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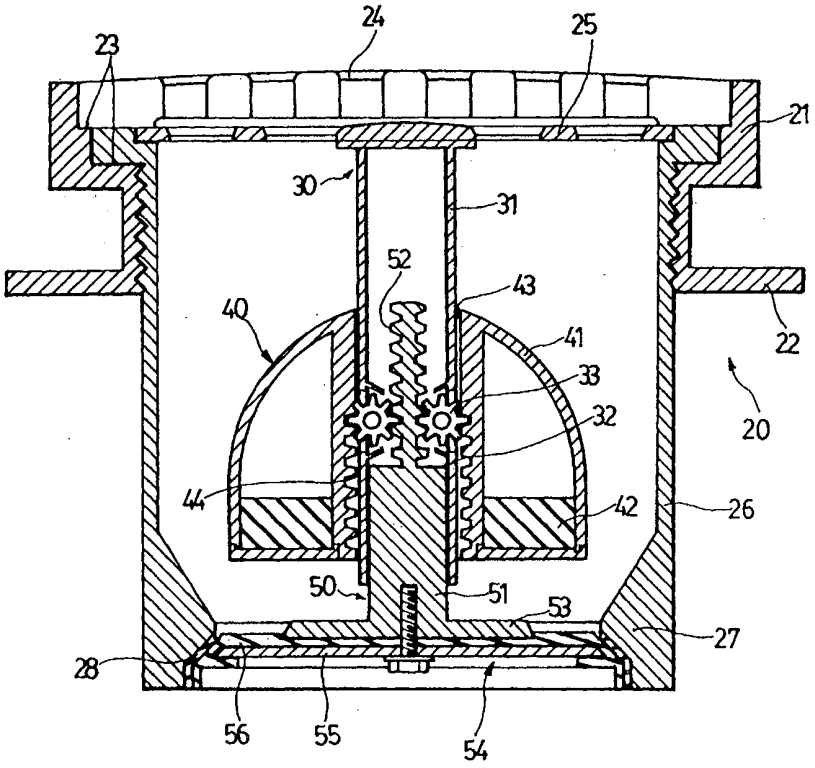
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(54) **Title:** APPARATUS FOR PREVENTING REVERSE FLOW IN DRAINAGE

(57) **Abstract**

An apparatus for preventing reverse flows in a drainage is disclosed. In this apparatus, a floating device (41) and a reverse flow preventing device (54) act mutually in opposite directions owing to the floating force and the water pressure, and thus the bottom of the round body (20) of the apparatus is automatically opened and closed, so that the drainage can efficiently work, and the waste water and the draining water with foul odors can be prevented from flowing reversely. The apparatus for preventing reverse flows of waste water according to the present invention includes a round body (20) to be installed in a drain hole (60). A guide member (30) is installed on a second filtering net (25) of the top of the round body (20), and has a guide (31) at the center of it. An openable/closable device actuating member (40) is insertingly installed on the guide member (30), for moving up and down along the guide (31) owing to the floating force and the self-gravity. An openable/closable member (50) is installed on the guide member (30), for causing an air-tight sealing part to be opened and closed by being oppositely interlocked to the openable/closable device actuating member (40).



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TITLE OF THE INVENTION

APPARATUS FOR PREVENTING REVERSE FLOW IN DRAINAGE

FIELD OF THE INVENTION

The present invention relates to an apparatus for preventing reverse flows in a drainage. More specifically, the present invention relates to an apparatus for preventing reverse flows in a drainage, in which a floating device and a reverse flow preventing device act mutually in opposite directions owing to the floating force and the water pressure, and thus the bottom of the body of the apparatus is automatically opened and closed, so that the drainage can efficiently work, and the waste water with foul odors can be prevented from flowing out reversely.

BACKGROUND OF THE INVENTION

FIGs. 1 and 2 illustrate a conventional drainage reverse flow preventing apparatus 10. In this apparatus 10, a filtering device 12 is fixed on the top of a cylindrical tube 11, and an annular engaging step 13 projects from the lower inner circumference of the cylindrical tube 11. A protuberance 14 is formed under the annular step 13.

A shaft 15 pass through the protuberance 14, and a damper 16 is movably secured to the shaft 15. Further, there is installed a torsion spring 17 between the inner wall of the cylindrical tube 11 and the bottom of the damper 16.

In the conventional drainage reverse flow preventing apparatus 10 constituted as above, when waste water or drainage water does not flow within the cylindrical tube 11, the damper 16 keeps contacting to the annular step 13. That is, the damper 16 is kept closed. On the other hand, when waste water or drainage water flows through the cylindrical tube 11, the damper 16 departs from the annular step 13 so as for the damper 16 to be opened.

In this conventional appratus 10, however,if the torsion spring 17 loses its elasticity after a long use or due to corrosion, then reverse flows cannot be prevented. Moreover, in this conventional apparatus, the closing of the damper 16 depends only on the force of the torsion spring 17, and therefore, the sealing between the damper 16 and the annular step 13 is mostly insufficient, with the result that the reverse flow of foul odors cannot be prevented.

Besides the above described conventional apparatus, there are various other apparatuses for preventing reverse flows of foul odors and waste water. However, they are not capable of serving as the apparatus for preventing foul odors and waste water simultaneously, but serves only a single function. Further, even this single function cannot be performed perfectly, thereby failing the originally intended purpose.

The flow directions of the waste water and the reversely flowing water and foul odors are directly opposite, and therefore, a strong reliability has to be ensured. Such a reliability can be provided through a complicated structure, however, a high cost should be accompanied. Further, such a complicated structure is subjected to a clogging by food stuffs and other foreign materials, with the result that the apparatus loses the intended functions.

SUMMARY OF THE INVENTION

The present invention is intended to overcome the above described disadvantages of the conventional techniques.

Therefore it is an object of the present invention to provide an apparatus for preventing reverse flows in a drainage, in which when draining waste water, a openable/closable plate descends owing to the rise of a floating

device by the incoming waste water to open an air-tight sealing part so as to drain waste water efficiently, and when waste water does not flow, the floating device descends owing to the self-gravity, and the openable/closable plate ascends to close the air-tight sealing part so as to prevent the reverse flow of various foul odors. Particularly, in the raining seasons, the reverse flow of the draining water can be prevented, thereby avoiding flooding.

In achieving the above object, the apparatus for preventing reverse flows of waste water according to the present invention includes: a round body to be installed in a drain hole; a guide member installed on a second filtering net of the top of the round body, and having a guide at the center of it; an openable/closable device actuating member insertingly installed on the guide member, for moving up and down along the guide owing to a floating force and a self-gravity; and an openable/closable member installed on the guide member, for causing an air-tight sealing part to be opened and closed by being oppositely interlocked to the openable/closable device actuating member.

The round body includes: an inner body having the air-tight sealing part at a lower portion thereof; and an outer body having a flange at a lower portion thereof, the inner and outer bodies being detachably coupled together.

The guide member includes: a guide having a pair of pinions in the interior thereof, and installed at the center of the second filtering net; and a pair of guide grooves formed in both sides of the guide.

The openable/closable device actuating member includes: a floating device having a through-hole at the center of it so as for the floating device to move up and down along the guide; a weight provided in the interior of the floating device; and racks formed on the lower portion

of the through hole.

The openable/closable member includes: a movable bar having racks at its upper portion, and having a securing part at a lower portion of it; and a reverse flow preventing device having an openable/closable plate and having an elastic member installed thereon, the openable/closable plate and the reverse flow preventing device being detachably coupled together.

In another embodiment of the present invention, the apparatus for preventing reverse flows in a drainage according to the present invention includes: a round body to be installed in a drain hole; a guide member installed within the round body, and having a guide at the center of it; an openable/closable device actuating member installed on the top of the guide member, for moving up and down along the guide owing to the floating force and the self-gravity; and an openable/closable member installed under the guide member, for causing a lower portion of the round body to be opened and closed by being oppositely interlocked to the openable/closable device actuating member.

The guide member includes: a guide formed at the center of it with pinions installed in the interior of the guide; a securing part having at its bottom a supporting device for supporting the guide; and a water draining part formed within the securing part.

The openable/closable device actuating member includes: a floating device having a weight provided in the interior of it, and having a guide accommodating part at the center of the inside of it; and a movable bar having racks formed on the lower portion of it, and having a securing part on the upper portion of it.

The openable/closable member includes: a passive body having racks on the inside of it, and having guide grooves on the front and rear faces of it; and a reverse

flow preventing device having an openable/closable plate formed at the bottom of it and having a hooking device formed on the upper portion of it, the openable/closable plate and the reverse flow preventing device being detachably coupled together.

BRIEF DESCRIPTION OF THE DRAWINGS

The above object and other advantages of the present invention will become more apparent by describing in detail the preferred embodiment of the present invention with reference to the attached drawings in which:

FIG. 1 is a perspective view of the conventional drainage reverse flow preventing apparatus;

FIG. 2 is a sectional view showing the conventional apparatus installed in a draining hole;

FIG. 3 is a perspective view of the drainage reverse flow preventing apparatus according to the present invention, showing the state of a normal draining;

FIG. 4 is a perspective view of the drainage reverse flow preventing apparatus according to the present invention, showing the state of a reverse flow prevention;

FIG. 5 is an exploded perspective view showing the drainage reverse flow preventing apparatus according to the present invention;

FIG. 6 is a sectional view of the apparatus of FIG. 5;

FIGs 7a to 7b are sectional views showing the reverse flow preventing action in the apparatus of the present invention;

FIG. 8 is an exploded perspective view showing another embodiment of the drainage reverse flow preventing apparatus according to the present invention;

FIG. 9 is a sectional view showing the assembled state of the drainage reverse flow preventing apparatus of FIG. 8; and

FIGs. 10a and 10b are sectional views showing the reverse flow preventing action in the apparatus according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 5 is an exploded perspective view showing the drainage reverse flow preventing apparatus according to the present invention. FIG. 6 is a sectional view of the apparatus of FIG. 5. FIGs 7a to 7b are sectional views showing the reverse flow preventing action in the apparatus of the present invention.

A barrel shaped round body 20 which is to be installed in a draining hole 60 includes an inner body 26. The inner body 26 includes: an air-tight sealing part 27 projecting inward from the lower portion of it and a threaded part formed on the upper portion of it. An elastic member 28 is installed under the air-tight sealing part 27.

The inner body 26 is coupled with an outer body 21. The outer body 21 includes: a flange 22 extending outward; a threaded part formed on the inside thereof; and steps 23 for accommodating first and second filtering nets 24 and 25.

The inner and outer bodies 26 and 21 are threadably coupled together, and therefore, they are detachable from each other.

A guide member 30 is installed on the second filtering net 25, and the member 30 includes: a guide 31 having a cylindrical shape; guide grooves 32 formed on the both sides of the guide 31; and a pair of rotors 33 installed within the guide 31.

An openable/closable device actuating member 40, which is inserted into the guide 31 to move up and down, includes a floating device 41 to ascend owing to the floating force or to descend owing to the self-gravity. The floating device 41 has a through-hole 43 for

accommodating the guide 31, and racks 44 are formed on the lower portion of the through hole 43, for being coupled with the pinions 33. Further, a weight 42 is formed within the floating device 41.

An openable/closable member 50 is partly inserted into the guide 31. In the member 50, racks 52 are formed to be coupled with the pinions 33, and a movable bar 51 is formed under the racks 52, while a securing part 53 is formed under the movable bar 51. A openable/closable plate 55 is attached to the bottom of the securing part 53, and the plate 55 is a member of a reverse flow preventing device 54.

Thus in the openable/closable member 50, the securing part 53 and the reverse flow preventing device 54 are detachably coupled by means of bolts and the like.

Now another embodiment of the drainage reverse flow preventing apparatus according to the present invention will be described.

FIG. 8 is an exploded perspective view showing another embodiment of the drainage reverse flow preventing apparatus according to the present invention. FIG. 9 is a sectional view showing the assembled state of the drainage reverse flow preventing apparatus of FIG. 8. FIGs. 10a and 10b are sectional views showing the reverse flow preventing action in the apparatus according to the present invention.

The round body 20 includes an outer body 21 and an inner body 26. The outer body 21 has a flange 22 on the bottom of it, while the inner body 26 includes a threaded part. The outer and inner bodies 21 and 26 are threadably coupled together. The outer body 21 has steps 23 to accommodate first and second filtering nets 24 and 25. Thus the filtering is carried out twice, and the outer and inner bodies 21 and 26 are detachable from each other.

Further, the inner body 26 includes: an air-tight sealing part 27 on the lower portion of it; and a setting

part 29 for setting a guide member 30a. An elastic member 28 is attached on the bottom of the inner body 26 to enhance the sealing.

The guide member 30a is placed on the setting part 29 of the inner body 26. The member 30a includes a guide 31a extending vertically, and the guide 31a has a hollow interior.

Further, the guide member 30a includes a round securing part 35, and a supporting part 34 integrally links the guide 31a to the securing part 35.

Between the securing part 35 and the supporting part 34, there are formed draining holes 36 for efficiently draining waste water. Within the guide 31a, there are installed pinions 33 which are rotatable forward and reverse.

An openable/closable device actuating member 40a includes a floating device 41a which ascends by the floating force and descends by the self-gravity. The floating device 41a accommodates the guide 31a by having a guide accommodating part 45.

A weight 42 is press-fitted to the floating device 41a. A securing part 53 is formed to be fastened to the guide accommodating part 45. Under the securing part 53, there is formed a movable bar 51 on which there are formed racks 52 to be moved up and down depending on the revolution direction of the pinions 33.

An openable/closable member 50a opens and closes the air-tight sealing part 27. The member 50a is accommodated within the guide 31a to slide up and down. The member 50a includes: racks to be meshed with the pinions 33; a pair of slots to be engaged with the hooking devices 57; and a passive body 59 having guide grooves 58 with the same size to each other.

Owing to the guide grooves 58, the shafts of the pinions 33 are not impeded when the floating device 41a

moves up and down.

An openable/closable plate 55a is fixed to the bottom of the passive body 59. The hooking devices 57 are formed at the center of the plate 55a, and the hooking devices 57 are inserted into the guide 31a to be engaged with the slots of the inside of the passive body 59.

An elastic member 56 is installed on the bottom of the plate 55a to reinforce the sealing of the air-tight sealing part 27.

Now the action of the apparatus of the present invention will be described.

The drainage reverse flow preventing apparatus according to the present invention is applicable not only to the underground draining channels, but also to the kitchen sink and the veranda draining holes. Further, the apparatus can be used at a pipe where oil flows.

The shape of the body 20 of the apparatus is not limited to the round shape, but can be varied to rectangular or any other shape depending on the shape of the draining hole 60.

First, the state of the draining of waste water through the apparatus of the present invention will be described.

As shown in FIGs. 6 and 7a, when water or waste water is introduced into the body 20 of the apparatus, the floating device 41 floats due to the floating forces of the introduced water.

Therefore, the pinions 33 which is meshed with the racks 44 are rotated, and therefore, the racks 52 together with the movable bar 51 descends.

Therefore, the reverse flow preventing device 54 which is fastened to the bottom of the securing part 53 departs from the air-tight sealing part 27, thereby opening the lower portion of the round body 20. In this manner, the introduced water flows efficiently through the

apparatus.

When the draining is carried out in this manner, the flowing water imposes a pressure onto the reverse flow preventing device 54, and therefore, the floating force and the water pressure are combined to completely open the reverse flow preventing device 54 from the air-tight sealing part 27.

Accordingly, the draining is more efficiently carried out.

The reason why the first and second filtering nets are installed is to filter off various foreign materials.

Now the state of preventing the reverse flow of waste water or foul odors by the apparatus of the present invention will be described in detail below.

When waste water is not introduced into the round body of the apparatus of the present invention, the floating device 41 descends owing to the self-gravity. Under this condition, owing to the racks 44 of the floating device 41, the pinions 33 of the guide 31 are rotated.

Therefore, when the floating device descends, the movable bar 51 rises owing to the racks 52 of the movable bar 51.

Accordingly, the reverse flow preventing device 54 closely contacts to the air-tight sealing part 27, thereby closing the lower portion of the round body 20. Therefore, any reverse flow of waste water or foul odors is prevented.

Meanwhile, in raining seasons, if the draining holes overflow due to reverse flows through the draining conduit, the reversely flowing water pushes up the reverse flow preventing device 54, that is, lifts up the openable/closable plate 55. Therefore owing to the water pressure, the reverse flow preventing device 54 is closely contacted to the air-tight sealing part 27, thereby preventing the reverse flow.

The elastic member 28 of the air-tight sealing part 27 and the elastic member 56 of the openable/closable plate 55 enhance the contacting between the reverse flow preventing device 54 and the air-tight sealing part 27, thereby improving the sealing state and maximizing the prevention of the reverse flow.

Now the draining through the second embodiment of the apparatus of the present invention will be described in detail below.

When waste water is introduced into the round body 20 of the apparatus, the floating device 41a floats owing to the floating force of the introduced water. Therefore, the movable bar 51 moves up together with the floating device 41a, while the pinions 33 are rotated because they are meshed with the racks 44.

When the pinions 33 are rotated, the passive body 59 descends owing to the racks which are meshed with the pinions 33. As a result, the openable/closable plate 55a which is fixed to the passive body 59 departs from the air-tight sealing part 27, thereby opening the lower portion of the round body 20 of the apparatus. Thus the introduced water is efficiently drained into the draining hole 60.

When the introduced water flows through the round body 20 into the draining hole 60, the flowing water exerts a pressure onto the openable/closable plate 55a, and therefore, the floating force and the water pressure are combined to completely open the openable/closable plate 55a from the air-tight sealing part 27.

Therefore, the draining of the water is more efficiently carried out.

The reason why the first and second filtering nets 24 and 25 are installed in dual is to filter off various foreign materials.

Now the state of preventing the reverse flow of water or foul odors by the apparatus of the present invention

will be described in detail below referring to FIG. 10b.

If there is no water or waste water incoming into the round body 20 of the apparatus of the present invention, then the floating device 41a descends owing to the self-gravity. At the same time, the movable bar 51 which is fixed to the floating device 41a descends together with the floating device 41a. Therefore, owing to the racks 52, the pinions 33 are rotated.

When the pinions 33 are rotated, the passive body 59 ascends owing to the racks which are outwardly meshed with the pinions 33. Therefore, the openable/closable plate 55a ascends to closely contact with the air-tight sealing part 27, thereby closing the lower portion of the round body 20.

Accordingly, any reverse flow of water or foul odors is prevented.

Meanwhile, in raining seasons, if the draining holes overflow due to reverse flows through the draining conduit, the reversely flowing water pushes up the openable/closable plate 55a. Therefore owing to the water pressure, the reverse flow preventing device 54 is firmly and closely contacted to the air-tight sealing part 27, thereby preventing the reverse flow.

The elastic member 28 of the air-tight sealing part 27 and the elastic member 56 of the openable/closable plate 55a enhance the contacting between the openable/closable plate 55a and the air-tight sealing part 27, thereby improving the sealing state and maximizing the prevention of the reverse flow.

According to the present invention as described above, the water draining is efficiently carried out, thereby solving the overflow problem. Further the reverse flow of the waste water or foul odors can be prevented, and therefore, the environment is prevented from being polluted or contaminated. Further, in raining seasons,

the flooding due to the reverse flow through draining holes can be prevented.

WHAT IS CLAIMED IS:

1. An apparatus for preventing reverse flows of waste water in drainage, comprising:

a body 20 to be installed in a drain hole;

a guide member 30 installed on a second filtering net 25 of a top of said body 20, and having a guide 31 at a center of it;

an openable/closable device actuating member 40 insertingly installed on said guide member 30, for moving up and down along said guide 31 owing to a floating force and a self-gravity; and

an openable/closable member 50 installed on said guide member 30, for causing an air-tight sealing part 27 to be opened and closed by being oppositely interlocked to said openable /closable device actuating member 40.

2. The apparatus as claimed in claim 1, wherein said body 20 comprises: an inner body 26 having said air-tight sealing part 27 at a lower portion thereof; and an outer body 21 having a flange 22 at a lower portion thereof, said inner and outer bodies being detachably coupled together.

3. The apparatus as claimed in claim 1, wherein said guide member 30 comprises: a guide 31 having a pair of pinions 33 in an interior thereof, and installed at a center of said second filtering net 24; and a pair of guide grooves 32 formed in both sides of said guide 31.

4. The apparatus as claimed in claim 1, wherein said openable/closable device actuating member 40 comprises: a floating device 41 having a through hole 43 for allowing vertical movements of said guide 31; a weight provided in an interior of said floating device 41; and

racks 44 formed on a lower portion of said through hole 43.

5. The apparatus as claimed in claim 1, wherein said openable/closable member 50 comprises: a movable bar 51 having racks 52 at its upper portion, and having a securing part 53 at a lower portion of it; and a reverse flow preventing device 54 having an openable/closable plate 55 and having an elastic member 56 installed thereon, said openable/closable plate and said reverse flow preventing device being detachably coupled.

6. An apparatus for preventing reverse flows in a drainage, comprising:

a body 20 to be installed in a drain hole;

a guide member 30a installed within said body 20, and having a guide 31a at a center of it;

an openable/closable device actuating member 40a installed on a top of said guide member 30a, for moving up and down along said guide 31a owing to a floating force and a self-gravity; and

an openable/closable member 50a installed under said guide member 30a, for causing a lower portion of said body 20 to be opened and closed by being oppositely interlocked to said openable/closable device actuating member 40a.

7. The apparatus as claimed in claim 6, wherein said guide member 30a comprises: a guide 31a formed at a center of it with pinions 33 installed in an interior of said guide 31a; a securing part 35 having at its bottom a supporting device 34 for supporting said guide 31a; and a pair of water draining holes 36 formed within said securing part 35.

8. The apparatus as claimed in claim 6, wherein said openable/closable device actuating member 40a

comprises: a floating device 41a having a weight 42 provided in an interior of it, and having a guide accommodating part 45 at a center of an inside of it; and a movable bar 51 having racks 52 formed on a lower portion of it, and having a securing part 53 on an upper portion of it.

9. The apparatus as claimed in claim 6, wherein said openable/closable member 50a comprises: a passive body 59 having racks on inside of it, and having guide grooves 58 on front and rear faces of it; and a reverse flow preventing device 54a having an openable/closable plate 55a formed at a bottom of it and having hooking devices 57 formed on an upper portion of it, said openable/closable plate and said reverse flow preventing device being detachably coupled.

Fig. 1

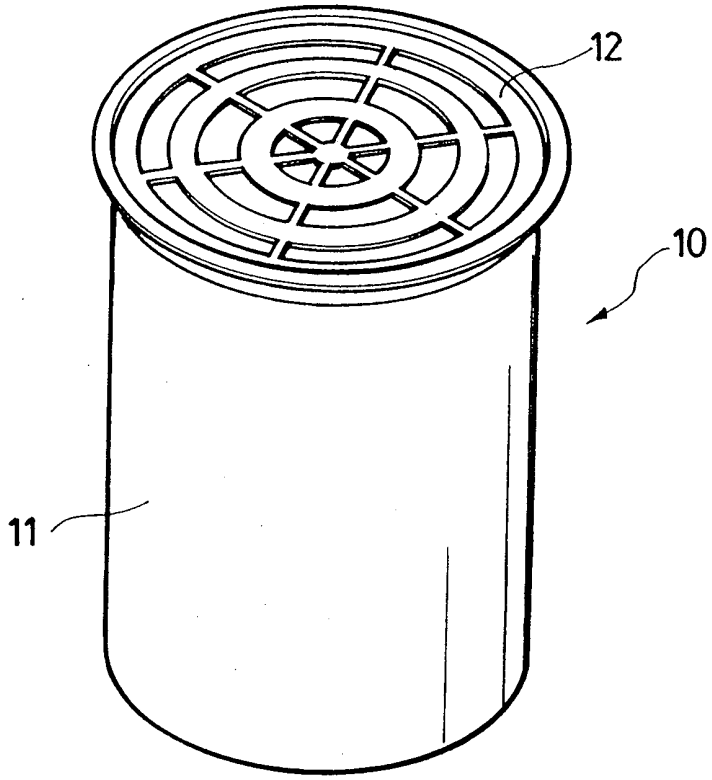


Fig. 2

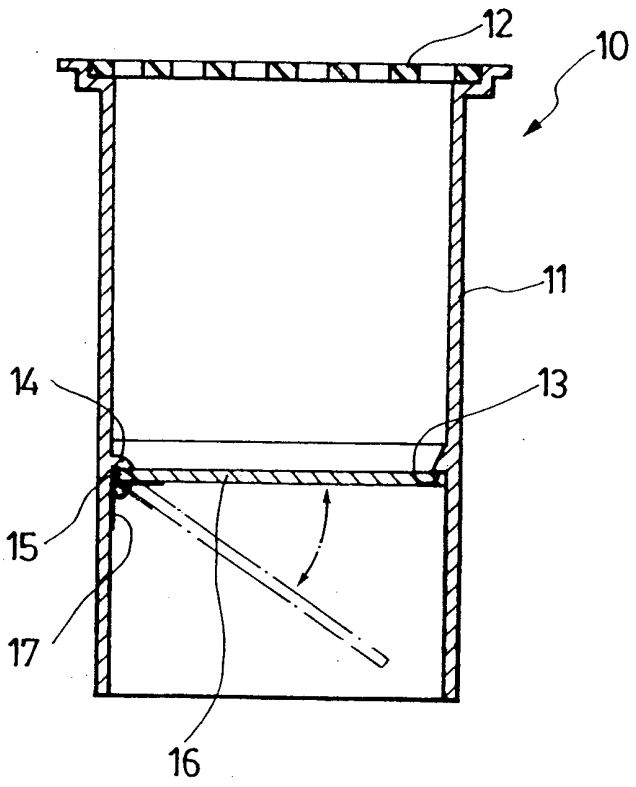


Fig. 3

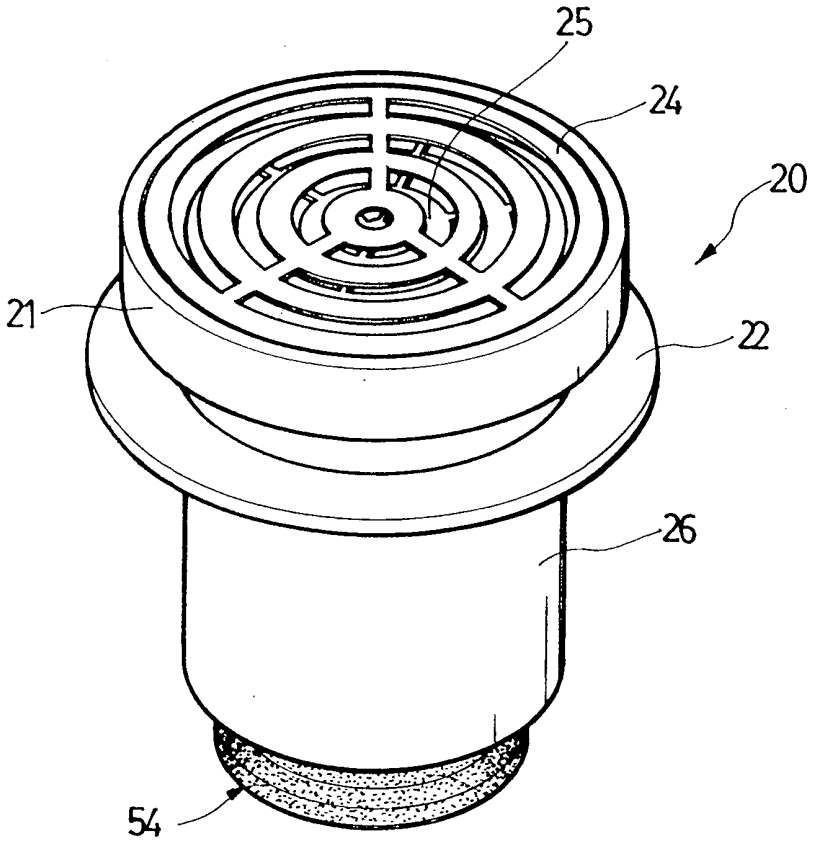


Fig. 4

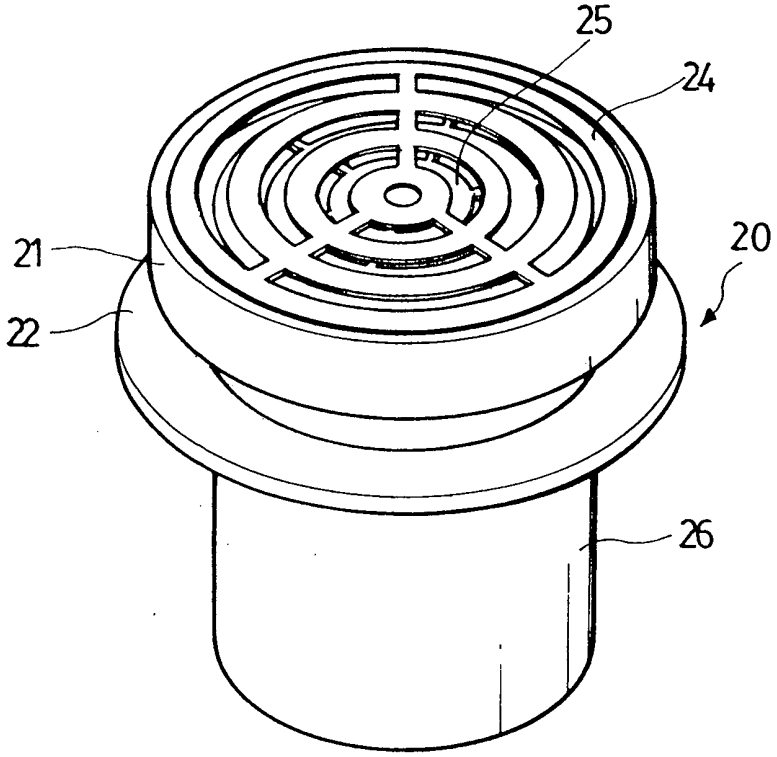


Fig. 5

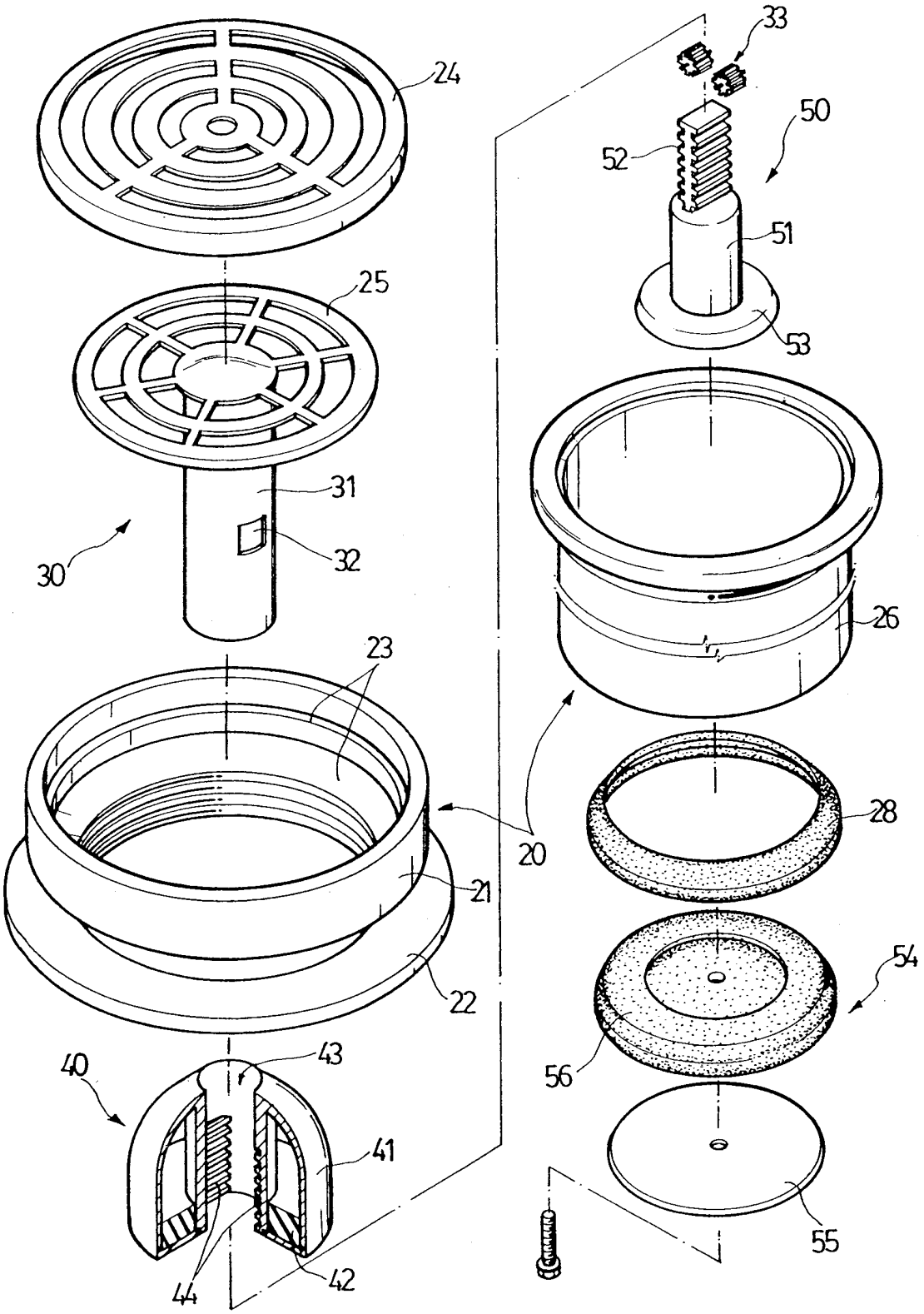


Fig. 6

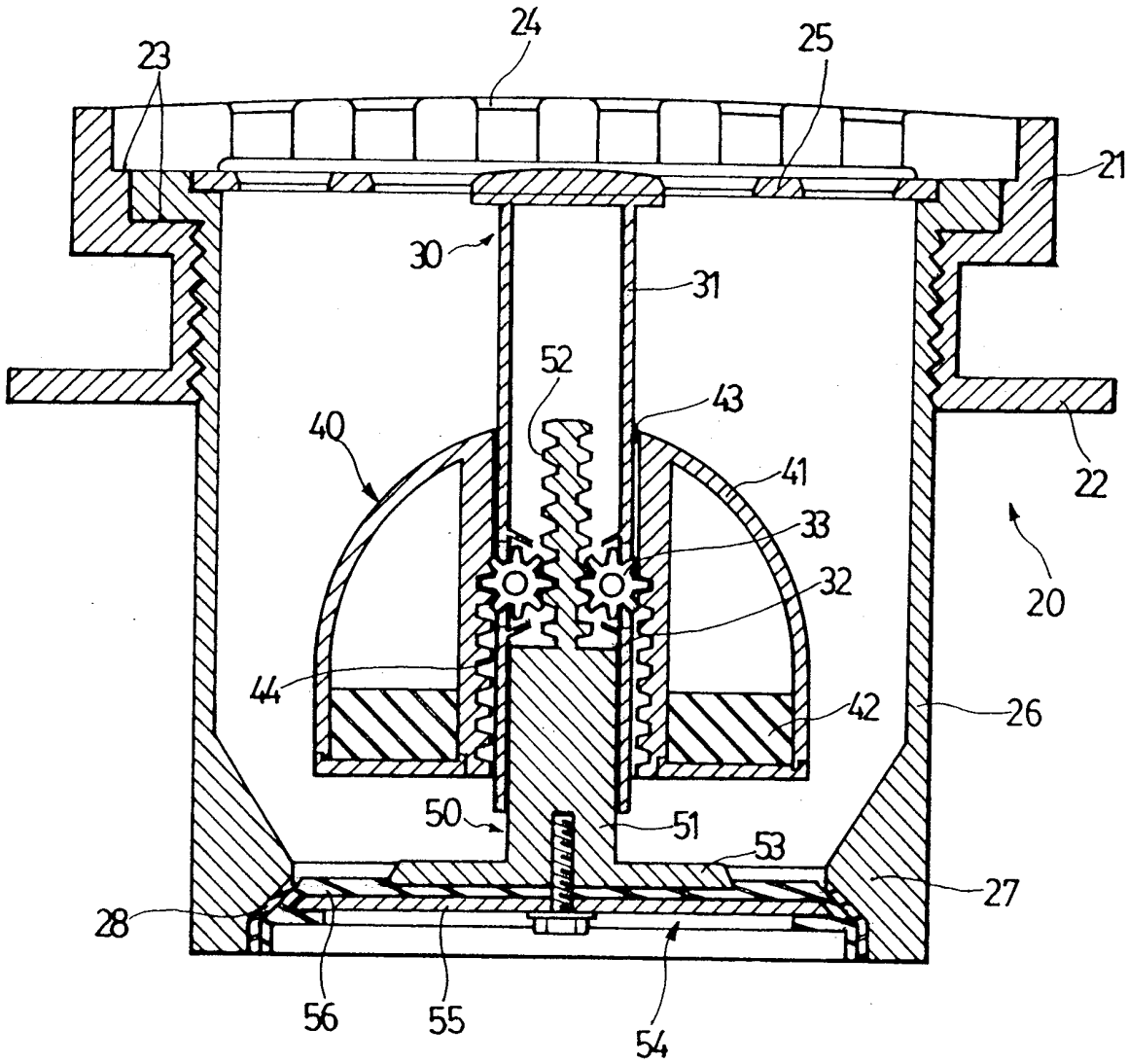

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Fig. 7a

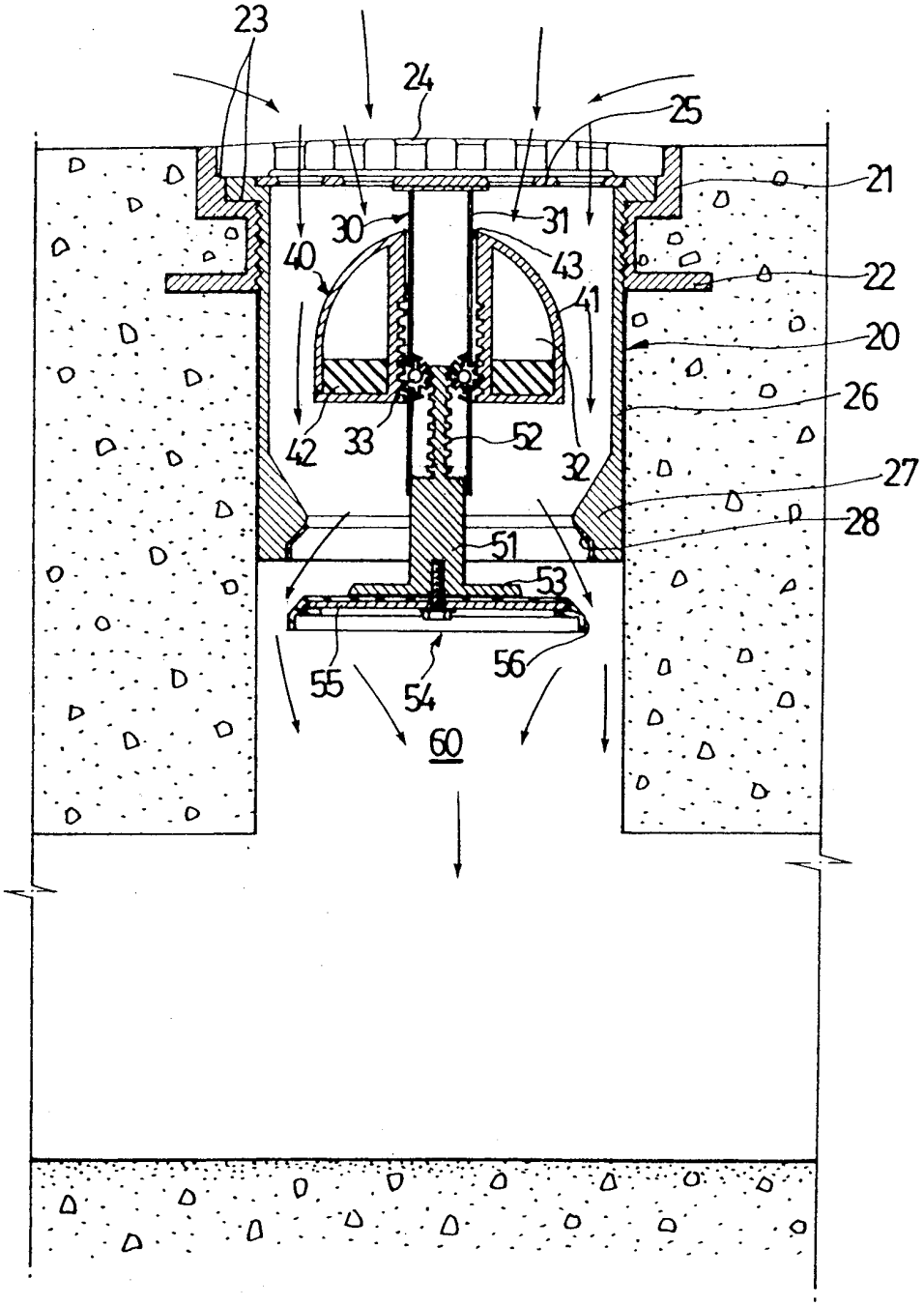


Fig. 7b

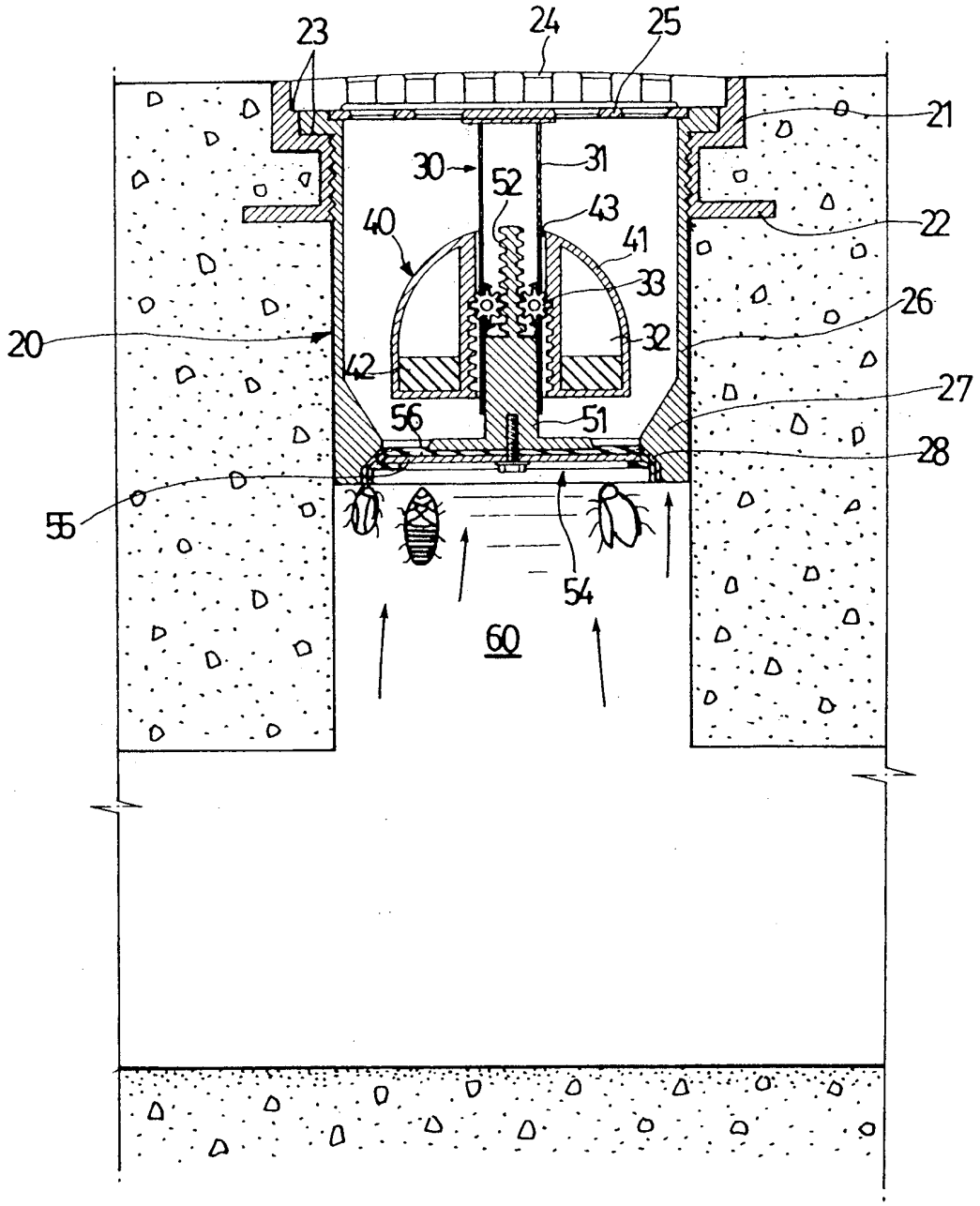


Fig. 8

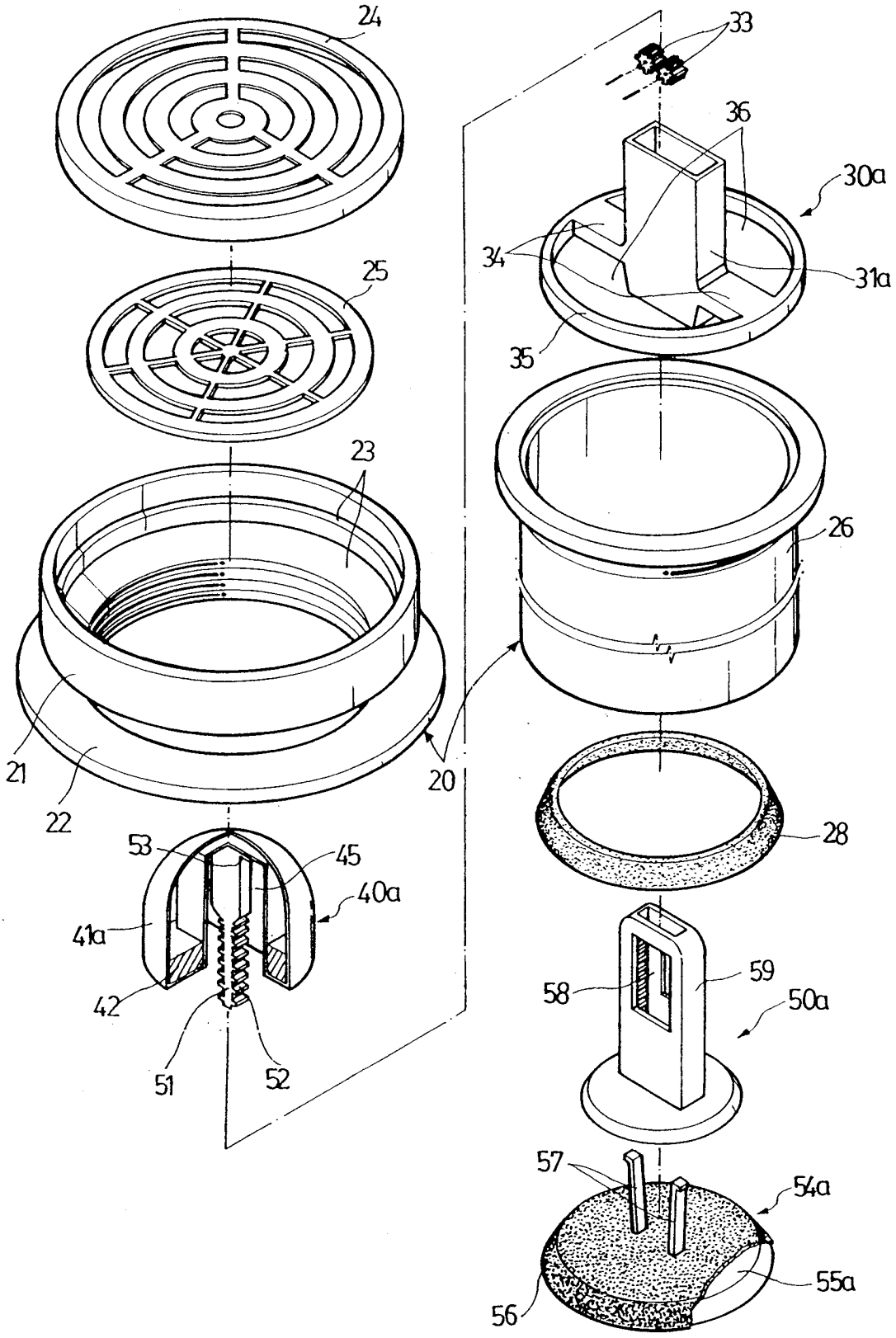

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Fig. 9

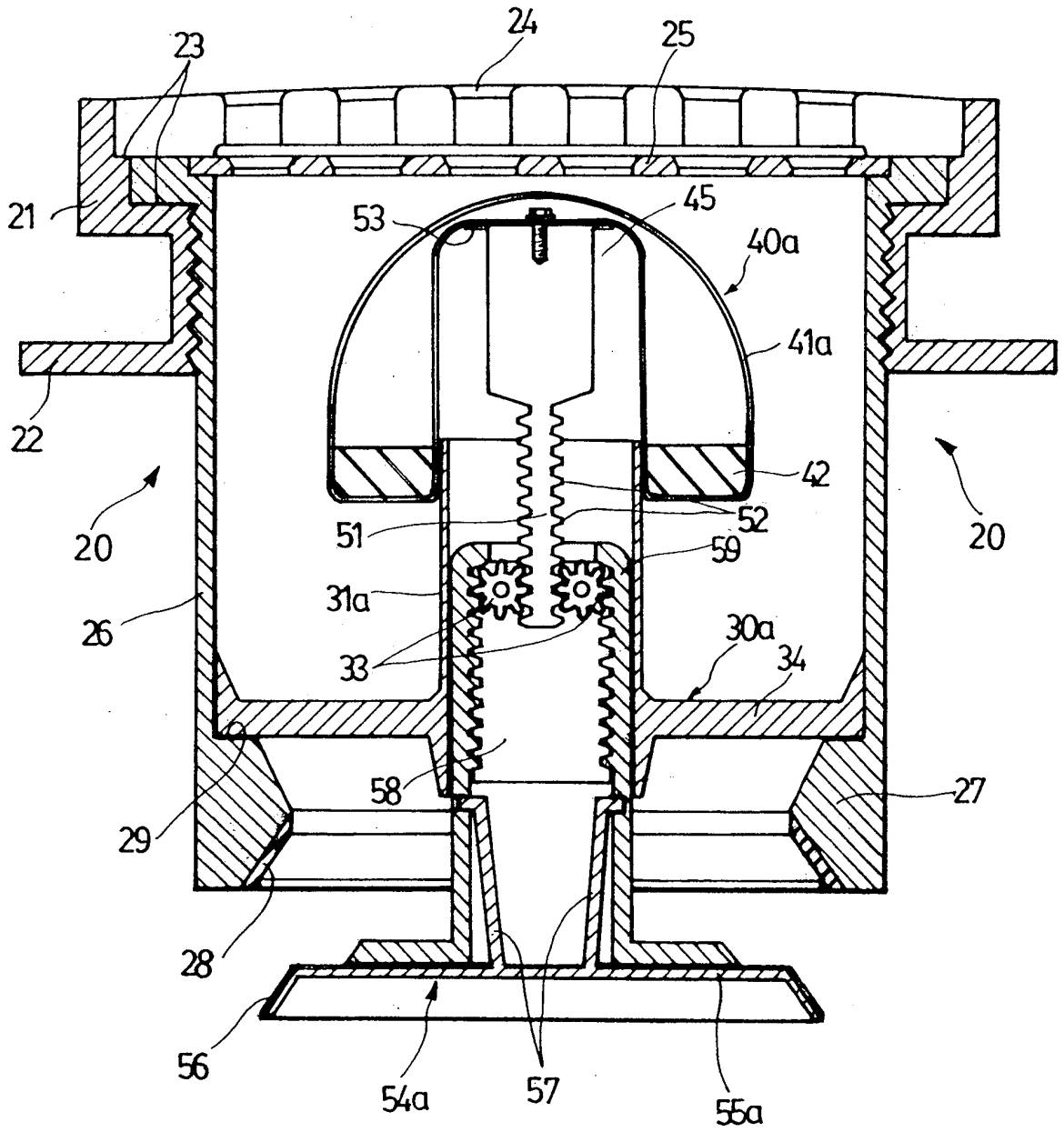

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Fig. 10a

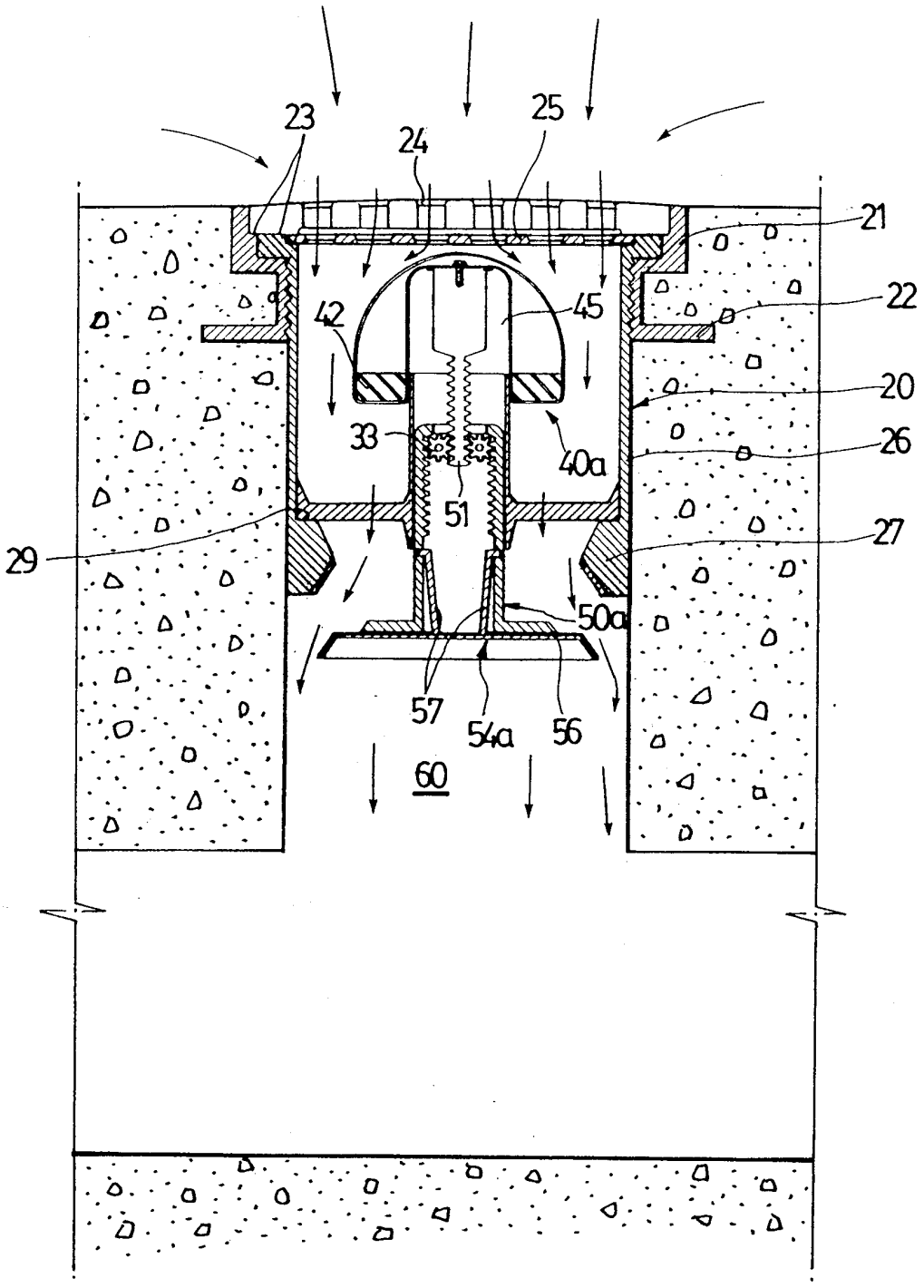
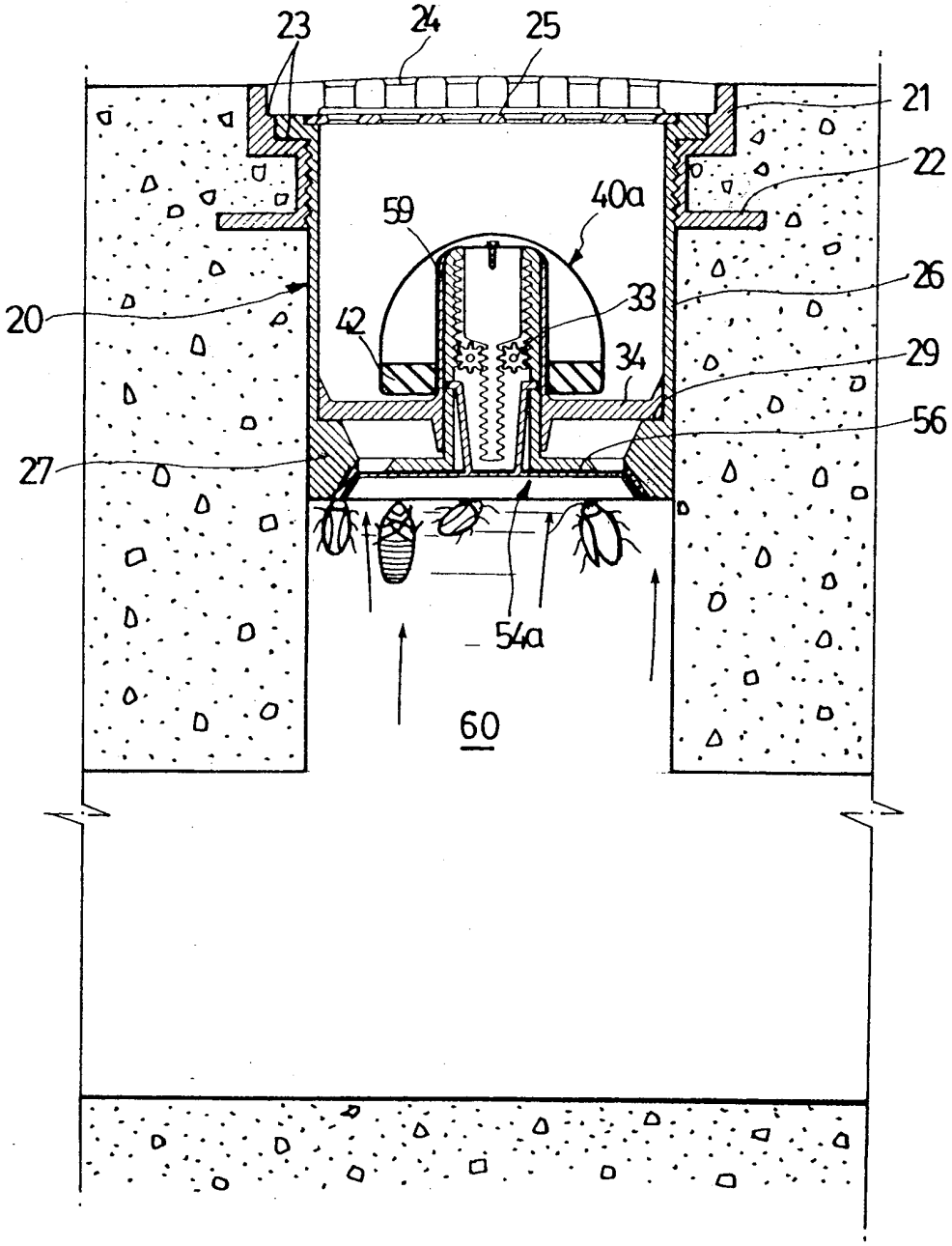


Fig. 10b



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00182

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: E 03 F 5/042; E 03 F 7/04; E 03 C 1/288

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[6]: E 03 F; E 03 C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 419 359 A (KOR), 30 May 1995 (30.05.95), especially fig.1,2,4,5.	1,2,4,6
A	FR 336 489 A (SCHMITT), 10 March 1904 (10.03.04).	1,2,6

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
„A" document defining the general state of the art which is not considered to be of particular relevance
„E" earlier application or patent but published on or after the international filing date
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„P" document published prior to the international filing date but later than the priority date claimed
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„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 June 1999 (22.06.99)	03 August 1999 (03.08.99)

Name and mailing adress of the ISA/AT	Authorized officer
Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Schneemann Telephone No. 1/53424/353

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR 99/00182

In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
US A 5419359	30-05-1995	CA AA 2142489 CA C 2142489	04-09-1995 09-01-1996
FR A 336489		keine - none - rien	