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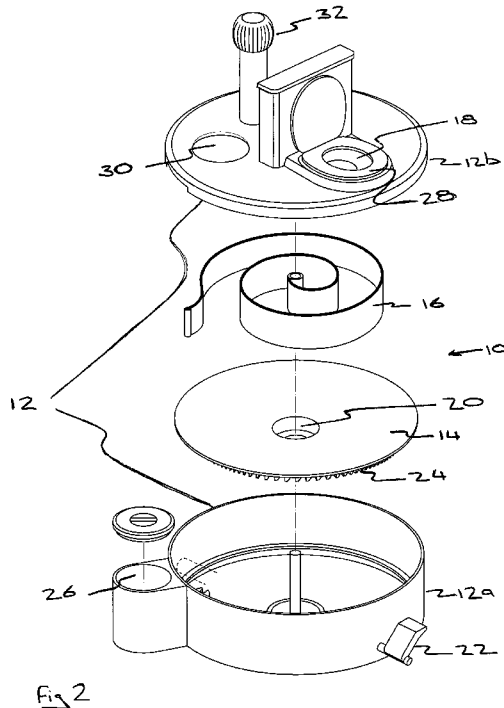
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(54) Title: WASTE DISPOSAL UNIT



(57) Abstract: A waste disposal unit (10) for desiccating solid waste in-
cludes a housing (12) with a disc (14) rotatably mounted therein. The hous-
ing (12) defines an inlet aperture (18) that permits solid and liquid waste
material to be deposited into the housing (12) and onto the disc (14). Liquid
waste material flows by the influence of gravity off the disc (14) into a li-
quids receptacle at or near the centre of the disc (14). A spiral scraper (16)
is located above the disc (14) and fixed against rotation relative to the housing
(12). Rotation of the disc (14) relative to the scraper (16) causes solid waste
material to spiral towards the outer perimeter of the disc (14) and into a
solids receptacle.



WASTE DISPOSAL UNIT

BACKGROUND

The present invention relates to a waste disposal unit. More particularly, the invention relates to a unit for disposing of human urine and faecal matter by separating the two components and drying the faecal matter.

Waste disposal units that dry waste material are known. For example: (i) WO03/045212 "Waste Disposal Apparatus" describes a unit that dries waste material on a rotating disc before scraping the material from the disc into a central receptacle; (ii) WO2004/107946 "Human Waste Disposal" describes a unit that conveys faecal matter along a channel while exposing it to solar radiation; and (iii) WO01/10279 "Human Waste Disposal Units" separates the urine and faecal matter and transports the faecal matter along a helical conveyor that "tumbles" and dries the faecal matter before depositing it into a receptacle.

Drawbacks of known desiccating waste disposal units of the drying type are that many fail properly to separate solid and liquid waste material. Some are somewhat bulky, and others adopt complex systems for the transport of solid waste material.

The waste disposal unit according to the preferred present invention aims to address these drawbacks by providing separate receptacles for solid and liquid waste material and conveying the solid material in a spiral.

SUMMARY OF THE INVENTION

According a preferred embodiment of the present invention there is provided a waste disposal unit that includes:

- a housing;

- a disc located within the housing;

- an inlet aperture defined by the housing that permits solid and liquid waste material to be deposited into the housing and onto the disc;

at least one scraper located within the housing and, in use, proximate the upper surface of the disc;

a liquids outlet at or near the centre of the disc for receiving liquid waste material flowing from the disc; and

a solids receptacle at or near the perimeter of the disc for receiving solid waste material scraped off the disc, wherein relative rotation of the disc and scraper causes the solid waste material to be displaced towards the perimeter of the disc and deposited into the solids receptacle.

Generally, the liquids outlet discharges liquid waste material into a liquids receptacle.

Typically, the disc is circular and defines a central aperture and the liquids receptacle is, in use, located below the central aperture.

Preferably, the inlet aperture is, in use, located above the disc and spaced radially inward from the perimeter of the disc.

Generally, the centroid of the inlet aperture is located between 25 and 45 centimetres, preferably 35 centimetres radially inward from the perimeter of the disc.

Typically, at least a portion of the disc is conical to facilitate gravitational flow of liquid waste material deposited via the inlet aperture towards the central aperture of the disc and through the liquids outlet.

Preferably, the scraper is in the form of a spiral having a radius that increases by between 10 and 30 centimetres, more preferably 20 centimetres per complete rotation. Optionally, the turns of the spiral tighten as the scraper spirals radially outwards. Alternatively, a plurality of scrapers define a virtual spiral concentric with the disc, wherein the radius of the virtual spiral increases by between 10 and 30 centimetres, more preferably 20 centimetres per complete rotation. Optionally, the turns of the virtual spiral tighten as the virtual spiral spirals radially outwards.

Generally, the lower edge of the at least one scraper is supported on the upper surface of the disc. Alternatively, the lower edge of the at least one scraper is spaced not more than 5 millimetres above the upper surface of the disc.

Typically, the housing further includes a ventilating means for drawing air through the inlet aperture, into the housing and out through an outlet vent.

Preferably, the outlet vent is located diametrically opposite the inlet aperture.

Generally, the waste disposal unit further includes a means for heating the interior of the housing.

Typically, the heating means is an aperture defined by the housing covered by a translucent dome, which permits solar radiation to penetrate and heat the inside of the housing.

Preferably, the actuating means causes incremental relative rotation between the disc and the scraper of between 10 and 35 degrees, more preferably 22.5 degrees.

Generally, the actuating means causes rotation of the disc within the housing while the scraper is rotatably fixed relative to the housing.

Typically, the actuating means includes a foot or hand actuated lever that extends outside the housing and wherein each actuation of the lever causes the disc to rotate by an increment.

Generally, a toilet seat is located over the inlet aperture.

Optionally, the disc defines radially extending ribs or channels to facilitate the flow of liquid waste material towards its centre.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a top perspective view of a waste disposal unit according to a preferred embodiment of the invention;

Figure 2 is an exploded top perspective view of the waste disposal unit in Figure 1;

- Figure 3** is a front view of the waste disposal unit in Figure 1;
- Figure 4** is a side view of the waste disposal unit in Figure 1;
- Figure 5** is a top view of the waste disposal unit in Figure 1 showing internal mechanisms; and
- Figure 6** is a cross-sectional view of the waste disposal unit along line A-A in Figure 5.

DESCRIPTION OF THE INVENTION

With reference to the Figures 1 to 4, according to a preferred embodiment of the invention a waste disposal unit 10 is provided for receiving human waste, separating solid and liquid waste material, drying the solid waste material and storing the liquid and dried solid waste material separately.

As illustrated in Figure 2, the waste disposal unit 10 comprises a housing 12, disc 14 and scraper 16.

The housing 12 includes a container 12a and cover 12b. The container 12a comprises a right circular cylindrical portion with base, and the circular cover 12b fits over and closes the open end of the container 12a. The cover 12b defines an inlet aperture 18 for receiving waste material into the housing 12.

The disc 14 is circular in shape, made from a material with a low friction co-efficient and defines an aperture 20 at its centre that acts as an outlet for liquid waste material flowing off the disc 14. As is apparent from Figure 6, the disc 14 is conical, sloping downwards from its perimeter to its centre.

The scraper 16 is made from a rectangular sheet of low friction co-efficient material formed into a spiral that increases in radius by between 10 and 30 centimetres, preferably 20 centimetres per 360 degree rotation.

The disc 14 and scraper 16 are both located within the housing 12. However, whereas the disc 14 is rotatable within the housing 12, the scraper 16 and housing 12 are fixed against

relative rotation. The scraper 16 is supported on the disc 14. Alternatively, the scraper 16 may be spaced above the disc 14 by no more than 5 millimetres.

An actuating means rotates the disc 14 within the housing 12. The actuating means comprises a ratchet including a foot lever 22 extending from the housing proximal the inlet aperture 18 and corresponding teeth 24 on the underside of the disc 14. Each cycle of the foot lever 22 causes an incremental rotation of the disc 14 of between 10 and 35 degrees, preferably 22.5 degrees.

With reference to Figure 5, a liquids receptacle 24 is located at the centre of the disc 14, below the central aperture 20 / liquids outlet. And, a solids receptacle 26 is located at the perimeter of the disc 14, by the terminal end of the scraper 16.

Referring back to Figures 1 to 4, a toilet seat assembly is located on the housing 12, framing the inlet aperture 18 and the centroid of the inlet aperture 18 is located between 25 and 45 centimetres, preferably 35 centimetres radially inward from the perimeter of the disc 14.

A heating means is included to increase the temperature within the housing 12 and accelerate drying of solid waste material on the disc 14. The inside of the housing 12 is preferably heated to above 60 degrees Celsius. With reference to Figure 1, the heating means comprises a translucent dome 30 covering an aperture defined by the housing cover 12b. The dome 30 permits solar radiation to enter into and heat the interior of the housing 12.

A ventilating means 32 located diametrically opposite the inlet aperture 18 facilitates movement of air via the inlet aperture 18, through the housing 12 and out via an outlet vent 32. The primary purpose of such circulation is to inhibit egress of foul air from the housing via the inlet aperture 18. However, it also assists in drying solid waste material deposited on the disk 14.

We now turn to Figure 5 to describe the waste disposal unit 10 in action. A user sits on the toilet seat 28 and deposits urine and faeces on the disc 14 through the inlet aperture 18. The urine flows, under the influence of gravity, down towards the centre of the conical disc 14, through the central aperture 20 and into the liquids receptacle 24. But the faeces, due to the friction between the faeces and disc 14 and/or barrier presented by the scraper 16, remains in place on the disc 14. The user then pushes down on the foot lever 22 to rotate the disc 14 by 22.5 degrees, which rotation is sufficient to shift the faeces out of direct view of the

subsequent user standing over the inlet aperture 18. The circulation of air by the ventilating means 32 prevents malodours from escaping through the inlet aperture 18 and the heating means 30 accelerates drying of the faeces. Each subsequent actuation of the foot lever 22 causes the disc 14 to rotate incrementally relative to the static spiral scraper 16 with the faeces bearing against the scraper 16 and pushed thereby towards the perimeter of the disc 14. Since the increased radius of the scraper 16 per 360 degree rotation mirrors the diameter of the inlet aperture 18, when the disc 14 has completed a 360 degree rotation, the previously deposited faeces is not visible to new users through the inlet aperture 18. Continued rotation of the disc 14 causes displacement of the faeces further towards the perimeter of the disc 14 until the scraper 16 pushes the now dried faeces off the disc 14 and into the solids receptacle 26.

The liquids and solids receptacles 24 and 26 are emptied from time to time.

It will be appreciated that:

- (i) The disc 14 may include channels or ridges (not shown) to facilitate channelling of urine towards the central aperture 20.
- (ii) Instead of including a single spiral scraper 16, the waste disposal unit 10 may include a plurality of scrapers spaced and oriented along a virtual spiral concentric with the circular disc 14. As with the spiral scraper 16, the radius of the virtual spiral increases by between 10 and 30 centimetres, preferably 20 centimetres per complete rotation. In such embodiment, the faeces does not bear continuously against the scraper, but is rotated on the disc until the faeces bears against the series of scrapers and is thereby displaced incrementally radially outwards along the disc.
- (iii) The spiral scraper or virtual spiral may "tighten" along its radius, i.e. the radial increase of the spiral per outwards rotation may decrease.
- (iv) Liquid waste material flowing off the disc may also be discharged via the liquids outlet into a French drain, in which arrangement a liquids receptacle is not required.
- (v) The foot lever 22 could be substituted with a hand operated lever.
- (vi) The waste disposal unit could include a chute to channel waste material deposited through the inlet aperture 18 further towards the centre of the disc 14.
- (vii) The ventilating means 32 can be located at any point on the housing, preferably near the perimeter thereof.

CLAIMS

1. A waste disposal unit including:

a housing;

a disc located within the housing;

an inlet aperture defined by the housing that permits solid and liquid waste material to be deposited into the housing and onto the disc;

at least one scraper located within the housing and, in use, proximate the upper surface of the disc;

a liquids outlet at or near the centre of the disc for receiving liquid waste material flowing from the disc; and

a solids receptacle at or near the perimeter of the disc for receiving solid waste material scraped off the disc,

wherein relative rotation of the disc and scraper causes the solid waste material to be displaced towards the perimeter of the disc and deposited into the solids receptacle.

2. A waste disposal unit according to claim 1, wherein the disc is circular and defines a central aperture.
3. A waste disposal unit according to claim 2, wherein the liquids outlet discharges liquid waste material into a liquids receptacle.
4. A waste disposal unit according to claim 3, wherein the liquids receptacle is, in use, located below the central aperture.
5. A waste disposal unit according to any one of the preceding claims, wherein the inlet aperture is, in use, located above the disc and spaced radially inward from the perimeter of the disc.

6. A waste disposal unit according to claim 5, wherein the centroid of the inlet aperture is located between 25 and 45 centimetres radially inward from the perimeter of the disc.
7. A waste disposal unit according to claim 6, wherein the centroid of the inlet aperture is located 35 centimetres radially inward from the perimeter of the disc.
8. A waste disposal unit according to any one of the preceding claims, wherein at least a portion of the disc is conical to facilitate gravitational flow of liquid waste material deposited via the inlet aperture towards the central aperture of the disc and through the liquids outlet.
9. A waste disposal unit according to any one of the preceding claims, wherein the scraper is in the form of a spiral.
10. A waste disposal unit according to claim 9, wherein the radius of the spiral increases by between 10 and 30 centimetres per complete rotation.
11. A waste disposal unit according to claim 10, wherein the radius of the spiral increases by 20 centimetres per complete rotation.
12. A waste disposal unit according to claim 10, wherein the turns of the spiral tighten as the scraper spirals radially outwards.
13. A waste disposal unit according to any one of claims 1 to 8 wherein a plurality of scrapers define a virtual spiral concentric with the disc.
14. A waste disposal unit according to claim 13, wherein the radius of the virtual spiral increases by between 10 and 30 centimetres per complete rotation.
15. A waste disposal unit according to claim 14, wherein the radius of the virtual spiral increases by 20 centimetres per complete rotation.
16. A waste disposal unit according to claim 15, wherein the turns of the virtual spiral tighten as the virtual spiral spirals radially outwards.
17. A waste disposal unit according to any one of claims 9 to 16, wherein, in use, the lower edge of the at least one scraper is supported on the surface of the disc.

18. A waste disposal unit according to any one of claims 9 to 16, wherein, in use, the lower edge of the at least one scraper is spaced not more than 5 millimetres above the upper surface of the disc.
19. A waste disposal unit according to any one of the preceding claims, wherein the housing further includes a ventilating means for drawing air through the inlet aperture, into the housing and out through an outlet vent.
20. A waste disposal unit according to claim 19, wherein the outlet vent is located diametrically opposite the inlet aperture.
21. A waste disposal unit according to any one of the preceding claims further including a means for heating the interior of the housing.
22. A waste disposal unit according to claim 21, wherein the heating means is an aperture defined by the housing covered by a translucent dome, which permits solar radiation to penetrate and heat the inside of the housing.
23. A waste disposal unit according to any one of the preceding claims, wherein the actuating means causes incremental relative rotation between the disc and the scraper of between 10 and 35 degrees.
24. A waste disposal unit according to claim 23, wherein the actuating means causes incremental relative rotation between the disc and the scraper of 22.5 degrees.
25. A waste disposal unit according to either claim 23 or claim 24, wherein: (i) the actuating means causes rotation of the disc within the housing; and (ii) the scraper is rotatably fixed relative to the housing.
26. A waste disposal unit according to claim 25, wherein the actuating means includes a foot or hand actuated lever that extends outside the housing.
27. A waste disposal unit according to claim 26, wherein each actuation of the lever causes the disc to rotate by an increment.
28. A waste disposal unit according to any one of the preceding claims further including a toilet seat located over the inlet aperture.

29. A waste disposal unit according to any one of the preceding claims, wherein the disc defines radially extending ribs or channels to facilitate the flow of liquid waste material towards its centre.

AMENDED CLAIMS
received by the International Bureau on 03 May 2012 (03.05.2012)

1. A waste disposal unit including:
 - a housing;
 - a disc located within the housing;
 - an inlet aperture defined by the housing that permits solid and liquid waste material to be deposited into the housing and onto the disc;
 - at least one scraper located within the housing and, in use, proximate the upper surface of the disc;
 - a liquids outlet at or near the centre of the disc for receiving liquid waste material flowing from the disc; and
 - a solids receptacle for receiving solid waste material displaced away from the centre of the disc,wherein relative rotation of the disc and scraper causes the solid waste material to be displaced towards the perimeter of the disc for depositing in the solids receptacle.
2. A waste disposal unit according to claim 1, wherein the disc is circular and defines a central aperture.
3. A waste disposal unit according to claim 2, wherein the liquids outlet discharges liquid waste material into a liquids receptacle.
4. A waste disposal unit according to claim 3, wherein the liquids receptacle is, in use, located below the central aperture.
5. A waste disposal unit according to any one of the preceding claims, wherein the inlet aperture is, in use, located above the disc and spaced radially inward from the perimeter of the disc.

6. A waste disposal unit according to claim 5, wherein the centroid of the inlet aperture is located between 25 and 45 centimetres radially inward from the perimeter of the disc.
7. A waste disposal unit according to claim 6, wherein the centroid of the inlet aperture is located 35 centimetres radially inward from the perimeter of the disc.
8. A waste disposal unit according to any one of the preceding claims, wherein at least a portion of the disc is conical to facilitate gravitational flow of liquid waste material deposited via the inlet aperture towards the central aperture of the disc and through the liquids outlet.
9. A waste disposal unit according to any one of the preceding claims, wherein the scraper is in the form of a spiral.
10. A waste disposal unit according to claim 9, wherein the radius of the spiral increases by between 10 and 30 centimetres per complete rotation.
11. A waste disposal unit according to claim 10, wherein the radius of the spiral increases by 20 centimetres per complete rotation.
12. A waste disposal unit according to claim 10, wherein the turns of the spiral tighten as the scraper spirals radially outwards.
13. A waste disposal unit according to any one of claims 1 to 8 wherein a plurality of scrapers define a virtual spiral concentric with the disc.
14. A waste disposal unit according to claim 13, wherein the radius of the virtual spiral increases by between 10 and 30 centimetres per complete rotation.
15. A waste disposal unit according to claim 14, wherein the radius of the virtual spiral increases by 20 centimetres per complete rotation.
16. A waste disposal unit according to claim 15, wherein the turns of the virtual spiral tighten as the virtual spiral spirals radially outwards.
17. A waste disposal unit according to any one of claims 9 to 16, wherein, in use, the lower edge of the at least one scraper is supported on the surface of the disc.

18. A waste disposal unit according to any one of claims 9 to 16, wherein, in use, the lower edge of the at least one scraper is spaced not more than 5 millimetres above the upper surface of the disc.
19. A waste disposal unit according to any one of the preceding claims, wherein the housing further includes a ventilating means for drawing air through the inlet aperture, into the housing and out through an outlet vent.
20. A waste disposal unit according to claim 19, wherein the outlet vent is located diametrically opposite the inlet aperture.
21. A waste disposal unit according to any one of the preceding claims further including a means for heating the interior of the housing.
22. A waste disposal unit according to claim 21, wherein the heating means is an aperture defined by the housing covered by a translucent dome, which permits solar radiation to penetrate and heat the inside of the housing.
23. A waste disposal unit according to any one of the preceding claims, wherein the waste disposal unit further includes an actuating means for causing incremental relative rotation between the disc and the scraper of between 10 and 35 degrees.
24. A waste disposal unit according to claim 23, wherein the actuating means causes incremental relative rotation between the disc and the scraper of 22.5 degrees.
25. A waste disposal unit according to either claim 23 or claim 24, wherein: (i) the actuating means causes rotation of the disc within the housing; and (ii) the scraper is rotatably fixed relative to the housing.
26. A waste disposal unit according to claim 25, wherein the actuating means includes a foot or hand actuated lever that extends outside the housing.
27. A waste disposal unit according to claim 26, wherein each actuation of the lever causes the disc to rotate by an increment.
28. A waste disposal unit according to any one of the preceding claims further including a toilet seat located over the inlet aperture.

29. A waste disposal unit according to any one of the preceding claims, wherein the disc defines radially extending ribs or channels to facilitate the flow of liquid waste material towards its centre.
30. A waste disposal unit according to any one of the preceding claims, wherein the solids receptacle is located at or near the perimeter of the disc and receives solid waste material scraped off the disc.

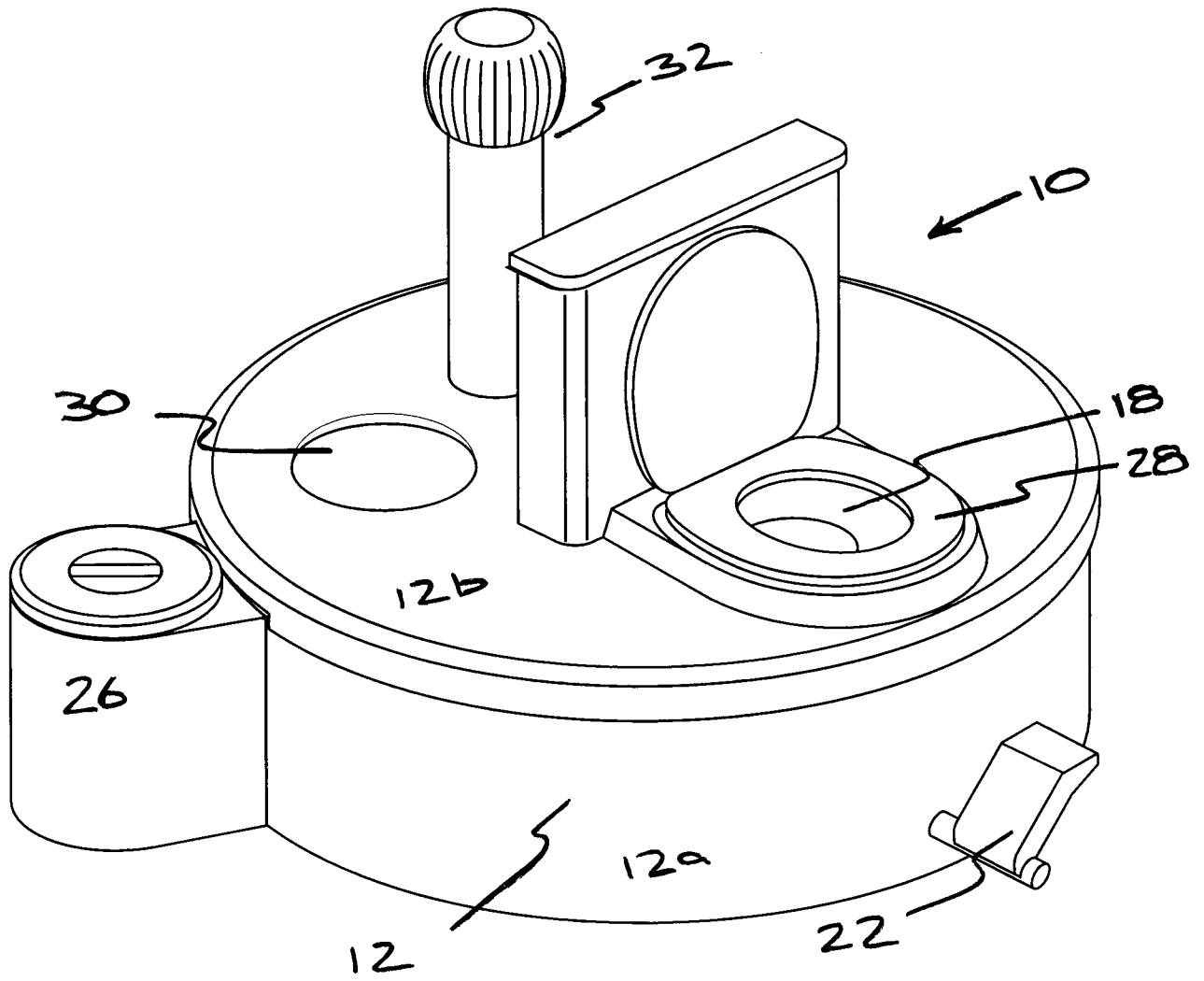


Fig 1

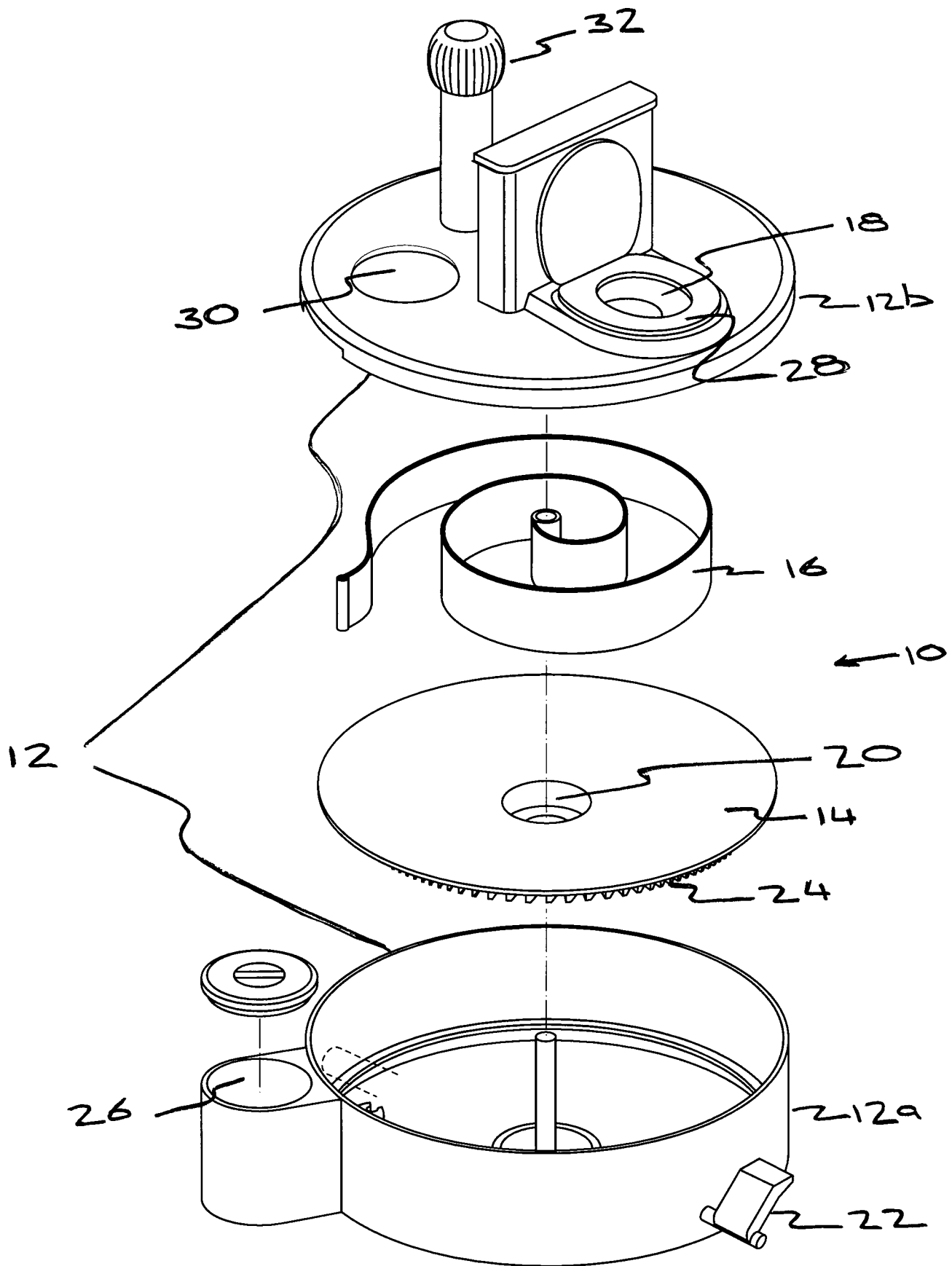
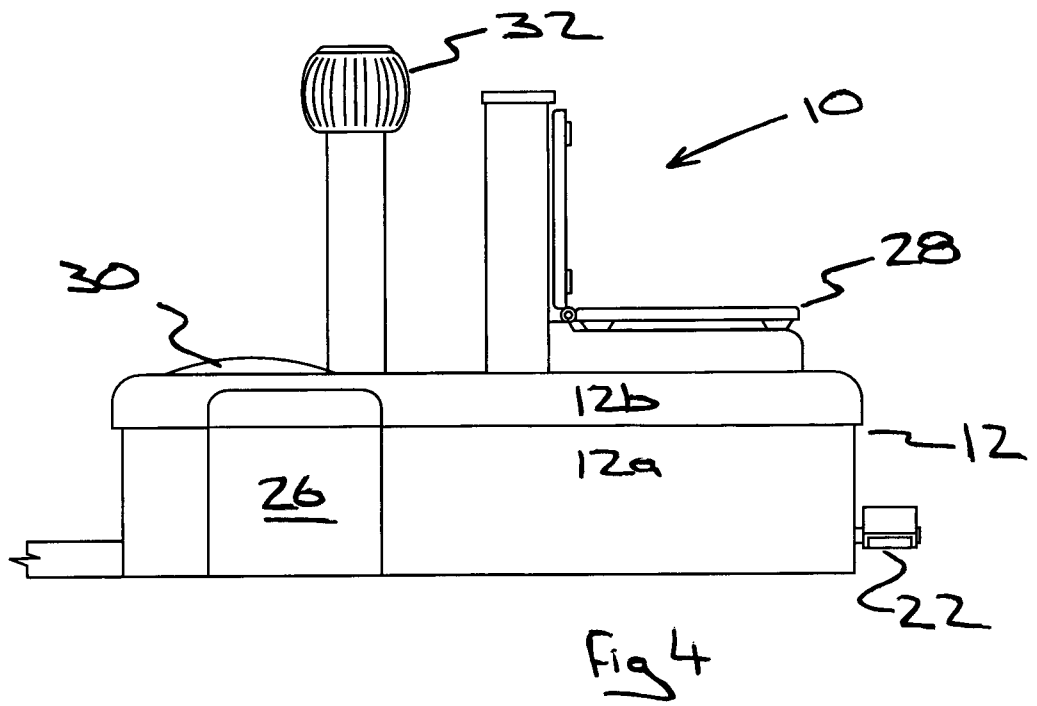
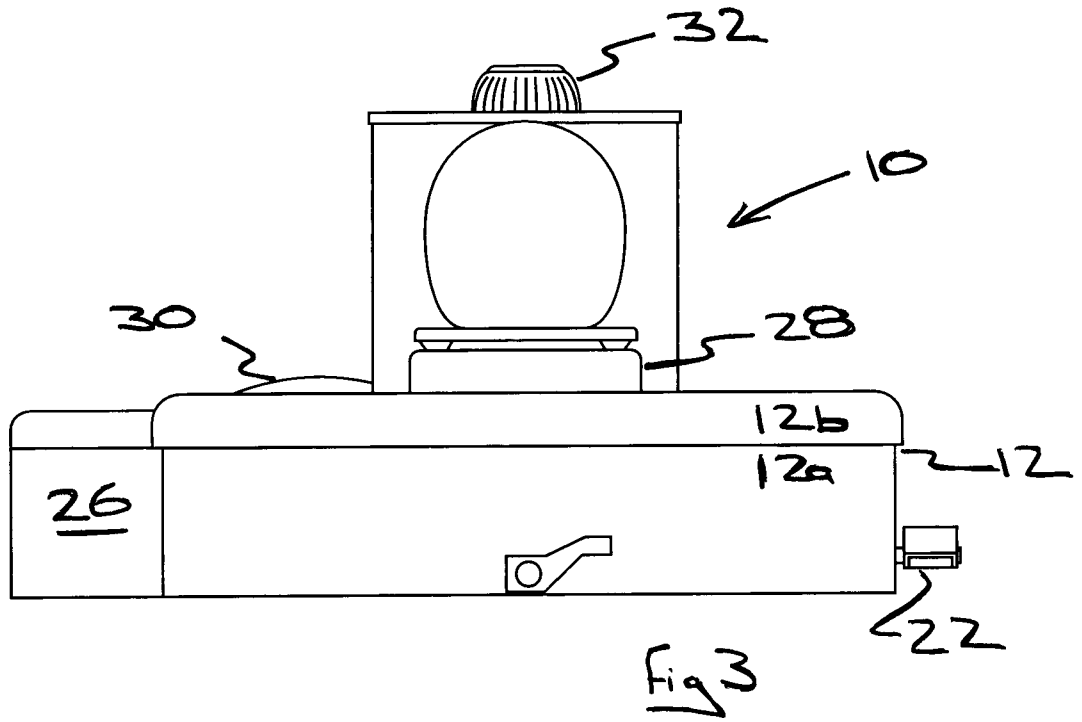


Fig 2



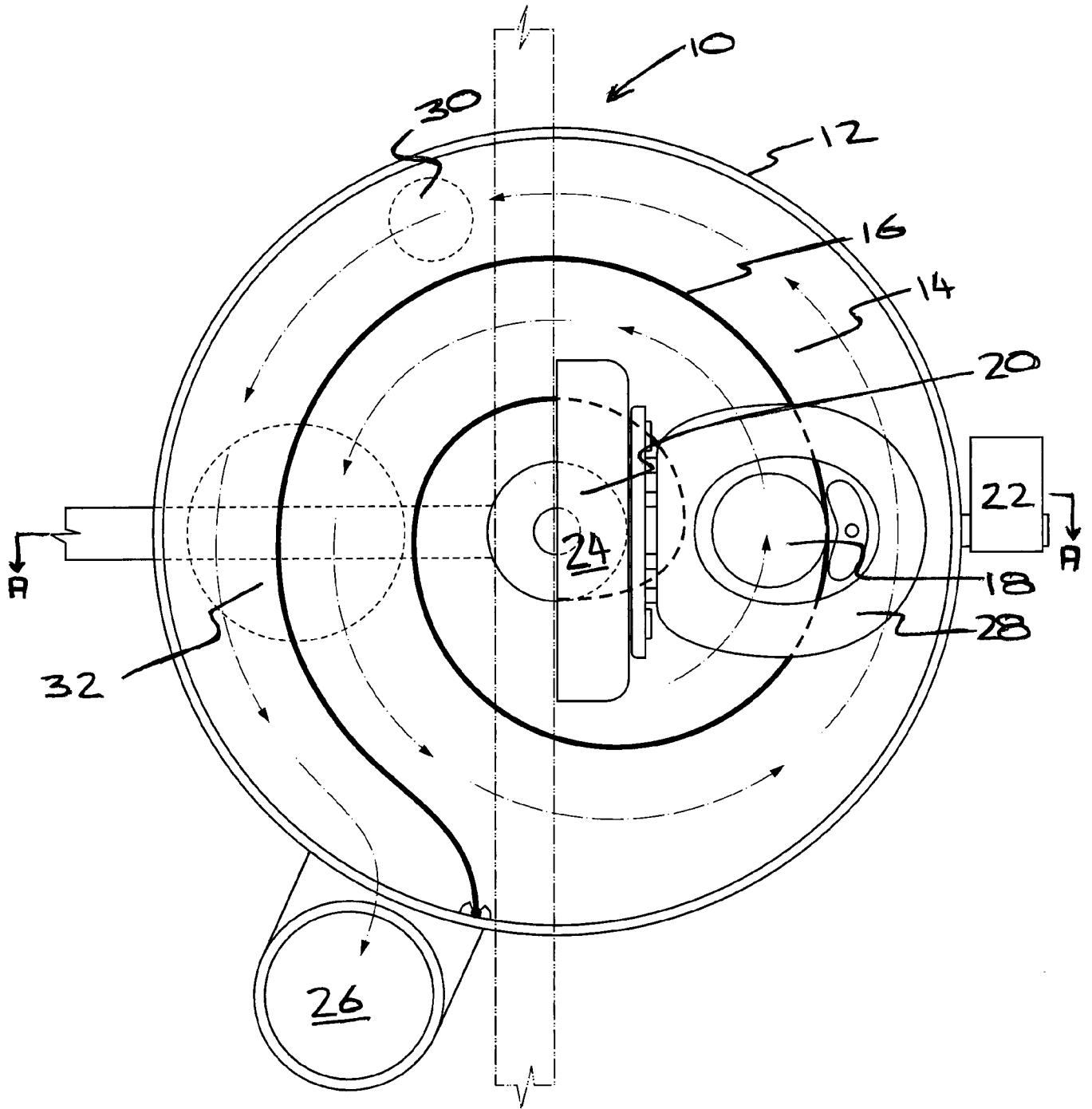
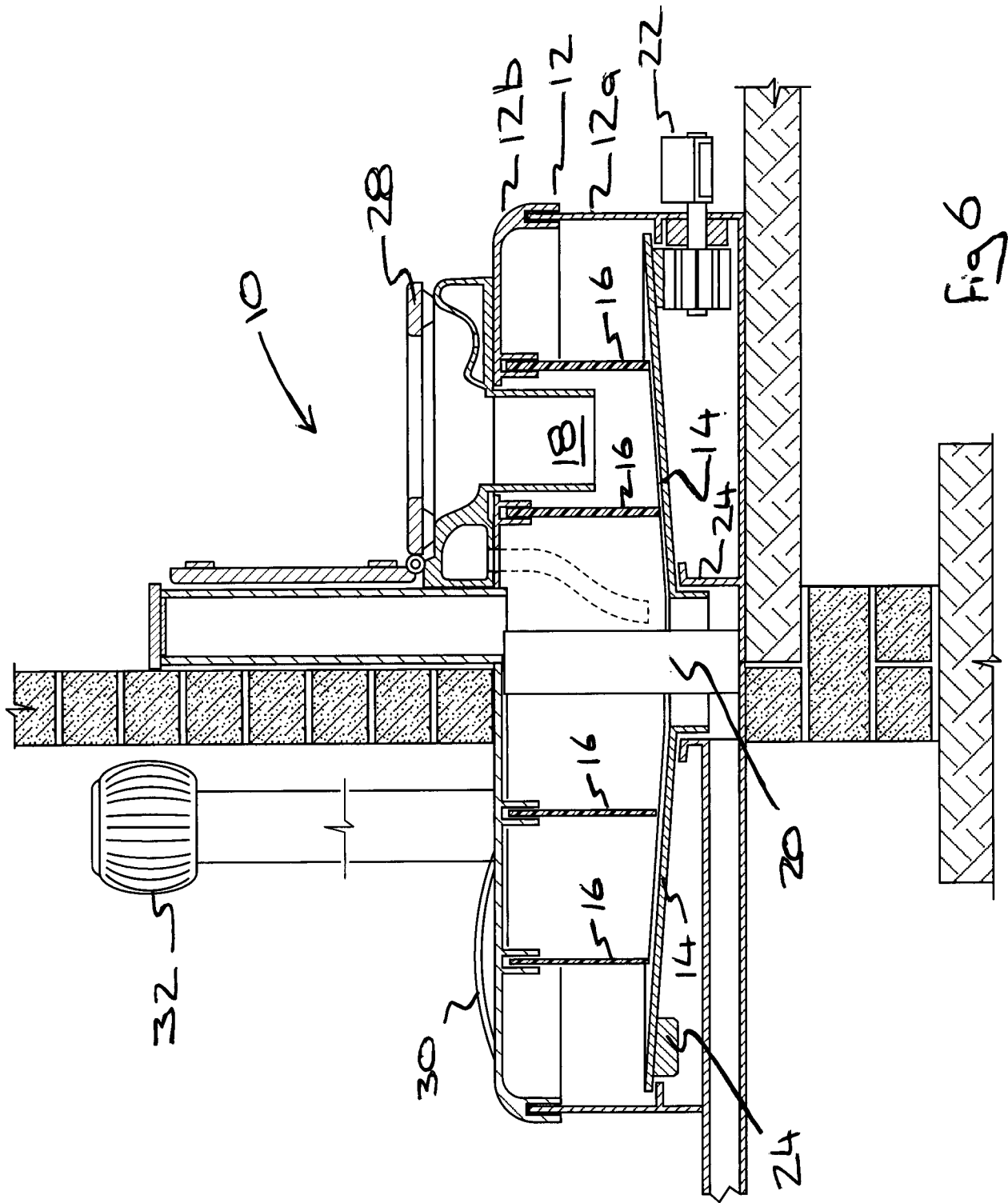


Fig 5



INTERNATIONAL SEARCH REPORT

International application No.

PCT / ZA 2012/000001

A. CLASSIFICATION OF SUBJECT MATTER IPC: A47K 11/02 (2006.01) 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) A47K, E03D, C05F 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) EPODOC, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2003045212 A1 (HARRIS) 05 June 2003 (05.06.2003) figures	1-29
A	DE 3991055 C2 (YLÖSJOKI) 17 November 1994 (17.11.1994) figures	1-29
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 11 April 2012 (11.04.2012)		Date of mailing of the international search report 20 April 2012 (20.04.2012)
Name and mailing address of the ISA/AT Austrian Patent Office Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24-535		Authorized officer WANKMÜLLER A. Telephone No. +43 / 1 / 534 24-415

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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