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(54) **SYSTEM FOR ADJUSTABLE SCREENING OF A WINDOW ON THE OUTSIDE OF A BUILDING**

(57) A system for adjustable screening of a window on the outside of a building comprises a frame for mounting the system on the building and a packet of strips with elongated strips that extend parallel to each other and which are each connected to the frame swivellably about an associated respective swivel axis, extending parallel to a longitudinal direction of the strip. The system further comprises a drive device for swivelling the strips about their respective swivel axes between an open state and a closed state. The frame comprises a first elongated frame element and a second elongated frame element, wherein for each strip, at a first end thereof, a first supporting arm is connected to the first frame element, and at the second end thereof, a second supporting arm is connected to the second frame element, said first and second supporting arms forming part of the frame and each extending from the associated frame element, to the outer sides of the associated frame elements. Each strip is connected, swivellably about its associated swivel axis, via two respective connecting elements to the first and second supporting arms associated with the respective strip, and extends in the open state fully to the outer sides of the frame elements.

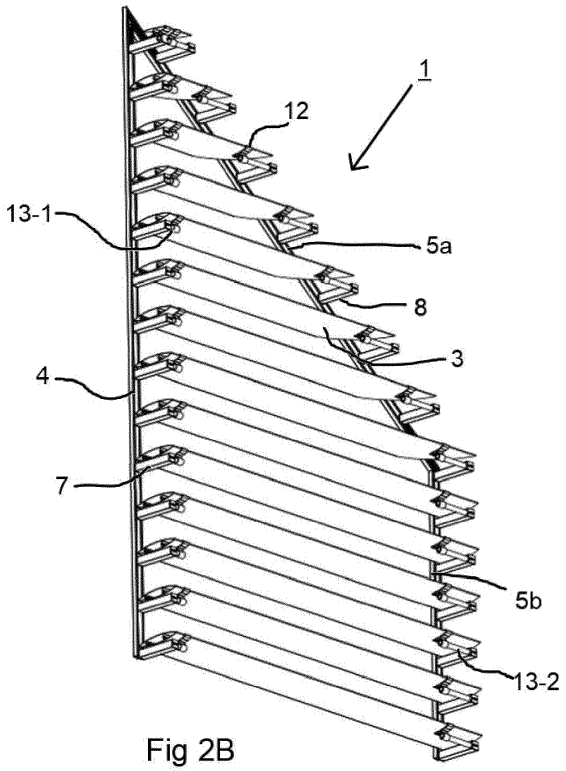

Fig 2B

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Description

[0001] The present invention relates to a system for adjustable screening of a window on the outside of a building. Such systems are marketed for example by the company Livium. The systems in question comprise posts that are provided in a window of a building and between which elongated screening bodies, also indicated with terms such as panels, louvres or strips, are connected at their ends to the posts, swivellably between an open state and a closed state. The system may for example be used for frames in a building, but also for windows between posts of verandas. Moreover, said systems may also be used for windows in sloping or flat roofs. By closing the screening bodies, the amount of light and/or wind passing through the window can be restricted and/or more privacy can be created. The system is also used for non-rectangular, for example triangular, windows. In an application of this kind, in a vertical façade, one or both posts is/are not vertical, but at an angle to the vertical, for example at 45 degrees. The associated post/posts also defines/define the aforementioned triangular shape. Between the inclined posts and the elongated screening bodies, fixed triangular filling bodies are additionally provided, which together have a stepped shape.

[0002] The present invention aims to provide a system that is suitable for use with a non-rectangular window, in particular for a triangular window, wherein the system offers a visually clean image. Furthermore, the invention aims to provide a system which, with respect to structure, is also very suitable for use with rectangular windows, and then also offers a visually clean image. For this purpose, the invention provides a system according to claim 1. The use of supporting arms offers the possibility that, even in the open state, the strips extend on the outside of and directly opposite the elongated frame elements so that the strips can be made longer, and the frame elements, seen from the outside, can be hidden partially, or in the closed state even completely, behind the strips. The relative term outside is to be interpreted as relating to the building for which the system is applied. Thus, for example, on application of the system, the outside of a frame element is the side of the frame element turned away from the building.

[0003] Specifically for use with triangular, or at least non-rectangular, windows, the longitudinal direction of a respective frame element of the first frame element and the second frame element, over at least a part of the length thereof, encloses an angle different from 90 degrees with the longitudinal directions of the strips so that the design of the particular window can be followed. Over the respective length, the frame element may have a rectilinear course, but also a curved, for example convex, course.

[0004] In practice, the design of a particular window will generally be able to be followed well if the angle is between 15 degrees and 75 degrees, preferably between 30 and 60 degrees.

[0005] For the purpose of reducing, in the closed state of the strips, the seam on the outside of the ends of the strips that are located on the side of the respective frame element, it may be advantageous if strips that are located within the length of the respective frame element, within which the respective frame element encloses an angle different from 90 degrees with the longitudinal directions of the strips, are chamfered at the ends thereof, and then in particular if the chamfers of the first ends extend, in the closed state of the respective strips, parallel to the respective frame element.

[0006] In one embodiment it is also possible that the longitudinal directions both of the first frame element and of the second frame element, over at least respective parts of the lengths thereof, enclose an angle different from 90 degrees with the longitudinal directions of the strips.

[0007] The size of the seams between the ends of the strips and the perimeter of the window, at the location of which for example a projecting cap may limit the available space, in particular in the case of triangular or at least non-rectangular windows and in particular if strips are chamfered at the ends thereof as described above, may be limited if the swivel axis associated with a strip is located, in the open state, on the outside of the middle of the longest dimension of the cross-section of the strip.

[0008] The aforesaid limitation may in particular apply if the swivel axis associated with a strip in the open state is located within the outermost 35%, preferably within the outermost 25%, of the longest dimension of the cross-section of the strip. In the open state, the direction of said longest dimension will extend, at least substantially, perpendicularly to the frame elements, i.e. in use, perpendicularly to the plane of the window, whereas in the closed state the respective direction extends, in use, precisely parallel to the plane of the window.

[0009] Efficient use of material of the system may be promoted if each supporting arm has a length that is between 75% and 100% of the largest dimension of the cross-section of the respective strip.

[0010] In particular in the case of a system suggested above wherein the swivel axis associated with a strip is located, in the open state, on the outside of the middle of the longest dimension of the cross-section of the strip, it may be more preferable if each strip, in the open state thereof, extends completely on a first side of an associated arm and wherein, in the closed state thereof, each strip extends partly on a second side of the associated arm, located opposite the first side. Thus, the strips, in the closed state thereof, may partly overlap each other in a suitable manner.

[0011] The aforementioned advantage may in particular apply if each strip, in the closed state thereof, extends by max. 35%, preferably max. 25%, of the largest dimension of the cross-section of each strip on the second side of the associated arm.

[0012] The system according to the invention offers

advantages in particular with systems in which each strip is hollow, such as manufactured by aluminium or plastic extrusion, and/or in cross-section has at least substantially the shape of an ellipse or a rectangle. Alternatively, however, it is also possible in the context of the present invention for the strips to be made of some other material such as wood, glass, stainless steel, epoxy resin or combinations thereof. The largest dimension of the cross-section of such a strip may be relatively large, for example at least 150 mm and/or at most 350 mm, so that the seams at the ends of the strips, via which light may pass in the closed state of the strips, may also be large in the absolute sense. With the invention, the size of these seams may be small.

[0013] Especially in the case of hollow strips, it may offer constructional advantages if each swivel axis extends on the outside of the cross-section of the respective strip.

[0014] In a constructionally favourable embodiment, the two connecting elements associated with a strip are provided between the two supporting arms associated with a strip. It can thus be prevented that these connecting elements could in service conflict spatially with available space that the building offers at the location of the window.

[0015] Especially with non-rectangular windows, such as triangular windows, and then in particular if one end of the respective strips is chamfered as described above, it may be advantageous if the two connecting elements associated with a strip are provided at different distances from the nearest of the two supporting arms associated with a strip.

[0016] From the viewpoint of design simplicity, it may be preferable that the swivel axis associated with a strip extends through the first and second supporting arms associated with the strip.

[0017] The cleanness of the outward appearance of the system, in particular in the closed state of the strips, is promoted if each strip, at their first and/or second ends, viewed perpendicularly to the packet of strips from the outside, extends directly in front of the first frame element and the second frame element, respectively.

[0018] In a further embodiment, each supporting arm has, in side view, a straight shape and/or each supporting arm is hollow, and more preferably it is manufactured by extrusion. Thus, the supporting arms can easily be made to length as a function of the dimensions of the strips.

[0019] From the viewpoint of striving for design simplicity, it may further be preferred that each supporting arm extends perpendicularly to the associated frame element and perpendicularly to the longitudinal directions of the strips.

[0020] In general, it may be said that the system lends itself pre-eminently for relatively large spans of the strips. In that context, for at least one of the strips it may apply that the distance between the first and second supporting arm associated with that strip is at least 200 cm and more preferably at least 250 cm.

[0021] The invention will be explained in more detail on the basis of the description of a possible embodiment of the invention, referring to the following figures:

Figs. 1A, 2A and 3A show, in isometric top view and outside view, in bottom view and outside view and in perpendicular outside view, respectively, a system according to the invention wherein the strips are closed;
Fig. 4A shows section A-A in Fig. 3A;
Fig. 5A shows detail B in Fig. 4A;
Figs. 1B, 2B, 3B, 4B, 5B correspond to Figs. 1A, 2A, 3A, 4A, 5A on the understanding that the strips of the system are open;
Fig. 6 shows, in isometric inside view, a system comparable to the preceding figures.

[0022] System 1 according to Figs. 1A to 5B is intended to be used on the outside of a building, more specifically at the location of a window in a fagade, for example made of concrete, of said building. For example a frame, for example of wood, with a fixed window therein, may be provided in said window. The window, and therefore the frame, in outside view have a non-rectangular shape, more specifically the shape of a trapezium with three sides at right angles and one slanting side. The design of the system 1 is adapted to that of the window, namely in such a way that the system fits precisely in the window. In so far as the system would project from the window on the outside of the building, in this example it is assumed that a cove is provided that abuts onto the window, for example on account of projecting roof parts.

[0023] System 1 comprises a packet of strips 2 with elongated strips 3, which extend parallel to each other in the horizontal direction. The strips 3 are parts made to length from an extruded aluminium profile with an at least substantially elliptical cross-section (see Figs. 5A and 5B) whose largest dimension is X, wherein X in the context of the present invention is typically between 150 mm and 300 mm. The invention generally lends itself in particular to application with strips with a hollow section, where said section may for example also be substantially rectangular. The length of the strips used may for example be at least 50 cm and at most 350 cm, wherein the strips are supported exclusively near the ends located opposite each other, as will be explained in more detail hereunder.

[0024] System 1 further comprises a frame 6 with a first elongated frame element 4 and a second elongated frame element 5 that is made up of frame element parts 5a and 5b. The frame elements 4 and 5 each extend over the full height of the packet of strips 2. At their respective upper ends, the frame elements 4 and 5 abut against each other, which is not essential, in the sense that this abutment does not have any constructional function. The frame elements 4 and 5 may, on application of the system 1, for example be fastened against the outside of the frame in the window of the building in question, so that

from inside the building, the frame elements 4 and 5 are hidden behind the frame and are not visible.

[0025] The frame 6 further comprises, on first ends 3-1 of each strip 3, first supporting arms 7, which, with regular spacing from each other, are fastened to the first frame element 4, and on second ends 3-2, which are located opposite the associated first ends 3-1, second supporting arms 8, which, with regular spacing from each other, are fastened to the second frame element 5. The supporting arms 7, 8 have a straight, elongated shape and may for example, just like the frame elements 4, 5 and the strips 3, be made-to-measure lengths of extruded aluminium profile. The supporting arms 7, 8 extend outwards, perpendicularly to the associated frame elements 4, 5 as well as in the longitudinal directions of the strips 3.

[0026] Frame element part 5a extends parallel to the first frame element 4. The frame element part 5b encloses, at the upper end, an angle of 45° with the first frame element 4 and, at the lower end, an angle of 135° with the frame element part 5a of the second frame element 5. Each of the strips 3 is connected, near the first end 3-1 and the second end 3-2 thereof, swivellably about a horizontal swivel axis 11 to a first supporting arm 7 and a second supporting arm 8 located directly opposite. The strips 3 that are located within the length of the slanting frame element part 5b are chamfered at their respective ends 3-2, wherein the chamfer angle is such that these chamfers extend, in the closed state of the respective strips 3, parallel to the slanting frame element part 5b.

[0027] For the purpose of the swivellable connection of the strips 3 to the frame 6, the system 1 comprises, per strip 3, two mounting lugs 12 that engage on the respective strip 3, wherein if necessary, use may also be made of screwed joints between the mounting lugs 12 and the respective strip 3. Each mounting lug 12 is connected rigidly to a spindle body 13-1 for the mounting lugs 12 that are located at the first ends 3-1 of the strips 3 and to spindle body 13-2 for the mounting lugs 12 that are located at the second ends 3-2 of the strips 3. The mounting lugs 12 and the spindle bodies 13-1 and 13-2 extend between the associated supporting arms 7 and 8. For the strips 3 that are chamfered at their second ends 3-2, the associated spindle bodies 13-2 are longer, so that the associated mounting lugs 12, despite the chamfer, are able to engage on the respective strips 3.

[0028] The spindle bodies 13-1 and 13-2, and therefore also the strips 3 connected to the spindle bodies via the mounting lugs 12, are connected swivellably about the associated swivel axis 11 to associated supporting arms 7 and 8, wherein the centre lines of the spindle bodies 13-1 and 13-2 coincide with the associated swivel axis 11 so that the strips 3 can assume an open state according to Figs. 1A, 2A, 3A, 4A and 5A, a closed state according to Figs. 1B, 2B, 3B, 4B and 5B or any intermediate state between them. For operating the strips 3, more specifically for swivelling the strips 3 between the open state and the closed state, the system 1 comprises a drive device, as will be explained further, on the basis of Fig. 6.

[0029] In the side views according to Figs. 5a and 5b it can clearly be seen that swivel axis 11 is located from the middle of the largest dimension X of the cross-section of strips 3. More specifically, in the open state of the strips 3, the swivel axis 11 is located on the outside of the middle of the largest dimension X, roughly at a distance equal to 0.15 times X from the, in the open state, outer longitudinal edge 14 of the strip. The length of the supporting arms 7 and 8 is less than X and the swivel axis 11 extends on the free ends of the supporting arms 7 and 8. Thus, space is provided for the strips 3 to extend in the closed state on the outer sides of the free ends of supporting arms 7 and 8, more specifically in the extension of the supporting arms 7 and 8, wherein longitudinal edge 14 extends under the supporting arms 7 and 8. The inner longitudinal edge 15 of each strip 3, located opposite outer longitudinal edge 14, in the open state is a short distance from the frame elements 4, 5, for example in absolute size of max. 5 mm, so that the lengths of the supporting arms 7, 8 are used efficiently. In the open state, the strips 3 abut against the upper sides of the supporting arms 7, 8. In the closed state, the longitudinal edge 15 is just under, for example over a distance of less than 5 mm, the supporting arms 7, 8 associated with the next higher strip 3 but above the longitudinal edge 14 of said higher strip. This of course does not apply to the uppermost strip 3, which does not have a next higher strip 3. Thus, the strips 3 overlap each other in the closed state so that the packet of strips 2 at least appears to form a closed surface.

[0030] Fig. 6 shows one half of a system 31 from the inside of a building. System 31 is comparable to system 1, except that the mounting lugs 32 are of somewhat different configuration than mounting lugs 12. Unlike in Figs. 1A to 5B, for system 31 the drive device 33 is visible. This comprises an operating rod 34 that extends parallel to frame element part 35 and is connected to each strip 37 via operating arms 36 connected by hinge to the operating rod 34. The drive device 33 further comprises an actuator configured as pneumatic cylinder 38, which at a lower end is connected swivellably to the frame element part 35 and which connects via the end of the piston rod 39 to coupling element 40, which is also connected to the operating rod 34. By suitable excitation of the cylinder 38, the operating rod may thus be moved up or down for closing or opening the strips 37, respectively.

Claims

1. System for adjustable screening of a window on the outside of a building, said system comprising a frame for mounting the system on the building and a packet of strips with elongated strips, which extend parallel to each other and which each are connected to the frame swivellably about an associated respective swivel axis, extending parallel to a longitudinal direction of the strip, the system further comprising a drive

device for swivelling the strips about their respective swivel axes between an open state and a closed state, wherein the frame comprises a first elongated frame element and a second elongated frame element, wherein for each strip, at a first end thereof, a first supporting arm is connected to the first frame element, and at the second end thereof, a second supporting arm is connected to the second frame element, said first and second supporting arms forming part of the frame and each extending from the associated frame element, on the outer sides of the associated frame elements, wherein each strip is connected swivellably about its associated swivel axis via two respective connecting elements to the first and second supporting arms associated with the respective strip and extends in the open state fully to the outer sides of the frame elements.

2. System according to claim 1, wherein the longitudinal direction of a respective frame element of the first frame element and the second frame element over at least a part of the length thereof, encloses an angle different from 90 degrees with the longitudinal directions of the strips, wherein preferably the angle is between 15 degrees and 75 degrees, and more preferably between 30 and 60 degrees.

3. System according to claim 2, wherein strips that are located within the length of the respective frame element within which the respective frame element encloses an angle different from 90 degrees with the longitudinal directions of the strips, are chamfered at the ends thereof that are located on the side of the respective frame element, wherein preferably the chamfers of the ends extend, in the closed state of the respective strips, parallel to the respective frame element.

4. System according to one of the preceding claims, wherein the swivel axis associated with a strip is located, in the open state, on the outside of the middle of the longest dimension of the cross-section of the strip, wherein preferably the swivel axis associated with a strip is located, in the open state, within the outermost 35%, more preferably within the outermost 25%, of the longest dimension of the cross-section of the strip.

5. System according to one of the preceding claims, wherein each supporting arm has a length that is between 75% and 100% of the largest dimension of the cross-section of the respective strip.

6. System according to one of the preceding claims, wherein each strip, in the open state thereof, extends completely on a first side of an associated arm and wherein, in the closed state thereof, each strip extends partly to a second side of the associated arm, located opposite the first side, wherein preferably each strip, in the closed state thereof, extends by max. 35%, more preferably max. 25%, of the largest dimension of the cross-section of each strip on the second side of the associated arm.

7. System according to one of the preceding claims, wherein each strip is hollow, and preferably has been manufactured by extrusion, wherein preferably each strip has in cross-section at least substantially the shape of an ellipse or a rectangle.

8. System according to one of the preceding claims, wherein each swivel axis extends on the outside of the cross-section of the respective strip.

9. System according to one of the preceding claims, wherein the two connecting elements associated with a strip are provided between the two supporting arms associated with a strip, wherein preferably the two connecting elements associated with a strip are provided at different distances from the nearest of the two supporting arms associated with a strip.

10. System according to one of the preceding claims, wherein the swivel axis associated with a strip extends through the first and second supporting arms associated with the strip.

11. System according to one of the preceding claims, wherein each strip, at their first and/or second ends, viewed perpendicularly to the packet of strips from the outside, extends directly in front of the first frame element and the second frame element, respectively.

12. System according to one of the preceding claims, wherein in side view each supporting arm has a straight shape.

13. System according to one of the preceding claims, wherein each supporting arm is hollow, and preferably has been manufactured by extrusion.

14. System according to one of the preceding claims, wherein each supporting arm extends perpendicularly to the associated frame element and perpendicularly to the longitudinal directions of the strips.

15. System according to one of the preceding claims, wherein it applies for at least one of the strips that the distance between the first and second supporting arm associated with that strip is at least 200 cm, more preferably at least 250 cm.

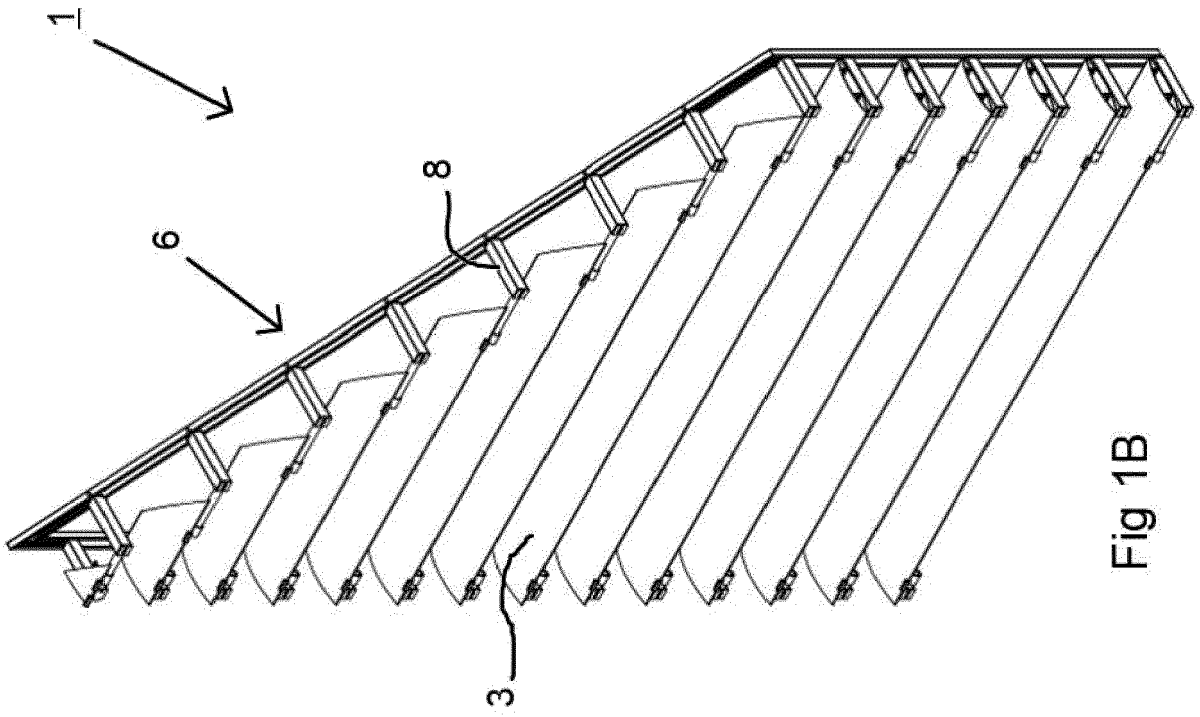

Fig 1B

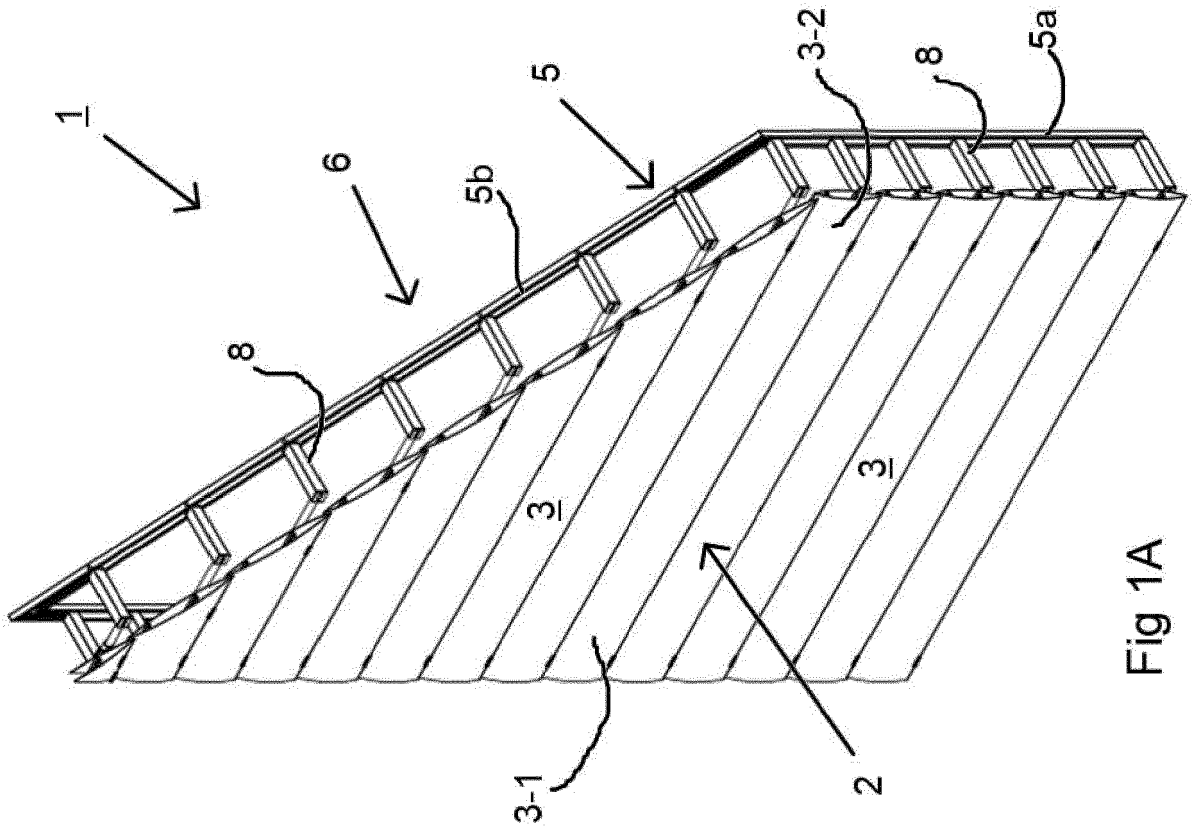

Fig 1A

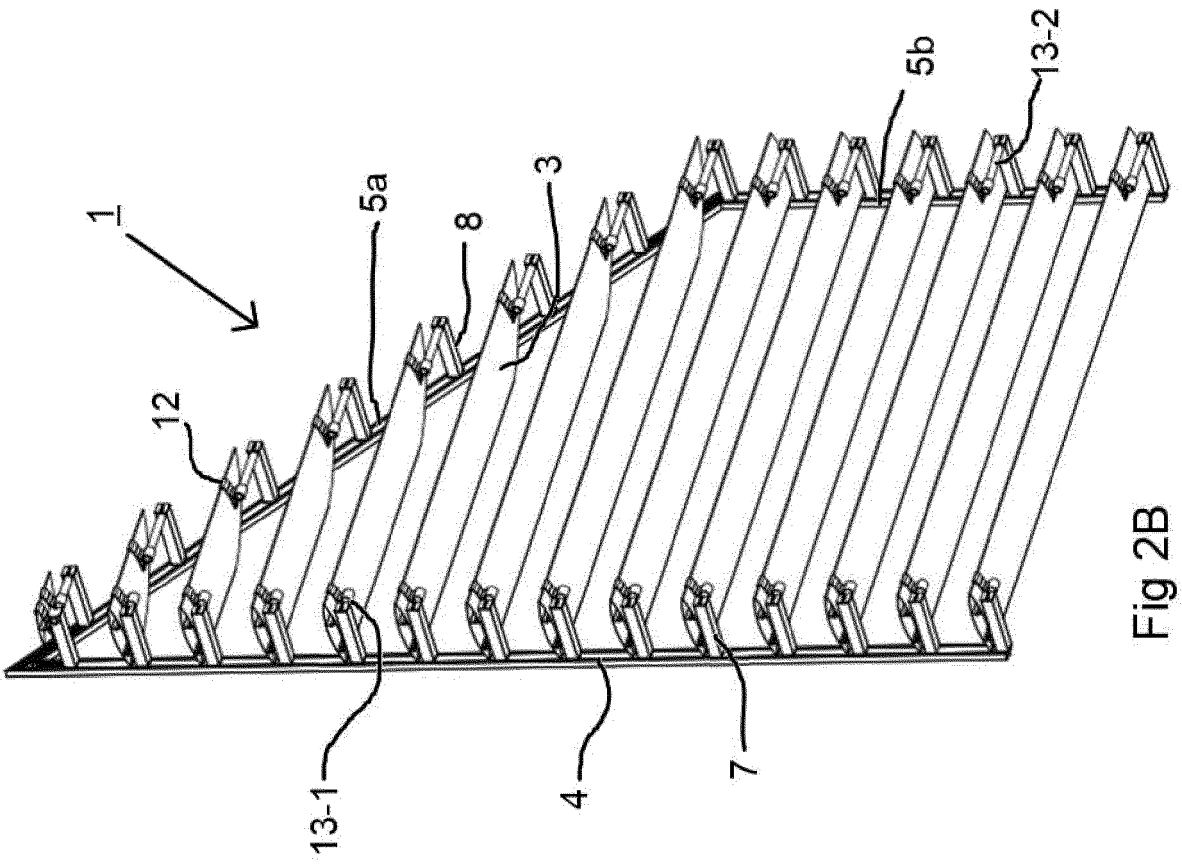

Fig 2B

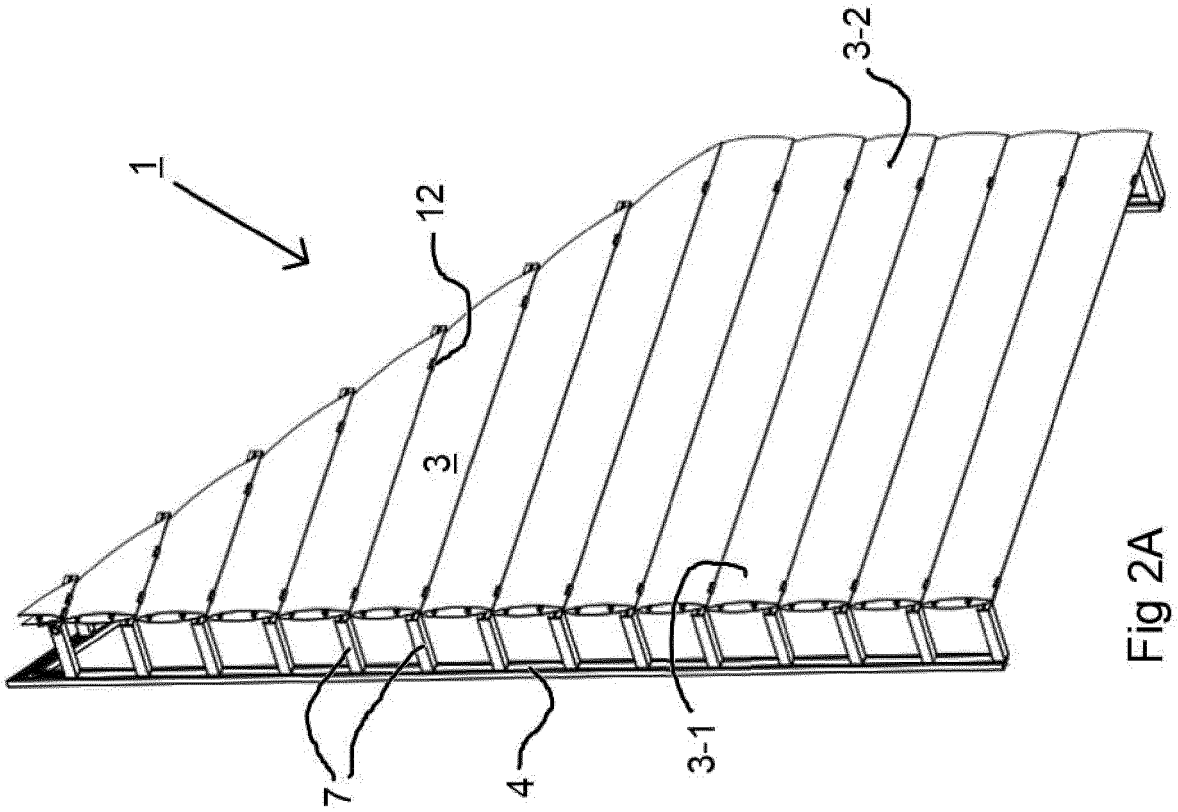

Fig 2A

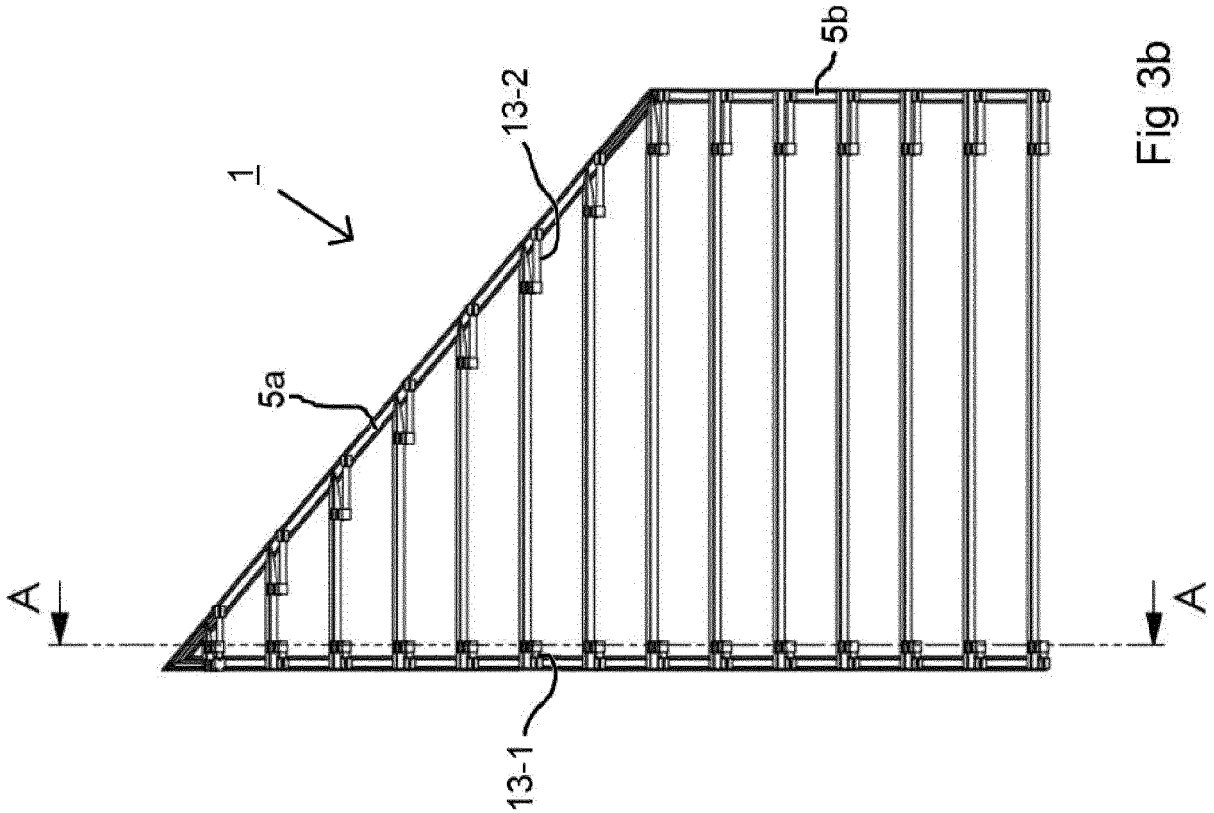

Fig 3b

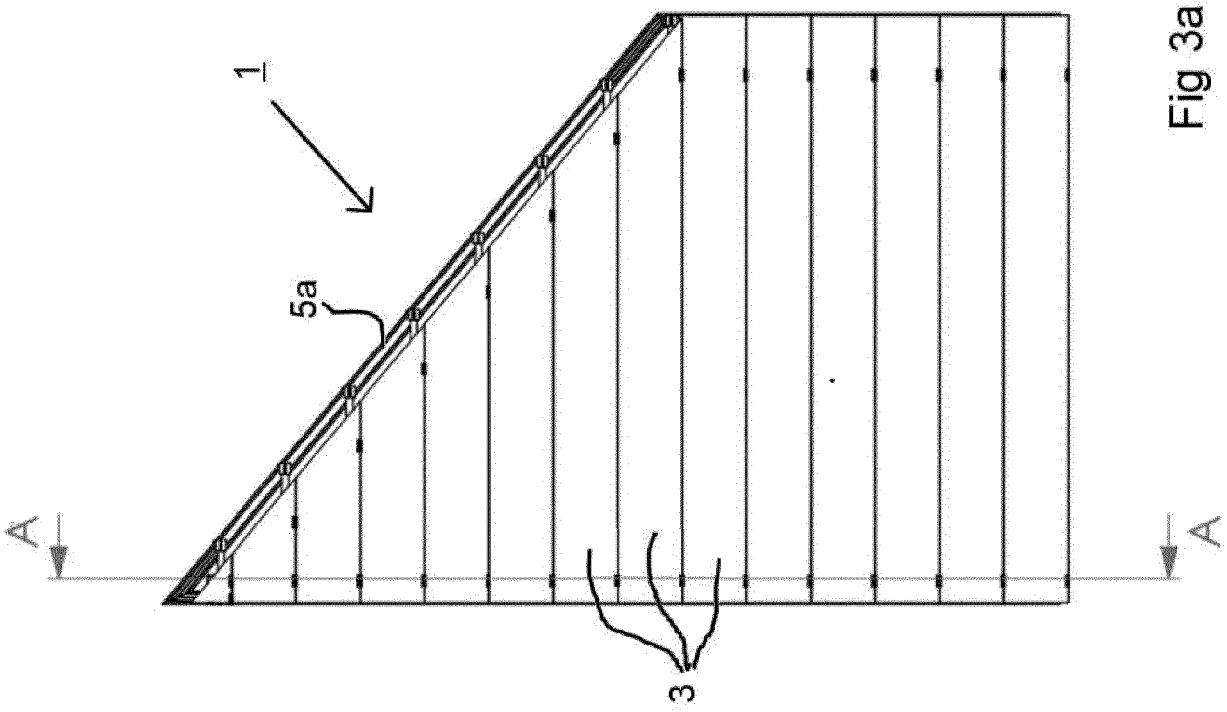

Fig 3a

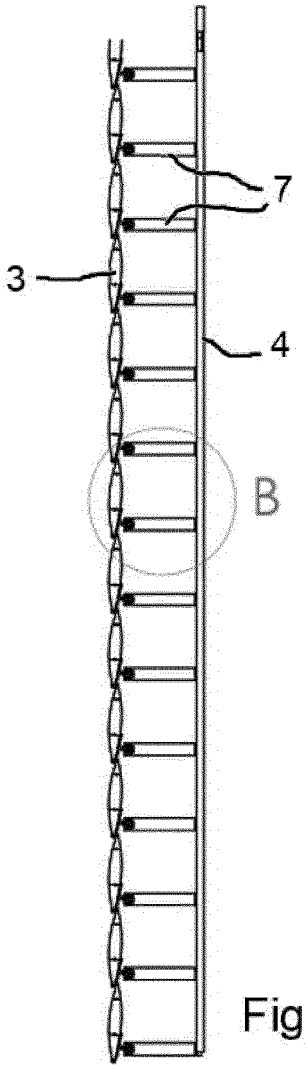

Fig 4A

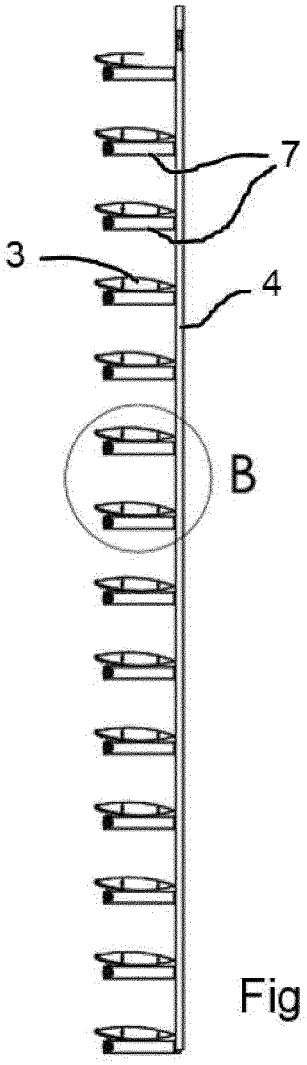

Fig 4B

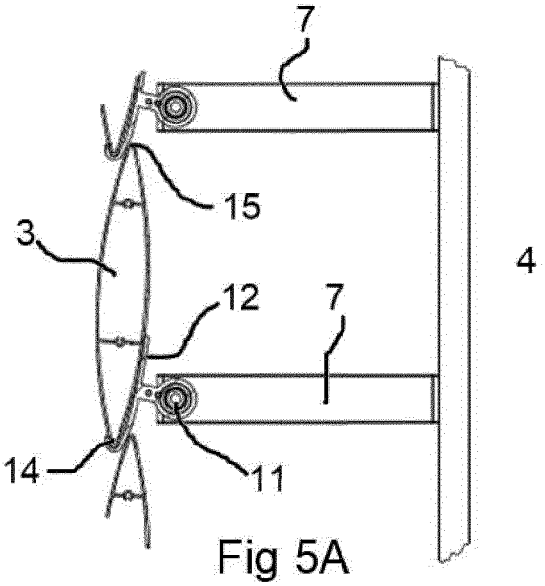

Fig 5A

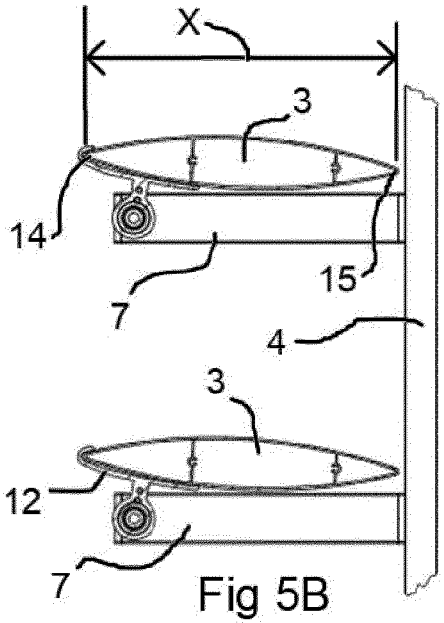

Fig 5B

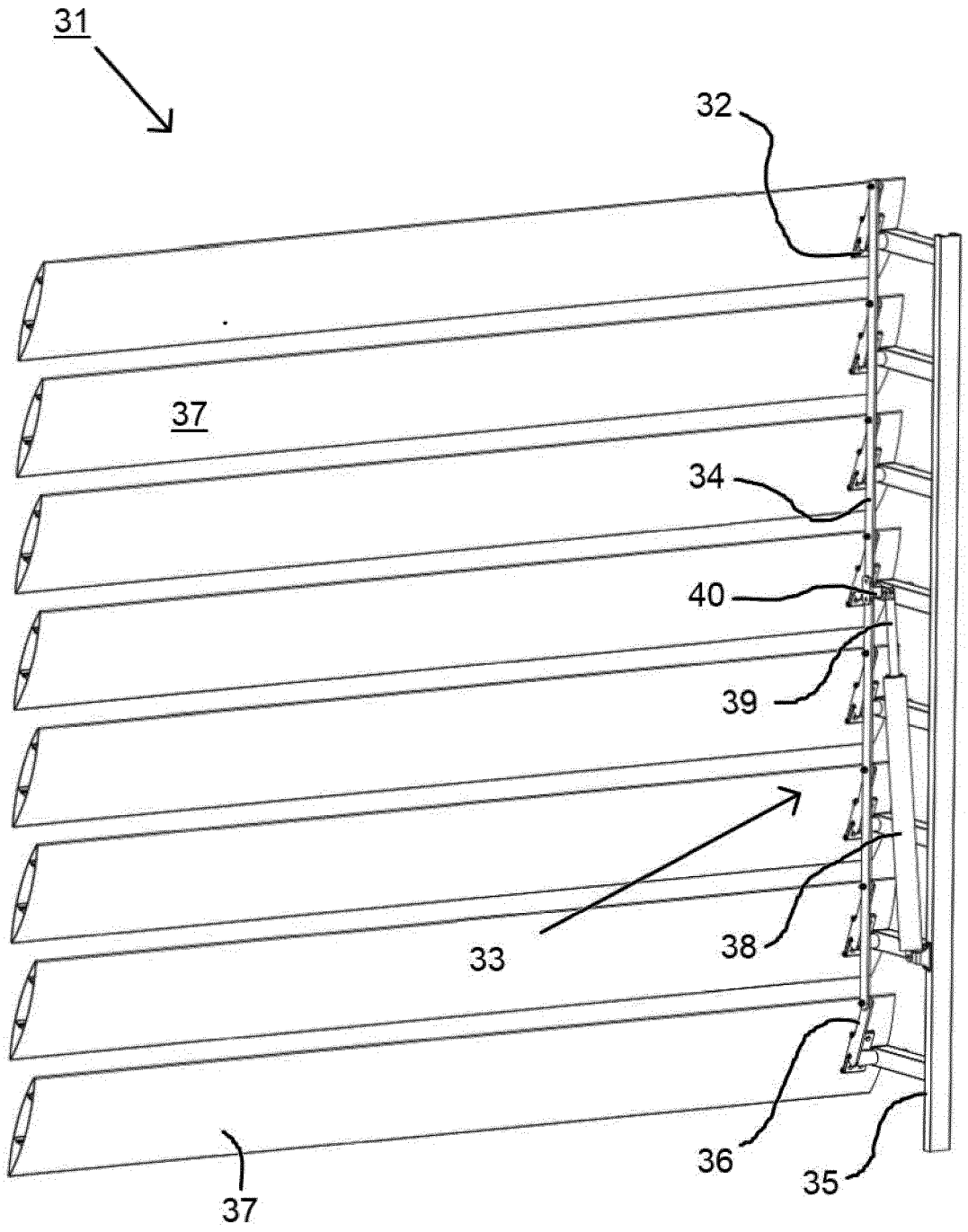

Fig 6

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 3946

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	CN 110 836 083 A (SANHE GEYU ENERGY SAVING TECH CO LTD) 25 February 2020 (2020-02-25) * paragraphs [0028] - [0038]; figures 1,2,3 *	1,4,5,7, 9-12,14	INV. E06B7/086 E06B9/28
A	US 2014/027071 A1 (WILSON SR JAMES WESLEY [US]) 30 January 2014 (2014-01-30) * paragraph [0016]; figures 1-4 *	1-15	
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TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 October 2023	Kofoed, Peter

CATEGORY OF CITED DOCUMENTS

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