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

(11) EP 3 272 940 A1

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.01.2018 Bulletin 2018/04

(51) Int Cl.:
E01F 7/02 *(2006.01)*

(21) Application number: **17182769.4**

(22) Date of filing: **24.07.2017**

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

(30) Priority: **22.07.2016 NL 2017216**

(71) Applicant: **Bayards Aluminium Constructies B.V.**
2957 CP New Lekkerland (NL)

(72) Inventor: **Mackintosh, Dingenus Wilfried Siwart**
2957 CP Nieuw-Lekkerland (NL)

(74) Representative: **V.O.**
P.O. Box 87930
Carnegieplein 5
2508 DH Den Haag (NL)

(54) **WIND SHIELD WALL AND STRUCTURE COMPRISING SUCH WALL**

(57) The invention relates to a wind shield wall for shielding people and/or equipment from wind. The wind shield wall comprises a series of interspaced elongate air guiding members, and said wind shield wall is arranged such as to allow incoming wind to flow through the wall via openings between the elongate air guiding members and such as to upwardly deflect said incoming wind flowing through the wall. Said elongate air guiding members can be located substantially above each other and may substantially have a streamlined cross-sectional shape and/or a substantially drop shaped cross-section. Preferably, the elongate air guiding members can be substantially formed as aerofoils, especially streamlined aerofoils.

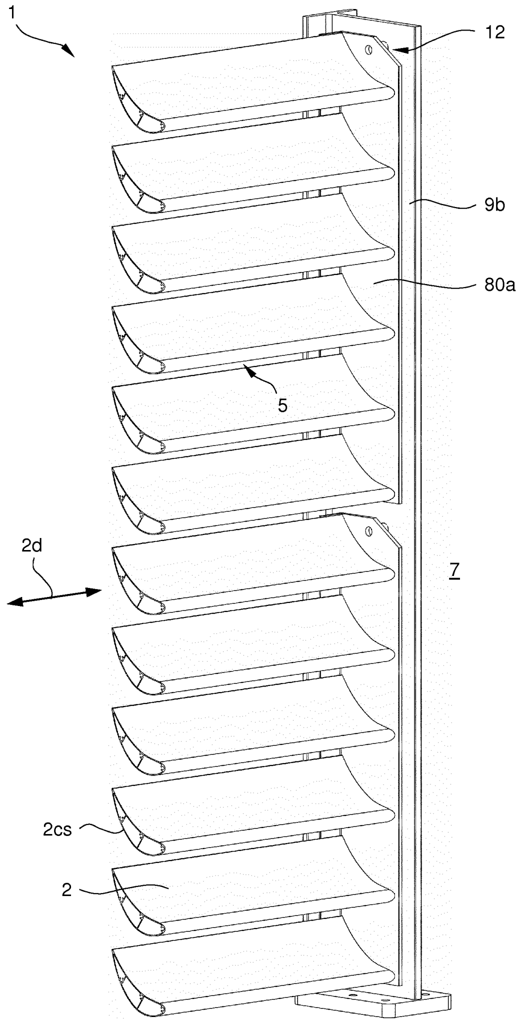


FIG. 1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to wind shield constructions for shielding people and/or equipment from wind and other conditions, such as rain or radiant heat.

[0002] Usually, wind shield constructions are formed as wind shield walls which are extending substantially vertically. The wind shield walls may for instance be located at or near one or more sides of a deck, a floor or a storey to protect personnel from harsh weather conditions. Often, structures, both offshore and onshore structures, which for instance are used in the oil and gas industry, in the renewable energy industry and/or in the petrochemical industry, are provided with such wind shield walls. Since ventilation is usually very important in such industries, known wind shield walls comprise openings allowing for natural ventilation.

[0003] For example, wind shield walls are known which comprise perforated stainless steel sheets. On the one hand, the stainless steel sheet breaks the wind by absorbing a large part of its energy, such that personnel can work under the lee of said wind shield wall, while on the other hand said perforations, which provide a certain percentage of open area, will allow for natural ventilation. Such wind shield walls are said to be able to achieve wind speed reduction in excess of 75%. Often said sheets are of corrugated design which provide some stiffness to the wind shield wall absorbing wind energy.

[0004] Besides, wind shield walls are known which comprise metal wire screen, especially welded wire mesh, which comprises openings for allowing natural ventilation. The metal wires provide resistance and break the wind. As a result, the wind speed may be reduced by 60% or even more, even if the combined surface area of the openings may be much larger than the combined surface area covered by the metal wires.

[0005] Furthermore, there are known wind shield walls comprising a cascade of stacked interspaced slats, or so-called louvres, having an angulated cross-section, especially an angulated and substantially S-shaped cross-section. On the one hand, angulated twisted air paths between the interspaced slats allow for natural ventilation, whereas said angulated twisted air paths on the other hand break the wind by preventing smooth wind flow and thereby reducing the energy from the wind by creating turbulence.

[0006] Known wind shield walls can break the wind and can considerably reduce the wind speed behind the wind shield wall, especially relatively close behind such wind shield wall. However, at distances relatively far behind the wind shield wall, e.g. at distances of 2 times or 4 times the wall height, known wind shield walls are less effective.

[0007] Another disadvantage of known wind shield walls may lie in that the shielded region behind the wind shield wall usually is substantially less high than the height of the wind shield wall. Since strong wind at head level may be very inconvenient, known wind shield walls need to be relatively high, e.g. at least about 2.5 meters, about 3 meters, or even higher in order to keep persons substantially out of the wind behind such walls.

[0008] It is an object of the invention to provide an alternative wind shield construction. In particular, it can be an object of the invention to provide a wind shield construction, wherein at least one of the disadvantages of prior art wind shield constructions is counteracted. More in particular, the invention may aim to provide a wind shield construction, wherein at least one of the disadvantages mentioned above is counteracted. In embodiments, the invention aims at providing a wind shield construction, which allows for natural ventilation and which can provide for a relatively deep shielded region, for instance such that persons can be kept out of the wind relatively well at distances of 2 times or 4 times the wall height, or at locations even further behind the wind shield wall.

[0009] Thereto, the invention provides for a wind shield wall for shielding people and/or equipment from wind, comprising a series of interspaced elongate air guiding members, wherein the wind shield wall is arranged such as to allow incoming wind to flow through the wall via openings between the elongate air guiding members and such as to upwardly deflect said incoming wind flowing through the wall. The elongate air guiding members can preferably extend substantially horizontally and/or may be located substantially above each other.

[0010] By arranging the wind shield wall such that it allows incoming wind to flow through the openings between the air guiding members and such that it upwardly deflect said incoming wind, it can for instance convert a substantially horizontal incoming airflow into an upwardly inclining outgoing airflow, and the wind shield wall can create a low velocity wake behind the wind wall.

[0011] Further, the upwardly deflected flow can form an air stream that can counteract that air flowing over the top end of the wind shield wall deflects downwards. At the position of the wind shield wall said air stream may for instance be inclining upwardly and further downstream said air stream may decrease in strength and/or may deflect downwardly. The initially upwardly deflected air flow may itself form a flowing shield that may shield an area behind the wind shield wall from wind flowing over the wind shield wall. Said initially upwardly deflected air flow may form a flowing air ceiling, so to speak. Hence, the shielded region of the present wind shield wall may stretch further downstream from the wind wall than with known wind shield walls, e.g. wind shield walls comprising conventional S-type louvres.

[0012] Additionally, the shielded region may be relatively high compared to traditional wind shield walls. Actually, the shielded region may be higher than the wall, for instance 1.1 to 1.8 times the wall height, e.g. about 1.25 or about 1.5 times the wall height. This may be a huge advantage in comparison to conventional wind shield walls which often provide a shielded region even lower than the wall height. Such conventional wind shield walls namely do not deflect the wind in a manner in which it can substantially retain most of its energy, but instead try to break the wind and absorb its energy, which may lead to a turbulent wake behind the wind shield wall which can actually cause wind flowing over said conventional wind shield wall to deflect downwardly behind said wall. The wind shield wall of the present invention may thus shield a relatively high region compared to a conventional wind shield wall of the same height, or the present wind shield wall may be relatively low compared to a conventional wind shield wall for providing a shielded region of substantially similar height.

[0013] For example, in embodiments the wind shield wall may be less than 3.5 meter high, for instance at most about 3 m, at most about 2.5 m, such as for instance about 2.0, 2.1, 2.2 or 2.3 meter.

[0014] An additional advantage of the present invention may lie in that the construction holding a wind shield wall deflecting wind upwardly may have less to endure than when said construction has to hold a conventional wind shield wall that tries to break the wind energy.

[0015] Advantageously, the elongate air guiding members may be substantially formed as aerofoils, especially streamlined aerofoils, may have a substantially streamlined cross-sectional shape and/or may have a substantially drop shaped cross-section. As a result, the incoming air flow may be deflected upwardly relatively well, which for instance may cause that a flowing air shield formed by said deflected air flow may form a relatively strong barrier for counteracting that wind flowing over the wall deflects downwardly behind said wall. Additionally or alternatively, a result may be that turbulence behind the wall can be counteracted. Relatively little turbulence may reduce hinder and/or may reduce that wind flowing over the wall is drawn down.

[0016] In embodiments, the upper surface of the elongate air guiding member may preferably be arranged such that water, e.g. rain water, can flow off from said upper surface. For example, the top side of said air guiding member may be substantially free of ledges, especially free of ledges extending substantially in the elongated direction of said member, and may further be free of other obstacles behind which water may remain. By arranging the air guiding member such that it can be counteracted that precipitation or water remains behind on said air guiding member, icing can be counteracted.

[0017] Advantageously, the air guiding member can comprise a hollow profile and/or an extrusion profile, preferably an aluminium extrusion profile. The profile may have a closed periphery when seen in a cross-sectional view transverse to the longitudinal direction of the elongate air guiding members. Any connectors may preferably be located within a hollow interior of said profile. Hence, it can be counteracted that such connectors obstruct an air flow between two subsequent air guiding members and/or it can be counteract that water or precipitation get stuck behind such connecters and that the air guiding member may ice up.

[0018] In embodiments, the wind shield wall may comprise a panel or module, and preferably multiple panels or modules, provided with a series of interspaced elongate air guiding members for upwardly deflecting incoming wind flowing through the respective panel via openings between its elongate air guiding members. Said panels may for example be relatively small with respect to the wall and/or may facilitate that the wind shield wall can be formed as a modular system.

[0019] Advantageously, the panel or module may be fixed in the wall by means of at least a break-away coupling. For example, in case of a blast or explosion, e.g. inducing an increase of for instance at least 0.1 Bar, the module or panel can then be swept away in order to counteract that blast waves will be substantially reflected by the wind shield wall. In preferred embodiments, the panel may be hingedly suspended in the wind shield wall and be fixated by means of one or more break-away couplings. Hence, it can be counteracted that a panel swept away by a blast or exposition falls down towards, and/or is blown away towards, people and/or equipment located outside the region initially protected against wind by said wind shield wall.

[0020] The invention also relates to a structure, especially an offshore structure, said structure for instance being or comprising an offshore platform, a turret, a derrick, a stair tower, a factory construction or building, etc., wherein said structure comprises at least one wind shield wall arranged to deflect incoming wind upwardly, such that it for instance can deflect substantially horizontally incoming wind into an upwardly inclined direction.

[0021] Advantageous embodiments according to the invention are described in the appended claims.

[0022] By way of non-limiting examples only, embodiments of the present invention will now be described with reference to the accompanying figures in which:

Fig. 1 shows a schematic partly cut-away perspective view of an embodiment of a wind shield wall according to an aspect of the invention;

Fig. 2 shows a schematic cross-sectional view of a floor of a structure provided with an alternative embodiment of a wind shield wall according to an aspect of the invention;

Fig. 3 shows schematically presented test results of a further embodiment of a wind shield wall according to an aspect of the present invention;

Fig. 4 shows a schematic cross-sectional view of an embodiment of an elongate air guiding member for a wind shield wall according to an aspect of the invention;

Fig. 5 shows a more detailed view of the schematic cross-sectional view of the wind shield wall of Fig. 2; and

Fig. 6 shows the wind shield wall of Fig. 1 in two different states thereof.

[0023] It is noted that the figures show merely preferred embodiments according to the invention. In the figures, the same or similar reference signs or numbers refer to equal or corresponding parts.

[0024] Fig. 1 shows a schematic partly cut-away perspective view of a first embodiment of a wind shield wall 1 according to an aspect of the invention. During use, the wind shield wall 1 may extend substantially vertically. Said wind shield wall 1 is for shielding people and/or equipment from wind. Additionally, the wall 1 may be arranged to protect people and/or equipment from other conditions, for instance other harsh weather conditions such as precipitation, fire or radiant heat hazard.

[0025] In embodiments, the wind shield wall 1 may be an offshore wind shield wall. The wind shield wall 1 may for example be located at an offshore structure, for example an offshore structure used in the oil and/or gas industry, in the renewable energy industry and/or in the petrochemical industry. For example, the structure may be an offshore platform, which can also be referred to as an oil platform or an oil rig. One or more decks, floors or storeys of the structure may be provided with one or more wind shield walls 1, which for example can be located at or near edges thereof, and which may extend substantially upwards from the floor. It is noted that the structure may also be an onshore structure.

[0026] The wind shield wall comprises a series of interspaced elongate air guiding members 2, preferably extending substantially parallel to each other. The elongate air guiding members 2, which may be extending substantially horizontally, can be stacked, e.g. in a cascade manner. Between the air guiding members 2, openings 5 are present, which may facilitate ventilation of an area or region 7 behind said wall 1. Further, said openings 5 can also allowing natural daylight and/or may allow visibility through the wind shield wall 1.

[0027] As best can be seen in Fig. 2, which shows a schematic cross-sectional view of a floor 3 of a structure provided with a wind shield wall 1, the wind shield wall 1 is arranged such as to allow incoming wind 4i to flow through the wall 1 via openings 5 between the elongate air guiding members 2 and such as to upwardly deflect said incoming wind 4i flowing through the wall 1.

[0028] During use, the wall 1 may upwardly deflect said incoming wind 4i. For example, the wall 1 convert a substantially horizontal incoming airflow 4i into an upwardly inclining outgoing airflow 4o, and the wind shield wall 1 can create a low velocity wake 7 behind the wind shield wall 1.

[0029] As further can be understood from Fig. 2, and from Fig. 3 which shows test results of a wind shield wall 1 according to an aspect of the present invention, the upwardly deflected flow 4o can form an air stream 4c that more or less can counteract that air 4t flowing over the top end 1t of the wind shield wall 1 deflects downwards. Hence, the wind shield wall 1 can provide wind shielding up to a relatively large height 7h, e.g. being at least substantially equal to the height 1h of the wind shield wall 1, and preferably being even larger, such as for instance being at least 1.1, at least 1.2, at least 1.3 or even at least 1.4, such as about 1.5, times the wall height 1h.

[0030] At the position of the wind shield wall 1, the air stream 4o may for instance be inclining upwardly and further downstream said air stream 4c may extend decrease in strength and/or may deflect downwardly. For example, it may be deflected downwardly to such extent that the initially upwardly inclining outgoing air stream 4o is deflected into an air stream 4p substantially parallel with the incoming air flow 4i and/or with substantially undeflected air 4t' flowing over the top end 1t of the wall 1. Said initially upwardly deflected air flow 4i may thus provide a sort of a shield 4c, 4p shielding an area 7 behind the wind shield wall 1 from wind 4t flowing over the wind shield wall 1.

[0031] Especially for top deck locations, where the wind shield wall cannot upwardly extent up to an upper deck, the wind shield wall 1 can thus perform relatively well with respect to conventional wind shield walls that slow down wind by generating turbulence. Nevertheless, the wind shield wall 1 can also be advantageously used in embodiments in which it extends from a floor 3 up to a ceiling located there above.

[0032] Tests have shown that shielded region 7 stretches further downstream from the wind wall 1 than is the case with conventional wind shield walls comprising conventional S-type louvres or other means for slowing down the wind by generating turbulence.

[0033] As may be understood from Figs. 2 and 3, wind speed in a small area 7a at a relatively short distance to the wind shield wall 1 may be relatively high and in this area 7a the present wind shield wall 1 may perform less than conventional wind shield walls. However, for such situations the wind shield wall may be placed a little more outward. This is, the wind shield wall can for instance be located about 1 m or about 2 m outward from the (imaginary) periphery 7p of the area 7 to be shielded.

[0034] In order to guide the incoming air stream such as to deflect it in an upward direction, the elongate air guiding members 2 can have a substantially streamlined cross-sectional shape and/or a substantially drop shaped cross-section 2cs, which for instance can be seen in the exemplary embodiment shown in Fig. 4. A substantially drop shaped cross-section can for instance be understood as a cross-section 2cs in which cross-section looks like a drop or a tear drop. The cross-section may have a substantially round or convex head (or leading edge 2l) and may have a substantially sharp or pointed back end (or trailing edge 2t),

[0035] In embodiments, the elongate air guiding members 2 may be wing-shaped and/or can be substantially formed as aerofoils, especially streamlined aerofoils. Since the interspaced elongate air guiding members 2 can be located above each other, they can thus form an aerofoil cascade, such as is the case in the here shown embodiments.

[0036] Advantageously, the aerofoils are cambered aerofoils or so-called asymmetrical aerofoils, which may facilitate that they can deflect incoming wind relatively well in the desired direction.

[0037] As for instance can be seen in Fig. 4, and in Fig. 5 which shows the cross-section of the wind shield wall of Fig. 2, a lower or bottom surface 2b and/or an upper surface 2u of the elongate air guiding member 2 may in embodiments be formed as a curved surface. Preferably, the lower surface 2b may be substantially convex over at least a relatively large part, e.g. at least 80%, of the length of said lower surface. Additionally or alternatively, the upper surface 2u may be substantially concave over at least a relatively large part of the length of said upper surface. In particular at the rear side of the air guiding member 2, the upper or top surface 2u may be substantially concave. For example, the concavity 2u' can cover at least 75%, preferably at least 80%, more preferably at least 85% of the length of said upper surface. It is noted that said length of the upper surface or lower surface, respectively, can be measured along said upper or lower surface starting from the leading edge 2l and ending at the trailing edge 2t of the elongate air guiding member 2.

[0038] It is noted that the trailing edge 2t may be understood as the point where the upper surface 2u and the lower surface 2b connect at the rear end 2r of the air guiding member 2, e.g. the end of the air guiding member 2 facing towards the shielded region 7. In case these upper surface and lower surface smoothly flow into one another, the trailing edge 2t may be understood as the point of maximum curvature at the rear end 2r of the air guiding member 2.

[0039] Furthermore, it is noted that the leading edge 2l may be understood as the point where the upper surface 2u and the lower surface 2b connect at the front end of the air guiding member 2, e.g. the end of the air guiding member 2 facing away from the shielded region 7. In case these upper surface and lower surface smoothly flow into one another, which is highly preferred, the leading edge 2l may be understood as the point that has maximum curvature at the front end of the air guiding member 2.

[0040] Advantageously, the aerofoil 2 may have a rounded leading edge 2l and a relatively sharp trailing edge 2t.

[0041] In case both the leading edge 2l and the trailing edge 2t are rounded, the maximum curvature at the front of the aerofoil 2 can for instance have a radius being at least three times larger, preferably at least four or five times larger, than the radius of the maximum curvature at the rear of the aerofoil 2. Alternatively or additionally, also in case both the leading edge 2l and the trailing edge 2t are rounded, the largest inscribed imaginary circle touching the leading edge 2l may have a radius being at least three times larger, preferably at least four or five times larger, than the radius of the largest inscribed imaginary circle touching the trailing edge 2t.

[0042] Preferably, the air guiding member 2 that may be formed as an aerofoil 2 can be much thicker near its leading edge 2l than near its trailing edge 2t. For example, when comparing the local aerofoil thickness 2th' at a position located at 5% of the length of the mean chamber line 2m with the thickness 2th" at a position at 95% of the length of said mean chamber line 2m, or when comparing the local aerofoil thickness 2th' at a position located at 10% of the length of the mean chamber line 2m with the thickness 2th" at a position at 90% of the length of said mean chamber line 2m, the local aerofoil thickness 2th' located relatively near to the leading edge 2l may be at least 50%, at least 80% or even at least 100% larger than the local aerofoil thickness 2th" located relatively near to the trailing edge 2t. It is noted that the respective aerofoil thickness 2th', 2th" should be measured transverse to the mean chamber line 2m, i.e. the locus of points midway between the upper surface 2u and the lower surface 2b.

[0043] In order to deflect the incoming wind 4i upwardly, the elongate air guiding members 2 can be skewed. As for instance can be seen in Fig. 5, the chord line 2c of the aerofoil 2, i.e. a straight line 2c connecting the leading edge 2l with the trailing edge 2t, can be inclined. This is, the trailing edge 2t can be located higher and more to the rear than the leading edge 2l.

[0044] At the location of the trailing edge 2t, the tangent to the mean camber 2m line is inclined upwardly at an angle of at least 15°, preferably at least 25° or even at least 30°, such as for instance about 35° or about 40 °. Additionally or alternatively, said tangent to the mean camber 2m line at the location of the trailing edge 2t is inclined upwardly at an angle of at most 60°, preferably at most 50°, such as for instance at an angle of about 45° or about 35°.

[0045] Besides, as for instance can be seen in Fig. 5, which shows a cross-sectional view transverse to the longitudinal direction 2d of the elongate air guiding members 2, the opening 5 between two subsequent elongate air guiding members 2 can be converging from the front side 1f of the wall 1 to its rear side 1r. For example, when seen in a cross-sectional view transverse to the longitudinal direction 2d of the elongate air guiding members 2, the thickness 5th of the opening 5, i.e. the distance 5th between the lower surface 2b of an upper member and the upper surface 2u of an adjacent lower member, can, when measured transverse to a mean line 5m or locus of points midway between said lower and upper surfaces 2b, 2u, decrease from the front side 1f of the wall to the rear side 1r of said wall.

[0046] In preferred embodiments, the spacing 5s between two adjacent elongate air guiding members 2, e.g. measured from leading edge 2l to leading edge 21, can be such that 5s it is not substantially exceeding the length 2x of said air guiding members 2 measured from the leading edge to the trailing edge. In case the elongate air guiding members 2 are formed as aerofoils, said spacing 5s is then thus preferably not substantially exceeding the length of the chord line 2c of the aerofoil 2.

[0047] As a result of said spacing 5s not being too wide, incoming wind 4i can be deflected relatively well.

[0048] It is noted that the length of chord line 2c can in embodiments thus be at least equal to and preferably be larger than said spacing 5s, more preferably be at least 110% or at least 120% of said spacing 5s.

[0049] For example, said spacing 5s can be between 100 mm and 350 mm, for instance about 175 mm ,whereas the chord line 2c may then for instance have a length of between 115 mm and 400 mm, such as for instance about 200 mm.

[0050] In embodiments, such as for instance in the embodiments shown in Figs. 1, 2, 3, 5 and 6, a gap below the bottommost one of the series of interspaced elongate air guiding members 2, for instance a gap between the floor 3 and said bottommost air guiding member 2, may be relatively small, preferably not substantially larger than the spacing 5s between two adjacent elongate air guiding members 2. For example, the height of the gap, if any, below the bottommost air guiding member 2 may be such that it does not substantially exceed the length 2x of the air guiding member 2 measured from the leading edge 2l to the trailing edge 2t. Additionally or alternatively, the height of said gap, if any, may be less than 25 cm, preferably less than 20 cm, more preferably not more than 15 cm or not more than 10 cm high. It will be appreciated that a relatively low height of such gap, or the absence of such gap, will prevent that wind can simply be blowing underneath the series of air guiding members 2 too a relatively large extent.

[0051] Although the gap may thus extend from the bottom side of the lower one of the air guiding members 2 up to the floor, the gap may alternatively extend from the lower air guiding member up to one or more elements located below said lower air guiding member and on top of the floor. Such element may for instance be formed by part of a support structure of the wind shield wall, e.g. a support structure 9 for supporting one or more panels 8. The element may for instance be formed by a ridge and/or a foot of the support structure, which for example may be used to mount the wind shield wall 1 to the floor surface, and/or said element may be formed by a kick plate extending upwards from the floor, for instance up to a height of about 10 cm or about 15 cm. The kick plate may be installed to counteract that someone accidently kicks an object underneath the lower air guiding member, and thus for instance to counteract that said object accidentally falls onto somebody located at a lower level, e.g. a on lower deck of an oil platform than a deck provided with the kick plate.

[0052] As mentioned above, the spacing 5s between two adjacent elongate air guiding members 2 can be chosen such that said spacing is not too wide, in particular such that incoming wind 4i can be deflected relatively well. On the other hand, the opening 5 between two adjacent elongate air guiding members 2 should also not be too narrow, such that wind is not blocked too much and can be guided through the wind shield wall 1 relatively smoothly. The spacing 5s may for instance be dependent on the maximum thickness 2thm of the elongate air guiding member 2, i.e. the thickness at it thickest point.

[0053] For example, when seen in a cross-sectional view transverse to the longitudinal direction 2d of the elongate air guiding members 2, the smallest thickness 5th'" of the opening 5, i.e. the distance 5th between the lower surface 2b of an upper member and the upper surface 2u of an adjacent lower member measured transverse to a mean line 5m or locus of points midway between said lower and upper surfaces 2b, 2u, can advantageously be at least equal to and preferably be larger than the maximum thickness 2thm of the elongate air guiding members 2, e.g. being at least 110%, at least 120% or even at least 150% larger than said maximum thickness 2thm.

[0054] The wind shield wall 1, which may thus form an aerofoil cascade, can thus have a relatively open structure with respect to for instance a conventional wind shield wall with S-type louvres. This may facilitate improved natural ventilation, relatively much daylight at the shielded location, and/or relatively good visibility through the wind shield wall.

[0055] Besides, it is noted that the upper length of the elongate air guiding members 2, measured along the upper surface 2u and measured from the leading edge 2l of the air guiding member 2 to the trailing edge 2t of said air guiding member 2, can preferably be shorter than the lower length, measured along the lower surface 2b and measured from the leading edge 2l to the trailing edge 2t. For example, said lower length can be at least 2%, preferably at least 5%, and more preferably at least 20%, longer than the upper length of the air guiding member.

[0056] In embodiments, the upper surface 2u of the elongate air guiding member 2 can be arranged such that water, e.g. rain water, can flow off from said upper surface 2u. Advantageously, the upper surface 2u can be free of any ledges and/or other obstacles preventing water to flow off from said upper surface 2u. Additionally or alternatively, the upper surface 2u, which preferably may be curved, can be of such design that, seen in a cross-section transverse to the longitudinal direction 2d of the elongate air guiding member 2, substantially any tangent line to said upper surface is inclined downward to the front end of said elongate air guiding member 2. By counteracting that water can remain on top of the elongate air guiding member 2, the formation of ice can be counteracted.

[0057] Besides, due to the design of the wind shield wall 1 that is intended to guide wind 4i, 4o through the wall 1 instead of breaking the incoming wind 4i by creating turbulence, ice and snow will not easy be trapped on or between one or more elongate air guiding members 2, whereas this is the case with conventional S-type louvres that unintentionally trap ice and snow due to stagnant air flow regions generated by such conventional S-type louvres. Moreover, the shape of the air guiding member 2 can also facilitate that said air guiding members 2 can be de-iced relatively well, if needed at all.

[0058] Due to the relatively low turbulence levels, the present wind shield wall 1 can also have a relatively low risk of producing aero-acoustical noise.

[0059] Further, a relatively large inherent stiffness may also reduce risks of producing aero-acoustical noise. The relatively large inherent stiffness may be at least partly due to the shape of the air guiding member 2, which can be formed as an aerofoil and/or can have a drop-shaped cross-section 2cs. Advantageously, the air guiding member 2 can comprise a hollow profile and/or an extrusion profile, preferably an aluminium extrusion profile. The air guiding member 2 can then preferably have a closed periphery when seen in a cross-sectional view transverse to the longitudinal direction 2d of the elongated air guiding member 2.

[0060] Besides, due to relatively large open areas between the air guiding members 2 and/or due to that the openings 5 between the air guiding members 2 are not arranged to block an air flow, the wind shield wall 1 can be less vulnerable to damage in case of blast events.

[0061] As can be seen in Fig. 6, which shows the wind shield wall 1 in two different states thereof, the wind shield wall 1 may comprise at least one panel 8, and preferably multiple panels 8, provided with a series of interspaced elongate air guiding members 2 for upwardly deflecting incoming wind 4i flowing through the respective panel 8 via openings 5 between its elongate air guiding members 2. For example, the panel 8 may comprise one or more frame parts 80 for supporting the air guiding members 2 of said panel 8. In embodiments, the frame parts may for instance comprise a left frame part 80a and right frame part 80b, and the elongate air guiding members 2 may extend between said two frame parts 80a, 80b.

[0062] The wind shield wall 1 may further comprise a support structure 9 for supporting one or more panels 8. For example, such as for instance can be seen in the embodiment shown in Fig. 6, the support structure 9 can comprise one or more posts 9a, 9b. However, other designs are possible. In embodiments, the one or more posts 9a, 9b may have a foot or a flange that can be attached to the floor 3, for example by means of bolting or the like. For instance, said foot or flange can be provided with attachment means, such as one or more through holes for receiving one or more bolts or the like.

[0063] At the left hand side of Fig. 6, the wind shield wall 1 is shown in its neutral state or wind shielding state and at the right hand side of Fig. 6 the panels 8 have been swung out, e.g. due to a blast unfortunately occurred at a platform of which at least a region 7 was shielded against incoming wind 4i.

[0064] Advantageously, the panel 8 or module may be fixed in the wall 1, especially to a support structure 9, 9a, 9b of the wall 1, by means of at least a break-away coupling 10. For example, in case of a blast or explosion, e.g. inducing an increase of for instance at least 0.1 Bar, the module 8 or panel 8 can then be swept away at least partly in order to counteract that blast waves will be substantially reflected by the wind shield wall 1. In preferred embodiments, the panel 8 may be hingedly 12 suspended in the wind shield wall 1 and be fixated by means of one or more break-away couplings. Hence, it can be counteracted that a panel 8 swept away at least partly by a blast or exposition falls down towards, e.g. onto a lower deck, and/or is blown away towards people and/or equipment located outside the region 7 initially protected against wind 4i by said wind shield wall 1.

[0065] Alternatively or additionally, the wind shield wall 1 may comprise one or multiple stops 11 to counteract that a hingedly suspended panel 8 can swing inwardly, e.g. towards the area 7 to be shielded against incoming wind 4i. For example in such cases, the wind shield wall 1 may also be arranged to protect against blasts occurring outside the shielded area 7.

[0066] In embodiments, the winds shield wall 1 may be arranged such that the panel or panels 8 can be swept away and/or hinged outwardly when a certain pressure increase occurs, preferably in case of a pressure increase of at least 0.08 Bar, more preferably in case of a pressure increase of at least about 0.1 Bar.

[0067] Typically, multiple panels 8, e.g. two panels 8, may be provided above each other. As a result, the panels may have a limited weight and the arm of the couple may be limited in case the panel 8 has to pivoted by the pressure increase.

[0068] For example, the weight of a panel 8, module 8, so-called cartridge 8 or so-called cassette 8 may be at most about 100, 80 or 60 kg, at most about 50 kg, or at most about 40, 30 or 25 kg, which may facilitate relatively easy installation thereof and/or which may suit health and/or safety regulations. Preferably, the elongate air guiding members 2 may be of hollow design, may be made of aluminium or an aluminium alloy, and/or may be formed as an extrusion profile.

[0069] It is noted that connectors 6, e.g. for connecting the aerofoil 2 or other air guiding member 2 to a support structure 9, may for instance be integrated in an extrusion profile.

[0070] Advantageously, connecters 6 can be located in a hollow space or interior inside the air guiding member 2. Hence, it can be counteracted that water, snow, ice or dirt can get stuck behind such connectors 6 and/or that said connectors may hinder wind 4 to guided upwardly and/or may cause vibrations and/or noise.

[0071] In embodiments, the height 8h of the panel 8 may be substantially half of the height 1h of the wind shield wall 1. For instance, the wall 1 may be about 2 m high, e.g. between 1.8 and 2.5 m, and the panel 8 may be about 1 meter high, e.g. between 0.8 and 1.3 m. Additionally or alternately, the wall 1, the support structure 9, and/or the panel 8 may for instance be about 3 m wide, e.g. between 2.5 and 3.5 m wide. Preferably, the support structure 9 may be about 3 m wide, e.g. between 2.5 and 3.5 m wide. Additionally or alternatively, said support structure 9 may be arranged to support two panels 8 supported next to each other, which then for example may be both about 1.5 m wide, e.g. between about 1.3 and 1.7 m.

[0072] It is noted that for the purpose of clarity and a concise description features are described herein as part of the same or separate embodiments, however, it will be appreciated that the scope of the invention may include embodiments having combinations of all or some of the features described.

[0073] Further, it is noted that the invention is not restricted to the embodiments described herein. It will be understood that many variants are possible.

[0074] For example, multiple wind shield walls may be located next to each other, e.g. in order to form a wind shield wall assembly, which for instance may extend along at least a relatively large part of at least one edge of a floor, storey or platform.

[0075] Such and other variants will be apparent for the person skilled in the art and are considered to lie within the scope of the invention as formulated in the following claims.

Claims

1. Wind shield wall for shielding people and/or equipment from wind, comprising a series of interspaced elongate air guiding members, wherein the wind shield wall is arranged such as to allow incoming wind to flow through the wall via openings between the elongate air guiding members and such as to upwardly deflect said incoming wind flowing through the wall.

2. Wind shield wall according to claim 1,
wherein the elongate air guiding members are located substantially above each other; and/or
wherein the elongate air guiding members substantially have a streamlined cross-sectional shape and/or a substantially drop shaped cross-section.

3. Wind shield wall according to any one of the preceding claims, wherein a lower surface and/or an upper surface of the elongate air guiding member is formed as a curved surface, preferably wherein the lower surface may be substantially convex and/or the upper surface may be substantially concave over at least a relatively large part of the length of said upper surface.

4. Wind shield wall according to any one of the preceding claims,
wherein the elongate air guiding members are substantially formed as aerofoils, especially streamlined aerofoils,
preferably wherein the aerofoils are cambered aerofoils or so-called asymmetrical aerofoils.

5. Wind shield wall according to claim 4,
wherein the aerofoil has a rounded leading edge and a relatively sharp trailing edge; and/or
wherein the maximum curvature at the front of the aerofoil has a radius being at least three times larger, preferably at least four or five times larger, than the radius of the maximum curvature at the rear of the aerofoil.

6. Wind shield wall according to claim 4 or 5,
wherein the chord line of the aerofoil is inclined; and/or
wherein, at the location of the trailing edge, the tangent to the mean camber line is inclined upwardly at an angle of at least 15°, preferably at least 25° or even at least 30°, such as for instance about 35°.

7. Wind shield wall according to any one of the preceding claims, wherein, seen in a cross-sectional view transverse to the longitudinal direction of the elongate air guiding members, the opening between two elongate air guiding members located one above the other is converging from the front side of the wall to its rear side.

8. Wind shield wall according to any one of the preceding claims, wherein the spacing between two adjacent elongate air guiding members, e.g. measured from leading edge to leading edge, is not substantially exceeding the length of said air guiding members measured from the leading edge to the trailing edge.

9. Wind shield wall according to any one of the preceding claims, wherein the upper length, measured along the upper surface and measured from the leading edge of the air guiding member to the trailing edge of said air guiding member, is shorter than the lower length, measured along the lower surface and measured from the leading edge to the trailing edge.

10. Wind shield wall according to any one of the preceding claims, wherein the upper surface of the elongate air guiding member is arranged such that water, e.g. rain water, can flow off from said upper surface.

11. Wind shield wall according to any one of the preceding claims, wherein the air guiding member comprises a hollow profile and/or an extrusion profile, preferably an aluminium extrusion profile.

12. Wind shield wall according to any one of the preceding claims, comprising at least one panel, and preferably multiple panels, provided with a series of interspaced elongate air guiding members for upwardly deflecting incoming wind flowing through the respective panel via openings between its elongate air guiding members.

13. Wind shield wall according to claim 12,
wherein the panel is fixed in the wall by means of at least a break-away coupling; and/or
wherein the wind shield wall further comprises a sup-

port structure for supporting at least one panel, the at least one panel being hingedly supported with respect to said support structure.

14. Wind shield wall according to any one of the preceding claims, wherein said wall is an offshore wind shield wall.

15. Structure, especially an offshore structure, the structure for instance being or comprising an offshore platform, a turret, a derrick, a stair tower, a factory construction or building, etc., comprising at least one wind shield wall according to any one of the preceding claims.

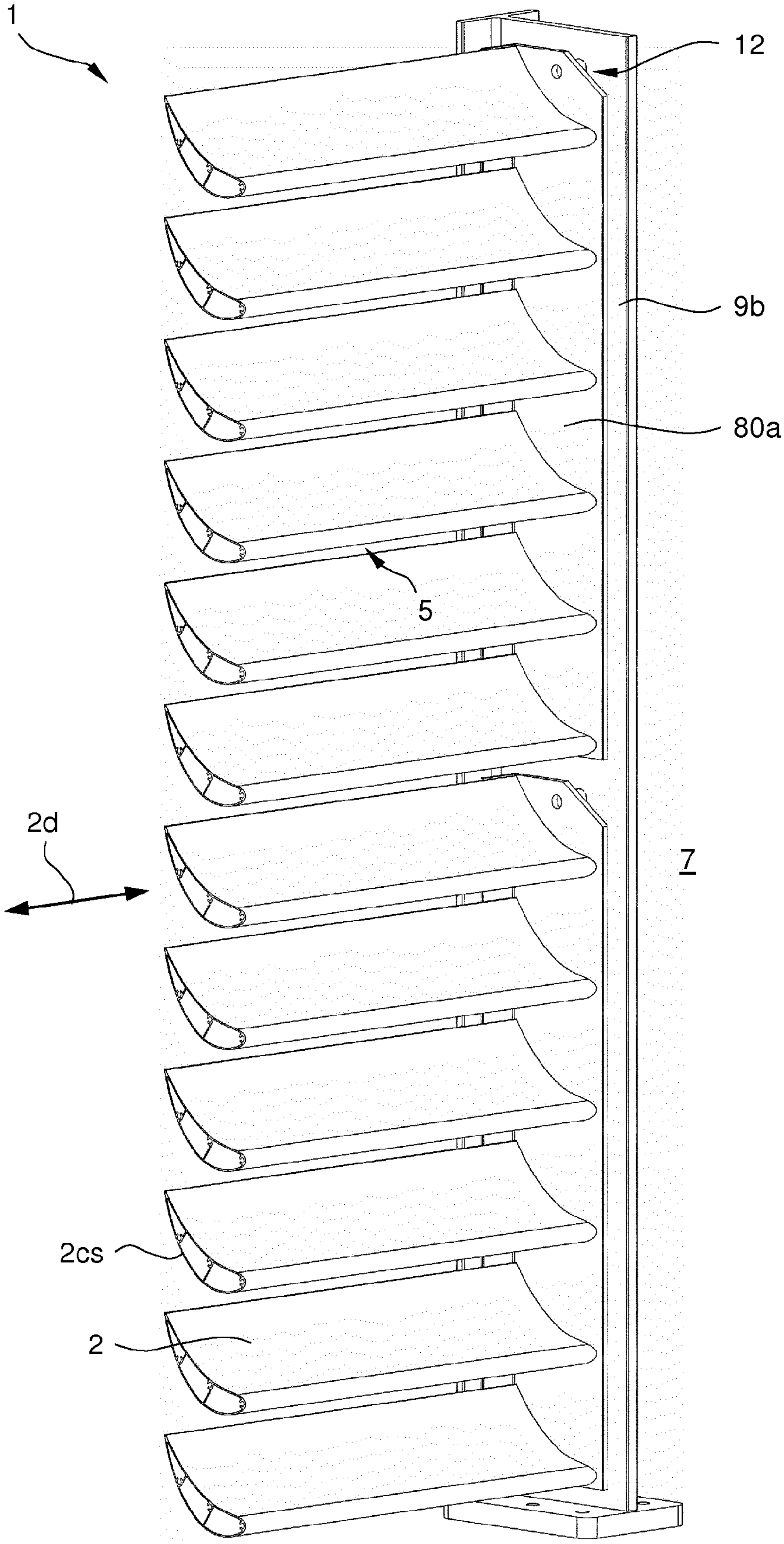
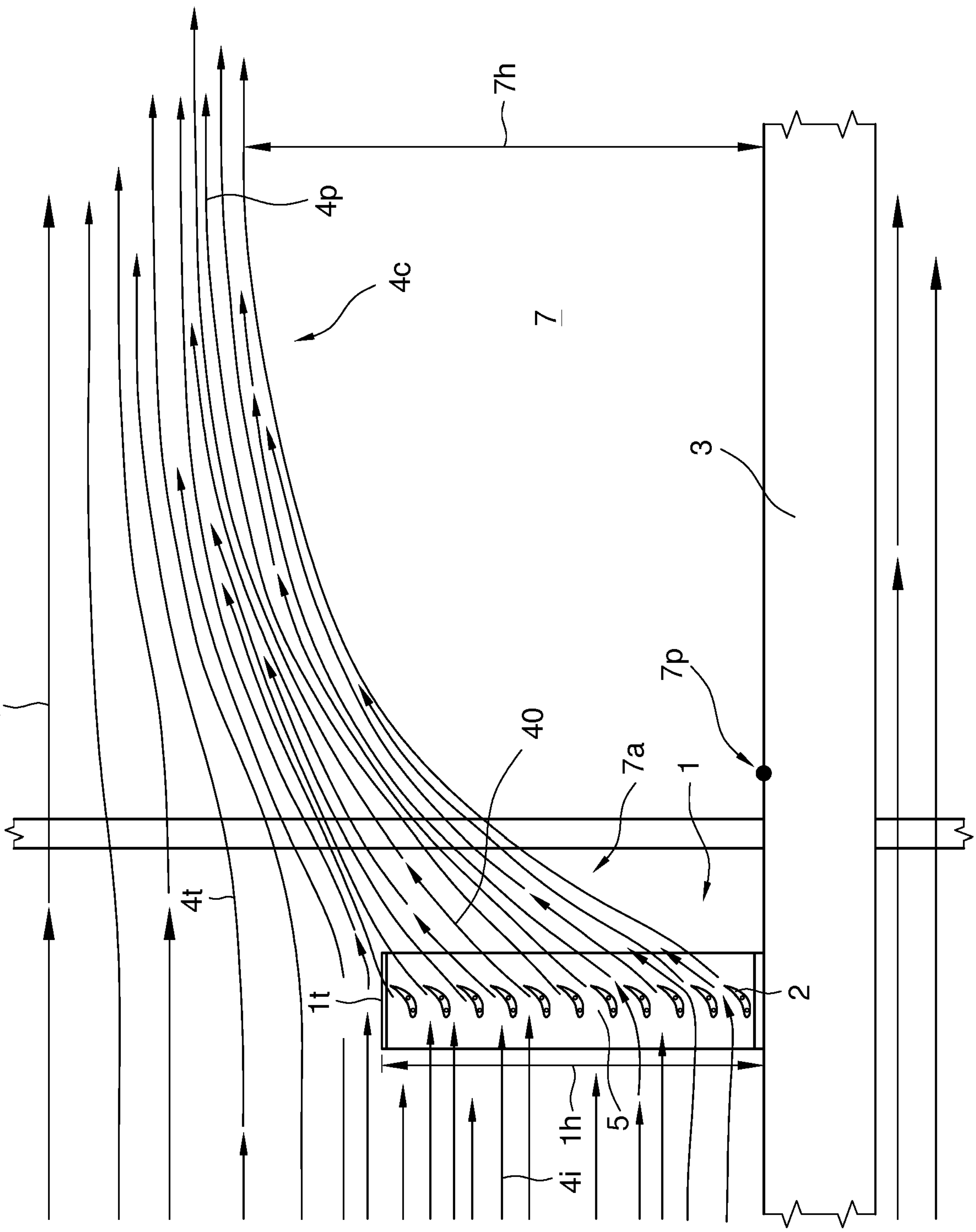
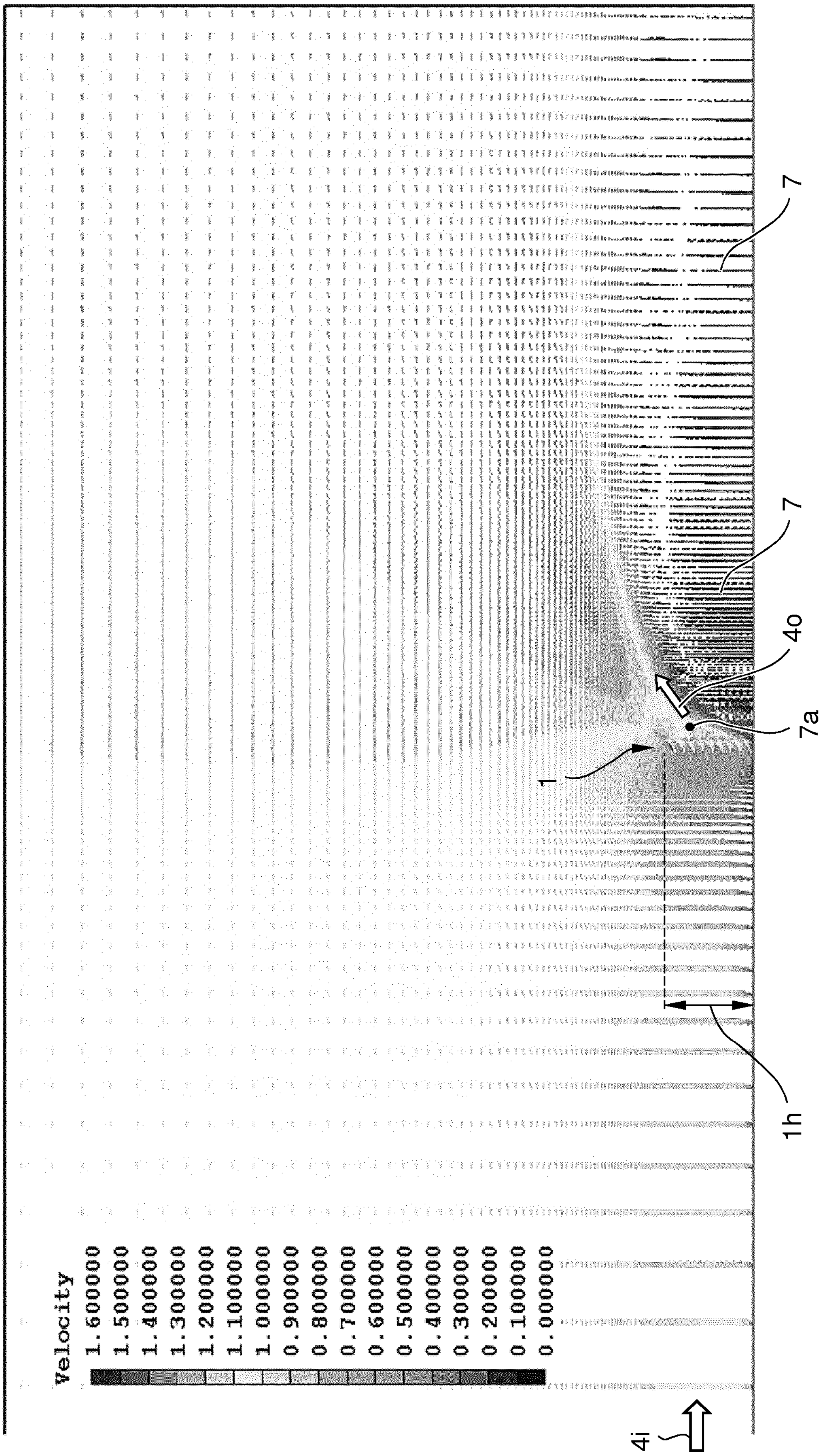


FIG. 1

FIG. 2





Velocity
1.600000
1.500000
1.400000
1.300000
1.200000
1.100000
1.000000
0.900000
0.800000
0.700000
0.600000
0.500000
0.400000
0.300000
0.200000
0.100000
0.000000
7
7
4o
7a
1
1h
4i

FIG. 3

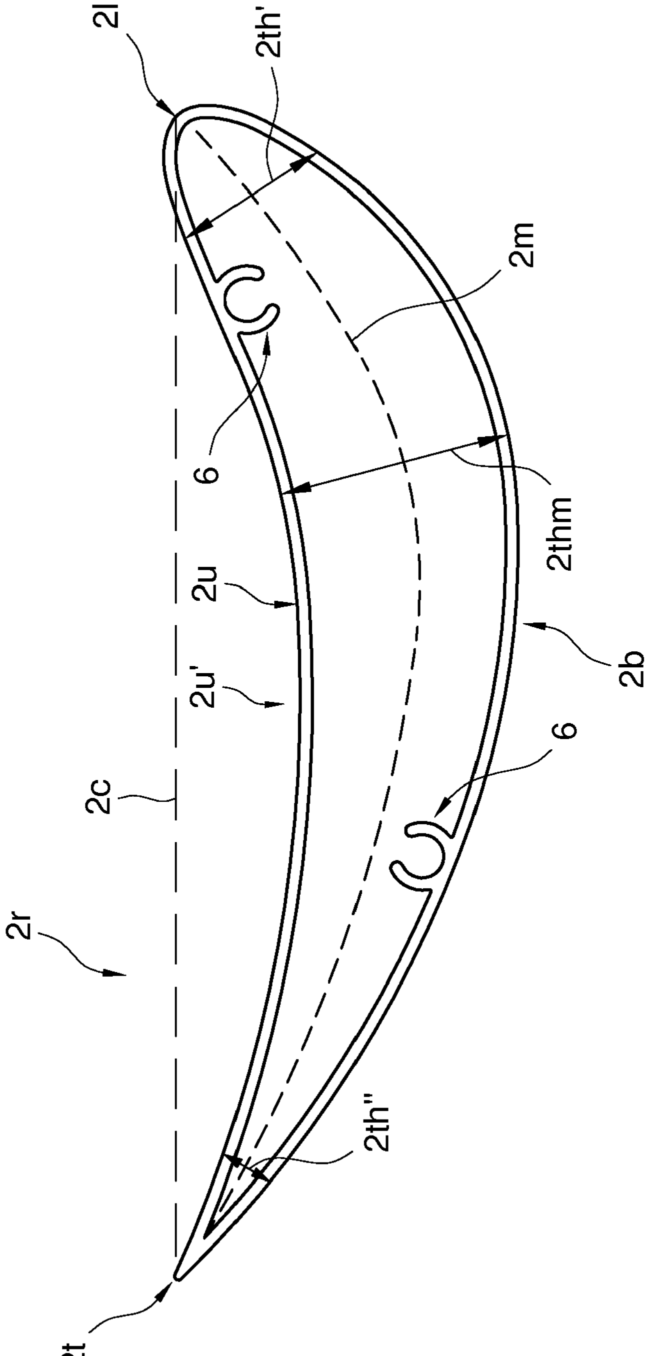


FIG. 4

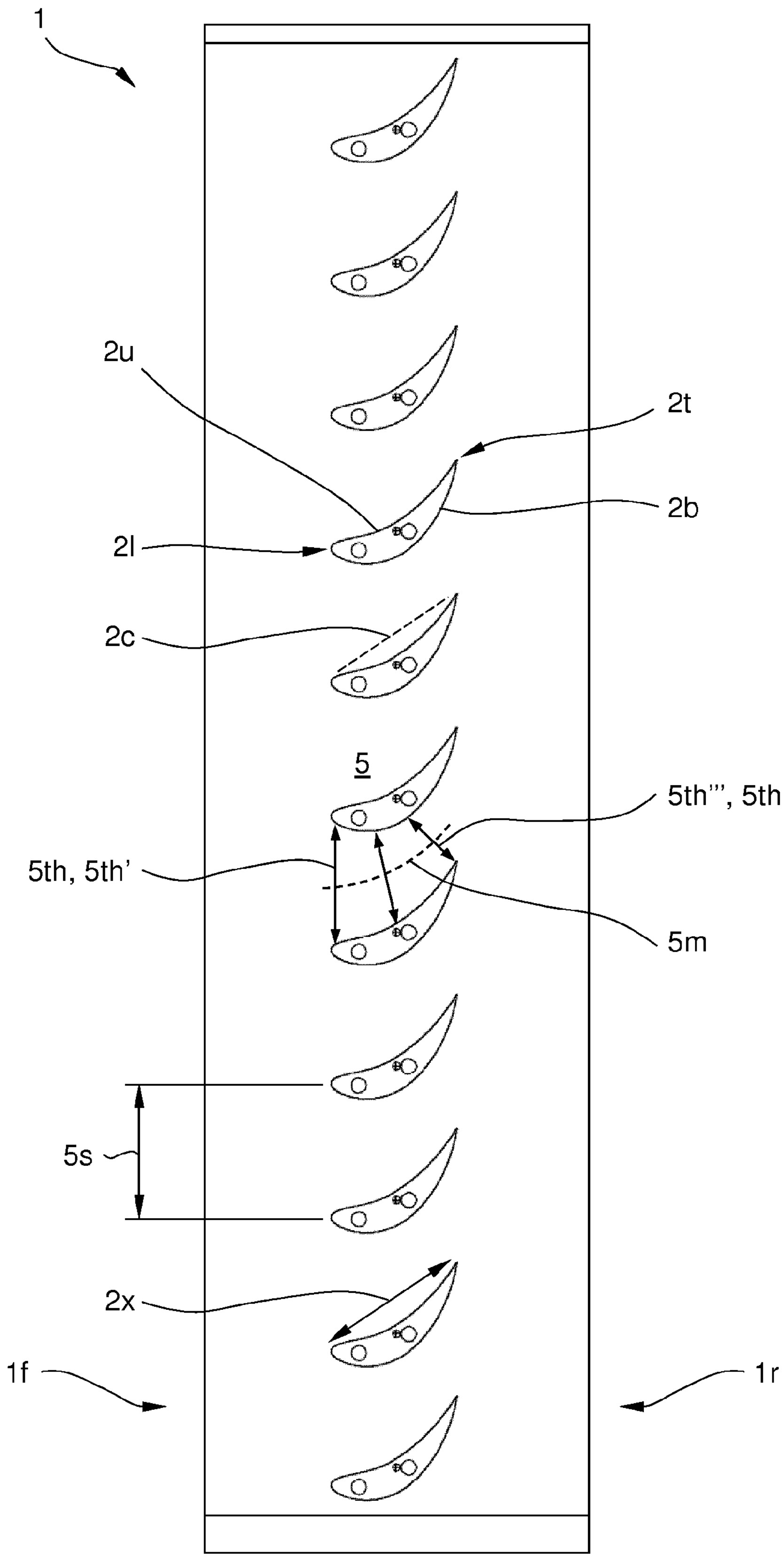
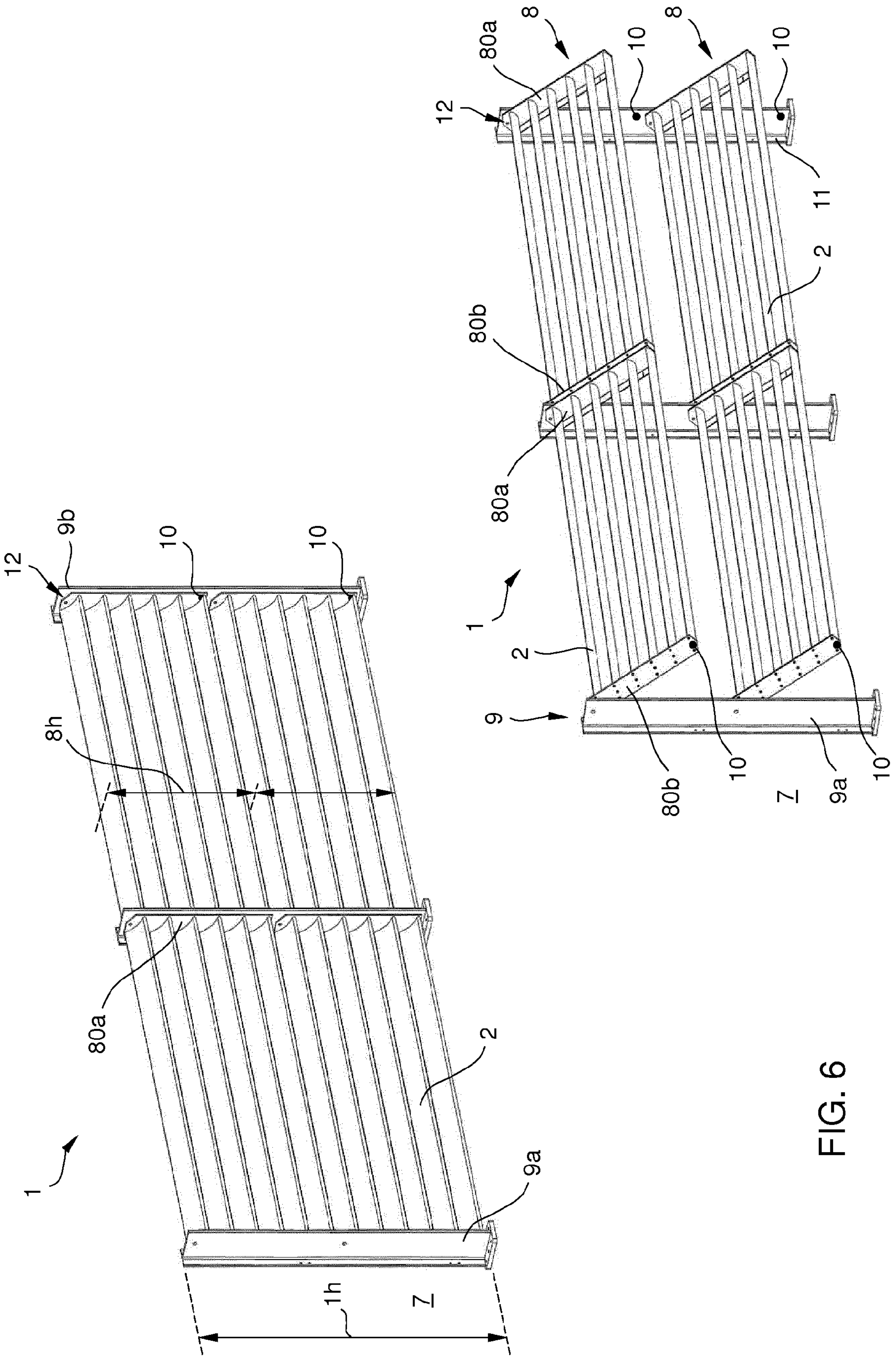


FIG. 5



12
8
80a
10
8
10
11
2
80b
80a
1
2
9
80b
10
7
9a
10
12
9b
10
10
8h
80a
2
1
9a
1h
7

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 18 2769

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	JP 2000 199209 A (TATEYAMA ALUMINUM KOGYO KK) 18 July 2000 (2000-07-18) * the whole document * -----	1-15	INV. E01F7/02
X	JP 2002 227138 A (NAT RES INST FOR EARTH SCIENCE; SATO KENSETSU KOGYO CO LTD; BLUE WATER) 14 August 2002 (2002-08-14) * the whole document * -----	1-8, 10-12,15	
X	DE 299 03 795 U1 (HOEFER ANDREAS DR ING [DE]) 27 May 1999 (1999-05-27) * the whole document * -----	1,2,10, 12,14,15	

TECHNICAL FIELDS SEARCHED (IPC)

E01F

The present search report has been drawn up for all claims

2

Place of search	Date of completion of the search	Examiner
Munich	17 November 2017	Flores Hokkanen, P

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 18 2769

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-11-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2000199209 A	18-07-2000	NONE	
JP 2002227138 A	14-08-2002	NONE	
DE 29903795 U1	27-05-1999	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82