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(54) **MOBILE MODULAR UNIT FOR MULTI-FRACTION URBAN WASTE COLLECTION**

(57) The present invention relates to a mobile modular unit for multi-fraction urban waste collection that consists of a trailer (1) or semi-trailer comprising: a fixed or foldable hitch system (2) coupled to the front portion of the chassis (3) to be able to be towed with a towing vehicle (4) and to be able to easily move and place it wherever convenient; a lifting and lowering mechanism (5) for lifting and lowering the chassis (3) with respect to the wheels (10) of the trailer (1), which allows it to be positioned lifted above the ground (s) for transport and flat on the ground(s) when placed in use mode; a plurality of modular containers (6) for the selective collection of different waste, placed transversely on the chassis (3) of the trailer (1) such that the inlet openings (7) of the waste are located on the same side (1a) of the trailer (1); and tipping means (8) for the containers (6), located on the side opposite to the waste inlet openings (7), such that they enable the containers (6) to be unloaded from said opposite side (1b) of the trailer onto a hopper vehicle (9) and with the lifting and lowering mechanism (5) in the lifted position of the chassis (3) to facilitate the unloading of waste.

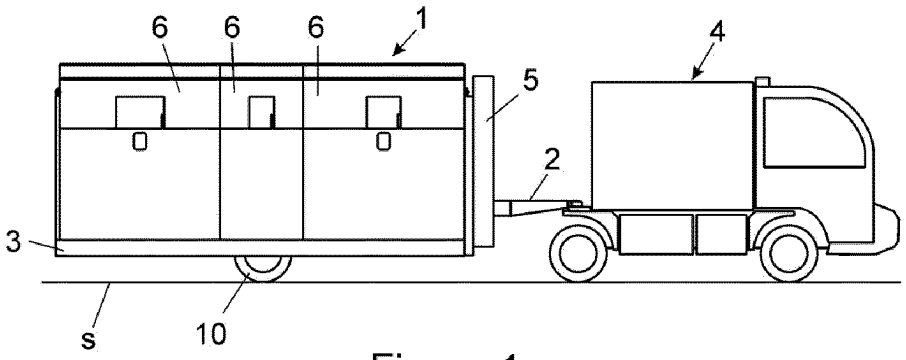


Figure 1

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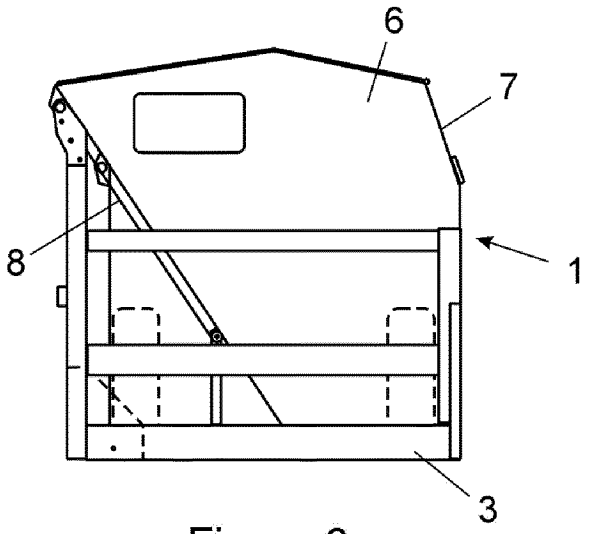


Figure 6

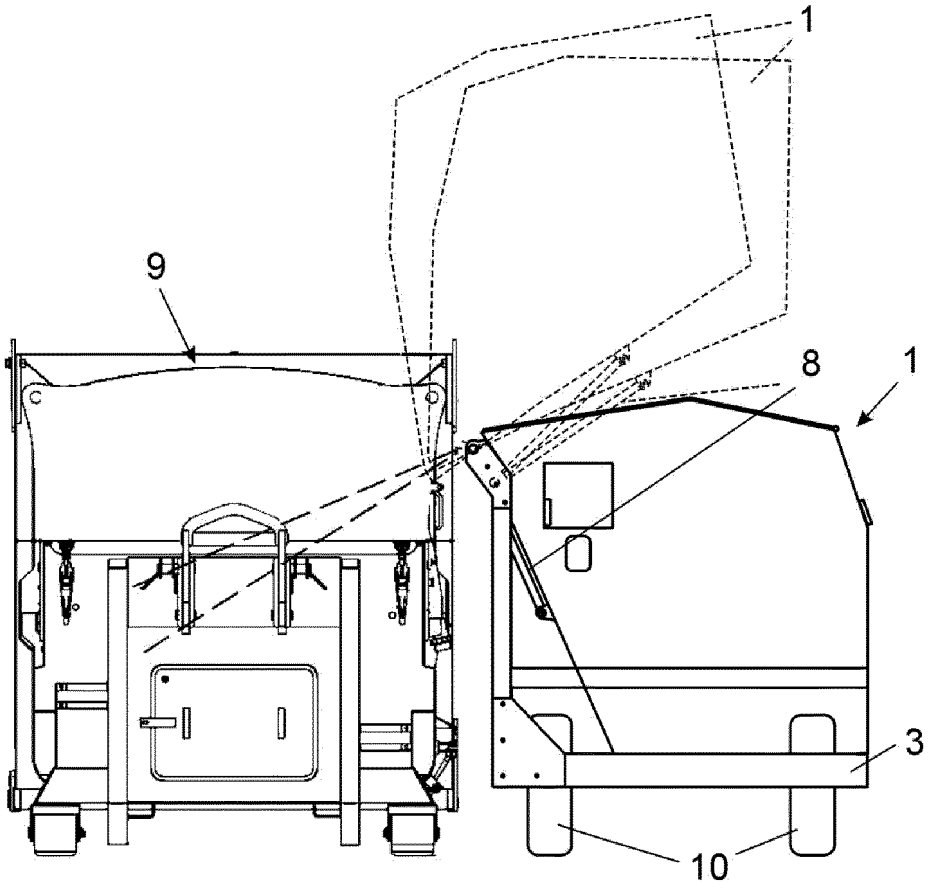


Figure 7

## Description

### OBJECT OF THE INVENTION

**[0001]** The invention, as expressed in the title of this specification, relates to a mobile modular unit for multi-fraction urban waste collection, providing advantages and characteristics, which are described in detail below, which are an improvement on the current state of the art.

**[0002]** The object of the present invention is a modular unit made up of an assembly of modular containers suitable for the selective collection of two or more types of urban waste, which have the advantage that they are integrated into a trailer or semi-trailer, with a hitch system to facilitate its mobility and transfer to any point by means of a towing vehicle, which also has a liftable mechanism structure to enable it to be lowered and positioned flat on the ground, as well as a cylinder system for lateral tipping of the containers, which, among other advantages, means that when the unit is placed flat on the ground, the openings of the containers are at a lower height, facilitating access for users and when the unit is tipped, it is placed in an elevated position, which improves unloading.

### FIELD OF APPLICATION OF THE INVENTION

**[0003]** The field of application of the present invention falls within the sector of the industry dedicated to the manufacture of waste collection systems, focusing particularly on the field of urban containers intended for the selective collection of waste.

### BACKGROUND OF THE INVENTION

**[0004]** As is known, for the selective collection of urban waste, containers are installed that, generally, are independent and different elements for each type of fraction, that is, one type for plastics, another for glass, another for cardboard, another for organic, and another for the rest. Furthermore, containers are usually static, such that in order to move them crane lorries or similar must be used to lift and move them. Furthermore, in order for the waste inlet to be at a suitable height within the reach of users, the containers usually have a height in accordance therewith and, consequently, said height is fixed and is the height that the container has for the tipping thereof when waste is deposited in hoppers.

**[0005]** Moreover, document ES1298766U, the holder (Grau machinery) of which is the applicant of the present invention, discloses a trailer or semi-trailer assembly and foldable coupling system in which, among other particular features, the trailer or semi-trailer comprises a lifting and lowering mechanism for lifting and lowering the chassis with respect to the wheels that enables it to be moved vertically between a lifted transport position and a lowered position in which the body remains flat on the ground, that is, seated with the lower base thereof level with the ground.

**[0006]** The objective of the present invention is, therefore, the development of a trailer or semi-trailer of this type adapted to incorporate containers and dedicate it to the collection of waste, taking advantage of easier transport and, in particular, being able to vary the height thereof such that for use by users in a lowered position, the inlet openings are easily accessible and, when tipped into custom-made hoppers, they are placed in an elevated position, thereby facilitating unloading.

**[0007]** Furthermore, and as a reference to the current state of the art, it must be noted that at least the applicant is unaware of the existence of any other collection unit for urban waste, or of any other invention of similar application, which presents technical, structural and constitutive features that are the same or similar to those presented by that which is claimed herein.

### DESCRIPTION OF THE INVENTION

**[0008]** The mobile modular unit for multi-fraction urban waste collection that the invention proposes is configured as an optimal solution to the aforementioned objectives which, in turn, represents an improvement of the current state of the art, the characterising details being that which make it possible and that distinguish it, conveniently contained in the final claims that accompany this description.

**[0009]** Specifically, the modular unit for waste collection that the invention proposes, as noted above, is an assembly of two or more modular containers for the selective collection of two or more different types of urban waste fraction which are integrated into a trailer or semi-trailer that, in addition to a hitch system to facilitate its mobility and transfer to any point using a towing vehicle, has a lifting and lowering mechanism for lifting and lowering the chassis to position it flat on the ground when it is installed at the point of use and lift it for the transport thereof, as well as with a cylinder system for lateral tipping of the containers, all of which, among other advantages, means that when the unit is placed flat on the ground the openings of the containers are at an adequate height to facilitate the access to users and when the tipping is carried out the unit is placed in an elevated position and the unloading is improved.

**[0010]** More specifically, the mobile modular unit for multi-faction urban waste collection, object of the invention, consists of a trailer or semi-trailer that essentially comprises the following elements:

- A fixed or foldable hitch system to be able to be towed with a towing vehicle, preferably an electric vehicle, and to be able to easily place it wherever convenient.
- A lifting and lowering mechanism for lifting and lowering the chassis with respect to the wheels, which allows said chassis to be positioned flat on the ground when it is placed in use or lifted to enable the movement of the wheels for transport.

- A plurality of modular containers, which are referred to as "satellite", at least two, which are custom-made and which are placed transversely on the chassis of the trailer,
- And a tipping system of the containers with which they are unloaded laterally over a hopper vehicle provided for this purpose, which, preferably, enables each container to be tipped independently (hence the term satellite).

**[0011]** In this way, since the semi-trailer can be lifted by means of the aforementioned lifting and lowering mechanism (by approximately 30 cm), it enables the unloading height to increase by this same magnitude, favouring the same, since a greater unloading height entails a better fall by gravity and, consequently, better penetration of waste into the collection hopper.

**[0012]** With this system, users have the waste inlet opening, on one side of the containers, less than 1200 mm (when the unit is flat on the ground), and the discharge is carried out on the other side at a height of 1800 mm.

**[0013]** The satellite container system enables said containers to be custom built and make better use of the space.

**[0014]** The trailer or semi-trailer can be custom made, meaning that the containers can also be custom made and the number or capacity can be increased or decreased at will, preferably between three and six units.

**[0015]** As such, there are multiple advantages of the unit object of the invention in different aspects:

- Improvement of public space:

  Reduction in space occupation, since all the containers of the different types of fraction are joined together and do not move from their position when they are tipped and returned to their place.
  Reduction of visual impact, since they are always well placed.

- Electrification of the means used:

  Compact electric vehicles are, preferably, those used both for transporting the trailer or semi-trailer and for incorporating the waste collection hoppers.
  Noise reduction.
  Pollution reduction.

- Increase in levels of recycling:

  The unit is configurable to each volumetric requirement. It enables up to seven different fractions to be included in the same unit.
  Optimal filling coefficient

- Operation and economy:

  Good access for people with reduced mobility.
  The containers at both ends can also be loaded from the side.
  No leachate loss
  Easy, frequent and economical washing, when the containers have just been unloaded
  Reduction in vandalism
  Cost reduction
  Prevents the intrusion of animals (e.g. wild boars)
  Reduction of risks due to inclement weather
  Multiple combinations to exchange fractions
  Better manoeuvrability
  Good access for lorries to restricted areas

## DESCRIPTION OF THE DRAWINGS

**[0016]** To complete the description provided herein, and for the purpose of helping to make the features of the invention more readily understandable, this description is accompanied by a set of drawings constituting an integral part of the same, which by way of illustration and not limitation represents the following:

Figure 1 shows a schematic side elevation view of an example of the mobile modular unit for multi-fraction urban waste collection represented in transport position with a motor vehicle;
Figure 2 shows a schematic side elevation view of the example of the modular unit of the invention shown in Figure 1, in this case represented in a flat use position on the ground, showing the waste inlet openings of each container;
Figures 3 and 4 show schematic elevation views, of the rear portion and the front portion respectively, of the example of the modular unit shown in Figure 2;
Figure 5 shows a schematic side elevation view of the modular unit of the invention shown in the preceding figures, in this case represented on the opposite side to that of Figure 2, that is, on the discharge side of the waste;
Figure 6 shows a schematic cross-sectional view of the unit shown in the preceding figures, showing in this case the tipping cylinder; and
Figure 7 shows a schematic rear elevation view of an example of the modular unit of the invention, in this case represented in the unloading phase over a waste collection hopper.

## PREFERRED EMBODIMENT OF THE INVENTION

**[0017]** In view of the aforementioned figures, and in accordance with the adopted numbering, one may observe therein a non-limiting exemplary embodiment of the mobile modular unit for multi-fraction urban waste collection of the invention, comprising what is described

in detail below.

**[0018]** Thus, as seen in said figures, the unit of the invention consists of a trailer (1) or semi-trailer essentially comprising:

- a fixed or foldable hitch system (2) coupled to the front portion of the chassis (3) to be able to be towed with a towing vehicle (4), preferably an electric vehicle, and to be able to easily move and place it wherever convenient;
- a lifting and lowering mechanism (5) for lifting and lowering the chassis (3) with respect to the wheels (10) of the trailer (1), which allows it to be positioned lifted above the ground (s) for transport, as shown in Figure 1, and flat on the ground(s) when placed in use mode, figure 2;
- a plurality of modular containers (6) for the selective collection of different waste, at least two and, preferably, between three and six or seven, placed transversely on the chassis (3) of the trailer (1) such that the inlet openings (7) of the waste are located on the same side (1a) of the trailer (1); and
- tipping means (8) for the containers (6), which are located on the side opposite to the waste inlet openings (7), such that they enable the containers (6) to be unloaded from said opposite side (1b) of the trailer onto a hopper vehicle (9) provided for this purpose and with the lifting and lowering mechanism (5) in the lifted position of the chassis (3) to facilitate the unloading of waste. Figure 7 shows the tipping of the containers (6) via dashed lines.

**[0019]** Preferably, the containers located at the front (1c) and rear (1d) ends of the chassis (3) of the trailer (1) also include a waste inlet opening (7) on the side wall thereof.

**[0020]** Preferably, the tipping means (8) of the containers (6) are pneumatic cylinders. And, preferably, each container (6) has a pneumatic cylinder (8) so that it can be tipped independently.

**[0021]** Preferably, the lifting and lowering mechanism (5) for lifting and lowering the chassis (3) of the trailer (1) comprises at least one lifting shaft that vertically moves said chassis by about 30 cm.

**[0022]** The containers (6) that comprise the trailer (1) are of variable size and number, customisable depending on the type of waste for which they are intended and the requirements of each case.

**[0023]** Having sufficiently described the nature of the present invention, as well as the ways in which it may be implemented, it is not considered necessary to elaborate on the explanation thereof in order for a person skilled in the art to understand the scope of the invention and the advantages derived therefrom.

## Claims

1. A mobile modular unit for multi-fraction urban waste collection, **characterised in that** it consists of a trailer (1) or semi-trailer comprising:

   - a fixed or foldable hitch system (2) coupled to the front portion of the chassis (3) to be able to be towed with a towing vehicle (4) and to be able to easily move and place it wherever convenient;
   - a lifting and lowering mechanism (5) for lifting and lowering the chassis (3) with respect to the wheels (10) of the trailer (1), which allows it to be positioned lifted above the ground (s) for transport and flat on the ground(s) when placed in use mode;
   - a plurality of modular containers (6) for the selective collection of different waste, placed transversely on the chassis (3) of the trailer (1) such that the inlet openings (7) of the waste are located on the same side (1a) of the trailer (1); and
   - tipping means (8) for the containers (6), located on the side opposite to the waste inlet openings (7), such that they enable the containers (6) to be unloaded from said opposite side (1b) of the trailer onto a hopper vehicle (9) and with the lifting and lowering mechanism (5) in the lifted position of the chassis (3) to facilitate the unloading of waste.

2. The mobile modular unit for multi-fraction urban waste collection, according to claim 1, **characterised in that** the chassis (3) of the trailer (1) comprises at least two containers (6).

3. The mobile modular unit for multi-fraction urban waste collection, according to claim 1 or 2, **characterised in that** the chassis (3) of the trailer (1) comprises up to seven containers (6).

4. The mobile modular unit for multi-fraction urban waste collection, according to any of the preceding claims, **characterised in that** the containers (6) located at the front (1c) and rear (1d) ends of the chassis (3) of the trailer (1) also include a waste inlet opening (7) on the side wall thereof.

5. The mobile modular unit for multi-fraction urban waste collection, according to any of the preceding claims, **characterised in that** the tipping means (8) of the containers (6) are pneumatic cylinders.

6. The mobile modular unit for multi-fraction urban waste collection, according to claim 5, **characterised in that** each container (6) has a pneumatic cylinder (8) so that it can be tipped independently.

**7.** The mobile modular unit for multi-fraction urban waste collection, according to any of the preceding claims, **characterised in that** the lifting and lowering mechanism (5) for lifting and lowering the chassis (3) of the trailer (1) comprises at least one lifting shaft that vertically moves said chassis by about 30 cm.

**8.** The mobile modular unit for multi-fraction urban waste collection, according to any of the preceding claims, **characterised in that** the containers (6) are of variable size and number, customisable depending on the type of waste for which they are intended and the requirements of each case.

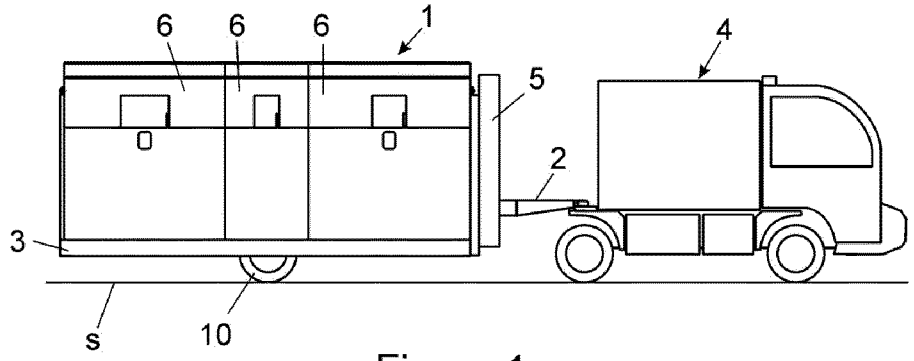


Figure 1

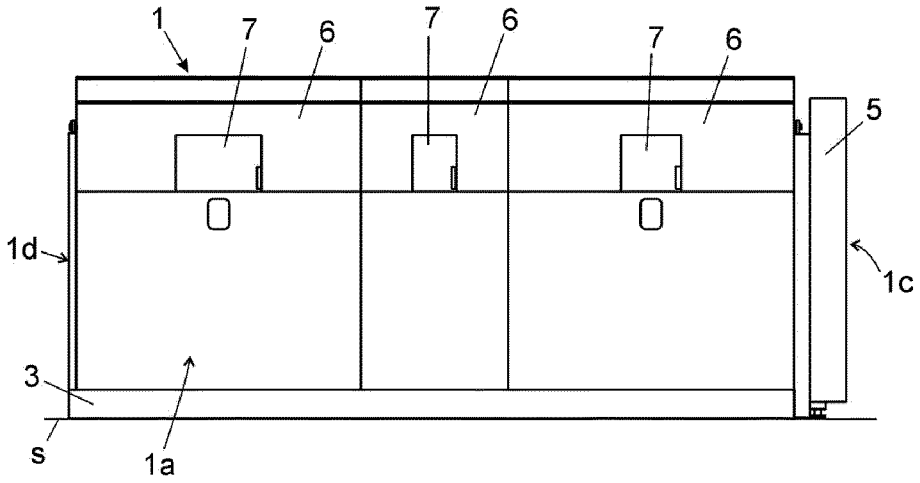


Figure 2

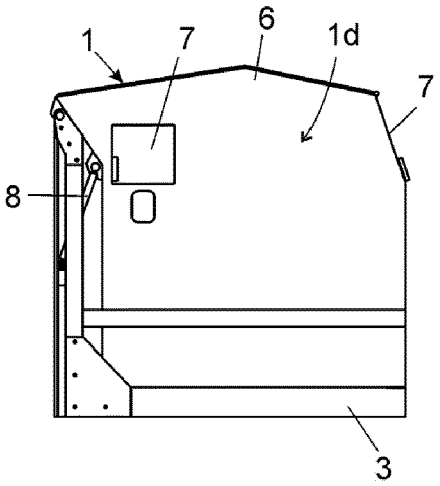


Figure 3

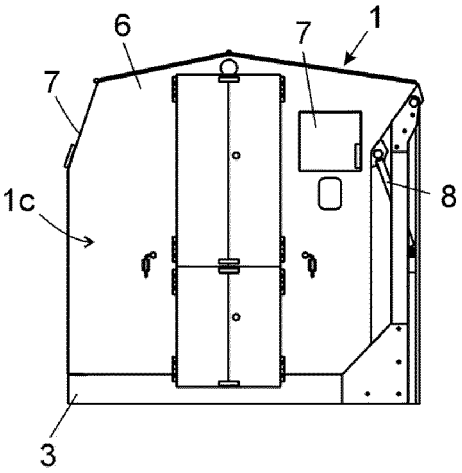


Figure 4

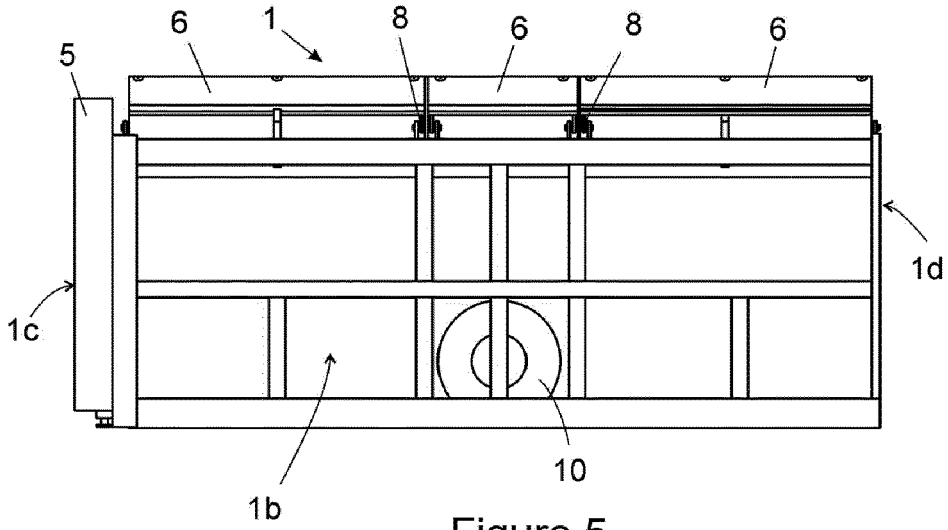


Figure 5

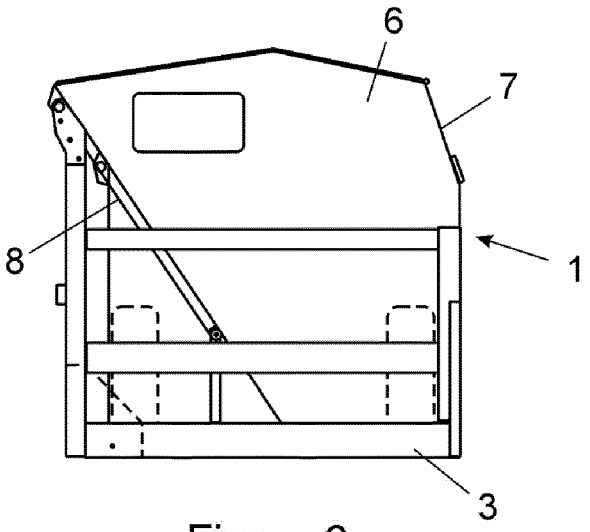


Figure 6

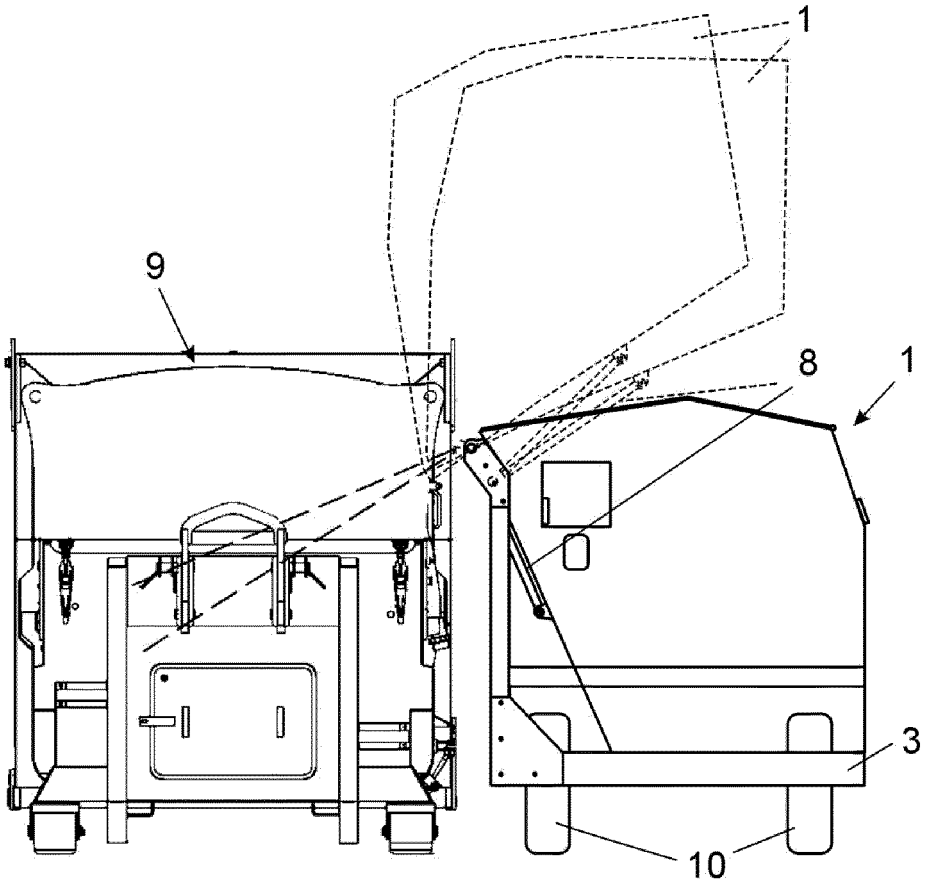


Figure 7

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# EUROPEAN SEARCH REPORT

Application Number
EP 23 38 3137

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| A | EP 3 157 846 B1 (FORGHIERI S R L [IT]) 4 April 2018 (2018-04-04) * paragraphs [0002], [0016]; figures 1, 2 * | 1-8 | INV. B65F1/14 B65F3/00 |
| A | ES 1 298 766 U (GRAU MAQU I SERVEI INTEGRAL S A [ES]) 30 March 2023 (2023-03-30) * figures 1A-1C * | 1 | |

TECHNICAL FIELDS SEARCHED (IPC)

B65F

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 28 March 2024 | Nicolas, Pascal |

CATEGORY OF CITED DOCUMENTS

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28-03-2024

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| EP 3157846 B1 | 04-04-2018 | EP 3157846 A1 | 26-04-2017 |
| | | ES 2676350 T3 | 18-07-2018 |
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| ES 1298766 U | 30-03-2023 | NONE | |



For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- ES 1298766 U **[0005]**