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hereby apply for the grant of a Patent for an invention entitled: "IMPROVEMENTS INTRODUCED IN SYSTEMS FOR CLEANING PUBLIC CONVEYANCE VEHICLES" which is described in the accompanying complete specification.

This application is a Convention application and is based on the application(s) numbered: 464,637 - 474,956

for a patent or similar protection made in SPAIN on 30th November, 1977 - 8th November, 1978


DATED this 23rd day of November, 1978

SERVICIOS CARIBE, S.A. By their Patent Attorneys:

of GRIFFITH, HASSEL & FRAZER Fellows, Institute of Patent Attorneys of Australia
1. Improvements introduced in systems for cleaning public conveyance vehicles which, coordinating with a series of known elements, are designed to be used in the cleaning and tidying of trains, the underground, buses, aircrafts, etc., essentially characterized in that, starting from a compressed air producing station, a pneumatic suction takes place by means of a Venturi system which is used as the detritus dust-liquid extractor; to at least one end of a Venturi suction pump there is attached a series of different aspirating nozzles, depending on the surface to be cleaned and the compressed air likewise being used as the activating means for a dry foam producing apparatus, having different degrees of moisture, provided with a spraying gun, as well as for pneumatic rotating brushes with a liquid discharge and for a pneumatic spraying element.
The following statement is a full description of this invention, with the best method of performing it known to me/us:-
The present invention refers to improvements introduced in systems for cleaning public conveyance vehicles.

The object of this invention consists in coordinating the working system of different machines existing in the market, the components of which were previously modified somewhat, introducing at the same time improvements or corrections in the structure thereof so that, by applying the utility thereof concretely to the cleaning of the interior and exterior of passenger vehicles, trains, the underground, buses, automobiles, aircrafts, premises, etc., a series of advantages not heretofore obtained are achieved with the conventional methods used.

The cleaning of vehicles having the mentioned characteristics, particularly trains and the underground, requires an increased number of skilled personnel who need an excessively long time for a perfect finish of this type of work. Presently, the exterior of vehicles is cleaned, this naturally being understood as a standard cleaning thereof, by means of a washing tunnel or, in its stead, manually by at least two persons who work in the following manner: the first extends on the body of the vehicle a suitable detergent which he picks up with a brush from a bucket, while the other person then rinses the surface with water and a brush.

Cleaning of the interior of these vehicles takes place presently by the following operations:
- A normal sweeping using a broom.
- A suction of the fabrics using an electric machine.
A manual cleaning with a wet cloth passed along the walls, windows, roofs and seats.

The linoleum floors are washed by hand. The seats are also cleaned manually.

It can readily be understood that this cleaning system, which has not heretofore been modified nor mechanized due to the intrinsic characteristics of public conveyance vehicles, poses serious problems for the company dedicated to this work, among which the following can be emphasized:

1. The high cost of hand labour.
2. The low quality in work, since the cloths, brushes and mops withdraw 50% of the dirt and the other 50% remains on other surfaces of the vehicle.
3. Due to the high number of personnel, the company dedicated to these cleaning services, receive more and more social claims, which should forcibly have a bearing on the price, making the contracted cleaning service more expensive.
4. Complete standstill of a public service due to a strike by the workers in charge of the cleaning service.

These problems are eliminated to a large extent and reduced in a good proportion with the system of this invention, since, among others, the following advantages of the application of the proposed cleaning system can be emphasized:

1. The cost of hand labour can be reduced in 30%.
2. The prices of the cleaning work, to be
invoiced to the clients, do not undergo heavy risings and can be normalized.

3. The cost of hand labour saved could be distributed among the remainder of the personnel of the company who are maintained on the job, whereby a high standard in salaries is obtained.

4. A 100% quality in the work effected is obtained, since the dirt extracted from the vehicle by means of powerful suction pumps, three times superior to the present day electric industrial suction pumps, is gathered in containers which will subsequently be emptied at appropriate sites.

5. In case of working conflicts, strikes, etc., a single person can clean 25 vehicles, sweeping by suction and cleaning the toilets by using a water blast, so that although the cleaning of the vehicle were not perfect, it could at least be utilised by the user under almost normal conditions, thus preventing the public conveyance vehicle from coming to a standstill.

6. The danger and contamination indices of the cleaning system proposed by this invention are practically nil, due to the complete absence of electrical energy in the mechanization of the cleaning process, as well as to the use of non-contaminating machines.

The cleaning system proposed uses compressed air as the driving force for the carrying out of the cleaning services of passenger trains, buses, aircrafts, metropolitan cars, automobiles in general, premises, etc. This compressed air, depending on the case, would come from a centralized station or from movable stations, and
will undergo a transformation due to the Venturi effect which will originate a suction which would be advantageously used to carry out the different cleaning operations.

Thus, the element which produces compressed air could be fed by gas, electricity, gasoil, petrol, etc., being centralized in a producing or a movable station through a cleaning platform. The stream of air produced should be maintained between 1,600 liters/min. when fed by one module and 30,000 liters/min. when fed by three special modules.

Should a fixed station for producing compressed air be desired, which can be interesting in the case of certain railway platforms, bus stations, etc., the compressed air will be distributed by a galvanized, or even a rubber, piping system, providing the key points with supply inlets to which the different apparatus to be used with this system will be connected.

A piping system, parallel to the former, could be interesting in the majority of the cases to likewise supply the products and detergents to be used, which will be described subsequently. In this way, centralized supply inlets will be provided, which guarantee at all times the access of the machinery and specialized equipment to any point of the vehicle or wagon.

Should these supply platforms not be beneficial or interesting, the cleaning system in question contemplates the possibility of incorporating a movable station, producer of compressed air, which could naturally be self-propelled or not.

At the ends of the conduits, carriers of compressed air, there are connected pneumatic suction pumps,
which transform this air under pressure by the Venturi effect into a suction, the ideal strength of which should be of from 2,100 to 3,100 m/m per water column.

It is interesting to point out that the suction strength which is obtained from the operative coordination of the effects: Compression of air/Venturi, since suction readings, impossible to reach with conventional portable-type suction pumps, are obtained.

To these pneumatic Venturi suction pumps are connected by means of appropriate conduits, aspirating nozzles which have diverse characteristics, depending on the surface to be cleaned. Thus, for example, nozzles of from 15 to 25 cms. are recommendable for absorbing the fabrics of the seats and from 25 to 45 cms. for the carpets of the vehicles. For the suction of hard floors, the ideal nozzles have the dimension of from 25 to 45 cms., while for the windows, wood panels, flat parts and metal parts, "skay", leather, etc., the ideal aspirating nozzles should have from 15 to 25 cms. The angle of all these nozzles will be suitable for the type of work to be carried out, so as to facilitate the perfect adaption thereof to the surface in question as well as the work of the operator.

MOVABLE COMPACT CLEANING UNITS

Where there is a wide dispersion of the material to be cleaned, as in the case of aircrafts, buses, and premises, there will be a movable compact cleaning unit comprising the following elements:

- A Land-Rover, Jeep, etc. type vehicle, the platform of which has a capacity for three person, and
the machinery and equipment necessary for carrying out the cleaning as will subsequently be described.

- A portable gasoil compressor, towed by the aforementioned vehicle having a minimum flow of 2.5 m³/min.
- A machine and tool equipment comprising: Venturi for the suction of at least a 3,100 m/m water column; floor, seat, wall, roof and outer wall rubbing machines; a set of dust and liquid aspirating nozzles; flexible and rubber piping accessories, guns for pressurized water, a mixture producing apparatus, sprays, and a container for collecting bulky wastes.

Such cleaning unit will be placed as close as possible to the vehicle or premises to be cleaned, and the compressor will be put into operation immediately, the equipment will then be situated and will be connected by means of rapid plug-ins thereof. Once the unit is in a working position, cleaning will take place in the manner subsequently described.

The movable cleaning unit can be put into operation in a matter of minutes, just as the gathering up thereof and, once cleaning has been done, it is in a position to be conveyed to other sites where it should operate, such as in the case of aircrafts and premises. In the case of urban buses, where there are small spaces for the parking of a reduced number of vehicles, the movable cleaning unit is situated at a zone close thereto so that cleaning of various of them can take place without having to move the unit.

METHOD

The method rationally defines the following
Equipment and accessories to be fundamentally used

M-1. Compressor for the manufacture of compressed air
(minimum 2 m³/minute)

M-2. Piping (rubber or iron) for conveying the compressed air.

M-3. U-shaped compressed air inlets for the independent suction and compression.

M-4. Pneumatic Venturi type suction pumps having a vacuum of 2,000 to 3,100 mm. per water column.

M-5. Nozzles to be applied to the Venturi piping for the two suction versions:

P. Dust and wastes
L. Liquids (detergents, dry foams, etc.)

For Dust
M-5-P-1. Fabric upholsteries
M-5-P-2. Carpets and moquettes
M-5-P-3. "Skay" upholsteries
M-5-P-4. Smooth, hard, synthetic (linoleum, etc.) floors
M-5-P-5. Walls, roofs, windows.

For Liquids
M-5-L-1. Fabric upholsteries
M-5-L-2.- Carpets and moquettes
M-5-L-3.- "Skay" upholsteries
M-5-L-4.- Smooth, hard, synthetic (linoleum, etc.) floors
M-5-L-5.- Walls, roofs, windows.

M-6.- Guns fed with compressed air and water, having different outlet positions for the jet under pressure (fan, fixed jet, etc.), for the spraying under pressure which are fed by two conduits, a water conduit consisting of a plastic pipe of 15 mm., and a compressed air conduit consisting of a rubber pipe of 5 mm.

M-7.- Spray, with a manual pressure or compressed air, having a high capacity (10 - 15 liters) where the biodegradable detergent, disinfectant and perfumed products are mixed.

M-8.- Mixture producing apparatus (shampoo mixers) activated by compressed air for the manufacture of dry foam having different degrees of moisture to treat fabrics, or the spraying with different detergents, working pressure of 3 Kgs/cm², a capacity depending on the needs, made of stainless steel and provided with a pressure manoreducer, a safety valve and an outlet having a delivery hose directly to the M-9, M-10 and M-11 machines, according to the use thereof and it is provided with wheels for being conveyed.

M-9.- Pneumatic rotating brush apparatus for washing-rubbing the outer side of the body of vehicles with a discharge of detergent and a blast of rinsing water, maneuvered by operators at will.

The rubbing operation is carried out by a brush having hard bristles (without damaging the paint) which can
operate at a speed of from 500 to 1,800 r.p.m., the maximum weight of the machine being of 1,7 Kgs.

This machine is provided with gears which reduce the revolutions of the motor to the most appropriate working speed. The angular transmission, due to its low profile, makes the use of this machine very manageable and, at the same time, an excellent control in the operation is achieved. They are provided with a centrifugal speed regulator which prevents a possible overspeed and likewise reduces the consumption of air, as in the M-10 and M-11 machines.

M-10.- Pneumatic-rotating brush which discharges, at will, dry or liquid foam containing a bio-degradable detergent-disinfectant product, which it receives from M-9. It has the same characteristics as the former M-9 and, due to its low centre of gravity, same is always well balanced.

The M-10 machine which also incorporates special brushes for the upholstery or hard surfaces (walls, roofs, windows, etc.) is ideal for rubbing and washing seat backs, walls, roofs, windows etc.; during the operation a detergent or dry foam is supplied, at the will of the operator, directly onto the surface to be cleaned.

The brush of this machine can be provided with a woolen or synthetic fabric for rubbing and polishing the already cleaned surfaces.

Weight: 1,5 Kgs. Speed: 500 to 1,800 r.p.m.

M-11.- Pneumatic rotating brush for floors, either synthetic (linoleum, etc.) or of fibers (moquettes, caroets, etc.) provided with a rod for use by the operator
in guiding the brush, which rubs and cleans all types of floors and supplies directly onto the surface to be cleaned, at the will of the operator, dry foam (moquettes and carpets) or detergent on hard floors (linoleum, etc.).

It weighs 5 kgs. and reaches speeds of up to 4,500 r.p.m., it is the most powerful machine and satisfies the highest demands of productivity in truly heavy works.

It is mainly used for the thorough rubbing of floors and it can also be used to lacquer and polish same.

Types of Cleaning

Three types are mainly recommended:

(L S).- Standard cleaning when reaching a second class city and after having travelled from 500 to 1,000 Kms.

(L C).- Complete cleaning when leaving a first class city and having travelled from 500 to 1,000 Kms.

(P).- Preferential cleaning of those surfaces which, depending on the state thereof, require cleaning.

Each one of these modalities in the interior or on the exterior thereof.

Description of operations:

Standard cleaning, exterior
- Cleaning by rubbing with water and a mechanical brush and using a M-9 machine of the sides, doors and outer windows of the vehicle.

Standard cleaning, interior
1. Manually removing lapsed notices of reserved seats, emptying ashtrays onto the floor, collecting papers,
bottles, and bulky wastes in general.

2.- Normal suction of floors with a Venturi M-4, nozzle M-5-P-4, and seats with a suitable M-5-P.

3.- Manual revision of the possible stains produced during the journey, on those parts of the vehicle in direct contact with the passenger.

4.- Cleaning of lavatory seats and toilets with a M-6 gun, water and detergent under pressure, and manual revision of walls and accessories, then suction of the floors with a M-4 Venturi, M-5-L-4 version.

Complete Cleaning, exterior

1.- Mechanical by washing tunnel.

2.- When no tunnel exists, washing with water and detergent by rubbing with a mechanical brush M-9 of the sides, doors and outer windows of the vehicle and a subsequent rinsing (M-6).

Complete Cleaning, interior

1.- Manually removing lapsed notices of reserved seats, emptying ashtrays onto the floor, collecting papers, bottles and bulky wastes in general.

2.- Thorough suction with a Venturi (M-4) (maximum vacuum of 3,100 mm. per water column) of floors, seats, walls, roofs and corners, using the suitable M-5-P.

3.- Cleaning by mechanical rubbing of seats with the subsequent suction of liquids using (M-10 and then M-4 with the suitable M-5-L nozzle).

4.- Cleaning by mechanical rubbing of floors with the subsequent suction of liquids using M-11 and then M-4 with the suitable M-5-L nozzle.

5.- Manual revision of objects and accessories in direct
contact with the passenger.

6.- Cleaning of roofs with "strip".
7.- Thorough cleaning of inner windows.
8.- Thorough cleaning with a water blast of lavatory bowls and washbasins, floors and corners with suction of liquids in all the sites thereof using M-6 and then M-4 with the suitable M-5-L nozzle.

Observation

It will not be necessary in practice to always carry out the totality of the mentioned operations, but only those necessary, according to the degree of dirtiness of the vehicle, and, therefore, the working times could be proportionally reduced.

Preferential Cleanings

These cleanings should be undertaken on those parts of the vehicle since, due to the degree of dirtiness thereof, the prior cleanings are not sufficient, the vehicle thus being in a correct cleaning condition for its immediate use by the passenger.

The most interesting parts of the vehicle to be revised would be:

1.- Exterior Cleaning
1-1.- Exterior cleaning of the body of the vehicle.
1-2.- Exterior cleaning of the window frames, handrails, entrances, etc.
1-3.- Exterior cleaning of the fronts of the vehicles on which the washing tunnels do not act.

2.- Interior Cleaning
2-1.- Fabrics
2-1-1.- Upholstery of the seats and backs
2-1.- Carpets and moquettes (on walls or floors)
2-2.- Roofs, walls, doors and windows
2-3.- Synthetic seats and "skay" seat backs
2-4.- Linoleum or polyvinyl floors
2-5.- Toilets and lavatories.

Description of operations to be carried out and machinery to be used.

1.- Exterior Cleaning (1-1, 1-2 and 1-3)
   1. The vehicle is first cooled if it has been in the sun for a long time, with the M-6 gun.
   2. The M-9 machine is used with a detergent discharge, rubbing those parts which are dirtier until they are again in their normal condition.
   3. The body is rinsed with the M-6 gun.

2.- Interior Cleaning, Fabric (2-1)
   1. A thorough suction is carried out using a M-4 suction pump and a M-5-P-1 nozzle.
   2. A vigorous rubbing with dry foam is carried out using a M-8 (dry foam version) and a M-10 for the upholstered seats and fabric backs, and using a M-11 for carpets and moquettes, which are left to dry.
   3. Once dry, a thorough suction takes place with a M-4 and M-5-P-1 and M-5-P-2.

2.- Synthetic-Interior Cleanings (2-2, 2-3 and 2-4)
   1. A thorough suction is carried out using a M-4 and M-5-P-5 nozzles (hard parts, roofs, walls, doors, etc.) or M-5-P-4 for linoleum or polyvinyl floors or M-5-P-3 (skay seats and backs, depending on the chosen part to be cleaned).
   2. A vigorous rubbing of the elected part is under-
taken using a M-8 (cleaner-disinfectant detergent version) and a M-10.

3. A thorough suction with a M-4 and M-5-L-5 nozzles for the roofs, walls, doors, etc. and M-5-L-4 for polyvinyl floors or M-5-L-3 for skay seats and backs.

4. Then the parts which have not been suctioned are retouched manually with a cloth.

5. The polyvinyl floors (linoleum, etc.) which, after washing and drying, should be polished and lacquered, are spread, rubbed and polished with a M-11 using the adequate brush.

2. Interior Cleaning (2-5, toilets and lavatories)

1. A blast washing of the inner parts of the bowls of the WC as well as all the drains and floors of the toilet is then undertaken with a M-6 and M-8 (perfumed cleaner-disinfectant detergent version).

2. The walls, roofs, doors and floors are rubbed with a M-10 and M-8 using the same perfumed cleaner-disinfectant detergent mixture, until all the dirt adhering thereto is loosened.

3. The roofs, walls, doors and windows are then suctioned with a M-4, liquid version, and a M-5-L-5 nozzle, and the floors with a M-5-L-4.


Cycles of utilization

It is of vital importance, once the type of cleaning is defined, to limit the application time thereof:

The following are considered as normal:
- Standard Cleaning, 3 or 4 per week (LS)
- Complete Cleaning, 3 or 4 per week (LC)
- Preferential Cleaning, 1 per month (LP)

1st Week: LP / LS / LC / LS / LC / LS / LC / LC
2nd Week: LS / LC / LS / LC / LS / LC / LS / LC
3rd Week: LC / LS / LC / LS / LC / LS / LS / LC
4th Week: LS / LC / LS / LC / LS / LC / LS / LS

These cycles can be varied, to a greater or lesser extent, at the criterion of the client and depending on the degree of dirtiness of the vehicle.

Working times

The normal times, fixed for each one of the described types of cleaning, are:

- Standard Cleaning:
  - Interior cleaning, 95 minutes/operator
  - Exterior cleaning, 20 minutes/operator

- Complete cleaning:
  - Interior, 220 minutes/operator
  - Exterior, 30 minutes/operator (without washing tunnel)

- Preferential cleaning in the interior:
  - Upholstery and carpets or moquettes: 200 minutes/operator
  - Roofs, walls and windows: 160 minutes/operator
  - Seats and backseats in skay: 150 minutes/operator
  - Floors: 150 minutes/operator
  - Toilets (2): 60 minutes/operator

Surfaces

The foregoing details have been calculated for a U.I.C. type passenger railway car having the following
The materials to be used will be:

- Exterior: degreasing detergent
- Toilets: perfumed disinfectant detergent
- Floor: disinfectant detergent and hard waxes
- Skay seats: disinfectant detergents
- Upholstery and carpets: dry foam (10% moisture)
- Walls and roofs: disinfectant detergent
- Interior windows: window cleaner
- Revision: cloth and disinfectant detergent

Control in quality

The normal control processes will comprise:

- Exterior:
  - Visually verifying the lack of dust and stains by randomly passing a cloth.
- Interior:
  - Verifying the non-existence of bottles and wastes.
  - Verifying the lack of dust, mud and stains which can disappear by suction, on seats and floors.
  - Verifying the lack of dust on accessories by randomly passing a cloth.
- Toilets:
  - Verifying the lack of dirt, soap remains, dirty water,
CONCLUSIONS

This system for the first time contributes absolute mechanization techniques to the cleanings, both exterior and interior, of the vehicle.

The quality is optimum.

With the aforementioned details of time, the considerable saving in hand labour which is obtained, when compared with the normal manual cleaning systems, can readily be verified.

The investment made is minimum and can readily be amortized with the saving in hand labour obtained.

Although the given example refers to a U.I.C. type railway vehicle (universal), the cleaning system can likewise be applied to buses, aircrafts, the underground, etc., the working times, in relation to the surface of each model and the characteristics thereof, can be calculated proportionally.

To complement the description and for a better understanding of the characteristics of the invention, a set of drawings is attached to this specification, wherein the following is represented illustratively and not limitatively:

Figure 1 represents a scheme of a fixed installation on a railway platform, illustrating the various pipings and supply inlets contemplated by the invention.

Figure 2 represents a perspective view of the pneumatic Venturi suction pump incorporated to the residue collector container.

Figure 3 corresponds to a perspective view of
the mixture producing apparatus (dry foam) or shampoo mixers.

Figures 4 and 5 represent, respectively, a plan and an elevational view of one of the dust aspirating nozzles used.

Figure 6 corresponds to a cross section along A-B of figure 5.

Figures 7, 8 and 9 represent, respectively, a lower plan, an elevational and an upper plan view of another one of the dust aspirating nozzles used and provided with wheeling means.

Figures 10, 11 and 12, illustrate, respectively, a plan, an elevational and a profile view of one of the liquid aspirating nozzles.

Figures 13, 14 and 15 correspond, respectively, to an elevational, a plan and a profile view of another one of the solid aspirating nozzles used.

Figure 16 corresponds to a schematic view of the pneumatic rotating brush for the interior cleaning and provided with liquid discharge means.

Figure 17 represents a mode of embodiment of the pneumatic rotating brush with a liquid discharge used in the cleaning of the body of the vehicle.

According to the foregoing and with reference to the attached figures, the system of this invention when referring to a fixed installation, is constituted on the basis of a compressed air producing station 1, a tank 2 for chemicals and special detergents, a water supply 3, elements which distribute the stored product by means of a piping system 4 provided with branches which end at
supply inlets 5, strategically arranged along a platform 6 which, in the case represented, is housed in the centre of railway lines 7, the vehicles of the train to be cleaned having been referenced as 8.

The supply inlets 5 have valves or taps 9 to which is connected the Venturi suction pump M-4, the dry foam producing apparatus M-8, and the spray M-7.

The pneumatic suction pump M-4 comprises a suction head 10, by the Venturi effect, housed on a residue container 11 and the assembly is mounted on a travelling platform 12.

The mixture producing apparatus M-8 is activated, just like the rest of the elements used by this invention, by compressed air and has the purpose of manufacturing dry foam (shampoo) which reaches the points to be cleaned by the appropriate conduit connected to the outlet 13 thereof. The compressed air inlet 14 can be restricted by the stopper valve 15. The pressure within the container 16 can be verified by the manometer 17 provided for such purpose.

This structure is similar to that presented by the spray M-7, in which the perfuming, disinfectant and detergent products are mixed.

The angles of the connecting tubes of both the liquid suction nozzle (series M-5-L) and the solid suction nozzle (series M-5-P) can differ and they can have different dimensions, in order to achieve a better and more comfortable adaptation to the surface to be suctioned.

Finally, the pneumatic rotating brushes M-9,
M-10 and M-11 comprise a pneumatic motor 18, in the interior of which, besides the compressed air supply piping 19, the liquid supply piping 20 and that of pressurized water 21 move, these latter two ending in the pump 22 arranged co-axially with the spin axis of the brush 23. There is provided a casing 24, made of flexible material, which besides hiding the bristles of the brush 23, prevents the liquid dispensed by the pump 22 from being sent out.

This complete assembly will be conveniently coupled to a handle 25 so shaped to permit a comfortable and rational utilization of the device.

It is obvious that in all cases in which, due to economical and other reasons, the presence of a centralized cleaning station such as that illustrated in the scheme of figure 1, is not beneficial or interesting, a portable or self-conveying compressor could be used, without varying the essence of the invention. This is the case of the Movable Compact Cleaning Units which are mainly used in the cleaning of commercial aircrafts.
The claims defining the invention are as follows:

1. Improvements introduced in systems for cleaning public conveyance vehicles which, coordinating with a series of known elements, are designed to be used in the cleaning and tidying of trains, the underground, buses, aircrafts, etc., essentially characterized in that, starting from a compressed air producing station, a pneumatic suction takes place by means of a Venturi system which is used as the detritus dust-liquid extractor; to at least one end of a Venturi suction pump there is attached a series of different aspirating nozzles, depending on the surface to be cleaned and the compressed air likewise being used as the activating means for a dry foam producing apparatus, having different degrees of moisture, provided with a spraying gun, as well as for pneumatic rotating brushes with a liquid discharge and for a pneumatic spraying element.

2. Improvements introduced in systems for cleaning public conveyance vehicles according to claim 1, characterized in that they comprise a fixed station, producer of compressed air, which is distributed along the cleaning platform by a rigid piping system or a flexible pipe provided with compressed air outlet ends having different gauges; and a water and special chemical product conducting system.

3. Improvements introduced in systems for cleaning public conveyance vehicles according to claim 1, characterized in that they comprise a movable station, producer of compressed air, which is connected to at least one Venturi suction pump by a flexible pipe and
provided with various compressed air distribution inlets; optionally provided with a water and special chemical product conducting system.

4. Improvements introduced in systems for cleaning public conveyance vehicles according to claim 1, characterized in that the station, producer of compressed air, the Venturi suction pump, the spray and other accessory elements are housed in an automobile, provided furthermore with tanks for the water, detergent and perfuming disinfectant products.

5. Improvements introduced in systems for cleaning public conveyance vehicles according to the preceding claims, characterized in that they comprise a series of different aspirating nozzles for the solid detritus, and another series for the liquid detritus, having different angles and dimensions in order to comprise an assembly adaptable to any working surface.

6. Improvements introduced in systems for cleaning public conveyance vehicles according to the preceding claims, characterized in that one of the aspirating nozzles adopts, in plan view, a pentagonal shape contoured by flexible bends and two of the antagonic sides thereof are provided with wheeling elements.

7. Improvements introduced in systems for cleaning public conveyance vehicles according to the preceding claims, characterized in that one of the aspirating nozzles adopts, in elevation, an isosceles triangular shape which has flexible edges of the friction brush type.

3. Improvements introduced in systems for
cleaning public conveyance vehicles according to the preceding claims, characterized in that one of the aspirating nozzles adopts, in profile, a straight angle and rectangular plan shape, the smaller sides whereof are curvov-convex, a group of bristles, perimetrically distributed projecting from the periphery thereof.

9. Improvements introduced in systems for cleaning public conveyance vehicles according to the preceding claims, characterized in that the Venturi suction pump is coupled to a tank, receiver of detritus, and the assembly is housed on a tubular frame provided with wheeling means.

10. Improvements introduced in systems for cleaning public conveyance vehicles according to the preceding claims, characterized in that the spray and the dry foam producing apparatus comprise a sealed pump having wheeling means, provided with a compressed air inlet with its corresponding shutoff cock, and a product outlet with a rapid connection point, and a manometer which indicates the pressure in the container.

11. Improvements introduced in systems for cleaning public conveyance vehicles according to the preceding claims, characterized in that the pneumatic rotating brushes are formed from a pneumatic motor provided with means for regulating the rate of turn thereof, to the drive shaft of which is associated a circular brush as well as a conductor coaxial with said shaft which confers thereto characteristics of a pump and which communicates with pressurized water and detergent ducts; having furthermore provided a flexible casing which encloses
the periphery of the brush, which prevent leaks of the injected liquid, by a centrifugal effect, as well as a handle for the use of the assembly.

Dated this 23rd day of November, 1978

SERVICIOS CARIBE, S.A.
By their Patent Attorney;
GRIFFITH, HASSEL & FRAZER.