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(12) # EUROPEAN PATENT APPLICATION

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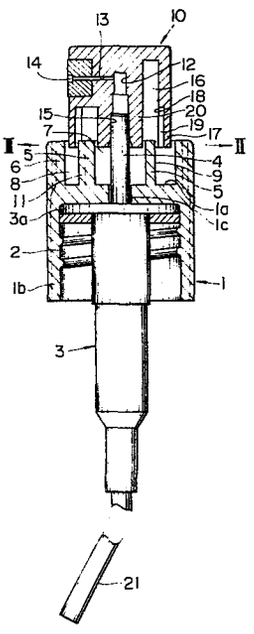
(71) Applicant: **WACOAL CORP., 29, Kisshoin-Nakajimacho, Minami-ku Kyoto (JP)**

(72) Inventor: **Majima, Toshimichi, 2-7 Sakuma-cho Kanda, Chiyoda-ku Tokyo (JP)**

(74) Representative: **Klingseisen, Franz, Dipl.-Ing. et al, Dr. F. Zumstein sen. Dr. E. Assmann Dr. F. Zumstein jun. Dipl.-Ing. F. Klingseisen Bräuhausstrasse 4, D-8000 München 2 (DE)**

(54) **Spray pump.**

(57) A spray pump for liquid container having a stationary cap (1) with a ceiling plate (1a) provided with a pump cylinder (3), and a spray head (10) fixed to a plunger (4). The ceiling plate (1a) and the lower surface of the spray head (10) are provided with cylinders (5, 6, 17, 20) projected integrally therefrom so as to fit each other. One of the fitting peripheral surfaces of these cylinders has ribs (11) or the like protrusions while the other is provided with slits (19) for receiving the protrusions, so that the spray head (10) is prevented from rotating relatively to the ceiling plate (1a) when it is moved up and down relatively to the ceiling plate.



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SPECIFICATION

1. Title of the Invention

SPRAY PUMP

2. Background of the Invention

The present invention relates to a spray pump improved to permit the fixing and holding of nozzle port of a spray head at a position determined beforehand optimumly from the requirement by the construction of the pump, as well as from the view point concerning the advertising design on the surface of the container.

In the spray containers having spray pumps, it is preferred and necessary from the view point of the construction of the pump structure that the nozzle port of the spray head is directed in the same direction as the bend of the suction pipe suspended from the lower end of the pump structure towards the bottom of the container. On the other hand, since the name of the good and an advertising design are placed on the front side of the outer surface of the spray container, it is necessary that the nozzle port of the spray head is directed forwardly so that the spray may made in the same direction as the display of the goods name and the advertising design.

Usually, the connection between the spray head and the valve stem is made through a friction fitting engagement between the outer periphery of the upper end of the valve stem and a bore of a rather large diameter formed in the lower end of the spray head in communication with a vertical passage formed in the spray head. Since this friction fitting engagement is not so tight, it is often experienced that an unintentional relative rotation is caused between the spray head and the valve stem during the use. An inadequate use of the spray container impairs the performance of the pump seriously or make the pump inoperative, even though there is no defect in the pump structure. This cannot be expected by the manufacturer. For instance, the rotation of the valve stem within the cylinder may occur however the connection between the spray head and the valve stem may be made tight. In such a case, one end of the valve stem is ground by the keen edge of the coiled spring mounted on the bottom of the cylinder. In consequence, the orifice is often clogged with the ground powder of the material of the valve stem. In addition, the operation for depressing the spray head is unstabilized due to a comparatively short length of fitting between the spray head and the valve stem.

Thus, in the spray container having a spray pump, it is desirable that the optimum inital set condition given by the manufacturer is maintained over the period of use of the spray container, by avoiding the unintentional relative rotation between the valve stem and the spray head.

Under this circumstance, the present invention aims at providing a spray pump which can fix and hold the spray nozzle port of the spray head at the correct position.

3. Summary of the Invention

It is, therefore, an object of the invention to provide a spray pump in which the vertical upward and downward movement of the spray head is guided correctly in such a manner as to avoid any unintentional rotation of the spray head with respect to a stationary cap attached to the neck of the liquid container.

To this end, according to the invention, there is provided a spray pump comprising a fitting projection formed in one of the ceiling surface of the stationary cap and the opposing lower end surface of the spray head, and a fitting recess formed in the other of these surfaces, one of these fitting surfaces being provided with a rotation-preventing

rib or the like protrusion while the other has a slit for guiding the protrusion, the fitting engagement between the spray head and the stationary cap being made beforehand when the spray head is fixed to the plunger.

4. Brief Description of the Drawings

Fig. 1 is a vertical sectional view of a portion of a spray pump with the spray head positioned at the upper end of the stroke;

Fig. 2 is a sectional view taken along the line II-II of Fig. 1;

Fig. 3 is a vertical sectional view of a portion of the pump structure of another embodiment having a different type of rotation prevention means;

Fig. 4 is a cross-sectional view taken along the line IV-IV of Fig. 3;

Fig. 5 is a vertical sectional view of a portion of spray pump of still another embodiment having a different type of rotation prevention means; and

Fig. 6 is a sectional view taken along the line V-V of Fig. 5.

5. Description of the Preferred Embodiments

Preferred embodiments of the invention will be explained hereinunder with reference to the accompanying drawings.

Fig. 1 is a sectional side elevational view of a pump structure showing a spray head and a stationary cap. The stationary cap 1 has a ceiling plate 1a and an annular peripheral wall 1b suspending downwardly from the periphery of the ceiling plate 1a so as to form a downwardly opening fitting recess 2. Screw threads are formed in the inner peripheral surface of the recess 2 so that the stationary cap 1 can be freely screwed onto and out of the outer periphery of a neck portion of the spray container. A pump cylinder 3 has a flange 3a which contacts at its upper surface with the lower surface of the ceiling plate 1a. The pump cylinder 3 is made to fit in the recess 2 to suspend downwardly therefrom. The arrangement is such that, when the cap 1 is mounted on the neck of the container, the lower side of the flange 3a is born by the upper end of the neck. As is well known, the pump cylinder 3 accomodates a plunger 4 having a piston and a coiled spring supported by the bottom of the cylinder 3. The cylinder 3 is provided with valves at portions thereof adjacent to the plunger and the suction pipe. These parts are assembled in such a manner that, as the plunger 4 is moved up and down within the cylinder by the manual force and the force of the

coiled spring, the valves are opened and closed alternatingly to discharge the content liquid.

The upper end portion of the plunger 4 projects upwardly through the central bore 1c of the ceiling plate 1a by a height which is determined in view of the necessity for the fitting to the spray head and the downward stroke. An inner cylinder 5 and an outer cylinder 6 protrude from the ceiling plate 1a as a unit with the latter, concentrically with the central bore 1c. An inner annular recess 7 provided in the inner cylinder surrounds the plunger 4 protruding through the central bore 1c so as to open upwardly with the bottom thereof constituted by the ceiling plate. On the other hand, an outer annular recess 8 is formed between the inner cylinder 5 and the outer cylinder 6 so as to open upwardly with the bottom thereof constituted by the ceiling plate. A reference numeral 9 designates a fitting surface formed on the outer periphery of the inner cylinder 5 and adapted to fit in the spray head 10. Ribs 11 of a prdetermined height is formed on the fitting surface 9 so as to extend in the axial direction. Although the described embodiment employs 3 (three) ribs 11 arranged at a constant circumferential pitch, it is possible to use only one rib 11. Each rib 11

may have the form of a small projection.

As is well known, the spray head 10 is provided therein with a discharge passage consisting of a vertical bore 12, a horizontal bore 13 and a nozzle 14 provided on the end of the horizontal bore 13. The spray head 10 is further provided at its lower end with a fitting bore 15 of a rather large diameter adapted to fit around and receive the upper end of the plunger 4 so as to be fixed and connected to the plunger 4. The fitting bore 15 is in communication with the vertical bore 12. The spray head 10 is provided on the lower end thereof with a convexity or concavity complementary to the shape of the upper surface of the stationary cap 1. More specifically, the spray head is provided at its lower end with a downwardly opening recess 16 having an inside diameter substantially equal to the outside diameter of the inner cylinder 5 on the stationary cap 1. In addition, an annular cylinder 17 for fitting in the outer peripheral recess 8 of the stationary cap 1 is formed on the outer periphery of the spray head. The fitting recess 16 in the spray head has a diameter substantially equal to the outside diameter of the inner cylinder 5. A fitting surface 18 for mating with the fitting surface 9 of the of the inner

cylinder 5 is formed on the inner periphery of the fitting recess 16. Axial guide slits 19 are formed to extend from the lower end of the fitting surface 18 to a prdetermined height so as to receive the ribs 11 formed in the inner cylinder 5. The spray head 10 having the convexity and concavity has to fit to the complementary surface of the stationary cap 1 when the same is set on the plunger 4. To this end, the connection between the plunger 4 and the spray head 10 are accomplished by aligning the ribs 11 on the stationary cap 1 and the guide slits 19 in the spray head 10. By making the ribs 11 fit in the guide slits 19, the ribs 11 are retained by the side walls of the slits to prevent the spray head 10 from rotating to ensure that the initial optimum direction of the nozzle is maintained permanentally. On the other hand, the ribs 11 provide a good guide for the vertical movement of the plunger so that the upward and downward stroking of the spray head 10 can be made in quite a stable manner. If the length of fit between the plunger 4 and the spray head 10 is short, the spray head may be declined when the same is pushed downward to impair the vertical depression of the plunger 4. However, in the spray head of the invention, the undesirable lateral oscillation and

declining of the spray head are avoided because a very stiff connection is achieved by the fitting engagement with the stationary cap.

Fig. 3 shows another embodiment having a different construction for rotation prevention fitting between the spray head 10 and the stationary cap 1. In this embodiment, the fitting surface 9 is formed on the inner periphery of the inner cylinder 5 of the cap 1, and the guide slits 19 are formed in the fitting surface 9 to extend from the upper end to lower end of the cylinder. The spray head 10 has a mounting cylinder 20 for mountng the plunger 4, and the fitting surface 19 is formed on the outer periphery of the cylinder 20. The fitting surface 19 is provided with ribs or small projections which serve to prevent the rotation as in the case of the construction shown in Fig. 1. In this embodiment, the annular cylinder 17 on the spray head 10 may be omitted but, preferably, this cylinder 17 is formed from the view point of design or appearance of the spray head.

Fig. 5 shows still another embodiment having a different construction for rotation prevention fitting between the spray head 10 and the stationary cap 1. The stationary cap 1 has the outer cylinder 6

the inner peripheral surfaceof which serving as the fitting surface 9 in which formed are the guide slits 19. On the other hand, ribs 11 and other small protrusions are formed on the fitting surface 18 on the outer periphery of the annular cylinder 17 of the spray head 10. A reference numeral 21 designates a suction pipe which extends downwardly from the lower end of the pump cylinder 3.

As has been described, in the spray pump of the invention, a fitting projection is formed in one of the opposing surfaces of the ceiling plate 1a of the stationary cap 1 and the spray head 10 while a cooperating fitting recess is formed in the other surface. One of these fitting surfaces is provided with ribs or the like protrusions while the other is provided with slits. The arrangement is such that the fitting engagement between the stationary cap 1 and the spray head 10 is achieved when the spray head 10 is assembled. Therefore, the spray head secured to the plunger in the correct orientation or direction is prevented from rotating relatively to the stationary cap to maintain the correct initial set condition permanentally. The convexity and concavity formed in the fitting surfaces of the spray head and the plunger are effective to some extent in

weakening the rotation prevention force to facilitate the work for setting the spray head and in guiding the spray head when the latter is reciprocally moved up and down, thereby to ensure a correct operation of the spray head.

What is Claimed is:

A spray pump comprising a stationary cap detachably secured to the neck portion of a liquid container and having a ceiling plate to which a pump cylinder is fixed, said pump cylinder accomodating a plunger projecting through the central bore of said ceiling plate, said ceiling plates having a cylinder projecting integrally therefrom so as to form a recess opening upwardly and having a bottom constituted by said ceiling plate, said spra pump further having a spray head provided at its lower side opposing to said ceiling plate with a cylinder integral therewith and sized to loosely fit the outer peripheral surface or the inner peripheral surface of said cylinder, one of the fitting peripheral surfaces of these cylinders being provided with ribs or the like protrusions while the other is provided with slits capable of receiving said protrusions and adapted to guide said spray head when said spray head is moved in the axial direction.

FIG.1

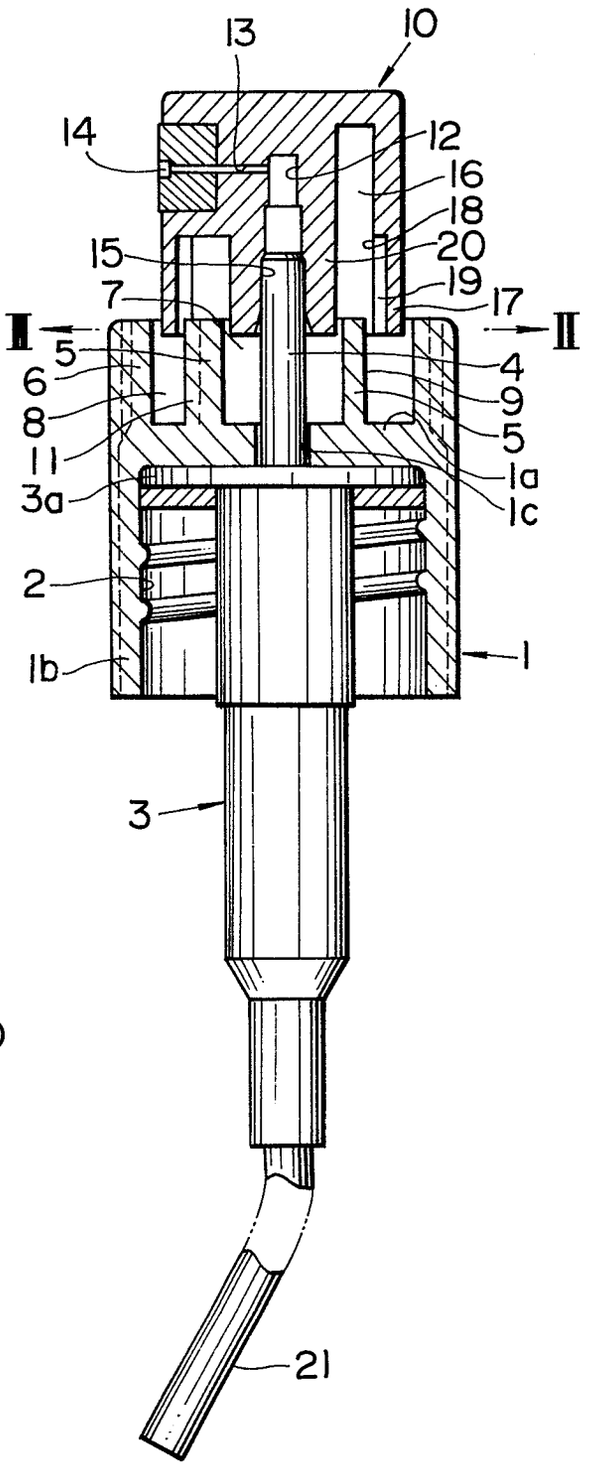
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FIG.2

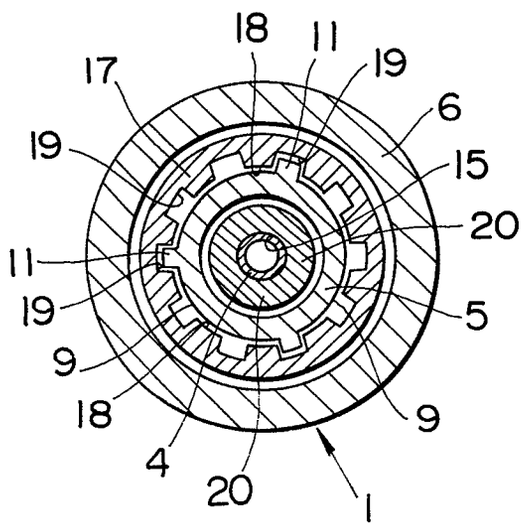
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FIG.3

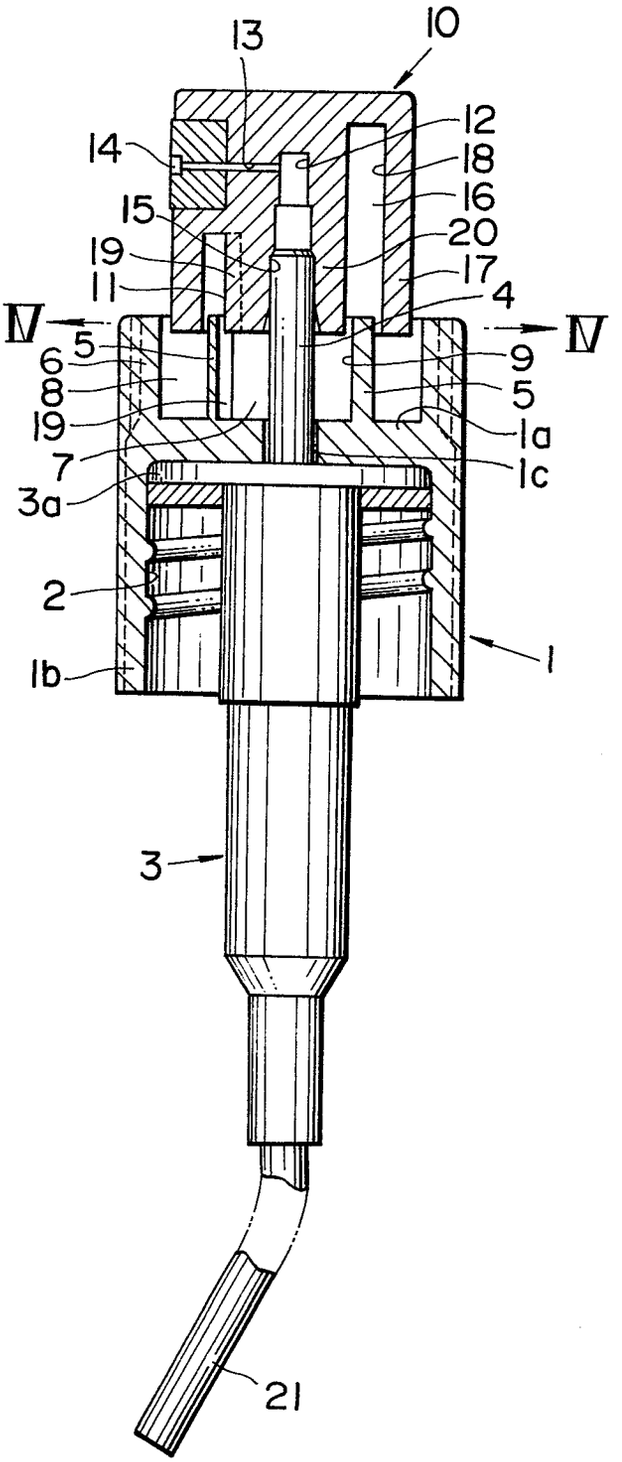
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FIG.4

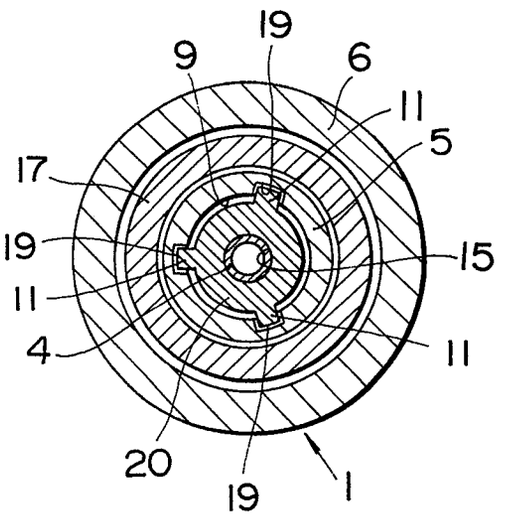
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FIG.5

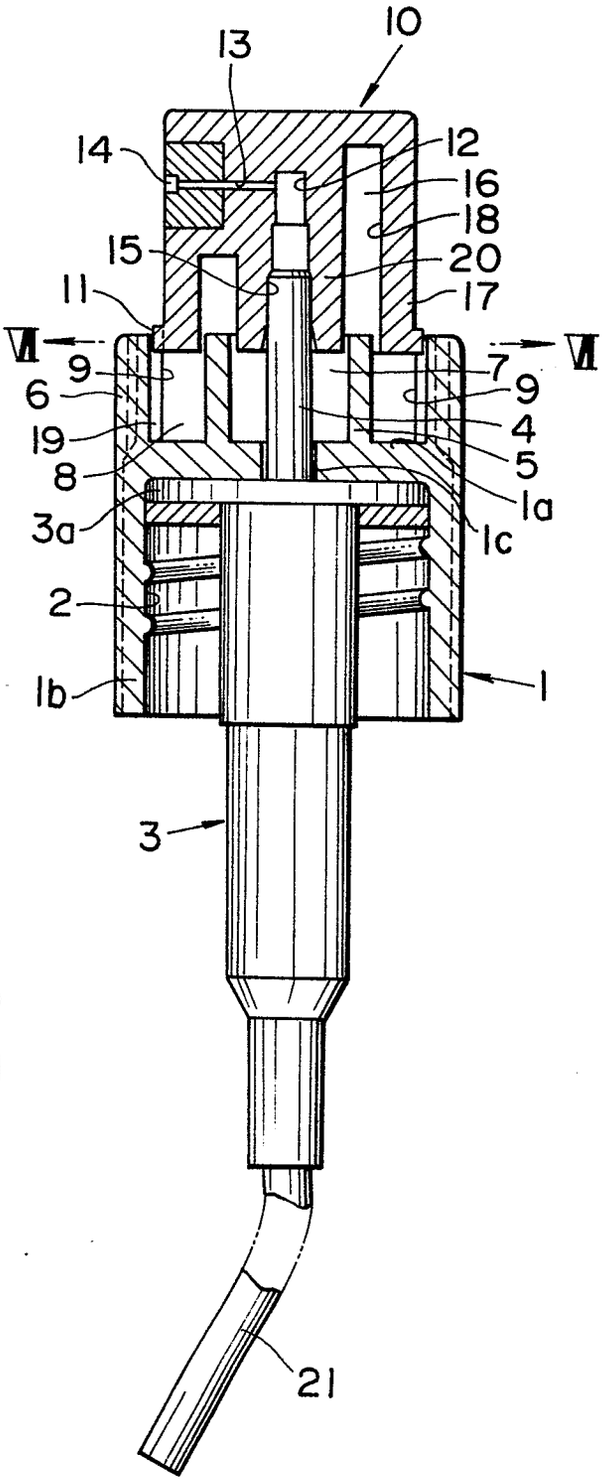
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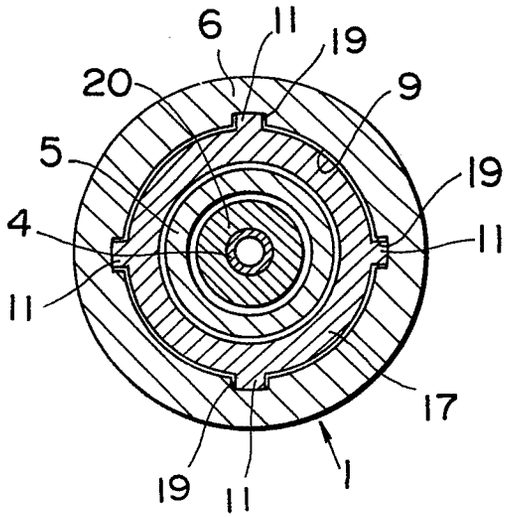
FIG.6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EUROPEAN SEARCH REPORT

0105202

Application number

EP 83108603.8

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	US - A - 4 216 883 (TASAKI et al.) * Fig. 3; column 5, lines 28-35 * --	1	B 65 D 47/34 B 05 B 9/043 F 04 B 9/14
A	DE - B2 - 2 818 560 (YOSHIMO KOGYOSHO CO., LTD.) * Fig. 2,5, numerals 2,6 * --	1	
A	DE - B - 1 290 499 (VAPORISATEURS MARCEL FRANK) * Fig. 2,3 * --	1	
A	US - A - 4 051 983 (ANDERSON) * Fig. 1; column 2, lines 38-40 * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 65 D 47/00
B 05 B 9/00
F 04 B 9/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	15-12-1983	WITTMANN

CATEGORY OF CITED DOCUMENTS

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