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(54) IMPROVED MACHINE INTENDED TO THE CLEANING OF TUNNELS, WALLS AND THE LIKE

(57) Improved machine intended to the cleaning of tunnels, walls and the like, comprising a frame provided with wheels (2) at its lower part and a towing bar (3) at its front part, having on top of the frame a variable capacity water tank (1), the machine being characterized in that it is provided with a diesel engine, a multiplier group, a high-pressure pump for ejecting the water outside through the nozzles (7 and 7') fixed to the conduits (5 and 5') and to transverse conduits (6) fixed to elements situated at the front of the rear part of the machine, the transverse conduit (6') with its nozzles (7'). The machine has a fuel tank, a hydraulic oil tank, and additive or detergent tank, a hot water boiler operated with propane gas or similar and an air pump or compressor, etc. The machine can be operated manually, by means of a telescopic or remote control, or automatically using stroke limit ends or bounce cells, which send appropriate signals to the corresponding automata connected to a computer for their programming, or actuated directly by means of the electrovalves of the dispensers

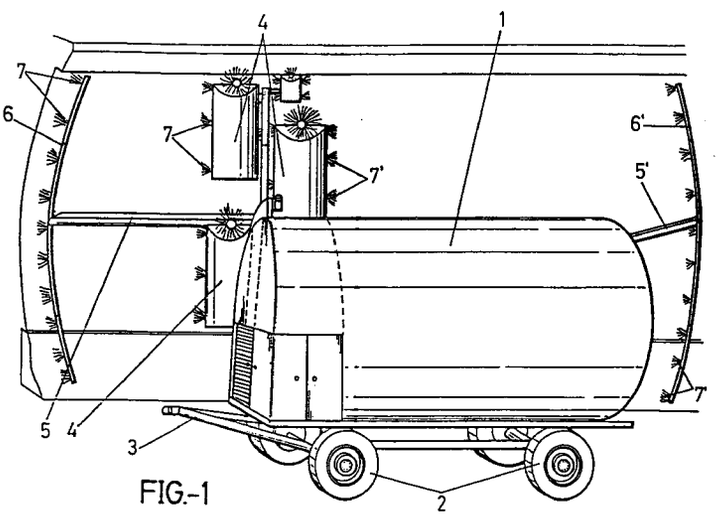

FIG.-1

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Description

BACKGROUND OF THE INVENTION

The present specification refers to an improved machine intended to the cleaning of tunnels, walls and the like.

FIELD OF THE INVENTION

The present invention will find application in the industry devoted to the manufacture of cleaning machines, particularly surface cleaning machines, both vertical and horizontal surfaces, having them any curvature or not.

RELATED ART

The applicant owns a Spanish Utility Model number 9301786, about a self-transported machine for cleaning tunnels, walls or the like.

After making this machine and testing it, with excellent performances, the machine described in the above mentioned specification has been improved.

DESCRIPTION OF THE INVENTION

The improved machine intended to the cleaning of tunnels, walls and the like, is structured as a self-transported or propelled by the help of an auxiliary vehicle, having a variable capacity water tank on the top of the frame, at its rear part or at its front one, having a Diesel engine, a multiplier group, a high pressure pump for ejecting the water over the walls that must be cleaned, a hydraulic pump arrangement to move the brushes and the lever arms, a hydraulic arrangement to translating, driving, etc.

The invention has a fuel tank, a hydraulic oil tank, a detergent or additive tank, a hot water boiler operated with propane or other combustible and an air pump working as a compressor.

The machine can be operated manually, by means of a telescopic or remote control, or automatically using stroke limit ends or bounce cells, etc., which send appropriate signals to the corresponding automata connected to a computer for their programming, being able to work with a little vigilance, or half-automatically, actuated by stroke limit ends or bounce cells, connected in such way that they work following a strong factor preferential order, actuating over the electrovalves of the dispensers.

The invention has a conduits disposed as water pipes to dispense cold or hot water, with detergent or additive inside the brushes arrangement former pipe. On last sprayings the water has not any product, and was ejected as pure water, to final rinsing. The conduits are articulated, and adopt the position of the brush carrier arm.

By means of these conduits or water pipes, and with the high pressure pump, the machine improves its cleaning capacities, adding the high pressure water to the machine working.

The water pipe actuating on the rear part to the final rising, allows the installing of a second line of nozzles, to make a drying by means of the air sprayed by the air pump or compressor.

Due to the high pressure water pump, it can be placed on the machine an horizontal nozzle line, to clean and dry the pavement.

The invention has a plurality of sensors that switch-off the automatic working when the wall ends, preventing the resting sensors for working when there is not a wall.

The invention has sensors situated on the upper side in order to control the vertical brush movement and the height, when the movement is up-to-down or down-to-up.

Other sensor placed on the upper side controls the gap of the upper half operating over a middle turn, and moving closer or away the upper half of the same.

Other sensor placed on the middle of arrangement with the brush carrier arms, operates over the extending arm, moving the brush carrier closer and away.

Other sensor placed on the inside brush, that operates over the turn, moving closer or away the upper and lower edges.

At last, other sensor placed on the lower side of the arm, operates the extensible arm, turning it, moving up and down the whole brush carrier, in order to keep the gap with the floor.

The machine can be folded over the upper side of the water tank to facilitate its transport. The folding capacity is achieved thanks to the articulations of the telescopic arm.

The machine can be unfolded to the right and to the left hand. This allow the job in a one way double lane road, decreasing the job space, and so attenuating the traffic troubles.

The movements can be done mechanically or hydraulically when the machine is working or in little displacements, by means of a gear box or a hydraulic engine over the shaft. They are disconnected when the machine is been transported, being towed by a truck.

The machine driving is done hydraulically by means of two hydraulic bottles over the front shaft. They are operated by a hydraulic driving group that drives the machine automatically without needing a drive.

The machine can incorporate a crane or a platform, that can be improve the working of the other cleaning elements. Incorporating a crane or platform, it is multiplied the height and distance the surface cleaning elements can reach, substantially improving the machine.

In synthesis, the invention is configured as a machine that can be incorporated over a truck platform, or fitted with wheels an towed by a truck, or over a railway wagon, or any other carrier element, to clean rail-

way tunnels, or can be configured as a self-propelled machine. It has a water tank, a telescopic arm or crane, managed by oil-hydraulic means, that works radial or transversally with the surface to be cleaned. To permit a vertical plane movements, it have a first oil-hydraulic cylinder, an articulated frame fixed by means of a second group of oil-hydraulic cylinders with the former telescopic arm or crane. This arrangement can extends in a same vertical plane with this telescopic arm, crane, etc.. Its articulated frame is formed by a plurality of sections fitted with tangential-vertical or circle spinning brushes, etc.. They are moved oil-hydraulically, and independently. The both sections joined with the arm sides, are articulated respect this arms, and there are other supplementary sections side by side with the arm-joined ones. All this sections are articulated, and been moved by oil-hydraulic cylinders. The brushes carried by these sections are overlapped.

The invention it has been described has a vertical pipe which will spray a liquid curtain formed by a mixed of hot or cold water and detergent or additive. Following its movement, this curtain is before the front of the machine , and there is other before each tangential brush. There is also a device to spray clean water to a firs tangential rig, and two pipes spraying clean water to a latter rig. It is possible to fit an air spraying pipe on the back of the frame to make a drying.

In summary, the invention has a similar looking than that filed in a former time by the applicant, but it has been improved substantially, reaching better performances.

DESCRIPTION OF THE DRAWINGS

In order to complement this description and aid to a better understanding of the characteristics of the invention, this specification is accompanied, as part of the same, by the appending set of drawings, which are by way of illustrative and non-limiting example, the following figures:

Figure number 1.- shows a perspective view of the invention, while the improved machine intended to the cleaning of tunnels, walls and the like, is working over a wall inside a tunnel.

Figure number 2.- shows a side elevational view of the subject represented in figure number 1, and in the same work of cleaning the tunnel wall.

Figure number 3.- shows a detail view of the fixing support of the telescopic arm

Figure number 4.- also shows the figure 3 support, on a plan view.

Figure number 5.- shows a side elevational view, from the rear side, like the view represented on figure number 2, showing how the telescopic arm could work either on the upper side of the tunnel, or on the lower one.

Figure number 6.- shows how the machine can fold over itself the articulated arms to allow an accurate carrier.

Figure number 7.- shows a view of the object viewed on figure number 6, but viewed from the front side

PREFERRED EMBODIMENT OF THE INVENTION

Showing this figures can be appreciated how the improved machine intended to the cleaning of tunnels, walls and the like is formed with a tank (1), inside there is stored an adequate amount of water. This tank is carried over a chassis or frame with wheels(2), having this frame a shaft (3) on the front, in order to be towed by a vehicle when the machine must be travel by roads. On the upper side of the machine, there is a hydraulic arm (8), that can be also placed over a crane or lifter platform. From this arm (8), arise several elements (4) carrying spinning brushes (9). The machine has, on the front side, a conduit (5) placed horizontally or semi-horizontally respect the machine, this conduit carrying a transversal conduit (6), which has nozzles (7). In the opposite side of the machine, in the back side, there is a second horizontal conduit (5'), connected with a transversal conduit (6') that has spraying nozzles (7'). The nozzles (7) spray water mixed with detergent, but the nozzles (7') sprays pure water.

Optionally, the machine could have a second line of nozzles on the back side. This nozzles would not spray water, but air, in order to dry the zone previously cleaned.

The invention has a Diesel engine, a fuel tank, a hydraulic oil tank, a detergent tank, a boiler operated with propane gas or similar, to spray trough the nozzles (7) or (7') hot water, and an air pump or compressor.

The invention has a high pressure water pump, and a arrangement of hydraulic pumps to manage the arms (8) movements.

The invention has a plurality of sensors to move closer and away the arms carrying the cleaning brushes, and the water spraying nozzles.

A sensor is placed over the brush (10), controlling the height position of the brush displacements in a vertical way, up-to-down or down-to-up. Another sensor is placed in the brush frame(10) to control the upper gap, operating over the turn(14) and (15), moving the same close or away to the zone to be cleaned.

The brush frame (12) has been fitted with other sensor that operates over the extensible arm edge (8), moving close or away the whole brushes frame.

By means of other sensor placed on the frame (13), the turning axle (20) is operated, moving closer or away

from the wall the upper and lower edges.

At last, other sensor placed on the lower part of the frame (13), operates over the turn (22) lifting or downing the whole brushes frame in order to maintain a gap with the floor.

The machine, as is shown in figures number 6 and 7, when it been towed by road, can be folded over the upper side of the water tank (1), thanks to the telescopic arm (8) and the turns (20), (21) y (22).

By means of the turn (21) it can be unfolded towards the left side and towards the right side. This allows to work in one way two lanes road, cleaning the left wall or the right one but always moving in the way of the road, attenuating to a minimum the traffic troubles.

The machine driving is done hydraulically by means of two hydraulic bottles over the front shaft. They are operated by a hydraulic driving group that drives the machine automatically, without needing a driver.

It is not necessary to make longer this specification in order to allow any expert in the art could understand the invention scope, and its advantages.

Materials, shapes, dimensions and disposition of the elements could change, without not changing the invention essentials.

The words used in this specification must be always understood in an extended and not restricted way.

Claims

1. Improved machine intended to the cleaning of tunnels, walls and the like of those constituted with a chassis or frame provided with wheels (2) at its lower part and a towing bar (3) at its front part, having on top of the frame a variable capacity water tank (1), the machine being characterized in that it is provided with a diesel engine, a multiplier group, a high-pressure pump for ejecting the water outside through the nozzles (7 and 7') fixed to the transversal conduits (6), fixed to the conduit elements (5 and 5') situated at the front of the rear part of the machine, being joined to (1) the transversal conduit (6) with the spraying nozzles (7) in the front side, but in the rear side the horizontal conduit (5') is joined with the transversal conduit (6'), having this nozzles (7'), and could optionally having a second complementary transversal conduit, put after the line of nozzles (7') fixed to the transversal conduit (6'), that would spray air. The machine has on the upper side of the tank a telescopic arm, that can be placed on a crane or extensible platform, in which a plurality of arms (10), (11), (12), (13), etc., or brushes (9), carrying spinning marginal elements that work in collaboration with the brushes (4). The machine has a fuel tank, a hydraulic oil tank, and additive or detergent tank, a hot water boiler operated with propane gas or similar and an air pump or compressor, etc. The machine can be operated manually, by means of a telescopic or remote control, or automatically using stroke limit ends or bounce cells, which send appropriate signals to the corresponding automata connected to a computer for their programming, or actuated directly by means of the electrovalves of the dispensers.

2. Improved machine intended to the cleaning of tunnels, walls and the like according to claim 1, characterized in that it has a sensor that switch-off the automatic working when the wall ends, preventing the resting sensors for working when there is not a wall, and having another sensor situated on the upper and lower side in order to control the brushes displacement height, which work vertically up-to-down or down-to-up.

3. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that it has a sensor placed on the upper side of the frame (10), which control the gap of the upper part, operating over the axle of the central turns (14) and (15),and moving the upper half closer or away to the surface to be cleaned.

4. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that it has a sensor placed on the central place or frame (12), that operates over an extensible arm fixed to the telescopic arm, crane or platform (4), moving closer or away the brushes (4).

5. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that it has two sensors, one of them placed on the middle zone of the frame (13), operating over the turn (20), moving closer and away the upper and lower edges. The other sensor is placed on the lower part of the same frame, and operates over the turn (21), lifting or downing the whole brushes frame (4), in order to maintain the gap with the floor.

6. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that the telescopic arm (8), carrying the brushes frame (4) and auxiliaries, is folded over the upper side of the tank (1) to be transported, or over the crane or lifting platform, thanks to turns (20), (21) and (22).

7. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that by means of the turn or articulation (21), the machine can be unfolded to the right or to the left hand, or the turn of the crane or platform.

8. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that it has an hydraulic engine placed over one of the shafts, the front one or the rear one, that can be disconnected when the machine is been transported by road.

9. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that the machine driving is done hydraulically by means of two hydraulic bottles over the front shaft. They are operated by a hydraulic driving group that drives the machine automatically or mechanically.

10. Improved machine intended to the cleaning of tunnels, walls and the like according to the above claims, characterized in that ,optionally, by means of its high pressure equipment and air pump, it can clean and dry pavements, or high pressure water demolition, and could also do cleaning of building fronts, or cleaning of tanks, inside or outside.

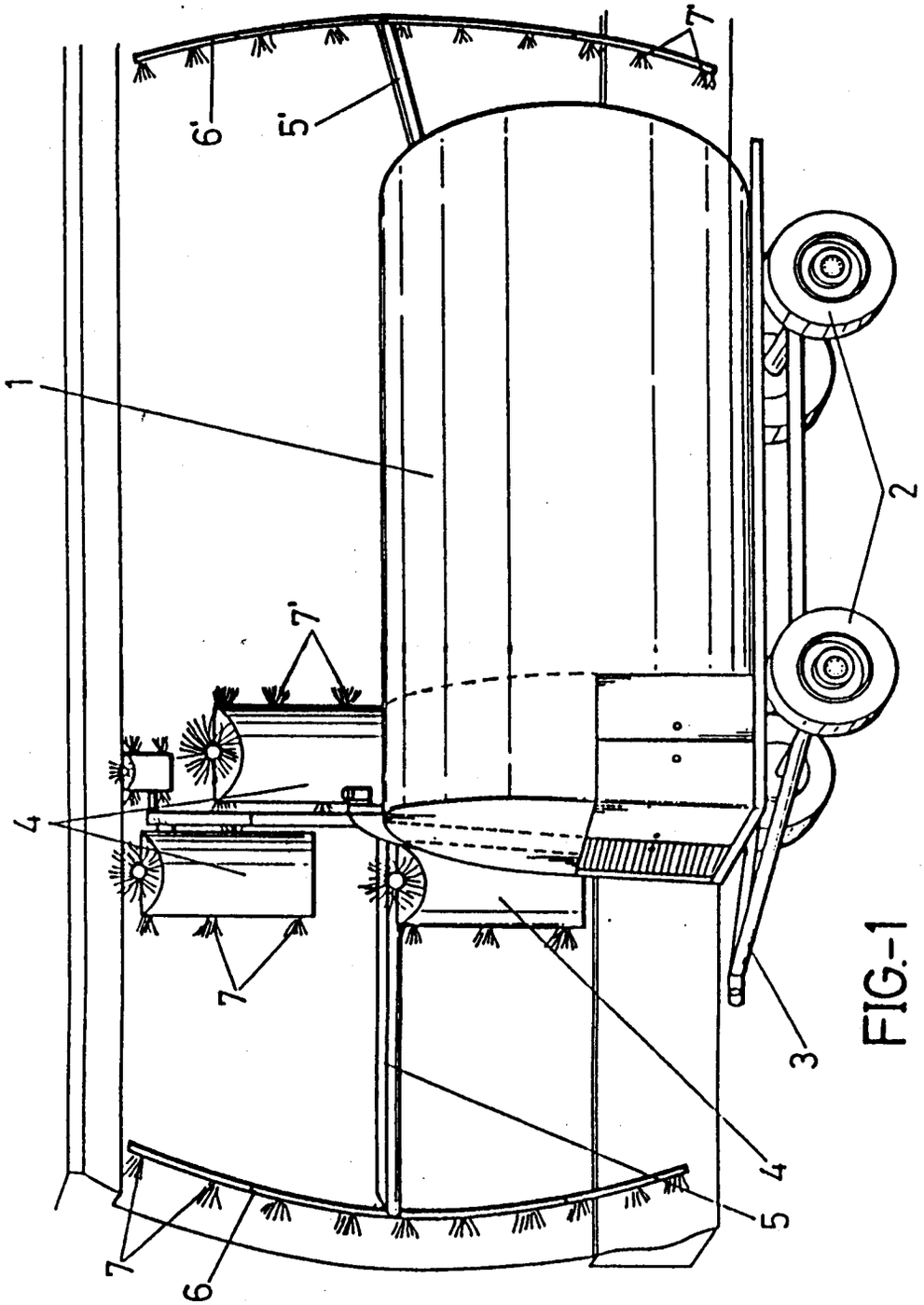

FIG.-1

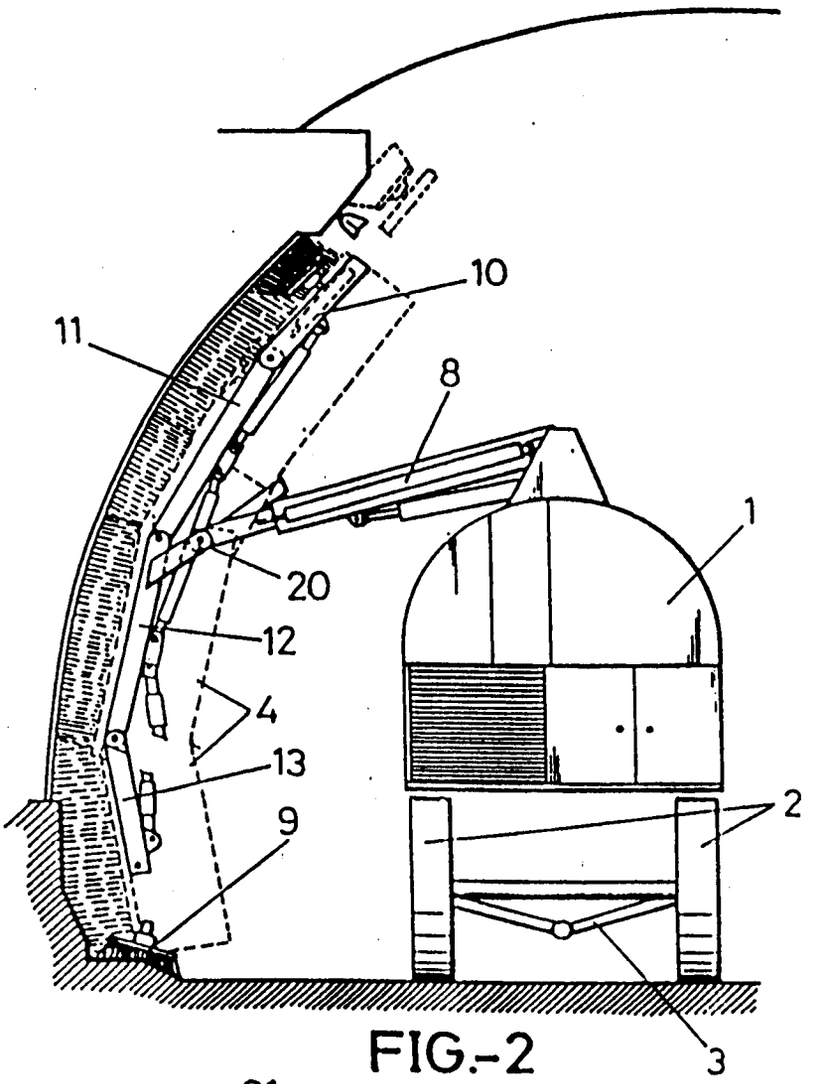

FIG.-2

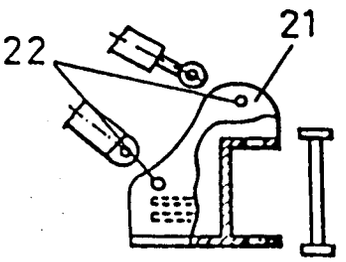

FIG.-3

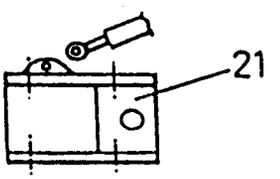

FIG.-4

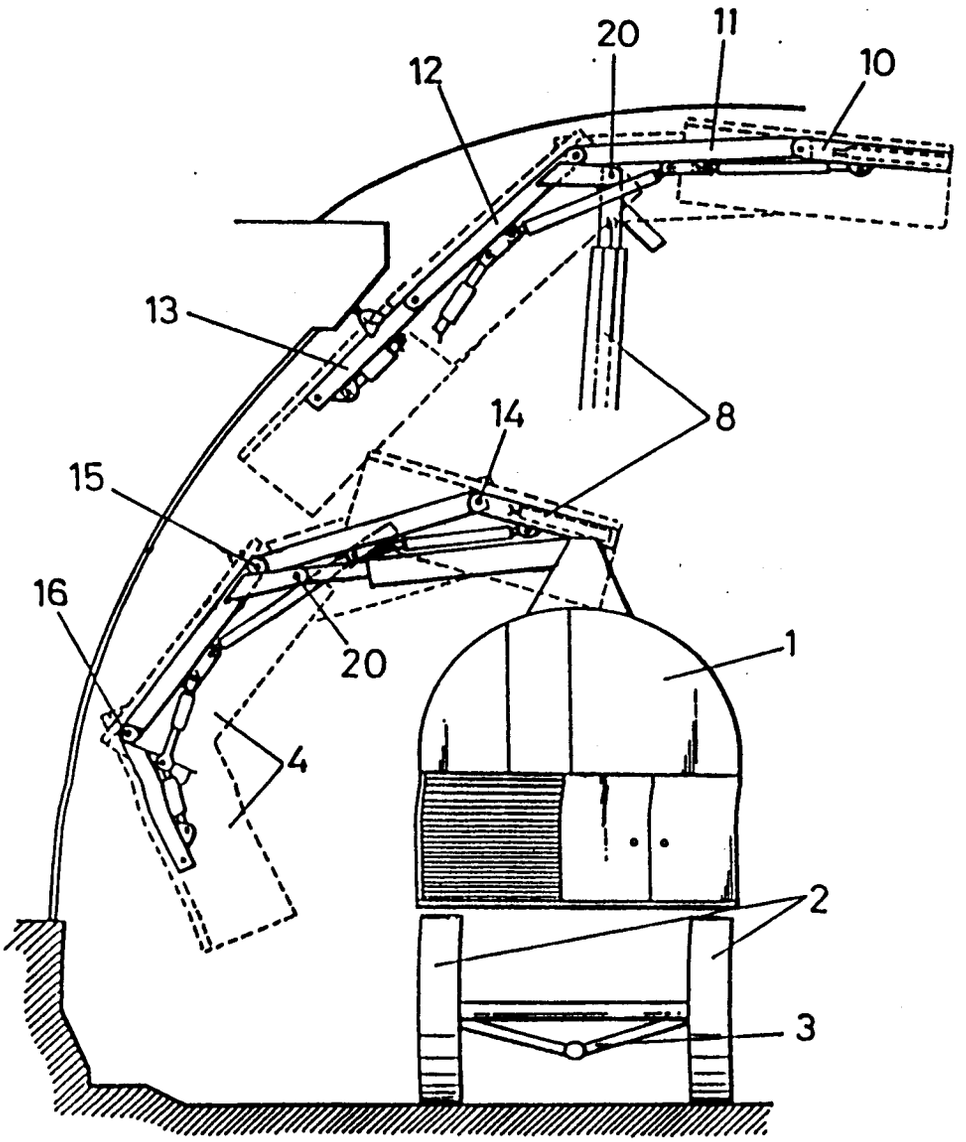

FIG.-5

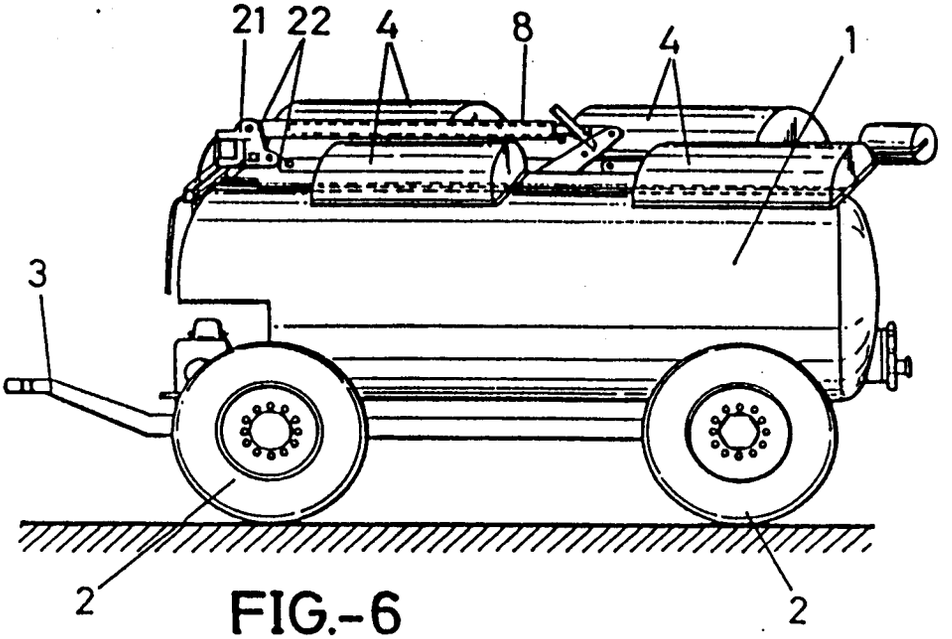

FIG.-6

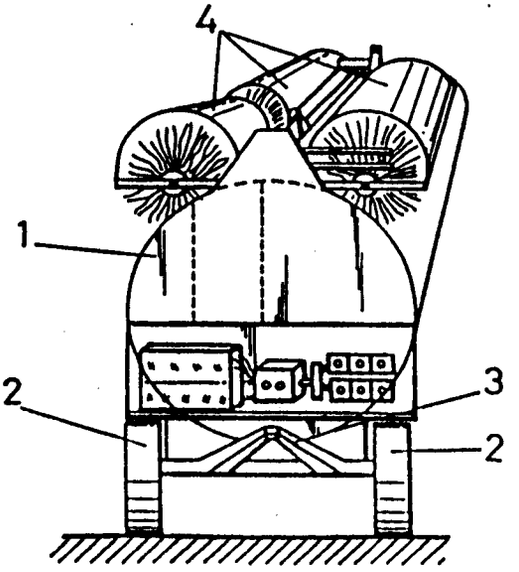

FIG.-7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 97/00160

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6: E01H1/00, B60P3/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6: E01H, B60P, A47L, E04G23/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT, EPODOC, WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ES 1025055 U (VILLANUEVA SAUTU), 01 November 1993 (01.11.93) The whole document	1,6
Y A		4,7,10 9
Y	FR 2584747 A (LE MATERIEL DE VOIRIE), 16 January 1987 (16.01.87)	4,7
A	Page 1, lines 1-15; page 6, line 29 - page 9, line 24; page 10, line 9 - page 15, line 33; figures 1-4,7	3,5
Y A	US 5004156 A (MONTANIER) 02 April 1991 (02.04.91) column 7, line 46 - column 9, line 55; figures 9-11	10 1,2,6,7
A	US 5282290 A (VAN FOSSEN) 01 February 1994 (01.02.94) column 3, line 59 - column 4, line 33; column 5, line 48 - column 10, line 53; figures 1-3, 8, 10	1,6,7

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 October 1997 (10.10.97)	17 october 1997 (17.10.97)
Name and mailing address of the ISA/ S.P.T.O. Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 97/00160

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0668400 A (PENNATINI), 23 August 1995 (23.08.95) column 3, line 15 - column 5, line 7, figures	1,6,7
A	GB 2139164 A (SIMON ENGINEERING DUDLEY Ltd), 07 November 1984 (07.11.84) page 1, lines 24-122; figure 1	8,9
A	ES 2013032 A (SERVICIOS TECNICOS DE LIMPIEZAS INDUSTRIALES MIGUEL ARIAS, S.L.), 16 April 1990 (16.04.90) column 2, line 65 - column 4, line 58; figures	1,6

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