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(54) **Device for dispensing a non-fluid chemical product.**

(57) A device (1) for dispensing a non-fluid chemical product can be made without the need for a spray head. This device is of the kind where the product is dispensed as a dosing liquid comprising a solution and/or dispersion thereof in a solvent, wherein the device is separated by a liquid-pervious screen (10), into an upper chamber (8) in which the product is to be held, and a lower chamber (14) provided with an inlet (14a) for the solvent and an outlet (18) for the dosing liquid. This is achieved by virtue of the inlet being connected to a mouth (16) for receiving the solvent in free space, whereby the solvent can flow into and fill the lower chamber to a level where it permeates the screen to take-up the product thereabove, whereafter it flows back into the lower chamber to exit via the outlet as the dosing liquid.

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Description

DEVICE FOR DISPENSING A NON-FLUID CHEMICAL PRODUCT

The present invention relates to a device for dispensing a non-fluid chemical product as a dosing liquid comprising a solution and/or suspension thereof in a solvent, of the kind wherein the device is separated by a liquid-pervious screen, into an upper chamber in which the product is to be held, and a lower chamber provided with an inlet for the solvent and an outlet for the dosing liquid.

One particular application for this type of dispenser is in the dispensing of non-fluid detergent materials into mechanical warewashing or fabric-washing machines, although the present invention is not limited to these applications, as many others can readily be envisaged.

In commercial washing institutions, where frequent dosing of detergent products from large supply containers is general practice, dispensers both inside and outside the washing machines are widely employed and the proper and safe functioning thereof is of the utmost importance.

One particular type of detergent product for use in commercial washing machines comprises various liquid compositions, i.e. dissolved or dispersed products. These have been popular from the point of view of transport, easy formulation and good storage properties. However, recently, there has been an increase in interest in non-fluid products for improvement in reliability, especially for the purpose of providing uniform concentrations of product in the wash liquor.

In the art, a number of improvements have been proposed pertaining to dispensers for powder and other solid form detergent products. Some of these have been known for a very long time. For example, US patent 2,686,080 describes impregnating water running from a tap by directing it through a chamber containing a soap bar. US patent 2,135,969 describes passing water through a chamber in which soap flakes are held in a mesh cage, and supplying the resultant solution to a bathroom shower.

More recent developments have mainly been in the mechanical warewashing field. US patent 4,462,511 (Viking) describes dosing a caustic powder product retained by a screen over the mouth of a up-turned container, into which water is sprayed. European specification EP 58,507 (Berelson) describes a two-part container divided by a mesh, particles of dishwashing powder being held above the mesh and a spray head being situated below it. Spraying water over a solidified block product held in a container is described in European specification EP 20,709 (Economics Laboratory).

All of the aforementioned known systems suffer from the disadvantage that they are designed for coupling in-line between the water supply and the point of use. The later developments specifically intended for mechanical warewashing, involve use of a spray-system to ensure uniform dispensing behaviour.

We have found that a simpler construction, which yet avoids these disadvantages, is possible if the inlet of the device is connected to a mouth for receiving the solvent in free space, whereby the solvent can flow into and fill the lower chamber to a level where it permeates the screen to take-up the product thereabove, whereafter it flows back into the lower chamber to exit via the outlet as the dosing liquid.

In its simplest form, the present invention may be realised as a unitary construction, manufactured from relatively inexpensive materials not involving any electrical components, which can be produced either as a refillable dispenser or as a disposable (throw-away-after-use) package. In some embodiments, the outlet merely may be an opening in the device so that during use, the supply of water is caught by the mouth and the dimensions of the inside of the device are such that during operation, the throughput is approximately constant, resulting in a substantially uniform concentration of the product in the exuded dosing liquid.

In another (preferred) form, the outlet is provided with a gate which when closed, allows saturation of the product by the solvent as the device is filled. Subsequently, when the gate is opened, a batch of dosing liquid is released, which is more concentrated than that produced during the continuous operation described in the previous paragraph. In this kind of non-continuous operation, opening and closing of the gate may be controlled by a remote means, e.g. through a mechanical, hydraulic or electrical linkage. These may be operated as desired, for example according to a predetermined programme, or in response to a temperature-sensitive element. The latter is appropriate when the device is intended for operation inside washing (warewashing or fabrics-washing) machines. In the latter instance, it is also possible for the gate to be provided with a thermochemically operated element so that operation of the gate is automatic upon sensing of a predetermined temperature in its vicinity.

Although not absolutely necessary, it is preferred thaat the upper chamber is closed. In this way, the upper chamber (disposed above the screen) provides an air trap in which, during use, the product is located. However, most preferably, the upper chamber is then provided with a lid which must be substantially sealable (air-tight) to preserve the air trap function of said upper chamber.

The filling of the chamber to the level sufficient for the solvent to permeate the screen to contact the chemical product, will in general be determined by the dimensions of the mouth, the inlet, outlet and the inside of the lower chamber, as well as the flow rate of liquid entering the mouth. However, especially, but not exclusively, in the case of the aforementioned continuous operation, it is preferred if the mouth is situated above the level of the screen. This tends to ensure that the lower chamber is always filled to the required level to ensure proper and uniform up-take of the product.

For the avoidance of doubt, all references herein to "level", "height" and "upper" and "lower" chambers are defined in terms of the normal and intended orientation of the device in use and does not limit the claims solely in terms of the device when so positioned. In fact, all dimensional restrictions are to be construed in this light.

Simplified and low-cost construction is facilitated if the device is manufactured with the mouth connected to the inlet by a channel integral with the upper and lower chambers, and separated from the former by a dividing wall. In the most preferred construction, the device is in the form of a rectangular box having two opposing square or rectangular side walls and two narrower, opposing rectangular side walls, with the channel running vertically along one side parallel to or contiguous with, one of said narrower side walls, up to the mouth which is flush with the top of the device.

It should also be noted that whatever the form of construction, during the intake of solvent and discharge of dosing liquid, the second compartment defines a flow-path adjacent the screen. To improve the contact between the solvent and the chemical product supported by the screen, it is preferred to incorporate means for causing turbulence in the flow-path. For example this may take the form of cross-ribs in one or more of the walls of the lower chamber, partially blocking the flow-path.

The device may be used for dispensing any non-fluid chemical product which can be dissolved and/or dispersed in the solvent in question. The term "non-fluid" is intended to exclude products which would simply run through the liquid-pervious screen, especially liquids. The term does however include various solid, near-solid, paste and gel products which can be retained above the screen (which of course may be varied also to suit the particular product). In particular, the term includes physical forms such as powders, (notwithstanding that powders are sometimes in other contexts termed "fluids" in that they are pourable), granulates, solid blocks, sticks, "noodles", other extruded forms and the like. They may be of either homogeneous or heterogeneous consistency. In general, a main requirement is that the size of any particles, must be greater (at least for most particles) than the size of the holes in the screen.

The mesh may be of any material compatible with the chemical product and solvent in question, and may be porous such as is blotting paper, a non-woven fabric or sinter glass, or may have a mesh which can be either fine, such as found in various woven fabrics, or wide, such as a netting or mesh, e.g. of wire or plastics material. For example, for use with powders, the holes in the mesh may be in the order of 0.5 x 0.5 mm, or with noodles, 0.5 x 0.5 cm, or with sticks, 2 cm x 2 cm.

As stated, the device according to the invention will be applicable to a wide range of applications which may readily be appreciated in the light of the present disclosure. Although not limited thereto, it is however particularly suited to location in washing machines, especially for fabrics washing, and more especially mechanical warewashing. In this situation, of course the solvent will normally comprise substantially only water and the chemical product will be a detergent and/or caustic composition, optionally containing the usual products such as bleaches, enzymes and the like. For these uses, it is particularly preferred that the upper chamber has a closed top and side walls and the screen is disposed in a bottom wall thereof, the lower chamber being disposed beneath and substantially peripherally co-terminous with the screen. For support inside a washing machine, the device may be provided with a support means such as a hook, cord or any other feature which may readily be envisaged. Another application where the solvent is not water but is a volatile organic liquid, is in the dosing of adjuncts in dry cleaning.

Although a major advantage of the present invention is that it can be located inside a washing machine, rather than in-line, it can also be located outside the machine, e.g. in a by-pass unit in the water supply system.

It should also be appreciated that the aforementioned systems described in US 4,462,511, EP 58,507 and EP 20,709 all employ jets to spray the held solid, the jet size and dimensions being tailored according to the required flow rates so that the dissolved or dispersed product simply falls away from the bulk of the material, but there is no chamber filled with water and the mechanism of product dispensing is not by way of permeation through a screen. Thus, according to a further aspect of the present invention, we may also claim a method of dispensing a non-fluid chemical product as a dosing liquid comprising a solution and/or dispersion thereof in a solvent, by providing a device separated by a liquid-pervious screen into an upper chamber in which the product is held, and a lower chamber provided with an inlet for the solvent and an outlet for the dosing liquid, and supplying solvent to said inlet at a rate whereby the solvent flows into and fills the chamber to a level where it permeates the screen to take-up the product thereabove, whereafter it flows back into the lower chamber to exit via the outlet as the dosing liquid.

Although this method is not limited to being performed with the device according to the invention (as hereinbefore described) it is preferred that the solvent is received in free space by a mouth, connected to said inlet.

It should also be mentioned that in devising the present invention, the applicants envisaged constructions based on permeation through liquid-pervious screens, whereby the product is in a chamber below or to one side or another of the other chamber forming a flow-path. However, this would result in non-uniform dispensing and incomplete usage of the stock product. However, it should be further noted that in the context of the present invention, references to the "upper" and "lower" chambers do not exclude constructions whereby the device is used with an upper chamber positioned or angled somewhat to one side of the lower chamber, which is still generally positioned at a lower level.

The invention will now be described in more detail and with reference to the accompanying drawings in

which:-

Figure 1 shows a detailed perspective view of a device according to the present invention, the front wall being shown partly cut-away.

Figure 2 shows a less detailed, alternative perspective view of the device in Figure 1, illustrating better, the opening of the lid and with the outlet in a different position.

Figure 3 shows in schematic view, a washing machine containing the device shown in Figure I or Figure 2.

The device 1 comprises a top wall 2, side walls 4, 5, 6 and a bottom wall 7. A first upper chamber 8 is defined by the top wall 2, the side walls 3, 4, 6, a dividing wall 9 and a bottom screen 10. The top wall 2 comprises a lid 11 pivoting along a hinge 12 and having a knob 13 for opening and closing. A second lower chamber 14 is defined by the side walls 3, 4, 6, the bottom wall 7, the dividing wall 9 and the screen 10. A channel 15, between the side wall 5 and the dividing wall 9 of the compartment 14 connects a mouth 16 for receiving water, and an inlet 14a to the lower chamber. The latter is also provided with an outlet 17, egress from which is controlled by a gate 18 (details not shown). The upper chamber 8 comprises a non-fluid product (also not shown) which is introduced through the lid 11 and supported by the screen 10, the mesh size of which is sufficiently small not to have undissolved non-fluid product falling through.

Figure 2 shows the same device as Figure 1, the outline 22 delineating the locus of the lid as it is opened. Also, in this case, the outlet of the lower chamber is situated at the bottom of the narrow side wall 3.

As shown in Figure 2, the device may be suspended under the supply water spraying line 19 of a washing machine 20, the mouth 16 being immediately below a spraying nozzle 21. Suitable means (not shown) such as a cord or hook are provided for this purpose.

When non-discharging, the lower chamber 14 will be completely filled with water. Owing to the fact that the top wall 2, the side walls 3, 4, 6 and the dividing wall 9 are closed, the upper chamber 8 forms an air trap cavity and water is not introduced therein to any significant extent. Only the down-most layer of the non-fluid product therein is wetted owing to contact through the screen 10 with the water in the lower chamber 14. In this way, slow dissolving of non-fluid product is facilitated.

During supply water intake or recycling of the wash bath solution, any oversupply of water/solution from the spraying nozzle 21, immediately above the mouth 15, results in the latter simply functioning as an overflow.

The operation of the device according to the present embodiment, is fully dependent on the control of the outlet 17 by the gate 18 and the timing of the water supply to the device.

Accordingly, if relatively concentrated doses of product solution are desired, egress from the lower chamber 14 is controlled such that, after the previous discharge of solution, this chamber is filled with water and the egress of solution is blocked during a period in which a gradual build-up of the product concentration can take place. At this point there is saturation of the product, at least the lower layers thereof, with the water. Depending on the length of this period, a more or less concentrated solution can be established for release as a batch when the gate is opened.

If, on the other hand, only relatively low concentrations of product are required, it may be sufficient to use the device simply as a flush-through unit and have the outlet 17 in the open position all the time (or to omit the gate altogether). Product dissolution will then only take place during water intake, the lower chamber 14 defining a flow-path along the screen 10.

It will be evident that the above two modes of use can be combined or applied in some alternating pattern to achieve product dispensing and concentration control as desired. Depending on the specifics of the wash programme and the consequent ingress and egress of water/solution, a whole range of product concentration levels can be established.

Claims

1. A device (1) for dispensing a non-fluid chemical product as a dosing liquid comprising a solution and/or dispersion thereof in a solvent, wherein the device is separated by a liquid-pervious screen (10), into an upper chamber (8) in which the product is to be held, and a lower chamber (14) provided with an inlet (14a) for the solvent and an outlet (18) for the dosing liquid, characterised in that the inlet is connected to a mouth (16) for receiving the solvent in free space, whereby the solvent can flow into and fill the lower chamber to a level where it permeates the screen to take-up the product thereabove, whereafter it flows back into the lower chamber to exit via the outlet as the dosing liquid.

2. A device according to claim 1, further characterised in that the outlet is provided with a gate which when closed, allows saturation of at least some of the product by the solvent, and when subsequently opened, results in release of a batch of concentrated dosing liquid.

3. A device according to claim 2, further characterised in that the gate is remotely operable.

4. A device according to claim 2, further characterised in that the gate is thermomechanically operable.

5. A device according to any preceding claim, further characterised in that the upper chamber is closed.

6. A device according to claim 5, further characterised in that the upper chamber is provided with a substantially sealable lid (11) for charging the device with the product.

7. A device according to any preceding claim, further characterised in that the mouth is situated above the level of the screen.

8. A device according to any preceding claim,

further characterised in that the mouth is connected to the inlet by a channel (15), integral with the upper and lower chambers and is separated from the former by a dividing wall.

9. A device according to any preceding claim, further characterised in that means for promoting turbulent flow is incorporated in the lower chamber.

10. A device according to any preceding claim, for dispensing a solid detergent product, when the device is located within a mechanical warewashing machine, further characterised in that the upper chamber has a closed top (2) and side walls (3), (4), (5), (6) and the screen is in a bottom wall thereof, the lower chamber being disposed beneath and substantially peripherally co-terminous with the screen.

11. A method of dispensing a non-fluid chemical product as a dosing liquid comprising a solution and/or dispersion thereof in a solvent, by providing a device (1) separated by a liquid-pervious screen (10), into an upper chamber (8) in which the product is held, and a lower chamber (14) provided with an inlet (14a) for the solvent and an outlet (18) for the dosing liquid, characterised by supplying solvent to said inlet at a rate whereby the solvent flows into and fills the lower chamber to a level where it permeates the screen to take-up the product thereabove, whereafter it flows back into the lower chamber to exit via the outlet as the dosing liquid.

12. A method according to claim 11, further characterised in that the solvent is received in free space, by a mouth (16) connected to said inlet.

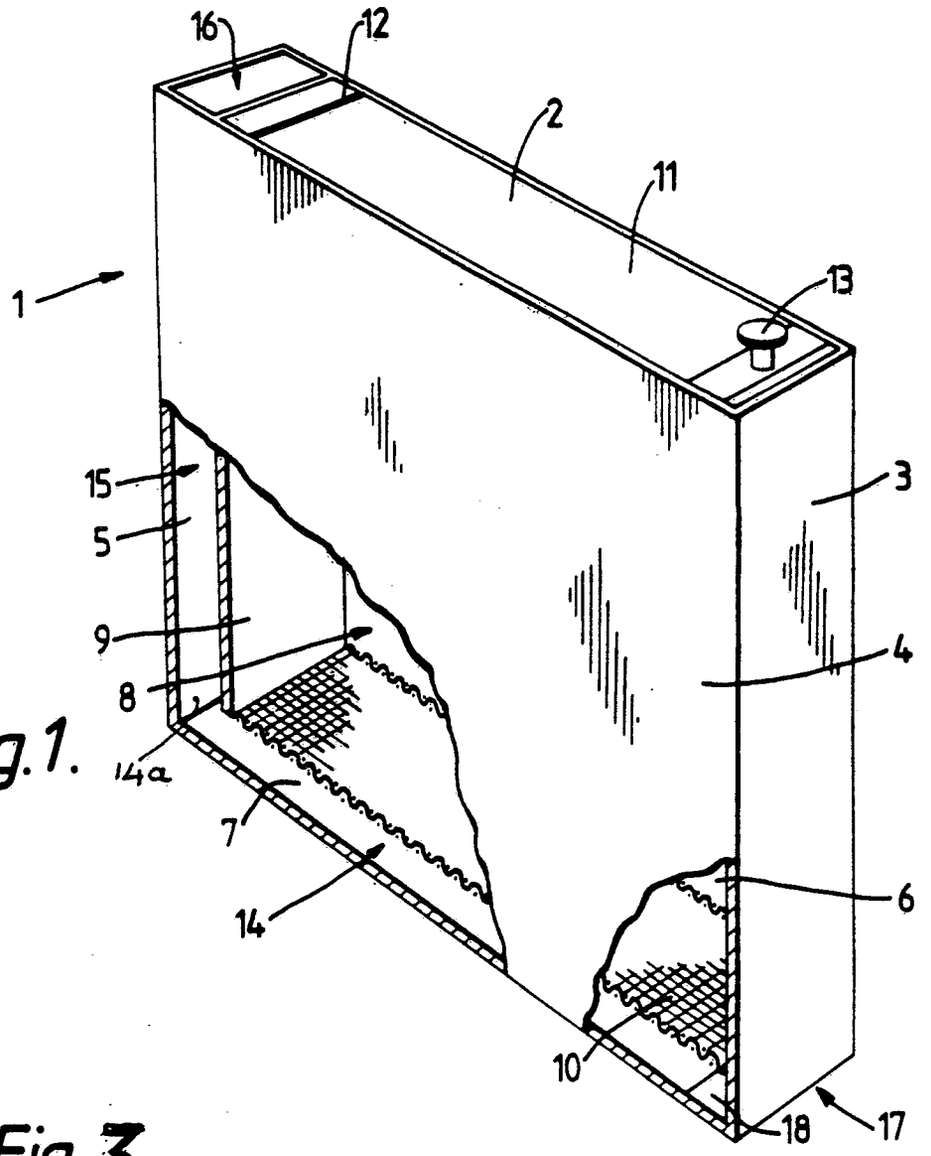
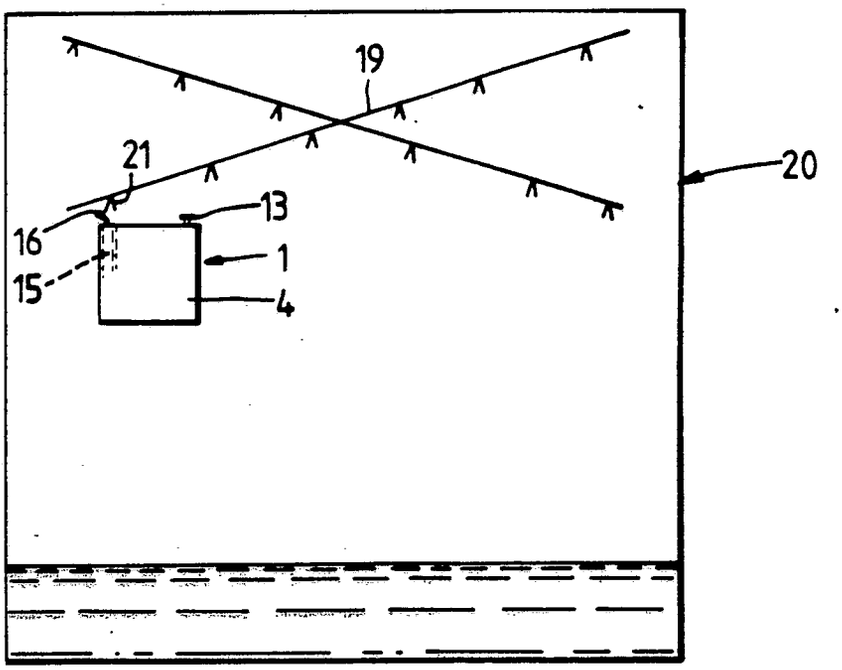


Fig. 1.

Fig. 3.



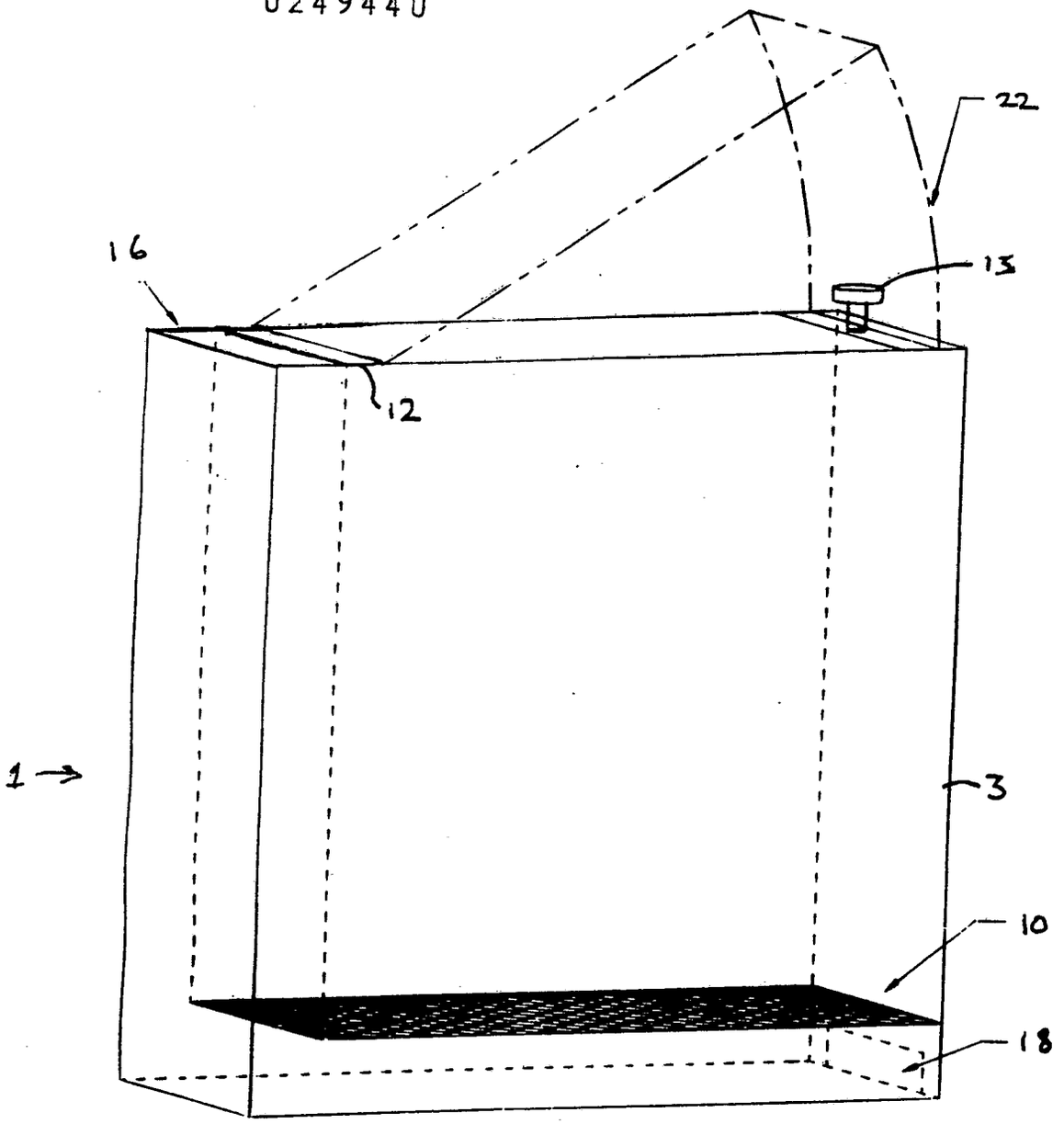


Fig. 2