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I-33170 Pordenone (IT)(54) **Improvement in a carpet cleaning/shampooing machine.**

(57) Carpet cleaning/shampooing machine wherein part of the exhaust air is intercepted by a cover (7a) located downstreams of the exhaust grille (7), and is sent through a further conduit (13) to an appropriate

nozzle (14) located so as to be almost in contact with said liquid detergent ejection nozzle (12) in a substantially orthogonal arrangement with respect thereto.

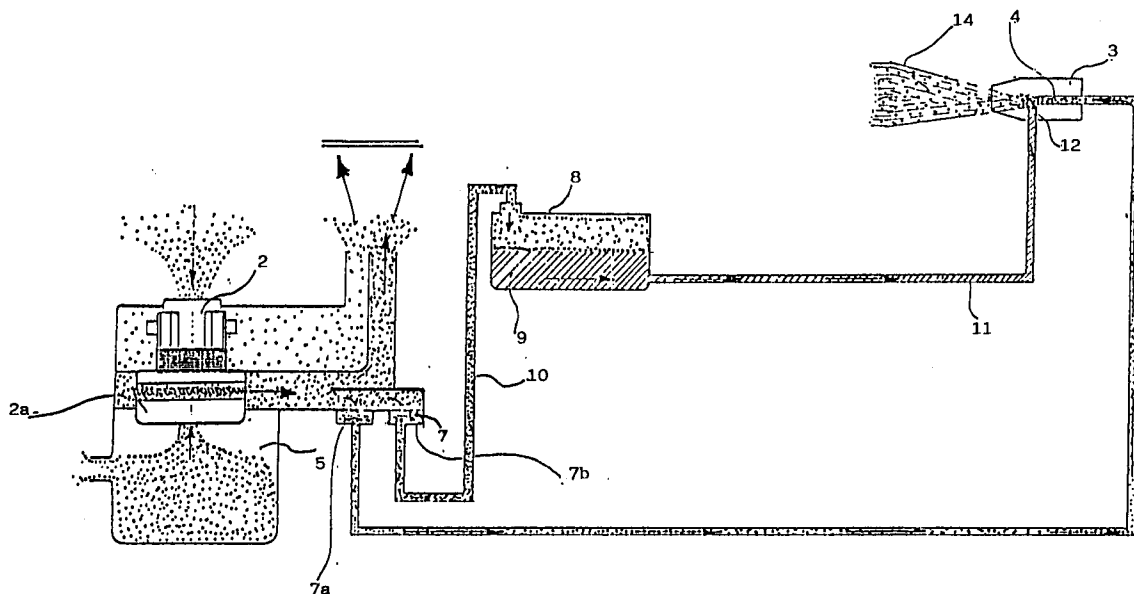


FIG. 2

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The present invention relates to an improvement in a carpet cleaning/shampooing machine comprising an apparatus to distribute and spray a liquid detergent medium onto carpets, moquettes or similar surfaces, and to then withdraw by suction said liquid detergent medium after the latter has performed its cleaning duty.

Carpet cleaning/shampooing machines are universally known, which are provided with a reservoir containing liquid detergent for sprinkling under atomization over the surface to be cleaned by means of an electric pump that withdraws said liquid detergent from said reservoir and sprays it under high pressure, in view of achieving the desired atomization effect, onto the surface to be treated.

After having been in such a way wetted by the liquid detergent, the surface to be cleaned is in some way agitated so as to enable the liquid detergent to more adequately develop its cleaning action. Thereupon, the liquid detergent is removed by means of a second suction pump.

This method of operation of said carpet cleaning/shampooing machines is well-known and time-proven, while the thereby achievable cleaning effect is unfailingly assured and satisfactory.

However, this method of distributing the cleaning detergent liquid makes it necessary to use a pump having particular operating and design specifications, as well as provided with all the associated control components pertaining thereto.

All this leads to an easily understandable drawback of a complication both in construction and manufacturing, a lower level of inherent reliability, as well as added costs. Especially the latter aspect is of particular significance in this industry and market segment which, as anyone in the industry is well aware of, is extremely competitive.

In view of removing all these drawbacks, a method for distributing the liquid detergent medium has been devised and proposed, which does away with the use of the afore cited delivery pump for sprinkling said liquid under pressure.

This method consists in using part of the suction air exhausted by the machine for conveying it into the reservoir containing the liquid detergent medium. This reservoir, that in a most appropriate way is given a sealed air-tight construction, is then slightly pressurized and the pressure that in this way builds up inside the reservoir is in most cases sufficient to drive said liquid detergent medium into a specially provided conduit ending in a diffusion mouth piece from which the liquid detergent medium flows out under the effect of the afore cited pressure building up inside the reservoir.

However, this method for distributing the liquid detergent medium onto the surface to be cleaned

suffers from a number of drawbacks deriving basically from the fact that the pressure induced by the air exhausted by the machine into the afore cited reservoir is very small, so that, while it is sufficient to cause the liquid detergent medium to flow through the channel leading to said diffusion mouth piece, the cleaning solution will not be ejected from this mouth piece in the form of an atomized jet, but rather caused to simply fall by gravity down onto the surface to be treated, where as no possibility is available to either widen the outflowing jet so as to accelerate the surface treatment process in progress or, least of all, to achieve some effectiveness in penetrating the structure of the fibres.

An improved embodiment of the afore described method relies on the utilization of a diffusion mouth piece having special characteristics, as well as the negative pressure that is created inside said diffusion mouth piece. As a matter of fact, it is a well-known fact that the so-called cleaning mouth piece of carpet cleaning/shampooing machines, ie. that portion of said machines which comes into direct contact with the surface to be cleaned, has such a shape that, when it is laid in contact with said surface, a practically sealed chamber is created, apart from the porosity of the fabrics. Now, through an appropriate conduit, the suction pump, ie. the pump that extracts the liquid and all other particles to be removed from the surface, is enabled to act in this sealed chamber.

Since this sealed chamber is in this way brought in a depressurized condition, ie. a condition in which a substantially negative pressure prevails, this negative pressure state is also used to bring about a certain effect of suction of the liquid detergent medium from said delivery conduit and, therefore, to boost and improve the detergent distribution and diffusion effect.

However, even this improved method does not fail to suffer from certain drawbacks, since said suction effect that is brought about to extract the liquid detergent from the related delivery conduit is in all cases very modest and, furthermore, as soon as the user lifts the mouth piece from the floor or the surface, or when he/she fails to position it correctly against the surface, said depressurization effect almost immediately disappears and, as a consequence, the arrival of liquid detergent medium practically stops simultaneously.

Furthermore, if a need arises to clean a surface that lies at some height above the floor, such as a sofa, it will in this case be necessary that the cleaning and suction sput be lifted to the corresponding height. This means that the pressure of the air inside the detergent reservoir should also overcome the pressure due to the column of water corresponding to the difference between the height

at which the detergent medium reservoir is situated and the height to which the mouth piece is actually brought; anyone skilled in the art knows that, as even a layman is able to most easily verify, if the mouth piece is lifted beyond a certain height above the level at which the carpet cleaning/shampooing machine is resting, any arrival of liquid detergent medium would therefore most immediately cease and, as a consequence, there would simply be no further cleaning function.

It is therefore desirable, and it is actually the purpose of the present invention, to provide a carpet cleaning/shampooing machine offering the possibility of ensuring the distribution, the atomization and the diffusion of the liquid detergent medium onto the surface to be cleaned without any need arising to use a special delivery pump to this purpose, while at the same time avoiding incurring the above cited drawbacks.

For a better understanding, the invention will be further described by way of non-limiting example with reference to the accompanying drawings in which:

- Figure 1 is a perspective, partially sectioned view showing schematically a carpet cleaning/shampooing machine according to the invention;
- Figure 2 is a schematical view of the air and detergent circulating circuits in a carpet cleaning/shampooing machine according to the invention.

The invention essentially consists in the utilization of the air that is exhausted by the machine, after due filtration, and in conveying it through an appropriate conduit to a point which is exactly in correspondence of the location at which the detergent medium flows out from the related nozzle arranged at the end of the delivery conduit leading from the detergent reservoir to said mouth piece.

Usually, said nozzle is arranged within the suction and cleaning mouth piece.

In such a way, between the detergent ejection nozzle and the nozzle provided for pumping the exhaust air being appropriately filtered and recirculated, a configuration is created which is particularly favourable in view of promoting the occurrence of the well-known "Venturi effect".

As anyone who is skilled in the art is well aware of, the occurrence of said effect causes a state of negative pressure to prevail in correspondence of the surface on which a fluid flows, and brings about a corresponding effect of suction from a nozzle that vents onto said surface on which said negative pressure prevails.

Referring now to Figure 1, it can be noticed that it shows, partially cross-sectioned, a carpet cleaning/shampooing machine 1 comprising a suction motor 2 which, through a blower 2a, draws in

the dirty air and liquid mixture picked up by the mouth piece 3 through an appropriate conduit 4 and sends it to a recovery reservoir 5.

The liquid sets down on the bottom of said reservoir 5, whereas the air is appropriately filtered through the filter means 6 and sent again outside through an appropriate exhaust grille 7.

Downstreams of said exhaust grille 7, two separate covers 7a and 7b are provided, the function of which will be described further on.

The reservoir 8 containing the liquid detergent medium 9 is connected to a respective cover 7b through a conduit 10 which, as previously described, is instrumental in slightly pressurizing said reservoir 8, so as to drive the therein contained liquid detergent medium 9 toward the mouth piece 3 through an appropriately provided conduit 11 for ejection through the nozzle 12 shown in Figure 2.

The invention consists in recovering at least part of the air being exhausted under a light pressure through the grille 7, and intercepted by a respective cover 7a, so as to convey it through an appropriate conduit 13 into said mouth piece 3.

As shown in Figure 2, said conduit 13 ends in a nozzle 14 which lies adjacent to the afore cited liquid detergent ejection nozzle 12 in an orthogonal arrangement with respect thereto. The ultimate effect of this mutual arrangement of the two above cited nozzles is that the liquid ejected by the nozzle 12 intersects the jet of air blowing out of the nozzle 14, thereby generating the afore cited "Venturi" suction effect.

In this way, a jet of atomized liquid detergent medium 15 is produced, which is much alike the atomized jet that can for instance be achieved with a spray gun.

It is apparent that the two covers 7a and 7b, which for constructional reasons might also be combined into a single cover, preferably obtained in the form of a plastic moulding, would be of hindrance to said air exhaust function when the carpet cleaning/shampooing machine is operating in a "vacuum cleaning" mode and not in its "shampooing" mode. As a matter of fact, when the machine is operated in its "vacuum cleaning" mode, it is on the contrary necessary that said air exhaust be as free as possible so as to optimize the suction effect of the blower.

It therefore is an advantageous improvement of the present invention to provide said covers 7a and 7b in such a way as to enable them to be removable, ie. to enable them to be installed or removed according to the above cited modes of operation of the machine.

Since the afore described invention is embodied in a simple, economical and performance-effective way, its implementation is such as to provide a carpet cleaning/shampooing machine

which fully meets the afore cited reliability, manufacturability, performance and cost-effectiveness requirements.

It will be appreciated that the embodiments of the invention that have been described above with reference to the accompanying drawings are to be considered as having been described by way of non-limiting examples of the invention and that, therefore, they may be the subject of any modifications considered to be appropriate, without departing from the scopes of the invention.

Claims

1. Carpet cleaning/shampooing machine comprising a blower (2a) to draw in the dirty air and liquid mixture removed from the surface to be cleaned, a motor (2) for driving said blower, a recovery reservoir (5) in which said drawn-in dirty air and liquid mixture are collected through a conduit (4), a suction mouth piece (3), a filter means (6) for retaining contaminants and dirt from said air, at least a grille (7) through which said air collected in said recovery reservoir (5) and filtered through the filter (6) is exhausted outside, a reservoir (8) for containing the liquid detergent medium (9), a delivery conduit (11) for delivering said liquid detergent medium to an ejection nozzle (12), **characterized in that** at least part of said exhaust air is intercepted by a cover (7a) located downstream of said exhaust grille (7), and is sent through a further conduit (13) to an appropriate nozzle (14) which is located almost in contact with said liquid detergent ejection nozzle (12) in a substantially orthogonal arrangement with respect thereto.
2. Carpet cleaning/shampooing machine according to claim 1, **characterized in that** a further part of said exhaust air is intercepted by a respective cover (7b) and sent through a conduit (10) into said liquid detergent containing reservoir (8).
3. Carpet cleaning/shampooing machine according to claim 2, **characterized in that** both said liquid detergent ejection nozzle (12) and said nozzle (14) ejecting the air from the exhaust through the conduit (13) are situated inside said suction mouth piece (3).
4. Carpet cleaning/shampooing machine according to any of the preceding claims, **characterized in that** said cover (7a), which may possibly be combined with the cover (7b), is removable according to the particular mode of operation of the machine.

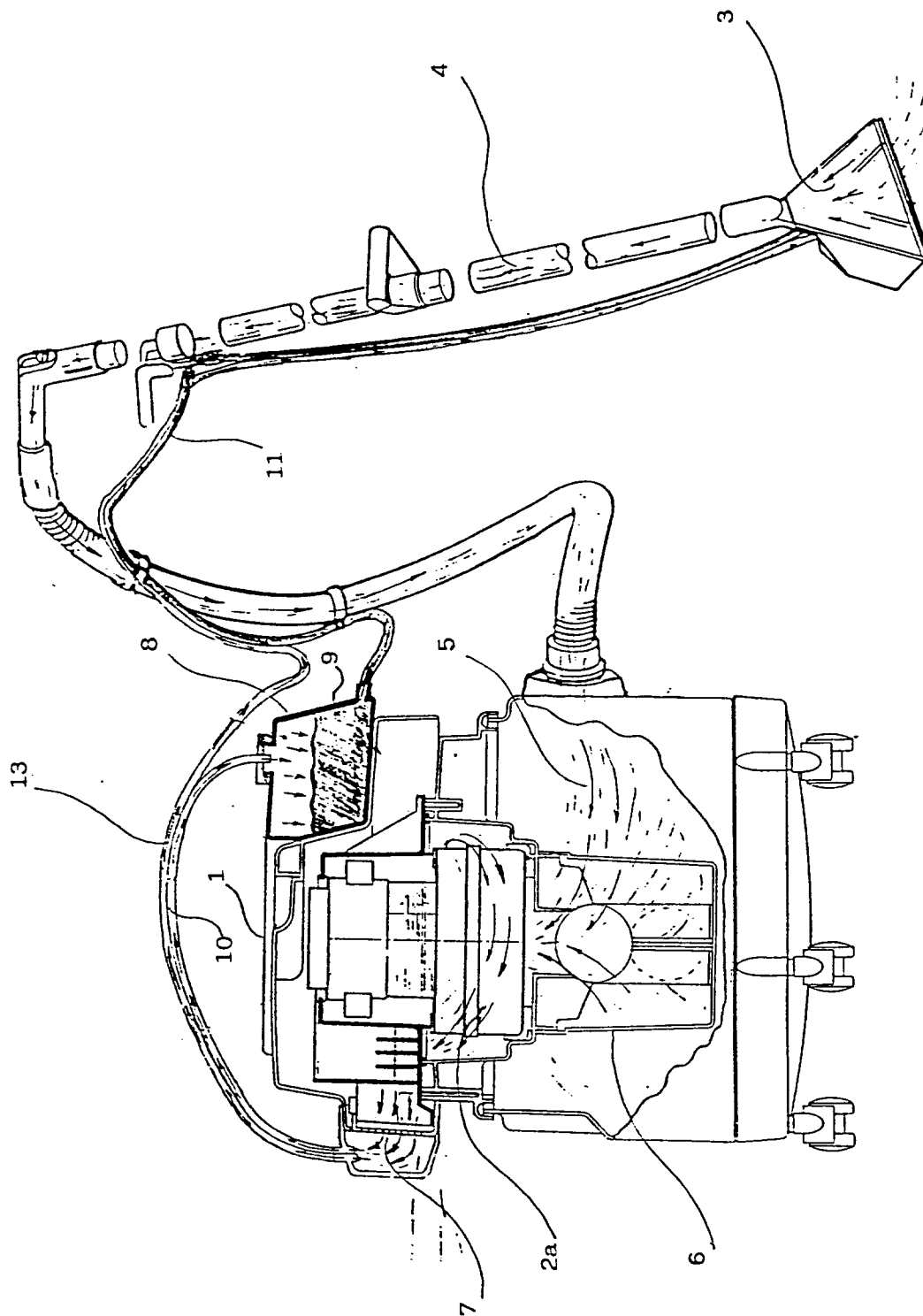


FIG. 1

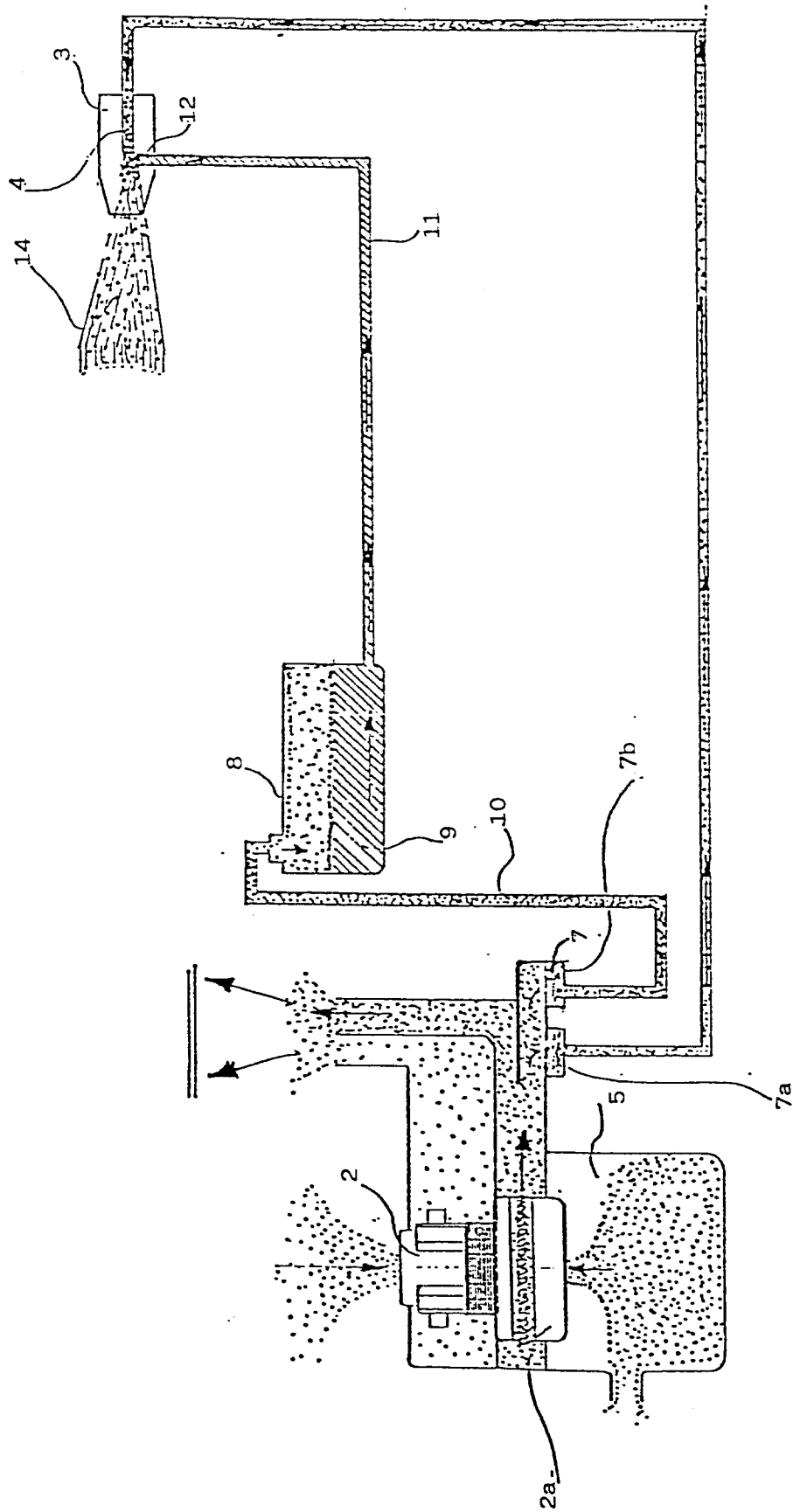


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 5256

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 430 415 (W.H. WILLIAMS) * column 7, line 55 - column 9, line 32; figures 5,8 *	1,2	A47L11/34
A	DE-U-8 513 126 (K. FASSE) * claims; figure 1 *	1-3	
A	FR-A-2 634 996 (C. GALLEY) * the whole document *	1-3	
A	GB-A-2 031 270 (BIGGLESWADE DEVELOPMENTS LTD) * the whole document *	1-3	
A	NL-A-7 002 080 (ELECTROLUX AB) * page 3, line 13 - page 4, line 31; figure 4 *	1-3	
A	CH-A-675 674 (A. NEGRI) * claim 5; figures 2,3 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A47L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 JANUARY 1993	Examiner M. VANMOL
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