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(12) # EUROPEAN PATENT APPLICATION

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(54) **Filter device.**

(57) A device for filtering a gaseous medium flowing in a pipe (B), which device consists of a first annular member (1) extending along the inner wall of the pipe (B) and a second annular member (2) located at a distance, wherein a filter (3) is arranged extending between both members (1,2) and preferably supported by a spiral wire and which is formed from a strip of filter material into a bag-like body (3) tapering in the direction of the second annular member (2), this such that the filter material is easy to replace.

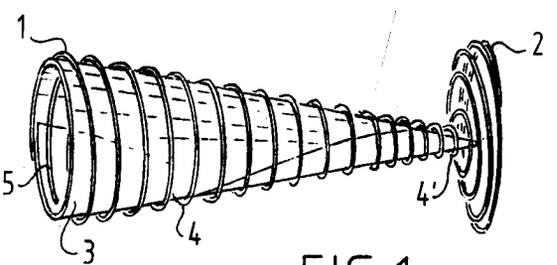

FIG.1

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The invention relates to a device for filtering a gaseous medium flowing in a pipe.

It is known to arrange piping in buildings for conditioning the air in the building, for which purpose air is fed into a space and then discharged. This piping is concealed invisibly, preferably between a suspended ceiling and the storey floor located above. Such a discharge of air via the ceiling results in a comparatively large amount of dust being sucked along with the air. At the central air conditioning device this dust must be filtered out, which soon leads to blockage due to the central arrangement and which necessitates frequent monitoring.

The invention has for its object to provide a filtering device which can be arranged at random locations in the pipe system, can be replaced easily and is inexpensive to manufacture.

The invention according to the invention consists of a first annular member extending along the inner wall of the pipe and a second annular member located at a distance, wherein a filter is arranged extending between both members which is formed from a strip of filter material into a bag-like body tapering in the direction of the second annular member.

Due to the use of a foldable strip of filter material and the two annular members located at a mutual distance, the filter can be assembled manually in very simple manner and placed in the pipe. Replacing of the filter device can also be very simply carried out by hand. The filter material moreover does not have to be cleaned but can be removed as a disposable product. These operations can if necessary be included in the normal maintenance schedule of the building.

In the preferred embodiment the second annular member is formed such that the point of the bag is held in the middle of the axis of the pipe. A uniform flow through the pipe is hereby effected and, since the distance between the annular members determines the length of the filter bag filtering can take place virtually without pressure loss. The filter surface area is relatively large and blockage will therefore occur only after a long time.

Owing to the small drop in pressure the annular means for supporting the bag-like filter can be formed in each case by a spirally wound wire. This not only results in a simple construction but the resistance for the flow of the gaseous medium is also reduced to a minimum.

According to a further embodiment the invention proposes to support at least the outer wall of the bag-like filter body by a support member preferably consisting of a spirally wound wire, wherein the diameter of the successive windings becomes smaller in the direction towards the second annular member.

In the preferred embodiment the first and second annular member and the support member are formed from a single wound wire.

The invention further relates to the strip of filter material suitable for a filtering device as described above.

The invention will be further elucidated in the figure description of an embodiment hereinbelow and applications thereof. In the drawing:

fig. 1 shows a filtering device according to the invention,

fig. 2 shows the constituent components of the filtering device of fig. 1 in dismantled state,

fig. 3 shows a strip of filter material suitable for a filter body as in fig. 1 or 2,

fig. 4a and b each show a standing section through a pipe provided with a filtering device from fig. 1,

fig. 5a, b and c show perspective views, partly with broken away portions, of a pipe system provided with filtering devices according to the invention.

Designated in the figures with the numeral 1 is the first annular body, with the numeral 2 the second annular body located at a distance therefrom and with numeral 3 a filter body having the form of a conical bag.

The respective annular members 1 and 2 are wires which extend as a number of spirally tapering windings, thereby forming a support body 4 for the filter 3. At the smallest winding 4' the wire is enlarged to the diameter of the annular member 2. It is noted that the outer diameter of the annular member 1 and that of annular member 2 corresponds with the inner diameter of the pipe, which is further elucidated hereinbelow. The filter body 3 can be formed from a strip of filter material as in fig. 3 which, as a result of a suitable manner of rolling up about the point A can be folded into a conical bag as according to fig. 2. This conical bag 3 can subsequently be pushed through the annular member 1 in the direction of arrow P1 into the wire windings of the support body 4 until it automatically becomes lodged.

In a preferred embodiment a second support body 5 in the form of a spirally wound wire can be pushed into the filter bag 3 so that the latter is supported both on the outside and the inside by a reinforcing wire. This embodiment is particularly useful when the filter material 3 is made of very thin material. Thin material contributes to a small fall in pressure through the filter.

Placing of the filter device of fig. 1 can be performed in exceptionally simple manner by inserting it into the pipe B in fig. 4 such that the first annular member points in the direction of the flow of gaseous medium, see arrow P2 in fig. 4. The filter material is thus pressed against the support

member 4 by the gas flow, which is of particular importance if no inner support member 5 is arranged.

If desired, use can be made of a separate retaining ring C, fig. 4a, which is for instance clamped fixedly at the transition between two pipes between the flanges thereof. Due to the diameter decrease at this point the first annular member 1 can remain snagged therebehind, thus preventing the filter element being carried away by the gas flow.

Alternatively, the annular members forming the largest diameter of the filter can snap into pressed out ridges R, see fig. 4b. The filtering device is now fixed. Replacing of the filter can be carried out in simple manner by turning the support body in the opposite direction to the winding of the wire in order to thus reduce the diameter. The filtering device can then be pulled from the pipe.

Placing of the filtering device according to the invention can take place in diverse pipe configurations, see fig. 5a, b and c respectively.

In fig. 5a the pipes are drawn in line with each other and placed between the pipes B is an insert pipe provided with a partially removable side wall D. The filter can be inserted via this wall D and pushed along into the position as shown in fig. 4.

In fig. 5b a T-piece is shown as connecting piece between three mutually connecting pipes B, this T-piece also being provided in its main axis with a removable wall portion D. Two filtering devices can be used here in this embodiment.

Should there be only one angular connection of two pipes, a T-shaped connecting piece as in fig. 5b can then be used, wherein one leg is closed off by a cover E, through which the filtering device can be inserted.

Removal of a filter for replacing can take place in the same manner by taking out the whole, that is, filter body 3 with spiral-shaped bodies 4 and 5 and annular members 1 and 2, and immediately replacing it with an assembled filter unit as in fig. 1. It is also possible to take out only the inner support member 5, if this is present, and to replace only the filter body 3.

In preference the entire filter according to fig. 1 is replaced, wherein the soiled filters can be treated by a company for cleaning and reconditioning the filters.

The filtering material can be any suitable means, wherein paper, plastic and/or textile are conceivable.

Other embodiments are possible within the scope of the invention. The first annular member 1 does not for instance have to consist of the spiral wire for the support member 4 but may be formed by a strip of plastic material bent to a ring to which the spiral 4 is adhered. The same applies to the annular member 2, wherein the distance between both members is determined subject to the use. Nor does the filter material itself have to be formed from a strip as shown in fig. 3 but can also be obtained by other production methods such as injection or blow moulding or extrusion and so on. The shape of the filter body 3 does not have to be precisely the conical bag formed in fig. 2 but may also have a straight generated shape varying from the cone shape. It is apparent that this shape can easily be brought about as a result of a simply realizable diameter change of the windings of the respective support members 4 and 5.

Claims

1. Device for filtering a gaseous medium flowing in a pipe, which device consists of a first annular member extending along the inner wall of the pipe and a second annular member located at a distance, wherein a filter is arranged extending between both members which is formed from a strip of filter material into a bag-like body tapering in the direction of the second annular member.

2. Device as claimed in claim 1, **characterized in that** the second annular member bears means for holding the point of the bag-like body in or close to the axis of the pipe.

3. Device as claimed in claims 1 and 2, **characterized in that** the means are formed together with the second annular member by a spirally wound wire.

4. Device as claimed in claims 1-3, **characterized in that** the side wall of the bag-like filter body is supported by a support member.

5. Device as claimed in claim 4, **characterized in that** the support member is formed from a wound wire, wherein the diameter of the successive windings becomes smaller in the direction toward the second annular member.

6. Device as claimed in any of the foregoing claims, **characterized in that** the first and second annular member and the support member are formed by a single wound wire.

7. Device as claimed in any of the foregoing claims, **characterized in that** a second support member is arranged in the bag-like filter body.

8. Filter material suitable for a bag-like filter element in a device as claimed in any of the

claims 1-7.

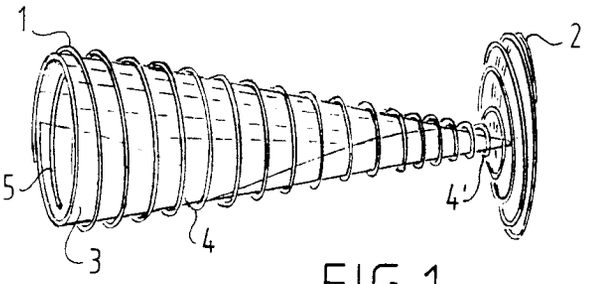

FIG.1

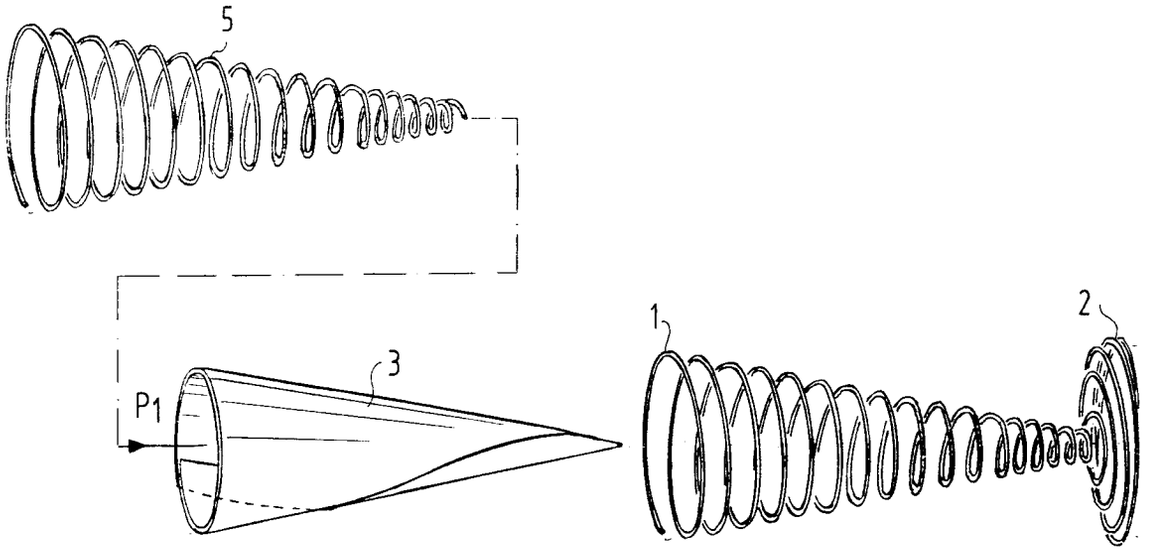

FIG.2

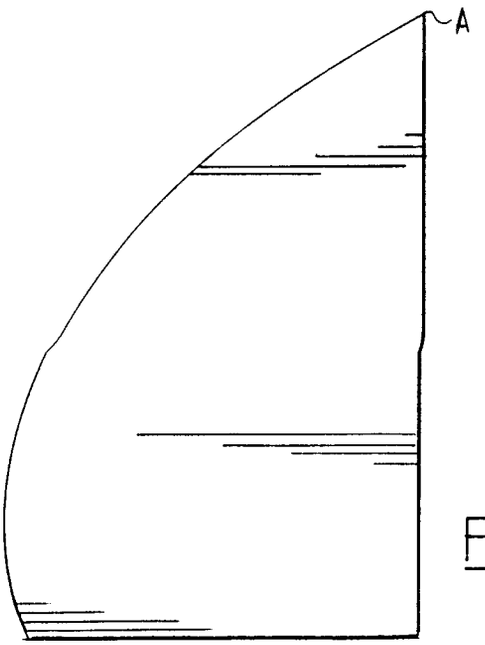

FIG.3

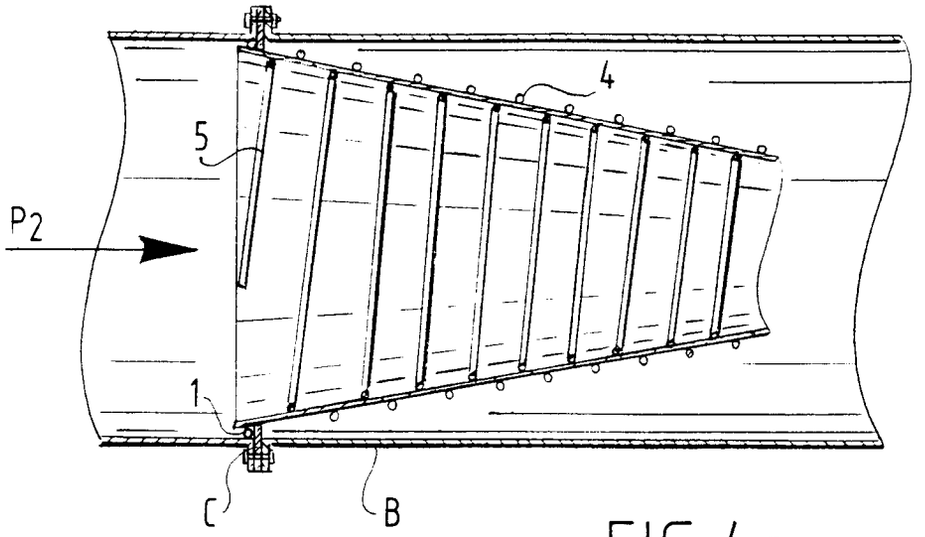

FIG.4a

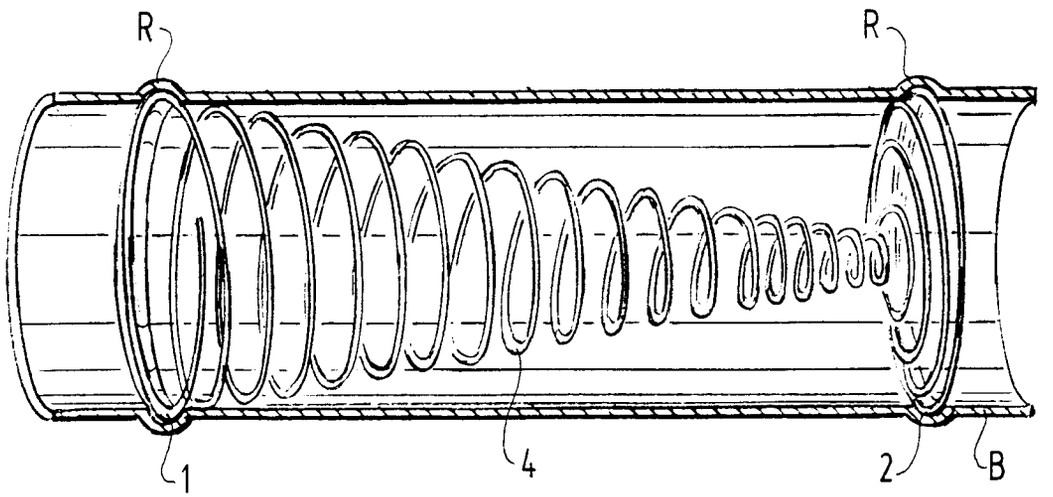

FIG.4b

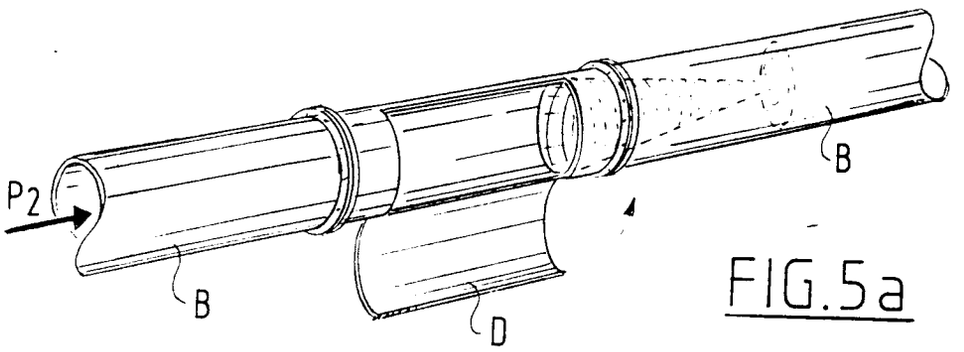

FIG.5a

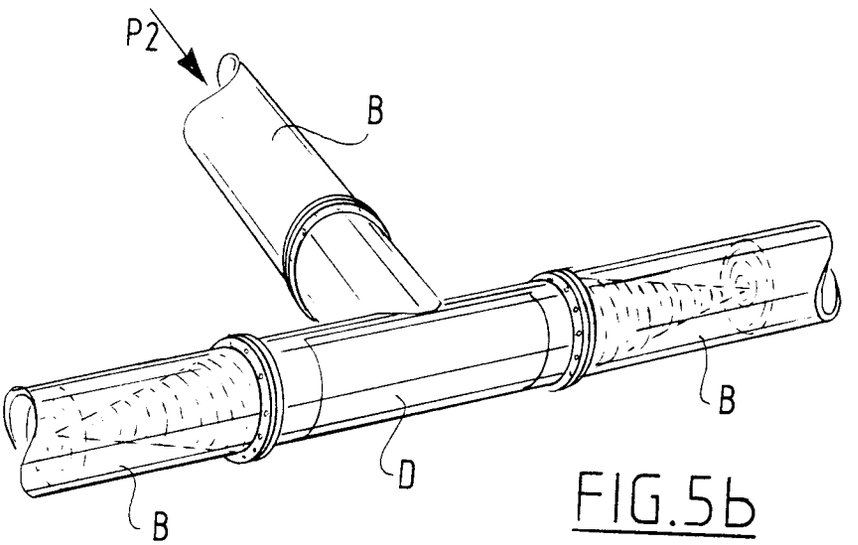

FIG.5b

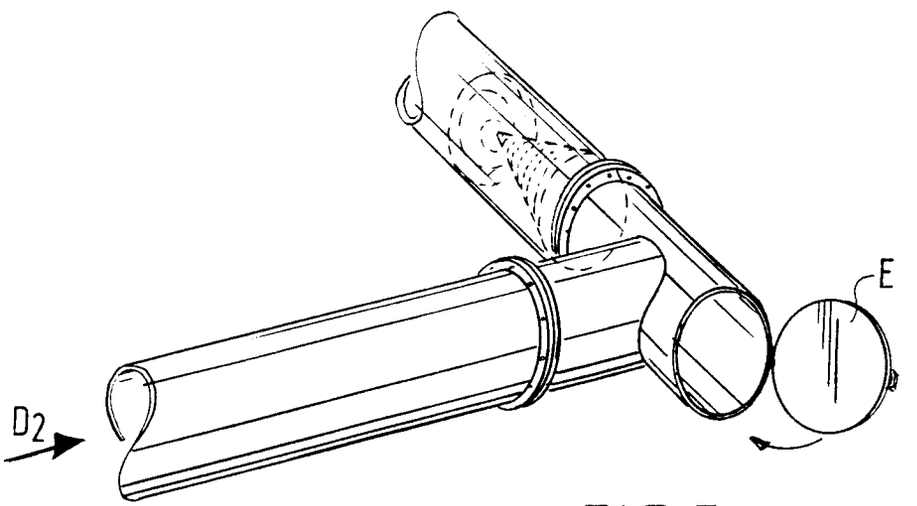

FIG.5c

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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 0244

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-1 565 796 (GERTSCH) * page 2, line 16 - page 3, line 19; figures 2,3 *	1	F24F13/00
A	DE-A-2 017 593 (SVENSKA FLÄKTFABRIKEN)		
A	US-A-1 739 372 (PIRCHIO)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 MAY 1992	PESCHEL G.

CATEGORY OF CITED DOCUMENTS

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