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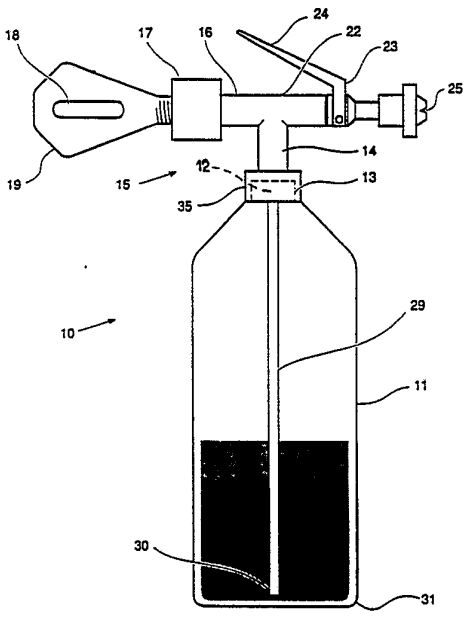
(54) Title: LIQUID APPLICATOR

(57) Abstract

A portable liquid applicator apparatus including an applicator (23), liquid connection means (29) for operatively connecting the applicator to a liquid container (11) for supply of liquid, gas supply means (18) for pressurising the container and pressure regulating means (17) interposed between the gas supply means and the container for regulating the gas supply. The container may be of the type including a seal adapted to be punctured on being connected to the apparatus. The apparatus may include puncture means adapted to puncture the seal.



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"LIQUID APPLICATOR"

Technical Field

This invention relates to a liquid applicator.

This invention has particular but not exclusive application to liquids such as paints, pesticides, herbicides, insecticides, fungicides and liquid fertilizers but of course it could be used with other liquids such as deodorants. It also has particular application to spraying and for illustrative purposes will be so described hereinafter. However, this invention could be used in other devices where a fluid is fed under pressure to a fluid applicator, for example it could be used for feeding paint to a roller head, brush, pad or the like.

Background Art

Spraying apparatus is well-known and usually includes a liquid container, a pressure supply and a sprayhead. However some of these known sprayers are relatively complicated and expensive. They may also be difficult to use effectively. Some sprayers are relatively bulky or require external electrical or pressure supplies and therefore lack portability. Other known sprayers result in inconsistent spray results due to, for example, variations in the pressure supply, difficulty in obtaining a desired liquid quality and difficulties in cleaning the container.

Known portable spraying equipment includes a container for containing the liquid to be sprayed. The container forms part of the equipment and is removable so that it can be cleaned and filled. The extremely toxic nature of many materials used for spraying means that the necessity to fill and clean known containers exposes users to dangers, particularly if the materials give off toxic vapours or are transdermal. There is thus a need for an inexpensive spraying apparatus able to cooperate with sealed containers of toxic material in a manner such that a user cannot accidentally come into physical contact with the material to be sprayed, and such that the spent container can be replaced without endangering a user.

Disclosure of the Invention

The present invention aims to provide an improved portable liquid applicator which will be reliable and efficient in use. Other objects and advantages of this invention will hereinafter become apparent.

With the foregoing and other objects in view, this invention in one aspect resides broadly in portable liquid applicator apparatus including:-

applicator means;

liquid connection means for operatively connecting the applicator to a liquid container for supply of liquid therefrom;

gas supply means for pressurising said container, and

pressure regulating means of the type adapted to maintain a constant relatively low pressure in the container interposed between said gas supply means and said container for regulating said gas supply.

Preferably the applicator means, the liquid connection means, the gas supply means and the pressure regulating means form a portable unit. However any one of the various components of the apparatus or any combination of the components could form separate portable units. For example, the applicator head means could form one unit to be held in one hand and the combination of the container and the regulated gas supply could form a separate unit to be held in the other hand or hung from the belt or another object, for example, a ladder.

The gas supply means may include gas supply mounting means for mounting a gas cylinder. In a preferred arrangement the gas supply means comprises a gas bulb and includes communication means to penetrate the closure on the bulb. The regulator may be pre-set or it may be provided with means for adjustment. The cylinder or bulb may be releasably mounted to the liquid applicator apparatus or housed within the apparatus.

It is also preferred that the liquid connection means includes control valve means for controlling flow of liquid

from the applicator means, whereby stopping the liquid supply downstream of the liquid container results in the pressure regulating means closing the gas supply means.

The liquid applicator apparatus may be provided with a releasable mounting associated with the gas pressure regulating means and the liquid connection means and adapted for releasably mounting the liquid container. The apparatus may include a liquid container and wherein the mounting and the liquid container are complimentary, for example in the form of a screwthread or a bayonet fitting.

Preferably the liquid container is of the type including sealing means adapted to be punctured on being connected to the mounting. Thus the mounting means of the apparatus preferably includes puncture means adapted to puncture the container sealing means to provide communication between the container and both the liquid connection means and the pressure regulating means. Preferably the puncture means includes first puncture means adapted to puncture the seal to provide communication between the container and the liquid connection means and second puncture means adapted to puncture the container seal to provide communication between the container and the pressure regulating means.

The puncture means may be of any convenient form suitable for providing an opening or openings in the seal. It could, for example, be in the form of a knife edge or a series of teeth adapted to provide an opening of any convenient shape.

In a preferred arrangement the first puncture means includes a cutting portion located at the distal end of a fluid supply tube adapted to extend into the container. The supply tube may be of any convenient cross-sectional shape suitable to provide passage of the liquid to the applicator means. Preferably the second puncture means includes a cutting member located on the mounting externally of and coaxially with the supply tube. In a preferred arrangement the supply tube may be cylindrical and the second puncture means may be provided with teeth arranged in a circular formation. The container seal may

be provided with weakened portions in the shape of at least one of the openings to facilitate ease of forming the opening.

The liquid container is preferably non-pressurised. The liquid container is also preferably disposable and designed for a single use to facilitate consistency of the liquid flowing from the applicator means.

The components of the apparatus may be made of any suitable material such as plastics or metal depending upon the manufacturing technique used to produce the apparatus and also upon the properties of liquid to be applied.

In another aspect this invention resides broadly in a sealed non-pressurised liquid container adapted for releasable connection to a liquid applicator as hereinbefore described.

In a further aspect this invention resides broadly in portable liquid applicator apparatus including:

applicator means;

liquid connection means for operatively connecting the applicator to a sealed liquid container for supply of liquid therefrom;

gas supply means for pressurising said container, and

puncture means adapted to puncture the seal of said sealed container to provide communication between said container and both said liquid connection means and said pressure regulating means.

In yet another aspect this invention resides broadly in a method of delivering a liquid from a sealed container, said method including:-

providing a portable liquid applicator apparatus as defined above;

providing a sealed non-pressurised container as defined above, and

puncturing the seal of the sealed container whereby the contents of the container are pressurised.

Description of preferred embodiment

In order that this invention may be more easily understood and put into practical effect, reference will

now be made to the accompanying drawings which illustrate a preferred embodiment of the apparatus for applying liquid of this invention, wherein:-

Fig 1 is a front view of spraying apparatus in accordance with this invention, and

Fig 2 is a sectional, enlarged part-front view of the apparatus shown in Fig 1.

The spraying apparatus 10 illustrated in Figures 1 and 2 is adapted for use with a single use disposable liquid container 11. The container 11 is connected by a screwthread at its upper end 12 to the branch leg 14 of a T-piece mounting body 15. One arm 16 of the T-piece 15 is releasably connected to a gas bulb mounting 19 through a pressure regulator 17.

The gas bulb mounting 19 provides a clip-in mounting 18 for a gas bulb which when clipped into position communicates with the pressure regulator 17. For this purpose the clip-in mounting 18 is of conventional form and includes a tubular spike and seal arrangement which upon insertion of the sealed gas bulb or sparklet therein communicates sealably with the mounting 18 and through the mounting 18 with the pressure regulator 17.

The other arm 22 of the T-piece body 15 is connected through a manually controllable on/off valve 23 to a spray head 25. A trigger 24 is operable to control the valve 23 and thus spray from the nozzle 25. Furthermore the regulator 17 is actuated by a pressure differential whereby closure of the valve 23 will result in immediate closure of the gas supply from the pressure regulator. Accordingly the regulator also acts as an automatic on/off valve for the gas bulb which operates without the need to provide a separate manually operated valve and the associated high pressure seals. This results in minimising any gas leakage from the relatively small volume gas bulb.

The outlet of the disposable container 11 is sealed by a penetrable membrane 28 and the lower end 30 of supply tube 29 which extends from the base of the container 11 to the spray head 25 is provided with a cutting edge 30 for

cutting through the membrane 28. Alternatively in a manner not illustrated, the distal end of the supply tube 29 may be sharpened to form a tyne or needle-like end adapted to penetrate the membrane 28. The supply tube 29 is located within and coaxial with the mounting 13. The lower end could extend to a bottom corner 31 of the container to facilitate removal, in use, of substantially all the container contents. An annular sealing washer 34 is provided at the junction between the T-piece arm 22 and the control valve 23.

The mounting 13 includes an internally threaded annular flange 35 and a stepped bore 36 for locating a sealing ring 37 co-operable with the upper end of the container 11. Cutting teeth 38 are located about the underside of the seal 37 and are adapted to penetrate the membrane to provide communication of the gas supply with the interior of the container 11 whereby the contents thereof may be pressurised at the selected pressure.

In operation the sharpened lower end 30 of the supply tube 29 is passed through the membrane 28 of a suitable container 11 which is then screwed into the threaded annular flange 35 until the teeth 38 cut through the membrane and provide communication between the regulator 17 and the container 11. A gas bulb or sparklet is clipped into the mounting 18 such that gas is released into the container 11 until the gas pressure in the container 11 reaches the regulated pressure. The apparatus 10 is then ready for use.

Spraying is initiated by operating the trigger arm 24 to open the spray head control valve 23. As the volume of the gas space above the liquid is increased with usage of liquid, gas is introduced to maintain the selected pressure and thus maintain substantially constant spraying.

In one particular example the gas bulbs utilized are charged to a pressure in the order of 700 kPa and the regulator 17 is adjusted to provide a constant discharge pressure of approximately 200 kPa in the liquid container. Thus in comparison with known prior art sprayers the

location and use of the regulator in the embodiment described may result in improvements in pressure stability and improved liquid flow control as well as lower pressures being applied to the container, trigger valve and other components.

Thus it can be seen that the spraying apparatus of the embodiment will be simple to operate, compact and readily portable. The gas bulb provides a reliable and efficient gas supply and the single use disposable container facilitates a reliably constant mix and also eliminates the need for cleaning the container. Furthermore, the spraying apparatus will be seen to be usable with sealed containers of toxic materials and thus many of the health dangers usually associated with preparing for spraying toxic substances are removed.

It will of course be realised that whilst the above has been given by way of an illustrative example of this invention, all such and other modifications and variations hereto, as would be apparent to persons skilled in the art, are deemed to fall within the broad scope and ambit of this invention as is defined in the appended claims

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. Portable liquid applicator apparatus including:

applicator means;

liquid connection means for operatively connecting the applicator to a liquid container for supply of liquid therefrom;

gas supply means for pressurising said container, and

pressure regulating means of the type adapted to maintain a constant relatively low pressure in the container interposed between said gas supply means and said container for regulating said gas supply.

2. Liquid applicator apparatus as claimed in claim 1, wherein said applicator means, said liquid connection means, said gas supply means and said pressure regulating means form a portable unit.

3. Liquid applicator apparatus as claimed in claim 1 or claim 2, wherein said gas supply means includes gas supply mounting means for mounting a gas cylinder.

4. Liquid applicator apparatus as claimed in claim 3, wherein said gas supply mounting means is adapted for mounting a gas bulb and includes communication means adapted to penetrate the closure on the bulb.

5. Liquid applicator apparatus as claimed in any one of the preceding claims, wherein said liquid connection means includes control valve means for controlling flow of liquid from said applicator means.

6. Liquid applicator apparatus as claimed in any one of the preceding claims and including a releasable mounting associated with said gas pressure regulating means and said liquid connection means and adapted for releasably mounting container means.

7. Liquid applicator apparatus as claimed in claim 6

and including a liquid container and wherein said mounting and said liquid container are complementary.

8. Liquid applicator apparatus as claimed in claim 7, wherein said container includes sealing means adapted to be punctured on being connected to said mounting.

9. Liquid applicator apparatus as claimed in claim 8 wherein said mounting includes puncture means adapted to puncture said container sealing means to provide communication between said container and both said liquid connection means and said pressure regulating means.

10. Portable liquid applicator apparatus including:

applicator means;

liquid connection means for operatively connecting the applicator to a sealed liquid container for supply of liquid therefrom;

gas supply means for pressurising said container, and

puncture means adapted to puncture the seal of said sealed container to provide communication between said container and both said liquid connection means and said pressure regulating means.

11. Liquid applicator apparatus as claimed in claim 9 or 10, wherein said puncture means includes first puncture means adapted to puncture said seal to provide communication between said container and said liquid connection means and second puncture means adapted to puncture said seal to provide communication between said container and said pressure regulating means.

12. Liquid applicator apparatus as claimed in claim 11, wherein said first puncture means includes a cutting portion located at the distal end of a fluid supply tube adapted to extend into said container.

13. Liquid applicator apparatus as claimed in claim 11

or 12 wherein the second puncture means includes a cutting member located on said mounting externally of and coaxially with said supply tube.

14. A sealed non-pressurised liquid container adapted for releasable connection to a liquid applicator as claimed in any one of the preceding claims.

15. A method of delivering a liquid from a sealed container, said method including:-

providing a portable liquid applicator apparatus as claimed in any one of claims 9 to 13;

providing a sealed non-pressurised container as claimed in claim 14, and

puncturing the seal of the sealed container whereby the contents of said container are pressurised.

16. Liquid applicator apparatus substantially as hereinbefore described with reference to the accompanying drawings.

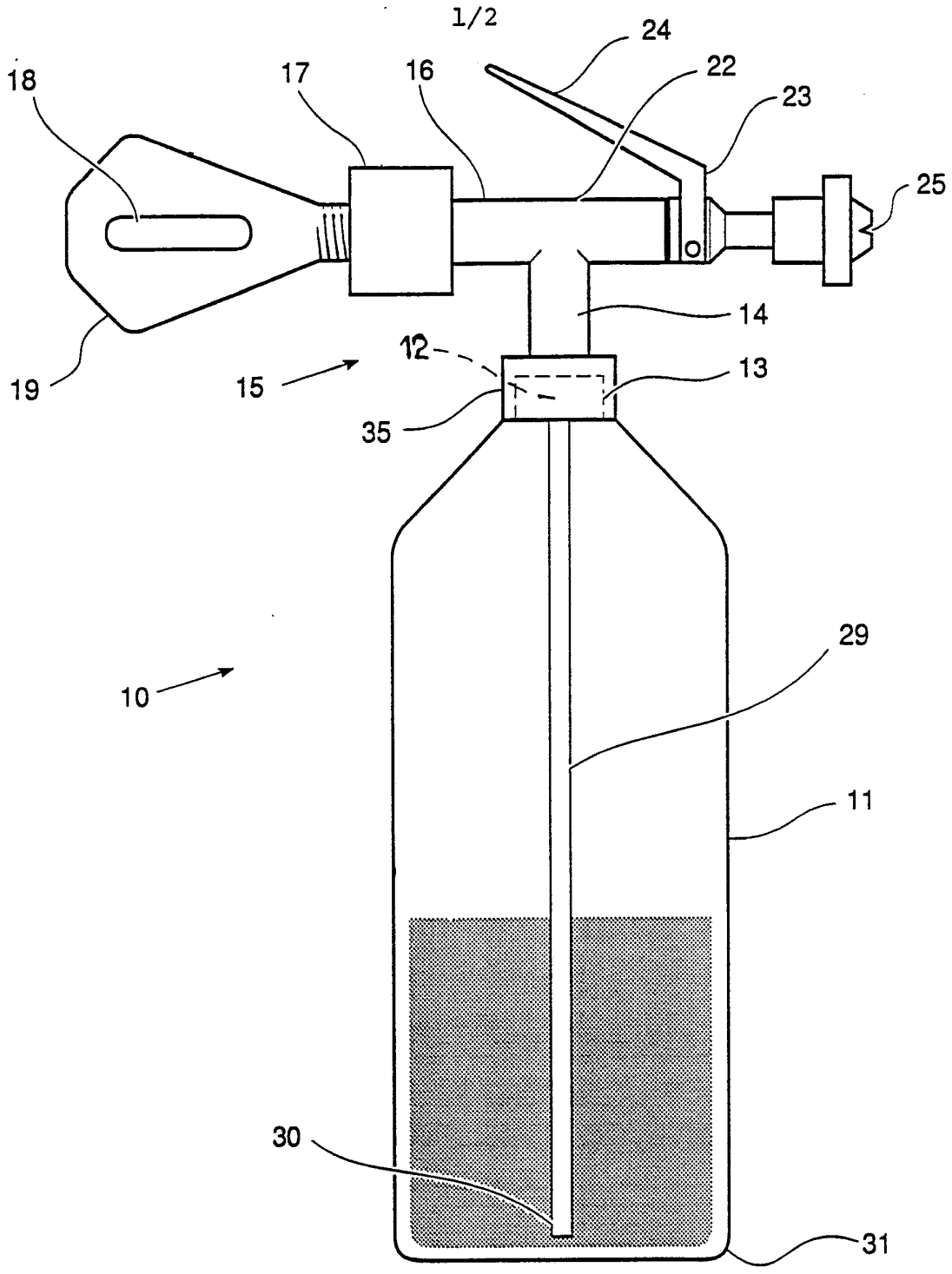

Figure 1.

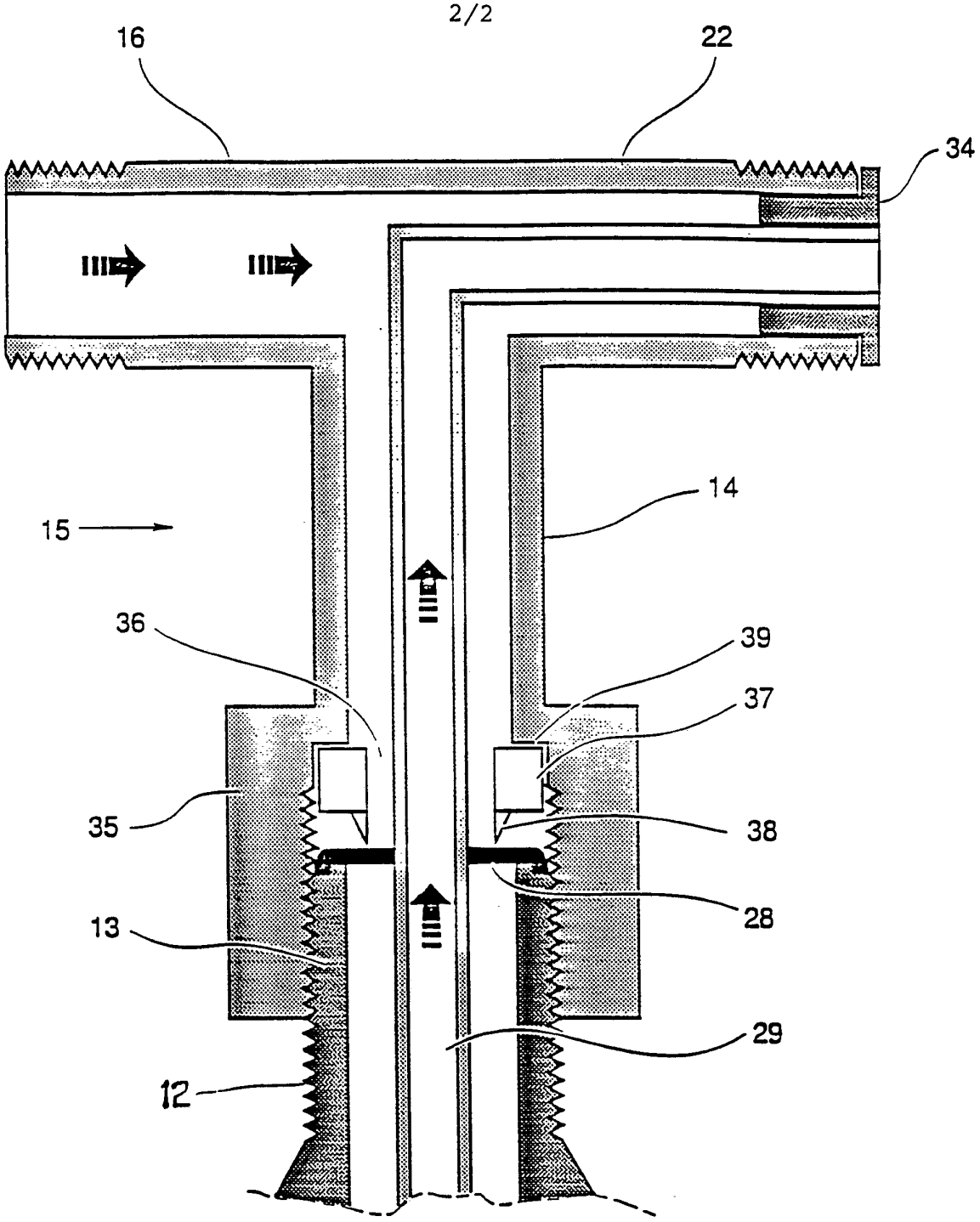

Figure 2.

INTERNATIONAL SEARCH REPORT

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent classification (IPC) or to both National Classification and IPC

Int. Cl.[5] B05B 11/06, B05C 17/03

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC	B05B 11/06, B67D 1/04, F17C 5/06, A61M 5/30

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

AU: IPC as above; B05B 7/32, 9/01, 9/08, 17/08, F17C 13/00 B05C 17/—, A46B 11/02

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category*	Citation of Document, [11] with indication, where appropriate of the relevant passages [12]	Relevant to Claim No [13]
X Y	AU,A, 12478/52 (COULTON) 10 September 1953 (10.09.53)	(1-4,6,7) (8)
X Y	AU,B, 15089/83 (567496) (MURPHY) 1 December 1983 (01.12.83)	(1-3,5) (8)
X Y	DE,A, 827291 (BECKER) 6 December 1951 (06.12.51)	(1-3,5) (8)
X Y	GB,A, 1082582 (R.P. SCHERER CORP) 6 September 1967 (06.09.67)	(14) (8)
X Y A	US,A, 4507113 (DUNLAP) 26 March 1985 (26.03.85) See item 52 AU,B, 7352/66 (413818) (HINZ) 4 January 1968 (04.01.68)	(14) (8)

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
10 August 1992	21 Aug 1992 (21.08.92)
International Searching Authority	**Signature of Authorized Officer**
AUSTRALIAN PATENT OFFICE	VINCE BAGUSAUSKAS

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL APPLICATION NO. PCT/AU 92/00204

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	4507113	CA	1208830

END OF ANNEX