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(54) **A dustproof vacuum cleaner**

Staubdichter Staubsauger

Aspirateur étanche à la poussière

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Description

[0001] The present invention relates to a cleaning machine, in particular a vacuum cleaner, of the type defined in the preamble of claim 1.

[0002] A cleaning machine of that kind is disclosed in DE-19530976-A.

[0003] DE-3723695-A discloses another vacuum cleaner, in which the air and dust intaken through a suction hose are filtered and the filtered air is then humidified and treated in a chemical filter before being emitted again to the surrounding environment.

[0004] An object of the present invention is to provide an improved cleaning machine of the initially defined kind.

[0005] This object is achieved according to the invention by a cleaning machine having the features defined in claim 1.

[0006] The invention will now be explained with reference to the appended drawings showing a non-limiting embodiment of a cleaning machine according to the invention.

[0007] Figure 1 shows the principle of operation of the invention; the air and the dust are drawn in from the opening 1 and pass through the filter 2 which retains a large portion of the dust. In the system of the invention, the filtering of the air can be coarse; this permits a considerable reduction in the power of the suction unit and hence in its consumption and noise. The noise connected with the emerging air-flow is attenuated owing to the fact that the discharge air-flow is no longer admitted freely to the atmosphere. The filter 2, which may be equipped with a dust-collection box 21, is cleaned periodically, manually or automatically, by the methods known in the prior art. After the air has left the filter 2, it is drawn in and compressed by the turbine 3 and is not expelled to the exterior (as in the prior art) but is conveyed to the output opening 4 where its mechanical energy renders the dust removal more efficient since it acts in the manner of a rotating brush, helping to remove the dirt and, finally, the mechanical compression energy of the discharge air is recovered. As a result of the recirculation, in addition to the recovery of the mechanical compression energy, there is a further advantage due to the recovery of the thermal energy of the process air which thus tends to be heated considerably. The fact that, in the present invention, the expelled air is conveyed back into the region to be cleaned, provides the opportunity for the air to be treated by a device 5 which is constituted by any dispenser known in the art which enables the output air to be enriched with liquid or solid detergents and disinfectants, water, steam, ozone, foam, ions, heat, etc. As a result of the recirculation of the air, the additives are not dispersed and both the perceptible heat and the latent heat contained in the steam are recovered. The motor 6 which drives the turbine 3 is not affected by the treated air but has its own independent cooling system. Figures 2 and 3 show embodiments of the suction and output openings;

before the compressed air is expelled into the working region, it undergoes a reduction in cross-section and, for the same air subsequently drawn in, the cross-section then increases progressively. In practice, in the dust-removal region, in which the cross-section is smallest, a large increase in the air speed is brought about in the same manner as in a Venturi tube and in the suction openings of currently available vacuum cleaners. Again with reference to Figures 2 and 3, the suction duct, indicated 1, is the diverging portion of the Venturi tube which has its smallest cross-section in the dust-removal region, with the purpose of recovering the kinetic energy of the air-flow coming from the duct 4 which constitutes the converging portion; the diverging portion must be designed in a manner such as to favour the conversion of the kinetic energy into pressure energy with great efficiency in order thus to achieve energy and noise advantages. Figure 4 shows another advantageous application of the invention and indicates, by way of example, a possible configuration of the suction and output openings which operate effectively on a battery-operated "robot" vacuum cleaner. This device takes advantage particularly of the reduction in power absorbed and in noise permitted by the invention. The "robot" structure also helps to reduce flow resistance since it avoids the long hoses of the conventional structure. Moreover, the expulsion of air into the atmosphere is prevented according to the present invention; in practice, the "robot" vacuum cleaner takes in dusty air from the opening 1, conveys it directly, that is, without long connecting hoses, through the filter to the turbine and, from there, discharges it again directly, under pressure, from the opening 4 where it contributes to the exertion of a mechanical dirt-removal action.

Claims

1. A cleaning machine (1-21), in particular a vacuum cleaner (1-21), wherein in the operation a flow of air is drawn into the machine from a region to be cleaned through a suction opening (1), is passed through a filter (2), and is conveyed back to said region through a return duct and an output opening (4); the machine being **characterised in that** a dispenser device (5) is coupled to the return duct (4) and is adapted to dispense to the air flow recirculated towards said region additives for treating the recirculated air and for performing a treatment of said region without dispersing the additives in the atmosphere.
2. A cleaning machine (1-21), in particular a vacuum cleaner, according to claim 1, comprising a compressor unit (3, 6), **characterised by** a filtration system (2) with low flow resistance and by a suction duct (1) with a diverging portion, for reducing the power of the compressor unit (3, 6) and the noise generated in use.

3. A cleaning machine according to one of the preceding claims, **characterised by** being embodied as a robot vacuum cleaner.

ment et par un conduit de succion (1) ayant une partie divergente, pour diminuer la puissance de l'unité à compresseur (3, 6) et le bruit généré lors de l'utilisation.

Patentansprüche

1. Reinigungsmaschine (1-21), insbesondere Staubsauger (1-21), wobei im Betrieb eine Luftströmung aus einem zu reinigenden Bereich durch eine Saugöffnung (1) in die Maschine gezogen wird, durch einen Filter (2) geleitet wird, und durch einen Rücklaufkanal und eine Ausgangsöffnung (4) zu dem Bereich zurückbefördert wird; wobei die Maschine **dadurch gekennzeichnet ist, dass** eine Abgabevorrichtung (5) mit dem Rückführungskanal (4) gekoppelt ist und dafür ausgelegt ist, an die in Richtung zu dem Bereich zurückgeführte Luftströmung Hilfsstoffe abzugeben, um die zurückgeführte Luft zu behandeln und eine Behandlung des Bereiches durchzuführen, ohne die Hilfsstoffe in die Atmosphäre abzugeben.
2. Reinigungsmaschine (1-21), insbesondere Staubsauger, nach Anspruch 1, eine Kompressoreinheit (3, 6) umfassend, **gekennzeichnet durch** ein Filtersystem (2) mit geringem Strömungswiderstand und **durch** einen Ansaugkanal (1) mit einem divergierenden Abschnitt zum Reduzieren der Leistung der Kompressoreinheit (3, 6) und des beim Gebrauch erzeugten Geräusches.
3. Reinigungsmaschine nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** sie als Roboterstaubsauger ausgeführt ist.

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Revendications

1. Machine de nettoyage (1-21), en particulier un aspirateur (1-21), dans laquelle, au cours du fonctionnement, un écoulement d'air est aspiré à l'intérieur de la machine depuis une région devant être nettoyée à travers une ouverture de succion (1), est amené à passer à travers un filtre (2), et est renvoyé à ladite région en passant par un conduit de retour et une ouverture de sortie (4) ; la machine étant **caractérisée en ce qu'un** dispositif distributeur (5) est relié au conduit de retour (4) et est conçu pour distribuer à l'écoulement d'air recirculé vers ladite région des additifs pour le traitement de l'air en recirculation et pour effectuer un traitement de ladite région sans dispersion des additifs dans l'atmosphère.
2. Machine de nettoyage (1-21), en particulier un aspirateur, selon la revendication 1, comportant une unité à compresseur (3, 6), **caractérisée par** un système de filtration (2) à faible résistance à l'écou-

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Fig. 1

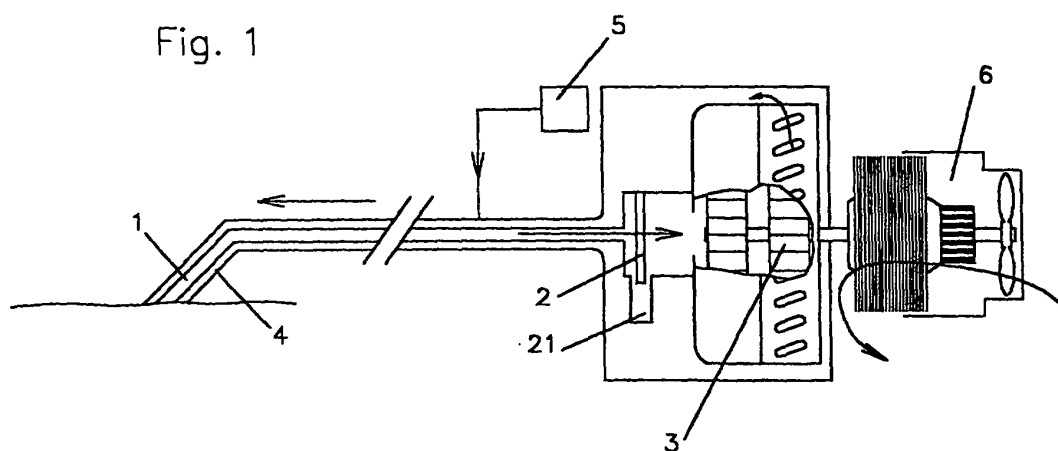


Fig. 2

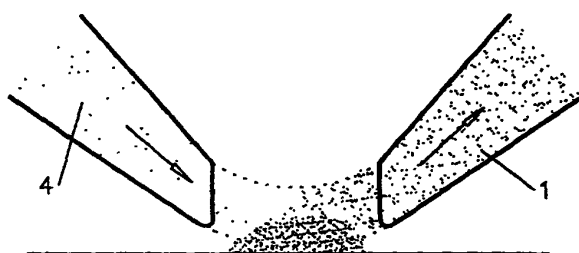


Fig. 3

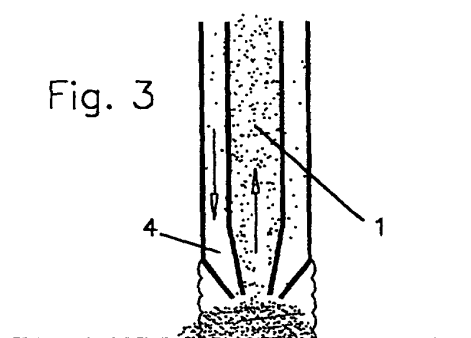
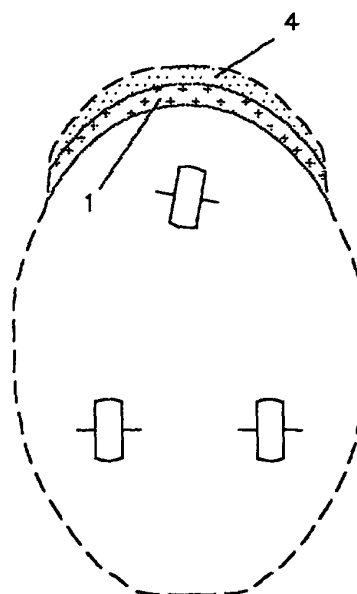


Fig. 4



REFERENCES CITED IN THE DESCRIPTION

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