Apparatus as claimed in any one of the preceding claims in which the cistern is flow connected to the bowl by means of a connection pipe or duct slidingly received in a seal mounted in an aperture in the w.c. bowl and, preferably in which the seal is in the form of a sealing sleeve having flange means that grips the material of the bowl that defines said aperture, and preferably in which said seal is fitted with a water spreader device arranged inside the w.c.bowl, and possibly in which said connection pipe/duct and/or said seal and/or said spreader device is/are of plastics.

5. Apparatus as claimed in in Claim 2 or any claim dependent therefrom, in which the w.c. bowl includes a rearward extension for supporting the cistern, and preferably in which the extension is formed with a slot to allow the pipe connection/duct from the cistern to pass downwardly therethrough.

6. Apparatus as claimed in Claim 5 when dependent from Claim 6 in which the pipe connection/duct is angled so that a generally horizontal pipe portion of the pipe connection/duct extends into said seal

mounted in said aperture, and preferably in which said aperture is defined in a generally vertical wall portion at the rear of the w.c. bowl, and preferably in which the rearward extension is integrally moulded with the bowl.

7. Apparatus as claimed in Claim 5 or Claim 6 in which the cistern can be clamped relative to the bowl by clamping bracket means arranged to clamp onto the rearward extension, said extension forming a mounting platform for the cistern, and preferably in which the clamping bracket means comprises an upper clamping bracket portion and a lower clamping bracket portion, said upper clamping bracket portion being positively retained to the cistern and the lower clamping portion being clamped to the underside of the rearward extension and the upper clamping portion by fastening means, and preferably in which said fastening means is in the form of a captivated threaded bolt and locking sleeve, and preferably in which the upper clamping bracket portion comprises a ring which is passed over a threaded pipe that depends downwardly from the cistern, said ring being locked to the cistern by means of a locking nut, said bolt being passed through receiving holes in the upper clamping portion and lower clamping portion, said lower clamping portion being clipped onto the pipe connection/duct underneath the rear extension.

8. Apparatus as claimed in any one of Claims 5 to 7 in which said pipe connection/duct includes a locking ring engaged on the pipe connection/duct and threadably engaged with the threaded pipe which downwardly depends from the cistern, and preferably in which a rubber seal is provided inbetween the downwardly depending pipe and the pipe connection/duct, and preferably in which the rubber seal is retained in a recess in the interior of the locking ring.

9. An adjustable connection for connecting a cistern to a w.c. bowl so that, in use, water can flow from the cistern into the bowl, said connection allowing the relative position of the cistern and w.c. bowl to be adjusted to one of a plurality of selectable or adjustable positions relative to the cistern, in which water can be delivered from the cistern into the bowl, and preferably comprising a connection pipe or duct slidingly received or receivable in a seal mountable in an aperture in the w.c. bowl, and/or in which said connection includes clamping bracket means arranged to clamp the cistern to the w.c. bowl.

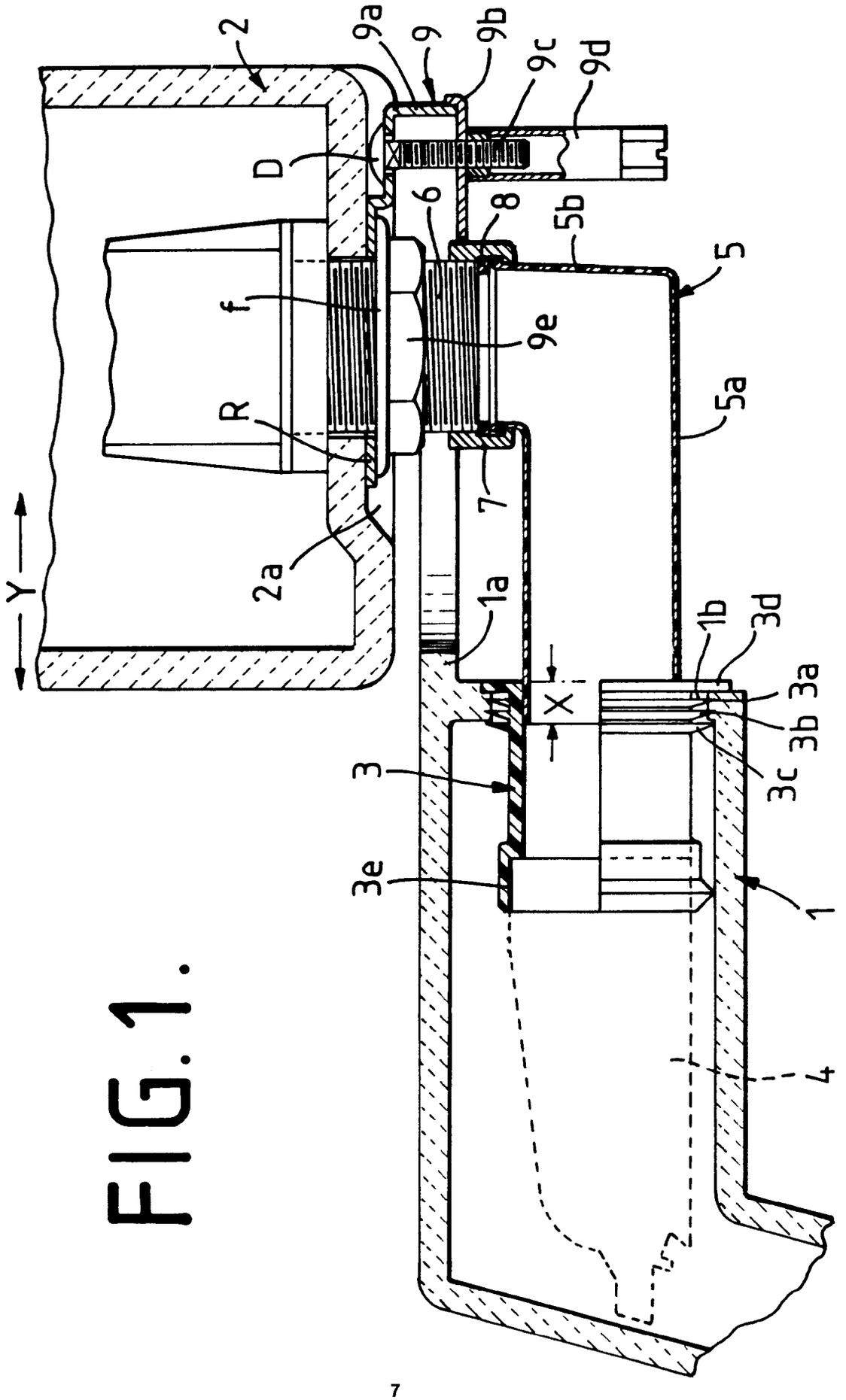

FIG. 1.

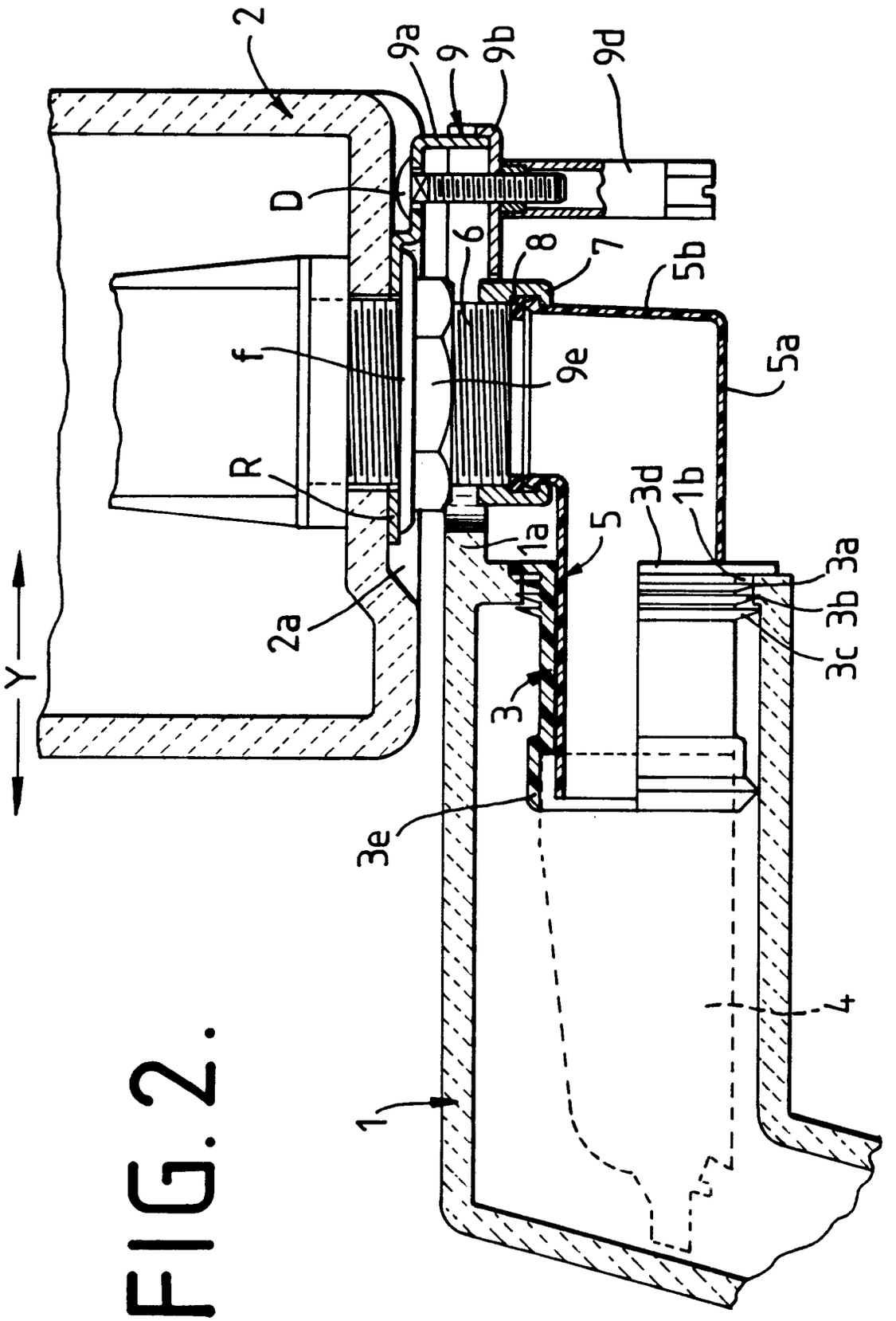

FIG. 2.

FIG.3.