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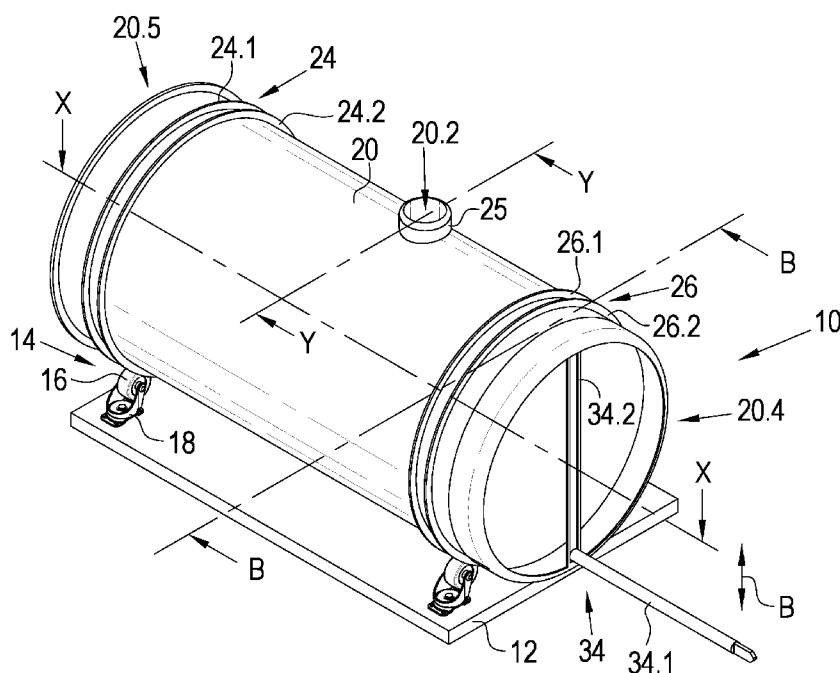


Fig. 1

(57) Abstract: This invention relates to a washing apparatus (10) for washing articles such as clothes. The washing apparatus (10) comprises a washer receptacle (20) defining an internal loading zone (L) accessible via at least one closable opening (20.1) for receiving articles, wherein the washer receptacle (20) defines at least one outer cylindrical portion which comprises at least one guide track arrangement (24, 26) for reliable engagement with one or more engagement formations (14) of a base (12); at least one fillable flywheel device (28) arranged with the washer receptacle (20), wherein the at least one fillable flywheel device (28) is fillable with a fillable material; and a handle arrangement (34) attachable to the washer receptacle (20), wherein the handle arrangement (34) is operable to bring about rotation of the washer receptacle (20) about at least one of its axes relative to the one or more engagement formations (14).

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WASHING APPARATUS

FIELD OF THE INVENTION

5 THIS INVENTION relates to a washing apparatus, particularly to a washing apparatus for washing fabric articles, for example, clothes.

BACKGROUND OF THE INVENTION

10 Manual washing of fabric materials such as clothes by hand is a tedious chore which often involves a clothes washer transporting clothes to be washed to a source of water and washing the clothes by hand with suitable chemicals, usually in the form of detergents/soaps.

15 In rural areas, the source of water typically is a river, stream etc. and manual washing and/or rinsing of clothes in running water is undesirable as it may result in contaminants from detergents/soaps being released into the water, polluting same. The polluting of the water has a negative environmental effect on the aquatic ecosystem and negative ramifications downstream. Moreover, washing clothes by hand is often very time consuming, not to mention labour intensive and tedious on the part of the clothes washer.

20 Apparatuses have been provided over the years to aid manual washing of clothes. However, many of these apparatuses are still very labour intensive in order to achieve desired results. For example, the Applicant is aware of an apparatus that is provided with a hollow receptacle rotatably attached to a frame at one or two attachment points, wherein clothes to be washed is placed in the receptacle together
25 with detergent and water. The receptacle is then rotated about the attachment points relative to the frame via a manual crank which essentially causes the clothes with the detergent water in the receptacle to be agitated thus aiding the washing thereof. One major drawback associated with such an apparatus is that the crank still requires a fair amount of labour to bring about desired rotation of the receptacle.
30 Moreover, the prior art apparatuses are expensive to manufacture, as well as heavy

to carry and bulky to store. This is true with apparatuses with complicated heavy frames.

It is thus an object of the present invention to provide a washing apparatus for washing articles manually which is different and less labour intensive than other manual washing apparatuses and means, as well as lighter in weight and requires less spaced to store.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a washing apparatus for washing articles, the washing apparatus comprising:

a washer receptacle defining an internal loading zone accessible via at least one closable opening for receiving articles, wherein the washer receptacle defines at least one outer cylindrical portion which comprises at least one guide track arrangement for rollable engagement with one or more engagement formations of a base;

at least one fillable flywheel device arranged with the washer receptacle, wherein the at least one fillable flywheel device is fillable with a fillable material; and

a handle arrangement attachable to the washer receptacle, wherein the handle arrangement is operable to bring about rotation of the washer receptacle about at least one of its axes relative to the one or more engagement formations.

The apparatus may comprise the base.

The engagement formations may be in the form of rollers.

In a preferred example embodiment, the washer receptacle may be in the form of a hollow cylindrical receptacle extending along a longitudinal axis.

The base may comprise a plurality of rollers arranged to form a cradle; and the washer receptacle may comprise a plurality of guide tracks for engagement with the rollers of the cradle. It will be noted that the washer receptacle may be arranged to rest on and rotate relative to the cradle, in use.

The guide tracks may be circumferentially extending tracks on the washer receptacle.

The guide tracks may be provided as circumferentially extending grooves. Instead, or in addition, the guide tracks may be defined by circumferentially
5 extending flanges.

In one example embodiment, the cradle may comprise a pair of longitudinally spaced rollers, wherein each roller of the pair of rollers are transversely spaced and aligned. The washer receptacle may comprise a pair of longitudinally spaced guide tracks spaced at a length corresponding substantially to the longitudinal spacing of
10 the pair of rollers.

Each roller may be raised from the base by way of a suitable mount to permit free rotation of the washing receptacle relative thereto. The mount may be fixedly attached to the base. In one example embodiment, the mount may be a swivel mount to permit the rollers to swivel.

15 The guide tracks may be shaped and/or dimensioned to engage with the rollers of the cradle to limit longitudinal and transverse displacement of the washer receptacle, in use.

The fillable flywheel device may extend along a longitudinal axis of the washer receptacle.

20 In one example embodiment the flywheel device may be in the form of longitudinally extending compartment arranged with the washer receptacle. The compartment may be externally located and attached to the washer receptacle. Alternately, the compartment may be internally located in the washer receptacle.

The compartment may comprise at least one closable opening to permit at
25 least filling of the flywheel device with flowable material, for example, a fluid, or particulate material.

In one example embodiment, the flywheel device may comprise a compartment wall extending longitudinally within the washer receptacle between two closed ends thereof so as to define the compartment. The compartment wall is
30 typically attached to an interior surface/ wall of the washer receptacle.

It will be noted that in some example embodiments, the flywheel device may be external to the receptacle. In other example embodiments, the flywheel device may be partially internal and partially external to the receptacle. Moreover, it will note that the apparatus may comprise more than one flywheel device.

5 The washing receptacle may comprise a filling opening. In some example embodiments, the washing receptacle may comprise a drainage opening.

It will be noted that the openings may be closable by way of associated caps which sealingly engage with the openings.

10 The handle arrangement may be attached to one end of the washer receptacle. The handle arrangement may comprise a handle; and a guide track extending transverse to the longitudinal axis of the washer receptacle, wherein the handle is attached to the guide tracks and displaceable relative thereto.

The washing receptacle may comprise a plurality of longitudinally extending and radially projecting ridges provided on an internal surface wall thereof.

15

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a perspective view of a washing apparatus in accordance with an example embodiment of the invention, with the handle in a first position;

20 **Fig. 2** shows a perspective view of a washing apparatus in accordance with an example embodiment of the invention, with the handle in a second position;

25 **Fig. 3** shows a perspective view of a washing apparatus in accordance with an example embodiment of the invention, with the handle in a third position;

Fig. 4 shows an end view of a washing apparatus in accordance with an example embodiment of the invention

Fig. 5 shows an opposite end view of a washing apparatus in accordance with an example embodiment of the invention

Fig. 6 shows a sectional view of the washing apparatus of Figure 1 at X-X;

Fig. 7 shows a sectional view of the washing apparatus of Figure 1 at Y-Y;

Fig. 8 shows a side view of a washing apparatus in accordance with another example embodiment of the invention;

5 **Fig. 9** shows another sectional view of the washing apparatus of Fig. 8 at Z-Z in accordance with an example embodiment of the invention;

Fig. 10 shows another side view of the washing apparatus of Fig. 8 in accordance with an example embodiment of the invention;

10 **Fig. 11** shows another part-sectional view of the washing apparatus of Fig. 8 in accordance with an example embodiment of the invention; and

Fig. 12 shows another side view of the washing apparatus of Fig. 8 in accordance with an example embodiment of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

15 In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of an embodiment of the present disclosure. It will be evident, however, to one skilled in the art that the present disclosure may be practiced without these specific details.

20 Referring to Figures 1 to 7 of the drawings, a washing apparatus in accordance with an example embodiment of the invention is generally indicated by reference numeral 10. The drawings will be discussed collectively but attention will be drawn to certain of the drawings where the drawing indicates a particular aspect of the invention more clearly.

25 The washing apparatus 10 typically finds application in manual washing of articles such as clothes. Thus the apparatus 10 is a manually actuatable clothes washing apparatus.

The apparatus 10 comprises a planar base 12 comprising engagement formations 14 in the form of rollers/ wheels 16 which are attached to suitable mounts

18 to the base 12. The base is typically a planar base 12 constructed of, for example, a wooden or wood-like material. In some example embodiments, the planar base 12 is constructed of plastic.

The mounts 18 are fixedly attached to the base 12 via suitable attachment means such as bolts, nails, screws etc.

In one example embodiment, the engagement formations 14 define a cradle. In particular, the engagement formations 14 are provided in two pairs of longitudinally spaced engagement formations 14 along longitudinal axis A (in Fig. 1). Each engagement formation of the pair of engagement formations 14 are transversely spaced relative to the longitudinal axis A. In this regard, it will be noted that each roller 16 is configured to rotate about its axis and that each roller from the pair of transversely spaced rollers have an axis of rotation which is parallel and also parallel to the axis A.

In other words, the engagement formations 14 may be located at corners of an imaginary square or rectangle. In some example embodiments, the engagement formations 14 may be located at corners of other imaginary quadrilaterals.

The washing apparatus 10 also comprises a washer receptacle 20 accessible primarily via a closable opening 20.1. The opening 20.1 may be closable by way of a suitable cap, for example, a screw on cap 22 (as can be seen in Figs. 6 & 7). The receptacle 20 is typically hollow cylindrical extending along the longitudinal axis A. In one example embodiment, the receptacle 20 has a length of approximately 35cm and a diameter of approximately 52cm. However, it will be appreciated by those skilled in the art that the dimensions may vary in different embodiments of the invention.

Though the opening 20.1 is illustrated to be located transversely on the receptacle 20, it will be noted that the opening 20.1 may be located at any position on the washer receptacle 20 to gain access to the same. In this regard, it will be evident to those skilled in the art that the location and/or dimensions of any of the openings referred to with regards to the apparatus 10 may be varied depending on the configuration thereof.

In any event, the washer receptacle 20 defines internal loading zone L (see Figs. 6 to 9) wherein articles may be located via the closable opening 20.1.

The receptacle 20 further comprises a filler opening 20.2 which may be closable via a suitable cap 23. The filler opening 20.2 permits access to the loading zone L so as to permit filling and/or draining of the loading zone L with fluid, in use, as will be described below.

In some example embodiments, it will be noted that the receptacle may comprise multiple closable openings of various sizes so as to permit access to the loading zone L.

The receptacle 20 defines a pair of guide tracks 24 and 26 (which can be best seen in Figs. 1-3) within which the rollers 16 of the base 12 are locatable, in use. It will be appreciated that the guide tracks 24 and 26 may each be defined by a pair of axially spaced circumferentially extending flanges 24.1, 24.2, and 26.1, 26.2. In this way, the guide tracks 24 and 26 are circumferentially extending around the receptacle 20 and may be shaped/ and dimensioned to receive the rollers 16 therein so as to limit transverse and longitudinal movement of the receptacle 20 in use.

The cradle defined by the engagement members 14 comprises the two pairs of engagement members 14 which are provided at a longitudinal spacing matched to the longitudinal spacing of the guide tracks 24 and 26 along the axis A.

Though not illustrated, the guide tracks 24 and 26 may be provided with suitable bearing therein to facilitate ease of rotation relative to the rollers 16 as will be apparent from the description of the apparatus 10, in use.

As can this be seen more clearly in Figs. 6 & 7, the washing apparatus 10 also comprises a fillable fly wheel device 28. The device 28 is arranged with washer receptacle 20. In particular, the device 28 is provided as an internal compartment which longitudinally extends through the interior of the receptacle 20. In this regard the compartment/device 28 may be defined by a compartment wall 28.1 which extends between ends 20.4 and 20.5 of the receptacle wherein the compartment wall 28.1 is also affixed to the interior walls of the receptacle 20.

The compartment 28 has an angular profile as can be seen in Fig. 7. Moreover, the receptacle 20 defines a comprises a closable inlet/outlets port 28.1

which is sealable with a suitable cap 30 (see Figure 5). The port 28.1 is in flow communication with the compartment 28 and permits the compartment 28 to be fillable with a suitable fluid or flowable material, for example, water, sand, etc. It will be appreciated that the fillable fly wheel device 28 is arranged to store rotational energy to facilitate ease of use of the apparatus 10, as will be described below. It will be appreciated that many conventional flywheel devices are very expensive to manufacture and relatively very heavy hence the flywheel device 28 of the type described herein is very cheap to manufacture, relatively very light to carry as it can be "discarded" when not in use by emptying the water located in the compartment 28.

As mentioned above, the compartment 28 may be outside the receptacle 20. Instead, or in addition, the compartment 28 may be partially inside and partially outside the receptacle 20. In this way, the moment of inertia of the rotating receptacle 20 is varied thereby permitting the receptacle 20 to rotate with less energy being applied, in use. To this end, it will be noted that the flywheel device 28 is typically located at least at one location on the receptacle, preferably longitudinally extending.

In one example embodiment, the interior of the loading zone L may comprise a series of spaced apart radially inwardly projecting and longitudinally extending fins 32. The fins 32 serve to assist in agitating the clothes to facilitate cleaning them, in use.

The apparatus 10 also comprises a handle arrangement 34 attachable to the washer receptacle 20 (as can be best seen in Figs. 1 to 3), to bring about rotation of the washer receptacle 20 about its axis A relative to the rollers 16. The handle arrangement 34 comprises a handle 34.1 attachable to a guide track 34.2 which is in turn attached to one end 20.4 of the receptacle 20.

The handle 34.1 is displaceable relative to the track 34.2. In particular, the handle 34.1 is slidably displaceable relative to the track in the directions indicated by arrow B (Figs. 1 to 3). In this way, the torque applied to bring about rotation of the receptacle 20 may be varied, in use.

In some example embodiments, the track 34.2 may be removably attachable to the receptacle 20.

In use, referring to Figs. 1 to 7, a user desiring to manually wash articles such as articles of clothing 42 will operate the cap 22 (see Fig. 6) to gain access to the opening 20.1. The clothes 42 are then loaded into the loading zone L and the cap 22 replaced on the opening 20.1.

5 A user may then operate the cap 25 to gain access to the opening 20.2. The user may then fill fluid/s such as water and/or detergents 46 into the loading zone L via the opening 20.2 which is in fluid communication with the same. Once the loading zone L is filled to a desired level, the cap 25 is then replaced on the opening 20.1.

10 The user then operates the cap 30 to gain access to the opening 28.1 of the flywheel compartment 28. The compartment 28 is then filled with fluid such as water 46. Instead, or in addition, other fluids with different viscosities or even particulate material may be filled into the fill the compartment 28. Once filled to a desired level, the cap 30 is then replaced. In this regard, it will be noted that the compartment 28
15 is fluidly isolated or in other words sealed off from the loading zone L.

The receptacle 20 which is loaded with the fluids 44, 46 and clothes 42 is then located on the base 12. In particular, the rollers 16 of the base 12 are located in the 24 and 26.

It will be noted that the steps mentioned above, may be done in any order
20 depending on ease of use of the apparatus 10, etc.

In any event, the handle 34.1 is then slid in the direction of arrow B to a desired location on the guide track 34.2 so as to obtain the desired torque for rotating the receptacle 20 as can be seen in the various position of the handle 34.1 in Figs. 1 to 3). The handle 34.1 is then fixed to the track 34.2 at a desired location
25 via a suitable means such as clamp, screws etc.

The user then grabs hold of the handle 34.1 and uses it to rotate the receptacle 20 in the direction of arrow C (see Fig. 4). The rollers 16 located in the tracks 24, 26 facilitate rotation of the receptacle 20. It will be noted that the axes of rotation of the rollers 16 may be parallel to the longitudinal axis A of the apparatus
30 10. Moreover, each pair of rollers 16 of the engagement formations 14 may rotate in opposite directions (as shown in Fig. 8).

As the user rotates the receptacle 20 relative to the rollers 16, the clothes 42 rotate in the loading zone L interacting with the ribs 32 which serve to agitate the clothes into interacting further with the detergent fluid/rinsing fluid 46 so as to clean the clothes 42. Moreover, the fluid filled flywheel compartment 28 stored rotational
5 energy as the receptacle rotates and assisting in the further rotation of the receptacle 20 with less effort from a user.

Once the clothes are sufficiently cleaned, the receptacle is rotated such that the opening 20.2 is in a position wherein the draining of the loading zone L is easily facilitated by operation of the cap 25 or any other drainage opening.

10 It will be appreciated by those skilled in the art that the similar procedure as described above may be used to rinse the clothes 42 with fresh water to remove the detergent.

Once the clothes 42 as washed, they are removed via the opening 20.1 and the loading zone L and/or the flywheel compartment 28 are drained via their
15 respective openings 20.2, 28.1.

Though not described or illustrated in great detail, it will be noted that the apparatus 10 as described herein may be packed for transport in a suitable trolley having a bin to receive the receptacle 20 therein and wherein the base 12 is provided as the base of the trolley to permit the trolley with the receptacle 20 therein
20 to be transported to various locations with ease with the rollers 16 serving a dual purpose of being the rollers for the receptacle 20 as described above and as the wheels of the trolley to allow motion thereof. The trolley may comprise a suitable handle, as is conventional with trolleys, to facilitate manoeuvring the trolley, in use. The trolley may form part of a kit together with the receptacle 20.

25 To this end, the invention may extend to a kit comprising a trolley having a frame and a base 12 of the type described herein attachable to the frame such that the rollers serve as the wheels of the trolley, and wherein the frame houses or defines a bin/support structure with which the receptacle 20 and handle arrangement of the type described herein is operatively engageable with. In the case of the frame
30 comprising the bin, the receptacle 20 (and handle arrangement) may be receivable in the bin so that the trolley may be rolled to a desired washing location.

In use, the base 20 may be removed from the trolley frame, inverted and placed on a surface. The receptacle 20 with the handle arrangement is then located on the base 20 with the rollers 16 in the tracks 24, 26 as described above. The washing apparatus 10 is then used in a fashion as described above.

5 Referring to Figures 8 to 12 of the drawings, where another example embodiment of the invention is generally indicated by reference numeral 100. The apparatus 100 is substantially similar to the apparatus 10 as described above and thus the explanations above with respect to apparatus 10 apply to apparatus 100. Similar reference numerals are used with respect to both example embodiments.

10 The apparatus 100 differs from the apparatus 10 in that it includes an internally disposed perforated drainage plate to facilitate drainage of the apparatus 100. In addition, the apparatus 100 comprises an L-shaped base 112 having two operative faces comprising two sets of rollers 114, 115. The apparatus 100 comprises suitable guide tracks 126.1 and 127 for facilitating rotation of the
15 apparatus 100 about two axes, a longitudinal axis and a transverse axis.

The apparatus 100 is operated in a similar fashion to the apparatus 10 to wash clothes but for “spin drying” the clothes which have been washed, the apparatus 100 is placed in a transverse position to its longitudinal washing position and rotated with wheels of the base located in suitable tracks of the washer
20 receptacle 120. In this way, the washed clothes are suitable dried.

In one example embodiment, the apparatus 100 comprises an internally disposed perforated drainage plate (as can be seen in Figure 11) located longitudinally, or transversely, within the apparatus 100 to facilitate drying of the washed clothes during “spin drying”.

25 By way of the invention described herein, clothes are cleaned in a less tedious way than other manual clothes washing mechanisms. The invention addresses a need for those without access to automated washing machines to wash clothes.

Claims

1. A washing apparatus for washing articles, the washing apparatus comprising:

a washer receptacle defining an internal loading zone accessible via at least one closable opening for receiving articles, wherein the washer receptacle defines at least one outer cylindrical portion which comprises at least one guide track arrangement for rollable engagement with one or more engagement formations of a base;

at least one fillable flywheel device arranged with the washer receptacle, wherein the at least one fillable flywheel device is fillable with a fillable material; and

a handle arrangement attachable to the washer receptacle, wherein the handle arrangement is operable to bring about rotation of the washer receptacle about at least one of its axes relative to the one or more engagement formations.

2. A washing apparatus as claimed in claim 1, wherein the engagement formations are in the form of rollers.

3. A washing apparatus as claimed in either claim 1 or claim 2, wherein the washer receptacle is in the form of a hollow cylindrical receptacle extending along a longitudinal axis.

4. A washing apparatus as claimed in any one of the preceding claims, wherein the at least one fillable flywheel device extends along a longitudinal axis of the washer receptacle.

5. A washing apparatus as claimed in any one of the preceding claims, wherein the at least one fillable flywheel device is in the form of longitudinally extending compartment arranged with the washer receptacle.

6. A washing apparatus as claimed in claim 5, wherein the compartment is internally located within and/or externally located and attached to the washer receptacle.

7. A washing device as claimed in either claim 5 or 6, wherein the fillable flywheel device comprises a compartment wall extending longitudinally within the washer receptacle between two closed ends thereof so as to define the compartment.
- 5 8. A washing device as claimed in any one of claims 5 to 7, wherein the compartment wall is attached to an interior surface of the washer receptacle.
9. A washing apparatus as claimed in any one of the preceding claims, wherein the fillable flywheel device comprises at least one closable opening to permit at least filling of the flywheel device with fillable material.
- 10 10. A washing apparatus as claimed in any one of the preceding claims, wherein the fillable material is a fluid.
11. A washing apparatus as claimed in claim 8, wherein the fluid is water.
12. A washing apparatus as claimed in any one of the preceding claims, wherein the washing receptacle comprises a filling opening.
- 15 13. A washing apparatus as claimed in any one of the preceding claims, wherein the washing receptacle comprises a drainage opening.
14. A washing apparatus as claimed in either claim 12 or 13, wherein the openings are closable by way of associated caps which sealingly engage with the openings.
- 20 15. A washing apparatus as claimed in any one of the preceding claims, wherein the handle arrangement is attached adjacent one end of the washer receptacle.
16. A washing apparatus as claimed in any one of the preceding claims, wherein the handle arrangement comprises a handle.
- 25 17. A washing apparatus as claimed in claim 1, wherein the washer receptacle comprises a plurality of guide tracks for engagement with the base.
18. A washing apparatus as claimed in any one of the preceding claims, wherein the washer receptacle is arranged to rest on and rotate relative to the base.

19. A washing apparatus as claimed in any one of the preceding claims, wherein the at least one guide track is in the form of a circumferentially extending track on the washer receptacle.
- 5 20. A washing apparatus as claimed in any one of the preceding claims, wherein the guide track is a circumferentially extending groove.
21. A washing apparatus as claimed in any one of the preceding claims, wherein the guide track is a circumferentially extending flange.
22. A washing apparatus as claimed in any one of the preceding claims, wherein the apparatus comprises the base, and wherein the base comprises one or
10 more engagement formations for rollable engagement with the washer receptacle.
23. A washing apparatus as claimed in any one of the preceding claims, wherein the base comprises engagement formations in the form of rollers arranged to form one or more cradles for engagement with the washer receptacle.
- 15 24. A washing apparatus as claimed in claim 23, wherein the cradle comprises at least two longitudinally spaced rollers.
25. A washing apparatus as claimed in either claim 23 or claim 24, wherein the cradle comprises at least two transversely spaced rollers.
26. A washing apparatus as claimed in claim 24, wherein the cradle comprises at
20 least two pairs of longitudinally spaced rollers, wherein each roller in the pair are transversely spaced.
27. A washing apparatus as claimed in claim 25, wherein the cradle comprises at least two pairs of transversely spaced rollers.
28. A washing apparatus as claimed in claim 23, wherein the base is L-shaped and comprises longitudinal and transverse rollers disposed on each arm of
25 the L-shaped base.
29. A washing apparatus as claimed in any one of the preceding claims, wherein the apparatus comprises at least one perforated drainage member located within the washer receptacle.

30. A washing apparatus as claimed in any one of the preceding claims, wherein the washer receptacle comprises one or more inwardly projecting fins.

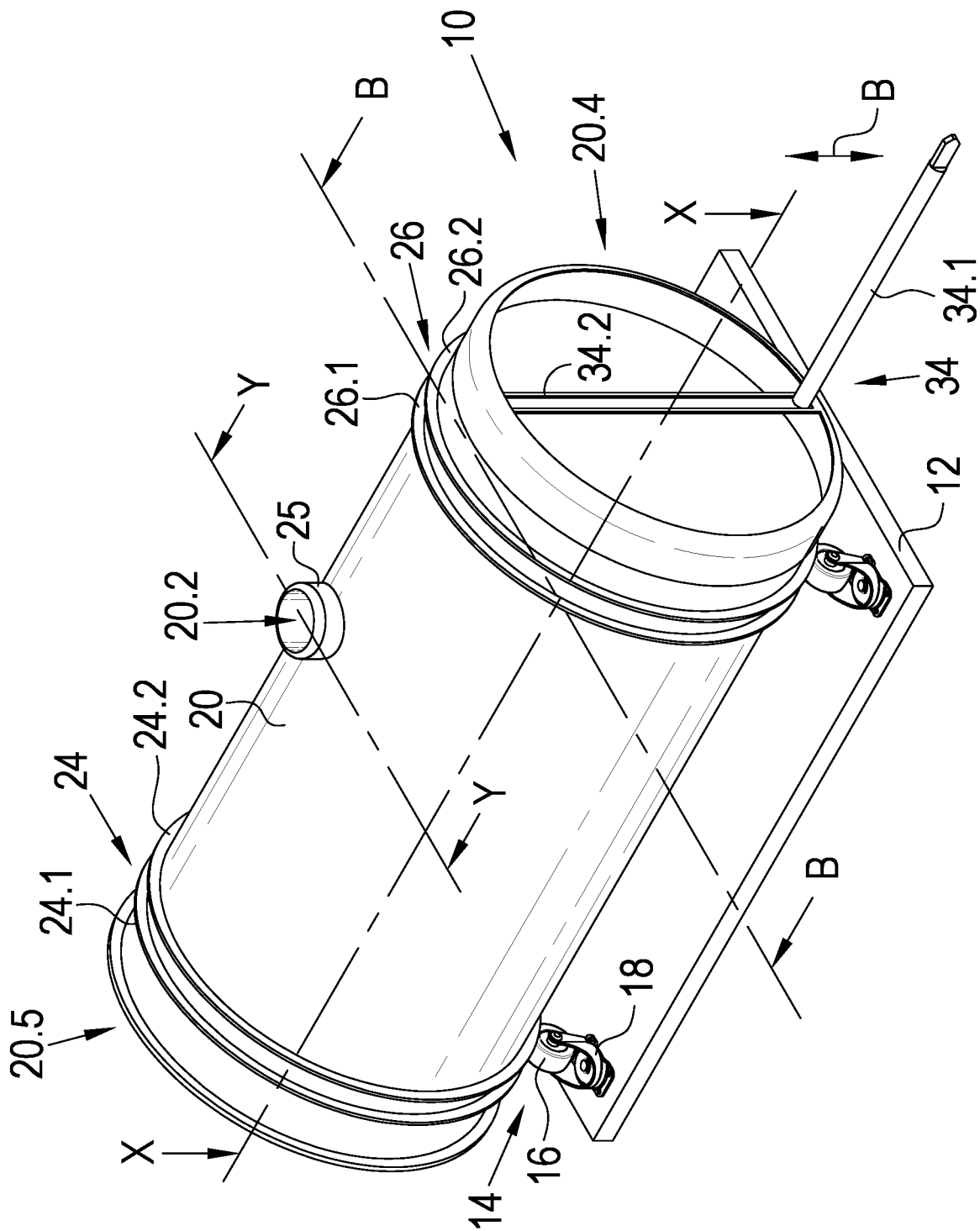


Fig. 1

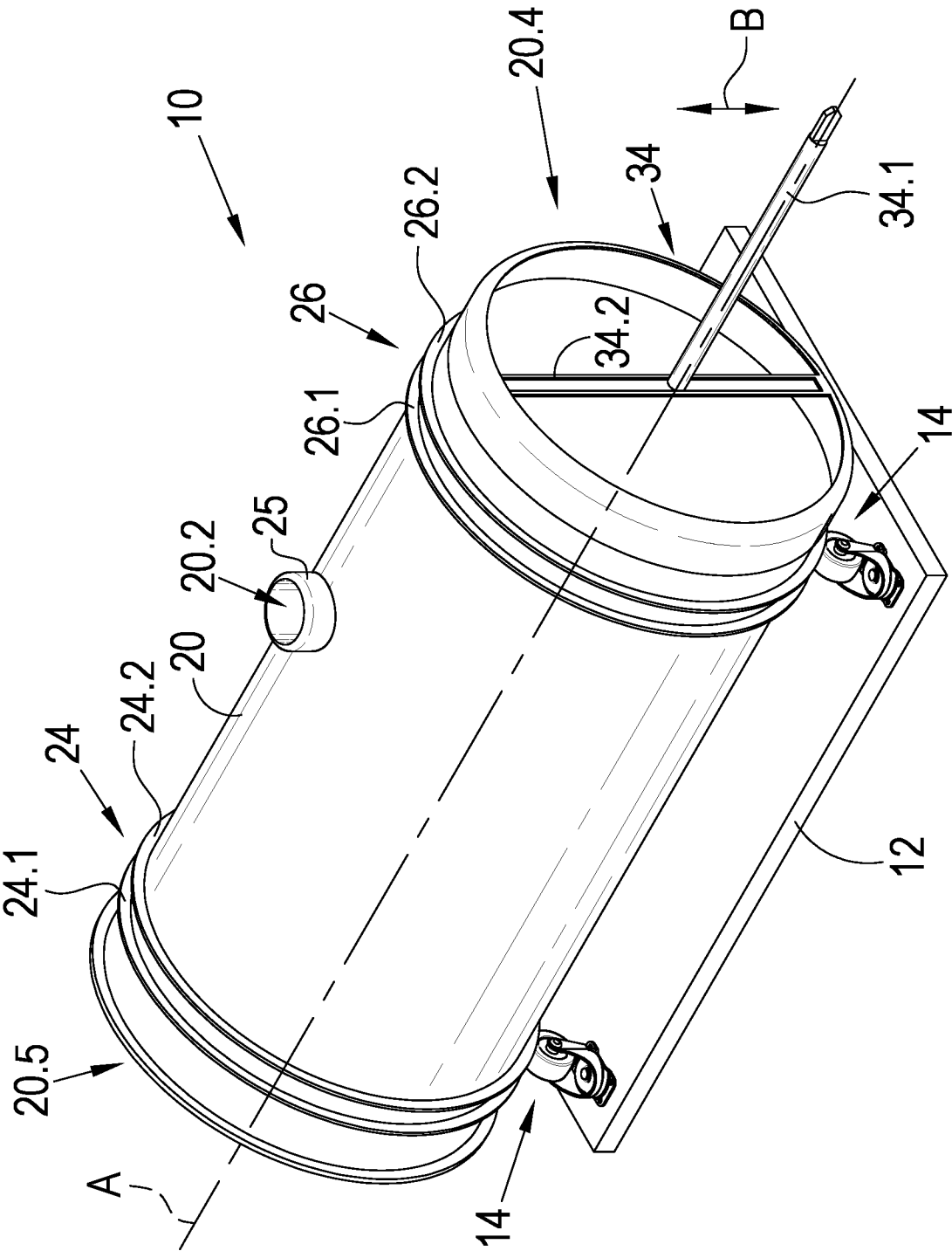


Fig. 2

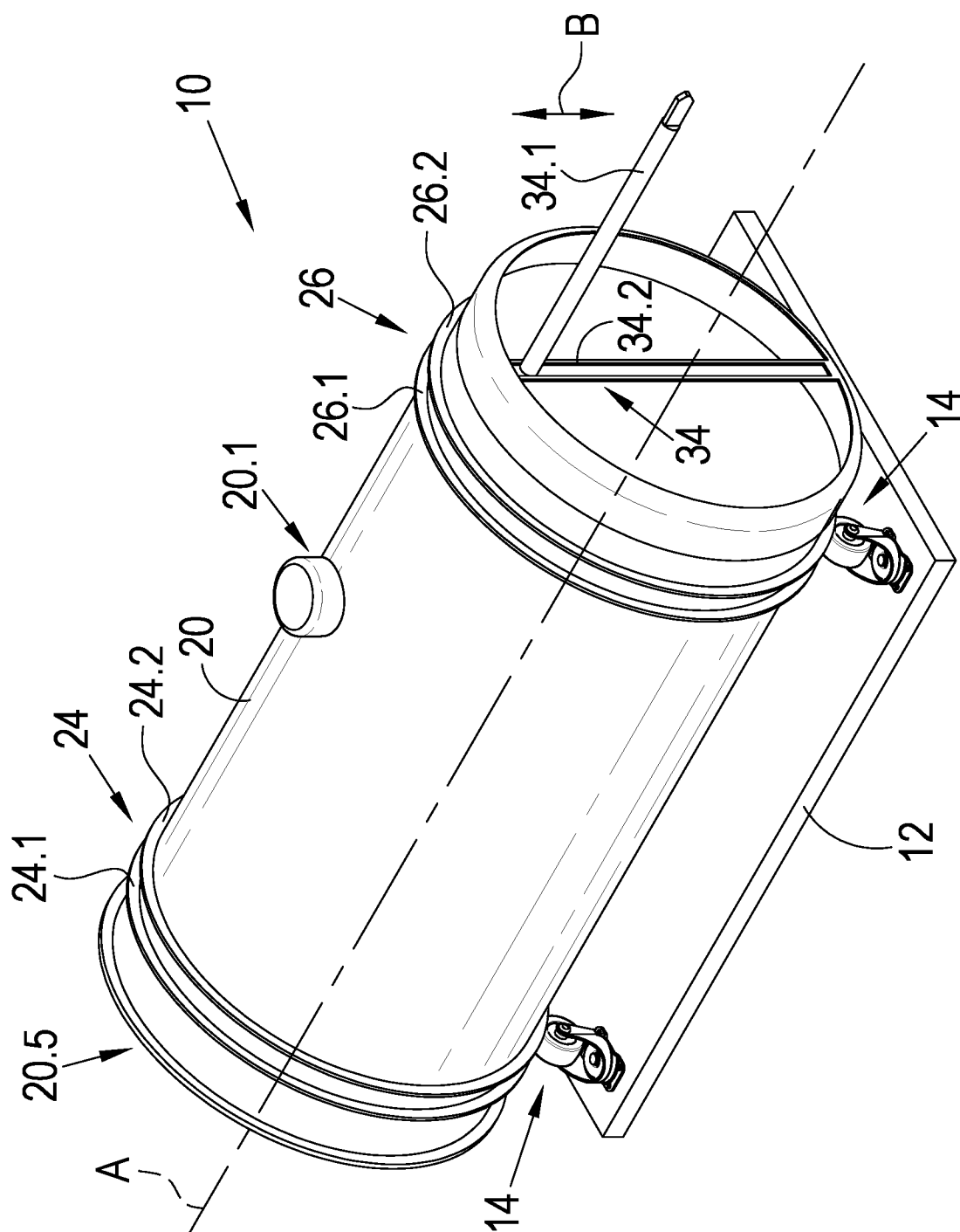


Fig. 3

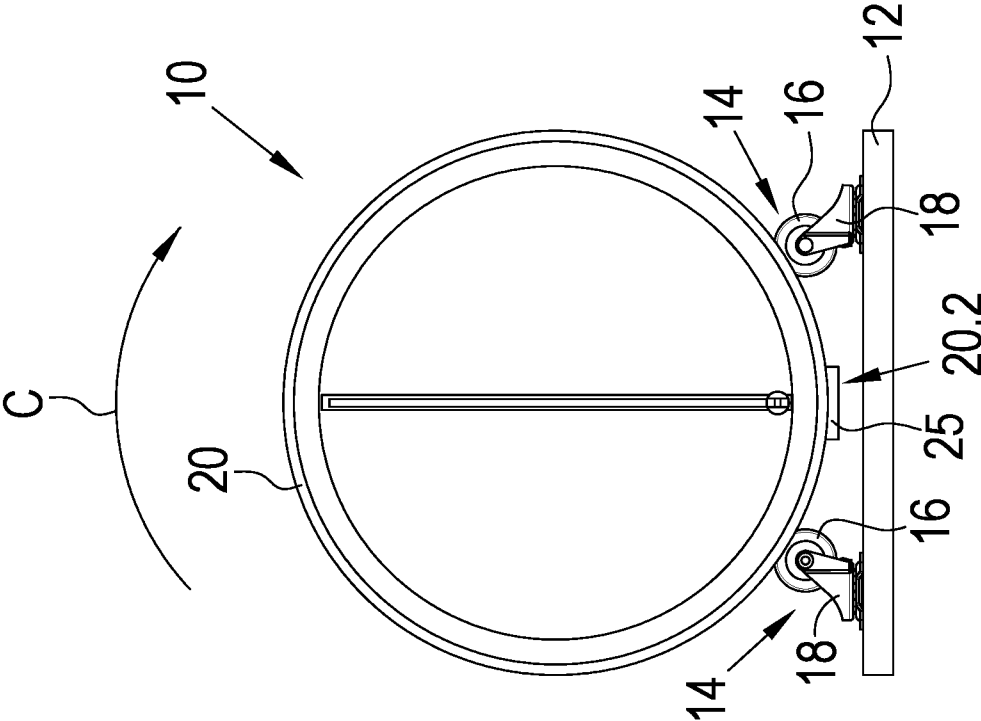


Fig. 4

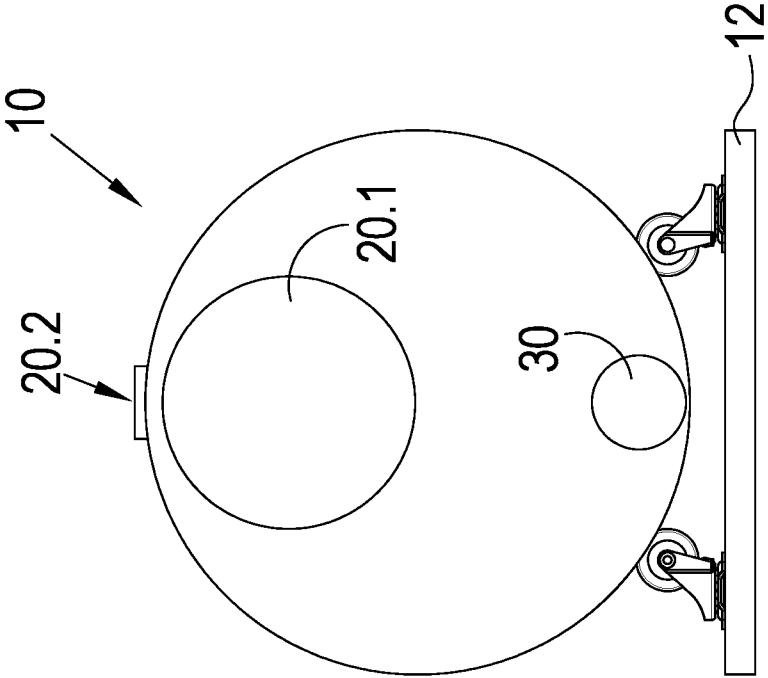


Fig. 5

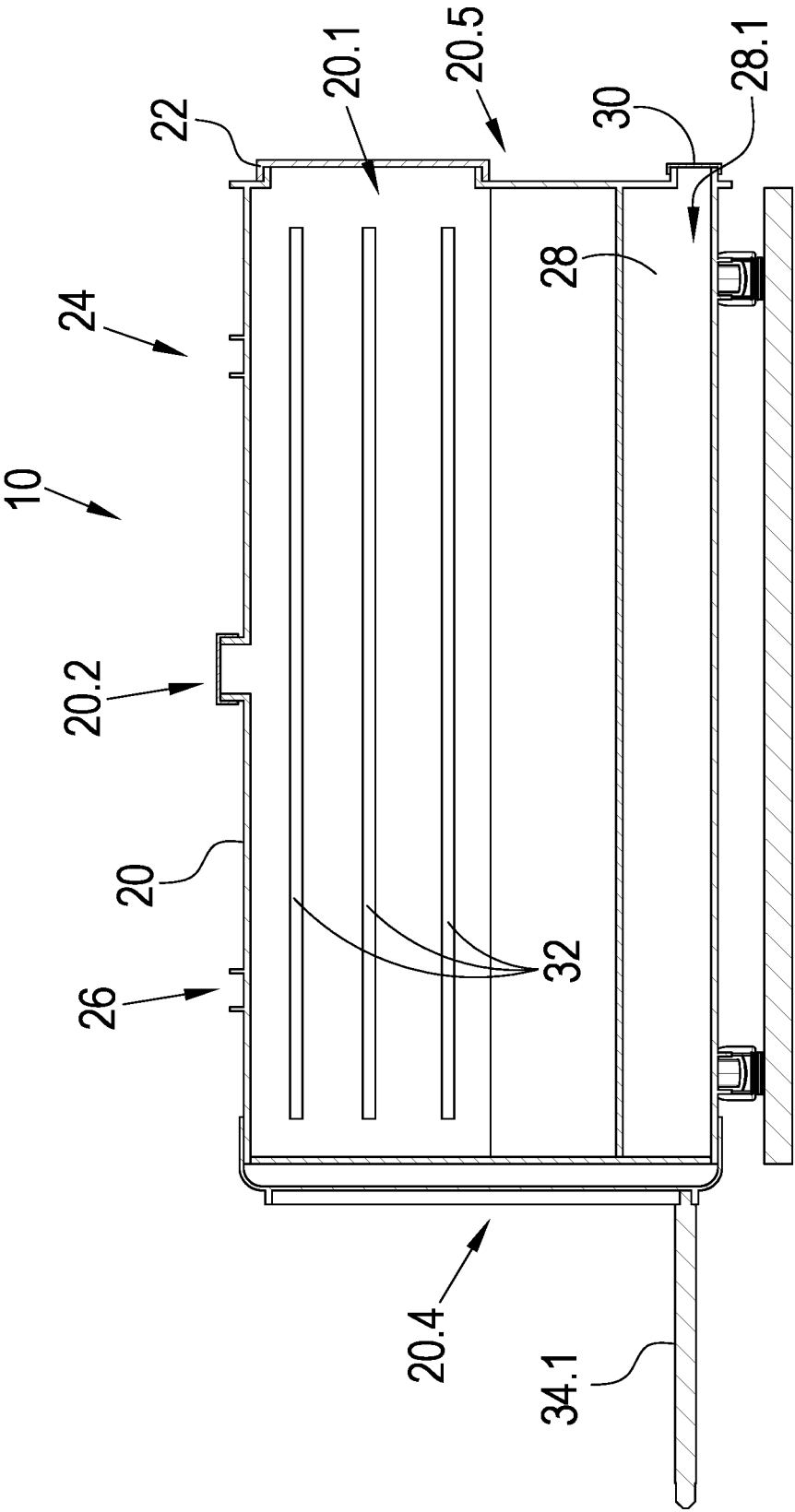


Fig. 6

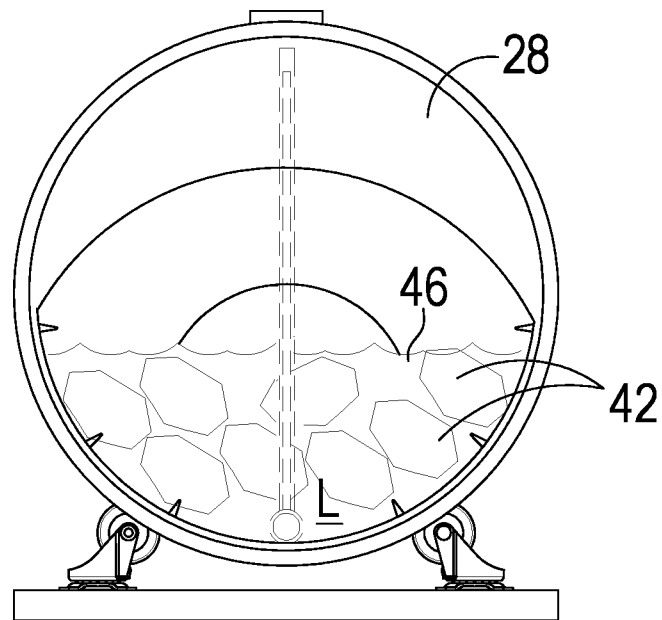


Fig. 7

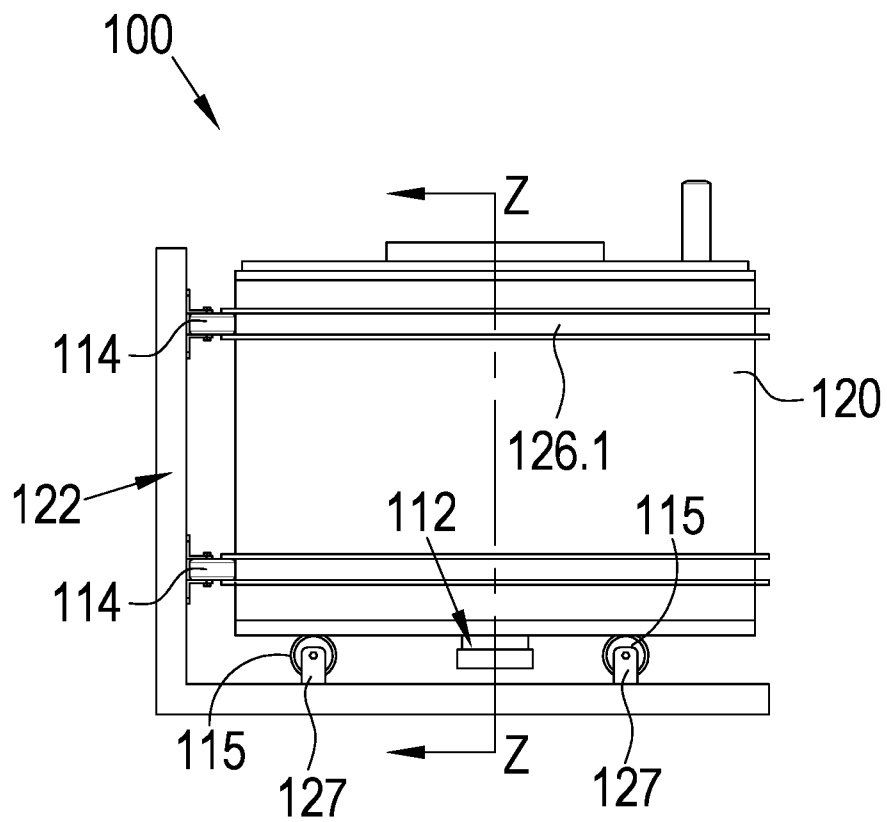
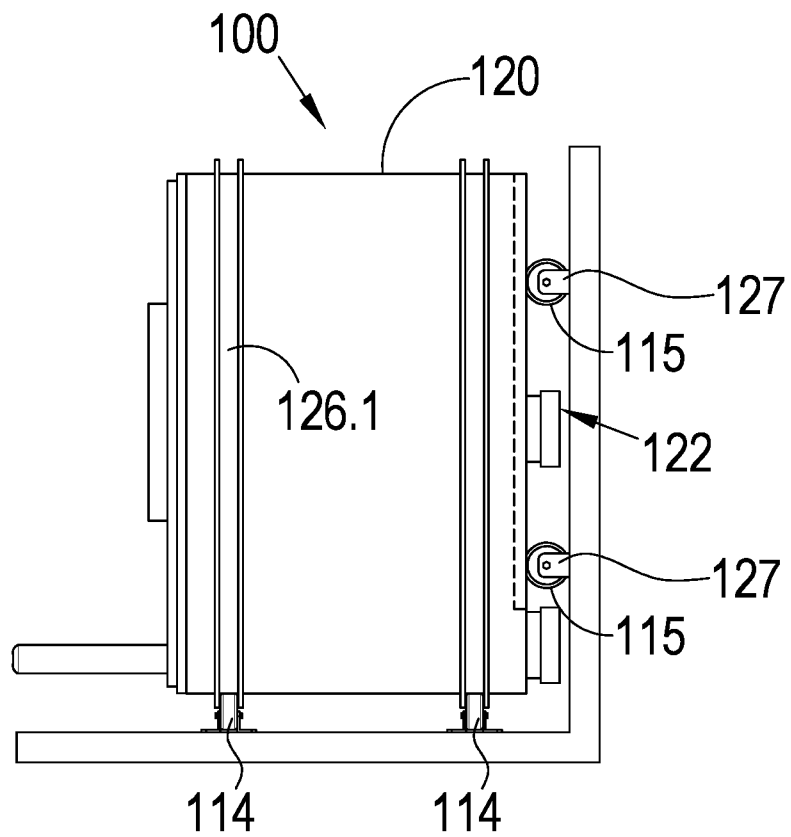
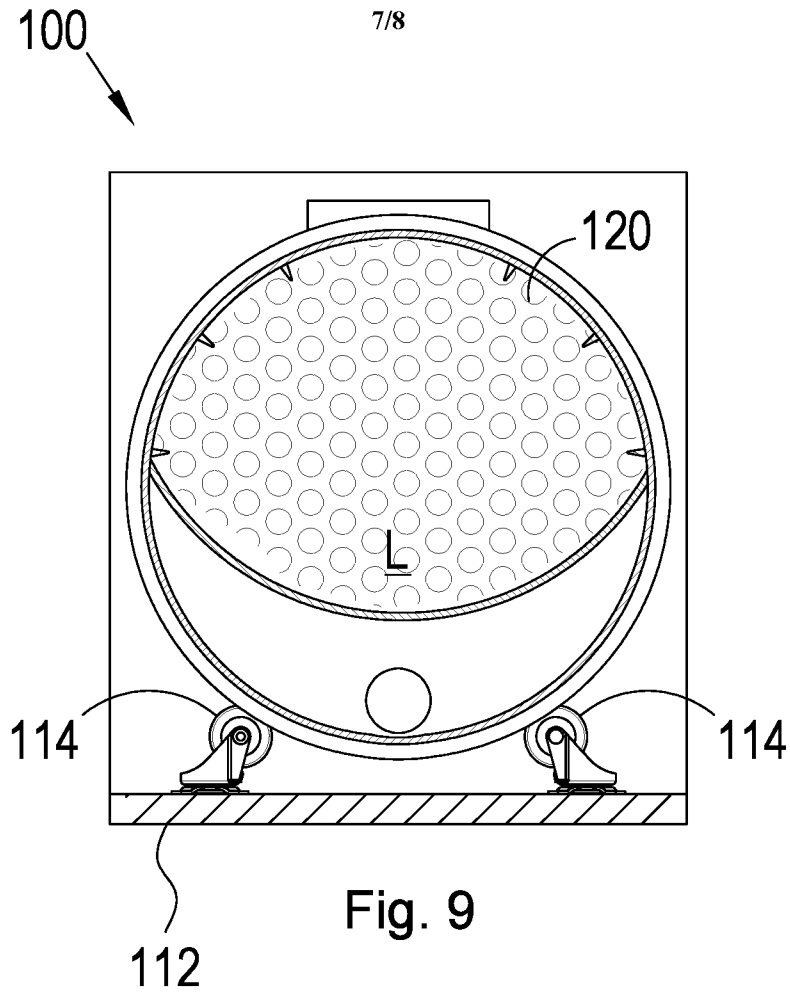


Fig. 8



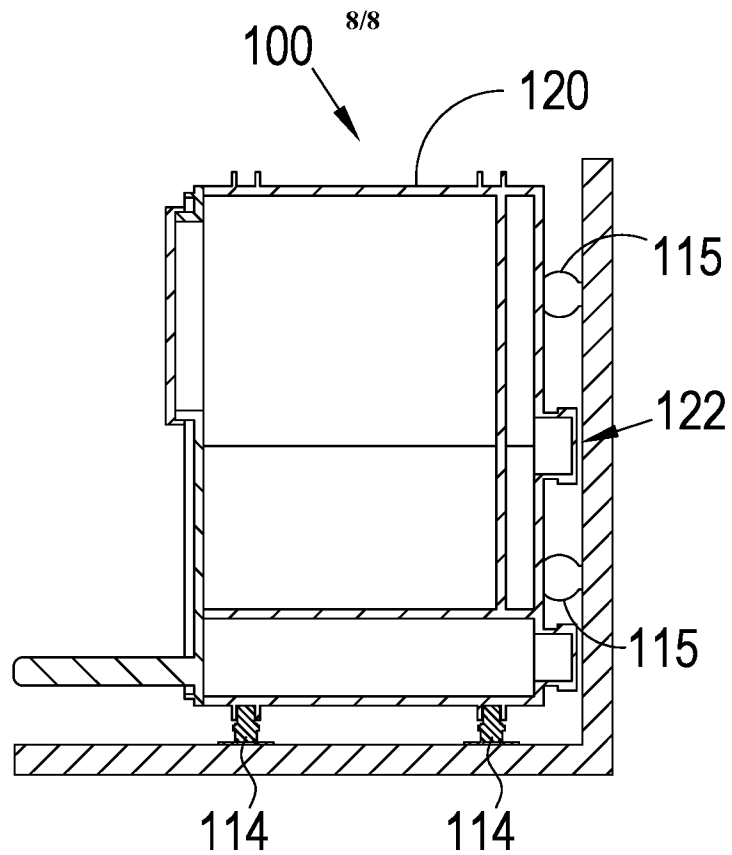


Fig. 11

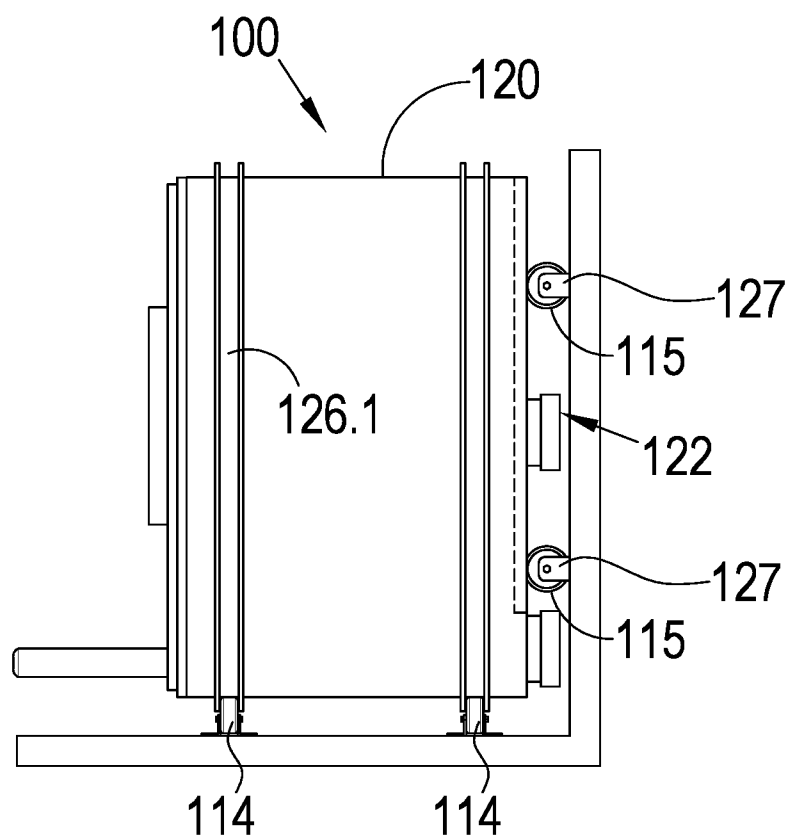


Fig. 12

INTERNATIONAL SEARCH REPORT

International application No.

PCT / IB 2019/055402

A. CLASSIFICATION OF SUBJECT MATTER IPC: D06F 23/02 (2006.01); D06F 37/30 (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) D06F 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) PATDEW, PATENW		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2426455 A (JORGENSEN JOHN P) 26 August 1947 (26.08.1947) Figs. 1, 2; column 2, lines 6 - 49	1 - 30
A	GB 743031 A (OLOF HOLGER PETTERSON, GUNNAR IVAR FREDHOLM) 04 January 1956 (04.01.1956) Figs. 1, 2; page 1, line 56 - page 103	1 - 30
A	DE 136635 C (JORDAN HERMANN) 28 November 1902 (28.11.1902) Fig. 1; page 1, left column	1 - 30
☐ 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 “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 13 November 2019 (13.11.2019)		Date of mailing of the international search report 19 November 2019 (19.11.2019)
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 ENGLISCH M. Telephone No. +43 / 1 / 534 24-565

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT / IB 2019/055402

Patent document cited in search report			Patent family member(s)			Publication date
US	A	2426455	US	A	2426455	1947-08-26
GB	A	743031	GB	A	743031	1956-01-04
DE	C	136635	DE	C	136635	