Further improved vacuum cleaner apparatus with at least three stages of dust collection, of the type with a path partially submerged in water and provided with a separation labyrinth, essentially subdivided in two parts, respectively: an upper one that includes the support body (12) of a suction motor unit (13) with relative circuitry, housed in an opening coated by acoustic insulating material, and a lower one which, comprising said labyrinth, provides at least an intermediate filter, of the type obtained in Filtro type sponge and the like, washable, annularly associated respect to said microfilter or absolute filter and held up by a common supporting means in proximity of the entry channel to the rotor’s mouth.
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DESCRIPTION

VACUUM CLEANER APPARATUS WITH AT LEAST THREE STAGES OF DUST COLLECTION, OF THE TYPE WITH A PATH PARTIALLY SUBMERGED IN WATER AND PROVIDED WITH A SEPARATION LABYRINTH.

This invention has for object a further improved vacuum cleaner apparatus with at least three stages of dust collection, of the type with a path partially submerged in water and provided with a separation labyrinth.

The innovation finds particular even if not exclusive application in the field of the electric appliances, with a high qualitative standard, also professional, intended for a thorough cleaning and at the same time for an hygienizing of the surfaces and of the air in the rooms.

The vacuum cleaner fittings, belong to the state of the art since a long time. The traditional ones, are essentially made up of a body, supported by small feet or pivoting wheels, on whose inside a motor unit is provided for the sucking of the external air, together with the dirt, for being filtered and again put in circulation. Such apparatus, by sucking the air through an extension or elephant trunk held by the user, commonly allows, according to the need, the dusting of carpets, mats, door-mats, moquette, and similar surfaces, but more recently also of the same floor, by means of electric brooms. The air thus sucked at first gets through at least one filter, which is generally made up of the same dust collection bag, for then being let in again once been filtered, as we have already seen, in the surrounding environment. Generally, the bag-filter is realised in a particular type of paper fabric with thick stitches, thus allowing the discharge of the sucked air, but retaining only the macrodust and the thicker dust in its inside.
In the described solutions different drawbacks are noticeable. Among these, it is mentioned that a careful cleaning of the treated surface does not seem possible, but above all, that the air still partially dirty, once sucked, is again let in the environment, transporting a large quantity of dust that for a certain time remains in suspension. This occurs because of the apparatus structure, which even if providing for the dust removal, cannot retain it completely in the traditional sachets-filter. This fact can also not be a particular worry for the healthy people, as they do not feel immediate benefits from a more careful cleaning, differently from the people who suffer of allergy. At this purpose, it is scientifically proved that the household or the work environment, may be particularly favourable to the rising of allergic symptoms, which mostly in the periods of maximum evolution, as for example when the heating is on, regularly occur. These symptoms are mainly originated from the volatilty of the microdust and of the mites that form it, using it as their nourishment. People particularly sensitive to dust, have the need to repeat the cleaning treatment several times, by frequently replacing the filter, which is an operation that any way does not offer satisfactory results.

A recent solution, used to solve the problem, consisted in providing, as combined with a traditional vacuum cleaner, the use of a device also suitable for a simultaneous washing of the surfaces. More in particular, said apparatus consists always of a body, movable, to which a motor suction unit is associated, but in whose inside it is obtained a tank containing the water to be distributed on the surfaces to be treated. The air, together with the water previously dispersed by a delivering device applied on the elephant trunk, is subsequently sucked and thus let inside of said tank. Here, a kind of perpendicular fan placed in
correspondence of the exit hole of the sucked air, by rotating, creates a
hollow area that by avoiding the recirculation of the fine dust stirs
both water and air at the same time. Thus it will be obtained a
precipitation of water and dust thanks to its catalytic effect,
discharging in the surrounding environment only the sucked air,
partially cleaned from such residues.
The suggested solution has some drawbacks, which first of all consist of
the fact that the afore mentioned apparatus cannot work exclusively as
a vacuum cleaner. Secondly, when the surfaces are treated with liquids,
they remain, even if just for a small period, rather damp, having their
utility and functional range limited. The third but not the least aspect is
that it would be a rather complex apparatus and that it does not allow to
further optimize the filtering function of the sucked air.
In the Italian Patent application for industrial invention
n.TV91A000117, a vacuum cleaner apparatus and relative filter is
particularly described, in which it is provided a body for the support of
a suction group, and a container, on whose inside is engaged, in contact
with an amount of water previously let in and in proximity of the
suction mouth, a filter, said filter being obtained from the
manufacturing of vegetal and/or animal fibres. Also the Italian patent
Application for industrial invention n.TV92A000005, It belongs to the
prior art, consisting of an improvement to the previously mentioned
patent, in which it is provided that inside of the container there is:
- a first filter, being made up of an air delivering means at least
partially submerged into an amount of water contained in the
underlying tank, said means being directly connected to the manifold
for the suction of the air coming from outside;
- a second filter, being engaged on the upper part and in proximity of
said means for the delivering of the sucked air, said filter being obtained from the manufacturing of vegetal and/or animal fibres; some water previously let in the underlying retaining tank, which submerges at least partially said delivering means.

One of the just described purposes of the invention is also to avoid some drawbacks occurred when using the previous fittings. More in particular, it was noticed that the main problems would merge on the type of filter, which, besides being hardly accessible, would be frequently clogged requiring a constant maintenance such to require its resetting at the end of each use. Consequently, during the cleaning operations there will progressively be a substantial reduction of the filtering power to the detriment of the benefits for which a certain type of apparatus was chosen, but above all making useless even the more traditional cleaning. Also another drawback is that such apparatus would not allow the collection of eventually dispersed liquids, being mainly limited to sucking only the air together with the fine dust in general. And in fact, the increase of the level of liquid inside of the container could interfere with the good functioning of the motor, which may thus be damaged and become very dangerous.

More recently, always the same applicant, has provided an improved vacuum cleaner apparatus of the type essentially divided in two parts, respectively; a first upper one that includes the body for the support of a suction motor unit placed into an opening coated by acoustic insulating material and buried into a first annularly positioned filter, and a lower one consisting of:

- a water container, essentially cone-shaped, peripherally engaged to said body by lever hooking means, ;
- a cylindrical element without ends placed inside of said container
supported along the edge and partially immersed into water, thus
obtaining between the facing walls, perpendicular to the bottom, an
annular interspace, thus making up a siphon, which is the forced path
of the air and/or of the liquid sucked from outside through sucking
means;
- at least one holed disc for the dirt separation, serving as a base of the
cylindrical element and submerged by the water provided in the
container;
- one or more filters also with differentiated density which are not in
contact with the water, where one of them is supported by the
cylindrical element, thus defining an intermediate air cushion.
In the just described solution, the mentioned drawbacks can be
summarized in the excessive complexity of the structure, which derives
from the presence of the many filters which are inside of the
separation container, that would also reduce its suction effectiveness.
Additionally, notwithstanding the presence of more intermediate
filters, the drops of water would anyway tend to go back to the
container up to impregnate the upperplaced filters, and dangerously,
the area in which the suction electric group is placed. Consequently, a
rather constant maintenance is required, which would regularly
concern both said filters, by suitably drying them, and with respect to
periodic controls of the motor housing.
A further evolution of the apparatus, even more recently realized, with
the Italian application n.TV94A000052, has provided the substitution of
the intermediate discs having a filter function for separating the air
from the mixture of water and sucked dust by a removable deflector
means. Said deflector is placed in an almost suspended position, above
the tank which contains the water to be stirred (for the air washing)
and it has a circular and funnel-like shape, peripherally supported by
the cylindrical element inside of said water container. The
simplification, has therefore concerned only the lower part of the
vacuum cleaner, letting instead unchanged the upper part in which it
is anyway provided a sponge filter, just above said deflector, and
underlying the rotor filter. The drawback of this solution is found just
in the presence of the sponge filter, which mainly when there is an
excessive amount of water, tends to allow the upward migration of the
water particles without stopping them. These latter therefore, after
having impregnated the sponge filter, tend again to be called towards
the rotor, impregnating its relative and next filter or - absolute filter-.
The consequences are obvious. In the first place the emission of
unpleasant smells, and therefore the need to carry out a constant
maintenance of the first filter, which will have to be well washed by
suitable detergents. Secondly a certain degree of danger, due to the fact
that the water thus migrated could also concern some electric parts
with inevitable problems.

The following national application n. TV94A000123, that represents
again an evolution of the vacuum cleaner apparatus of the type having
a path at least partially submerged in a water container, previously
described, consisted in providing in addition to a first separation
deflector-filter of the removable type, placed in an almost suspended
position, above the tank containing the water to be stirred and having
a funnel-like shape, peripherally supported by the cylindrical element
inside of said water container; a second deflector being shaped like an
overturned funnel with respect to the first one, placed above this
latter, and associated to the microfilter engaged in correspondence of
the suction rotor. The described solution, even without doubt
presenting some improvements, does not yet allow a complete stop of
the water particles that anyway tend to migrate upwards, that is
towards the suction rotor. Secondly, the movement of the air thus
sucked which is afterwards made pass through the water siphon,
determines a stirring which is still insufficient to eliminate all kinds
of dirt completely, and which will consequently be let again into the
surrounding environment.

The same applicant with the utility model n. TV95U000014, further
improves the structure of the aforesaid vacuum cleaner. In more detail
it includes, in addition to the previous one, a third separation deflector,
having a substantially conic shape, coaxially and overturned placed
with respect to a first funnel-like deflector which is in suspended
position, above the tank containing the water to be stirred,
peripherally supported by the cylindrical element internal to said
water container, being supported by a tubular upright engaged with a
corresponding male connection which is perpendicular to the
container bottom.

All this considered, presently, the apparatus may be divided in two
main zones provided for the air filtration. A first one, which consists of
the water contained on the bottom of the main tank and with which the
siphon path interacts. It in practice acts as a first filter, stopping in
operative condition the macrodust, but not all of it, which deposits on
the bottom of the tank, thus consequently requiring a discontinuous
removal of the water there present, with a washing of the surfaces to
then proceed to a filling with new water. A second filtration zone is
made up of the microfilter, or absolute filter, placed on the upper part
of the machine in proximity of the air circulation entry into the rotor.

This latter would have the purpose of retaining all the residue dirt let
through the first filtration stage (water), thus freeing clean air. 
Therefore the remaining particles, still present in a great amount,
include both the small and the average size ones. Not only, but it
sometimes occurs that a certain amount of macrodirt which is not
collected during the passing in water, is able to go beyond the first
obstacle proceeding toward the next filtration stage. The problem
which can be noticed, is referred only to this latter stage, which just
and for effect of the characteristics of the residual dust coming from
the first stage, tends with excessive frequency to cause the clogging of
the microfilter or absolute filter, obliging the house-keeper to a
prompt intervention for the substitution of the same, by stopping the
apparatus and removing the filter. Very often, finally, the microfilter
is not replaced, making partly ineffective a primary function of the
apparatus, namely that of holding the microdust mites included,
preventing to free in the surrounding environment only clean air.
The purpose of this invention is also that to avoid the above-mentioned
drawbacks.
This and other purposes are reached with this innovation according to
the characteristics as in the included claims solving the arising
problems by means of a further improved vacuum cleaner apparatus
with at least three stages of dust collection, of the type with a path
partially submerged in water and provided with a separation labyrinth,
especially divided in two parts, respectively: a first upper one that
includes the support body of a suction motor unit with relative circuits,
housed in an opening coated by acoustic insulating material, and a
lower one that, including said labyrinth, consists of:
- a water container, peripherally engaged by hooking means, to said
upperly placed body;
- a cylindrical element without one end and internal to said container,
  held up along the edge, partially immersed into water, obtaining
  between the facing walls, perpendicular to the bottom, an annular
  interspace, that makes up a siphon, as a forced path of the air and/or
  the liquid sucked from the outside through sucking means;
- at least one surface that simplifies the separation of the thick dust,
  interacting with the water in which it is immersed, some openings
  being made on the base of the cylindrical element;
- a first removable deflector, placed in an almost suspended position,
  above the water containing tank and having a funnel-like shape, held
  up peripherally by the cylindrical element internal to said water
  container;
- a second deflector being shaped like an overturned funnel respect to
  the first deflector, placed above the latter and underlying to a
  microfilter or absolute-filter engaged in correspondence of the suction
  rotor;
- at least one third separation deflector, having a substantially conic
  shape, coaxially placed and overturned respect to said first one, being
  supported by a tubular upright engaged with a corresponding
  perpendicular male connection to the bottom of the container; and in
  which an intermediate filter is provided, of the type obtained in Filtren
  type sponge and the like, washable, annularly associated respect to said
  microfilter or absolute filter and held up by a support common means
  in proximity of the entry channel to the rotor's mouth.
In this way, through the considerable creative contribution whose
effect is an immediate technical progress, an ideal cleaning cycle of
the air sucked by the apparatus is completed, optimizing the previously
obtained advantages. In more detail, following the dirty air path,
starting with the upstream suction, up to when the same clean air is let
again in the environment, at least three distinguished areas or stages
are obtained, intended for cleaning the same, each of which,
progressively, tends to clean increasingly the sucked air, up to clean it
completely. The first of these, as already noticed, occurs when the
water contained in the container, where the outside airflow sucked, is
forced to run along a siphon. This stage, proceeds substantially to the
washing of the inlet air, making precipitate only the thickest dirt,
allowing the air, only partly cleaned, to proceed toward a second
filtration phase, intermediate, including a sponge filter or the like. In
this case, the dirt retained is the one having a mean thickness, and
which seems, in the totality, present in greater measure. This does not
appear at all as a problem because the filter itself, like the filter -
water, is easily removable for being subjected to a simple washing, and
therefore being let in again. Additionally, it is found that one purpose
of the intermediate air filtration stage, made up of the sponge, is also
that of retaining the type of macrodust not eliminated by the passing in
water, as the extremely volatile products (E.g. polystyrene, ashes, and
so on).

Finally, the known third stage. This, placed at the end of the suction
cycle and near to the rotor, allows the final cleaning of the air that
transports the residual dirt, consisting of extremely small particles;
from which the terminology used to identify it derives, microfilter or
absolute filter.

A second, but not last advantage, relates to a less frequent need for
ordinary maintenance, because, in this case the microfilter, not being
often clogged by the excess of residual dust from the first stage, is not
more subjected to a frequent substitution, with a comfort in use and an
indubitable time and money saving.

These and other advantages will appear from the following specific
description of a preferred solution with the aid of the schematic
drawing enclosed whose details are not to be considered as limitative
but only illustrative.

Figure 1 shows a sectional view of the vacuum cleaner apparatus,
concerning the three stages of progressive dust collection, and
downwardly including a group of deflectors, as an interacting
labyrinth for simplifying the separation of the air thus sucked, from
the water which is inside of the washing chamber.

Finally, Figure 2, is another section view of the vacuum cleaner
apparatus of Figure 1., in which the ideal path of an airflow sucked for
then being let in again, cleaned, in the surrounding environment is
shown.

Considering also the Figure as a reference, it can be noticed that an
apparatus (A), particularly a vacuum cleaner having at the same time
an air cleaner function for the hygienizing of the environments, is
essentially made up of two parts, respectively, a first one (12) including
the support body of the suction group (13), and a second one, made up
of an underlying water container (1), in whose inside it is provided at
least one filter for cleaning the air, sucked by the mentioned apparatus
(A) by means of a collection means or an external extension cord, for
example, of the elephant trunk type.

In more detail, the suction group (13), creates a hollow, making convey
inside of the apparatus (A) the air and/or the water mixed with dust
previously removed and collected outside by the user by moving the
above mentioned elephant trunk joined with a mouth (14) obtained on
the side of the container (1).
On the inside of said container (1) a cylindrical structure (3), removable, is housed, whose walls (3') are maintained at a certain distance from the facing ones (1') which thus define the container (1). It is obtained, therefore, an annular interspace (2), in whose inside, following a forced path, the air and/or the water taken from outside flow by means of the suitable elephant trunk and are subsequently transferred toward the bottom of the container (1), partially filled with water (15). During the route, the airflow (f) let in the chamber determines the stirring of the water (15), undergoing a kind of washing, which allows the separation from the airflow (f), of the -macro-dirt-, that consequently precipitates, laying time by time on the bottom of the container (1). The cylindrical structure (3), is held in suspension respect to the container (1), providing on the upper part a collar (16), almost adherent to the internal wall (1') of the container (1), which protrudes with the end portion (16') over the upper edge of the container (1), resting on it by previous interposition of a sealing gasket (17). In proximity of the base of the collar (16), a step is provided (16''), which, being made in continuity along the internal perimeter, allows a reduction of the diameter of the cylindrical structure (3), allowing, to annularly realize said interspace (2) in the underlying part. In proximity of the lower edge or base (3''), instead, which is immersed into water (15) let into the container (1), the structure (3), provides a surface (21) where there is a plurality of openings (21') which allow the airflow (f) let into the interspace (2), being this the part immersed into water which makes up together with the lower edge or base (3'') the siphon, the passing and the proceeding toward the following dust collection stages.

With the purpose of preventing the migration of the water toward the
top of the apparatus (A), both because of the suction process of of the
airflow (f) and of the stirring, a first deflector suspended device (4) is
provided, which is supported by a prominent small edge (5) which
overlaps the step (16") of the structure (3) to then vertically continue
with the wall (5'), parallel and adjacent to the collar (16). In more
detail, the device (4), like the other both metallic and plastic deflectors,
is obtained according to a particular funnel-like shape, which for the
part of air mixed with water, exceeding the central portion, allows its
homogenous distribution along the internal walls (3') of the washing
chamber (1-3). This condition, allows the water abatement, that falls on
the bottom of the container (1), while a part of the cleaned airflow, laps
the converging walls of the deflector (4) to then proceed, together with
the central flow (f), toward the suction mouth. For other reasons, the
funnel-like shape, involving a reduction of the outflow channel
diameter in proximity of the mouth, allows an even distribution of the
airflow (f) directed upwardly. Additionally, peripherally to the first
deflector (4), there may be associated a sealing gasket, that allows the
latter to adhere perfectly to the walls of the collar (16) of the chamber
(3).

A second deflector (6), is placed exactly above the first one (4), and has
an analogue conic shape. In more detail, said second deflector (6) is
overturned respect to the first one, in order to project the part of wider
diameter (6') downwards, while, the circular bottom (6'\) with a slight
central hollow, holds a cup (7) for supporting at least one microfilter or
absolute filter (18) provided in correspondence of the suction drawhole
(19) of the motor unit (13). Furthermore, in a preferred solution, it can
be noticed that in the deflector (6), the diameter of the conic part (6') is
larger than the diameter found in correspondence of the mouth of the
first deflector (4). Regarding the microfilter (18), being also known as
filter of the absolute type, it may be housed along the supporting base
fixed on the same plane of the motor unit, and held by eventual radial
and concentrical means that compress it against said underlying cup
(7) which has also the function of defining a channel for the forced
outflow of the sucked air (f) toward the rotor for letting it again in the
environment.

Finally, there is a third deflector (8) which supports simultaneously the
group deflector (6), cup (7), microfilter (18) and intermediate filter
(20). This is made up of a conic body essentially bell-like placed, whose
base diameter (8') corresponds roughly to the diameter of the lower
opening of the first deflector (4). The height of said conic element (8),
additionally allows it to be placed coaxially to the first deflector (4),
partially protruding along the same and leaving a considerable
perimetrical interspace for the upward outflow of the sucked air (f).

Integral with the conic body (8), a perpendicular upright (9) is
obtained, tubular, whose length is greater respect to the height of the
single cone (8). Thus the spacing of the deflector (8), from the bottom
(21) of the container (3), being in suspension is obtained. Regarding
the positioning of the deflector (8), it is centrally provided, on the
bottom (21) of the container (3), a male connection (10), that stands
perpendicularly, able to be coaxially inserted inside of the tubular
upright (9). Further, it is noticed that the upright (9), extends from
over the apex of the cone (8), obtaining with the terminal (9') a male
connection, for being housed inside of a female bush (11) obtained
centrally and monolithically from the shape of the second deflector (6),
as well as allowing simultaneously the support of the latter.

According to this teaching, it has been noticed that it is the same
surface of the deflector (6) that on the extrados allows the supporting
of the microfilter (18) by the interposition of a cup-like support (7).
The latter, is provided on the intrados of an alignment cone (7'), around
which the microfilter or absolute filter (18) is housed. The cup (7)
realizes peripherally a ring, exceeding the size of the microfilter (18),
with the tilted walls (7") externally followed by a protrusive and on
level annular edge (7"'), which ends far from the facing wall (5') as the
upper part of the first deflector (4). Between the edge (7"') of the cup
(7) and the underlying surface of the body (12) which supports the
motor unit (13), an interspace or air outflow channel is obtained (f), in
whose inside an intermediate filter (20) is housed. The characteristic of
said filter (20), is that it is placed between the underlying air washing
chamber (1-3), and the microfilter or absolute filter (18), in such a way
to stop not only the dust and dirt generally having a mean size, but also
the macrdirt, for many causes not retained in the underlying siphon
path of the container (1). The filter (20), in more detail, is of the type
obtained in sponge or the like having a completely open cell structure,
so that eventuality the filter (20) if necessary may be removed, suitably
washed and again let into the apparatus (A). In this case, the material
preferably used for the realization of the filter (20), may be Filtren,
with variable porosity, consisting of reticulated polyurethanic foams
based on a polyether polyol.
A peculiarity which both the microfilter (18) and the intermediate
filter having a completely open cell structure (20), is that it does not
provide separated gaskets, but it provides some suitable integrate
surfaces (18') and (20'). In more detail, both filters (18) and (20), had
been previously partially put into a bath of PVC-foam type material,
concerning a portion of ring-like surface both of the upper and of the
lower side and partially the edges. This in conclusion allows to obtain surfaces (18') and (20') with a high degree of water penetration resistance.
1. Further improved vacuum cleaner apparatus with at least three stages of dust collection, essentially divided in two parts, respectively; an upper one that includes the support body (12) of a suction motor unit (13) with relative circuitry, housed in an opening coated by acoustic insulating material, and a lower one in which it is provided a forced path of the airflow (f) sucked from the outside by sucking means, characterised in that said path concerns respectively:
   - a first stage including a siphon, being provided on the bottom of a container (1), of the water (15);
   - a second stage, including an intermediate filter (20) placed along the outflow channel that leads to the rotor of the suction motor unit (13);
   - a third stage, including a microfilter or absolute-filter (18) engaged in correspondence of the suction rotor and concentrical to the intermediate filter (20).

2. Further improved vacuum cleaner apparatus with at least three stages of dust collection, of the type with a path partially submerged in water and provided with a separation labyrinth, essentially divided in two parts, respectively; a first upper one that includes the support body (12) of a suction motor unit (13) with relative circuitry, housed in an opening coated by acoustic insulating material, and a lower one that, including said labyrinth, consists of:
   - a water container (1), peripherally engaged by hooking means, to said body placed on the upper part (12);
   - a cylindrical element (3) without one end and internal to said container (1), held up along the edge, partially immersed into water (15), obtaining between the facing walls (1'-3'), perpendicular to the bottom, an annular interspace (2), involving a siphon, as the forced
path of the airflow (f) and/or of the liquid sucked from the exterior by
suction means;
- at least one surface (21) that simplifies the separation of the thick
dirt, interacting with the water (15) in which it is immersed, some
openings (21') being made on the base of the cylindrical element (3);
- a first removable deflector (4), placed in suspended position, above
the retaining tank (1) of the water and internal to the cylinder (3),
having a funnel-like shape, held up peripherally by said cylindrical
element (3) internal to the water container (1);
- a second deflector (6) being shaped like an overturned funnel respect
to the first deflector (4), placed above the latter and underlying a
microfilter or absolute-filter (18) engaged in correspondence of the
suction rotor;
- at least a third deflector (8), having a substantially conic shape,
coaxially and overturned placed respect to said first one (4), being
supported by a tubular upright (9) engaged to a corresponding male
connection (10) perpendicular to the surface (21) of the cylinder (3)
according to claim 1a., characterised in that it provides an intermediate
filter (20), of the type obtained in sponge with a completely open cell
structure, washable, annularly associated respect to said microfilter or
absolute filter (18) concerning the entry channel to the rotor's mouth,
for again letting the airflow (f) in environment.
3. Apparatus according to claims 1. and 2., characterised in that it is the
same surface of the deflector (6) that allows on the extrados, the
support of the microfilter (18) and intermediate filter (20) by the
interposition of a cup-like support (7).
4. Apparatus according to previous claims, characterised in that said
cup-like support (7) realizes peripherally a ring, exceeding the size of
the microfilter (18), with a protrusive annular and on level edge (7'"'), which ends far from the facing wall (5') as upper part of the first deflector (4), and in which between the edge (7'"") of the cup (7) and the underlying surface of the body (12) supporting the motor unit (13), an interspace or air outflow channel (f) is obtained, in whose inside an intermediate filter (20) is housed.

5. Apparatus according to previous claims, characterised in that the cup (7) on the intrados is equipped with, an alignment cone (7''), around which the microfilter or absolute filter (18) is housed.

6. Apparatus according to previous claims, characterised in that said intermediate filter (20), is interposed along the outflow path of the air (f) between the air washing underlying chamber (1-3), and the microfilter or absolute filter (18).

7. Apparatus according to previous claims characterised in that the second deflector (6), is placed exactly above a first one (4), and analogously has a conic shape, overturned respect to the first one, in order to offer downwardly the part having wider diameter (6''), while, the circular bottom (6'') with a slight central hollow, holds up a cup (7) supporting a microfilter or absolute filter (18) provided in correspondence of the suction drawhole (19) of the motor unit (13).

8. Apparatus according to previous claims, characterised in that a third deflector (8) supports simultaneously the group deflector (6), cup (7), microfilter (18) and intermediate filter (20).

9. Apparatus according to previous claims, characterised in that the third deflector (8), being made up of a conic body partially coaxial to the first deflector (4) and presenting, integral with the same, a perpendicular upright (9), tubular, whose extension is greater respect to the height of the single cone (8), is held up by a male connection
(10), that stands perpendicularly from the bottom (21) of the cylinder-like structure (3), coaxially inserted in the upright (9) which extends beyond the apex of the cone (8), realizing with the terminal (9') its own male connection for being housed inside of a female-bush (11) obtained centrally and monolithically from the shape of the second deflector (6), as well as allowing simultaneously the support of the latter.

10. Apparatus according to previous claims, characterised in that the filter (20), is of the type obtained from reticulated polyurethanic foams based on a polyether polyol.

11. Apparatus according to previous claims, characterised in that both the microfilter (18) and the intermediate filter with completely open cell structure (20), provide some integrate surfaces (18') and (20') functioning as gasket, both filters (18) and (20), having been previously inserted, partially, in a bath of PVC-foam type material, concerning at least one ring-shaped surface portion both of the upper side and of the lower side and partially along the edges.
Fig. 1
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A47L9/18 //A47L9/12

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 A47L

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 practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>WO 96 28082 A (W S S P A : PIETROBON SILVANO (IT)) 19 September 1996</td>
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<td>A</td>
<td>see page 8, line 9 - page 11, line 5; figure 4A</td>
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* Special categories of cited documents:

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*"A" document member of the same patent family

Date of the actual completion of the international search

13 January 1998

Date of mailing of the international search report

30.01.98

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Laue, F

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