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(72) Inventor: **Teixeira, Nuno Armando Fonseca**  
**2750 Cadaval (PT)**

(74) Representative: **Pereira da Cruz, Joao**  
**J. Pereira da Cruz, S.A.**  
**Rua Vitor Cordon, 14**  
**1249-103 Lisboa (PT)**

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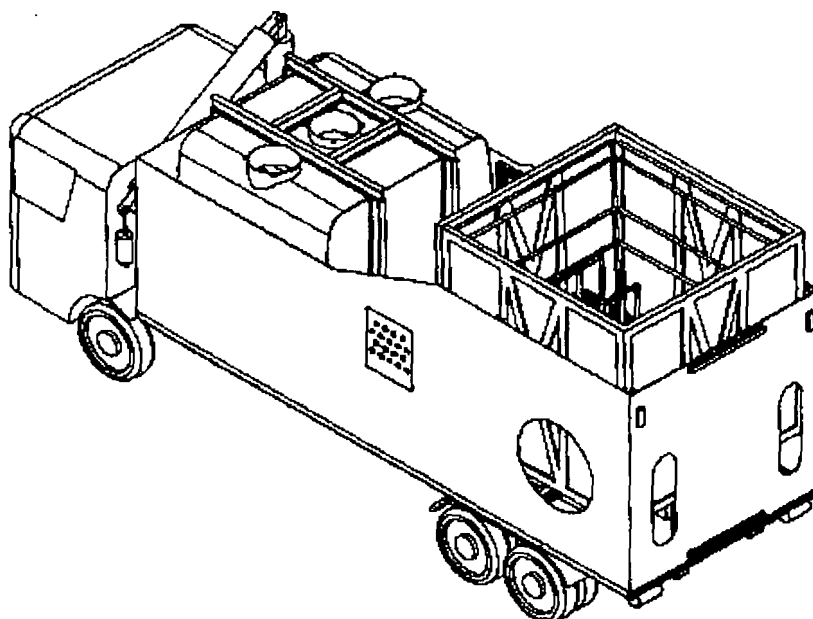
(71) Applicant: **Suma-Serviços Urbanos E Meio**  
**Ambiente, S.A.**  
**2785-035 S. Domingos de Rana (PT)**

(54) **System for washing urban solid waste containers**

(57) The present invention relates to a system for washing large urban solid waste containers, which containers may or may not be underground and in which the waste is released through the bottom. The system mounted onto a heavy vehicle (1) fitted with a crane (2) to which a device (3) is attached for moving the containers. On an appropriate structure (4) mounted onto the

heavy vehicle (1), the following parts are assembled:

- three tanks forming a single unit (5);
- a washing vessel in which it is possible to completely immerse the container that is to be washed; and
- washing units (6,7) for washing the outside of the container and inside of the container.



**FIGURE 1**

## Description

### Scope of the invention

[0001] The present invention relates to a system for washing urban solid waste containers, mounted onto a heavy vehicle fitted with a crane to which a device is attached for moving containers where the waste is released through the bottom, which containers may or may not be underground (Ecopoints).

### Prior art

[0002] Technology for washing urban solid waste containers is already known, for example patents EP 0 089 188, EP 0 487 826, EP 0 578 317 and US 3 604 038.

[0003] Patent EP 0 089 188 relates to a washing machine for a solid urban waste container or any other container of a relatively large size designed so as to be attached preferably to a vehicle, such as a lorry, for example as a unit with a frame of an exchangeable platform. The washing machine comprises at least one rotary brush, which consists of a tubular brush body, from which the brush fibres project preferably radially, and of nozzle means for spraying the washing liquid onto the object to be washed. According to the invention, for the purpose of moving the brush along the path of movement substantially of a shape of a rectangle or square in a plane perpendicular to the axis of rotation of the brush, the washing machine comprises guide means and a drive gear for moving the brush in a plane perpendicular to its axis in one direction back and forth. The washing machine additionally comprises a second set of guide means and a drive gear for moving the brush in a plane perpendicular to its axis back and forth in a direction perpendicular to the direction mentioned above.

[0004] EP 0 487 826 relates to a truck equipped for automatically washing solid urban waste containers of the type comprising a bay positioned between the driving cab and the tank, means associated with said bay for gripping individual containers and overturning them into the interior of the bay, clean water delivery nozzles provided in said bay and means for drawing in and discharging the soiled water, characterised in that said tank is subdivided into a plurality of chambers so positioned that the transfer between one and another of the liquid contained in them maintains the centre of gravity of the tank substantially unaltered.

[0005] Patent EP 0 578 317 relates to a method for both emptying and washing solid urban waste containers in or on the crushing device of a solid urban waste truck. As a result of the fact that the loading cycle and the cleaning take place after one another, the required power can be delivered by a single motor; extra motor power is not necessary. The washing device used contains one or more (rotating) spray heads for washing liquid, such as water, which can be turned away in a rela-

tively narrow part of the space to which the refuse opening provides access. For this purpose, the head is located at the end of one of two arms, which can move in a shearing manner with regard to one another, controlled with the aid of a steel cable extending between the frame of the device (the truck) and the arm on which the head is located, for an adjusted length with adjusted fixation points.

[0006] Patent US 3 604 038 relates to a solid urban waste truck which integrally incorporates a device for cleaning solid urban waste containers and the respective lids. The truck contains openings on one of its sides, in order to provide access to the cleaning devices. The container cleaning device includes an "L" shaped brush fitted with means for assembling it and connecting it to a water supply source. The shape of the brush allows the efficient cleaning of the whole of the inside of the container.

### Summary of the invention

[0007] The present invention relates to a system for washing large solid urban waste containers, mounted onto a heavy vehicle fitted with a crane to which a device is attached for moving containers where the waste is released through the bottom, which containers may or may not be underground. It is essentially characterised in that on an appropriate structure mounted onto the heavy vehicle, the following parts are assembled: water tanks and a vertically retracting washing vessel in which it is possible to completely immerse the container that is to be washed and which also uses the downward movement to wash the outside of the container, washing units which form the system for washing the inside of the containers and also subsystems for carrying out all the actions and operations necessary for moving the container, moving the vessel, washing and draining the washing water and assisting the operator in the control and programming operations.

### Brief description of the drawings

[0008] The following description is based on the drawings attached hereto, which illustrate non-restrictively an embodiment of the invention. In the drawings:

- Figure 1 represents a schematic perspective view of the vehicle equipped with the washing system;
- Figure 2 represents a main elevation in cross section of the vehicle represented in Figure 1;
- Figure 3 represents a rear view of the vehicle of Figure 1;
- Figure 4 represents a plan view of the vehicle of Figure 1;
- Figure 5 represents a perspective view in cross section of the system itself without the vehicle 1; and
- Figure 6 represents a perspective view of the subsystem for washing the inside of the container.

## Detailed description of the invention

**[0009]** As may be observed, the container washing system of the invention is mounted onto the structure 4 of a heavy vehicle 1 fitted with a crane 2 and a container moving device 3 and it essentially comprises a set of tanks 5, a system for washing the outside of the container 6 and a system for washing the inside of the container 7.

**[0010]** The water tank 5, which forms a single unit, consists of two outside sections aligned with the side walls of the vehicle, where the clean water to be used for washing is stored, and a central section where the dirty water from previous washes is stored. The two outside sections or tanks have a capacity of 5000 l and are connected to each other in such a way that the columns of water on either side are identical, in order to confer greater stability on the vehicle.

**[0011]** In view of the great height of the containers and the maximum height permitted by law for these vehicles, a washing vessel has been developed consisting of a compartment containing the washing system 7 for the inside of the containers and the washing system 6 for the outside of the containers, the said vessel being vertically retracting and allowing the total immersion of the body of the container to be washed. This vessel has a lower rear door 9 for unloading any solid waste and carrying out cleaning procedures and a door 10 in the upper front part of the retracting section in order to facilitate the moving of the containers.

**[0012]** As mentioned above, the vessel contains the washing system 7, which consists of three units for washing the inside of the container, each unit comprising a rotor for the passage of high pressure oil and water, which is driven by a hydraulic motor attached to the lower part. The upper part of each unit consists of a flywheel with a stabilising effect, above which there is a double-acting hydraulic component provided with washing bars, which are fed by a telescopic tube system. The washing system 7 is situated at the level of the floor of the vessel in the centre of the compartment, the three units being assembled longitudinally.

**[0013]** Each of the washing units, as mentioned above, consists of vertical and horizontal bars which, when they rotate, clean and wash the container. The vertical bars of the central washing unit are shorter than the bars of the outside units.

**[0014]** In the power take-off of the vehicle, a hydraulic pump is fitted which pumps around 80 litres of oil per minute at a nominal rotation rate and a pressure of 250 bars, being fed by a hydraulic oil tank in the vehicle chassis. This pump is designed to move the crane or the hydraulic motor which operates the system contained inside the compartment of the retracting vessel, this dual function being carried out by means of an electrically-controlled hydraulic valve.

**[0015]** The hydraulic oil system which operates the compartment of the vessel consists of an oil tank with a

capacity of around 80 litres of oil, a gear pump, a distributor with nine manual or electric control elements, a distributor with six electric control elements, pressure limiting and regulating valves, pressure sensors, four single-acting hydraulic elevation cylinders fitted with anti-fall safety devices, two double-acting hydraulic cylinders in the back door of the vessel, two double-acting hydraulic cylinders in the front door, three hydraulic motors, seven single-acting hydraulic cylinders for controlling the valves of the high pressure washing circuits and a hydraulic gear motor for driving the dirty water pump.

**[0016]** The water system that feeds the three units for washing the inside and outside of the containers consists of a 120 bar high pressure pump, a closed circuit control valve, six washing circuit control valves, a pump that can be submersed in dirty water, a washing water consumption meter and various washing bars fitted with calibrated spray nozzles.

**[0017]** The system is also equipped with an electric and electronic subsystem which consists of a board 8 fitted with two circuit breakers for protecting the power supply system, which runs on the vehicle batteries, two levelling amplifiers, one for the minimum clean water level and the other for the maximum dirty water level, a PLC (programmable logic controller), a key selector with automatic and manual modes, various warning devices and various manual control switches. This subsystem also includes a control console and a programme selector, with an emergency button and various warning devices.

**[0018]** The mode of functioning of the system is described hereunder. An operator attaches the container moving device 3 to the container that is to be washed, drives the crane 2 and uses it to place the container inside the compartment of the washing vessel. The same operator drives the retracting vessel and lifts it so that the container is completely immersed inside the vessel. The system for washing the inside of the container is then driven by means of the washing units, which use their component parts to move the telescopic bars which wash the inside of the container. Once the container has been washed, the single-acting hydraulic elevation cylinders are once again driven in order to lower the compartment and drive the subsystem for washing the outside of the container, which is carried out by means of high pressure water sprinklers attached to the four inside walls of the compartment of the vessel and situated at different levels. After washing the outside of the container, the operator simply needs to drive the crane again and place the container in the appropriate place on the ground.

**[0019]** As may be understood, the dirty washing water is removed from the washing vessel by means of a pump.

**[0020]** We would simply add that the whole system is controlled using the board 8 by a single operator and that, as mentioned above, it is provided with various safety and alarm systems which facilitate operation.

## Claims

1. System for washing large urban solid waste containers, mounted onto a heavy vehicle fitted with a crane to which a device is attached for moving containers where the waste is released through the bottom, which containers may or may not be underground, **characterised in that** on an appropriate structure mounted onto the heavy vehicle, the following parts are assembled:

- three tanks forming a single unit;
- a vertically retracting washing vessel in which it is possible to completely immerse the container that is to be washed and which also uses the downward movement to wash the outside of the container;
- washing units which form the system for washing the inside of the containers;

and also:

- a hydraulic oil subsystem for moving the washing vessel and the respective doors;
- a washing water subsystem;
- an electric and electronic control and programming subsystem designed to carry out all the actions and operations necessary for moving the container, moving the washing vessel, washing and draining the washing water and assisting the operator in the control and programming operations.

2. System for washing urban solid waste containers according to the previous claim, **characterised in that** the two outside tanks, which are aligned with the side walls of the vehicle, are intended for storing the clean water to be used for washing and are connected in such a way that the columns of water on either side are identical, and the central tank is used for collecting dirty washing water.

3. System for washing urban solid waste containers according to claim 2, **characterised in that** the dirty water from the washing of the containers is deposited in the respective tank by means of a pump.

4. System for washing urban solid waste containers according to claim 1, **characterised in that** the retracting washing vessel has a door in the lower part for unloading any solid waste and another door in the upper part of the retracting section of the vessel in order to facilitate the moving of the containers.

5. System for washing urban solid waste containers according to claim 1, **characterised in that** the washing units are situated at the level of the floor of the vessel and are placed centrally and longitudi-

nally, each unit comprising a rotor for the passage of high pressure oil and water, which is driven by a hydraulic motor attached to the lower part, the system for washing the inside of the container also including a flywheel in the upper part whose function is to stabilise the system, and above the said flywheel there is a double-acting hydraulic component provided with washing bars, which are fed by a telescopic tube system.

6. System for washing urban solid waste containers according to claim 1, **characterised in that** the hydraulic oil subsystem consists of an oil tank, a gear pump, a distributor with nine manual and/or electric control elements, a distributor with six electric control elements, pressure limiting and regulating valves, pressure sensors, four single-acting hydraulic vessel elevation cylinders fitted with anti-fall safety devices, two double-acting hydraulic cylinders in the front door of the vessel, three hydraulic motors, seven single-acting hydraulic cylinders for controlling the valves of the high pressure washing circuits and a hydraulic gear motor for driving the dirty water pump.

7. System for washing urban solid waste containers according to claim 1, **characterised in that** the water subsystem consists of high pressure pump, a closed circuit control valve, six washing circuit control valves, a pump that can be submersed in dirty water, a washing water consumption meter and various washing bars fitted with calibrated spray nozzles.

8. System for washing urban solid waste containers according to claim 1, **characterised in that** the electric and electronic subsystem consists of a board fitted with two circuit breakers for protecting the power supply system, which runs on the vehicle batteries, two levelling amplifiers, one for the minimum clean water level and the other for the maximum dirty water level, a programmable logic controller (PLC), a key selector with automatic and manual modes, various warning devices and manual control switches.

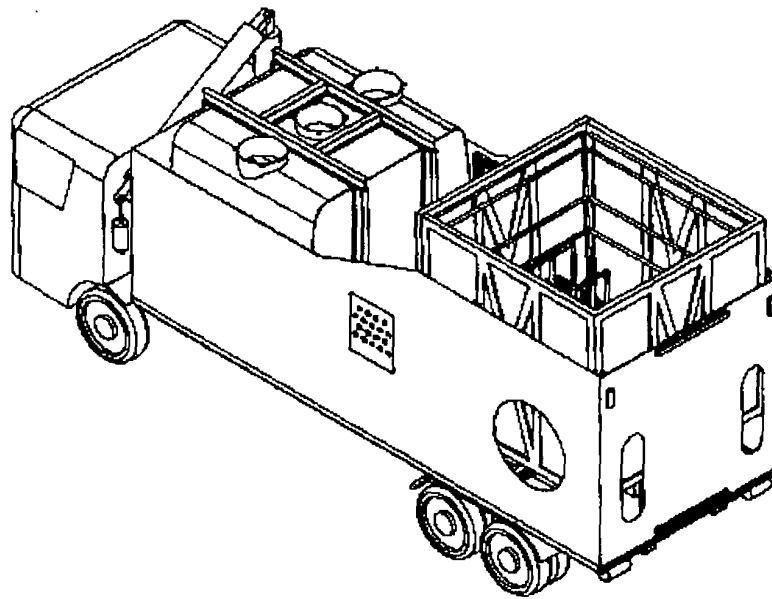


FIGURE 1

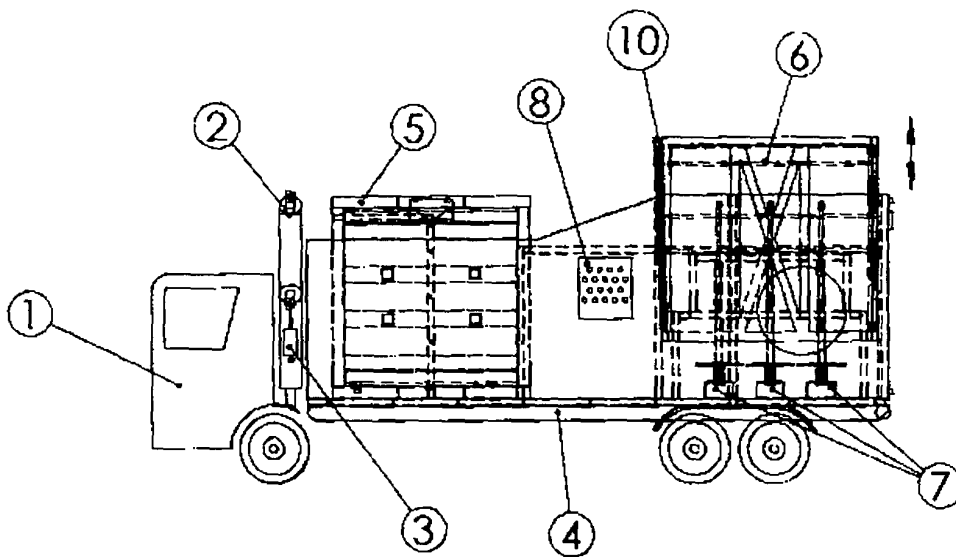


FIGURE 2

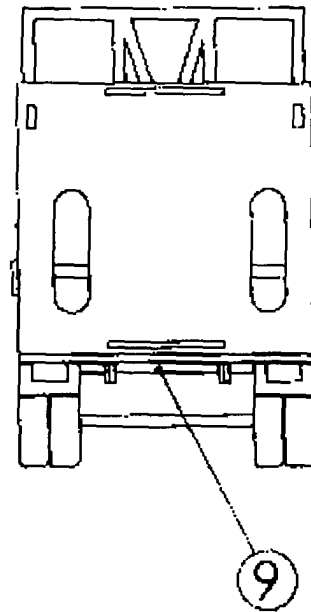


FIGURE 3

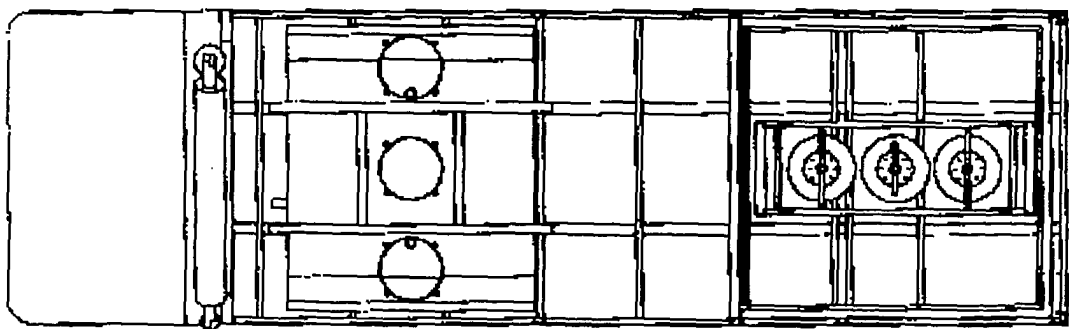


FIGURE 4

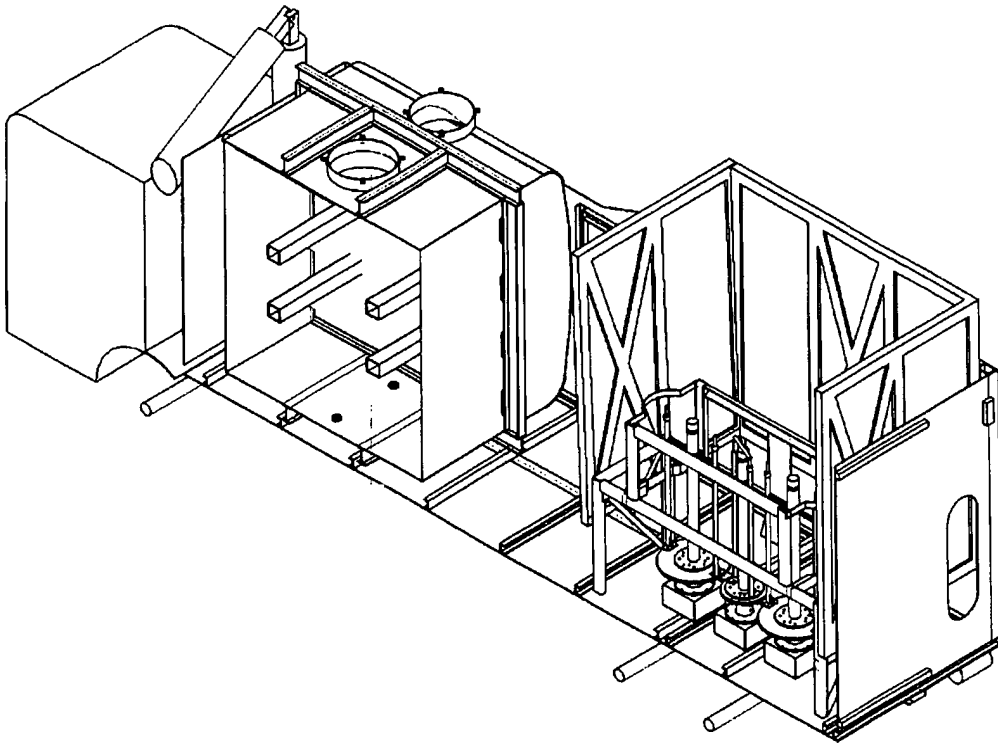


FIGURE 5

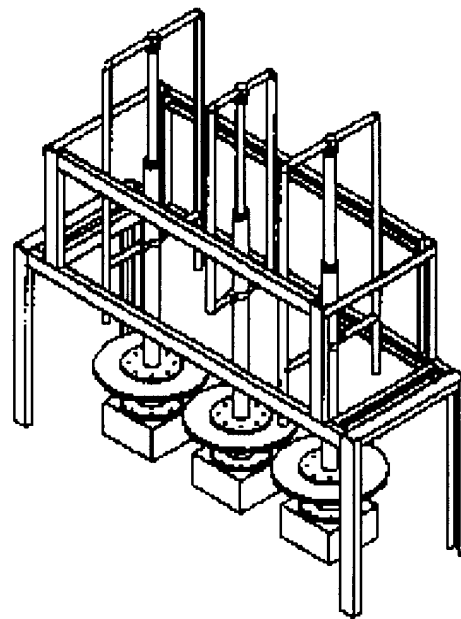


FIGURE 6





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Application Number  
EP 05 00 7954

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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 16 June 2005	Examiner Smolders, R
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