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

System zum Waschen von Müllbehältern

Système de lavage de conteneurs de déchets solides urbains

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EP 1 586 516 B1

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Description

Scope of the invention

[0001] The present invention relates to a heavy vehicle fitted with a crane to which a device is attached for moving large urban solid waste containers where the waste is released through the bottom, which containers may or may not be underground which comprises a structure onto which a container washing system is mounted which comprises a system for washing the inside of the containers and a system for washing the outside of the containers, according to the preamble of claim 1. Such a heavy vehicle is known from EP-A-1 302 414.

Prior art

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

[0003] Document 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] Document 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 relatively 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 heavy vehicle which is characterized according to the invention in that the container washing system comprises a vertically retracting washing vessel consisting of a compartment containing the system for washing the inside of the containers, the system for washing the outside of the containers, a lower rear door for unloading any solid waste and carrying out cleaning procedures, a door in the upper front part of a retracting section in order to facilitate the moving of the containers and a hydraulic oil subsystem for moving the washing vessel and the doors, wherein the system for washing the inside of the containers consists of washing units and the system for washing the outside of the containers comprises high pressure water sprinklers attached to the four inside walls of the compartment of the washing vessel and situated at different levels; a water tank forming a single unit and consisting of two outside sections aligned with the side walls of the vehicle and intended for storing clean water to be used for washing which are connected in such a way that the columns of water on either side are identical, and a central section used for collecting dirty washing water; and 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 an operator in the control and programming operations, consisting of a board fitted with two circuit breakers for protecting the power supply system running 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 various manual control switches;

wherein the device is attachable by the operator to a container to be washed, the container is placed inside the compartment of the washing vessel by the operator by means of the crane, the retracting washing vessel is lifted by the operator so that the container is completely inside the vessel, the system for washing the inside of the containers is driven, the washing vessel is retracted whereby the system for washing the outside of the containers is driven during the downward movement, after which the container is returned by the operator driving the crane.

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 container 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 container washing system itself without the vehicle 1; and
- Figure 6 represents a perspective view of the system for washing the inside of the container.

Detailed description of the invention

[0009] As may be observed, the container washing system 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 **water tank** 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 have a capacity of 5000 1 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 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 **retracting vessel** and drive the system 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. Heavy vehicle (1) fitted with a crane (2) to which a device (3) is attached, for moving large urban solid waste containers where the waste is released through the bottom, which containers may or may not be underground, said heavy vehicle (1) comprises a structure (4) onto which a container washing system is mounted, said container washing system comprises a system (7) for washing the inside of the containers and a system (6) for washing the outside of the containers, **characterized in that** said container washing system comprises a vertically retracting washing vessel consisting of a compartment containing the system (7) for washing the inside of the containers, the system (6) for washing the outside of the containers, a lower rear door (9) for unloading any solid waste and carrying out cleaning procedures, a door (10) in the upper front part of a retracting section in order to facilitate the moving of the containers and a hydraulic oil subsystem for moving the washing vessel and said doors (9, 10), wherein said system (7) for washing the inside of the containers consists of washing units and said system (6) for washing the outside of the containers comprises high pressure water sprinklers attached to the four inside walls of the compartment of the washing vessel and situated at different levels; a water tank (5) forming a single unit and consisting of two outside sections aligned with the side walls of the vehicle (1) and intended for storing the clean water to be used for washing which are connected in such a way that the columns of water on either side are identical, and a central section used for collecting dirty washing water; and 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 an operator in the control and programming operations, consisting of a board (8) fitted with two circuit breakers for protecting the power supply system running 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 various manual control switches; wherein said device (3) is attachable by the operator to a container to be washed, said container is placed inside the compartment of the washing vessel by the operator by means of the crane (2), the retracting washing vessel is lifted by the operator so that the container is completely immersed inside the vessel, the system (7) for washing the inside of the containers is driven, the washing vessel is retracted whereby the system (6) for washing the outside of the containers is driven during the downward movement, after which the container is returned by the operator driving the crane (2).

2. The heavy vehicle (1) according to claim 1, **characterized by** a pump for depositing dirty water from the washing of the containers in the central section (5).

3. The heavy vehicle (1) according to claim 1, **characterized in that** the washing units of said system (7) for washing the inside of the containers are situated at the level of the floor of the retracting washing vessel in the center of the compartment and assembled longitudinally, each washing 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 washing unit consists of a flywheel with a stabilizing effect, above which there is a double-acting hydraulic component provided with washing bars, which are fed by a telescopic tube system.

Patentansprüche

1. Schwerfahrzeug (1) mit einem Kran (2) ausgerüstet, an dem ein Gerät (3) befestigt ist, um große Behälter für festen Siedlungsabfall zu bewegen, an denen der Abfall durch den Boden freigesetzt wird, die Behälter

können unterirdisch sein oder nicht, das besagte Schwerfahrzeug (1) umfasst eine Struktur (4), auf der eine Behälterwaschanlage montiert ist, die besagte Behälterwaschanlage umfasst ein System (7), um die Innenseite der Behälter zu waschen und ein System (6), um die Außenseite der Behälter zu waschen, **dadurch gekennzeichnet, dass**
die besagte Behälterwaschanlage ein senkrechtes zurückziehendes Waschgefäß umfasst, aus einer Kammer bestehend, welche das System (7), um die Innenseite der Behälter zu waschen, das System (6), um die Außenseite der Behälter zu waschen, eine untere Hintertür (9), um irgendein Feststoffabfall zu entladen und Reinigungsverfahren durchzuführen, eine Tür (10) am oberen Vorderteil eines zurückziehenden Bereichs, um das Bewegen der Behälter zu erleichtern, und ein Hydraulikölsubsystem, um das Waschgefäß und die besagten Türen (9,10) zu bewegen, umfasst,
worin, das besagte System (7), um die Innenseite der Behälter zu waschen, aus Wascheinheiten besteht und das besagte System (6), um die Außenseite der Behälter zu waschen, Hochdruckwassersprinkler umfasst, die an den vier Innenwänden der Kammer des Waschgefäßes befestigt sind und auf verschiedenen Ebenen liegen; ein Wassertank (5), welcher eine einzige Einheit bildet und aus zwei Außenbereiche besteht, die nach den Seitenwänden des Fahrzeuges (1) ausgerichtet sind und für die Speicherung des gereinigten Wassers für das Waschen bestimmt sind, welche solchermaßen verbunden sind, dass die Wassersäulen an jeder Seite identisch sind, und ein zentraler Bereich, der für das Sammeln des schmutzigen Waschwassers genutzt wird; und ein elektrisches und elektronisches Steuerungs- und Programmierungssubsystem, gestaltet, um alle notwendigen Aktionen und Vorgänge für das Bewegen der Behälter, das Bewegen des Waschgefäßes, die Reinigung und Entleerung des Waschwassers durchzuführen und einen Bediener bei den Steuerungs- und Programmierungsvorgängen zu unterstützen, bestehend aus einem Board (8), das mit zwei Leistungsschaltern, um das Stromversorgungssystem, welches mit Fahrzeugbatterien betrieben wird, zu schützen, zwei nivellierende Verstärker, einer für den niedrigsten gereinigten Wasserstand und der andere für den höchsten Verschmutzungswasserstand, eine speicherprogrammierbare Steuerung (SPS), eine Auswahltaste mit automatischen und manuellen Betrieben, verschiedene Warngeräte und verschiedenen Handsteuerungsschalter ausgerüstet ist; worin das besagte Gerät (3) von dem Bediener an einen zu waschenden Behälter befestigt werden kann, der besagte Behälter wird durch den Bediener im Inneren der Kammer des Waschgefäßes mit Hilfe von dem Kran (2) platziert, das zurückziehende Waschgefäß wird durch den Bediener gehoben, sodass der Behälter komplett im Inneren des Gefäßes eingetaucht ist, das System (7), um die Innenseite der Behälter zu waschen wird angetrieben, das Waschgefäß wird zurückgezogen, wobei das System (6), um die Außenseite der Behälter zu waschen, während der Abwärtsbewegung angetrieben wird, wonach der Behälter von dem Bediener, der den Kran (2) betätigt, zurückgegeben wird.

2. Das Schwerfahrzeug (1) nach Anspruch 1, **gekennzeichnet durch** eine Pumpe, um Schmutzwasser von dem Waschen der Behälter im zentralen Bereich (5) abzulagern.

3. Das Schwerfahrzeug (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Wascheinheiten des besagten Systems (7), um die Innenseite der Behälter zu waschen, an der Höhe des Bodens des zurückziehenden Waschgefäßes und in der Mitte der Kammer platziert ist und längslaufend montiert sind, jede Wascheinheit umfasst einen Rotor für den Durchlauf von Hochdrucköl- und Wasser, welcher durch einen Hydraulikmotor, der am unteren Teil befestigt ist, getrieben wird, der obere Teil jeder Wascheinheit besteht aus einem Schwungrad mit einer stabilisierenden Wirkung, darüber liegt eine doppelwirkende hydraulische Komponente, mit Waschstangen ausgerüstet, welche durch ein teleskopisches Rohrsystem versorgt werden.

Revendications

1. Véhicule lourd (1) équipé d'une grue (2) pour auquel est fixé un dispositif (3), pour le déplacement de grands conteneurs de déchets solides urbains, où les déchets sont libérés par le fond, ces conteneurs pouvant être ou non souterrains, ledit véhicule lourd (1) comprend une structure (4) sur laquelle est monté un système de lavage de conteneurs, où le dit système de lavage de conteneurs comprend un système (7) pour le lavage de l'intérieur des conteneurs et un système (6) pour le lavage de l'extérieur des conteneurs, **caractérisé en ce que**
ledit système de lavage de conteneurs comprend une cuve de lavage verticalment rétractable constituée par un compartiment contenant le système (7) pour le lavage de l'intérieur des conteneurs, le système (6) pour le lavage de l'extérieur des conteneurs, une porte arrière inférieure (9) pour le déchargement de tous déchets solides et l'exécution des procédures de nettoyage, une porte (10) dans la partie supérieure avant d'une section de rétraction afin de faciliter le déplacement des conteneurs, et d'un sous-système huile hydraulique pour le déplacement de la cuve de lavage et des dites portes (9, 10), où ledit système (7) pour le lavage de l'intérieur des conteneurs est constitué par des unités de lavage,

et ledit système (6) pour le lavage de l'extérieur des conteneurs comprend des arroseurs d'eau sous haute pression fixés aux quatre murs intérieurs du compartiment de la cuve de lavage et situés à différents niveaux; un réservoir d'eau (5) formant une seule unité et constitué par deux sections à l'extérieur alignées avec les murs latérales du véhicule (1) et destinés au stockage de l'eau propre à utiliser pour le lavage, lesquelles sont connectés de façon à que les colonnes d'eau de chaque côté soient identiques, et une section centrale utilisée pour la collecte de l'eau de lavage sale; et un sous-système électrique et électronique de commande et programmation conçu pour effectuer toutes les actions et opérations nécessaires pour le déplacement du conteneur, le déplacement de la cuve de lavage, laver et vidanger l'eau de lavage et assister un opérateur dans les opérations de contrôle et de programmation, consistant en un panneau (8) équipé de deux disjoncteurs pour la protection du système d'alimentation électrique fonctionnant sur les batteries du véhicule, deux amplificateurs de nivellement, un pour le niveau minimum d'eau propre et l'autre pour le niveau maximum d'eau sale, un automate programmable (PLC), un sélecteur à clé avec modes automatique et manuel, divers dispositifs d'avertissement et divers interrupteurs de commande manuelle; où ledit dispositif (3) peut être fixé par l'opérateur à un conteneur à laver, ledit conteneur est placé à l'intérieur du compartiment de la cuve de lavage par le opérateur à l'aide de de la grue (2), la cuve de lavage rétractable est soulevée par l'opérateur afin que le conteneur soit complètement immergé dans la cuve, le système (7) pour le lavage de l'intérieur des conteneurs est entraîné, la cuve de lavage est rétractée, ce qui fait que le système (6) pour le lavage de l'extérieur des conteneurs soit entraîné pendant le mouvement descendant, après quoi le conteneur est retourné par l'opérateur qui conduit la grue (2).

2. Le véhicule lourd (1) selon la revendication 1, **caractérisé par** une pompe pour déposer l'eau sale du lavage des conteneurs dans la section centrale (5).

3. Le véhicule lourd (1) selon la revendication 1, **caractérisé en ce que** les unités de lavage dudit système (7) pour le lavage de l'intérieur des conteneurs sont situéss au niveau du plancher de la cuve de lavage rétractable, dans le centre du compartiment, et assemblées longitudinalement, chaque unité de lavage comprenant un rotor pour le passage de l'huile et l'eau sous haute pression, qui est entraînée par un moteur hydraulique fixé à la partie inférieure, où la partie supérieure de chaque unité de lavage est constituée d'un volant d'inertie avec un effet stabilisateur, au-dessus duquel il y a un composant hydraulique à double effet équipé avec des barres de lavage, qui sont alimentées par un système de tubes télescopiques.

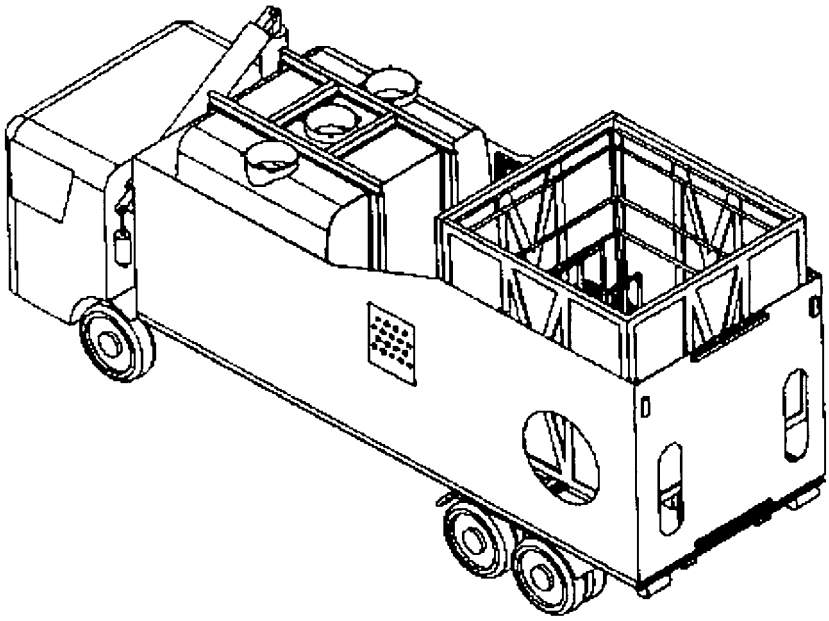

FIGURE 1

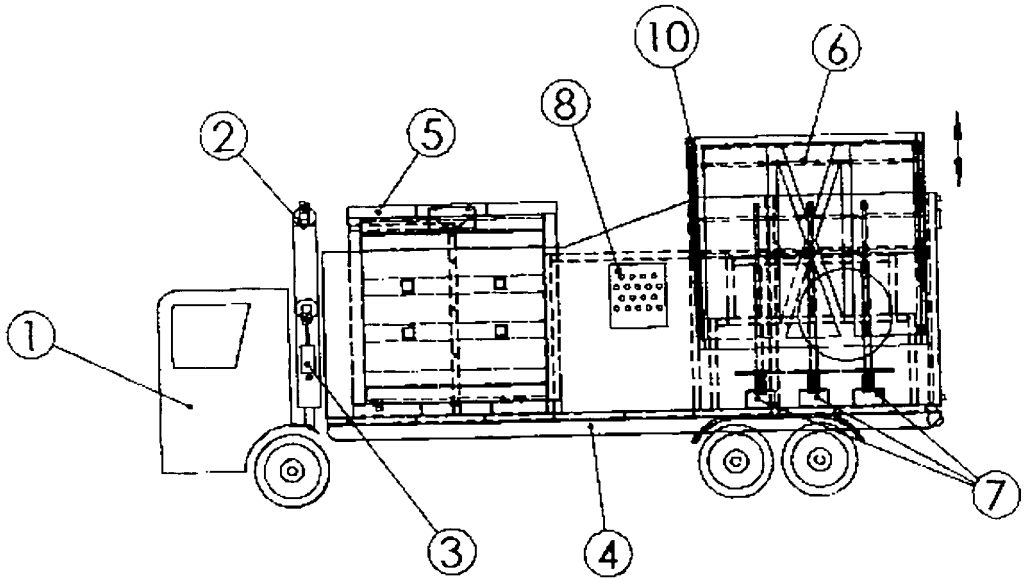

FIGURE 2

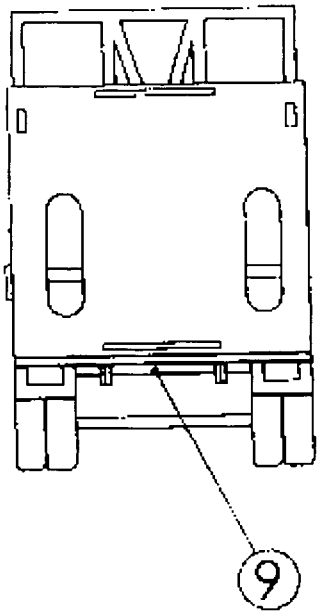

FIGURE 3

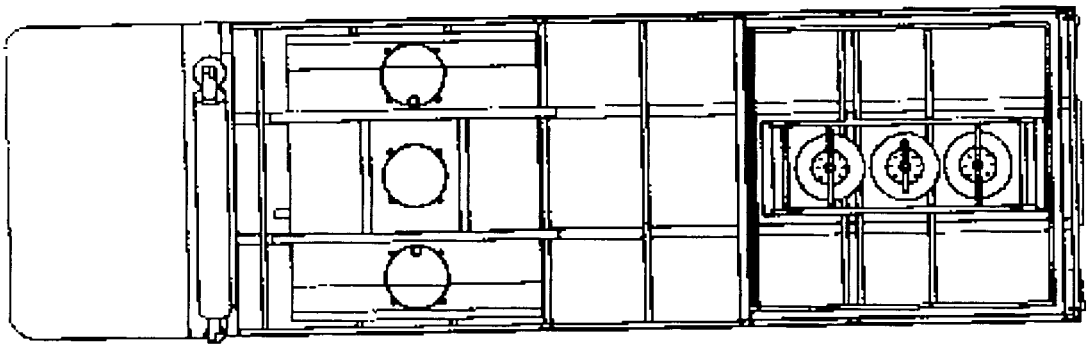

FIGURE 4

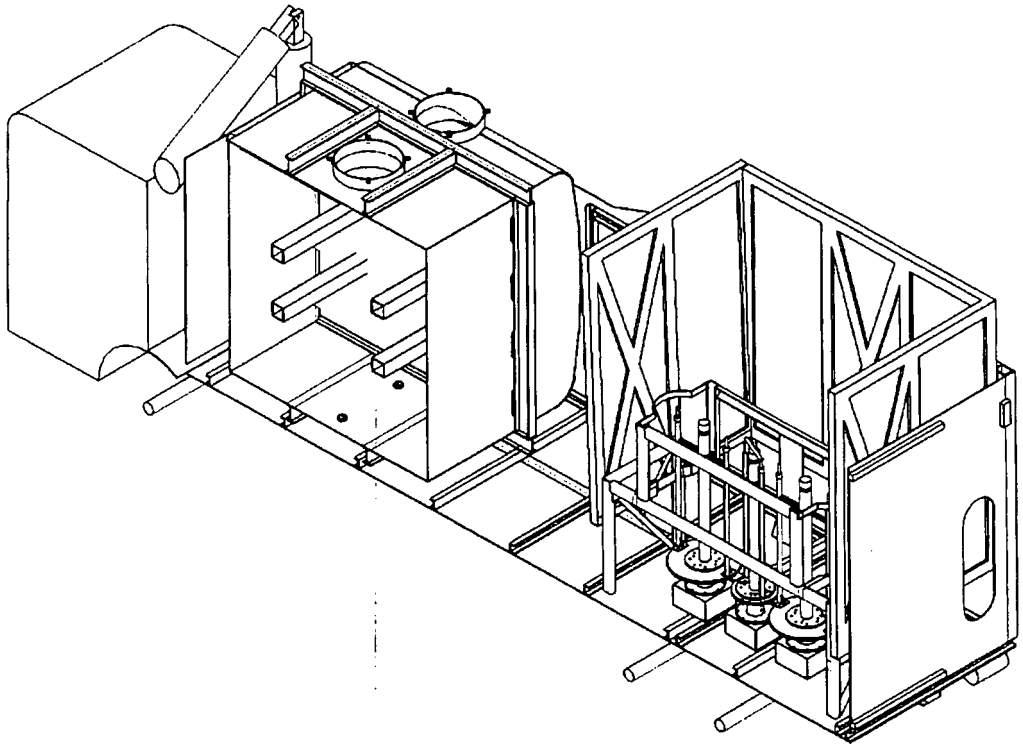

FIGURE 5

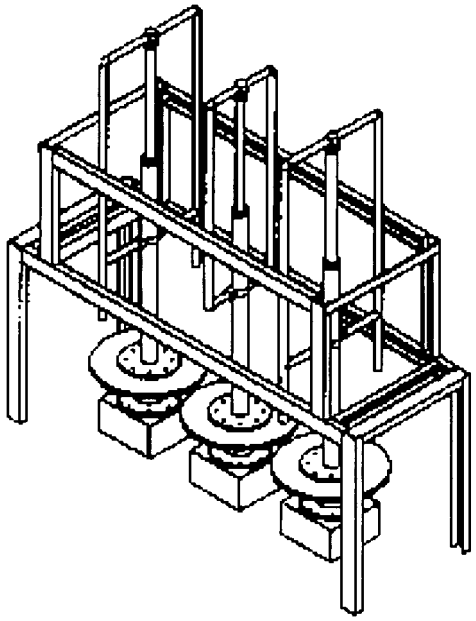

FIGURE 6

REFERENCES CITED IN THE DESCRIPTION

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