(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 080 849 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.07.2009 Bulletin 2009/30

(51) Int Cl.:
E04D 13/17 *(2006.01)* ***F24F 7/02*** *(2006.01)*

(21) Application number: **08425025.7**

(22) Date of filing: **17.01.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

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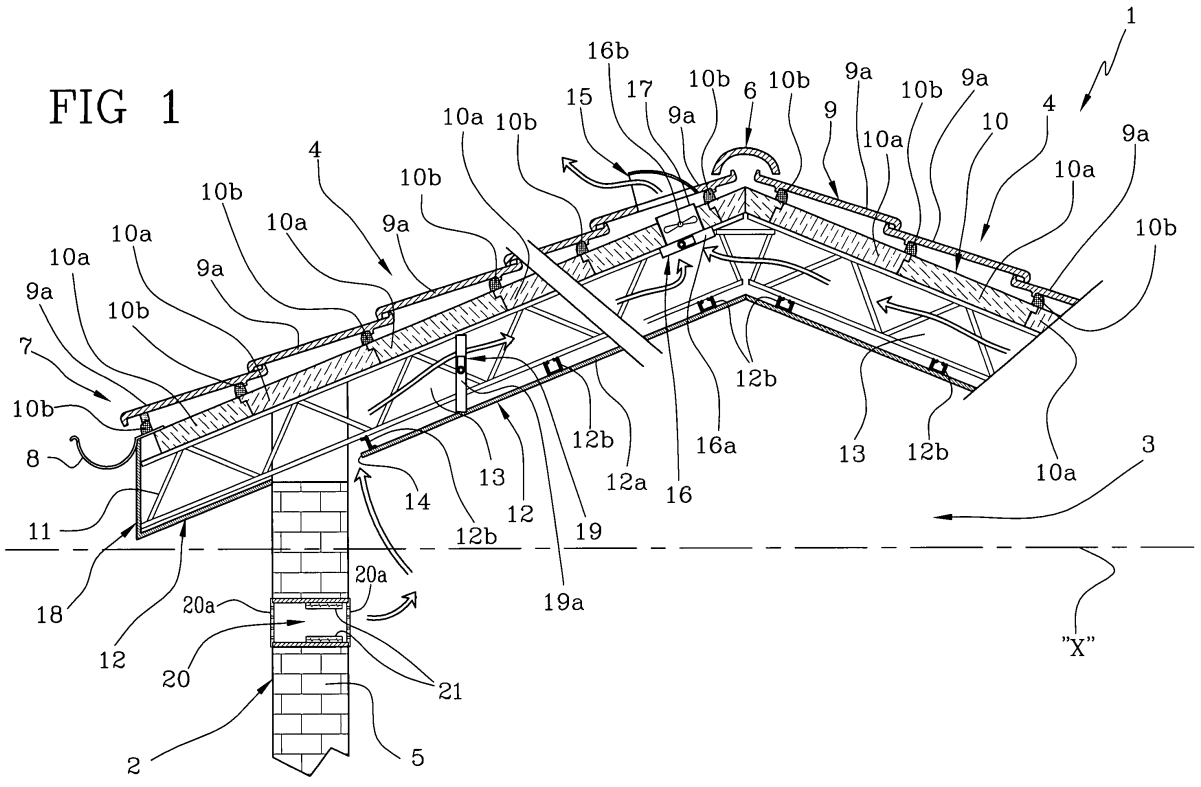
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(54) **Roof, in particular for houses**

(57) A roof (1), in particular for houses, comprises at least one pitch (4) the structure of which consists of a covering mantle (9) facing outwards and designed to protect at least one inside volume (3) from one or more atmospheric agents; at least one insulating layer (10), interposed between the covering mantle (9) and the inside volume (3) to thermally insulate said inside volume; and at least one lower sheathing (12) facing away from the covering mantle (9). The pitch structure has an air space (13) in fluid communication with an inlet opening (14) formed through the lower sheathing (12), and a vent opening (15) formed through the covering mantle (9). The vent opening (15) is operable to a closed or open condition by an occlusion mechanism (16) to enable passage of air along the air space (13) or accumulation of air therewithin.

FIG 1



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Description

[0001] The present invention relates to a roof, in particular for houses.

[0002] The present invention is suitable for use in the building sector and, in particular, addresses to any type of house or similar building construction.

[0003] It is known that every building construction, such as houses, condominiums, sheds and the like, is provided with a roof at the top which is able to shelter and protect the inside volumes or rooms from atmospheric agents. In particular, the roof must be able both to protect the inside volumes from rain and snow falls and to thermally isolate the same during the different seasons of the year.

[0004] Generally, a roof comprises a load-bearing structure, such as roof frames made of structural wood, trusses, steel section bars, prestressed reinforced concrete panels or reinforced concrete floors, fastened to the upper portion of the load-bearing walls of the corresponding building structure. Usually associated with the load-bearing structure is one or more layers of insulation material adapted to provide a suitable heat insulation relative to the external environment. The load-bearing structure can ultimately be provided with an inner sheathing or a garret mainly used in order to increase the roof heat insulation.

[0005] Generally, roofs in houses have an inclined geometric shape resulting from one or more inclined flat faces, termed pitches or slopes. Usually, sloping roofs have at least one ridge defined by intersection of the planes of two slopes and at least one eaves edge corresponding to the lower end portion of each slope.

In spite of improvements made in the last few years to houses' roofs in terms of resistance to atmospheric agents and heat insulation, the Applicant has found that said roofs are not free from some drawbacks and can be further improved under different points of view, mainly in connection with the heat conditions of the inside volumes placed immediately under the roof, both in the hot seasons and the cold seasons.

[0006] In detail, the Applicant has found that known roofs promote accumulation of heat inside the building structure during the hot seasons and do not conveniently insulate the inside volumes during the cold seasons, which has a great impact on the use of the heating system and the related costs.

[0007] Accordingly, the present invention aims at solving the problems found in the known art.

[0008] It is an aim of the present invention to propose a roof, in particular for houses, capable of promoting ventilation inside the houses and increasing heat insulation of same in co-operation with the insulating layers of said roofs.

[0009] The foregoing and further aims that will become more apparent in the course of the following description, are achieved by a roof, in particular for houses, comprising the features set out in the characterising part of claim 1.

[0010] Further features and advantages will be best understood from the detailed description of a roof, in particular for houses in accordance with the present invention.

[0011] This description will be set out herein after with reference to the accompanying drawing, given by way of non-limiting example, which represents a fragmentary diagrammatic section view of a roof, in particular for houses, in accordance with the present invention.

[0012] With reference to the attached figure, a roof, in particular for houses, in accordance with the present invention has been generally identified with 1.

[0013] In the figure a building structure 2 is diagrammatically shown, such as a house, a condominium or a shed, provided with a roof 11 capable of protecting one or more inside volumes or rooms 3 from atmospheric agents, such as rain or snow falls, wind, humidity.

[0014] Roof 1 comprises at least one inclined sector 4, hereinafter termed pitch, lying in an inclined plane relative to a horizontal reference plane "X".

[0015] In particular, roof 1 as shown in the attached figure, is provided with two pitches 4 each extending from a respective side wall 5 of the building structure 2 and converging towards each other to form a ridge 6 defining the top of the structure itself. On the opposite side relative to ridge 6 each pitch 4 defines a corresponding eaves line 7 at which a gutter 8 is located.

[0016] In detail, roof 1 is provided with at least one covering mantle preferably consisting of a plurality of roofing tiles 9a made of bricks or cement, facing outwards and designed to protect the inside volumes 3 from several atmospheric agents.

Obviously, the covering mantle 9 which is considered as the preferred solution, does not at all limit the present invention. In fact, roof 1 can be also made using other types of discontinuous coverings, such as slabs of asbestos cement, stone, plastic materials, as well as bituminous roofing tiles, insulating metal panels and/or fretted sheet metal of zinc plated steel and so on. Alternatively, the roof can also consist of continuous coverings, made impermeable by a cold or hot treatment, of synthetic membranes or bituminous membranes.

[0017] As shown in the figure, in order to reduce heat losses in the building structure 2 to a minimum, roof 1 comprises at least one insulating layer 10, interposed between the covering mantle 9 and the inside volumes 3 to thermally insulate the latter from the external environment.

[0018] The insulating layer 10 is made up of a plurality of insulated panels 10a suitably provided with corresponding upper supports 10b designed to support the roofing tiles 9a of the covering mantle 9 resting thereon.

[0019] Advantageously, the insulating layer 10 is supported by at least one load-bearing structure 11, preferably a lattice-like structure, under which at least one lower sheathing 12 facing away from the covering mantle 9 is disposed.

[0020] In particular, the lower sheathing 12 is defined, at the inside volumes 3, by at least one false ceiling or a garret 12a propped up by a series of supports 12b which are directly fastened to the load-bearing structure 11.

[0021] As shown in the attached figure, roof 1 is provided, at least at each pitch 4, with at least one air space 13. The air space 13 is preferably in fluid communication with an inlet opening 14 formed through the lower sheathing 12 and a vent opening 15 formed at least through the covering mantle 9.

[0022] Advantageously, the vent opening 15 is formed through the covering mantle 9 at the top of pitches 4. In other words, the vent opening 15 is positioned close to ridge 6. Preferably, the vent opening 15 can be driven to a closed or open condition by an occlusion mechanism 16 operatively associated with at least one vent hole 17 provided through the insulating layer 10 in register with a position corresponding to the vent opening 15.

[0023] In the inventive solution the occlusion mechanism 16 preferably comprises an insulated closing element 16a, manually operable through one or more suitable mechanisms, and/or electrically operable by means of suitable electric actuators. As shown in the figure, the air space 13 is interposed between the lower sheathing 12 and the covering mantle 9. Preferably, the air space 13 is interposed between the lower sheathing 12 and the insulating layer 10. In particular, the air space 13 houses the lattice-like load-bearing structure 11 which is suitably fastened to the upper portion of the side walls 5.

[0024] Still with reference to the attached figure, the inlet opening 14 is formed through the lower sheathing 12 close to the corresponding side wall 5 of the building structure 2.

The inlet opening 14 is advantageously positioned within the building structure 2, and is in fluid communication with the inside volume 3. In this way, when the vent opening 15 is in the open condition, the air present within the air space 13, heated by sun radiation, has a tendency to get out of the vent opening 15. The rising air, due to the stack effect, attracts the air present in the inside volume 3 in which there is a continuous state of recirculation of air, which will cause a constant cooling ventilation.

[0025] On the contrary, when the vent opening 15 is suitably occluded, by operating the corresponding occlusion mechanism 16, the air present inside the air space 13 defines a further insulating layer greatly increasing the heat insulation carried out by the insulating layer 10.

[0026] Preferably, the inlet opening 14 comprises at least one slit extending close to the respective side wall 5 on which the lower portion of the corresponding pitch 4 lies, in such a manner that the whole inside volume 3 is suitably in fluid communication with the air space 13.

[0027] In order to ensure an appropriate air flow from the inside volume 3 to the air space 13, the inlet opening 14 or slit extends along the whole extension of the corresponding side wall 5. The inlet opening 14 has a width, measurable from the corresponding side wall 5 to the ridge 6, included between 5 mm and 25 mm, preferably between 10 mm and 20 mm, more preferably equal to 15 mm.

[0028] Advantageously, the inlet opening 14 is provided with at least one grid (not shown) preferably a micro-perforated section member enabling passage of air alone between the inner volume 3 and the air space.

[0029] The inlet opening 14 can be provided with a closing device (not shown) operable between an open condition at which the air is free to flow through the inlet opening 14, and a closed condition at which entry of air inside the air space 13 is not allowed.

[0030] In addition or as an alternative to the closing device of the respective inlet opening 14 and/or to the occlusion mechanism 16, the air space 13 can be provided with one or more obstruction devices 19 operable between an open condition, at which the air is able to circulate within the air space 13, and an obstructed condition, at which the air space 13 is divided into at least two compartments 13a terminating at the inlet opening 14 and at the vent opening 15, respectively. In detail, the obstruction device 19 comprises at least one insulated closing element 19a operatively disposed within the air space 13 between the inlet opening 14 and the vent opening 15.

[0031] Still with reference to the attached figure, at least one air intake 20 can be formed through one of the side walls 5 of the inside volume 3 to bring the latter into fluid communication with the external environment. In this way, during the upward flow of the heated air present in the air space 13, the fresh air from the outside passes through the air intake 20 and flows towards the air space 13 and the vent opening 15.

[0032] In order to enable air passage and at the same time avoid passage of bulky bodies or insects, the air intake 20 is provided with suitable grids or insulating nets 20a.

[0033] When the heating effect of the thermal radiation terminates or is missing, particularly during the evening or night hours, the above mentioned cooling flow and the change-of-air flow can be obtained by operating a fan 16b operatively associated with the vent opening 15, preferably inside the vent hole 17. In this manner, the air present in the air space 13 is ejected through the vent opening 15 and new air is brought back into the inside volume 3 through the air intake 20.

[0034] Fan 16b can be activated both by a direct request, through use of a suitable activation switch, and automatically, through a suitable programmable electronic timer.

[0035] At least one heating device 21 can be also operatively associated with the air intake 20 so as to act, after activation, on the air passing through from the outside to the inside. The heating device 21, consisting for example of an electric resistor and/or a radiator operating close to the air intake 20, is designed to be activated during the cold seasons, when it is necessary to evacuate the moisture-charged hot air present at the inside of the air space 13 and replace it with less moist fresh air from

the outside.

[0036] The present invention solves the problems found in the known art and achieves important advantages.

[0037] First of all, the roof according to the present invention allows a constant natural ventilation of the inside volumes of the house with which it is associated during the hot seasons and greatly reduces the loss of heat of said house during the cold seasons.

[0038] In fact, the roof of the invention through the stack effect is able to generate an air displacement from the inside volumes of the house to the external environment, as the air rises along the air spaces formed inside the pitches. Said air displacement along the air spaces inhibits accumulation of heat within the roof, so that the surface and interstitial condensate is eliminated and formation of moulds is avoided, which will make the air more wholesome and free from humidity.

[0039] It will be also recognised that due to air displacement from the inside volume to the air spaces, there is a continuous flow of fresh air entering the house.

[0040] During the cold seasons, closure of the vent opening, on the contrary, gives rise to accumulation of the heat produced by the heating plant, at the inside of the air spaces, thereby greatly increasing the thermal break of the roof. During the hotter day hours, the vent opening in the vicinity of the ridge allows the moisture-charged hot air to exit and to be replaced by drier and more wholesome air that therefore can be heated more easily.

Claims

1. A roof, in particular for houses, comprising at least one inclined sector (4) with respect to a substantially horizontal reference plane ("X"), said roof (1) having:

- at least one covering mantle (9) facing outwards and designed to protect at least one inside volume (3) from one or more atmospheric agents;
- at least one insulating layer (10) interposed between said covering mantle (9) and said inside volume (3) for heat insulating said inside volume (3) from the external environment;
- at least one lower sheathing (12) facing away from said covering mantle (9);

characterised in that, at least at said inclined sector (4), it comprises at least one air space (13) in fluid communication with an inlet opening (14) formed through said lower sheathing (12), and a vent opening (15) formed through said covering mantle (9), said vent opening (15) being operable to a closed or open condition by an occlusion mechanism (16) associated therewith.

2. A roof as claimed in claim 1, wherein said air space (13) is interposed between said lower sheathing (12) and said covering mantle (9).

3. A roof as claimed in claim 2, wherein said air space (3) is interposed between said lower sheathing (12) and said insulating layer (10).

4. A roof as claimed in one or more of the preceding claims, wherein said air space (13) houses at least one lattice-like load-bearing structure (11).

5. A roof as claimed in one or more of the preceding claims, wherein said inlet opening (14) is formed through said lower sheathing (12) in the vicinity of a corresponding side wall (5) of said inside volume (3).

6. A roof as claimed in claim 5, wherein said inlet opening (14) is in fluid communication with said inside volume (3).

7. A roof as claimed in claim 6, wherein said inlet opening (14) comprises a slit extending along the respective side wall (5) of said inside volume (3).

8. A roof as claimed in claim 7, wherein said inlet opening (14) runs along the whole extension of the corresponding side wall (5).

9. A roof as claimed in claim 7 or 8, wherein said inlet opening (14) has a width included between 5 mm and 25 mm, preferably included between 10 mm and 20 mm, more preferably equal to 15 mm.

10. A roof as claimed in anyone of the preceding claims, wherein said inlet opening (14) is provided with at least one grid.

11. A roof as claimed in one or more of the preceding claims, wherein said inlet opening (14) is provided with a closing device operable between an open condition at which the air is free to flow through said inlet opening (14) and a closed condition at which entry of air in said air space (13) is not allowed.

12. A roof as claimed in one or more of the preceding claims, wherein said vent opening (15) is formed through said covering mantle (9) at the top of said inclined sector (4) of said roof (1).

13. A roof as claimed in anyone of the preceding claims, wherein said air space (13) is provided with an obstruction device (19) operable between an open condition at which the air can circulate inside said air space (13), and an obstructed condition at which the air space (13) is divided into at least two compartments (13a) terminating at the inlet opening (14) and the vent opening (15), respectively.

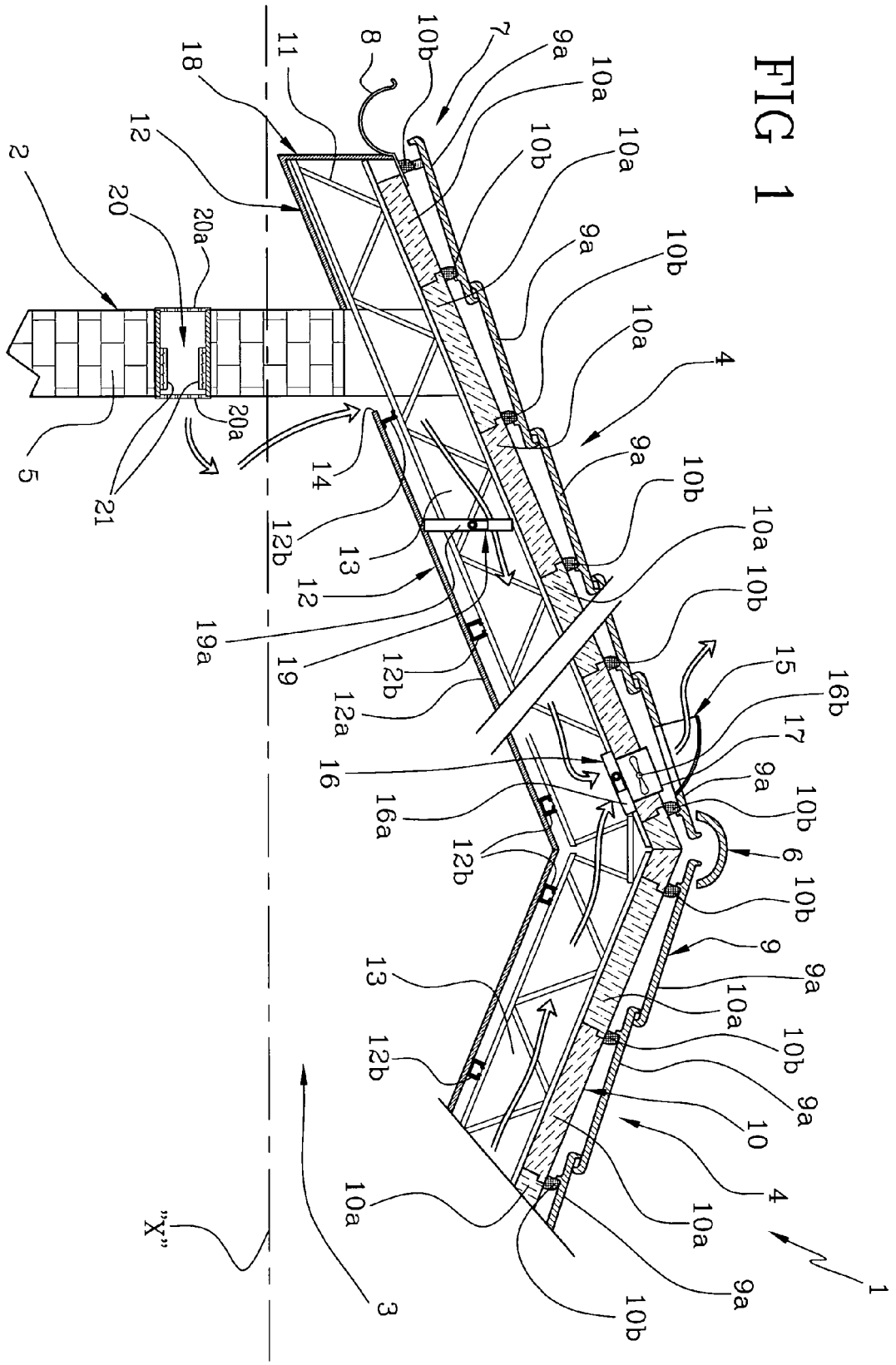
14. A roof as claimed in claim 13, wherein said obstruction device (19) is operatively disposed within said air space (13) at the respective side wall (5) of said inside volume (3).

15. A roof as claimed in anyone of claims 5 to 14, comprising an air intake (20) formed through said side wall (5) of said inside volume (3), said air intake (20) bringing said inside volume (3) into communication with the external environment.

16. A roof as claimed in claim 15, comprising a heating device (21) operatively associated with said air intake (20), said heating device (21) being selectively operable to heat the air passing through said air intake (20).

17. A roof as claimed in anyone of the preceding claims, further comprising at least one fan (16b) operatively associated with said vent opening (15), said fan (16b) being selectively operable to transfer the air present in said air space (13) towards the outside, through said vent opening (15).

FIG 1


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10a
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12a
12b
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16a
16b
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19a
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20a
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"X"

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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5025

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 July 2008	Righetti, Roberto

CATEGORY OF CITED DOCUMENTS

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