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Claims

- 10 1. An air cleaner, especially cold air cleaner of an electronic device for the removal of pollutants from an air flow, with a filter module (1), which comprises at least one permeable filter layer (4) for the accumulation of pollutants on the filter layer (4), is characterized by the presence of a bypass channel (50) developed in such a way that a part of the air flow may flow past each filter layer (4) without being filtered.
- 15 2. Air cleaner according to the preceding claim wherein the current cross-section of the bypass channel (50) is 10% to 30%, preferably about 15% to 25% of the area of the filter layer (4) through by which filter layer(4) covers the air current (52).
- 20 3. Air cleaner according to the preceding claim wherein the total of the cross-section area of the bypass channel (50) and the area of the filter layer (4) covering the air flow, is equivalent to the cross-section area of the air flow in front of the filter module (1).
- 25 4. The air cleaner according to one of the preceding claims, further comprising a ventilator (2) whose intake or exhaust air forms the air flow to be cleaned wherein the filter module (1) is provided directly besides the ventilator (2) in its exhaust or aspiration air flow.
- 30 5. The air cleaner according to one of the preceding claims wherein the bypass channel (50) may be closed with a valve system that is operable as a function of a dynamic pressure that develops at the filter module (1) and that opens up, especially if a pre-defined pressure level is exceeded in an upstream position with regard to the filter module (1) and/or if a pre-defined pressure level is undercut at a downstream position with regard to the filter module (1).

6. The air cleaner according to one of the claims 1-4 wherein the bypass channel (50) is established free of valve systems and/or will be permanently open.
- 5 7. The air cleaner according to one of the preceding claims wherein the bypass channel (50) is integrated in the filter module (1) and formed by a slot in (each) filter layer (4).
8. The air cleaner according to one of the preceding claims wherein the filter layer (4) is formed by a variety of preferably bar-shaped filter elements (6) that are provided in the area of the
10 filter layer (4) and at a certain distance to each other.
9. The air cleaner according to one of the preceding claims wherein several filter layers (4) are preferably formed by bar-shaped filter elements and arranged consecutively and wherein the filter elements (6) are arranged alternately and in consecutive filter layers (4) in transverse
15 position with regard to the flow direction so that the air flow has to flow through the filter layers (4) in a serpentine-shaped or meandering way.
10. The air cleaner according to one of the preceding claims wherein the bypass channel (50) has a clearance (51) which is at least twice, preferably more than three times and, further preferably
20 more than five times, bigger than the light width (61) of the air passing channels through the filter layer (4), especially the distance between adjacent filter elements (6) of the filter layer (4).
11. The air cleaner according to one of the preceding claims wherein the bypass channel (50) is
25 located on a circumferential side of the filter layer (4).
12. The air cleaner according to one of the preceding claims wherein the filter layer (4) has at least one frameless, open circumferential section on which the air flow may flow through the open circumferential side of the filter layer (4) wherein especially the mentioned frameless, open
30 circumferential section of the filter layer is developed free of any flow guiding systems such as delimitation walls and similar systems.

13. The air cleaner according to one of the preceding claims wherein at least one filter layer (4) is formed by freely overhanging, preferably bar-shaped filter elements (6) which have at least one unenclosed, free end wherein the mentioned filter elements (6) will be preferably enclosed by a central filter support (5) so that the filter elements (6) have two free ends or that they are enclosed by a one-sided filter support (5) so that the filter elements (6) have a free end.
14. The air cleaner according to one of the preceding claims wherein the filter layer (4) is formed by a variety of parallel filter bars (13).
15. The air cleaner according to one of the preceding claims wherein the or at least another filter layer (4) is formed by at least one meandering or spiral-shaped filter bar (13) which has bar sections adjacent to each other.
16. The air cleaner according to one of the preceding claims wherein the preferably bar-shaped filter elements (6) are made of a porous material which is dampened by a fluid such as oil.
17. Air cleaner, according to one of the preceding claims, with a mounting frame (29) that encloses the filter module (1) at least partially wherein the mounting frame (26) preferably has a slot (27) into which the filter module (1) may be inserted in the direction of the air flow.
18. The air cleaner according to one of the preceding claims with a mounting system to which to filter module may be reversibly connected wherein the connection is preferably done by means of a frictional contact wherein the filter module will further and advantageously remain insertable into a mounting frame and attachable to the mounting frame by means of press fitting.
19. The air cleaner according to one of the preceding claims with an enclosure through which an air flow is led from an input orifice through the filter module up to an output orifice wherein the air flow through the enclosure (147) is diverted on the way from the input orifice to the filter module and/or from the filter module to the output orifice, preferably by more than 45% or more preferably by approx. 90°.

20. The air cleaner, especially according to one of the preceding claims, in particular cooling air cleaner of an electronic device for the removal of pollutants from an air flow, with a filter module (1) which comprises at least a permeable filter layer (4), characterized by the fact that the air cleaner is designed as an air cleaning module which may be reversibly attached to an input device of a machine housing in order to be detached from the input device for the replacement of the filter module wherein the fixation is advantageously detachable without the use of tools.
21. The air cleaner according to claim 20 wherein fixation is done by means of an flexible element, in particular an flexible element with an adjustable length, in particular by means of a spiral spring wherein the flexible element is advantageously attached to the machine housing and wherein it presses the air cleaning module onto the input device.
22. Use of an air cleaner, according to one of the preceding claims, to clean the cooling air of an entertainment, gambling and/or betting machine which is provided with a machine enclosure, a screen element to display the gambling information as well as an electronic control device to control the screen element wherein the air cleaner is located inside the machine enclosure.
23. Electronic device with an air cleaner according to one of the preceding claims, in particular an entertainment, gambling and/or betting machine with a machine housing wherein the air cleaner is provided at or on the inside of the machine enclosure.

Claims

1. An air cleaner for the removal of pollutants from an air flow, with a filter module, which comprises at least one permeable filter layer configured to accumulate pollutants on the filter layer, said at least one filter layer being formed by a plurality of elongated filter elements arranged at a certain distance to each other so that air passing gaps are formed between adjacent filter elements, said air passing gaps having a gap width defined by the distance between adjacent filter elements, and a bypass channel different from the air passing gaps and configured such that a part of the air flow bypasses the filter layer without being filtered, wherein said bypass channel has a clearance which is significantly bigger than the gap width of the air passing gaps between adjacent filter elements.
2. Air cleaner according to claim 1 wherein the total of the cross-section area of the bypass channel and the area of the filter layer covering the air flow, is equivalent to the cross-section area of the air flow in front of the filter module.
3. The air cleaner according to claim 1, further comprising a ventilator whose intake or exhaust air forms the air flow to be cleaned wherein the filter module is provided directly besides the ventilator in its exhaust or aspiration air flow.
4. The air cleaner according to claim 1, wherein the bypass channel is configured to be closed with a valve system that is operable as a function of a dynamic pressure that develops at the filter module and that opens up, if at least one of a pre-defined pressure level is exceeded in an upstream position with regard to the filter module and a pre-defined pressure level is undercut at a downstream position with regard to the filter module.
5. The air cleaner according to claim 1, wherein the bypass channel is at least one of established free of valve systems and permanently open.

6. The air cleaner according to claim 1, wherein the bypass channel is integrated in the filter module and formed by a slot in (each) filter layer.

5 7. The air cleaner according to claim 1, wherein the filter layer is formed by a variety of bar-shaped filter elements that are provided in the area of the filter layer and at a certain distance to each other.

10 8. The air cleaner according to claim 1, wherein several filter layers are formed by bar-shaped filter elements and arranged consecutively and wherein the filter elements are arranged alternately and in consecutive filter layers in transverse position with regard to the flow direction so that the air flow has to flow through the filter layers in a serpentine-shaped or meandering way.

15 9. The air cleaner according to claim 1, wherein the bypass channel has a clearance which is at least twice the distance between adjacent filter elements of the filter layer.

10. The air cleaner according to claim 1, wherein the bypass channel is located on a circumferential side of the filter layer.

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11. The air cleaner according to claim 1, wherein the filter layer has at least one frameless, open circumferential section on which the air flow flows through the open circumferential side of the filter layer wherein the frameless, open circumferential section of the filter layer is developed free of any flow guiding systems such as delimitation walls and similar systems.

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12. The air cleaner according to claim 1, wherein at least one filter layer is formed by freely overhanging, bar-shaped filter elements which have at least one unenclosed, free end wherein the mentioned filter elements will be enclosed by a central filter support so that the filter elements have two free ends or that they are enclosed by a one-sided filter support so that the
 30 filter elements have a free end.

13. The air cleaner according to claim 1, wherein the filter layer is formed by a variety of parallel filter bars.

5 14. The air cleaner according to claim 1, wherein the or at least another filter layer is formed by at least one meandering or spiral-shaped filter bar which has bar sections adjacent to each other.

15. The air cleaner according to claim 1, wherein the bar-shaped filter elements are made of a porous material which is dampened by a fluid such as oil.

10 16. Air cleaner, according to claim 1, with a mounting frame that encloses the filter module at least partially and wherein the mounting frame has a slot into which the filter module is insertable in the direction of the air flow.

15 17. The air cleaner according to claim 1, with a mounting system to which to filter module is reversibly connected and wherein the connection is done by a frictional contact and the filter module will further and advantageously remain insertable into a mounting frame and attachable to the mounting frame by press fitting.

20 18. The air cleaner according to claim 1, with an enclosure through which an air flow is led from an input orifice through the filter module up to an output orifice and wherein the air flow through the enclosure is diverted on the way from at least one of the input orifice to the filter module and the filter module to the output orifice, by more than 45% or more preferably by approx. 90.

25 19. The air cleaner according to claim 1, in particular cooling air cleaner of an electronic device for the removal of pollutants from an air flow, with a filter module which comprises at least a permeable filter layer, wherein the air cleaner is designed as an air cleaning module which is reversibly attached to an input device of a machine housing to be detached from the input
30 device for the replacement of the filter module and the fixation is advantageously detachable without the use of tools.

20. The air cleaner according to claim 19 wherein fixation is done by a flexible element, and the flexible element is advantageously attached to the machine housing and presses the air cleaning module onto the input device.

- 5 21. Electronic device with an air cleaner according to claim 1, with a machine housing, wherein the air cleaner is provided at or on the inside of the machine enclosure.

- 10 22. An air cleaner for the removal of pollutants from an air flow, with a filter module, which comprises at least one permeable filter layer configured to accumulate pollutants on the filter layer, said at least one filter layer being formed by at least one elongated filter element having a plurality of elongated filter element portions arranged at a certain distance to each other so that air passing gaps are formed between adjacent filter element portions, said air passing gaps having a gap width defined by the distance between adjacent filter element portions, and a bypass channel different from the air passing gaps configured such that a part of the air flow
- 15 bypasses the filter layer without being filtered, wherein said bypass channel has a clearance which is significantly bigger than the gap width of the air passing gaps between adjacent filter element portions.