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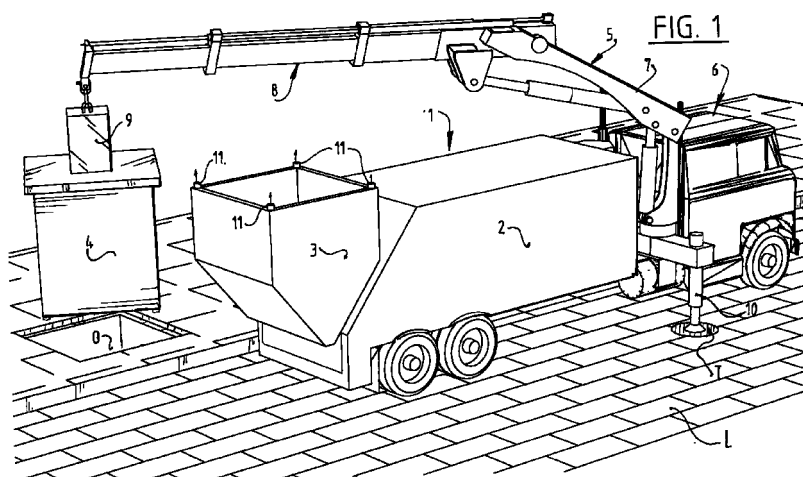
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(54) **A system, a truck and a collecting container for collecting domestic refuse**

(57) The present invention comprises a system for collecting domestic refuse, wherein the system comprises:

- a collecting container (4) which is placed on or in the public highway and which is provided with an insertion opening for insertion of domestic refuse, and an engaging member for allowing engagement thereon of a lifting member;

- a truck (1) which is provided with a loading space (2) for emptying therein the content of the collecting container and with crane means (5) provided with a crane for carrying the collecting container above an unloading opening (3) for the collecting container; and
- position-determining means (10,T) for determining the position of the crane means of the truck relative to the collecting container.



EP 1 008 537 A1

Description

[0001] Particularly in the Netherlands, but also elsewhere, domestic refuse, which may or may not be separated into fractions such as glass, paper, KGW (Kitchen and Garden Waste) and remaining refuse, is collected to an increasingly large extent in underground containers which are emptied at regular intervals using a crane and a truck.

[0002] In some cases the truck is provided with an open load container, whereby the investment in the truck can remain comparatively limited. In advanced embodiments the refuse truck is provided with pressing means for compressing the collected domestic refuse, so that the number of journeys to a waste dump can remain limited.

[0003] In both cases the speed of emptying the collecting container depends on the skill of the driver of the truck, who must also operate the crane. Incorrect operation of the crane means can also result in damage to the container.

[0004] The present invention has for its object to obviate the above stated drawbacks, and/or to provide a system for emptying one or more collecting containers into a loading space of a refuse truck in a short time and in reliable manner.

[0005] The present invention provides a system for collecting domestic refuse, wherein the system comprises:

- a collecting container which is placed on or in the public highway and which is provided with an insertion opening for insertion of domestic refuse, and an engaging member for allowing engagement thereon of a lifting member;
- a truck which is provided with a loading space for emptying therein the content of the collecting container and with crane means provided with a crane for carrying the collecting container above an unloading opening for the collecting container; and
- position-determining means for determining the position of the crane means of the truck relative to the collecting container.

[0006] The system according to the present invention is particularly advantageous when it is applied with a container placed underground, since the container must be lifted out of the opening in the ground in the most upright possible position, wherein a jib of the crane pivotable on the truck must simultaneously pivot upward as well as be extended. During lowering of the container in the upright position the jib is telescoped inward as it pivots downward. When the position-determining means are used the whole operation, including the upright lifting and lowering of the underground container, can take place automatically from control means of the truck. During the operation the driver of the truck can then for instance remove street litter in the vicinity of

the underground collecting container and/or supervise the surrounding area, while being able to interrupt the operation if necessary with for instance a remote control.

[0007] The present invention further provides a method for lifting a collecting container for collecting domestic refuse out of an opening in the ground from a truck and vice versa, wherein in pre-programmed manner pivoting means between the crane and a truck and the translation movement of parts of the arm are geared to each other such that the movement in upright position is carried out quickly and efficiently.

[0008] Further advantages, features and details of the present invention will be elucidated on the basis of the following description of preferred embodiments thereof with reference to the annexed drawing, in which:

fig. 1 shows a perspective view of a first preferred embodiment of a system according to the present invention; and

fig. 2 shows a perspective view corresponding with the view of fig. 1 of a second preferred embodiment of a system according to the present invention.

[0009] A truck 1 (fig. 1) is provided with a loading space 2 which is provided in a manner not shown with pressing means for compressing the domestic refuse placed in the loading space, in addition to a loading funnel 3 above which a container 4 emptying on the underside can be discharged. Further arranged on truck 1 is a crane 5 which can pivot close to the cab 6 of a truck and an arm part 8 of which can also be extended. 8 An above-ground part 9 of the container can be engaged with a hook on the end of arm.

[0010] In road surface L is arranged a marked tile T which defines a position relative container 4 with the above-ground part 9. If the truck is placed with its leg 10 above tile T, the position of the truck relative to the container is known. A program can thus be incorporated in the control means for the crane for automatically engaging the above-ground part 9 of container 4, in order to hoist it in upright position out of opening O, carry it above for instance corner points provided with sensors 11 of funnel 3, open the discharge flap on the underside of the container and re-place the container in upright position in opening O. These movements can take place as efficiently as possible, i.e. swinging of the container on the arm of the crane can be compensated by control thereof in pre-programmed manner by opposed movements of this arm. Emptying of such a container can thus take place more quickly and irrespective of the skill of the operative person.

[0011] It will be apparent that the position of the truck relative to the container can be determined in many ways, for instance by means of magnetic elements arranged in the road surface, by means of infrared radiation, wherein a reflector is then arranged on the above-ground part of the container, or by other types of

radiation, wherein it is noted that it is important that it be possible in the preferred embodiment to lift the container over a car parked between it and the truck and empty the container into the truck.

[0012] In the preferred embodiment according to fig. 2, wherein the same reference numerals are used as far as possible as in fig. 1, a transmitter 21 is arranged on extensible jib 8, for instance on the outer end thereof, which transmitter transmits radiation R which is reflected via a reflective surface 22 on the top side of the above-ground part of a container 4 to a radiation pick-up 22 likewise arranged on the arm of jib 8.

[0013] The present invention is not limited to the above described preferred embodiments thereof; the rights sought are defined by the following claims.

Claims

1. System for collecting domestic refuse, wherein the system comprises:

- a collecting container which is placed on or in the public highway and which is provided with an insertion opening for insertion of domestic refuse and an engaging member for allowing engagement thereon of a lifting member;
- a truck which is provided with a loading space for emptying therein the content of the collecting container and with crane means provided with a crane for carrying the collecting container above an unloading opening for the collecting container; and
- position-determining means for determining the position of the crane means of the truck relative to the collecting container.

2. System as claimed in claim 1, wherein the collecting container comprises a part for placing underground.

3. System as claimed in claim 1 or 2, wherein a truck comprises pressing means for compressing the waste discharged out of the collecting container into the loading space.

4. System as claimed in claim 1, 2 or 3, wherein the position-determining means comprise a transmitter for transmitting radiation such as infrared radiation, ultrasonic radiation or radar radiation, in addition to reflection means arranged on a collecting container for reflecting the radiation, and a pick-up arranged on the truck for picking up the reflected radiation.

5. System as claimed in any of the claims 1-4, wherein the position-determining means comprise one or more marker elements arranged in the road surface of the position in relation to which the connecting container disposed in a fixed position is known, in

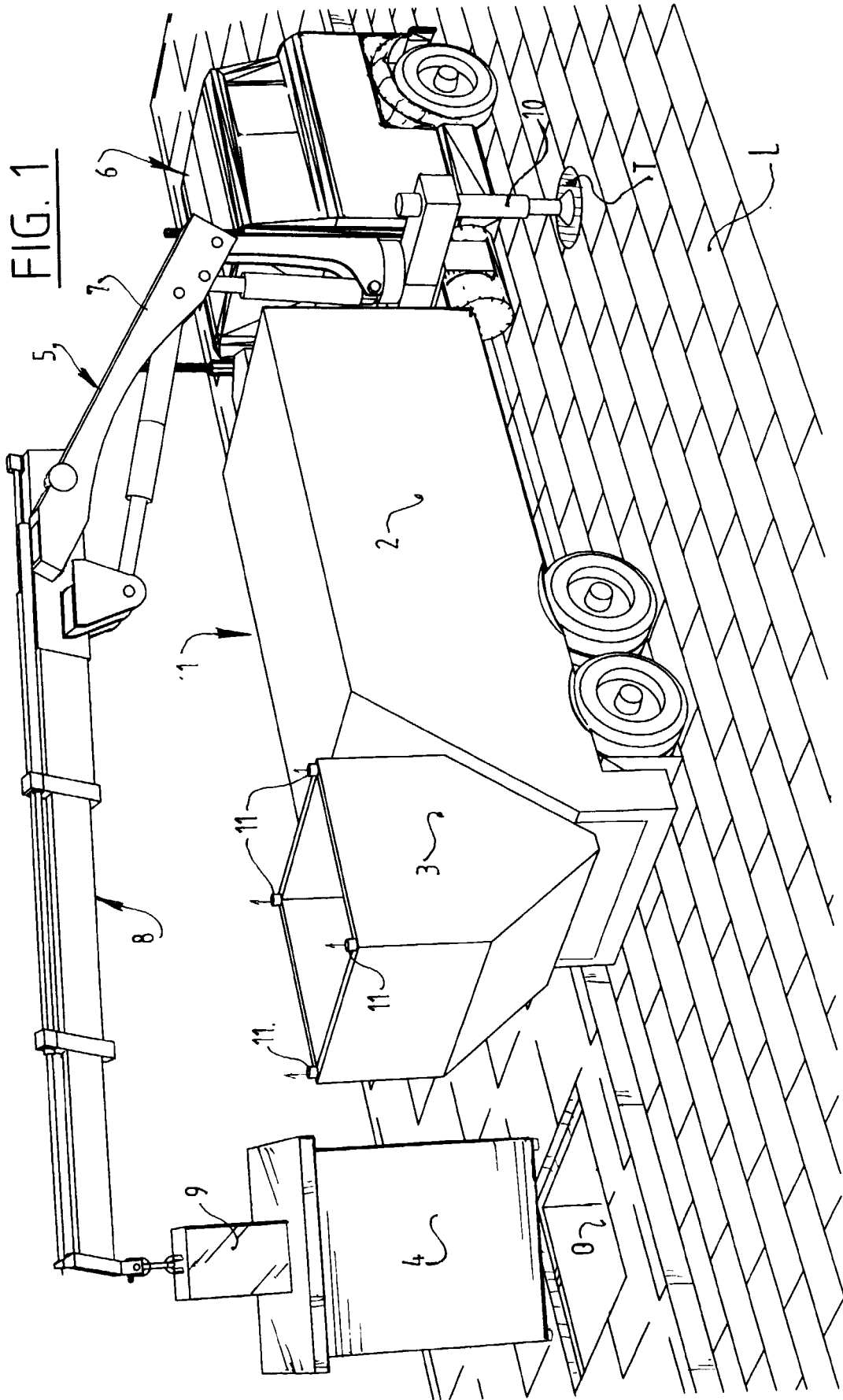
addition to detection means arranged on the truck for detecting the position of the truck relative to one or more marker elements.

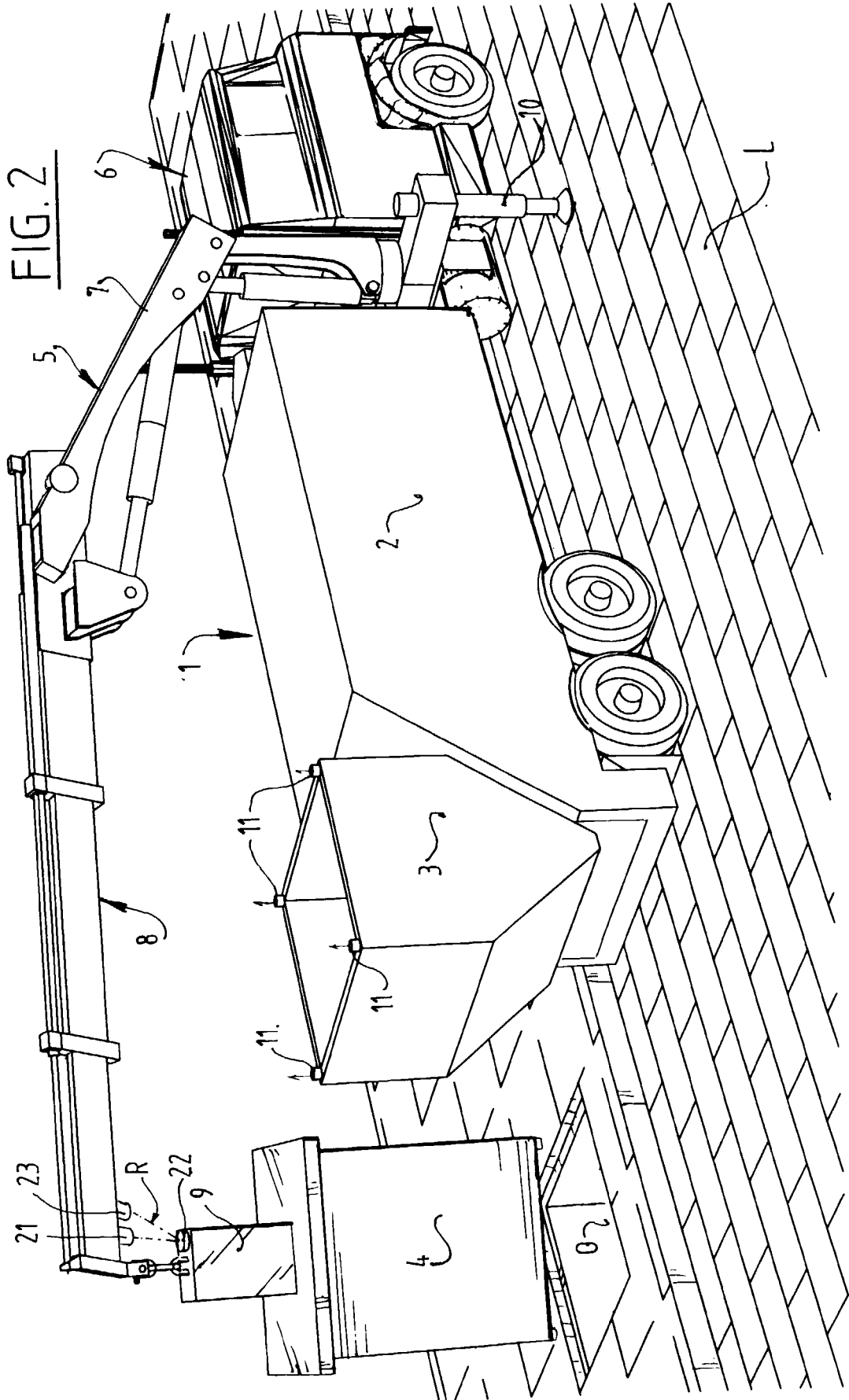
6. System as claimed in any of the foregoing claims, provided with control means for controlling the crane means of the truck on the basis of the information obtained from the position-determining means.

7. Method for lifting a collecting container for collecting domestic refuse out of an opening in the ground from a truck and vice versa, wherein in pre-programmed manner pivoting means between the crane and a truck and the translation movement of parts of the arm are geared to each other such that the movement in upright position is carried out quickly and efficiently.

8. Truck, evidently intended for a system and method as claimed in any of the claims 1-6, respectively 7.

9. Collecting container evidently intended for a system and method as claimed in one or more of the claims 1-6, respectively 7.







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 3931

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 21 February 2000	Examiner Smolders, R
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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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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