



(11) Publication number : **0 525 966 A1**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **92305602.2**

(51) Int. Cl.⁵ : **F24F 13/08**, E06B 7/082,
E06B 7/02

(22) Date of filing : **18.06.92**

(30) Priority : **18.06.91 GB 9113158**

(43) Date of publication of application :
03.02.93 Bulletin 93/05

(84) Designated Contracting States :
AT BE DE DK ES FR GB GR IT LU NL PT SE

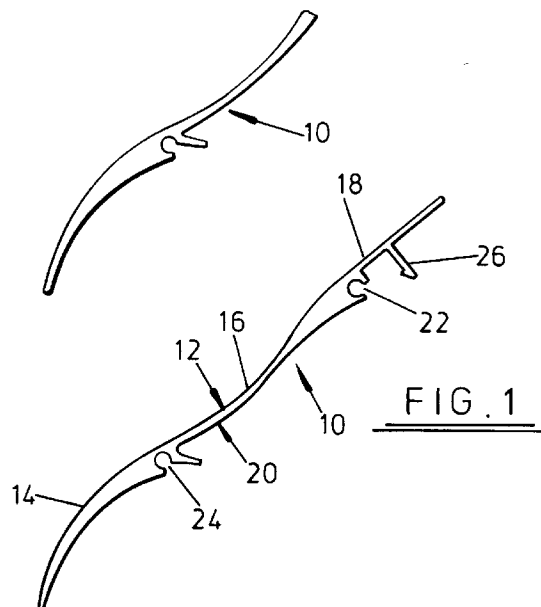
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(54) **Ventilators.**

(57) A louvre blade (10) has an air flow impacting surface (12) having a first convex section (14), a second concave section (16) and a third rectilinear section (18) with substantially smooth transitions between each section.



This invention concerns ventilators.

Ventilators for buildings comprise louvre blades usually in a fixed parallel relationship. The blades are generally designed to optimise air flow through the ventilator but inhibit ingress of rain. Such blades generally have an angular shape having a vertically depending front section, an inclined middle section and a vertically upstanding rear section. Unfortunately that arrangement has the effect of creating turbulence and accelerating air flow through the ventilator, which air flow carries with it rain through the ventilator. The ability of a ventilator to inhibit rain ingress is commonly referred to as weathering.

An object of this invention is to improve ventilators in terms of air flow.

According to the invention there is provided a louvre blade for a ventilator having a first air flow impacting surface that is generally convex.

In one preferred embodiment a louvre blade of the invention has a convex first section and a concave section second, preferably with a substantially smooth transition therebetween. A third substantially rectilinear section is preferably also provided again with a substantially smooth transition with the preceding section.

The first section of the preferred blade preferably increases in thickness from its leading edge. The second section of the preferred blade is preferably of substantially constant thickness.

In another preferred embodiment of the invention, a louvre blade has its leading edge turned over to provide not only a first section having a convex upper surface but also a convex lower surface.

Locations for coupling a blade to brackets or holders therefor are preferably provided in the region of transitions between blade sections. Such locations may comprise notches, recesses or projection to fit over or onto said brackets or holders preferably by a clipping action. Alternatively instead of an upper location being in the form of a notch, recess or projection, the upper edge of the blade may be shaped so as to locate into or under a bracket or the like. It is preferred that a lower location permit pivoting movement of a blade fitted thereto for selecting a desired angle of inclination of the blade.

The invention further provides a ventilator comprising an array of inclined blades of the invention in spaced parallel relationship.

For a louvre arrangement to forming ventilator, special louvres may be provided for interfitting with wall panels forming a frame for said arrangement. Preferably for a wall formed of panels, upper and lower louvres will be provided with formations for interfitment with edges formations of those panels. Typically such panels have either male or female type edges for mutual interfitment and upper and lower louvres may be provided having the appropriate male or female formations for interfitment with the panel edges. Such

special louvres may also interfit with each other for forming a horizontal joint between louvre arrangements.

The louvre blades of the invention are primarily intended to be fixed in position in a ventilator with their spacings and angles of inclination chosen to provide desired air flow and weathering, although it is also possible that the blades may be arranged to pivot between open and closed positions for the ventilator. The blades of the invention may also be used as an architectural feature in arrangements on a surface.

It is believed that the provision of a curved surface as the first air flow impact surface of a louvre blade of a ventilator has the effect of reducing air speed variation through the ventilator. Turbulence within a ventilator tends to accelerate air flow which in turn causes rain to be carried through a ventilator. Thus reducing air speed variations may reduce the amount of rain carried through a ventilator. At the same time it is believed that efficiency of air flow through the ventilator may be improved. For example, a hole in a wall has an air flow efficiency of about 60%, whereas a ventilator of the prior art type described above may have an efficiency in the range of 39-42%. It is believed that ventilators having louvre blades of the invention may have air flow efficiency in the range of 45 to 50%.

This invention will now be further described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is an end view of a louvre arrangement using a first louvre blade;

Figure 2 is an end view of a second louvre blade;

Figure 3 is an end view of a second louvre arrangement using a third louvre blade;

Figure 4 is an enlargement of part of Figure 3;

Figure 5 is a section through a louvre arrangement in a wall; and

Figure 6 is a section showing detail of a horizontal joint between louvre arrangements.

Referring to Figure 1 of the accompanying drawings, a louvre arrangement for a fixed ventilator is shown, in which louvre blades 10 are arranged in spaced parallel relationship. The blades 10 are inclined upwardly from outside to inside of a wall structure into which the arrangement is fitted. Each blade 10 is secured at its ends to clips or brackets (not shown) provided for that purpose.

Each blade 10 has an upper surface 12 that has three parts, firstly a convex part 14, then a concave part 16; and finally a rectilinear part 18, each part progressing smoothly into the next part. The under surface 20 of each blade 10 corresponds to the upper surface but it should be noted that the first part becomes thicker over its length up to the second part, the second part has a constant thickness and the third part becomes thicker over a short distance before a constant thickness section. Where the blade is thick-

est, upper and lower clip or bracket locations 22 and 24 respectively are provided. The upper location 22 includes a projection 26 normal to the blade. The lower clip location 24 allows the blade to be pivotted to a desired angle of inclination as well as for alignment of abutting blades for fixing

The blades are conveniently manufactured by extrusion of aluminium, although it will be appreciated that other materials and methods of manufacture may be feasible.

The blade 10 is shaped so as to optimise air flow through the ventilator without increasing ingress of rainfall. As the blade has a gently curving convex surface that is first impacted by air passing through the ventilator, air flow speed is not increased dramatically by such impact, so that less turbulence, which would usually carry rain through the ventilator is created within the ventilator.

Turning to Figure 2 of the accompanying drawings, an alternative louvre blade 50 is shown. This blade has a first section 52 that turned back on itself to form a leading edge 54 with upper and lower convex surfaces 56 and 58 respectively. The upper convex surface 56 leads into a concave section 60 and finally to a rectilinear section 62, the transitions between each section being relatively smooth.

On the underside of the blade in the region of the transition between the sections 52 and 60 there is provided a notch 64 for location of the blade on a bracket therefor (not shown). The other end 66 of the blade is formed as a latch member for locating under a clip of bracket (not shown). Again the blade is pivotable about notch 64 and its other end 66 securable over a range of angles for the blade.

Louvre blades 50 will be arranged in similar way to those of Figure 1 in forming a ventilator.

Referring now to Figures 3 and 4, a louvre blade 50A is shown that is similar to that of Figure 2. Like parts have been given the same reference numerals for ease of reference. The main difference between the two embodiments is that instead of a notch 64, the blade 50A has a projection 70 with an enlarged circular end 72 that fits into a recess 74 of a bracket 76. Brackets 76 are provided at opposite ends of each blade and are generally in the shape of a right angle triangle. Each bracket 76 has a vertical side 80, a side 82 extending at right angles therefrom and a diagonal side 84 joining ends of sides 80 and 82. From the junction of sides 82 and 84 extends recess member 74. From the junction of sides 80 and 84 extends upwards a clip member 78 for receiving the latch member 66 of the blade. To fit a blade 50A to a bracket involves seating louvre blade projection end 72 in the recess 74 and pivoting the blade towards the bracket until the member 66 clips under the clip member 78.

In Figure 5 of the accompanying drawings, there is shown a vertical section through a louvre arrangements fitted into a wall made up of panels 100. The

panels 100 are of a known type comprising spaced inner and outer metal skins 102 and 104 respectively with a plastics foam infill 106 therebetween. Each panel has its upper and lower edges 108 and 110 respectively shaped to overlap and interfit with an adjacent panel. In the arrangement shown all except the uppermost and lowermost louvres 112 and 114 respectively are the same type (10) as shown on Figure 1. The upper and lower louvres 112 and 114 are specially shaped to cooperate with the aforementioned upper and lower edges of the panels 100.

Regarding the louvre arrangement generally, each louvre 10 is mounted onto upper and lower clips 116 and 118 respectively which are secured to mullions 120. The upper clips 116 are inclined upwards from the mullion 120 and have an enlarged end section 122 over which projections 26 of the louvre 10 locate. The lower clips 118, which are also secured to mullions 120 are generally of inverted L-shaped so that one limb 124 lies against the mullion and the other limb 126 extends outwards, where it has a slightly angled ended portion 128 that fits snugly into the corner created above projection 24 of the louvre 10.

Turning to the upper and lower louvres 112 and 114 respectively, the upper louvre 112 has a similar shape to a louvre 10 up to the region 22. There the louvre 112 has a first straight web 130 that is at an obtuse angle to the lower part of the louvre generally. A second straight web 132 then extends upwards at right angles to the first web. A third web 134 turns back at right angles from the second web and then fourth, fifth and sixth webs 135, 136 and 138 respectively each at right angles to the preceding web form a downwardly opening channel section. At the junction of the first and second webs there is a depending web 140 which locates in mullions 120.

The channel section of the louvre 112 is designed to fit into the lower edge arrangement 110 of a panel 100 with a gasket 142 interposed. The louvre 112 may also be fixed as indicated at 144 to a supporting framework.

The lower louvre 114 has an outer face generally similar to that of a louvre 10. However, the louvre 114 is formed with a depending web 148 just about where the direction of curvature of the louvre changes from convex to concave and with a hollow section part 150 forming with the web 148 a downwardly open channel 152 which is adapted to fit over edge 108 of panel 100 with a gasket 154 interposed. Near the upper inner corner of the part 150 is an upstanding web 156 which locates in mullions 120.

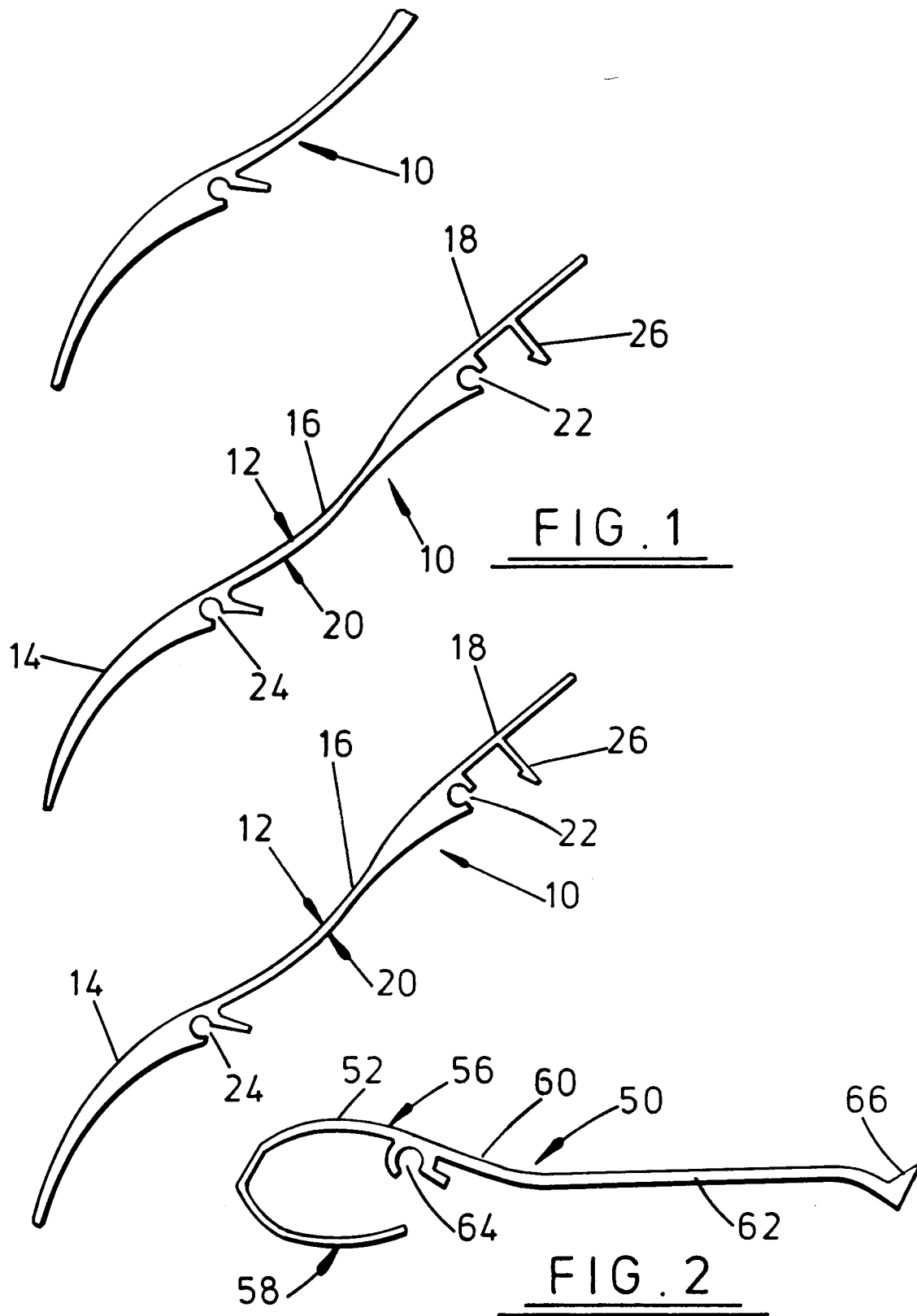
Finally in Figure 6, a horizontal joint between louvre arrangements is shown which makes use of the special upper and lower louvres 112 and 114 already described which interfit by virtue of their respective lower and upper channel sections with a gasket 160 interposed.

Claims

1. A louvre blade for a ventilator having a first air flow impacting surface that is generally convex. 5
2. A louvre blade as claimed in claim 1 having a convex first section and a concave second section.
3. A louvre blade as claimed in claim 2 having a substantially smooth transition between said first and second sections. 10
4. A louvre blade as claimed in claim 2 or 3 having a third rectilinear section. 15
5. A louvre blade as claimed in claim 4 having a substantially smooth transition between said third section and the preceding section.
6. A louvre blade as claimed in any one of claims 1 to 5, the first section increases in thickness from its leading edge. 20
7. A louvre blade as claimed in any one of claims 2 to 6, wherein said second section is of substantially constant thickness. 25
8. A louvre blade as claimed in any one of claims 1 to 7 having its leading edge turned over to provide a first section having a convex upper section and a convex lower surface. 30
9. A louvre blade as claimed in any one of claims 1 to 8 having locations for coupling the blade to a bracket or holder therefor. 35
10. A louvre blade as claimed in claim 9, wherein said locations are in the region of transitions between blade sections. 40
11. A louvre blade as claimed in claim 9 or 10, wherein said locations comprise notches.
12. A louvre blade as claimed in claim 9 or 10, wherein said locations comprise recesses. 45
13. A louvre blade as claimed in claim 9 or 10, wherein said locations comprise projections.
14. A louvre blade as claimed in any one of claims 9 to 13, wherein a lower location permits pivoting movement of the blade. 50
15. A ventilator comprising an array of inclined louvre blades as claimed in any one of claims 1 to 14. 55
16. A ventilator as claimed in claim 15, wherein an upper and/or a lower louvre blade are adapted to in-

terfit with adjacent wall panel edges.

17. A louvre blade substantially as hereinbefore described with reference to and as illustrated in any one of the accompanying drawings.
18. A ventilator substantially as hereinbefore described with reference and as illustrated in any one of the accompanying drawings.



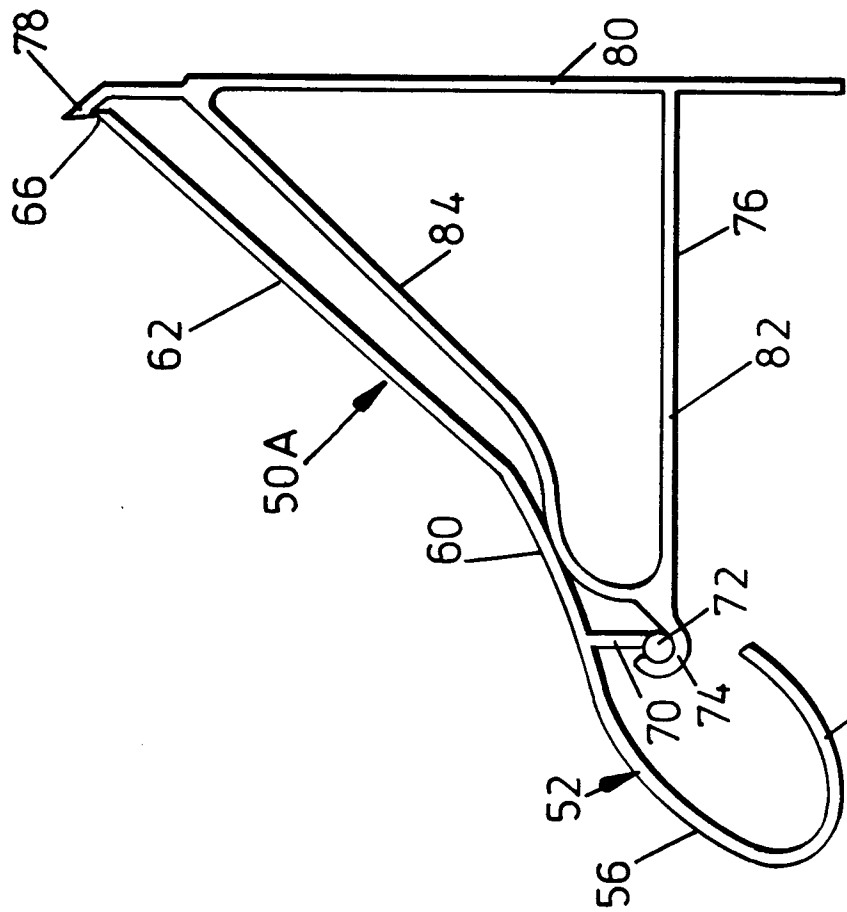


FIG. 4

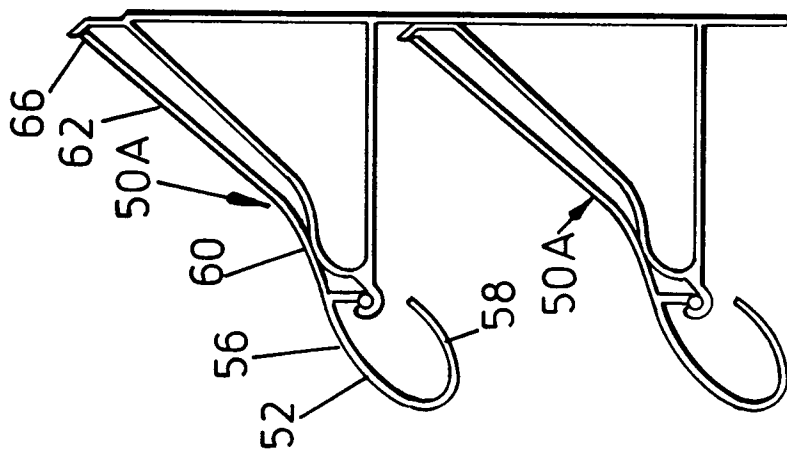
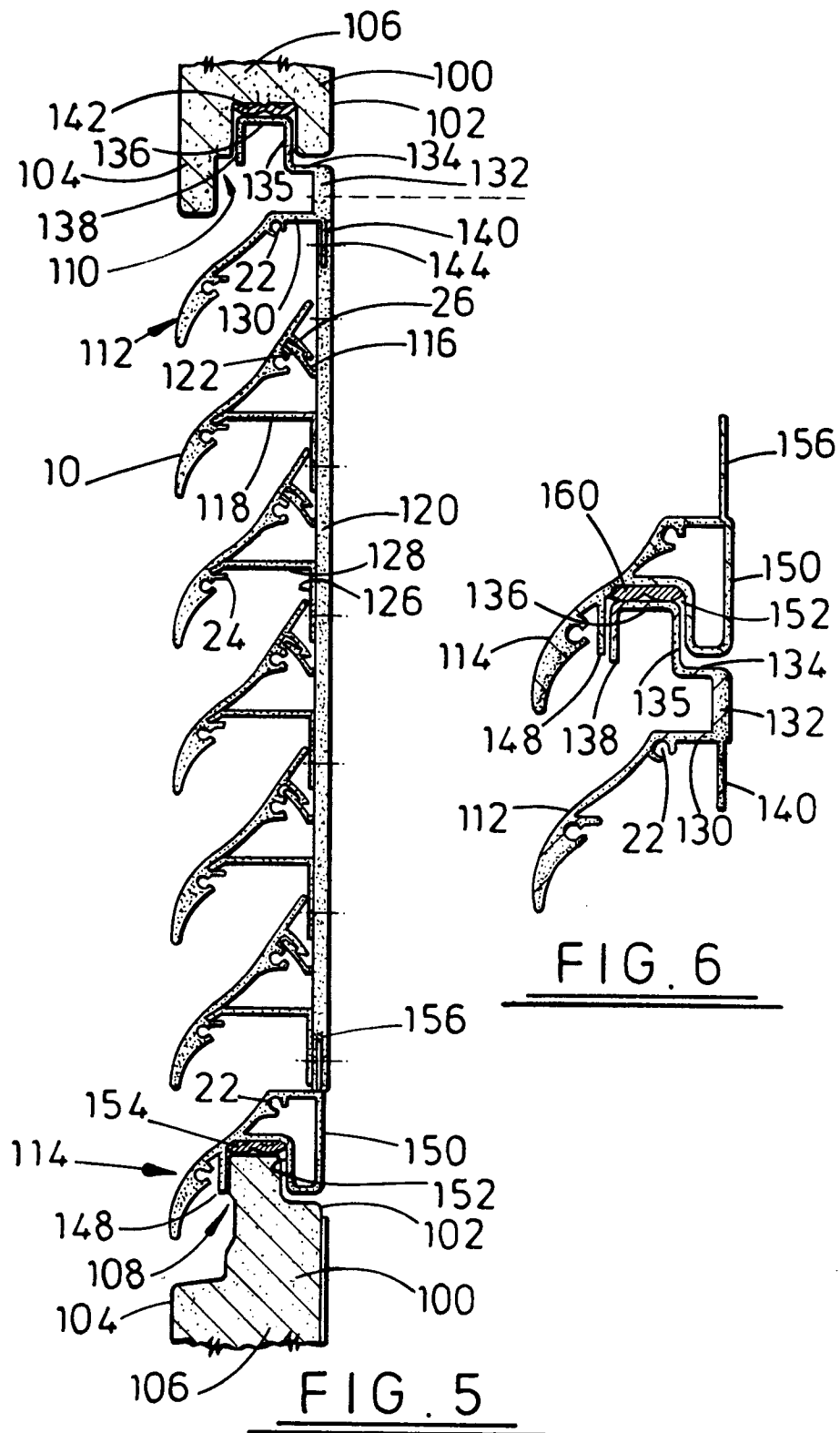


FIG. 3





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 5602

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)
X	FR-A-2 256 306 (MARTIN) * the whole document * ---	1-3, 15	F24F13/08 E06B7/082 E06B7/02
X	FR-A-1 104 997 (SOCIETE TECHNIQUE POUR L'UTILISATION DES ALLIAGES LEGERES) * the whole document * ---	1-3, 15	
X	EP-A-0 260 973 (NORSK HYDRO) * the whole document * ---	1-3, 8, 15	
A	DE-U-8 910 919 (SCHMIDLIN) * figure 7 * ---	7-9, 11-13, 15	
A	US-A-2 881 484 (HALLOCK) * the whole document * -----	14, 15	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			F24F E06B F04D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 AUGUST 1992	Examiner TEERLING J. H.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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