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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **Improved filter of recyclable material for air conditioning equipment**

(57) The invention relates specifically to a filter for air conditioning equipment, the body of which is manufactured with recyclable materials, preferably of pressed cardboard paper or similar, through the corresponding die-cutting, and later manual or automatic handling. This body is designed to have a resin filtering material inside, such as a polyethylene or nylon strip with a screen measuring 0.5 mm or similar, or a strip of non-fabric textile material that is also recyclable, attached by suitable means to the body or frame.

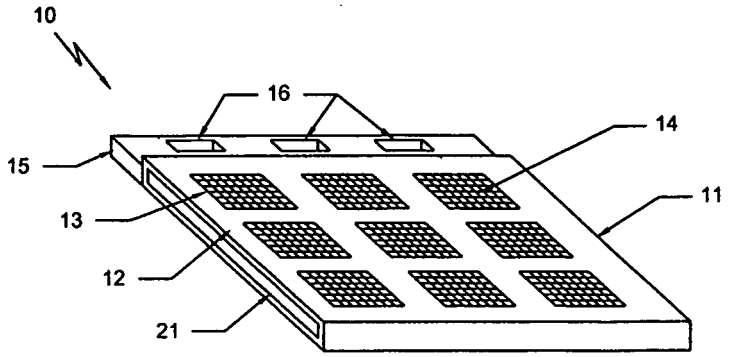

Fig. 1

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Description

Purpose of the Invention.

[0001] The invention relates specifically to a filter for air conditioning equipment, the body of which is manufactured with recyclable materials, preferably of pressed cardboard paper or similar, through the corresponding die-cutting, and later manual or automatic handling. This body is designed to have a resin filtering material inside, such as a polyethylene or nylon strip with a screen measuring 0.5 mm or similar, or a strip of non-fabric textile material that is also recyclable, attached by suitable means to the body or frame.

State of the Art.

[0002] The air conditioning equipment that is usually found on the market usually comprises an interior unit, installed in the place to be air conditioned, and an exterior unit, joined together by a pipe.

[0003] The interior unit includes a filter to remove from the dust particles of dirt, pollen, or any other type of particles in suspension. Some of these filters, for instance, the one shown in European Patent no. 769,664, are a double filter, also called a divided filter, use non-recyclable open-cell foam as the filter material.

[0004] An interior air conditioning unit comprising mainly a body with blow holes and air inlets located in front of them, to confront the interior space. These holes are connected to each other through a duct by an interior heat exchanger and the circulation fan.

[0005] The air-purifying filter is placed between the air inlet holes and the interior heat exchange fins, and in a general manner, the filter (filtering material) is attached in the frame or body, and it is not disposable. This constitutes a problem for companies, whose maintenance service generates a large amount of waste product that is difficult to recover, as the majority of it is made up of plastics, plastic foams, and similar materials, which, as they end up totally encrusted with particles, cannot be treated with a simple recovery process; this notably increases the cost if recovery is possible.

[0006] Also, before being disposed of and replaced with a new one, they are periodically cleaned, generally using a pressurised jet of air, or by cleaning the surface using air or water immersion or spray. In any case, the filters themselves must be removed from the frame where they are lodged.

[0007] In many cases, the frames must also be removed in order to extract the material of the filter itself, which involves difficulties in the dismounting and mounting of the filters, and the time taken up by these operations is too long, and therefore not profitable. Consequently, this means that in many cases this type of filters are not cleaned in the end, nor are they replaced over the course of the lifespan of the air conditioning device.

[0008] The negative consequences of the inconvenience caused by the difficulty in cleaning and the materials used are allergies, frequent colds, rhinitis, sinusitis, and other nasal and respiratory tract infections for the users.

[0009] The inefficiency of cleaning operations for filters that we consider to form a part of the state of the art, are the consequence of the fact that in almost all locations where air conditioning devices are installed, there are no pressurised air facilities allowing the material of the filter to be subjected to a current of air of greater than 4 kg/cm2, or vats or recipients for placing the filter inside and subjecting it to a flow of water or a bath that over time can dissolve the dirt stuck to the material of whatever kind that is used as a filter.

[0010] Under these conditions, the periodic checks obligated by the company manufacturing the air conditioning devices which are carried out respecting the times indicated by said manufacturers do not give the desired results, and the filter, instead of carrying out the function of filtering for which it was designed, ends up becoming a brake to the current of air flowing through it, and a place where all sorts of bacteria and dirt collect, with the consequences and drawbacks mentioned above.

[0011] In other types of devices, for example that shown in European Patent no. 1,275,907, the filter has a curved cross-section, and is made up of a set of filter parts that fit together with one another, in order to meet the need of interior units for a filter that is curved and not flat, in order to adapt to the shape of the interior unit, also non-recyclable.

Scope of the Invention.

[0012] The recyclable nature of the materials used for its construction are now of primary importance in the majority of industrialised countries, as a consequence of legislation regarding waste, obligating it to be selectively collected and eliminated. This means that the materials of which filters are manufactured are important for their elimination and later reuse.

[0013] In order to avoid all of these drawbacks, the frame of the recommended filter will be manufactured of newly manufactured or recycled paper or cardboard sheet, as well as polyethylene strip of totally recyclable material; the consequence of all of the above is the possibility of adapting it to different shapes, as they are flexible materials.

[0014] With this new type of filters, in periodic checks, the filters will be replaced by a new one made of new or recycled materials, avoiding the drawbacks mentioned above, as well as gaining time in the checks, and thus decreasing the cost associated with maintenance.

Description of the invention.

[0015] In one of the possible embodiments, the filter is made up of:

- A structure of cardboard paper or a similar material, new or recycled, obtained by die-cutting sheets of the aforementioned material, and manual or automatic handling of the same.
- Filter formed by strips of non-fabric textile, preferably of polypropylene or any type of equivalent material, with the conditioning factor that it must be totally recyclable, although any type of non-fabric textile may be used, with the corresponding holes for the passing of air generated by the interior unit.

[0016] The structure of new or recycled paper or cardboard allows a plurality of embodiments, basically the aforementioned structure includes means for its insertion into the inside of the interior unit, and a weave of lengthwise and crossing elements, with the lengthwise elements parallel to each other, the crossing elements parallel to each other, and the lengthwise and crossing elements perpendicular to each other; they may either have a flat or curved configuration, in function of the shape of the interior unit.

[0017] Other details and characteristics shall be shown throughout the description below referring to drawings attached to this report which are shown for illustrative but not limiting purposes a practical embodiment of the invention.

Description of the figures.

[0018]

Figure 1 is a perspective of the filter (10), which has, in one of the possible embodiments, a body (11), or structure of the filter (10), with windows (14), and in its upper part a support (15) with drilled holes (16).
Figure 2 is a side section view of the filter (10), on whose smaller base sides one can see the presence of an opening (21).
Figure 3 is a view from above of the filter (10), with its back base (17).
Figure 4 is an alternative embodiment of the invention (23), a frontal section view, adapted for machines in interior units with a curved shape.
Figure 5 is a side elevation view of the filter (23) in figure 4.

[0019] Description of a practical embodiment of the invention.

[0020] In one of the preferred embodiments of the invention, and as may be seen in figure 1, the filter (10) as a whole has a body (11) with a noticeably prismatic shape, manufactured in new or recycled paper laminate, cardboard or similar, on the upper part of the body (11), and upper base of which, there is a step (20), leading to another hollow prismatic body that is shorter (15), in which there are holes (16), that allow the body (14-16) to be incorporated into the internal unit of an air conditioning device. The filter with the drilled holes (16) hangs from the same, with the number and position of holes being that suitable for the size and shape of the machine.

[0021] The front and back bases (12-17) as shown in Figure 2, connect through a plurality of windows (13), which have in them (13) non-fabric textile strips (14), preferably of polypropylene or any other type of equivalent material, with the conditioning factor that it be totally recyclable, although it is possible to use any type of textile, with the appropriate screens, for the passing of the air generated by the internal unit, see figures 2 and 3.

[0022] The breathing of the filter (10) is achieved through the windows (13), and the filtering of the air that crosses the strip of non-fabric textile (14), combined with the screens (22) of the strips (14) placed in the aforementioned windows (13). Said respiration is complemented by openings (21) foreseen in the sides of the bases (18) of the body (11), see figures 1 and 2.

[0023] An equivalent and alternative embodiment of the filter (10) shown in figures 1-3, and as shown in figures 4 and 5, the filter (23) has a curved shape, formed by two strips of new or recycled (24-25) cardboard paper or a similar material, with windows (13). On the lower base of the filter (23) there are appendices (27) that allow the filter (23) to fit into the interior structure of the interior unit of an air conditioning device, not represented in the figures.

[0024] In order to facilitate the withdrawal of said filter (23) from the interior unit, in the base of one of the windows (13) there is a tab (28) facing upwards.

[0025] The general shape of the filters (10-23), is given by a frame or body (11) of cardboard paper or a similar material, with the imperative that it must be of recycled material, which has a means of being held into the internal structure of the interior unit, such as a support (15), or tabs (27), with holes (16) in the form of windows (13), the number and surface of which will be that suitable for the flow of air coming through these windows (13), and a filtering strip (14) of recyclable material such as, for instance, polypropylene or a similar material, with the appropriate screens (22).

[0026] Having sufficiently described this invention using the Figures attached, it is easy to understand that any changes judged to be suitable may be made, whenever these changes do not alter of the essence of the invention summarised in the following claims.

Claims

1. **"IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT"** of those used for the elimination of particles accompanying the air, this air being treated so that the device favours that the particles mixed with said air are retained in a mesh, preferably a metallic one, which acts with its corresponding metal frame, although it is possible to manufacture it with other type of non-recycled materials, **characterised by** the fact that

one of the possible embodiments of the filter is made up of:

- A structure of cardboard paper or a similar material, new or recycled, obtained by die-cutting sheets of the aforementioned material, and manual or automatic handling of the same.
- A filter material formed by strips of non-fabric textile, preferably of polypropylene or any type of equivalent material, with the conditioning factor that it must be totally recyclable, although any type of non-fabric textile may be used, with the corresponding holes for the passing of air generated by the interior unit.
- Means of immobilisation of the filter in the interior unit.

2. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to claim 1, **characterised by** the fact that the frame of the filter comprises a body with a noticeably prismatic shape, whose front and back bases are connected by holes in the form of windows, these windows being covered by a non-fabric textile strip.

3. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to the previous claims **characterised in that** in one of the embodiments of the filter the upper part of the body has a step, forming a second, shorter body that is also prismatic, this second body acting as a means of support of the filter, as there are drilled holes in it connecting its front base back with its back base, through these drilled holes.

4. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to the previous claims **characterised by** the fact that the side bases of the larger body of the filter have openings for the passage of air.

5. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to claim 1 **characterised by** the fact that the filtering material will be a resin filtering material, such as a polyethylene or nylon strip with screens measuring approximately 0.5 mm, the structure being attached to the filter by suitable means.

6. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to the claim 1 **characterised by** the fact that an alternative embodiment of the filter, the filter has a curved shape, formed by two strips of new or recycled cardboard paper or a similar material, with windows. On the lower base of the filter there are appendices that allow the filter to fit into the interior structure of the interior unit.

Amended claims in accordance with Rule 137(2) EPC.

1. "FITTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" of those used for the elimination of particles accompanying the air, this air being treated so that the filter allow that the particles mixed with said air are retained in a mesh, , which acts with its corresponding frame, although it is possible to manufacture with other type of non-recycled materials, **characterised by** the fact that the filter (10) is made up of:

- A structure of cardboard paper or a similar material, new or recycled, obtained by die-cutting sheets manual or automatic of the aforementioned material, A filter material formed by strips of non-fabric textile, preferably of polypropylene or any type of equivalent material, with a screen measuring 0.5 mm, with the conditioning factor that it must be totally recyclable, with the corresponding holes for the passing of air generated by the interior unit.
- Means of immobilisation of the filter in the interior unit.

2. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to claim 1, **characterised by** the fact that the frame of the filter (10) comprises a body(11) with a noticeably prismatic shape, whose front and back bases (17) are connected by drilled holes in the form of windows (13), these windows being covered by a nor-fabric textile strip (14).

3. IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPEMENT" according to the previous claims **characterised in that** in one of the embodiments of the filter (10) the upper part o support (15) of the body (11)has a step, forming a second, shorter body that is also prismatic, this second body acting as a means of support of the filter (10), as there are drilled holes (16) in it connecting its front base back with its back base, through these drilled holes (16).

4. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to the previous claims **characterised by** the fact that the side bases of the larger body of the filter (10) have openings (21) for the passage of air.

5. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUPMENT" according to claim 1 **characterised by** the fact that the

filtering material will be a resin filtering material, such as a polyethylene or nylon strip with screens measuring approximately 0.5 mm, the structure being attached to the filter by suitable means.

6. "IMPROVED FILTER OF RECYCLABLE MATERIAL FOR AIR CONDITIONING EQUIPMENT" according to the claim 1 **characterised by** the fact that an alternative embodiment of the filter (10), the filter has a curved shape, formed by two strips of new or recycled cardboard paper or a similar material, with windows (13) . On the lower base of the filter there are appendices (27) that allow the filter to fit into the interior structure of the interior unit.

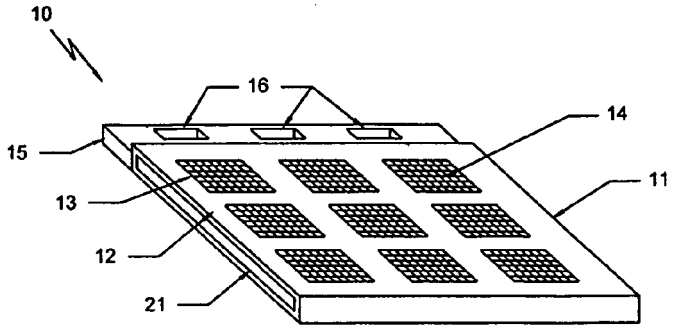

Fig. 1

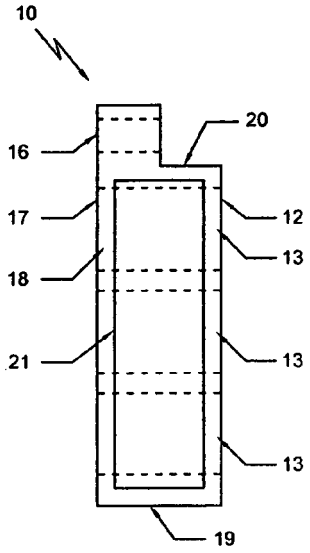

Fig. 2

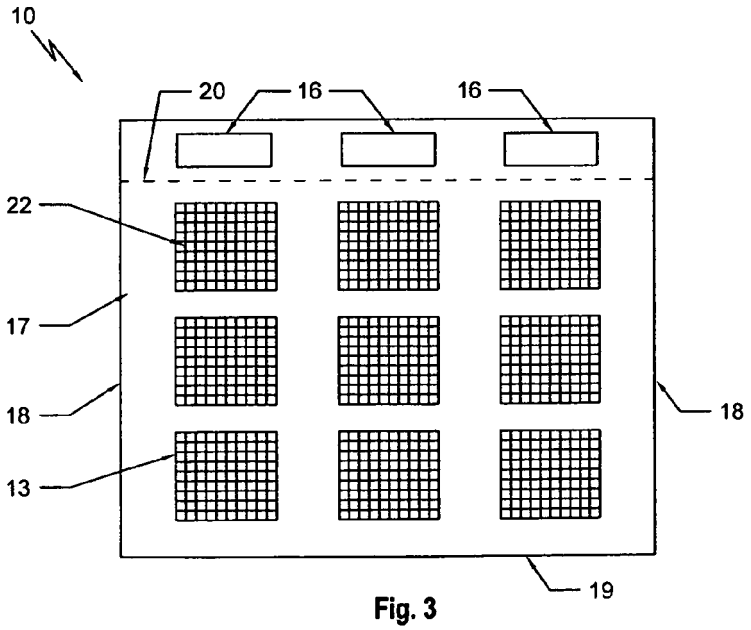

Fig. 3

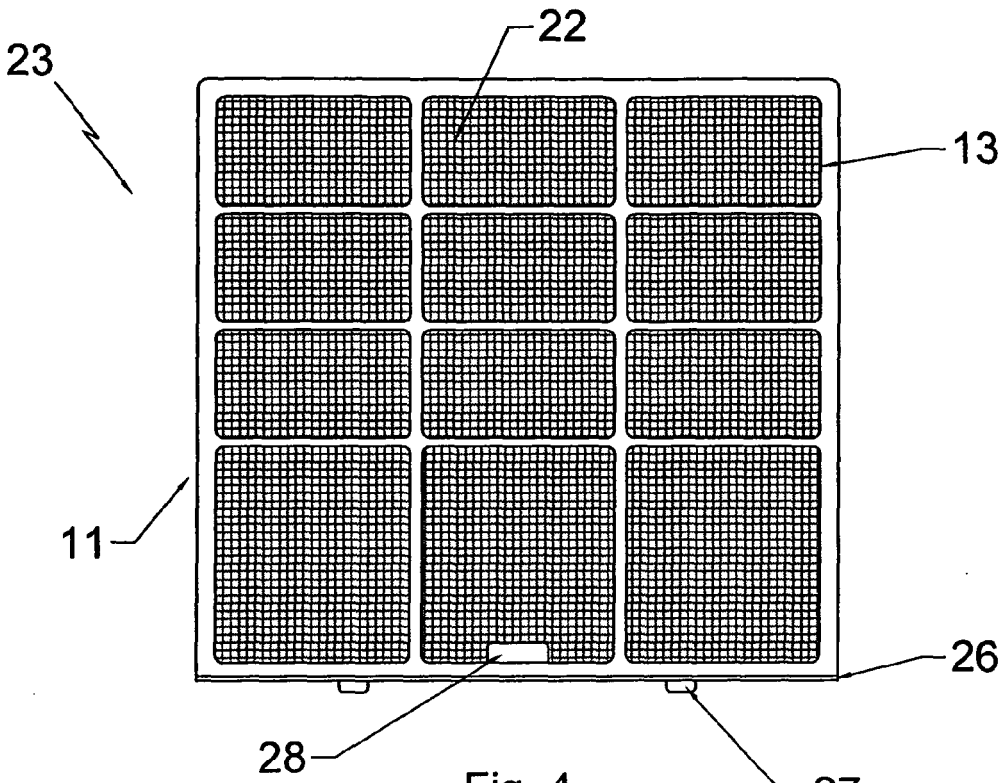

Fig. 4

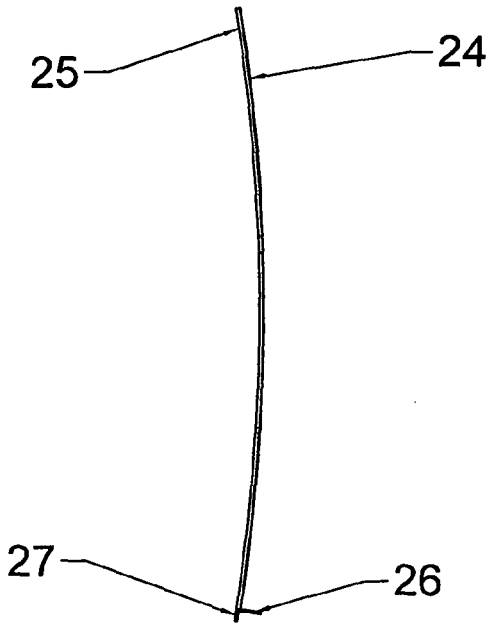

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 09 38 0145

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 878 057 B1 (CALLOURA, DEREK S.) 12 April 2005 (2005-04-12) * column 3; figures 2,3 *	1-6	INV. F24F13/28
A,D	EP 0 769 664 A (MATSUSHITA ELECTRIC IND CO LTD [JP]) 23 April 1997 (1997-04-23) * the whole document *	1-6	
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TECHNICAL FIELDS SEARCHED (IPC)

F24F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 January 2010	Decking, Oliver

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- EP 1275907 A **[0011]**