(12) UK Patent Application (19) GB (11) 2 438 849 (13) A

(43) Date of A Publication 12.12.2007

(21) Application No: 0611472.2

(22) Date of Filing: 09.06.2006

(71) Applicant(s):
Alan Patrick McElligott
18a Oxford Road, Breachwood Green,
HITCHIN, Herts, SG4 8NP, United Kingdom

(72) Inventor(s):
Alan Patrick McElligott

(74) Agent and/or Address for Service:
Gallafent & Co
27 Britton Street, LONDON, EC1M 5UD,
United Kingdom

(51) INT CL:
G01F 11/24 (2006.01)

(52) UK CL (Edition X):
B8N NP N6B1B3B

(56) Documents Cited:
GB 2323587 A
GB 0801022 A
GB 0316453 A
US 5469992 A
US 4394940 A
GB 2190655 A
GB 0629074 A
EP 1772710 A1
US 4560092 A

(58) Field of Search:
UK CL (Edition X) **B8N**
INT CL **G01F**
Other:

(54) Abstract Title: **Dispenser units for flowable solid materials**

(57) Apparatus for dispensing fluent solid material, for example granules or powdery material such as milk formula powder is described. A generally vertical housing has a lower section 2 adapted to receive a receptacle 1 for dispensed material, and an upper section adapted to receive an inverted open-topped container of the fluent solid material. The floor of the upper section has an aperture and is associated with a rotary dispensing and portioning mechanism, which includes at least one chamber of predetermined size located in a rotary member and means for rotating the rotary member to bring the chamber(s) into registration with the aperture in the floor of the upper section of the housing to enable powdered or fluent material to enter the chamber(s) under the effect of gravity. By rotating the rotary member further, the or a chamber comes to lie above the receptacle, enabling the discharge of the contents of the so positioned chamber into the receptacle.

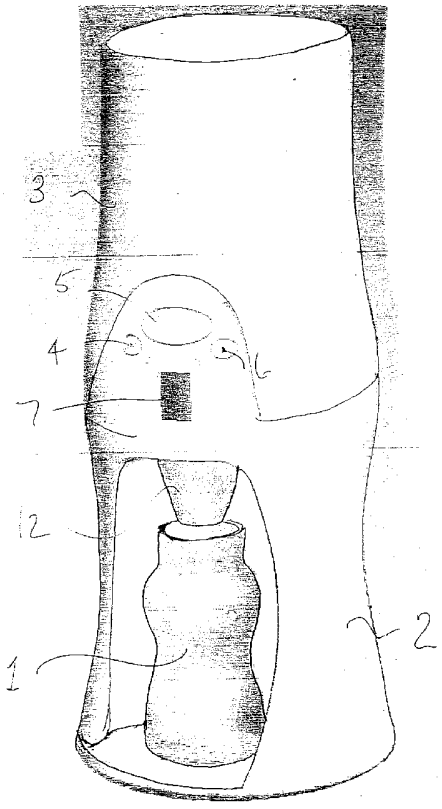


Figure 1

GB 2 438 849 A

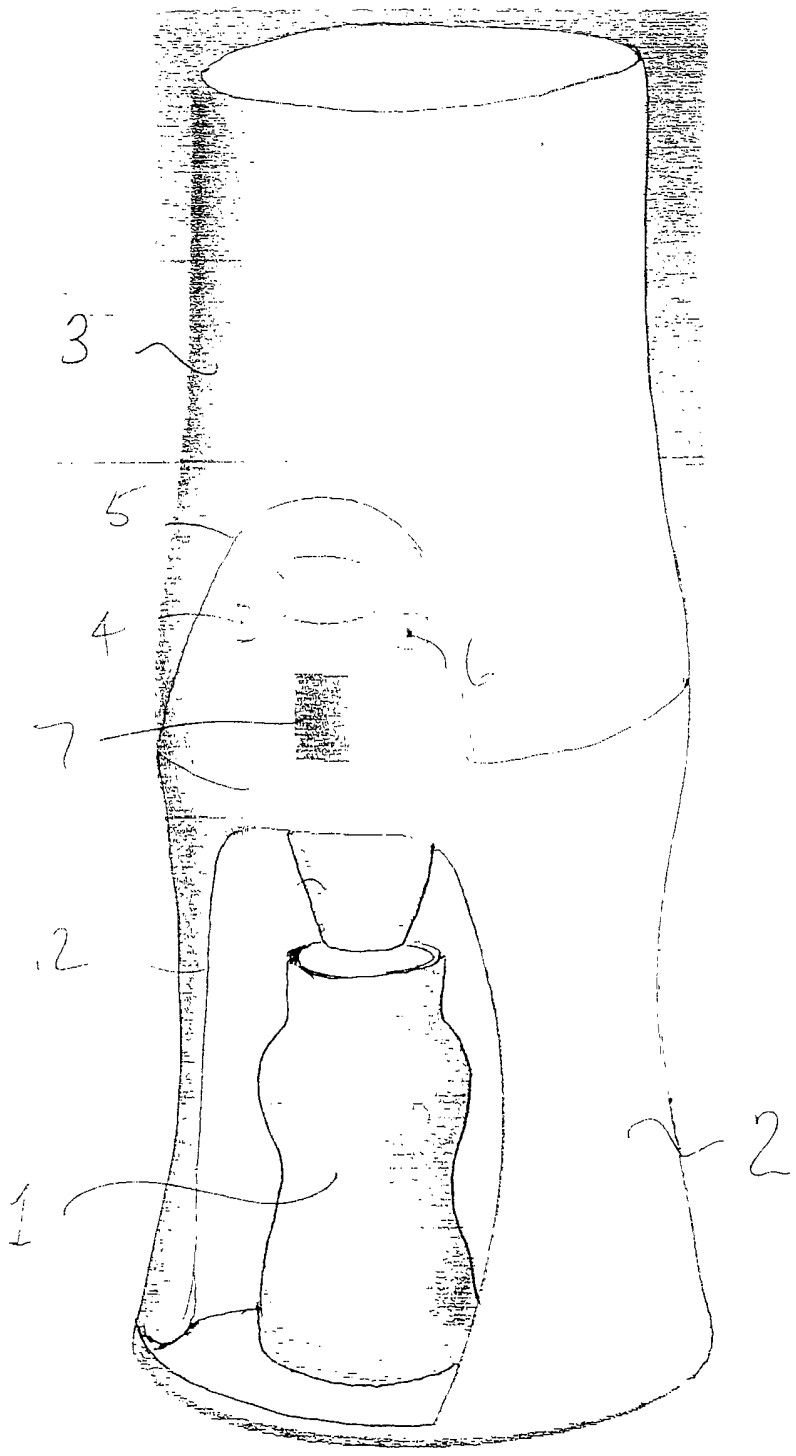


Figure 1

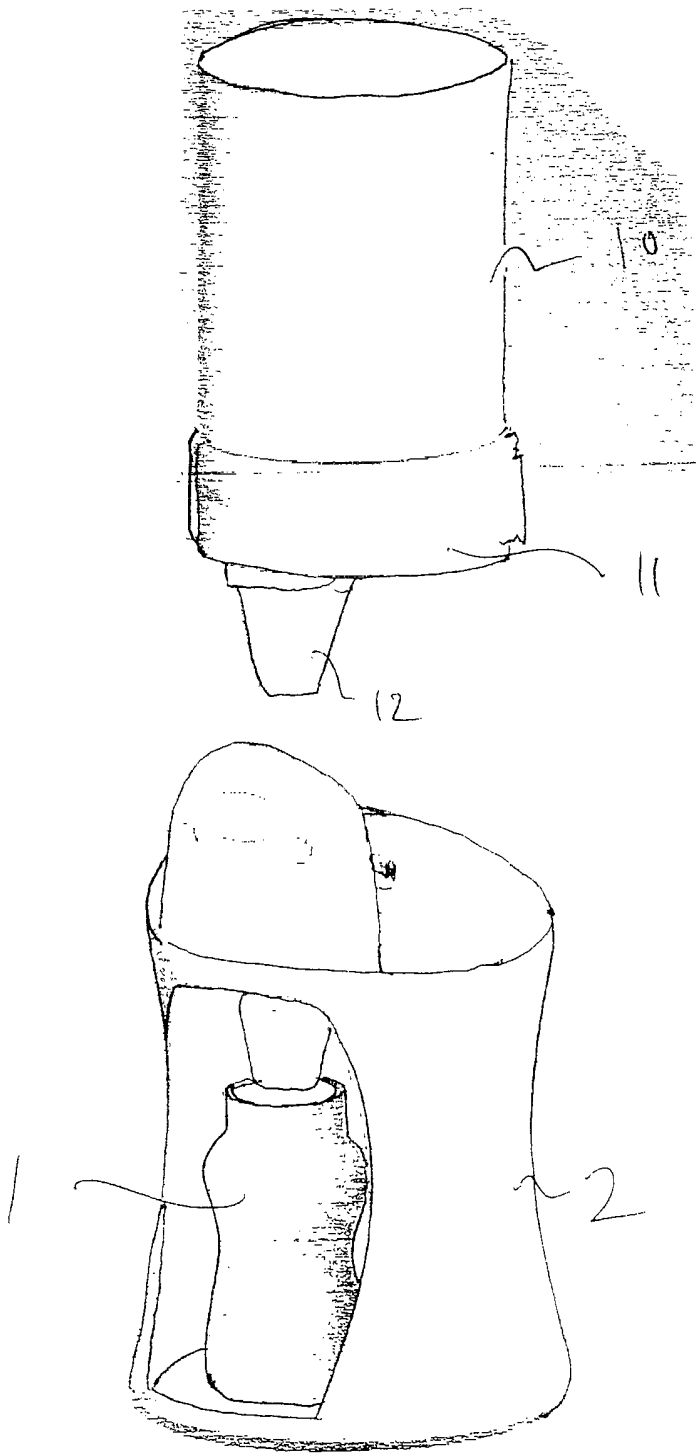
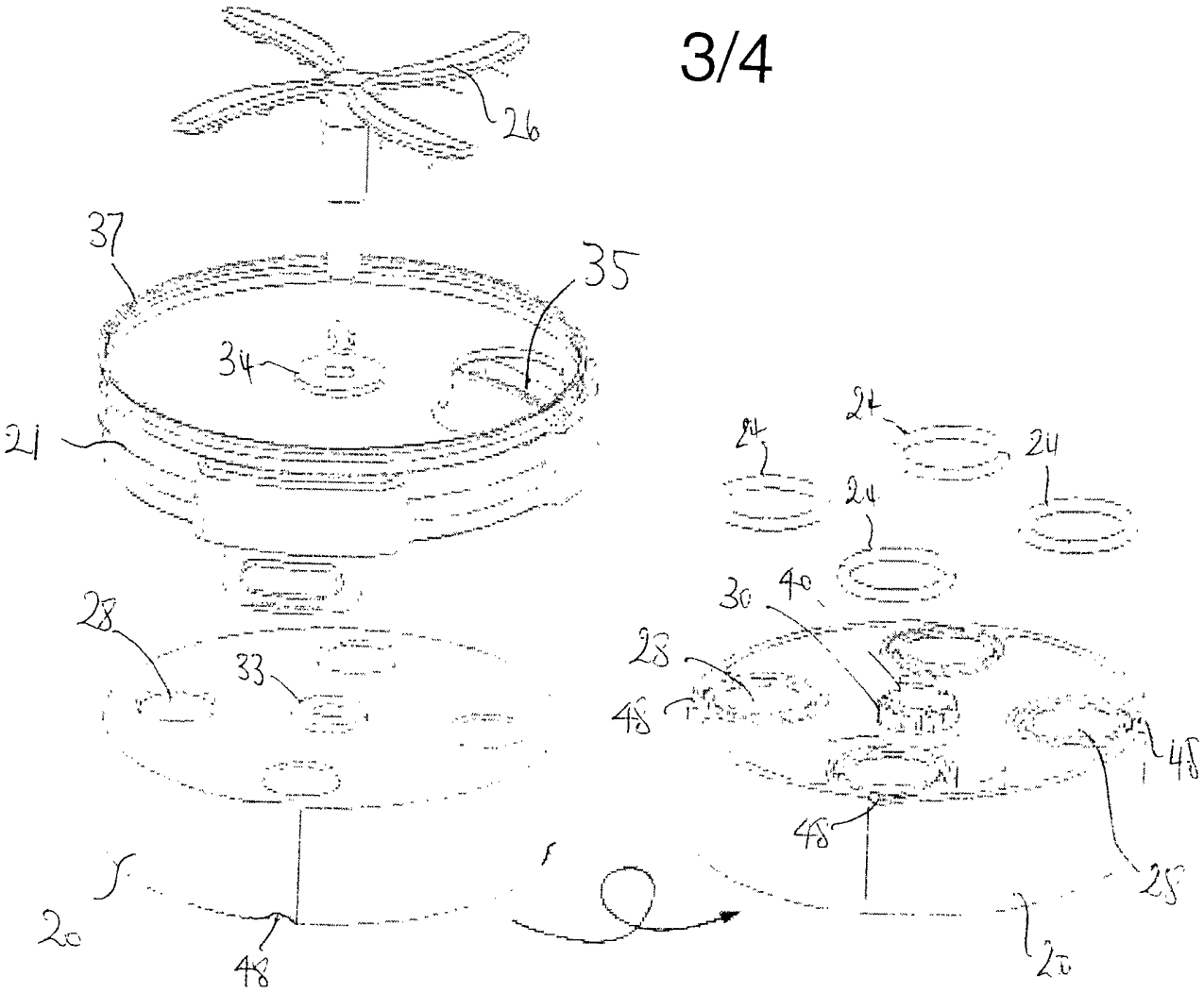


Figure 2


26
37
35
34
21
28
33
20
48
24
30
40
48
25
27

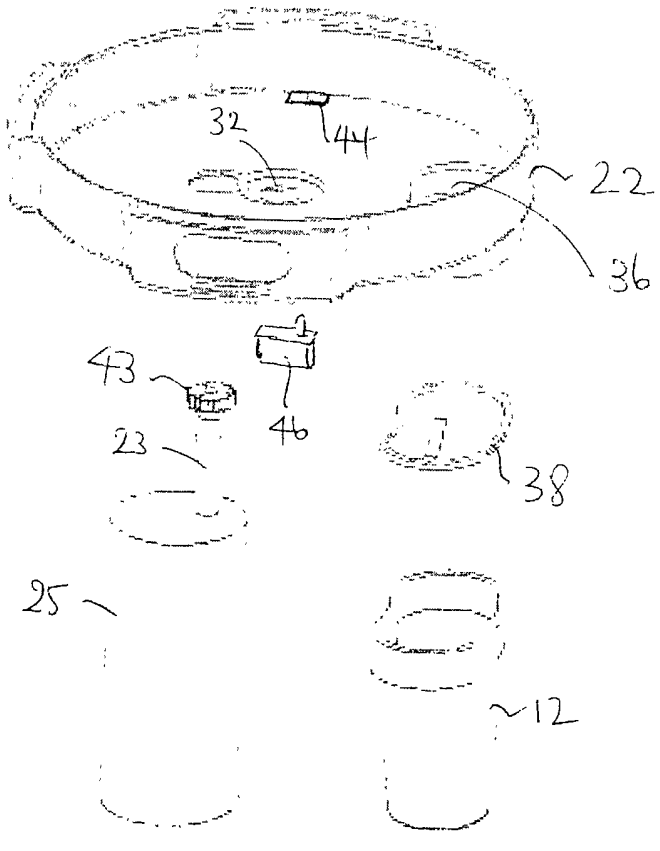
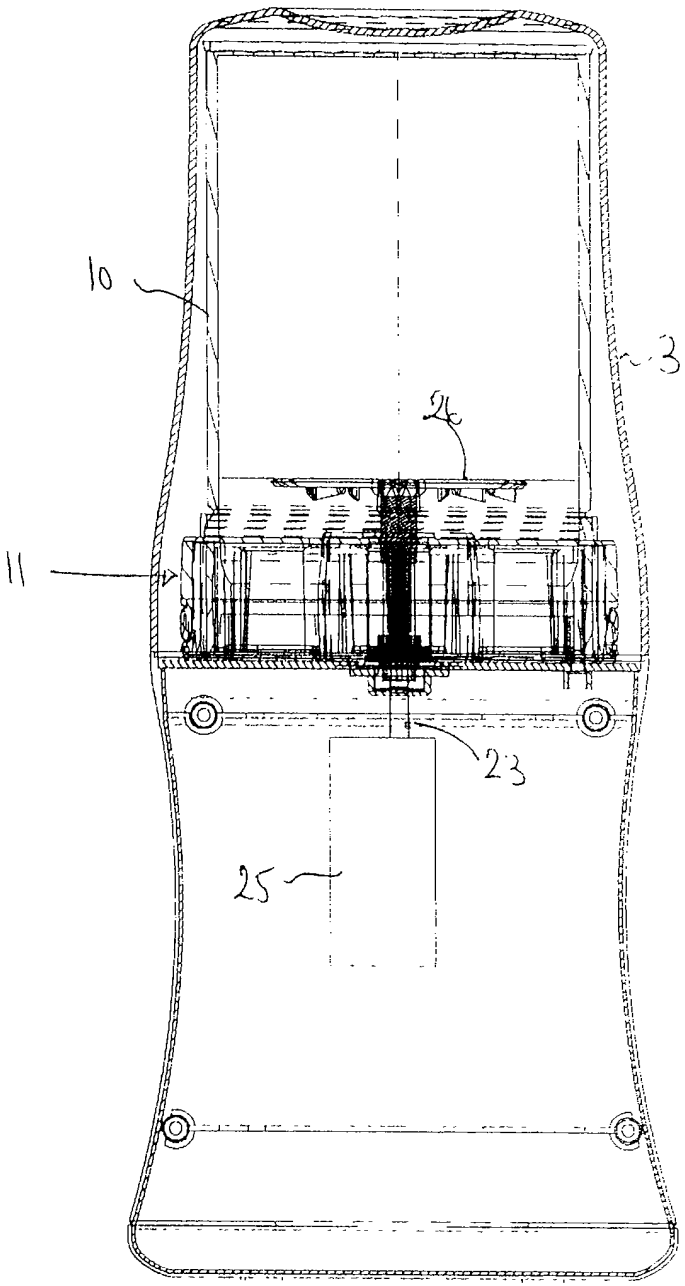

32
44
22
36
43
46
23
38
25
12

Fig 3.



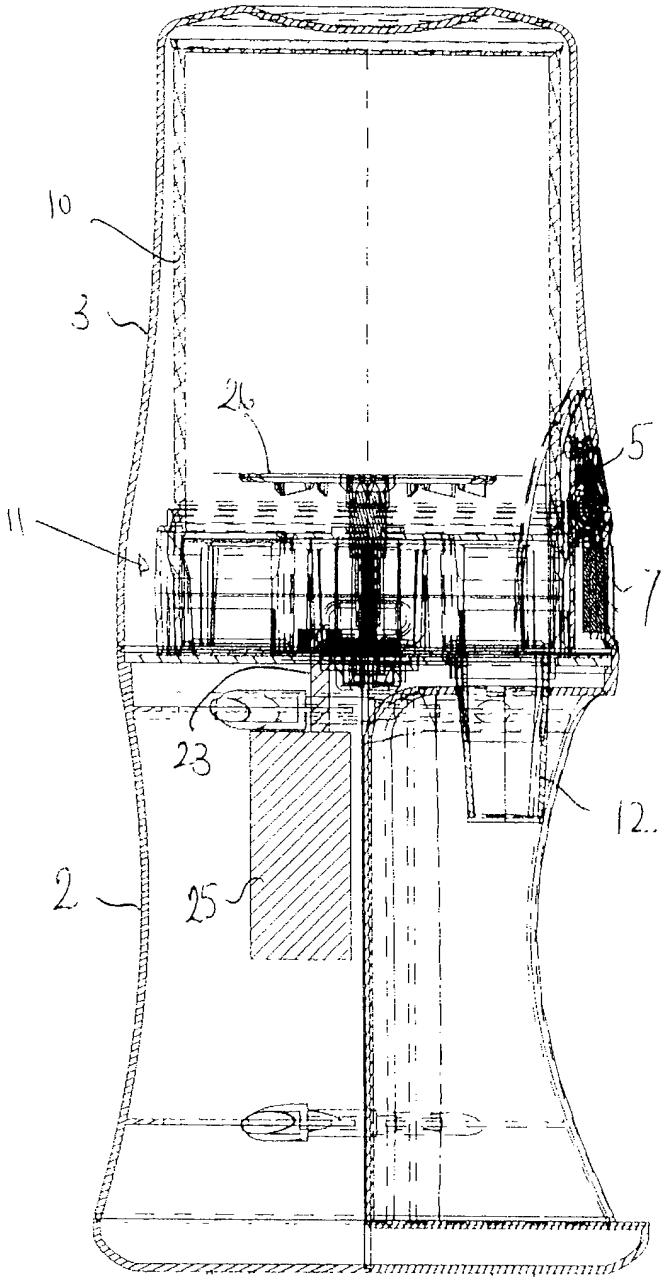


Fig. 4

DISPENSER UNITS FOR FLOWABLE SOLID MATERIALS

This invention relates to dispenser units for flowable solid materials, and, more particularly, to dispenser units adapted to enable the dosed dispensing of milk powder. However, there are numerous examples of fluent solid materials, powders or granules, which need to be portioned or dosed in use, and the apparatus of the present invention may be used for such purposes.

Dispensing measured quantities of powdered materials is traditionally most easily accomplished by the use of a spoon. In cooking, the standard unit of measure for small quantities of both liquids and solids or granular or like nature is the spoonful, be it tea, dessert or table. In practice, unless a "measuring spoon" is used, the amount of material actually constituting the relevant spoonful can vary widely. This is of no consequence in many situations, but it is undesirable in the specific area of formulated milk powders for feeding babies, where the regular preparation of liquid formula of precisely the same strength for the child is desired, rather than variations from one feed to another.

Although measuring spoons are conventionally provided with containers of milk formula, their use is messy because of the nature of the powdered

material itself. This is particularly the case where there is a high ambient humidity, which tends to lead to clogging and to residues, these last constituting a potential health hazard for the child in question. Indeed, it is highly desirable to ensure that powdered milk formula is as much as possible isolated from its surroundings during storage, with a view to preserving it intact and uncontaminated, but that is not so easy to do with conventional manual methods of use.

A further consideration applying to the dosed dispensing of infant milk formula is that, particularly when the child in question is very young, it is often necessary to carry out the dispensing formulating operation in the middle of the night when the person doing the job is perhaps not at their manipulative best. Lack of manual coordination can lead to spillage which in turn can lead to the strength of the formulated feed being reduced.

According to the present invention, there is provided apparatus for dispensing fluent solid material, for example granules or powdery material, which consists of a generally vertical housing having a lower section adapted to receive a receptacle for dispensed material, and an upper section adapted to receive an inverted open-topped container of fluent material, the floor of the upper section having an aperture and being associated with a rotary dispensing and portioning mechanism comprising at least one chamber of predetermined size and located in a rotary member, means for rotating the rotary member to bring the chamber(s) into registration with the aperture in the floor of the upper section of the housing to enable powdered or fluent material to enter the chamber(s) under the effect of gravity, means for rotating the rotary member further about a vertical axis until the or a chamber lies above the receptacle, and means enabling the discharge of the contents of the so positioned chamber into the receptacle.

Preferably the positions of the rotary member at which the or each chamber in it may be filled with powdery or fluent material and at which powdery or

fluent material in the chamber is discharged from the chamber under the effect of gravity are angularly spaced apart from one another by around 180°.

Conveniently, the rotary member is located between two horizontal plates, one of which is the floor of the upper section and the other of which corresponds to a ceiling above a receptacle for dispensed material received in the lower section of the housing.

In order to ensure that, as the rotary member rotates to bring the chamber(s) into registration with the aperture in the floor of the upper section of the housing, the chamber fills with the fluent material, it is convenient to provide stirring means for the fluent material adjacent the floor of the upper section. These may be operated independently of the rotation of the rotary member, but it is found highly convenient to configure the stirring means as a number of blades or paddles which are fixed to the rotary member and rotate with it. In a particularly preferred design, the blades or paddles have downwardly projecting resilient prongs which are biased slightly towards the floor and which serve to jog the blades as they run into the area of the aperture in the floor, so assisting flow of the material into the chamber.

The means for rotating the rotary member may be manually driven or motor driven. In a highly preferred apparatus, the rotary member is motor driven and means are provided to enable the rotary member to be driven through a sufficient angle to bring a chamber into position above the receptacle, and then stopped, each time, for example, a "dispense" switch is actuated. Stopping may conveniently be achieved by actuation of a microswitch by a can or like configuration on the rotary member.

Preferably the upper section of the housing is provided with means enabling an inverted open-topped container of fluent material to be fixed relatively firmly in place, for example by appropriate clipping means, and conveniently

an outer cover may be provided to cover the open-topped container of fluent material once it has been located in place in the upper section.

The invention is illustrated by way of example with reference to the accompanying drawings, in which.

Figure 1 is a perspective view of a powdered milk dispensing unit in accordance with the present invention.

Figure 2 is a perspective view of the dispenser unit of Figure 1 with its top cover removed and part of its construction elevated with respect to the base;

Figure 3 is an exploded view of the dispensing and portioning unit showing the individual components; and

Figure 4 shows two vertical sections through the unit at right angles to one another

Referring to the drawings, Figure 1 shows a dispensing unit for dispensing a predetermined quantity of powdered milk into a baby feeding bottle 1. This is located in a recess in a lower housing part 2 of the device. The upper part of the housing has an outer cover 3 which has been removed to produce the appearance in Figure 2, but which may be a clip fit on to the lower portion of the housing 2 in order to produce a unit having the appearance shown in Figure 1.

As can be seen, the lower portion of the housing also has three press buttons 4, 5 and 6 and a small display 7. The lower portion of the housing 2 also contains a motor, control electronics and, if the unit is to be operated from an internal power source, a battery compartment. If the unit is to be operated by mains power, the preferred configuration is to use a plug/transformer unit plugged into a socket and connected via a suitable

flexible lead and plug to a power entry socket on the unit. A typical power supply required is 5v 1 Amp.

As can be more clearly seen in Figure 2, inside the cover 3 is an assembly consisting of an inverted canister of milk powder 10 and a portioning unit 11, the portioning unit having a downwardly depending funnel 12 which is located above the recess in the bottom of the housing 2 which receives the feeding bottle 1. The lower narrower end of the funnel 12 is of smaller diameter than the open upper top of feeding bottle 1.

The precise mode of operation of the dispensing mechanism 11 is evident from consideration of the exploded view shown in Figure 3.

As can be seen with reference to Figure 3, the size of portion dispensed by the dispensing mechanism is determined by the size of each one of a set of cylindrical chambers 28 which are formed in a drum 20 which is rotatable about a vertical axis. Drum 20 is shown upside down on the right hand side of Figure 3. Drum 20 may be rotated by the engagement of a drive pinion with an annular set of teeth 30 set about its hub. The drive pinion is mounted at the top of a shaft 23 which is driven by a motor and reduction gear module 25.

Drum 20 is, in the assembled unit, held between upper and lower housing shells 21 and 22. Funnel 12 is a press fit into a suitable socket formation on the underside of shell 22 and surrounding an aperture 36 in shell 22. An o-ring seal 38 lies slightly compressed between the top of funnel 12 and the underside of drum 20, and four O-rings 24 seal the four chambers 28 against the floor of shell 22.

The top of shell member 21 is surrounded by a bead 37 which is dimensioned to receive the bottom of an open container of powdery material as a press fit. The contents of the container rest against the upper surface

of shell 21. Shell 21 has an aperture 35 through which fluent material may pass, as explained below.

The undersurface of drum 20 carries a central boss 40 which engages in an aperture 32 in shell 22. The upper surface of drum 20 as shown in the drawing carries a central cylindrical annular boss 33 which engages in a cylindrical recess on the underside of shell member 21 as shown in Figure 3, the recess being coaxial with a central aperture 34 in upper shell member 21. A stirrer blade assembly 26 may be inserted into drum 20 for co-rotation therewith via aperture 34. The degree of insertion of assembly 26 is such as to bias a set of tabs 42, two below each blade of assembly 36, towards the top surface of shell 21, so that as assembly 26 is rotated, each blade is jogged as its respective tabs 42 drop into aperture 35 The lower edge of each tab is angled to enable it to ride up again as rotation past aperture 35 continues.

Mounted below an aperture 44 in shell 22 is a microswitch 46, the actuation tab of which projects through aperture 44 with its end lying slightly above the floor of shell 22 when rotary member 20 is positioned with one of four notches 48 in its lower edge above aperture 44.

In use of the device shown in the drawings, the unit 11 with its funnel 12 pointing upwards is first of all placed over an already-opened canister 10, e.g. sitting on a work surface, and fixed thereto by appropriate clipping means (not shown in the drawings). Once so fixed, the assembly of container 10 and dispensing mechanism 11 can then be inverted to the orientation shown in Figure 2 and the entire unit simply lowered into place in the overall equipment housing.

As it is lowered into place, the toothing 30 comes into engagement with the drive pinion on the end of shaft 23 and the top of microswitch 46 in one of the notches 48. The cover 3 may then be clipped in place.

By actuating one of switches 4, 5 and 6, the pinion may then be driven in order to rotate drum 20 around. The electronic control continues the drive until the next notch 48 comes to lie above aperture 44, triggering microswitch 46 to stop the drive to the motor of module 25.

As a chamber 28 passes below aperture 35 in upper shell 21, powdered milk falls into the chamber 28, assisted by the agitation of the milk powder effected by the slow rotation of paddle 26. When a chamber 28 comes to lie vertically above funnel 12, the powder which has dropped under the effect of gravity into chamber 28 drops out through aperture 36 in the lower shell 22 and funnel 12 into the waiting bottle 1. Each time a rotation of drum 20 takes place, display 7 may be incremented e.g. to show the number of portions which have been dispensed into the waiting bottle 1. One of buttons 4, 5 and 6 may reset the count.

Dispensing can continue until the entire content of the container 10 has been dispensed in this way, at which point the cover 3 may be removed, the assembly of container 10 and dispensing unit 11 lifted out, the now empty container 10 replaced with a full one, and the unit inserted back on to the bottom of the housing 2 to enable further dispensing of the powder in question.

CLAIMS

1. Apparatus for dispensing fluent solid material, the apparatus including a generally vertical housing having a lower section adapted to receive a receptacle for dispensed material, and an upper section adapted to receive an inverted open-topped container of fluent solid material, the upper section having a floor including an aperture and associated therewith a rotary dispensing and portioning mechanism comprising a rotary member including at least one chamber of predetermined size located therein, means for rotating the rotary member about a vertical axis to bring the chamber(s) into registration with the aperture in the floor of the upper section of the housing to enable the material to enter the chamber(s) under the effect of gravity, means for rotating the rotary member further until the or a chamber lies above the receptacle, and means enabling the discharge of the contents of the so positioned chamber into the receptacle.

2. Apparatus according to Claim 1 wherein the positions of the rotary member at which the or each chamber in it may be filled with the material and at which material in the chamber is discharged from the chamber under the effect of gravity are angularly spaced apart from one another by around 180°.

3. Apparatus according to Claim 1 or 2 wherein the rotary member is located between two horizontal plates, one of which is the floor of the upper section and the other of which constitutes a ceiling located above a receptacle for dispensed material received in the lower section of the housing.

4. Apparatus according to any one of Claims 1 to 3 and including stirring means for the fluent solid material located adjacent the floor of the upper section.

5. Apparatus according to Claim 4 wherein the stirring means comprises a number of blades or paddles which are fixed to the rotary member and rotate with it.

6 Apparatus according to Claim 5 wherein the blades or paddles have downwardly projecting resilient prongs which are biased slightly towards the floor and which serve to jog the blades as they run into the area of the aperture in the floor to assist the flow of the material into the chamber.

7. Apparatus according to any one of Claims 1 to 6 wherein the rotary member is motor driven and the apparatus includes means to enable the rotary member to be driven through a sufficient angle to bring a chamber into position above the receptacle, and then stopped, each time a dispense switch is actuated.

8. Apparatus according to Claim 7 wherein the stopping is triggered by actuation of a microswitch co-acting with a cam or like configuration on the rotary member.

9. Apparatus according to any one of Claims 1 to 8 wherein the upper section of the housing is provided with means enabling an inverted open-topped container of fluent solid material to be fixed relatively firmly in place with an outer cover to cover the open-topped container of fluent material once it has been fixed in place in the upper section.

Intellectual Property Office

For Creativity and Innovation

10

Application No: GB0611472.2 **Examiner:** Robert Price

Claims searched: 1-9 **Date of search:** 21 June 2007

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-5,7-9	EP1772710 A1 (MAGFLAR) See paragraphs 5,7,9,11,55,58 and figure 1
X	1-5,9	US4560092 A (SOUZA) See figures 1,6,9 & 10
X	1-3,9	US4394940 A (PETERSON) See col 1 lines 37-59 and figures 1,11 & 12
X	1-3	GB316453 A (HORLICK) See figures 1 & 3
X	1-5	GB629074 A (ROGERS) See page 2 lines 56-page 3 line 6 and figures 1-5
X	1-5	US5469992 A (JENKINS) See col 1 lines 30-52, col 4 lines 29-32 and figure 2
X	1-3,9	GB801022 A (GASKELL & CHAMBERS) See figures 1 & 2
X	1-3,9	GB2190655 A (HURST GREEN) See figures 1 & 2
A	-	GB2323587 A (DENNETT) See figures 1-3

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Intellectual Property Office

For Creativity and Innovation

11

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

B8N

Worldwide search of patent documents classified in the following areas of the IPC

G01F

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
G01F	0011/24	01/01/2006