



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 816 259 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
07.01.1998 Bulletin 1998/02

(51) Int. Cl.⁶: **B65F 1/00**, B65F 1/14,
B65F 7/00

(21) Application number: **96944081.7**

(86) International application number:
PCT/ES96/00249

(22) Date of filing: **26.12.1996**

(87) International publication number:
WO 97/24279 (10.07.1997 Gazette 1997/30)

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI NL PT SE

(30) Priority: **02.01.1996 ES 9600002**
23.12.1996 ES 9602722

(71) Applicant: **Recologic, S.A.**
08140 Caldes de Montbui (ES)

(72) Inventors:
• **CAMPS LLAQUET, Salvador**
E-08013 Barcelona (ES)

• **RODRIGUEZ GARCIA, José Luis**
E-08140 Caldes de Montbui (ES)
• **RAMIREZ MARTINELL, Jorge**
E-08037 Barcelona (ES)
• **CANO ARJONA, Juan José**
E-08140 Caldes de Montbui (ES)

(74) Representative:
SUGRANES - VERDONCES - FERREGÜELA
Calle Provenza, 304
08008 Barcelona (ES)

(54) **PROCESS AND CONTAINER FOR COLLECTING URBAN SOLID WASTE MATERIALS**

(57) It comprises the use of a plurality of movable containers (1) placed on public ways, and vehicles provided with means for loading and unloading said containers. The process comprises the opening of the container by the use of remote control power means; tipping the residual material inside the container; closing automatically the container; compacting and/or accumulating the residual material introduced in the container; and spraying the inside of the container (1) with a disinfecting and/or deodorizing product. The con-

tainer (1) comprises a loading chamber provided with a loading opening (2) and a tank for storing the residues; at least one filling level sensor (22); compaction and/or accumulation means; a motor (6) controlled by remote control means; a self-supplied emitter capable of sending signals to an operative control central station; a sensor for detecting the presence of a living being and a sensor for detecting faults in the container.

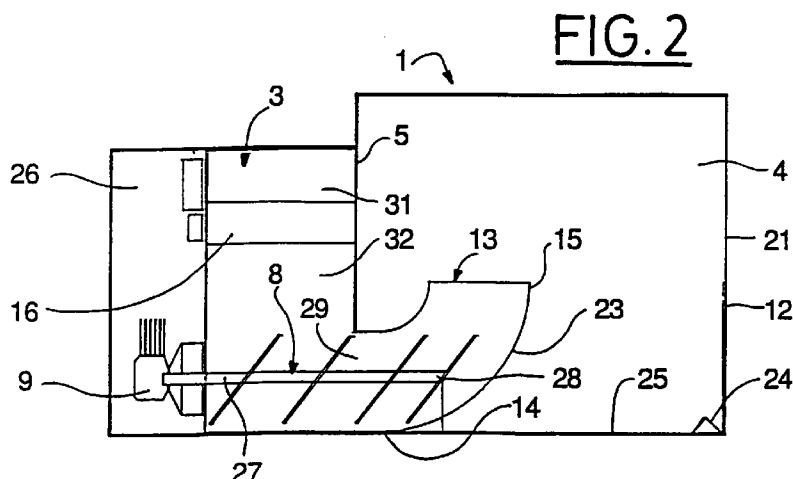


FIG. 2

EP 0 816 259 A1

Description

Technical field of the invention

The present invention relates to a procedure for the collection of solid urban waste, and to a container for the implementation of that procedure.

In particular, the present invention relates to a procedure for the collection of solid waste, of the type which involves the utilization of a plurality of movable containers, set down in respective locations in the streets and which can be picked up, emptied, cleaned, disinfected and/or deodorized, following which they are set down again in operating position by automobile vehicles provided with means for on-loading and off-loading the containers, while the container to which the present invention relates is of the type which has an opening for putting in the waste, which opening can be closed in sealed fashion; at least two compartments, the first of which forms a loading chamber and is provided with the said opening, while the second is a waste storage compartment, the two compartments being adjacent to each other and separated by a dividing wall; at least one filling-level detector; and means of compacting and/or accumulating the waste.

The procedure and the container of the present invention are particularly applicable for the collection of solid urban and industrial waste, either all together or selectively, for the subsequent controlled tipping or sorting thereof.

State of the art

It is known that in practically all the towns/cities of the western world the collection of refuse and recoverable materials is carried out by means of containers set down in the streets, which containers are emptied at regular intervals by a fleet of specific lorries which include means for the pressing and compacting of the refuse inside the actual body of the lorry.

Once the maximum waste capacity which the lorry can transport has been attained the lorry takes the waste to a transfer or sorting plant, or directly to a controlled tip.

This method, implemented in practically all countries of the world, suffers from many disadvantages to which no solutions have been found to date. Firstly, the population feels to a certain extent averse to making physical contact with the containers, which contact is unavoidable during the action of putting bags of refuse into the container, due to the fact that such containers have lids which must be opened manually by the user himself/herself. This situation leads many users to place the bags of refuse directly on the ground near the container, with the consequent risk of breakage of said bags by the action of domestic pets, which leads to scattering of the contents and the continued presence of uncontrolled refuse until the next collection, with the

attendant dirtying of the municipal area.

In cases where the town/city produces an excess of refuse for any reason, such as temporary increase of population, certain festivities or strikes by collecting personnel, the problems multiply and the number of full containers and of bags in the streets increases.

Moreover, the conventional containers known to date, although they have a lid which tends to remain closed, are nevertheless often to be found with their lids open. Even where closure is correct, the closure lacks fitments to make it hermetic and leaktight. Due to this, the containers which form an integral part of the state of the art give off unsanitary emanations and unpleasant odours which are clearly a nuisance to passers-by and surrounding zones.

The lack of hermetic means of closure and safety devices in the container makes it possible for living beings, such as children, domestic pets and the like to get into the container, with the risk of their being transferred to the collecting-compacting lorry and consequently dying.

Finally, another disadvantage of the present solid urban waste collection system lies in the fact that unloading of the containers into the collecting-compacting lorries is very noisy, which, added to collection times habitually falling in the night hours, considerably disturbs the rest-period of the population.

For all these reasons, new solid urban and industrial waste collection procedures are being studied and tested which are based on the movable installation of interchangeable containers of larger capacity and suitable for in-container compacting of the waste. In this type of procedures, the waste or refuse is collected inside the containers which are changed when they are full and transported to a waste collection centre or to a controlled tip by means of vehicles designed for the purpose.

Although they can be used for general unselective collection, these containers are also suitable for the selective collection of waste whose end-purpose is recycling or recovery of same, in which case they are transported normally to a waste sorting centre for classification into groups, such as the known groups of paper and cardboard, metal, plastics, glass, etc., or their final tipping and disposal.

Likewise known is compacting of the refuse prior to exchange of the container, pressing the refuse and thereby increasing the refuse collection capacity, for which purpose containers are known which are provided with at least two compartments, the first of which forms a loading chamber and is provided with a loading opening which can be closed in leaktight manner and the second is a waste storage compartment. The two compartments are adjacent to each other, normally in the horizontal direction, and are separated by a dividing wall.

Likewise known is the use in this type of container of means for detection of its degree of filling, which in

known embodiments employ a filling-level detector or a weight cell.

One disadvantage nevertheless suffered by the present containers for implementing these waste collection procedures is that the information on the filling of the containers in order to decide on the need to exchange containers must be carried out "in situ". This means that waste collection service operatives have to go to the containers merely to check on this situation, or else the container in use must be exchanged before it has been completely filled, thereby failing to make use of its full capacity. In both cases there is an unnecessary additional spending of energy. Moreover, any delay in collection of the containers leads to an accumulation of bags of refuse around the container, which is once again a cause of unsanitary public conditions.

Explanation of the invention

The purpose of the invention is to solve the disadvantages mentioned, and to provide other additional advantages.

In essence, the procedure of the invention is characterized in that it comprises the steps of: opening the container by motorized drive, preferably by operation of a remote control; emptying out the waste which is inside the container, while the latter is kept open; automatically closing the container once a preset period of time has elapsed after the previous step; compacting and/or accumulating the waste put in; and then sprinkling the inside of the container with a disinfectant and/or deodorizing product, in such a way that, when the waste put into the container exceeds at least a preset filling level, corresponding to a fraction of or its total capacity, or if a living being has entered or a breakdown of container operation has occurred, a signal is sent from the container which includes codes which identify the container and the filling situation of same, the presence of a living being inside it and/or a breakdown condition, so that a container-collector vehicle can travel to the site of the container in order to pick it up and transport it to a repair or emptying and waste treatment station.

The container of the invention is characterized essentially in that the aforesaid compacting means are made up of a worm with an essentially horizontal shaft, inserted into a tube and driven by a motor, which connects the loading chamber with the storage chamber, said tube having an essentially horizontal section, an essentially vertical section and an angled ascending section fitted between the previous two sections, which tube works in combination with the aforesaid worm to compact the waste.

In accordance with another characteristic of the invention, the container is provided with a motor, preferably governed by remote control, designed to open and close the load opening hatch.

According to another characteristic of the invention, the container is provided with a self-powered emitter

which can receive data from at least one transducer and is designed subsequently to send corresponding signals for container identification, for the filling level of the container, for the presence of a living being inside the container and/or for breakdown, to an operational control centre.

Preferably, the first compartment is provided with an inclined-plane gate, fitted under the loading opening, which divides said first compartment into an upper part and a lower part and is designed to regulate the fall of the solid waste into said lower part.

The container of the invention is also characterized in that it is provided with a detector of the presence of a living being inside the container, designed to emit a signal which deactivates the waste-compacting means and prevents opening of the inclined-plane gate in the event of actual detection of such presence, said detector being preferably formed by a vibration sensor and/or a heat sensor.

According to another characteristic of the invention, the container is provided with a fault detector.

According to another characteristic of the invention, the container is provided with means for protecting the interior of the loading chamber from any entry of rainwater while the loading opening is kept open.

Preferably, the container is provided with leak-tightness means for the liquids given off by the waste, preferably made up of an inverted-V profile attached to the base of the storage compartment and running transversally and adjacent to the back end of said base.

Brief description of the drawings

There follows below a detailed description of one mode of embodiment of the present invention, for a better understanding of which some drawings are attached, which drawings are provided merely by way of non-restrictive example. In the drawings:

Figure 1 is a perspective view of a container of the invention;

Figure 2 is an interior view in elevation of the container of Figure 1;

Figure 3 is another interior view, but in plan view from above, of the container of Figure 1;

Figure 4 is another interior view, but in elevation viewed from point IV, of the container of Figure 1;

Figure 5 is a back view of the container of Figure 1; and

Figure 6 is a schematic diagram of the operating method, showing a container, a collecting lorry and a control centre or base.

Detailed description of the drawings

In said drawings it can be seen that the container 1 of the invention, suitable for implementing the procedure of the present invention, comprises three interior

compartments 3, 4 and 26.

The first compartment 3, which is the central compartment, is a loading chamber for the solid waste and is provided with a loading opening 2 for putting in the waste. The loading opening 2 can be closed in leaktight fashion by a hatch and is of dimensions such as to permit comfortable insertion with free play into the container 1 of the waste which users will normally put into the container, for example a bag 34 of domestic or industrial refuse.

The second compartment 4 is a waste storage compartment, adjacent to the loading chamber 3 and separated from it by a dividing wall 5, except for an opening 29 which connects the storage compartment 4 with the chamber 3.

An essentially horizontal worm 8 which traverses said opening 29 in the dividing wall 5 and connects the chamber 3 with the storage compartment 4. The worm 8 is supported at one of its ends 27 by the dividing wall between the chamber 3 and the third compartment 26, for example on bearings, while at its other end 28 it projects into the interior of the storage compartment 4. In the example shown in the drawings the worm is of variable screw pitch, decreasing in the direction going from the chamber 3 to the storage compartment 4, as can be seen in Figures 2 and 3.

Through the interior of the storage compartment 4, the worm 8 runs through the interior of an essentially horizontal section 14 of a tube 13 fixed to the dividing wall 5 at its part adjacent to the storage compartment 4. Said tube 13 also includes an angled section 23 and an essentially vertical section 15 which, in the example shown, takes an ascending route. The projection end 28 of the worm 8 is to the interior of the angled section 23, so that the waste which is being compacted as it is transported from the loading chamber 3 to the storage compartment 4 hits against the interior face of said angled section 23 as it emerges from the worm 8. The waste, pushed by the worm 8, is forced to change direction and to move along said essentially vertical section 15, to be fed, by then compacted, into the storage compartment 4.

The worm 8 is driven by a motor 9 housed in the third compartment 26, which is a sealed compartment which houses the electrical actuation and container 1 control elements.

Just beneath the loading opening 2, the loading chamber 3 is provided with an inclined-plane gate 16, which descends towards the worm 8, to form a hopper-type configuration to facilitate the fall of the solid residue into the loading chamber 3, as can be observed particularly in Figure 4. Said gate 16 divides the loading chamber 3 into an upper part 31 and a lower part 32.

The loading opening 2 doors of the chamber 3 and the gate 16 are driven by respective actuating means, preferably formed by two motors 6 and 7.

Figure 1 shows that the container 1 has means of protection made up of a hood 18, fitted above the load-

ing opening 2, which protects the loading chamber 3 from any entry of rainwater into it while loading opening 2 is open. Alternatively, instead of said hood 18, similar protective means can be fitted, such as a roof section which, like the hood 18, can be movable.

On the back face 21 opposite to the loading chamber 3, the container 1 has a hermetic hatch 12 designed for tipping out the container 1 contents by overturning at the waste collection centre in the final tipping of the waste.

An inverted-V profile 24 of low height is attached, preferably by welding, to the base 25 of the storage compartment 4, transversally to the container 1 and near the side 21 of the aforesaid hermetic gate 12. Said profile 24 permits the liquids given off by the waste to be pooled in the bottom of the storage compartment 4, sealing them off and preventing accidental tipping of same during the collection phase of the operation or during transportation of the container 1.

The solid waste collection procedure which uses the containers 1 of the invention is implemented according to an operating cycle which includes the following sequential steps:

- a) opening of the container 1 by motor drive, preferably by actuation of a remote control 33 which activates the aforesaid motor 6, designed to open and close the aforesaid load opening hatch 2;
- b) the user places the waste 34 inside the load chamber 3 of the container 1, in the upper part 31 of the chamber 3, while the upper part of the latter is kept open and the gate 16 closed;
- c) the door of the loading chamber 3 of the container 1 closes automatically, after a preset period of time following the previous step;
- d) a detector of living being, whether person or animal, inside the container 1 is activated, preferably made up of a vibration and/or heat sensor and transducer, fitted inside the container 1, preferably in the upper part 31 of the loading chamber 3, designed to deactivate the operating cycle in the event of actual detection of presence of a living being;
- e) if no living being is detected inside the container 1, the inclined-plane gate 16 opens to permit the waste load to fall down onto the lower part 32 of the loading chamber 3 and onto the first end 27 of the worm 8;
- f) the gate 16 is closed;
- g) the upper part 31 of the loading chamber 3 is sprinkled with a disinfecting and/or deodorizing product, following closure of the container 1, for which purpose it is provided with a reservoir of disinfecting and deodorizing product and sprinkling means, duly equipped with a pump; and simultaneously, the waste which has been fed in is compacted and/or accumulated by the combined action of the worm 8 and the angled section 23 of the tube

13.

Steps a) to g), respectively, are implemented as long as no total filling or preset partial filling of the container 1 is detected, which detection is implemented by means of filling detection 22 means with which the container 1 is equipped.

Preferably, said means of filling detection 22 are made up of at least one level sensor and/or load sensors which, when activated, give rise to interruption of the above-described operating cycle.

Said means of filling detection 22 are designed so that they can be activated selectively in function of a certain degree of filling, corresponding to a fraction of or the entirety of the storage compartment of the container 1.

At the same time as operation of the load opening hatch 2 and the waste compacting means is deactivated, a signal is sent from the container 1 to an operational control centre 20. Said signal includes codes on container 1 identification and filling condition, so that a motorized vehicle 11 equipped with a receiver 19 and a crane 17 can go to the site of said full container 1 in order to put an empty one in its place and transport the full container to the waste collection and/or treatment centre or to the controlled tip.

Similarly, when either the presence of a living being inside the loading compartment 3 of the container 1 or a container fault is detected, the operational control centre 20 is sent another signal which includes a code to indicate the problem and a code identifying the container 1.

The emitter 10 for said signals is self-powered and designed to receive data from at least one transducer and then send said signals, whether radio, electrical or of other type, to the operational control centre 20.

For example, where the presence of a living being, whether a person or an animal, is detected inside the container, the procedure can be so designed that, in addition to transmitting the aforesaid presence identification signal to the operational control centre 20, the loading opening door 2 opens and closes, respectively, a preset number of times in order to give the living being inside the chance to get out of the container 1, in which case an operating cycle is re-initiated, while if no living being emerges the operation of the device is blocked.

Claims

1. Procedure for the collection of solid waste matter, of the type which involves the utilization of a plurality of movable containers (1), set down in respective locations in the streets and which can be picked up, emptied, cleaned, disinfected and/or deodorized, following which they are set down again in operating position by automobile vehicles equipped with means of on-loading and off-loading, characterized in that it comprises the steps of: opening the con-

tainer by motorized drive, preferably by operation of a remote control; emptying out the waste which is inside the container, while the latter is kept open; automatically closing the container once a preset period of time has elapsed after the previous step; compacting and/or accumulating the waste put in; and then sprinkling the inside of the container (1) with a disinfectant and/or deodorizing product, in such a way that, when the waste put into the container exceeds at least a preset filling level, corresponding to a fraction of or its total capacity, or if a living being has entered or a breakdown of container operation has occurred, a signal is sent from the container which includes codes which identify the container and the filling situation of same, the presence of a living being inside it and/or a breakdown condition, so that a container-collector vehicle can travel to the site of the container in order to pick it up and transport it to a repair or emptying and waste treatment station.

2. Container (1) for implementation of the procedure as claimed in Claim 1, of the type which has a loading opening (2) for putting in the waste, which opening can be closed in sealed fashion by a hatch; at least two compartments (3,4), adjacent to each other and separated by a dividing wall (5), the first (3) of which forms a loading chamber and is provided with the said loading opening (2), while the second (4) is a waste storage compartment; at least one filling-level detector (22); and means of compacting and/or accumulating the waste, characterized essentially in that the aforesaid compacting means are made up of a worm (8) with an essentially horizontal shaft, inserted into a tube (13) and driven by a motor (9), which connects the loading chamber (3) with the storage chamber (4), said tube (13) having an essentially horizontal section (14), an essentially vertical section (15) and an angled ascending section (23) fitted between the previous two sections (14, 15), working in combination with the aforesaid worm (8) to compact the waste.

3. Container (1) as claimed in Claim 2, characterized in that it is provided with a motor (6), preferably governed by remote control, designed to open and close the load opening hatch (2).

4. Container (1) as claimed in Claim 2 or Claim 3, characterized in that it is provided with a self-powered emitter which can receive data from at least one transducer and is designed subsequently to send corresponding signals for container (1) identification, for the filling level of the container, for the presence of a living being inside the container and/or for breakdown, to an operational control centre.

5. Container (1) as claimed in any of Claims 2 to 4, characterized in that first compartment (3) is provided with an inclined-plane gate (16), fitted under the loading opening (2), which divides said first compartment into an upper part (31) and a lower part (32) and is designed to regulate the fall of the solid waste into said lower part (32). 5
6. Container (1) as claimed in any of Claims 2 to 5, characterized in that it is provided with a detector of the presence of a living being inside the container, designed to emit a signal which deactivates the waste-compacting means and prevents opening of the inclined-plane gate (16) in the event of actual detection of such presence, said detector being preferably formed by a vibration sensor and/or a heat sensor. 10 15
7. Container (1) as claimed in any of Claims 2 to 6, characterized in that it is provided with a fault detector. 20
8. Container (1) as claimed in any of Claims 2 to 7, characterized in that it is provided with means (18) for protecting the interior of the loading chamber (3) from any entry of rainwater while the loading opening (2) is kept open. 25
9. Container (1) as claimed in any of Claims 2 to 8, characterized in that it is provided with leaktightness means for the liquids given off by the waste, preferably made up of an inverted-V profile (24) attached to the base (25) of the storage compartment (4) and running transversally and adjacent to the back end of said base. 30 35

40

45

50

55

FIG. 1

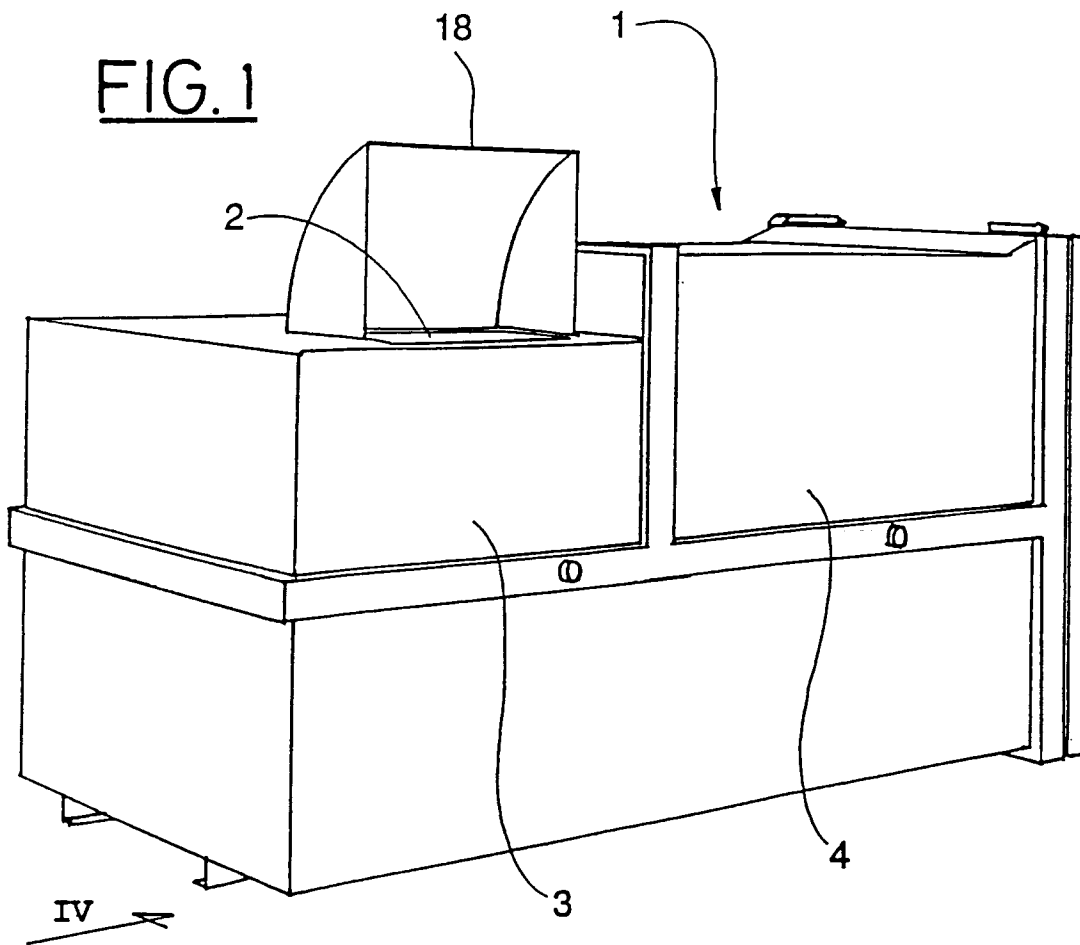


FIG. 2

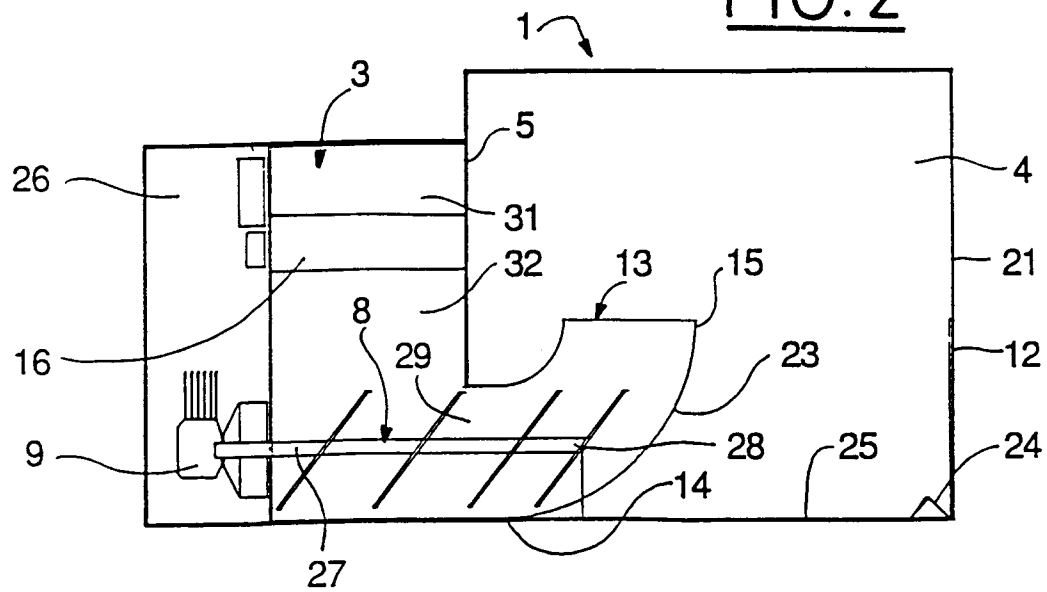


FIG. 3

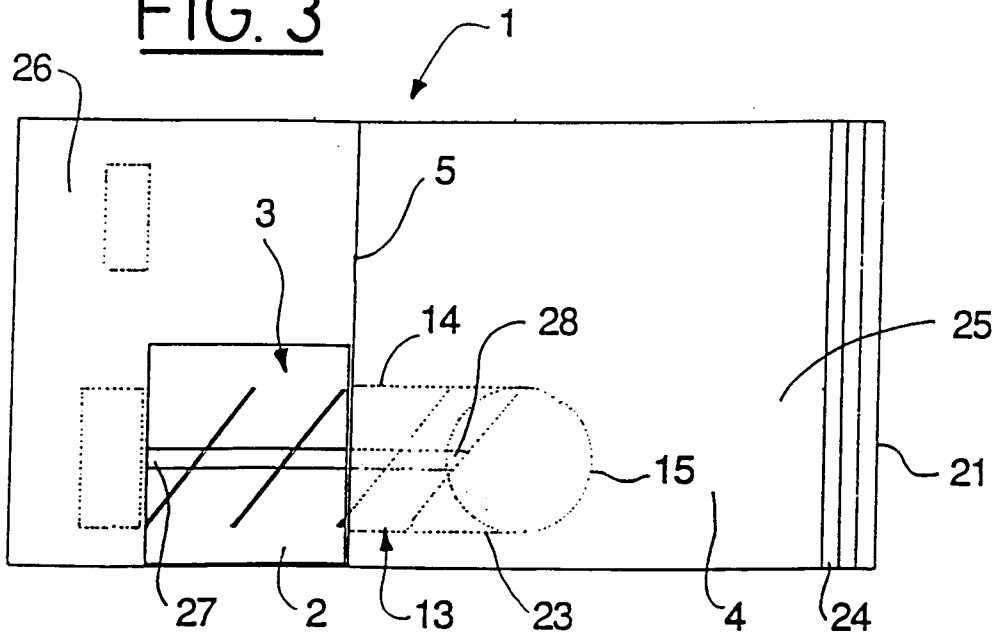


FIG. 5

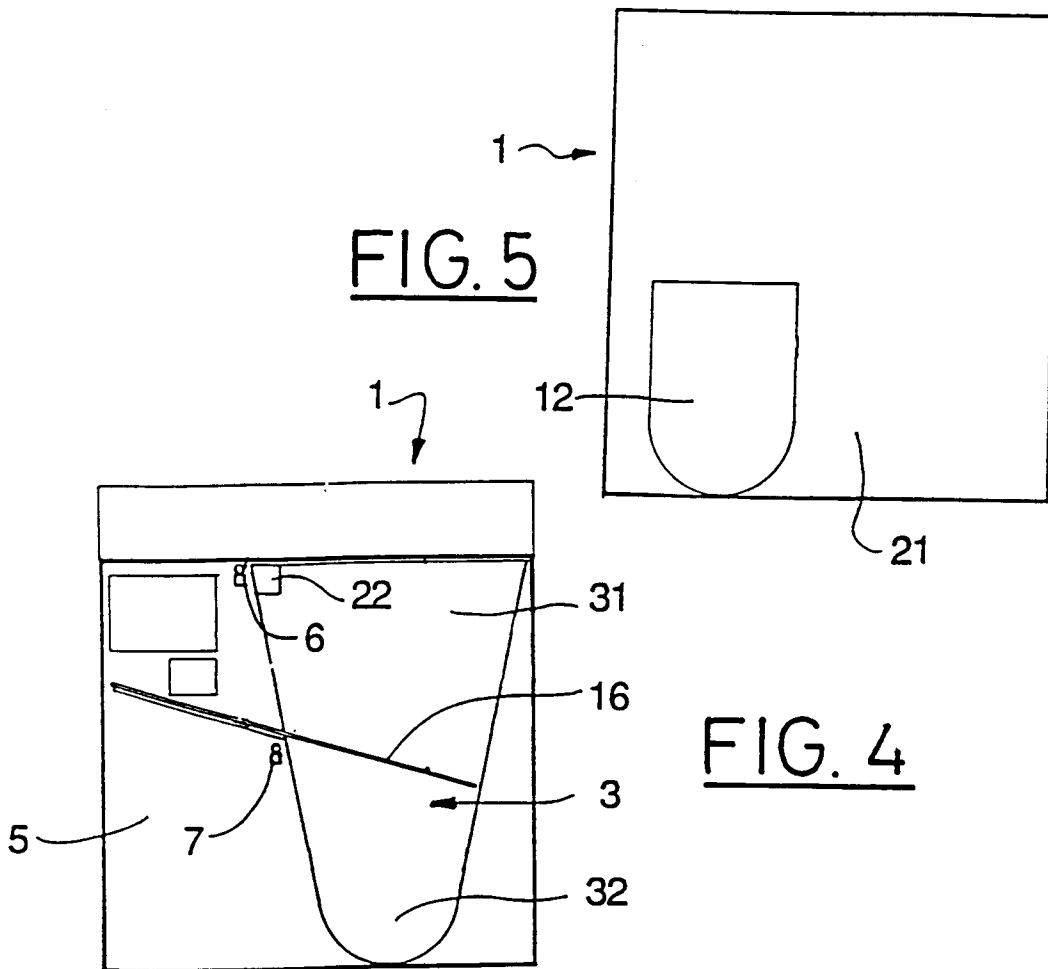
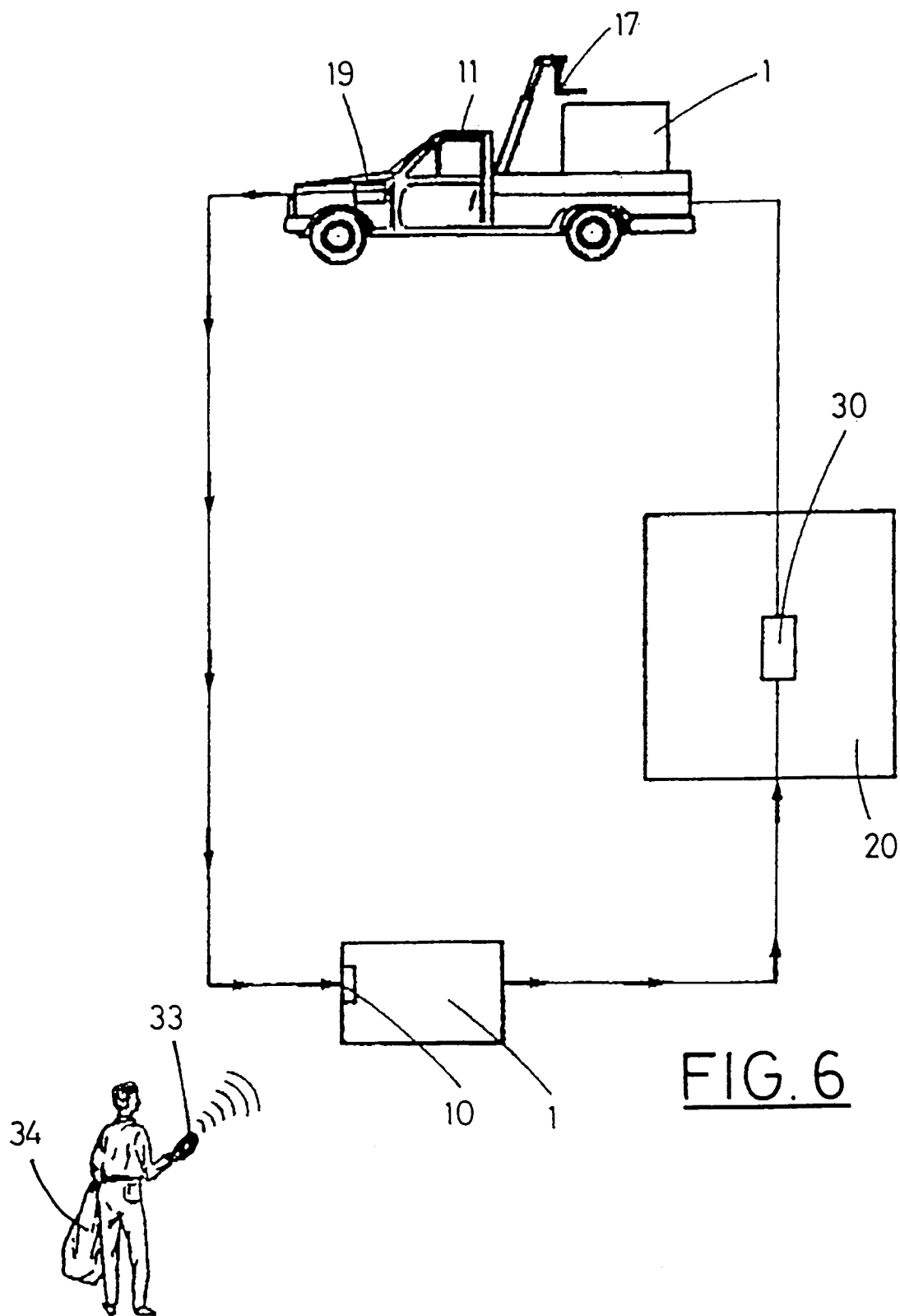


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES 96/00249

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: B65F1/00 B65F1/14 B65F7/00 According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC6: B65F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CIBEPAT, EPODOC, PAJ, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 2 705 952 A (ATIK SARL) 9 December 1994 (9.12.94) see page 2, line 1- page 3, line 9 see page 5, line 9- line 10 see page 6, line 9- line 11 see claims 1,3,5,7; figures ---	1,2,4,7
Y	US 3 768 398 A (ULLMAN M) 30 October 1973 (30.10.73) see column 1, line 6 - line 8 see column 1, line 66 - column 2, line 2; figure 1 ---	1,2,4,7
A	EP 0 543 763 A (NICOLETTI AGREGATS S A; SOGEDET SARL (FR)) 26 may 1993 (26.05.93) see abstract; claim 3 ---	1,2
-/--		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 8 April 1997 (08.04.97)		Date of mailing of the international search report 8 April 1997 (08.04.97)
Name and mailing address of the ISA/ S. P. T. O		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)