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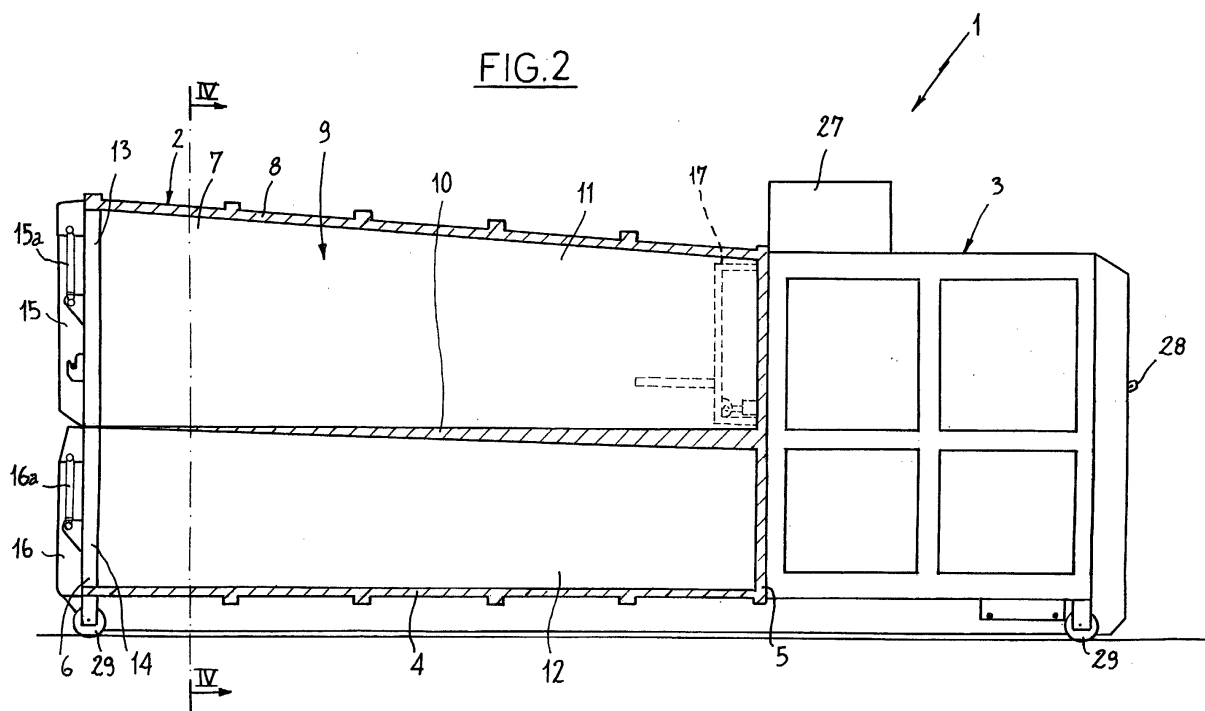
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(54) **Container for differentiated collection of rubbish**

(57) A device (1) for the differentiated collection of rubbish comprises a container (2) divided into housing compartments (11, 12) each having a loading opening (18, 19) for rubbish insertion and an outlet opening (12, 13) for rubbish ejection. The housing compartments (11, 12) have mutually diverging inner surfaces so that rubbish emptying from the container (2) is facilitated. Fur-

ther in engagement with the container (2) is a loading unit (3) equipped with appropriate pushers (22, 23) for insertion of the rubbish into the housing compartments (11, 12) through the respective loading openings (18, 19). The pushers (22, 23) are made in such a manner that the rubbish is directed towards a central region of the housing compartments themselves.



Description

[0001] The present invention relates to a container for the differentiated collection and transportation of rubbish comprising the features set forth in the preamble of claim 1.

[0002] The present invention also relates to a device for the differentiated collection of rubbish comprising the features set forth in the preamble of claim 9.

[0003] The object of the present invention applies to the sector of waste material disposal and in particular to the differentiated collection of rubbish.

[0004] Usually, as far as the differentiated collection of rubbish is concerned, said rubbish is conveyed into appropriate collecting bins that lend themselves to be emptied onto motor-vehicles intended for transportation of same to treatment and/or disposal locations.

[0005] Generally, motor-vehicles intended for transportation of rubbish are provided with a container divided into two or more housing compartments within which different types of waste are compacted.

[0006] Another mode for carrying out a differentiated rubbish collection, described in the Italian Patent Application for utility model No. BS98U00001 in the name of the same Applicant, involves that in place of usual collection bins, rubbish is directly conveyed to, and compacted in containers of big sizes, to be placed in basement rooms or other areas provided on the city ground and intended to be periodically loaded onto appropriate motor vehicles for taking rubbish to the dumps and leaving it there.

[0007] In more detail, the above mentioned document discloses a container internally provided with a horizontal partition defining a first and a second housing compartments designed to receive a first and a second type of waste to be collected, respectively. Also associated with each housing compartment is an outlet opening equipped with a respective closure door, through which the respective waste material is ejected when the container is emptied, usually by upsetting. Further formed in the door of each outlet opening is a respective loading opening for waste insertion into the respective first and second housing compartments.

[0008] A loading unit for rubbish insertion and compacting within the respective housing compartments of the container may be also associated with the container itself, at the loading openings,

[0009] The loading unit comprises a first and a second loading hoppers disposed vertically in side by side relationship and in alignment with each other in a plane perpendicular to the longitudinal extension of the container. The first and second loading hoppers communicate with a first and a second transfer chambers respectively, through which respective insertion devices act, each of which comprises a pusher alternately movable towards the respective loading opening.

[0010] Each insertion device and the respective loading opening are disposed close to a vertical side wall of

the container parallel to the median plane of the latter so that the waste material admitted to each housing compartment is introduced into the respective housing compartment flush with the closer vertical side wall.

[0011] The Applicant has found that containers as the one mentioned above are subject to some drawbacks. First of all it was found that, during rubbish unloading onto the respective disposal locations, the rubbish tends to block within the container making this operation difficult, wearisome and sometimes even dangerous. In more detail, the compacted rubbish tends to expand and/or swell exerting pressure against the inner surfaces of the container. This pressure gives rise to friction forces counteracting free falling of the rubbish when the container is overturned. This phenomenon is particularly apparent with reference to rubbish of the paper and/or plastic type, which has a particularly marked tendency to expand.

[0012] The Applicant has also found that the structure of the loading unit and position of the inlet openings of the container are of such a nature that the waste material admitted to each housing compartment by the respective insertion device tend to mainly occupy only part of the inner volume of the respective housing compartment, which will make complete filling of the collecting container difficult.

[0013] It is an object of the present invention to solve the problems found in the known art by arranging a container for differentiated collection and transportation of rubbish such structured that emptying of same is of easy and safe execution.

[0014] It is a further object of the invention to provide a device for differentiated collection of rubbish capable of completely filling the housing compartments of a container intended for differentiated collection and transportation of same.

[0015] The foregoing and further objects that will become more apparent in the following of the present description are substantially achieved by a container for differentiated collection and transportation of rubbish comprising the features set forth in the characterizing portion of claim 1 and by a device for differentiated collection of rubbish comprising the features set forth in the characterizing portion of claim 9.

[0016] Further features and advantages will be best understood from the detailed description of a preferred but not exclusive embodiment of a container for the differentiated collection and transportation of rubbish and a device for differentiated collection of same equipped with such a container, in accordance with the present invention. This description will be made hereinafter with reference to the accompanying drawings given by way of non-limiting example, in which:

- Fig. 1 is a perspective view of a device for the differentiated collection of rubbish equipped with a container for the differentiated collection and transportation of same, in accordance with the present

invention;

- Fig. 2 is a longitudinal sectional view of the container taken along line II-II in Fig. 1;
- Fig. 3 is a sectional view taken along line III-III in Fig. 1;
- Fig. 4 is a sectional view taken along line IV-IV in Fig. 2.

[0017] With reference to the accompanying drawings, a device for the differentiated collection of rubbish in accordance with the present invention has been generally identified by reference numeral 1.

[0018] Device 1 comprises a container 2 for differentiated collection and transportation of rubbish and at least one loading unit 3 that can be operatively associated with container 2 to admit rubbish being collected thereto and compact it therein.

[0019] As viewed from the accompanying figures, container 2 preferably having a substantially box-shaped configuration, comprises a substantially horizontal base wall 4 from which a front wall 5, a rear wall 6 opposite to the front wall 5 and two side walls 7 extend in a substantially vertical direction, the side walls 7 being mutually opposite and interposed between the front 5 and rear 6 walls. A top wall 8 extends between the upper edges of the front 5, rear 6 and side 7 walls, on the opposite side from the base wall 4, thereby confining a holding volume 9 between said walls.

[0020] Container 2 further comprises a partition 10 extending through the holding volume 9 so as to divide the same into a first and a second housing compartments 11 and 12 which are arranged to receive a first and a second type of waste to be collected, respectively. In detail, the partition 10 substantially extends in a horizontal direction so that the two housing compartments 11, 12 are disposed upon each other.

[0021] Container 2 further comprises a first and a second outlet opening 13, 14 associated with the first and second housing compartments 11, 12, respectively, to enable ejection of the collected rubbish during emptying of the container itself. Also operatively associated with the first and second outlet openings 13, 14 respectively is a first and a second closure door 15, 16, each movable between a first position in which the respective outlet opening 13, 14 is shut and a second position in which the respective outlet opening 13, 14 is disengaged from the corresponding closure door 15, 16 and consequently open.

[0022] Each closure door 15, 16 is preferably driven by at least one fluid-operated actuator 15a, 16a externally carried by container 2. It should be noted however that movement of each closure door 15, 16 can be carried out by any other device of known type.

[0023] The container further involves the presence of a first and a second loading openings 18, 19 associated with the first and second housing compartments 11, 12 respectively for insertion therein of the respective types of waste to be collected.

[0024] As shown in Fig. 1, the loading openings 18, 19 are disposed on container 2 on the opposite side from the outlet openings 13, 14 and the closure doors 15, 16, i.e. through the front wall 5 of the container itself. In accordance with this structural configuration, rubbish loading is carried out through the front wall 5 of container 2, whereas emptying of same takes place through the rear wall 6 thereof. It should be however pointed out that the loading openings 18, 19 could be also formed through the closure doors 15, 16 in such a manner that rubbish loading and emptying would be carried out through one and the same wall of container 2.

[0025] It is also to be noted that the loading openings 18, 19 are preferably formed in container 2 on opposite sides relative to a vertical plane parallel to the longitudinal extension of the container itself. In more detail, each loading opening 18, 19 is placed close to a respective side wall 7 of container 2.

[0026] Advantageously, each housing compartment 11, 12 has mutually diverging inner surfaces on moving close to the respective outlet opening 13, 14.

[0027] To this aim, as clearly shown in Fig. 1, partition 10 is preferably provided to have a progressively decreasing thickness on moving close to the outlet openings 13, 14, just as an indication according to a convergence ratio included between 1/30 and 1/50, expressed by the relation between the thickness reduction and the longitudinal extension of the partition itself.

[0028] Still referring to Fig. 1, in order to further emphasize the divergence of the surfaces of the first and/or second housing compartment 11, the top wall 8 of container 2 preferably extends in a diverging plane with respect to the base wall 4, on moving close to the outlet openings 13, 14.

[0029] As seen in Fig. 4, each housing compartment 11, 12 has inner surfaces that are preferably connected to each other by rounded corners, just as an indication with a radius of at least 50 mm. In more detail, it is preferably provided that this connection with rounded corners should concern at least the inner surfaces oriented according to the longitudinal extension of container 2 internally exhibited by the base wall 4, side walls 7, top wall 8 and partition 10.

[0030] In order to further facilitate rubbish ejection, container 2 may be equipped, at least at one of the housing compartments 11, 12, with at least one pushing device 17 active within the respective housing compartment 11, 12 and for example comprising a plate movable upon command of one or more fluid-operated actuators to push the waste material towards the respective outlet opening 13, 14 during the emptying operation of container 2.

[0031] The loading unit 3 can be fixedly in engagement with container 2 or it can be removably associated therewith by appropriate attachment means (not shown as it is known in itself).

[0032] In the accompanying figures the loading unit 3 is represented in an engagement condition on the front

wall of container 2.

[0033] The loading unit 3, for one or both of the housing compartments 11, 12, comprises an insertion device 20, 21 intended for rubbish loading. In more detail, a first and a second insertion devices 20, 21 are provided which are equipped with a first and a second pusher 22, 23 respectively, each pusher being movable towards the respective housing compartment 11, 12 in the direction of the respective loading opening 18, 19. The first and second insertion devices 20, 21 operate close to a first and a second transfer chamber 24, 25 internally defined in the loading unit 3 and terminating at the respective loading openings 18, 19. In more detail, the first and second pushers 22, 23 are such arranged that they move across the respective first and second transfer chambers 24, 25 during the operations for introducing rubbish into container 2, as diagrammatically and clearly shown in Fig. 3.

[0034] The first and second pushers 22, 23 have a first and a second thrust surfaces respectively 22a, 23a each active on the respective waste material to move it to the corresponding housing compartment 11, 12 through the respective loading opening 18, 19. Advantageously, as shown in Fig. 3, one or both of the first and second thrust surfaces 22a, 23a have an inclined orientation relative to a vertical plane parallel to the longitudinal extension of container 2 to transmit a transverse-thrust component to the rubbish transferred into the container itself. In more detail, each thrust surface 22a, 23a is oriented obliquely towards a vertical middle plane of container 2, in such a manner that during transferring of the waste material from the respective transfer chamber. 24, 25 to the housing compartment 11, 12 the waste material is directed obliquely away from the side wall 7 of container 2 which is closer to the respective loading opening 18, 19. In this way the available inner volume of the housing compartments 11, 12 is utilized at best.

[0035] As shown in the accompanying figures, the first and second transfer chambers 24, 25 are placed at the base of a first and a second loading hoppers 26, 27 respectively that are vertically carried by the loading unit 3 and each set to receive the respective waste material to be collected. The loading hoppers 26, 27, like the transfer chambers 24, 25 and the insertion devices 20, 21, are disposed in side by side relationship and in alignment in a vertical plane perpendicular to the side walls 7 of container 2.

[0036] In a manner known in itself container 2 is further provided with engagement means comprising a hooking bar 28 and running rollers 29 for example, for fixing it to a chassis of a transport motor-vehicle (not shown).

[0037] Operation of the container and device of the invention described above mainly as regards structure, is as follows.

[0038] In a manner known in itself, container 2 lends itself to be placed in an appropriate basement room in combination with the respective loading unit 3, the upper

ends of the loading hoppers 26, 27 being accessible to users for rubbish reception.

[0039] When a type of waste is inserted into one of the loading hoppers 26, 27, it reaches the respective transfer chamber 24, 25 by gravity, and its presence is detected by photoelectric cells or other detecting members controlling operation of the respective insertion device 20, 21. The pusher 22, 23 of such an insertion device 20, 21 moves in a horizontal direction across the corresponding transfer chamber 24, 25 and pushes the waste material by its thrust surface 22a, 23a so as to introduce it into the corresponding housing compartment 11, 12 through the respective loading opening 18, 19.

[0040] Advantageously, the inclination of the thrust surface 22a, 23a tends to cause a displacement of the waste material along an oblique direction relative to the side walls 7 of container 2 and converging towards the side wall which is farther from the respective loading opening 18, 19.

[0041] Once container 2 has been filled and possibly disengaged from the loading unit 3, it is adapted to be hoisted on an appropriate motor-vehicle intended for transportation of same to a dump or another rubbish disposal location.

[0042] Container 2 is positioned on the transport motor-vehicle with its closure doors 15, 16 facing away from the driver's cab of the motor-vehicle itself. During the emptying step, the closure door 15, 16 of the housing compartment 11, 12 holding the rubbish to be unloaded is brought to the second position and container 2 is raised close to its front wall 5 to cause falling of the rubbish. Under this situation, coming out of the rubbish is greatly facilitated by the mutual divergence of the inner surfaces of the housing compartment 11, 12 and can be possibly helped by the action of the above mentioned pushing device 17.

[0043] The present invention solves the problems found in the known art and achieves the intended purposes.

[0044] First of all, both the container 2 and device 1 enable a perfect rubbish unloading whereas, at the present state of the art, said unloading encounters many drawbacks mainly resulting from blocking of the waste material in the respective housing compartment at the outlet opening. In fact, arrangement of a container 2 the housing compartments 11, 12 of which have diverging inner surfaces prevents the rubbish from clogging the passage, due to its tendency to expand, and consequently from stopping within the housing compartment itself.

[0045] In addition, the presence of rounded corners connecting the inner surfaces of the housing compartments 11, 12 greatly helps in allowing a regular ejection of the rubbish that, in the known art, could easily create accumulation at the sharp corners defined between two inner surfaces.

[0046] It should be also understood that the arrange-

ment of thrust surfaces 22a, 23a that are inclined to the side walls 7 of the container 2 enables full exploitation of the volume of each housing compartment 11, 12 since the rubbish inserted therein is not introduced flush with the side wall 7 which is closer to the respective outlet opening, 13, 14, but it is directed towards a central region of the housing compartment itself.

Claims

1. A container for differentiated collection and transportation of rubbish, comprising:

- engagement means to fasten the container (2) to a chassis of a motor-vehicle;
- at least one partition (10) defining a first and a second housing compartments (11, 12) in the container (2) for a first and a second type of waste material to be collected, respectively;
- a first and a second outlet openings (13, 14) associated with said first and second housing compartments (11, 12) respectively, for ejection of said first and second type of waste material;
- a first and a second closure doors (15, 16) operatively associated with said first and second outlet openings (13, 14), respectively;

characterized in that each housing compartment (11, 12) has mutually diverging inner surfaces on moving close to the respective outlet opening (13, 14).

2. A container as claimed in claim 1, wherein each housing compartment (11, 12) has inner surfaces mutually connected by rounded corners.

3. A container as claimed in claim 1, wherein the partition (10) has a decreasing thickness on moving close to said outlet openings (13, 14).

4. A container as claimed in claim 1, wherein said partition (10) extends in a substantially horizontal plane.

5. A container as claimed in claim 1, further having a first and a second loading openings (18, 19) associated with said first and second housing compartments (11, 12) respectively, for insertion of said first and second type of waste material into said compartments, said first and second loading openings (11, 12) being formed in said container (2) on opposite sides relative to a vertical plane parallel to the longitudinal extension of the container itself.

6. A container as claimed in claim 4, wherein said first and second loading openings (18, 19) are formed in said first and second closure doors (15, 16), re-

spectively.

7. A container as claimed in claim 1 which, for at least one of said housing compartments (11, 12), further comprises a pushing device active within the housing compartment to push the rubbish towards the respective outlet opening (13, 14).

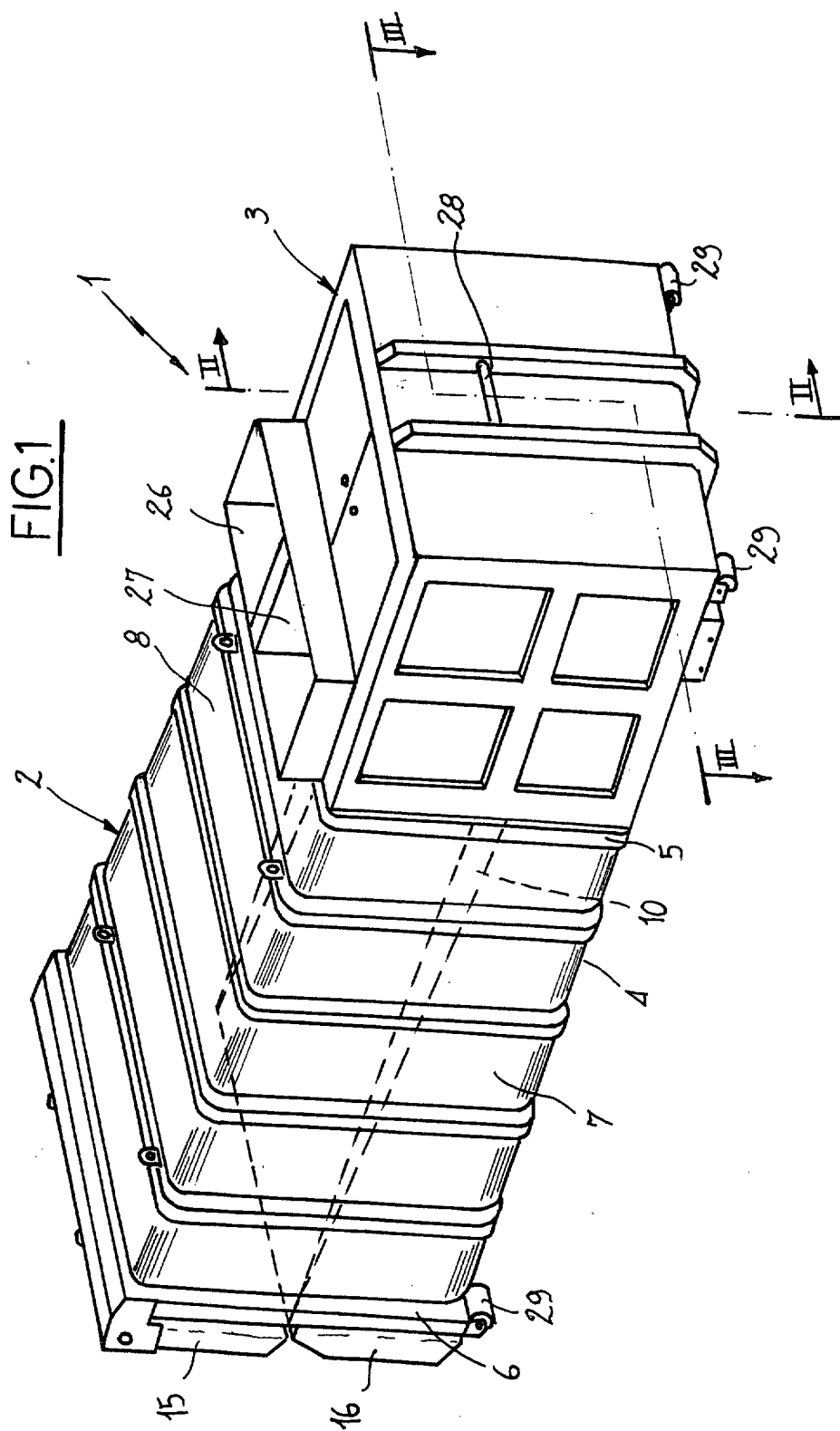
8. A container as claimed in claim 1, further comprising at least one loading unit (3) which, for at least one of said housing compartments (11, 12), comprises a pusher (22, 23) movable towards the respective housing compartment (11, 12) and having at least one thrust surface (22a, 23a) active on the respective waste material to transfer it to the housing compartment itself through the respective loading opening (18, 19), said thrust surface (22a, 23a) having an inclined orientation relative to a vertical plane parallel to the longitudinal extension of the container (2) to transmit a transverse-thrust component to the rubbish transferred into the container itself.

9. A device for the differentiated collection of rubbish comprising a container (2) in particular as claimed in one or more of claims 1 to 8, and at least one loading unit (3) that can be operatively associated with said container (2), said loading unit (3) comprising, for at least one of said housing compartments (11, 12), an insertion device (20, 21) comprising a pusher (22, 23) movable towards the respective housing compartment (11, 12) and having at least one thrust surface (22a, 23a) active on the respective waste material to transfer it to the respective housing compartment (11, 12) through a loading opening (18, 19),

characterized in that the thrust surface (22a, 23a) has an inclined orientation relative to a vertical plane parallel to the longitudinal extension of the container (2) to transmit a transverse-thrust component to the waste material transferred into the container itself.

10. A device as claimed in claim 9, wherein said insertion device (20, 21) further comprises:

- a loading hopper (26, 27) arranged to receive the respective waste material;
- a transfer chamber (24, 25) defined at the base of the loading hopper (26, 27) and terminating at said loading opening (18, 19), said pusher (22, 23) being movable across the transfer chamber (24, 25) to insert the waste material introduced into the loading hopper (26, 27), into the respective housing compartment (11, 12).



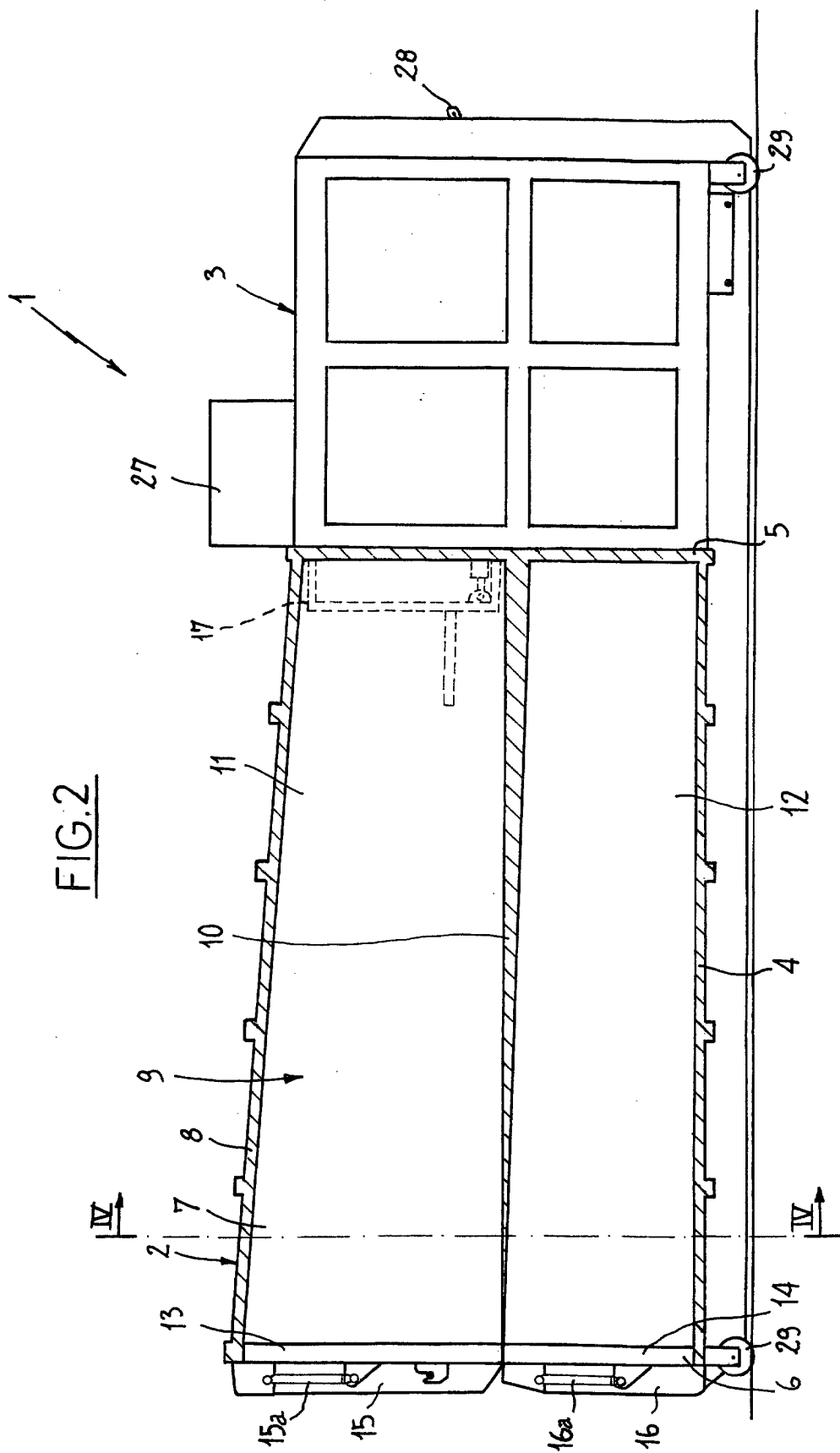


FIG.3

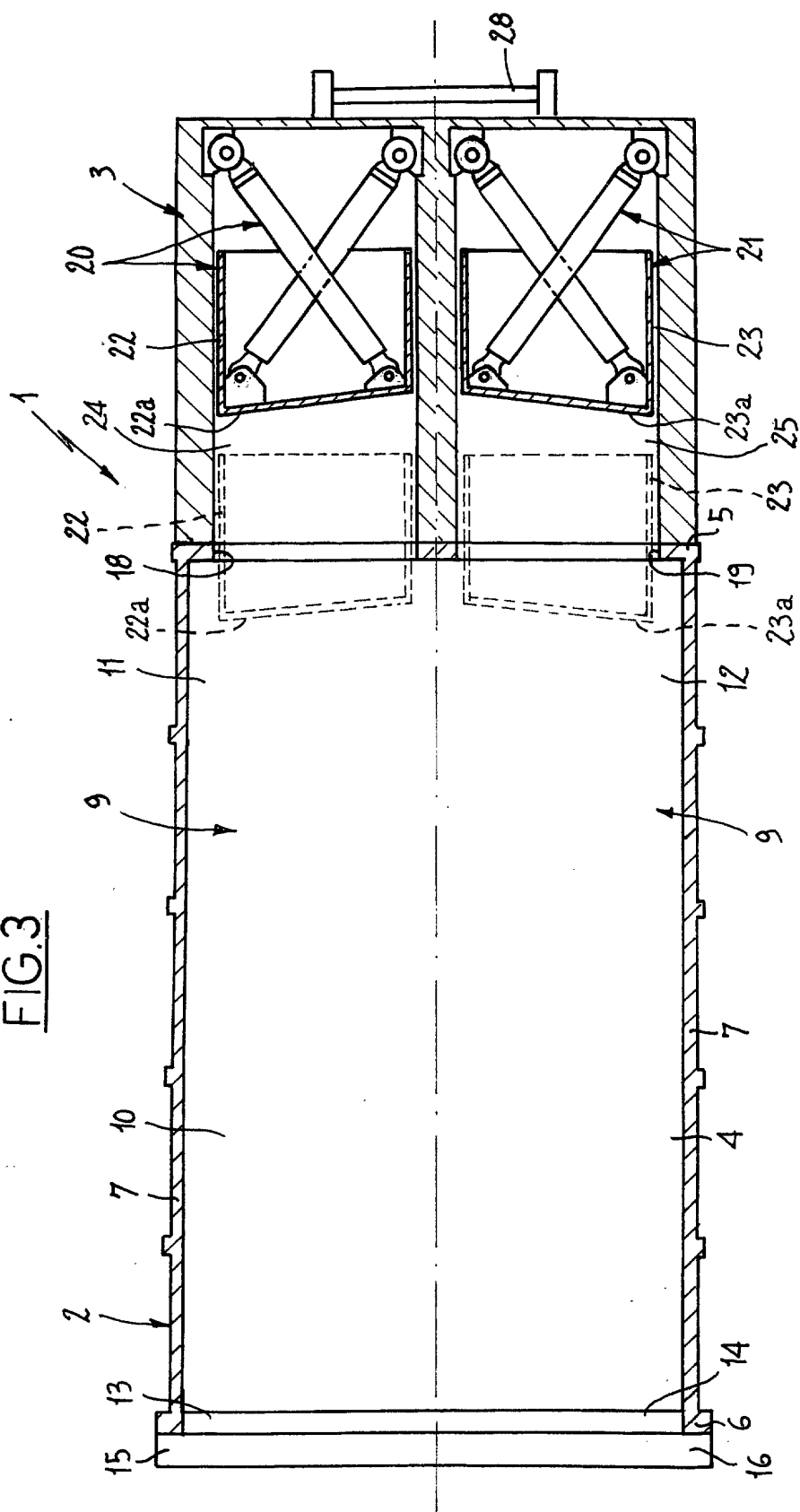
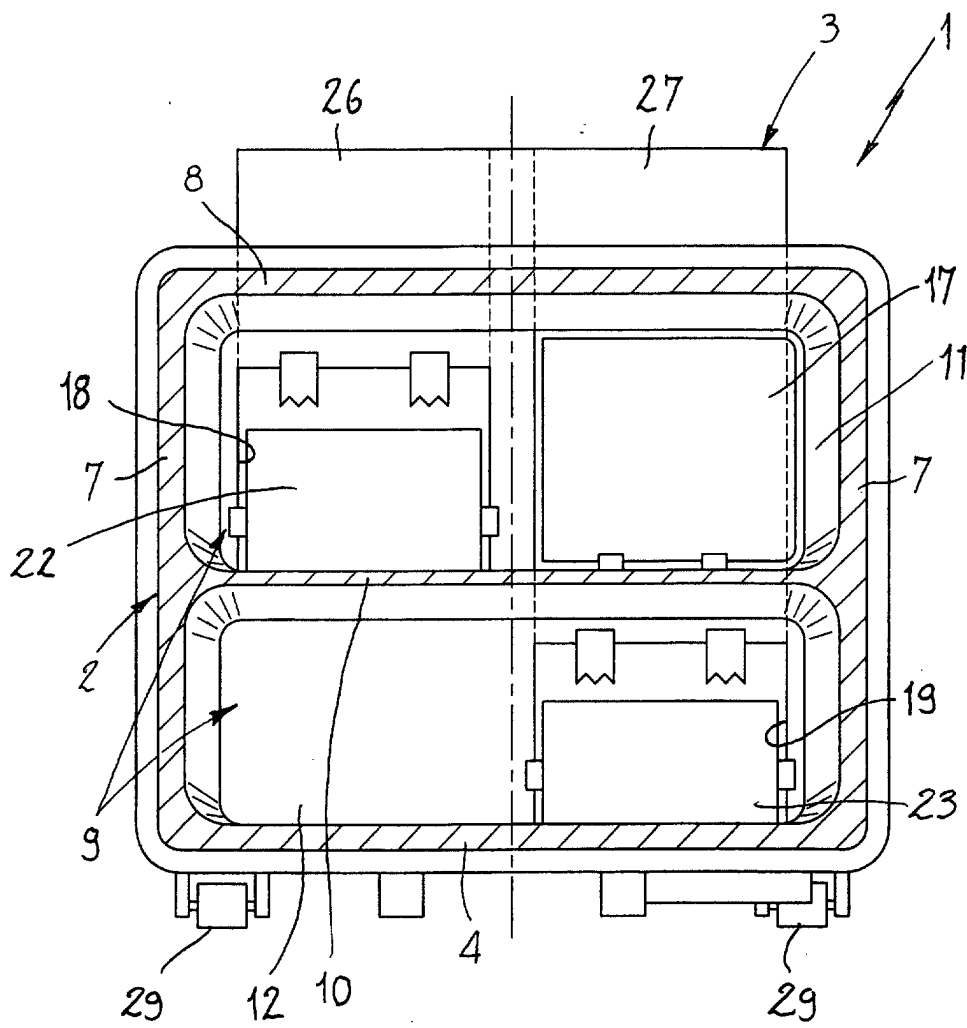


FIG.4





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0295

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.7)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B30B B65F
~~The present search report has been drawn up for all claims~~			
Place of search		Date of completion of the search	Examiner
THE HAGUE		5 October 2001	Müller, C
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			

EPO FORM 1503 03/82 (P04/C01)



European Patent
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Application Number
EP 01 83 0295

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-7



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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 01 83 0295

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-7

A container for differentiated collection of rubbish

2. Claims: 8,9,10

A loading unit with a pusher for a garbage container

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 83 0295

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82