(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 608 469 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93109229.0**

(51) Int. Cl.[5]: **F04B 33/00**, F04B 37/14

(22) Date of filing: **08.06.93**

(30) Priority: **26.01.93 JP 1688/93**

(43) Date of publication of application:
03.08.94 Bulletin 94/31

(84) Designated Contracting States:
DE FR GB IT

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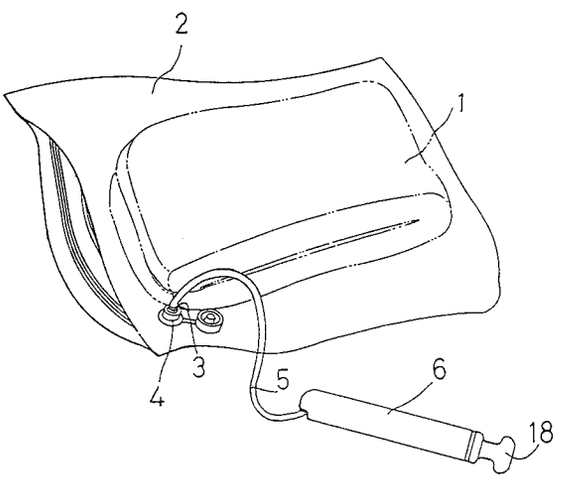
(54) Manually operated reciprocating suction pump.

(57) A manually operated reciprocating suction pump comprises a barrel, a plunger slidably abutting against an inner wall of the barrel in such a manner as to move in the barrel, a first port being provided at a top end of the barrel, a second port being provided at a top end of the plunger, a handle formed at a rear end of the plunger, an air vent hole defined on the plunger near the handle, a first check valve being provided in the first port, and a second check valve being provided in the second port.

FIG. 1



EP 0 608 469 A1

This invention relates to a manually operated reciprocating suction pump to suck air present in a bag or the like, while avoiding the reverse flow of air.

There are hitherto suction means to suck air present in a bag or the like for packing and storing articles therein at vacuum. The articles to be stored are preferably unseasonable bedclothes, garments, traveling clothes or the like, since these articles may occupy relatively large spaces when these articles are swelled by the absorption of air, which hesitates an easy storage in a limited space such as a closet and a trunk.

Japanese Utility Model Laid-Open Number 4-80839 discloses an air exhaustible bag using conventional suction means including a domestic vacuum cleaner and a dedicated electric suction pump.

The domestic vacuum cleaner has been commonly used due to its operability. However, the articles can not compactly be stored in the air exhaustible bag when the vacuum cleaner is not available.

To use the air exhaustible bag when the vacuum cleaner is not available, the electric suction pump may be used. However, the pump is relatively complicated in structure, which may raise manufacturing costs. In addition, the pump can not be applied to various types of bag or the like in any place, since the pump of this type is generally formed in such a manner as to be connected with the bag or the like of a particular type. As a further drawback, the pump requires power source for the sucking operation.

It is an object of the present invention to provide an inexpensive, improved manually operated reciprocating suction pump, which can readily suck air present in a bag such as an air exhaustible bag in order to compactly store the articles such as unseasonable bedclothes and garments at vacuum, or to evacuate air present in the bag or the like.

It is other object of the present invention to provide a manually operated reciprocating suction pump of a compact type, which allows a user to readily carry it during traveling or the like.

In accordance with the present invention, there is provided a manually operated reciprocating suction pump comprising a barrel, a plunger slidably abutting against an inner wall of the barrel in such a manner as to move in the barrel, a first port being provided at a top end of the barrel, a second port being provided at a top end of the plunger, a handle formed at a rear end of the plunger, an air vent hole defined on the plunger near the handle, a first check valve being provided in the first port, and a second check valve being provided in the second port.

In the manually operated reciprocating suction pump of the present invention, the plunger is pulled outwardly away from the barrel by hand or the like to such a position that the plunger does not drop from the barrel. The first check valve is opened and the second check valve is closed as the plunger is pulled outwardly away from the barrel. Whereby, air is sucked into the barrel through the first check valve.

To evacuate air from the barrel to the outside, the first check valve is closed and the second check valve is opened by pressing the plunger into the barrel. Whereby, air present in the barrel is compressed and introduced into the plunger, and subsequently evacuated through the air vent hole defined in the plunger near the handle. Air can readily be sucked by repeating the above motions.

The present invention will be more fully understood from the detailed description given hereinbelow read in conjunction with the accompanying drawings, which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 illustrates a perspective view in which a device of the present invention is used;

FIG. 2 illustrates a rear elevation of one embodiment of the present invention;

FIG. 3 illustrates a cross sectional view taken on line I-I of FIG. 2, in which a middle section of a pump is ommitted;

FIG. 4A illustrates a left side view of the present invention;

FIG. 4B illustrates a right side view of the present invention;

FIGS. 5 and 6 illustrate cross sectional views in which the device of the present invention is actually used;

FIG. 7 illustrates a perspective view in which the device of the present invention is stored in a trunk.

An embodiment of the present invention will be described hereinbelow. Referring to FIG. 1, articles 1 such as towels and clothes, dimensions of which are increased by the absorption of air, are stored in an air exhaustible bag 2.

A reciprocating pump 6 is made of synthetic resin of hard type. The flexible pipe 5 is made of synthetic resin of soft type. The reciprocating pump is separably connected with one end of the flexible pipe 5. The flexible pipe 5 is provided at its opposite end with a nozzle 3 to connect with an air exhaust port 4 of the air exhaustible bag 2. The fluid communication between the reciprocating pump 6 and the air exhaustible bag 2 can be attained in this manner.

Referring to FIGS. 2 and 3, the reciprocating pump 6 comprises a barrel 7 having an opening at its rear end and a wall at its top end 9, and a plunger 8 having a hollow space therein. An outer diameter of the plunger 8 is smaller than an inner

diameter of the barrel 7 such that an outer periphery of the plunger 8 can slidably abut against an inner periphery of the barrel 7.

A first port 10 is defined in a top end 9 of the barrel 7. The axial direction of the first port 10 is perpendicular to that of the barrel 7. A first nozzle 12 is mounted in the first port 10. A first check valve 11 is mounted in the first nozzle 12 in such a manner as to suck air into the barrel 7 directly and prevent the reverse flow of air.

Referring to FIGS. 3 and 4A, a partially concaved portion is formed in proximity of the top end 9 of the barrel 7 to mount the first nozzle 12 therein. According to this configuration, the first nozzle 12 does not protrude outwardly away from the barrel 7. Thus, undesirable contacts onto the first nozzle 12 are effectively avoided.

A second port 14 is defined in proximity of the center of a top end 13 of the plunger 8. T-shaped flat handle 18 is formed at a rear end 19 of the plunger 8. A second nozzle 16 is mounted in the second port 14. A second check valve 15 is mounted in the second nozzle 16 in such a manner as to suck air into the plunger 8 and prevent the reverse flow of air.

A cylindrical portion of the plunger 8 adapted for being inserted into the barrel 7 has two diametrically different portions. That is, a predetermined length from the top end 13 of the plunger 8 has a slightly larger diameter than the residual length of the plunger 8. Whereby, a step portion 17 is defined at a predetermined position on a periphery of the plunger 8. The inner periphery of an opening of the barrel 7 has a smaller diameter than the larger diameter portion of the plunger 8. Thus, the step portion 17 functions as an indication means for indicating the limit of the pulling mortion of the plunger 8 by abutting against the inner periphery of the opening of the barrel 7. However, if necessary, the plunger 8 can be pulled out completely from the barrel 7, since the plunger 8 and the barrel 7 are made of synthetic resin having a resilient property.

An air vent hole 20 is defined in the plunger 8 near the handle 18 in such a manner as to evacuate air present in the plunger 8 therethrough.

The steps of sucking operation in accordance with the above embodiment will be described herein.

First, the end of the flexible pipe 5 is connected with the first nozzle 12 of the reciprocating pump 6, then the nozzle 3 of the pipe 5 is inserted into the air exhaust port 4 of the air exhaustible bag 2. Thus, the pump 6 comes into a fluid communication with the air exhaustible bag 2 as illustrated in FIG. 1.

Referring to FIG. 5, the barrel 7 is held by hand such that the barrel 7 can not move along with the reciprocating motion of the plunger 8. Then, the handle 18 of the plunger 8 is held and pulled by hand. The plunger 8 is moved outwardly away from the barrel 7, sliding along the inner periphery of the barrel 7 and stopped at a position where the step portion 17 abuts against the inner periphery of the opening of the barrel 7. The first check valve 11 mounted in the first port 12 is opened, while the second check valve 15 mounted in the second port 16 is closed. Thus, air present in the air exhaustible bag 2 is sucked into the barrel 7 and kept within the barrel 7, not leaking into the plunger 8.

Referring now to FIG. 6, the handle 18 of the plunger 8 is held and pushed into the barrel 7 by hand. The first check valve 11 of the barrel 7 is closed, while the second check valve 15 of the plunger 8 is opened. Thus, air present in the barrel 7 is compressed and subsequently sucked into the plunger 8. Lastly, the sucked air in the plunger 8 is exhausted from the air vent hole 19 to the outside.

Air present in the air exhaustible bag 2 is evacuated by the reciprocating movement of the plunger 8 within the barrel 7 until the articles contract and reduce dimensions thereof. Thus, the articles 1 are stored compactly at vacuum in the bag 2. After the sucking of air, the pipe 5 can readily be disconnected from the reciprocating pump 6.

Referring to FIG. 7, the reciprocating pump 6 and the pipe 5 are respectively attached to predetermined positions on an inner wall of a cover 22 of a trunk 21 with fixtures 23 to be readily carried in the trunk 21 during travel.

In the above embodiment, the reciprocating pump 6 preferably sucks air from the air exhaustible bag 2 to the outside. However, it is to be noted that the pump 6 can suck air from a bag of varying types, if necessary.

This specification is by no means intended to restrict the present invention to the preferred embodiments set forth therein. Various modifications to the inventive manually operated reciprocating suction pump 6 as described herein, may be made by those skilled in the art without departing from the spirit and scope of the present invention.

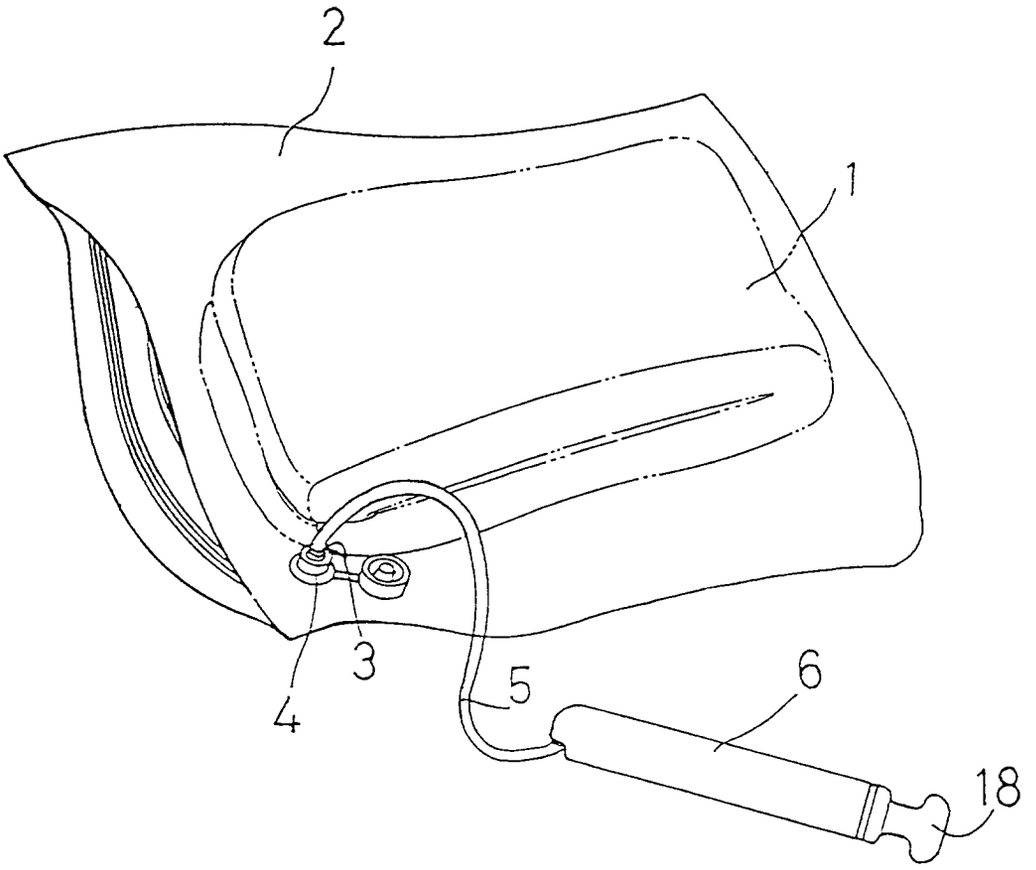
Claims

1. A manually operated reciprocating suction pump comprising a barrel (7), a plunger (8) slidably abutting against an inner wall of said barrel (7) in such a manner as to move in said barrel (7), a first port (10) being provided at a top end (9) of said barrel (7), a second port (14) being provided at a top end (13) of said plunger (8), a handle (18) formed at a rear end (19) of said plunger (8), an air vent hole (20)

defined on said plunger (8) near said handle (18), a first check valve (11) being provided in said first port (10), and a second check valve (15) being provided in said second port (14).

2. The manually operated reciprocating suction pump as set forth in claim 1, wherein said pump is separably connected with an air exhaust port (4) defined in an air exhaustible bag (2) adapted for enclosing and storing articles (1) at vacuum.

FIG. 1



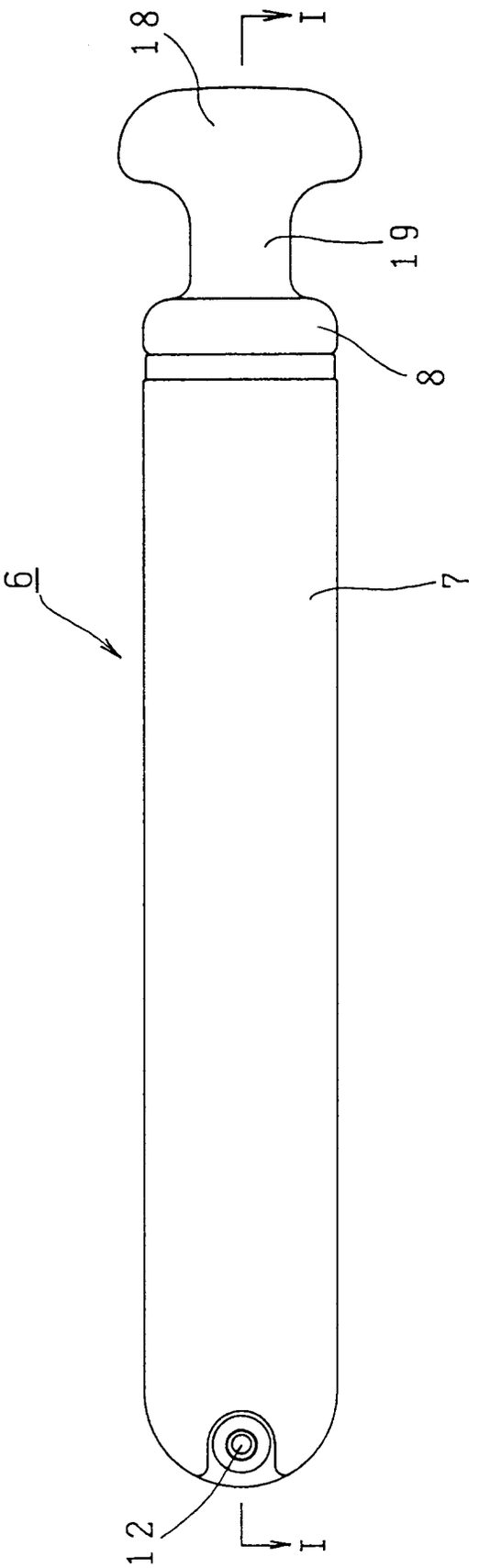


FIG. 2

FIG. 3

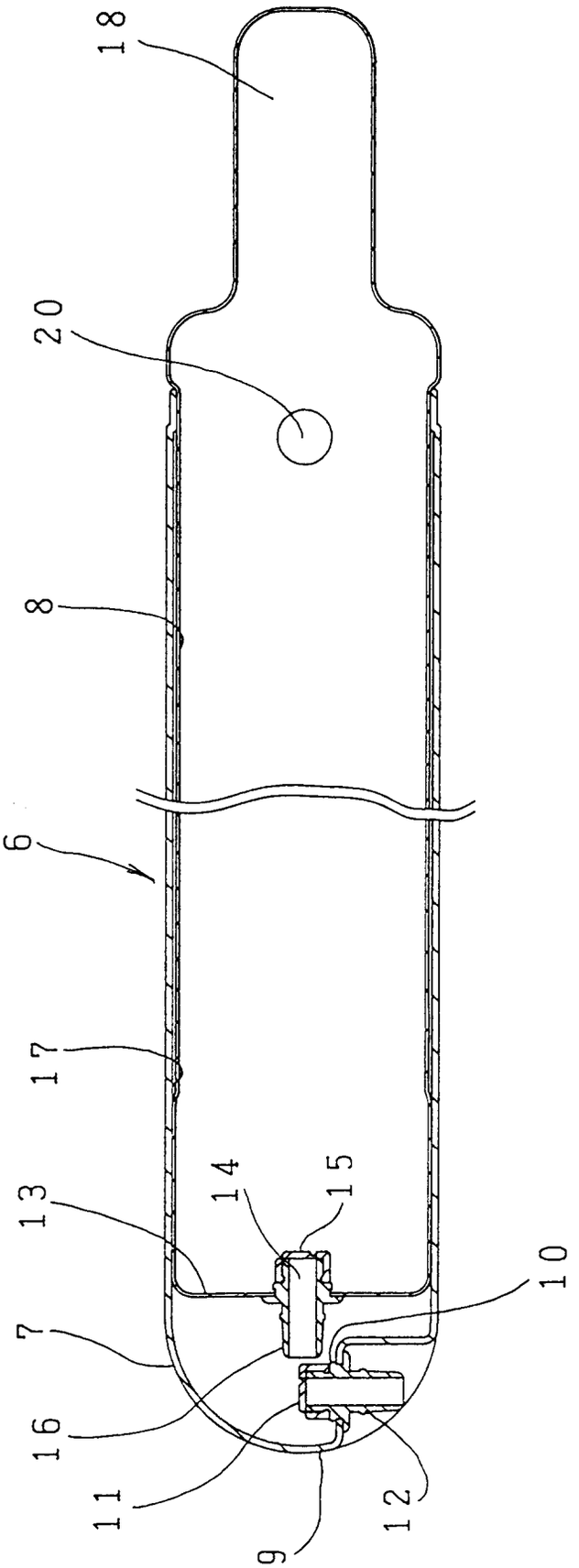


FIG. 4A

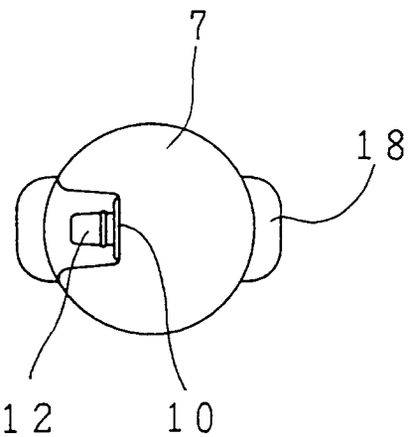


FIG. 4B

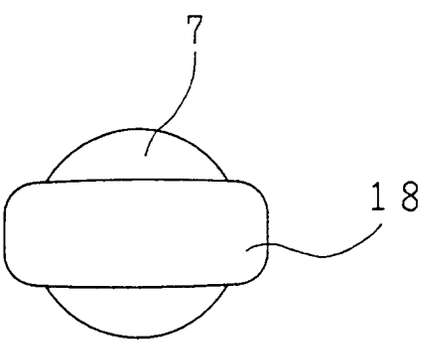


FIG. 5

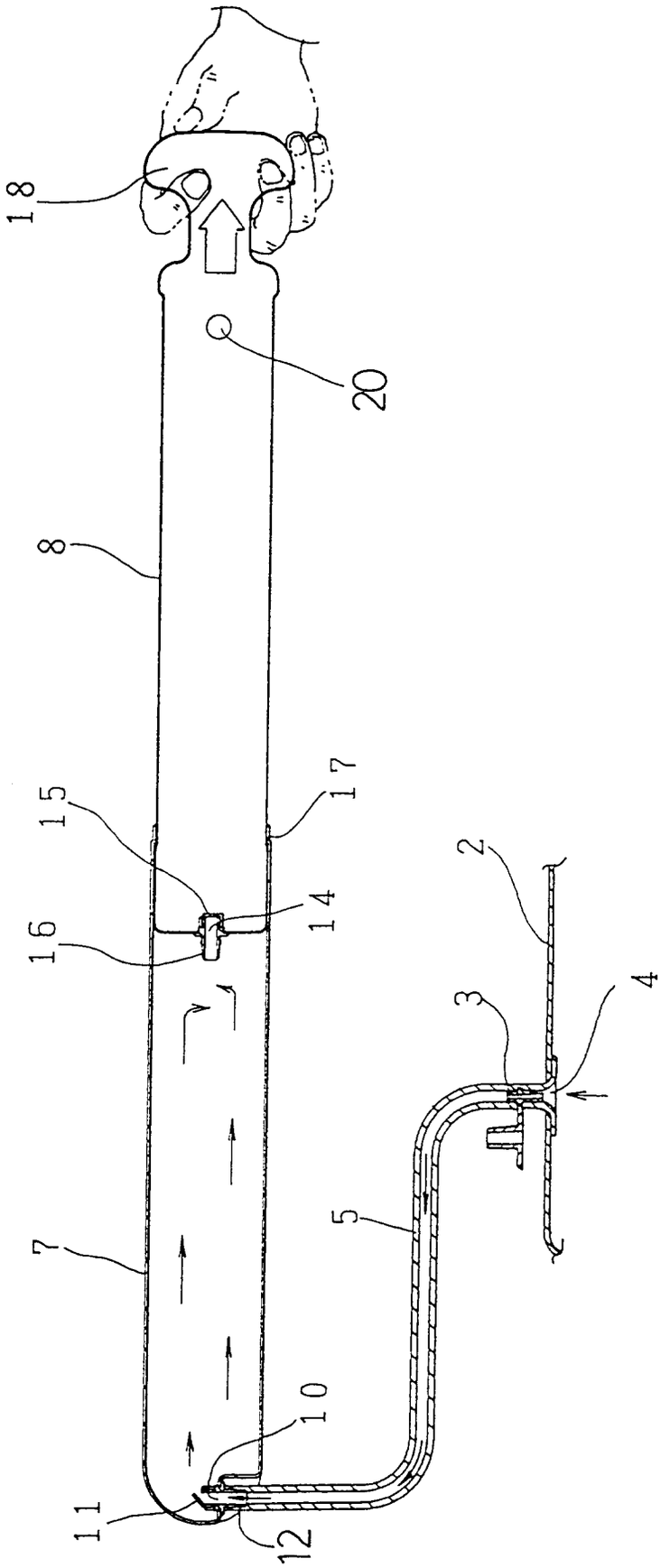


FIG. 6

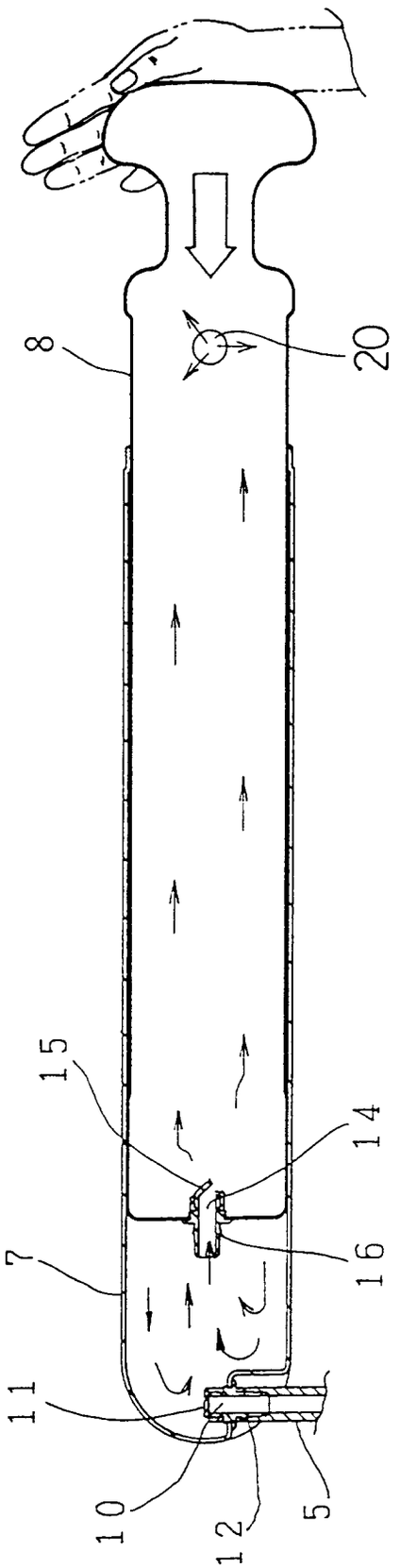
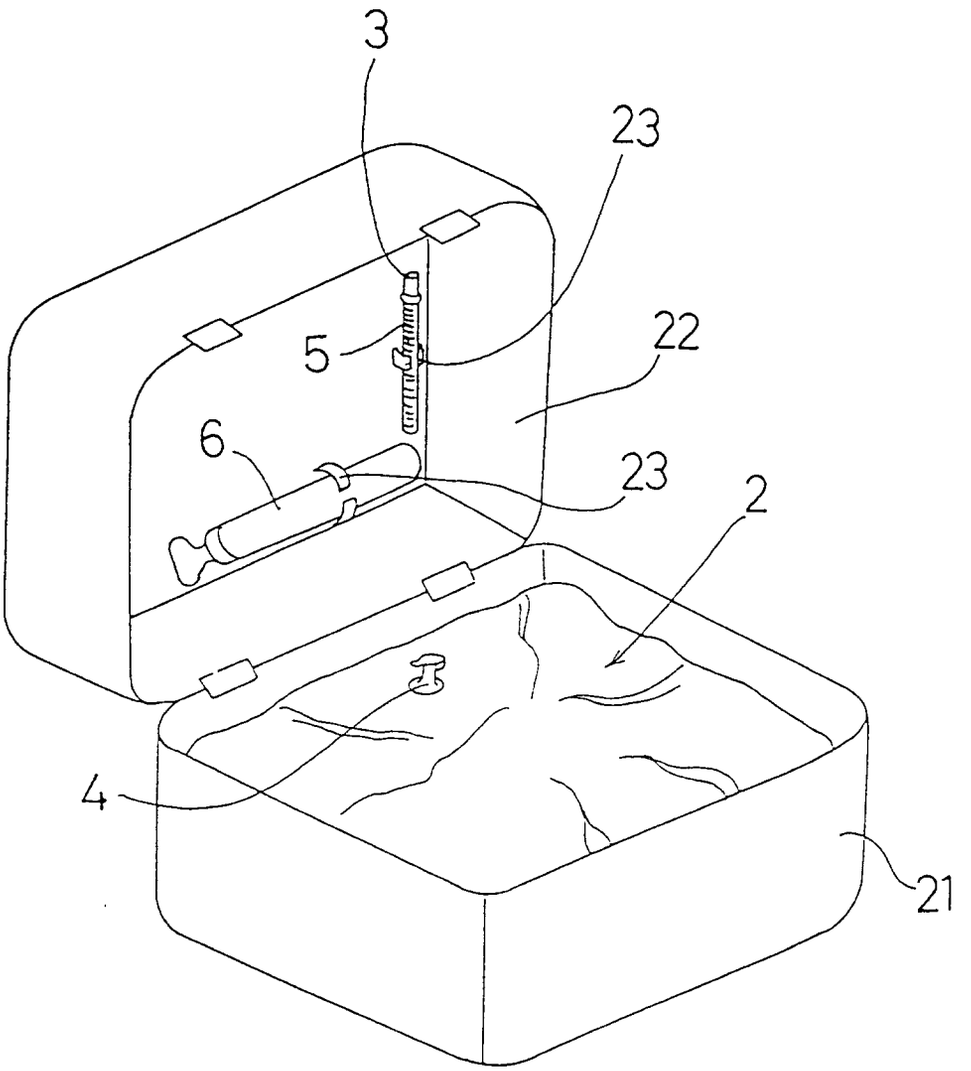


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 93 10 9229

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.5)
X	FR-A-2 313 855 (MC CULLOCH) * page 1, line 7 - line 28; figure 1 *	1,2	F04B33/00 F04B37/14
X	GB-A-1 341 558 (MC CULLOCH) * page 1, line 61 - page 2, line 17; figures 1-3 *	1,2	
X	US-A-5 165 877 (COLIN) * column 2, line 23 - column 3, line 39; figure 1 *	1,2	
X	FR-A-2 294 344 (NORMOS) * figures 1-3 *	1,2	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

F04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 May 1994	Bertrand, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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