A device for cleaning floor mats, carpets or the like by suction includes a suction nozzle (1) having a tubular handle (2) and a suction head (5), defining a suction chamber (11) wherein a compressed fluid intake tube (6) is connected to a compressed fluid source (7). The compressed fluid intake tube (6) includes a capillary tube (6) extending globally parallel to the tubular handle (2) and emerging in the suction chamber (11), the capillary tube (6) extending from the upper part of the suction tube (5) to the median part of the head (5) and the suction head comprises at least an air intake orifice (13, 15).

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DEVICES FOR SUCTION CLEANING

[0001] The present invention concerns an improvement on devices for suction cleaning carpets, floor-coverings or similar, comprising a suction nozzle consisting of a tubular handle connected via a flexible pipe to a vacuum source and of a globally cylindrical suction head delimiting a suction chamber wherein emerges an adjustable compression fluid intake tube.

[0002] In the area of suction cleaning devices, devices are known for suctioning dust and fine particles comprising a suction head, a pipe connecting the suction head and a suction unit to aspirate dust and fine particles from the head towards the suction unit, and a pipe to bring a gas derived from a pressurized gas source into the suction head; this is the case for example in Belgian patent BE 1 011 863 describing a suction device and a suction method. The device comprises a suction head, a tube connecting the suction head to a suction unit and a pipe to bring a pressurized gas into said suction head, said pressurized gas being derived from a bottle of compressed gas, an air compressor, an appliance for forming pressurized steam or similar. The pipe leads into a pressurized gas dispenser comprising two branches parallel to one another extending to inside the suction head in the vicinity of its edge and each having a series of orifices. The branches are extended by side attachments each having an orifice arranged so as to blow raised dust towards the suction orifice of the tube positioned in the centre of said suction head.

[0003] When the pressure of the compressed gas is greater than the vacuum set up in the suction head, even though the gas leaving the orifices of the gas dispenser branches can raise dust, insects, microscopic animals etc... located between the hairs of a carpet for example, it sets up an air overpressure in the suction head in the vicinity of the surface to be treated, a carpet for example, so that the suction head behaves as if it were blocked thereby setting up a suction phenomenon, i.e. a vacuum prevails in the suction chamber without any air being moved, thereby preventing the aspiration of said dust raised by the gas leaving the orifices.

[0004] One of the purposes of the invention is therefore to overcome these disadvantages by putting forward a device for cleaning carpets, floor-coverings etc comprising means for spraying a stream of compressed fluid inside the suction chamber of a suction nozzle of simple design, which does not disturb the suction vortex.

[0005] For this purpose and in accordance with the invention, a device is proposed for suction cleaning carpets, floor-coverings or similar comprising a suction nozzle consisting of a tubular handle connected via a flexible pipe to a vacuum source and a globally cylindrical suction head, whose axis is vertical when the suction head is in contact with a horizontal floor, delimiting a suction chamber in which emerges a tube connected to a compressed fluid source; said device is remarkable in that the compressed fluid intake tube consists of a capillary tube extending globally parallel to the tubular handle and leading into the suction chamber forming an angle of between 5 and 50° relative to the axis of the suction head, said capillary tube extending from the upper part of the wall of the suction head as far as the median part of said head so that the compressed fluid is sprayed to the centre of the surface to be treated delimited by the suction head, and in that said suction head comprises at least one air intake orifice so as not to disturb the suction vortex when the compressed fluid is sprayed into the suction chamber by the capillary tube.

[0006] It will easily be understood that the air intake orifice in the suction head makes it possible to maintain globally constant suction in the suction head of the device so that, initially, the dust is raised from the surface to be treated and, subsequently, the dust is aspirated.

[0007] According to one particularly advantageous characteristic of the device of the invention, it comprises means for controlling the intake of compressed fluid in the capillary tube integral with the first tube of the handle, these control means consisting of a trigger actuating a tip which slides inside a hollow body connected to the capillary tube and source of compressed fluid so that said tip partly or wholly blocks or can even leave free the intake of compressed fluid into the hollow body so as to adjust the flow rate of said fluid on leaving the capillary tube.

[0008] Other advantages and characteristics will become apparent in the following description of several variants of embodiment of the suction cleaning device, given as non-restrictive examples, with reference to the appended drawings in which:

[0009] FIG. 1 is a perspective schematic illustration of the device of the invention connected to a suction source and a fluid compression source.

[0010] FIG. 2 is a partial cross-section view of a first variant of embodiment of the suction head of the device according to the invention.

[0011] FIG. 3 is a partial cross-section view of a second variant of embodiment of the suction head of the invention.

[0012] FIG. 4 is a longitudinal section diagram of the device of the invention.

[0013] With reference to the figures, the suction cleaning device described below as a non-restrictive example is particularly intended for cleaning carpets, floor-coverings, fabrics or "plastics" of the inner fittings of a vehicle in particular.

[0014] In this respect, FIG. 1 gives a general view of the device comprising a suction nozzle 1 consisting of a tubular handle 2 connected via a flexible pipe 3 to a vacuum source 4 such as an air exhauster for example, and a globally cylindrical suction head delimiting a suction chamber in which a compressed fluid intake tube 6 emerges connected to a source of compressed fluid 7 via a flexible tube 8 as will be described in detail below. The compressed fluid source 7 advantageously consists of a compressed air compressor supplying compressed air at a pressure of over 2 bars.

[0015] Evidently, the fluid may be any type of fluid such as water, soapy water, or a gas such as steam for example, while remaining within the scope of the invention.

[0016] According to a first variant of embodiment of the device of the invention, with reference to FIG. 2, the suction head 5 of nozzle 1 consists of a globally cylindrical ring 9 provided on its lower edge with bundles of bristles 10 extending along the generating line of ring 9 and delimiting a suction chamber 1 wherein emerges a compressed fluid intake tube 6. The compressed fluid intake tube consists of a capillary tube extending globally parallel to tubular handle
2 and leading into the suction chamber 11 via an orifice 12 made in ring 9 of suction head 5 and forming an angle α of between 5° and 50°, preferably in the region of 45°, relative to axis A of suction head 5, said axis A extending globally vertically when the suction head 5 is in contact with a horizontal floor. By capillary tube 6 is meant a tube having a circular section with a diameter of between 1 and 5 mm; however, this capillary tube 6 may have an oblong or rectangular section without this affecting its efficacy. Also, the capillary tube 6 extends from the upper part of the wall of suction head 5, formed of ring 9 and bristle bundles 10, as far as the median part of said head 5 so that the compressed fluid is sprayed to the centre of the surface to be treated delimited by the suction head 5 as indicated by the arrows a in FIG. 2.

Also, the bundles of bristles 10 flare outwards in their lower part and are spaced around ring 9 to form orifices 13 in the vicinity of said ring 9, called “air intake orifices” allowing air to flow in the suction chamber 11. These air intake orifices 13 are advantageously positioned above the free end of capillary tube 6 so as not to disturb the suction vortex when the compressed fluid is sprayed into suction chamber 11.

According to another variant of embodiment of the device of the invention, with reference to FIG. 4, the suction head 5 consists of a globally cylindrical tube 14 obtained in a plastic material forming the suction chamber 11. Tube 14 has an air intake orifice 15 positioned above the free end of capillary tube 6, said capillary tube leading into the suction chamber via an orifice 12 formed in the wall of suction head 5 and forming an angle α between 5° and 50° relative to axis A of suction head 5 and extending from the upper part of the wall of suction head 5 as far as the median part of the latter so that the compressed fluid is sprayed to the centre of the surface to be treated delimited by suction head 5 as indicated by arrows b. Air intake orifice 15 of suction head 5 is diametrically opposite orifice 12 made in the wall of suction head 5 through which capillary tube 6 leads into the suction chamber 11. The Applicant found that this type of configuration for suction head 5 provides better suction than the suction head 5 fitted with bundles of bristles 10 described previously.

Evidently the suction head 5 may comprise several air intake orifices 15 and the number and diameter of these air intake orifices 15 depend in particular upon the pressure of the compressed gas and suction force.

With reference to FIG. 4, the handle 2 of suction nozzle 1 consists of two cylindrical tubes, a first tube 2a connected via flexible pipe 3 to the vacuum source 4 (FIG. 1) and a second tube 2b larger in diameter than first tube 2a and connected to suction head 5 so that the first tube 2a can be force fitted into the second tube 2b. That part of the capillary tube 6 extending along handle 2 also comprises connection means 16 provided with a seal 17 such as a union fitting for example, conventionally formed of a male connector with a locking nut cooperating with a female connector and fibre washer, so that suction head 5 can be changed at the end of handle 2 in relation to the type of surface to be treated. The suction head 5 provided with bundles of bristles 10 forming a brush, shown in FIG. 2, is preferably used for cleaning smooth surfaces such as “plastic” vehicle equipment or tiled flooring for example and the suction head 5 formed of a cylindrical tube 14 obtained in a plastic material, shown in FIG. 3, is preferably used for rough surfaces such as carpets, floor-coverings or fabrics; however, evidently the suction heads 5 can be changed as the user deems fit.

Also, the first tube 2a of handle 2, on its outer wall in the vicinity of its free end, advantageously comprises a lug 18a, extending radially and cooperating with a corresponding hollow 18b on the edge of the free end of the second tube 2b, i.e. on the edge opposite the suction head 5, to prevent rotation of said suction head 5 around the axis of handle 2.

To adjust the flow rate of the fluid on leaving capillary tube 6, the device advantageously comprises means 19 for controlling the intake of compressed fluid into capillary tube 6, said control means 19 being integral with first tube 2a of handle 2 which forms a preferred gripping area of nozzle 1. Control means 19 to control the intake of compressed fluid consist of a hollow body 20 integral with the first tube 2a of handle 2 via a fixing collar 21, said hollow body 20 being connected to capillary tube 6 and to the source of compressed fluid 7 via flexible pipe 8. Said control means also comprise a trigger 22 to actuate a tip 23 which slides inside hollow body 20 so that said tip 23 obstructs wholly or in part or may even leave free the inlet of compressed fluid into hollow body 20 so as to adjust the flow rate of the fluid on leaving the capillary tube 6.

Finally, the device of the invention may evidently be adapted to all types of suction heads such as a rectangular suction head for example, and the examples given above are evidently only particular illustrations which are in no way restrictive in respect of the sphere of application of the invention.

1. Device for suction cleaning carpets, floor-coverings or similar comprising a suction nozzle (1) consisting of a tubular handle (2) connected via a flexible pipe (3) to a vacuum source (4) and a globally cylindrical suction head (5) whose axis (A) is vertical when the suction head (5) is in contact with a horizontal floor, delimiting a suction chamber (11) wherein emerges a compressed fluid intake tube (6) connected to a compressed fluid source (7), characterized in that the compressed fluid intake tube (6) consists of a capillary tube (6) extending globally parallel to tubular handle 2 and leading into a suction chamber (11), forming an angle α between 5° and 50° relative to axis (A) of the suction head (5), said capillary tube (6) extending from the upper part of the wall of the suction head (5) as far as the median part of said head (5) so that the compressed fluid is sprayed to the centre of the surface to be treated delimited by suction head (5) and in that said suction head comprises at least one air intake orifice (13,15) so as not to disturb the suction vortex when the compressed fluid is sprayed into suction chamber (11).

2. Device as in claim 1, characterized in that the capillary tube (6) has a circular section with a diameter of between 1 and 5 mm.

3. Device as in any of the preceding claims, characterized in that the compressed fluid source (7) consists of a compressed air compressor supplying compressed air at a pressure of over 2 bars.

4. Device as in claim 2, characterized in that the free end of capillary tube (6) is narrowed to form an oblong or
rectangular section so as to increase the speed of the compressed fluid on leaving said capillary tube (6).

5. Device as in any of the preceding claims, characterized in that the suction head (5) consists of a globally cylindrical tube (14) obtained in a plastic material and having at least one air intake orifice (15) positioned above the free end of capillary tube (6).

6. Device as in claim 5, characterized in that the air intake orifice (15) of suction head (5) is diametrically opposite the orifice (12) made in the wall of suction head (5) through which capillary tube (6) leads into suction chamber (11).

7. Device as in any of claims 1 to 4, characterized in that the suction head consists of a globally cylindrical ring (9) provided on its lower edge with bundles of bristles (10) extending along the generating line of ring (9), said bundles of bristles (10) flaring outwards at their lower part and being spaced around ring (9) to form, in the vicinity of ring (9), at least one orifice (13) enabling air to flow in suction chamber (11).

8. Device as in any of the preceding claims, characterized in that handle (2) consists of two cylindrical tubes, a first tube (2a) connected by flexible pipe (3) to the vacuum source (4) and a second tube (2b) of larger diameter connected to suction head (5) so that the first tube (2a) can be force fitted into the second tube (2b), and in that the part of the capillary tube (6) extending along handle (2) comprises connection means (16) provided with a seal (17) so that suction head (5) can be changed at the end of handle (2) in relation to the type of surface to be treated.

9. Device as in claim 8, characterized in that the first tube (2a) of handle (2), on its outer wall in the vicinity of its free end, comprises a lug (18a) extending radially and cooperating with a corresponding hollow (18b) on the edge of the free end of second tube (2b) so as to prevent rotation of suction head (5) around the axis of handle (2).

10. Device as in claim 5, characterized in that it comprises control means (19) to control the intake of compressed fluid in capillary tube (6) integral with first tube (2a) of handle (2).

11. Device as in claim 10, characterized in that the control means (19) for compressed fluid intake consist of a trigger (22) actuating a tip (23) which slides inside a hollow body (20) connected to capillary tube (6) and compressed fluid source (7), so that said tip (23) wholly or partly blocks, or even leaves free, the inlet of compressed fluid into hollow body (20) so as to adjust the flow rate of said fluid on leaving capillary tube (6).

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