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54 Improvements in paint spraying equipment.

57 A generally conventional paint spraying pot 1 of an assembly operating by Venturi action has an injection moulded plastic vessel 2 of polyethylene or the like supported therein, typically by slots 15 or recesses 21 cooperating with lugs 12 of pot 1. The fluid supply tube 7 opens adjacent the bottom of vessel 2, the latter having a downwardly reducing cross-sectional area such that the volume of paint remaining in vessel 2 when the tube 7 is no longer immersed in the liquid is minimized to reduce wastage at cessation of a spraying operation.

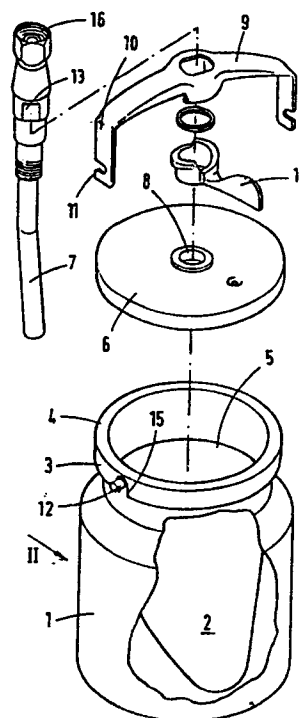


Fig. 1

IMPROVEMENTS IN PAINT SPRAYING EQUIPMENT

The invention relates to paint spraying equipment such as used in the car refinishing industry.

Car paint finishes are commonly replaced or renewed by
5 their owners either to change a vehicle's colour or to
provide a new finish to paintwork which has suffered damage,
discolouration and general wear and tear. In the past, and
still to some extent in the present, paint refinishing opera-
tions have employed cellulose paint finishes which are
10 sprayed from a conventional air spray gun and left to dry in
the air to a hard finish. Chemically-curing finishes have
gradually replaced cellulose paint finishes since introduc-
tion of the former some years ago. These finishes comprise
materials which cure by chemical change rather than simply
15 by solvent evaporation and offer the advantage of speedy
refinishing, hard surface finish and reductions in the level
of fumes and vapours compared to that derived from conventio-
nal paint vehicles, such as the volatile organic solvents
used in cellulose paints.

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Although chemically-curing coating materials offer the
above advantages, they are relatively expensive, costing
approximately twice the cost of cellulose paints. This has
led to an increase in the normal need to conserve materials.

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Spraying equipment used in car refinishing usually comprises a nozzled gun head supplied by Venturi effect via a tube from a reservoir of paint or other liquid coating composition contained in a cylindrical cup or pot to which the gun head is mounted. The supply tube is disposed in the cavity of the cup with its lowermost end opening within a body of the paint. The tube is bent towards one side of the cavity so that when the cup is tipped with its normally vertical axis no longer vertical, the risk that the level falls beneath the tube opening is minimized. The tube is, of course, also sufficiently long that its opening is as close as possible to the base of the cup. However, there is commonly sufficient clearance that a filter body of some kind can be mounted to the terminus of the supply tube in the clearance space.

The above practice obviously reduces the volume of paint or other liquid which must remain in the cup to allow spraying to continue. In practice, the minimum required volume is obviously important in as much as it determines the amount of paint required to be charged to the cup in excess of that required by the surface to be coated. The amount has particular significance in the context of chemically-curing surface coating materials where the resulting materials wastage would otherwise involve a real level of unnecessary cost.

According to the invention, there is provided an apparatus for spraying paint or other liquid material,

which apparatus comprises a container for said liquid material, said container having an access opening to its cavity for charging of said liquid material thereto and a removable closure member for said opening, and a fluid
5 supply tube penetrating said container and having an end opening into said cavity and so disposed as in use to be adjacent the bottom of a body of liquid contained in said cavity, characterized in that said container has a non-uniform cross-sectional area decreasing to a minimum in
10 the vicinity of the fluid supply tube open end whereby the ratio between volume and depth of liquid material in the container cavity when the level of said liquid material just reaches the fluid supply tube open end is preferably minimized but in any event reduced compared to a uniform
15 cross-sectioned container of the same maximum cross-section.

The liquid material container will in general take the form of a cavity-defining member supported within a
20 conventional paint sprayer container of, for example, right circular cylindrical form and made from metallic material such as aluminium or aluminium alloy. A conventional sprayer container may, of course, be entirely omitted in some embodiments of the invention. However, the
25 form of arrangement just referred to is much preferred since a simple accessory member, for example, of moulded plastics material, can easily and economically be made to be inserted into conventional spray containers so that the existing equipment can be fully relied on for its proven

design of closure and fluid supply tube arrangements.

Accordingly, in a preferred embodiment of the invention, the apparatus comprises a main container of preferably right circular cylindrical form, the main container having a top equipped with a closure member removable to allow access to the container cavity and a base, a vessel supported within the main container cavity and having a cross-section at its upper extremity preferably approximating that of the adjacent cavity-defining walls of the main container, the vessel having a smaller cross-sectional area at the lower extremity of the vessel.

15 The reduced cross-sectional area at the lower extremity of the vessel (or the minimum area) will conveniently be not more than 45% of the cross-sectional area of the container at its base. The ratio will generally be 35% or less (eg. not more than 25%), preferably less than 20% (eg 15% or less, most preferably a figure in the range from 8% to 14% such 10% approximately). The reduced cross-sectional area may, for example, be a circular area not more than 25 or 30 times (eg 10 to 20 times) such as about 12 to 25 times 25 larger in diameter than the opening of the fluid supply tube (typically about 15 times larger), the circular area being measured at the level of a body of liquid just covering the tube opening.

The internally supported vessel may conveniently be made of a coating composition-resistant plastics material such as a polyethylene or polypropylene (or copolymer). In any event, the vessel is most conveniently made by
5 Injection moulding and thus its material will preferably be selected with this in mind.

The vessel should normally be self-supporting in use conditions when charged with a body of paint so as to be
10 dimensionally and configurationally stable, at least at the lower extremity.

The following is a specific description intended to illustrate the invention, by way of example only,
15 reference being made to the accompanying drawings in which:-

Figure 1 is an exploded view of one form of the apparatus according to the invention, part of some
20 components being partially broken away to expose others;

Figure 2 is a side view showing part of the apparatus shown in Figure 1 in cross-section and from the direction of the arrow II shown in Figure 1;
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Figure 3 is a further cross-sectional view, taken from the direction of the arrow III shown in Figure 2; and

Figure 4 is a view similar to Figure 1 showing a

further embodiment of the invention.

The apparatus shown in the drawings comprises a 106mm internal diameter aluminium pot 1 of right circular cylindrical form, as conventionally used in paint spraying equipment. Supported through the open top of the pot is a 39mm internal diameter injection moulded polyethylene vessel 2 having 1mm thick walls. The flanges 3 and 4 of the latter locate over the upper rim of pot 1, cut-out 15 being received over pot lugs 12. A conventional-type lid 6, also of aluminium, sealingly engages by a seal (not shown) the flange 4 of vessel 2. A 10mm internal diameter fluid supply tube assembly 7 penetrates central opening 8 in lid 6 so as largely to reside in the cavity 5 of vessel 2 and is also conventional for use in paint spraying equipment. Vessel 2 has an external circular cross-section at its upper end which is approximately equal to the internal cross-section of container or pot 1. The cross-section of vessel 2, however, reduces downwardly until it is a fraction of this value at the region of the end opening of tube 7, as will be evident from Figures 2 and 3 in particular. Vessel 2 is configured to accommodate the bend in tube 7, as best seen in Figure 2.

A yolk 9 is received over the top portion of the tube assembly 7 and is located and restrained against rotation relative to the lid 6 and assembly 7 by diametrically opposed flats 13 of assembly 7 and cooperative parts of the yolk aperture, as will be evident from Figure 1. Arms 10 of

yolk 9 extend downwardly and include slotted extremities 11 which engage lugs 12 of the container 1, the latter being fixed in the wall of pot 1 by heads of caps 20 present in both the Figure 1 and Figure 4 embodiments but illustrated only in Figure 4. In use, the lugs 12 are entered into slots 11 by appropriate rotation of lid 6, assembly 7 and yolk 9 relative to the pot 1, following which operation of cam lever 14 urges the yolk 9 upwardly by cooperation of its rotating cam surfaces with those of the yolk. Lid 6 is at the same time forced downwardly to ensure its seal with flange 4 of vessel 2. Union nut 16 is internally threaded for coupling to an air line and spray nozzle assembly including a Venturi to draw paint into and along the tube 7 in use to complete a closure and supply system essentially identical with conventional systems used in paint spraying equipment, only vessel 2 being unconventional.

The volume of paint or other liquid material in the vessel 2 can, as will be appreciated, reach a very low level (typically 4ml in the case of the apparatus shown in Figures 1 to 3), whilst remaining above the opening in tube 7. This enables spraying to be effected with little wastage of materials and thus no significant wasted expenditure.

Although, as shown in the drawings, the vessel 2 has a front face inclined to the wall surface of container 1, it is thought that a vessel having a vertical front wall (ie generally parallel to the container 1 wall) will be easier to make by injection moulding. Such form is therefore

preferred and is illustrated in Figure 4 of the drawings in which as compared to Figures 1 to 3 like parts are designated by like reference numerals.

5 As will be seen from Figure 4, the vessel 2 of Figures 1 to 3 is replaced by an alternative vessel of the same material but having an upper relatively thick walled portion 19 of uniform right circular cylindrical form and a lower relatively thin walled portion 18 of non-
10 uniform cross-section and inclined axis. Portion 19 has an out-turned flange which seats upon and seals with the top rim of pot 1 in similar fashion to flange 4 of the apparatus shown in Figures 1 to 3 but has no counterpart to flange 3 shown in Figure 1. A recess 21 is formed at each
15 of two diametrically opposed sides in the thickness of portion 19, recesses 21 cooperating with caps 20 of lugs 12 to support the polyethylene vessel within the cavity of pot 1 in similar fashion to the arrangement shown in Figures 1 to 3.

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Lower cylindrical vessel portion 18 has a flat circular base 22. The remainder of the portion 18 rises from base 22 as a wall which is perpendicular at 17 and increasingly obtusely angled relative to the base 22 with increasing
25 angular separation from the perpendicular wall portion. Thus, two spaced parallel axes penetrate the centre of base 22 on the one hand and the centre of the circular open top of portion 19 on the other. In this way, tube 7 is received in the vessel in similar orientation with

respect to the vessel as that depicted in Figures 1 to 3.

Base 22 has an area of approximately 25% of the internal area of the opening into thick walled portion 19 of vessel 2, the latter conveniently being of the order of 50 sq.cm.

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Operation of paint spraying equipment as illustrated in the drawings is, of course, according to conventional practices well-known in the art. Such operation is not in principle affected by the inclusion of vessel 2 and therefore need
10 not be described.

The invention includes within its scope a self-supporting container for paint and the like comprising a moulded plastics material member defining a cavity within cylindrical
15 cal side walls which rise from a generally circular or elliptical flat base, the member having an outwardly flanged lip formed at its upper extremity and defining a generally circular opening into the cavity, the base having a surface area internally of the cavity equal to less than 35% of the
20 cross-sectional area of the circular opening defined at the upper extremity of the moulded member and the cylindrical walls rising perpendicularly from the base at a first junction of walls and base and rising with an obtuseness of angle at other junctions which increases with spacing from
25 said first junction. Such a container may, for example, be injection moulded, the cylindrical side walls including an upper portion adjacent the upper extremity of the moulded member, said portion having a uniform cross-section and being

moulded with a pair of diametrically opposed location recesses formed in the thickness of the plastic material of the moulded member on the exterior thereof, the base having a surface area internally of the cavity equal to 15% to 25% of
5 the cross-sectional area of the circular opening defined at the upper extremity of the moulded member.

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CLAIMS:

1. An apparatus for spraying paint or other liquid material comprising a container for said liquid material, said container having an access opening to its cavity for
5 charging of said liquid material thereto and a removable closure member for said opening, and a fluid supply tube penetrating said container and having an end opening into said cavity and so disposed as in use to be adjacent the bottom of a body of liquid material contained in said
10 cavity, characterized in that the container cavity has a non-uniform cross-sectional area decreasing from a maximum cross-section portion spaced from the fluid supply tube open end to a relatively reduced cross-section in the vicinity of the fluid supply tube open end whereby the
15 ratio between volume and depth of liquid material in the container cavity when the level of said liquid material just reaches the fluid supply tube open end is reduced compared to a uniform cross-sectioned container having said maximum cross-section.

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2. Apparatus as claimed in Claim 1 in which the container cavity has a non-uniform cross-sectional area decreasing to a minimum in the vicinity of the fluid supply tube open end whereby the ratio between volume and depth of liquid
25 material in the container cavity when the level of said liquid material just reaches the fluid supply tube open end is essentially minimized.

3. Apparatus as claimed in Claim 2 wherein the ratio between the minimum and maximum cross-sectional areas of the cavity is less than 45%.
- 5 4. Apparatus as claimed in any preceding claim wherein the ratio between the reduced cavity cross-sectional area and the cross-sectional area of the fluid supply tube open end is from 15:1 to 25:1.
- 10 5. Apparatus as claimed in Claim 4 wherein the ratio between the reduced cavity cross-sectional area and the cross-sectional area of the fluid supply tube open end is from 17:1 to 22:1.
- 15 6. Apparatus as claimed in Claim 5 wherein the ratio between the reduced cavity cross-sectional area and the cross-sectional area of the fluid supply tube open end is about 20:1.
- 20 7. Apparatus as claimed in any preceding claim which comprises a main container having a top equipped with a closure member removable to allow access to the cavity thereof and a base, a vessel supported within the main container cavity and having a relatively large cross-
25 section at its upper extremity and a relatively small cross-section at its lower extremity, and a fluid supply tube penetrating the vessel and extending into the region adjacent the lower extremity thereof.

8. Apparatus as claimed in Claim 7 wherein the cross-section of the vessel at its upper extremity approximates that of the adjacent cavity-defining walls of the main container and wherein the fluid supply tube penetrates the
5 closure member.

9. Apparatus as claimed in Claim 1 wherein the container cavity is defined by a vessel supported within an outer container.

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10. A self-supporting container for paint and the like comprising a moulded plastic material member defining a cavity within cylindrical side walls which rise from a generally circular or elliptical flat base, the member
15 having an outwardly flanged lip formed at its upper extremity and defining a generally circular opening into the cavity, the base having a surface area internally of the cavity equal to less than 35% of the cross-sectional area of the circular opening defined at the upper
20 extremity of the moulded member and the cylindrical walls rising perpendicularly from the base at a first junction of walls and base and rising with an obtuseness of angle at other junctions which increases with spacing from said first junction.

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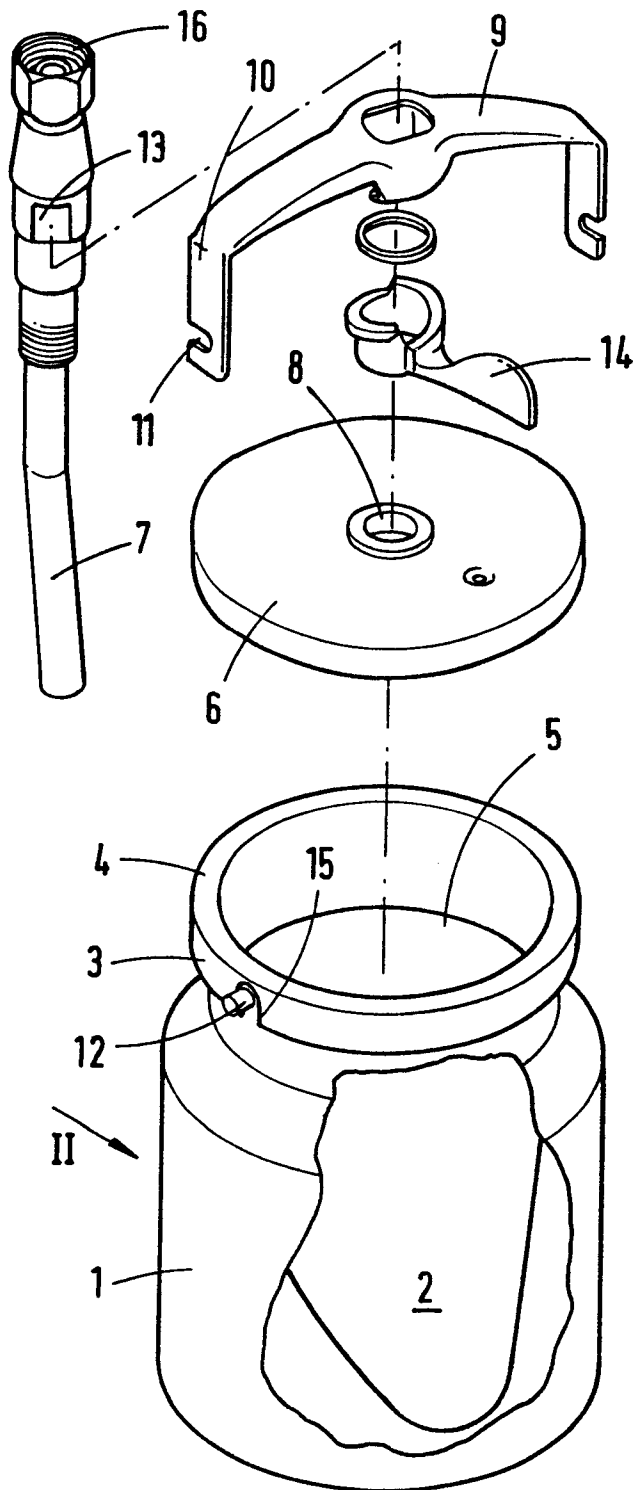


Fig. 1

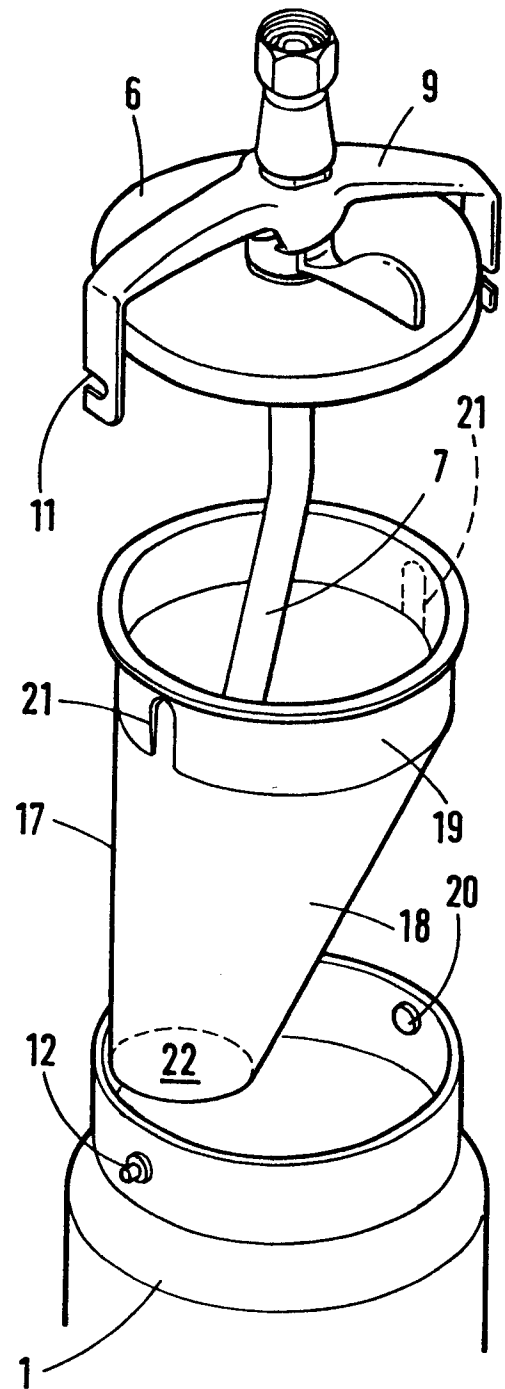


Fig.4

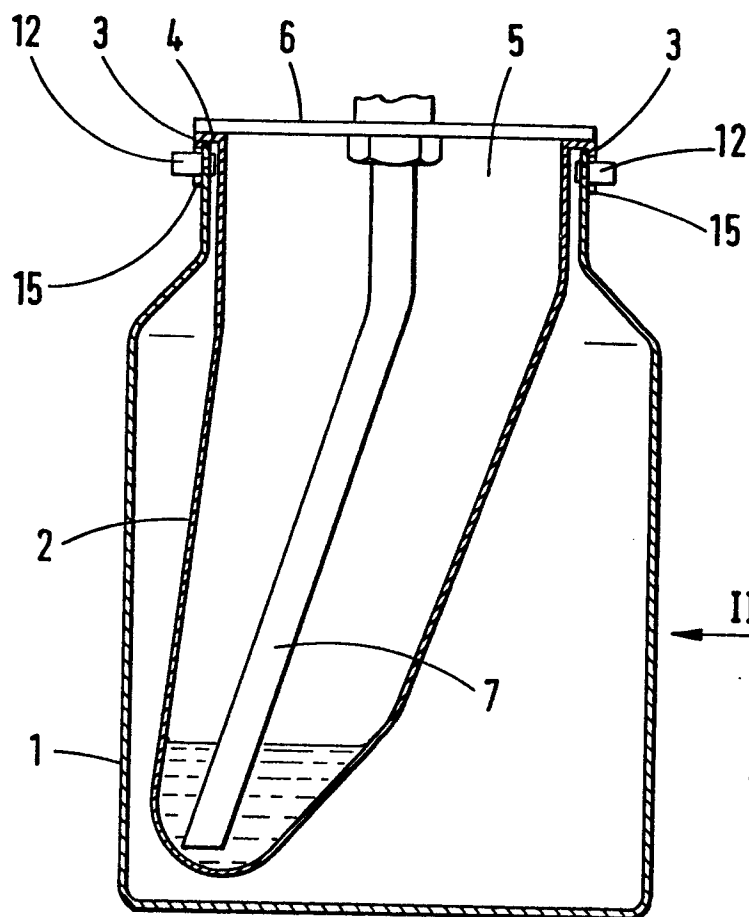


Fig. 2

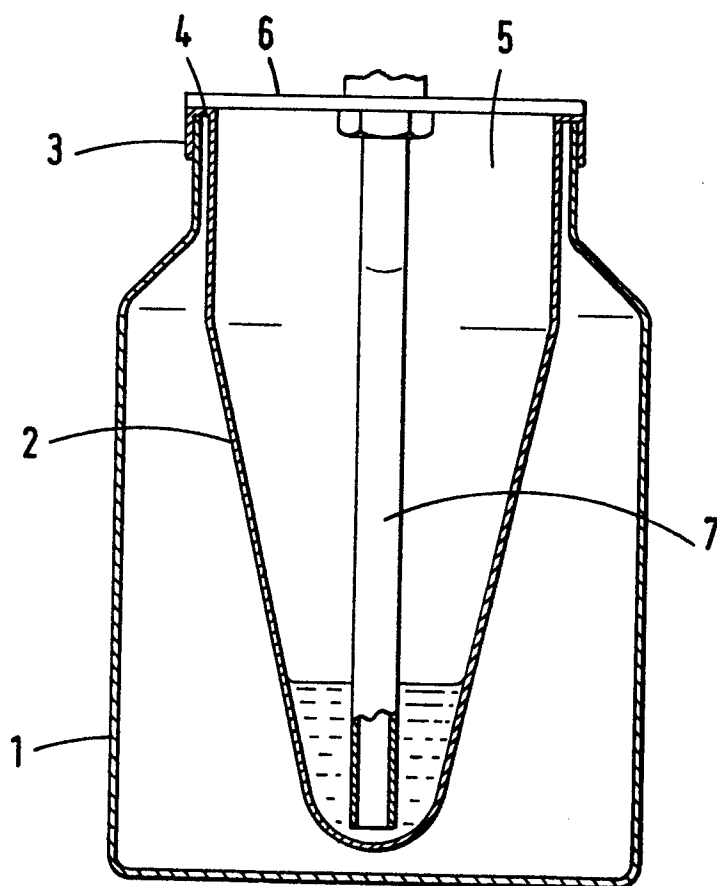


Fig. 3



DOCUMENTS CONSIDERED TO BE RELEVANT			EP 86306534.8
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	US - A - 4 429 835 (BRUGGER et al.) * Fig. 1 *	1,2	B 05 B 11/00 B 05 B 7/24
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X	US - A - 3 136 486 (DOCKEN) * Fig.. 1 *	1,2	
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A	US - A - 3 401 842 (MORRISON) * Totality *	1,2	
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A	US - A - 3 507 309 (JOHNSON) * Fig. 3 *	1,2	

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 05 B
Place of search VIENNA		Date of completion of the search 14-11-1986	Examiner SCHÜTZ
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			