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(54) **Vacuum cleaning apparatus with high filtering power**

(57) Vacuum cleaning apparatus with high filtering power comprising an outer housing operatively connected to air sucking, filtering and passage means, where said housing has a water collecting reservoir operatively connected to said sucked air passage means and to baffle means opposing said passage, so as to obtain a complete nebulization of at least a portion of the water into the sucked air, before the so obtained flow passes through said filtering means.

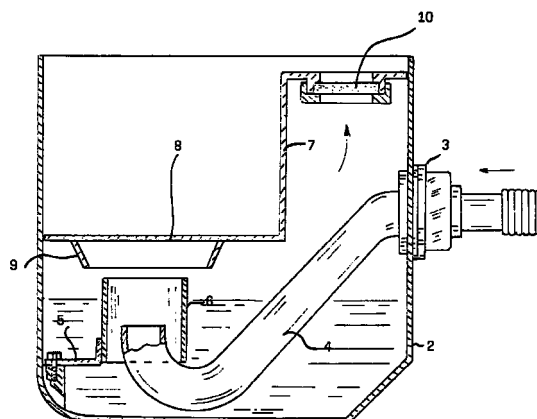


Fig.2

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Description

[0001] The present invention relates to a vacuum cleaning apparatus with high filtering power.

[0002] The recent vacuum cleaning apparatus both for household and industrial use are generally provided with a plurality of filters to ensure good quality of air coming out from the apparatus.

[0003] It is indeed important that air ejected downstream of the sucking motor does not contain suspended particles, impurities and the like, these being matter that should be kept in the filters in order to ensure a high quality cleaning effect.

[0004] The vacuum cleaners of the state of the art generally are provided with one or more filters even of a different kind, arranged in cascade upstream of the sucking motor and another filter downstream of said motor. These filters may be carried out in various ways by means of layers of dense non woven fibers, layers of materials with suitable antistatic features, active coal and so forth. In these vacuum cleaners air is purified by several passes, while the dust particles are collected in filters or suitable interchangeable bags.

[0005] Recent solutions proposed water as further filtering element to knock down and catch within the filters, with greater efficiency the particles sucked by the vacuum cleaner. Although these known solutions solve the mentioned technical problem, they have the following drawbacks.

[0006] The conventional vacuum cleaners cannot achieve a perfectly clean air because number and quality of the filters to be used, very often are not suitable to capture the particles of very little diameter.

[0007] Vacuum cleaners using also water as a working fluid, do not succeed to be substantially better than the above mentioned simpler and cheaper types, because water is simply mixed with air so that it cannot be an efficient filter for the dust particles present in the environment.

[0008] The object of the present invention is to overcome the drawbacks afflicting the mentioned prior art devices.

[0009] Object of the invention is therefore to provide a vacuum cleaning apparatus with high filtering power, easy to be manufactured, very efficient in collecting even the finest dust particles, of reliable operation, simple maintenance and with low production costs.

[0010] In few words, according to the present invention a vacuum cleaning apparatus with high filtering power comprises an outer housing operatively connected to air sucking, filtering and conveying means wherein said housing is provided with a water reservoir operatively associated with said sucked air conveying means and baffle means opposing air passage so as to obtain a complete nebulization of at least a portion of water into the sucked air, before the so obtained flow passes through said filtering means.

[0011] The vacuum cleaning apparatus with high filtering power according to the invention is characterized by the features recited in Claim 1.

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[0012] The vacuum cleaning apparatus according to the invention is comprised of several parts with improved maintenance because said outer housing has a transparent envelope connected to a head, where said envelope has a partially crowned frustum-conical base adapted to be joined to a mobile support plate and a cylindrical body having also the function of water reservoir, while the head comprises said sucking means and part of the air filtering means.

[0013] Water nebulization is obtained in an optimized way because over the transparent envelope a tray is arranged, consisting of two circle portions arranged on different planes and connected by a vertical portion, said tray being provided with said baffle means on the lower surface of the portion with greater area, said baffle means comprising a frustum-conical surface concentric with an injector connected to said transparent envelope and leading to a retaining surface.

[0014] The filtering operation of the filters is made lighter as a decanter is arranged above the tray, having a complementary shape with said tray, and with further passage means such as a hole connected with the tray, lateral walls with cylindrical development for deposit of impurities and mechanical means for connection with said head.

[0015] The vacuum cleaning apparatus of the invention has a very noiseless operation as said envelope is provided with a sucked air inlet consisting of a plurality of layers of sound absorbing material.

[0016] Further features, advantages and details of the vacuum cleaning apparatus with high filtering power according to the invention will be more apparent by reading the following detailed description made with reference to the accompanying drawings in which a preferred embodiment as a non limiting illustrative example is shown.

Fig. 1 is a perspective view of the vacuum cleaning apparatus of the invention;

Fig. 2 is a sectioned lateral view of some elements of the vacuum cleaning apparatus; and

Fig. 3 is an exploded perspective view of the vacuum cleaning apparatus shown in Fig. 1.

[0017] With reference to the figures of the accompanying drawings, the vacuum cleaning apparatus 1 with high filtering power according to the invention, comprises an outer housing preferably formed by an envelope 2 made of transparent plastic material and a head 12.

[0018] The envelope 2 has a frustum-conical base 16 which is crowned for a portion of its lateral surface and is connected to a mobile support plate 17 by screws or equivalent mechanical fastening means.

[0019] The body of the envelope 2 is cylindrical and on its lateral surface is provided with an inlet 3 to which

a corrugated sucking tube 18 is externally connected, at the free end of which the conventional fittings of a vacuum cleaner are connected (not shown on the drawings).

[0020] The inlet 3 is silenced as it is made of two blocks of sound absorbing material. The inlet is also connected inside the cylindrical body of the envelope 2 to a descending diagonal duct 4, whose lower end is directed upwards after a U bend.

[0021] The duct 4 is associated with a support ring 5 which is fixed to the base 16 by screws or equivalent mechanical fastening means. The support ring 5 holds a cylinder or injector 6 in a position concentric with the lower opening of the duct 4. The cylinder or injector 6 has the function of conveying upwards a mixture consisting of water present inside the envelope 2 and sucked air, as it will be better explained hereinafter.

[0022] On the envelope 2 a tray 7 is arranged, with a diameter slightly less than the diameter of the envelope but with its surface offset on two different planes connected by a vertical portion.

[0023] More particularly the surface comprises two portions of a circle, the one with a larger area and the other with a smaller area, where the portion of larger area is arranged in the lower position and after the tray 7 has been placed over the envelope 2, has a lower frustum-conical surface 9 concentric with the injector 6 and ending with a retaining surface 8. The portion of smaller area has a through hole in which a filter 10 is arranged, holding a first part of the sucked impurities, when the nebulized water passes through the sucked air, as described hereinafter.

[0024] A counter tray or decanter 11 of a complementary shape with the tray 7, is placed over said tray and has a circular hole flush with the above illustrated filter 10. Such decanter has lateral walls with cylindrical development for collecting the very fine particles as it will be described hereinafter.

[0025] On the decanter the head 12 is arranged, comprising a motor 14 of known type supporting a microfilter 13 with filtering power, an extremely fine outlet filter 15 to ensure a perfect purification of air coming out from the present apparatus, the electric supply and the control panel.

[0026] The head 12 is fixedly connected to the decanter 11 by a screw or equivalent mechanical fastening means and is then fixed to the transparent envelope 2 by means of known hooks not shown in the drawings.

[0027] Before starting the working cycle, water is poured or sucked inside the transparent envelope 2 used as a tank, so that its level is some centimeters higher than the level of the lower end of duct 4, but not higher than the level of the upper end of injector 6.

[0028] Then the various components of the apparatus are assembled, if required and the electric motor is actuated by the control panel.

[0029] The motor generates inside the apparatus 1

such a vacuum as to allow suction of air by the corrugated tube 18 at its free end not shown in the drawings. Sucked air then passes through the inlet 3 and the duct 4, reaching the partially flooded injector 6.

[0030] Mixed water and air therefore flow upwards and guided by the frustum-conical surface 9 impact the retaining surface 8 of the tray 7. This flow of air and water is balanced and stabilized by the crowning of the base 16, which is generating a virtual cylinder concentric to injector 6.

[0031] At this point passage through microfilter 13 will withhold other impurities while air will subsequently flow through filter 15 for a further purification.

[0032] It is to be pointed out that in comparison with the conventional vacuum cleaning devices, the sucked particles and powders are withheld with optimal efficiency in view of the properties of the nebulized water, which allows more particularly precipitation of these particles and powders on the walls of decanter 11, thus making easier the operation of the traditional filters.

[0033] Finally the vacuum cleaning apparatus of the present invention is not only environmentally friendly for its operation features but also versatile, because it allows use of many accessories known in this field, such as those ejecting water before suction but it is also possible its use as simple air purification device.

[0034] It is of course possible to make many modifications, adaptations, integrations, variations and substitutions to the embodiment previously described as an illustrative, non-limiting example, without departing however from the scope of the present invention as defined in the appended claims.

Claims

1. Vacuum cleaning apparatus with high filtering power comprising an outer housing, operatively connected to air sucking, filtering and conveying means, characterized by the fact that said housing is provided with a water collecting reservoir operatively associated with said means for conveying the sucked air and with baffle means opposing the air passage, so as to obtain a complete nebulization of at least a portion of water into the sucked air, before the so obtained flow passes through said filtering means.
2. Vacuum cleaning apparatus with high filtering power according to Claim 1, characterized by the fact that said outer housing comprises a transparent envelope (2) connected to a head (12), said envelope (2) having a partially crowned frustum-conical base (16) adapted to be joined to a mobile support plate (17) and a cylindrical body having also the function of said water collecting reservoir, while said head (12) comprises said sucking means and part of said air filtering means.

3. Vacuum cleaning apparatus with high filtering power according to Claim 2, characterized by the fact that said transparent envelope (2) is provided with a part of said conveying means, namely an inlet (3) arranged on its lateral wall, said inlet being connected outside to a sucking tube (18) and inside to a duct (4) associated near its free end to a support ring (5) holding an injector (6). 5
4. Vacuum cleaning apparatus with high filtering power according to Claim 2, characterized by the fact that over the transparent envelope (2) a tray (7) is arranged, said tray comprising two portions of a circle on different planes and of different area connected by a vertical portion. 10 15
5. Vacuum cleaning apparatus with high filtering power according to Claim 4, characterized by the fact that said tray (7) has the baffle means arranged on the lower surface of its portion with larger area, where said baffle means comprise a frustum-conical surface (9) concentric with the injector (6) leading to a retaining surface (8) while the portion with smaller area is provided with other passage means and part of the filtering means such as a hole in which a filter (10) for the passage of said sucked flow in a decanter (11) arranged above the tray (7). 20 25
6. Vacuum cleaning apparatus with high filtering power according to Claim 5, characterized by the fact that said decanter (11) has a complimentary shape with said tray (7) and is provided with further passage means such as a hole connecting with the tray (7), lateral walls with cylindrical development for deposit of impurities and mechanical means joining said head (12). 30 35
7. Vacuum cleaning apparatus with high filtering power according to Claim 2, characterized by the fact that the head (12) is provided with a motor (14) supporting a microfilter (13), an outlet filter (15), electric supply means and a control panel. 40
8. Vacuum cleaning apparatus with high filtering power according to Claim 3, characterized by the fact that said inlet (3) consists of a plurality of layers of a sound absorbing material. 45

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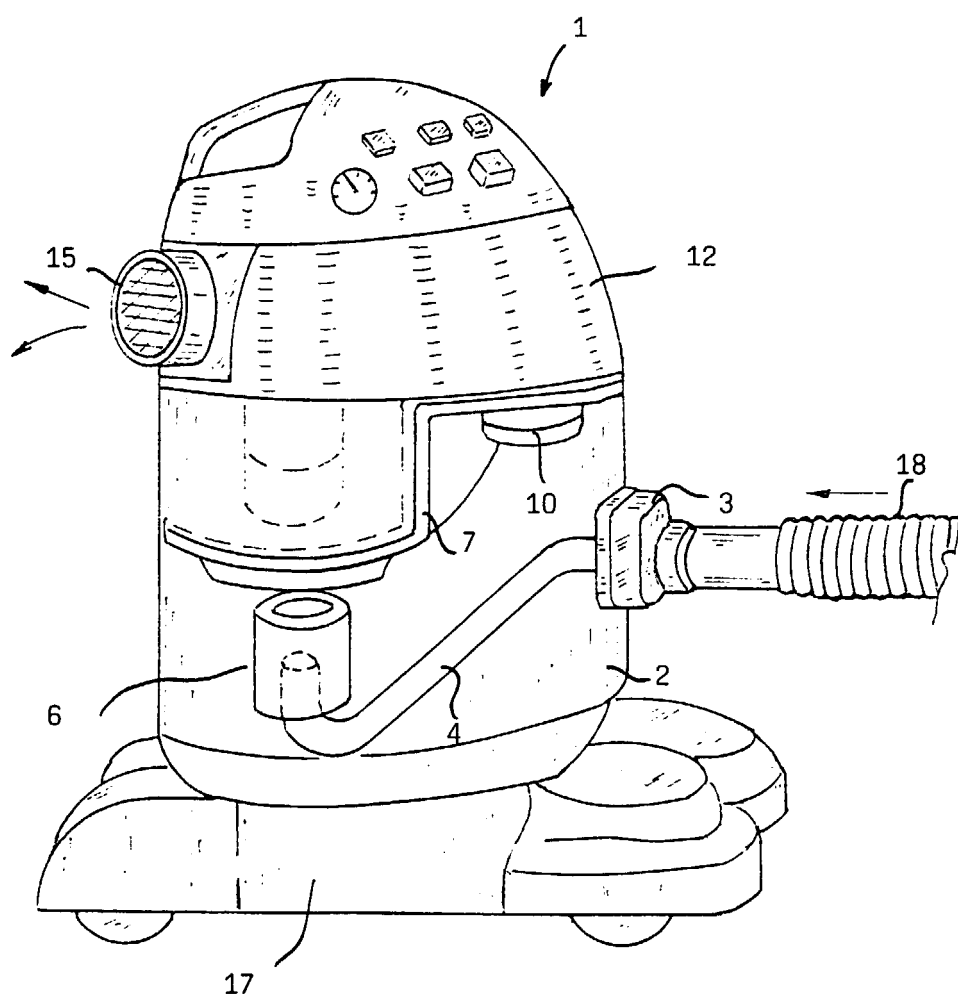


Fig. 1

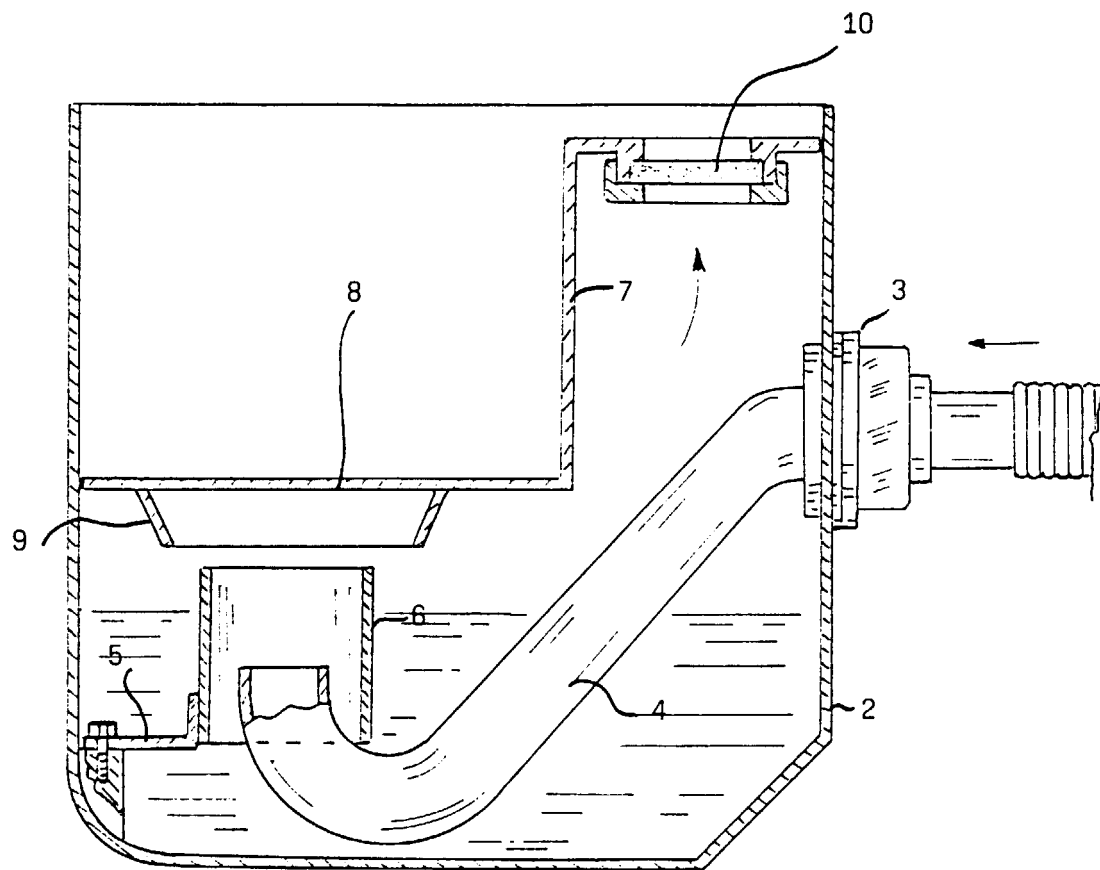


Fig.2

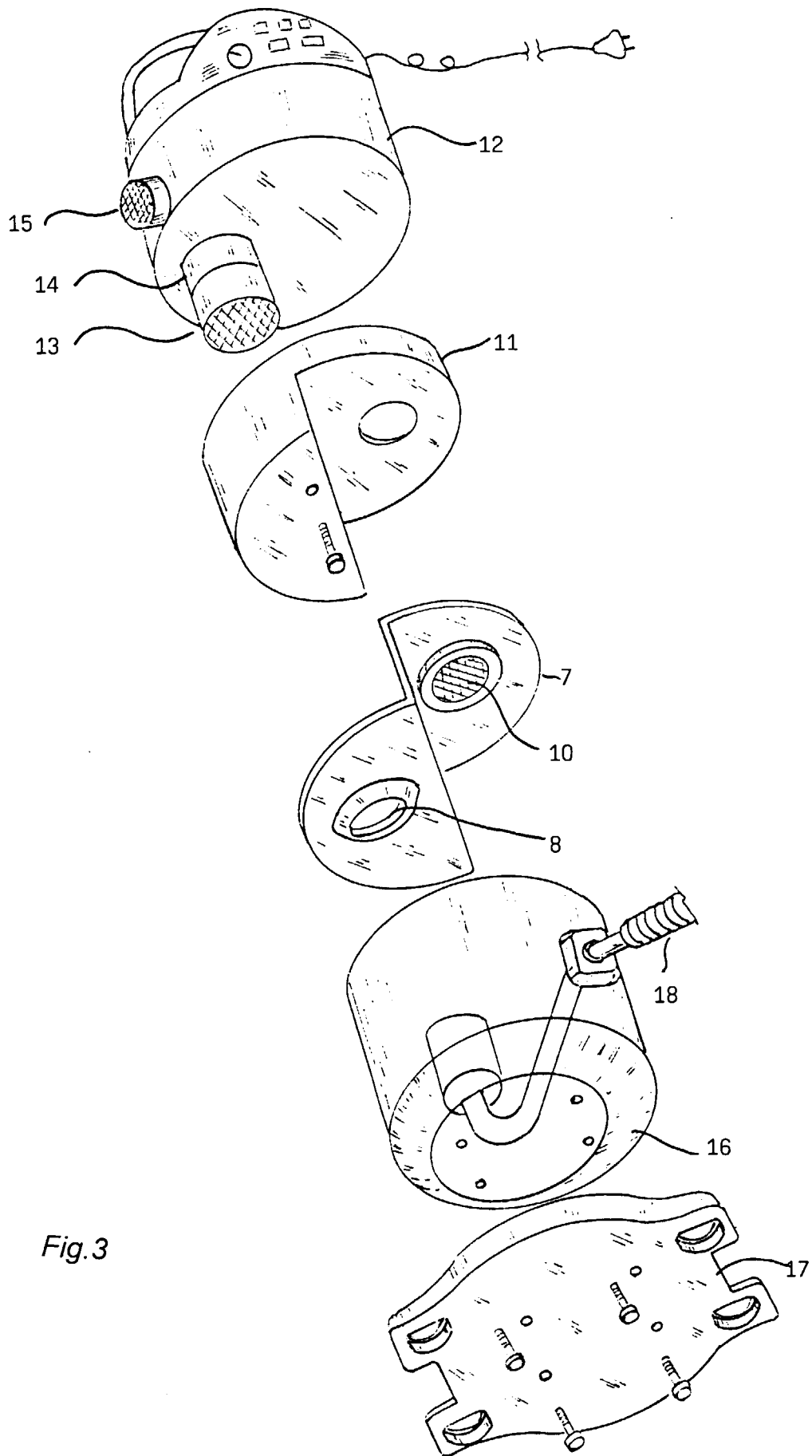


Fig.3