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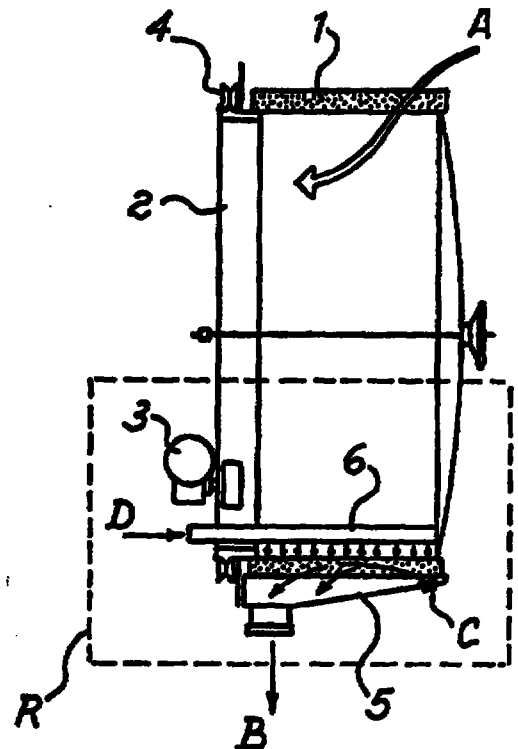
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>6</sup>:</b><br><b>B01D 46/26, 46/42</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 96/29139</b><br><b>(43) International Publication Date:</b> 26 September 1996 (26.09.96)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>(21) International Application Number:</b> PCT/IT96/00048<br><b>(22) International Filing Date:</b> 15 March 1996 (15.03.96)<br><b>(30) Priority Data:</b><br>MI95A000546 20 March 1995 (20.03.95) IT<br><b>(71) Applicant (for all designated States except US):</b> MAZZINI ICI S.P.A. [IT/IT]; Via Modena, 14, I-24040 Ciserano Zingonia (IT).<br><b>(72) Inventors; and</b><br><b>(75) Inventors/Applicants (for US only):</b> NANI, Eros [IT/IT]; Via Verdello, 31/P, I-24040 Ciserano Zingonia (IT). BONANDRINI, Andrea [IT/IT]; Via Industria, 22, I-25037 Pontoglio (IT).<br><b>(74) Agents:</b> ADORNO, Silvano et al.; Società Italiana Brevetti, Via Carducci, 8, I-20123 Milano (IT). |           | <b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i><br><i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |

**(54) Title:** SELF-CLEANING FILTER FOR PNEUMATIC CIRCUITS**(57) Abstract**

A self-cleaning filter for pneumatic circuits includes a filtering baffle (1) mounted on a drum (2) rotated steadily, the flow (A) of the air to be filtered being from outside to inside the baffle (1), as well as a suction mouth (5) longitudinally positioned in the vertical mid-plane at the lowest point of the baffle (1) and externally adjacent thereto, and a blowing nozzle (6) internally adjacent to the baffle (1) at a position exactly opposite the mouth (5), both the mouth (5) and the nozzle (6) extending along the whole length of the filtering baffle (1). The nozzle (6) has a plurality of aligned bores suitable to emit a narrow jet of counter-current air, with adjustable incidence, and the mouth (5) is shaped as a trapezoidal hopper with a small adjustable blowing nozzle (C) at one end.



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**"SELF-CLEANING FILTER FOR PNEUMATIC CIRCUITS"**

5 The present invention relates to filters used in pneumatic circuits, and in particular to a self-cleaning filter intended mainly, but not exclusively, for filtering air.

10 It is known that various industrial plants use air to drain away processing wastes and/or for different kinds of treatments, and they include devices for filtering the air polluted by particles or substances of various origin. Reference will be made hereafter to filters employed in particular in the textile industries plants, being clear that the following is valid also for other similar applications.

15 It is known that conventional self-cleaning filters essentially consist of a drum housed in a case and covered with a continuous filtering baffle. This drum is provided with a relative motion with respect to a suction mouth located on the air inlet side and/or with respect to a blowing nozzle located on the opposite side. The relative motion is usually achieved by rotating the drum around mouths which are fixed or longitudinally shifting at most. Obviously, it is also possible to keep the drum still and rotate/shift the mouths.

20 The function of the suction mouth on the air inlet side is to suck up dust, wastes, etc. which deposit on said side of the filtering baffle. However, the effectiveness of said mouth is good only in case the filtering baffle is flat, so that the mouth can be positioned close to the baffle. On the contrary, in the most common case of pleated baffle (which increases the filtering surface with the same bulkiness) the bottom areas of the pleats are not adequately cleaned, thus reducing the advantage coming from the pleating.

30 In this case, in order to improve the baffle cleaning there is adopted a blowing nozzle, possibly rotating, which is usually located inside the drum. This nozzle intermittently emits a strong jet of compressed air which causes the dust to fall on the bottom of the filter case thanks to the counter-pressure. Such a cleaning system is based on the instantaneous shaking and on the temporary inversion of direction of the air flow through the baffle, however it has a limited effectiveness too.

35 In fact, first of all it can not be applied in a continuous way since it momentarily blocks the incoming air flow. Moreover, its action is not

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localized but general, whereby it is not particularly effective at the bottom of the baffle pleats where the suction mouth does not arrive.

Therefore the object of the present invention is to provide a self-cleaning filter suitable to overcome the drawbacks of prior art filters.

5 This object is achieved by means of a filter having the characteristics cited in claim 1.

The main advantage of the filter according to the present invention is its capacity of complete self-regeneration even in the remotest areas at the bottom of the filtering baffle pleats.

10 This and other advantages and characteristics of the self-cleaning filter according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

Fig.1 is a schematic front view of a filter according to the invention;

15 Fig.2 is a schematic partially sectional side view of the filter of fig.1; and

Fig.3 is an enlargement of portion R of fig.2.

Referring to figs.1 and 2, there is seen that a self-cleaning filter according to the present invention includes a filtering baffle 1 mounted on a drum 2 which is rotated steadily by a motor-reducer 3 through a friction pulley which acts on the inner surface of drum 2. The outer surface of friction 2 also has a rib which engages with corresponding guide rollers 4.

20 A suction mouth 5 is longitudinally positioned in the vertical mid-plane outside the filtering baffle 1, at the lowest point of the baffle and adjacent thereto. A blowing nozzle 6 is located at an exactly opposite position inside the filtering baffle 1. As better seen in the enlarged view of fig.3, both the suction mouth 5 and the blowing nozzle 6 extend along the whole length of the filtering baffle 1. In particular, nozzle 6 has a "flute" structure, i.e. a plurality of bores aligned along the whole length of baffle 1, suitable to emit a narrow jet of air. On the other hand, mouth 5 is shaped as a trapezoidal hopper with the suction duct at its lowest end. A small adjustable blowing nozzle C is located at the opposite end of mouth 5.

30 The air flow to be filtered passes through baffle 1 from outside to inside, as indicated by arrow A in fig.2. The mouth 5 isolates a small portion of the filtering baffle 1 and sucks up therefrom the material



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deposited on the outer surface, which is gathered in the hopper and removed by the suction flow B. In order to improve the effectiveness of said cleaning, especially in case of damp and/or adhesive dusts, the small nozzle C intermittently acts with an oriented jet which helps the removal of the material.

5 The complete regeneration of the filtering baffle 1 is achieved through the timed action of the inner blowing nozzle 6 with a flow D of counter-current compressed air. The air blade which comes from nozzle 6 removes the dust from the bottom of the pleats and conveys it to mouth 5.

10 Furthermore, nozzle 6 preferably has an adjustable incidence in order to generate vibrations on baffle 1 which facilitate the dust removal.

Thanks to the localized nature of the jet, and since also nozzle 6 is placed adjacent to the filtering baffle 1 and at the suction mouth 5, said counter-current jet does not interfere with the normal flow A of the incoming air. Therefore, it is possible to regenerate deeply the filtering baffle 1 even when it is of the pleated type, without disturbing the normal operation of the filter.

15 It is clear that the above-described and illustrated embodiment of the self-cleaning filter according to the invention is just an example susceptible of various modifications. In particular, the exact shape of mouth 5 and nozzle 6 can be freely adapted according to specific needs, as long as their mutual position and with respect to the filtering baffle 1, as well as their length equal to the baffle length, are maintained.

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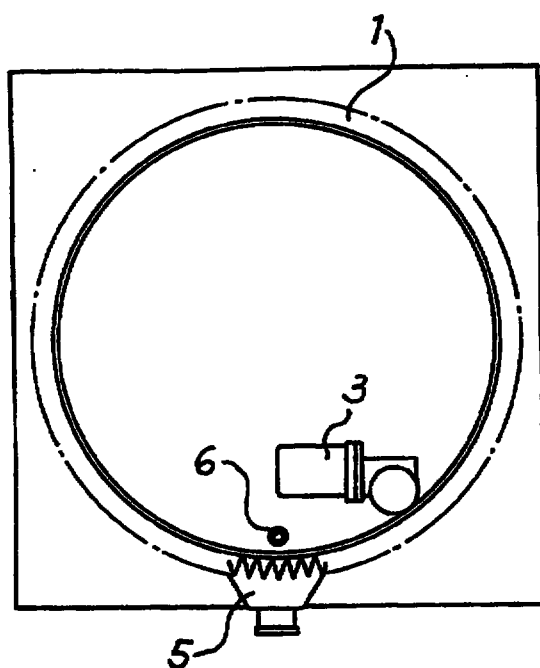
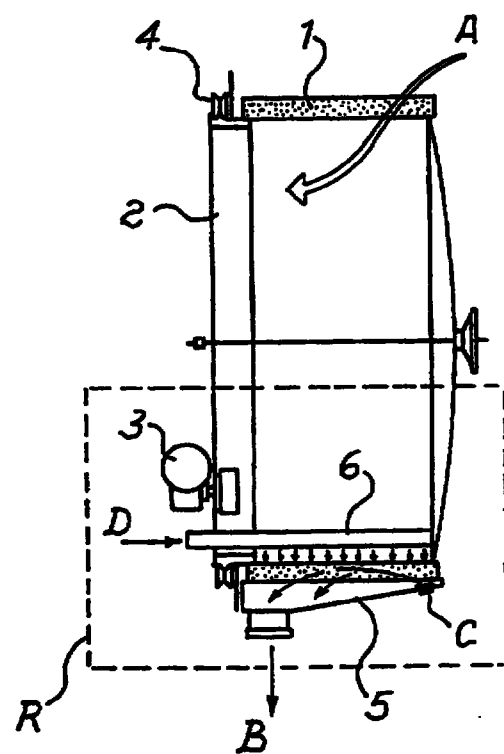
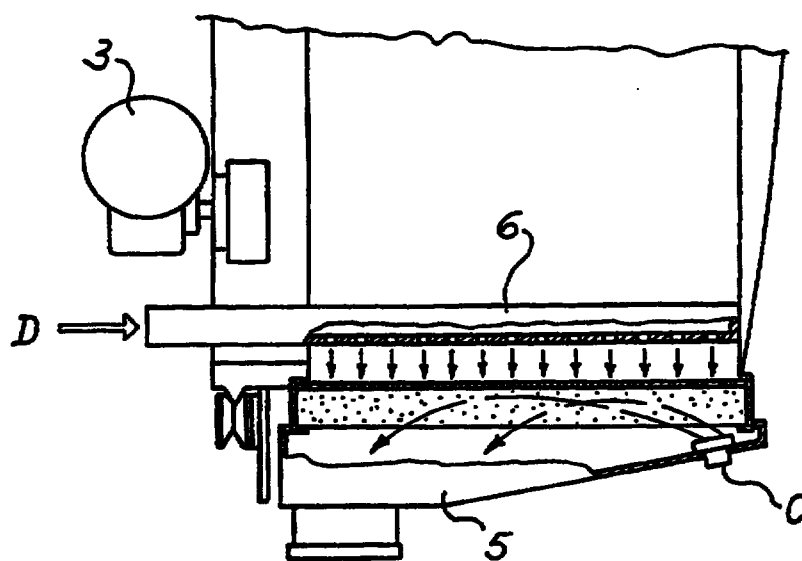
## CLAIMS



1. A self-cleaning filter for pneumatic circuits, including a filtering baffle (1) mounted on a drum (2) rotated steadily, as well as a suction mouth (5) located outside the baffle (1) and a blowing nozzle (6) located inside, the flow (A) of the air to be filtered being from outside to inside the baffle (1), characterized in that said suction mouth (5) is longitudinally positioned in the vertical mid-plane at the lowest point of the baffle (1) and adjacent thereto and also the blowing nozzle (6) is adjacent to the baffle (1) at a position exactly opposite the mouth (5), both the mouth (5) and the nozzle (6) extending along the whole length of the filtering baffle (1).
2. A self-cleaning filter according to claim 1, characterized in that the nozzle (6) has a plurality of aligned bores along the whole length of the baffle (1), the incidence of the nozzle (6) being adjustable.
3. A self-cleaning filter according to claim 1 or 2, characterized in that the mouth (5) is shaped as a trapezoidal hopper, with a suction duct at the lowest end and a small adjustable blowing nozzle (C) located at the opposite end.

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Fig. 1Fig. 2Fig. 3

localized but general, whereby it is not particularly effective at the bottom of the baffle pleats where the suction mouth does not arrive.

5 A more effective type of filter is disclosed in US-A-4.253.855, including a suction mouth and a blowing nozzle located adjacent to the baffle at mutually opposite positions and extending along the whole length thereof. This arrangement allows a better cleaning of the baffle but still is not completely satisfactory for particularly difficult types of filtration, e.g. the filtration of cotton fibers by means of a pleated baffle.

10 Therefore the object of the present invention is to provide a self-cleaning filter suitable to overcome the drawbacks of prior art filters.

This object is achieved by means of a filter having the characteristics cited in claim 1.

15 The main advantage of the filter according to the present invention is its capacity of complete self-regeneration even in the remotest areas at the bottom of the filtering baffle pleats.

This and other advantages and characteristics of the self-cleaning filter according to the present invention will be clear to those skilled in the art from the following detailed description of an embodiment thereof, with reference to the annexed drawings wherein:

20 Fig.1 is a schematic front view of a filter according to the invention;  
Fig.2 is a schematic partially sectional side view of the filter of fig.1;  
and

Fig.3 is an enlargement of portion R of fig.2.

25 Referring to figs.1 and 2, there is seen that a self-cleaning filter according to the present invention includes a filtering baffle 1 mounted on a drum 2 which is rotated steadily by a motor-reducer 3 through a friction pulley which acts on the inner surface of drum 2. The outer surface of friction 2 also has a rib which engages with corresponding guide rollers 4.

30 A suction mouth 5 is longitudinally positioned in the vertical mid-plane outside the filtering baffle 1, at the lowest point of the baffle and adjacent thereto. A blowing nozzle 6 is located at an exactly opposite position inside the filtering baffle 1. As better seen in the enlarged view of fig.3, both the suction mouth 5 and the blowing nozzle 6 extend along the whole length of the filtering baffle 1. In particular, nozzle 6 has a "flute" structure, i.e. a plurality of bores aligned along the whole length of baffle  
35 1, suitable to emit a narrow jet of air. On the other hand, mouth 5 is

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shaped as a trapezoidal hopper with the suction duct at its lowest end. A small adjustable blowing nozzle C is located at the opposite end of mouth 5.

5 The air flow to be filtered passes through baffle 1 from outside to inside, as indicated by arrow A in fig.2. The mouth 5 isolates a small portion of the filtering baffle 1 and sucks up therefrom the material deposited on the outer surface, which is gathered in the hopper and removed by the suction flow B. In order to improve the effectiveness of said cleaning, especially in case of damp and/or adhesive dusts, the small  
10 nozzle C intermittently acts with an oriented jet which helps the removal of the material.

The complete regeneration of the filtering baffle 1 is achieved through the timed action of the inner blowing nozzle 6 with a flow D of counter-current compressed air. The air blade which comes from nozzle 6  
15 removes the dust from the bottom of the pleats and conveys it to mouth 5. In order to generate vibrations on baffle 1 which facilitate the dust removal, nozzle 6 has an adjustable incidence, i.e. it emits a jet of air at different angles with respect to the surface of the baffle.

20 Thanks to the localized nature of the jet, and since also nozzle 6 is placed adjacent to the filtering baffle 1 and at the suction mouth 5, said counter-current jet does not interfere with the normal flow A of the incoming air. Therefore, it is possible to regenerate deeply the filtering baffle 1 even when it is of the pleated type, without disturbing the normal operation of the filter.

25 It is clear that the above-described and illustrated embodiment of the self-cleaning filter according to the invention is just an example susceptible of various modifications. In particular, the exact shape of mouth 5 and nozzle 6 can be freely adapted according to specific needs, as long as their mutual position and with respect to the filtering baffle 1, as  
30 well as their length equal to the baffle length, are maintained.



## CLAIMS

1. A self-cleaning filter for pneumatic circuits including a filtering  
baffle (1) mounted on a drum (2) rotated steadily, the flow (A) of the air to  
5 be filtered being from outside to inside said baffle (1), as well as a suction  
mouth (5) and a blowing nozzle (6) respectively located outside and inside  
the baffle (1) at mutually opposite positions adjacent thereto and extending  
along the whole length of the baffle (1), characterized in that said nozzle  
(6) emits a jet of air whose angle of incidence with respect to the surface  
10 of the baffle (1) is adjustable.
2. A self-cleaning filter according to claim 1, characterized in that  
the mouth (5) is shaped as a trapezoidal hopper, with a suction duct at the  
lowest end and a small adjustable blowing nozzle (C) located at the  
opposite end.
- 15 3. A self-cleaning filter according to claim 1 or 2, characterized in  
that the blowing nozzle (6) includes a plurality of aligned bores.
4. A self-cleaning filter according to any of the preceding claims,  
characterized in that the filtering baffle (1) has a pleated surface.