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

(11) EP 1 594 110 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
09.11.2005 Bulletin 2005/45

(51) Int Cl.[7]: **G09F 19/14**

(21) Application number: **04252630.1**

(22) Date of filing: **06.05.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(71) Applicant: **Corus UK Limited**
London SW1 4WY (GB)

(72) Inventor: **Allinson, John**
Glynneath, Neath SA11 5NR (GB)

(74) Representative: **Hansen, Willem Joseph Maria**
Corus Technology BV
Corus Intellectual Property Department
PO Box 10000
1970 CA IJmuiden (NL)

(54) Structure with profiled surface for variable visual effects

(57) A structure, substrate or other article having a profiled surface comprising a plurality of profiled, in a length direction extending ridges (20), each ridge having a peak (23) and on opposite sides of the peak a sloping side (21) and an opposite, downwardly directed side (22) ending at the end remote from the peak (23) in a valley wherein that the downwardly directed side (22) comprises an undercutting part which is directed back under the peak (23) of the ridge (20).

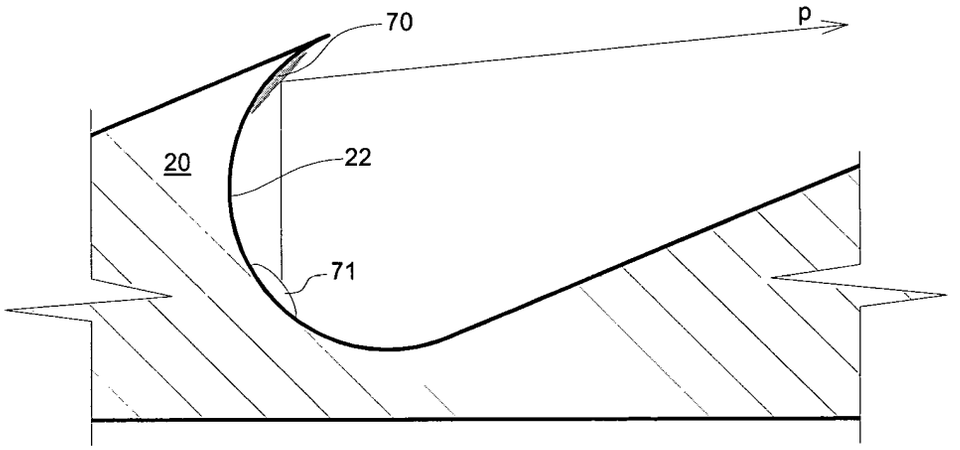

Fig. 5

EP 1 594 110 A1

Description

[0001] The invention relates to a structure, substrate or other article having a profiled surface comprising a plurality of profiled, in a length direction extending ridges, each ridge having a peak and on opposite sides of the peak a sloping side and an opposite, downwardly directed side ending at the end remote from the peak in a valley for providing the basis for a visual effect.

[0002] Generally the walls and ceilings of a building are flat. Similarly bill boards and similar sign faces are generally flat. Whether these are plain-coloured or patterned or portray an image, they give basically the same visual effect from whichever aspect or angle they are viewed.

[0003] US 6,001,456 discloses a doormat showing a plurality of ridges each having a sloping side and a downwardly directed side . The sloping sides, and the downwardly directed sides are provided with a first and second text respectively. When looking at the sloping sides, at a given viewing angle the first text on these sides can be read, while when looking at the downwardly directed sides at another angle the second text can be read.

[0004] Therefore the visual effect of the doormat varies with the viewing angle. It has shown that, while varying the viewing angle, that means, while passing the doormat, the transition from one image showing the first text, to the second image, showing the second text, is not smooth and the images, during transition, can be confusing to the observer.

[0005] It is an object of the present invention to provide a relief pattern or profiled surface which may be applied to substrates such as walls, ceilings, signs or any other articles or structures to provide a visual effect which has the attraction that it varies in a smooth and pleasant-to-the-eye way with the viewing angle.

[0006] It is another object of the present invention to provide such relief pattern or profiled surface the effect of which is independent of whether it is the observer or the object that moves.

[0007] It is further object of the invention to provide a relief pattern or profiled surface which can be manufactured from a wide range of materials.

[0008] It is still a further object of the present invention to provide a relief pattern or profiled surface which allows a great flexibility in the manner in which the images that can be observed from different viewing angles, can be applied or projected to or onto the relief pattern or profiled surface.

[0009] It is yet a further object of the present invention to provide a relief pattern or profiled surface which is cheap to manufacture, which can be manufactured in a wide variety of sizes dependent on the application or can be assembled to the desired size by coupling sub-assemblies.

[0010] These and other objects are obtained with a structure, substrate or other article having a profiled surface comprising a plurality of profiled, in a length direction extending ridges, each ridge having a peak and on opposite sides of the peak a sloping side and an opposite, downwardly directed side ending at the end remote from the peak in a valley and which is characterised in that the downwardly directed side comprises an undercutting part which is directed back under the peak of the ridge.

[0011] The profiled surface accordingly provides a different visual effect depending from which direction it is viewed. If the surface is viewed from one direction, then the sloping sides of the ridges will be seen and the opposite, downwardly directed sites of the ridges will be hidden, especially because these sides partially or totally undercut peaks of the ridges. If the surface is viewed from a direction facing the downwardly directed sides, the undercutting sides will be seen and the sloping sides will totally or substantially be hidden.

[0012] With the profiled surface according to the invention it has proved possible to ensure that the observer sees a very striking colour, pattern or image transition (or transitions) as the undercut, hidden, side (or sides) come into view and, in turn, different areas or regions become hidden.

[0013] The undercut nature of the downwardly directed sides allows any pattern, colour or image on these sides to be at least partially, preferably completely, hidden from an observer standing directly in front of the profiled surface. Hence, if a different pattern, colour or image is applied to the sloping sides, then, as an observer's viewing angle changes from one side of the profiled surface to the other, the pattern, colour or image changes gradually in a fashion that has proven to be very striking and very pleasant-to-the-eye.

[0014] Preferably the undercutting part of the downwardly directed side is curved.

[0015] Tests and simulations have shown that in this embodiment the gradual transition from one image into the other is further improved in the sense that the transition is perceived as striking and pleasant to the observer.

[0016] In a further embodiment characterised in that the undercutting part of the downwardly directed side is concave-curved the smooth and gradual transition from one image to the other image is still further improved.

[0017] Preferably the sloping side and the downwardly directed side meet at an acute angle to each other.

[0018] In this embodiment a distinct but gradual transition from one image into the other image is obtained.

[0019] This embodiment also covers the situation wherein a small (relative to the distance between peak and valley) radius or similar transition is present at the location where the two sides meet.

[0020] Preferably the downwardly directed side of the ridge initially (i.e. starting at the peak of the ridge) slopes under the peak of the ridge before coming back to merge with the commencement of the sloping side of an adjacent ridge, the peak of the ridge therefore overlying at

least the initial part of the downwardly directed, undercut side of that ridge.

[0021] For a good visual effect it is preferred that the sloping side and the downwardly directed side of at least one ridge present at least partly coloured or patterned areas or images in a contrasting manner.

[0022] The sloping side and the downwardly directed side may be plain, coloured, patterned or have an image, applied by any method in a contrasting manner.

[0023] The respective area of each ridge may be coloured or patterned in a contrasting manner. The respective areas may be provided with plain colours or tones, or with patterns. Instead, either the sloping or the downwardly directed sides of the ridges (or both sides thereof) may be provided with colouring which forms a pictorial image, e.g. of figurative, landscape or architectural nature.

[0024] The sloping side and / or the downwardly directed side of a plurality of ridges may have the same colours or pattern or the colour or pattern may vary from ridge to ridge or from one series of adjacent ridges to a second series of adjacent ridges, dependent on the effect to be obtained.

[0025] Preferably the sloping sides and / or the downwardly directed sides are provided with colouring or patterning which form a pictorial image.

[0026] The image may be formed by applying, by any method, sections of the image to different ridges so that, when viewing from one side, the complete image is observed.

[0027] An embodiment enabling to obtain additional surprising effects is characterised in that at least one downwardly directed side or sloping side has regions with distinct optical, physical or mechanical properties.

[0028] In this embodiment the observed image seen on the sloping side or the downwardly directed side can be interrupted or varied over a selected range of viewing angles giving rise to an additional optical effect. It is possible to reflect through optical means a portion of an image such that it can be seen only over a limited range of viewing angles or a mechanical perturbation can be applied to a side such that it can only be seen in a limited range of viewing angles.

[0029] A wider range of effects can be obtained with an embodiment of the invention which is characterised in that the pitch and / or the shape and / or the optical properties and / or the material of the ridges present on the profiled surface vary with the position of the ridges in the structure, substrate or other article.

[0030] In this embodiment successive changes in the images seen by the observer occur when the viewing angle is changed through relative movement of the profiled surface and the observer.

[0031] Preferably the structure, substrate or other article is manufactured through extrusion of a metal, preferably aluminium or a polymeric material.

[0032] Extrusion is a very effective method of producing profiled, mainly flat panels within a wide range of widths and lengths. The method is particularly suitable for making profiled surfaces.

[0033] Aluminium has the advantage of light weight. Polymeric material can be translucent or coloured and are cheap to process. Extrusion technology for aluminium and polymeric material is well known to the skilled person and does not need further elaboration.

[0034] Alternatively, the profiled surfaces can be manufactured from low carbon steel or stainless steel. Low carbon steel combines high strength for self supporting profiled surfaces with low price and good processibility like forming and coating with the desired colour, pattern or image.

[0035] Stainless steel has the advantage of high corrosion resistance for most applications of profiled surfaces according to the invention.

[0036] An embodiment with great flexibility in application is characterised in that the structure, substrate or other article is applied to a carrier whereby the structure, substrate, other article or substrate is at least for a part translucent and whereby between the carrier and the structure, substrate or other article a coloured pattern or image bearing intermediate layer is applied.

[0037] In this embodiment the same profiled surface can be used for a wide variety of applications by simply changing the intermediate layer. Also the image is protected from outside harmful influences like weather or vandalism which makes the profiled surface more robust.

[0038] Preferably coloured, patterned or image bearing areas are embedded in at least one of the sloping sides and / or downwardly directed sides.

[0039] This embodiment is of particular interest in the case wherein a translucent material is used. It is possible to embed in a single manufacturing process step, such as vacuum forming, the desired coloured or patterned areas or images.

[0040] A particularly versatile embodiment at the invention is characterised in that the structure, substrate or other article is provided with means for projecting coloured or patterned areas on at least one of the sloping sides and / or downwardly directed sides.

[0041] Use can be made of a blank or equally coloured or patterned profiled surfaceon which the desired colour, pattern or image is projected. By changing the projected image, the visual appearance of the profiled surface can easily, quickly and cheaply be changed.

[0042] In applications wherein a large area of profiled surface is required, an embodiment of the invention is characterised in that the structure, substrate or other article has the form of a panel and at least two panels are provided with coupling means for coupling two or more panels is beneficial. Also changes or repairs can easily be made without having to change or replace the whole structure, substrate or other article.

[0043] Preferably at least one of the downwardly directed side and sloping side of at least one ridge is provided with a photovoltaic element.

[0044] Profiled surfaces are often exposed to light, in particular in outside applications. Incident light can effectively be converted in electrical energy.

[0045] In a particular embodiment wherein the photovoltaic element is applied in the undercut downwardly directed side is of interest since incident light is to a large extent absorbed by the folded back side and converted into electrical energy, whilst the sloping sides can be used to provide the observer with aesthetic appearances different to that of the photovoltaic elements.

[0046] The principles of the invention may be applied to interior or exterior walls of a building, with the ridges extending vertically, so that a varying visual effect is provided depending upon the end from which the observer views the surface. Particularly where the surface is provided with pictorial images, an impression of movement may be created as the observer passes along the wall.

[0047] The principles of the invention may, however, be applied to a variety of other structures, substrates or articles, including display signage, ceilings, roofs, floors and articles of furniture.

[0048] The relief pattern or profiled surface may be formed directly on the surface of a wall or other structure, or onto panels which can then be used in the construction or cladding for that structure.

[0049] The ridges may be formed integrally with the structure, substrate or other article, or may comprise separate elements (e.g. pre-formed strips) applied to a planar surface.

[0050] The structure, substrate or other article may be formed of a variety of materials, including plaster, polymeric material, glass and metal.

[0051] Any colouring or pattern may be applied to the surface after its formation, whether manually, by machine, by projection or other technique. Instead, the colouring may be incorporated into the materials of the substrate etc. during its formation. Varying visual effects and surprising transitions, associated with interference effects and depending on viewing angle, can be created when transparent or translucent materials are used to create profiles conforming to the current invention.

[0052] As a significant aspect of the current invention is associated with images, colours and patterns, innumerable techniques associated with lighting can be used as enhancement or integral part of structures, substrates or articles that conform to this invention. These include coloured lighting, projected lighting, back lighting and lasers.

[0053] The invention is also embodied in a method for the manufacture of a structure, substrate or other article according to the invention wherein a sheet or strip shaped product is rolled into the structure, substrate or other article.

[0054] In this embodiment, long panels can be manufactured with any suitable pitch between the ridges with simple rolling or roll-forming equipment.

[0055] It is further preferred that prior to rolling, the sheet or strip shaped product is provided with a coloured, patterned or image bearing layer or a photovoltaic elements comprising layer such that after rolling a desired optical or photovoltaic effect is achieved.

[0056] This embodiment has the advantage that in a single process step, the sheet is formed and covered with the desired layer.

[0057] Embodiments of the present invention will now be described by way of examples only and with reference to the accompanying drawing in which

[0058] Fig. 1 shows a sectional view of some embodiments of a structure, substrate or other article according to the invention.

[0059] Fig. 2 shows a sectional view of some embodiments of a structure, substrate or other article according to the invention having images applied to it.

[0060] Fig. 3 shows a view of a structure, substrate other article as shown in Fig. 2 from two different angles.

[0061] Fig. 4 shows a view of a structure, substrate or other article according to the invention, showing two different images seen from two different angles and a view of two combined images prior to application to the structure, substrate or other article.

[0062] Fig. 5 shows schematically a cross section of a structure, substrate or other article according to the invention wherein a different image can be observed within a limited range of viewing angles.

[0063] Fig. 6 shows diagrammatically a process for the manufacture of a structure, substrate of other article according to the invention.

[0064] Referring now to Fig. 1, there are shown various examples of a structure, substrate or other article having a profiled surface according to the invention. The profiled surface has a plurality of wave-shaped ridges 20, each comprising a sloping side 21, and an opposite downwardly directed side 22 which is directed back or undercut the peak 23 of the ridge. The undercut side of a ridge merges with the sloping side of the, adjacent, ridge. The peak in the context of the present invention is the highest point, as shown in Fig. 1a, b, c, e, or the most forwardly extending point as shown in Fig. 1 d. The downwardly directed side is at least partly re-entered (undercutting) with respect to its side of the ridge.

[0065] Each ridge thus has a sloping side 21, which is inclined at a relative small or acute angle to the general plane of the structure, substrate or other article and an opposite side 22 which extends downwardly and sloping under the peak 23 of the ridge, then extends forward to merge with the commencement of the sloping side 21 of an adjacent ridge. The sloping and downwardly directed sides preferably meet at a relatively sharp peak 23 (i.e. at an acute angle to each other) which overlies at least the adjacent part of side 22.

[0066] The profiled surface can be integral with the structure, substrate or other article or it can be a separate layer mounted on a carrier 10 as shown in Fig. 1 d and e.

[0067] As shown in Fig. 1 e, the downwardly directed side can be composed of more than one different shape,

such as a curved shape 22a connected to a plain shape 22b. This embodiment creates, when different images, colours or patterns are applied to the surfaces of the respective shapes, different visual effects.

[0068] The different visual effects can be observed when the viewing angle changes from position A to position C through position B as will be explained later.

[0069] Fig. 2 shows the embodiment A of Fig.1, but now with a colour, pattern or image applied to it.

[0070] In Fig. 2, section a (dotted line a) indicates a first colour, pattern or image or part thereof applied to the downwardly directed side of the ridge or ridges, section b (dotted line b) indicates a second colour, pattern or image or part thereof applied to the sloping side at the ridge or ridges.

[0071] As can be seen from Fig. 2 b, the different colours, patterns or images can be to the surface of the ridges, but can also be embedded in the, translucent, ridges which protects them from outside influences.

[0072] Fig. 3 shows a top view of a structure, substrate or other article as depicted in Fig. 2, but seen from two different angles. This figure shows the change of colour or pattern or images, which is achievable dependent on the viewing angle using a profiled surface in accordance with the current invention.

[0073] In the example shown in Fig. 2 and 3, different areas of the profiled surface are of contrasting colours or patterns. In particular, an area of relatively light colour L (indicated by light grey shading in Fig. 3 a; section b in Fig. 2) extends over the sloping side 21 up to the peak 23 of each ridge 20; an area of relatively dark grey shading D (Fig. 3 b, section a in Fig. 2) extends from the peak 23 of each ridge 20, down over its concave-curved surface 22 to the commencement of the sloping side 21, or just prior to or just past it, of the adjacent ridge.

[0074] The substrate accordingly provides a different visual effect to an observer, depending upon the viewing angle. Thus, if the substrate is viewed from the direction of arrow A or B in Fig. 2, then the observer will see the lighter areas b, L of the sloping sides 21 of the ridges 20; the darker areas a, D of the downwardly directed surfaces 22 of the ridges will be substantially or entirely hidden, because of the undercut concave-curved profile of these surfaces, which provide that the peaks 23 overlie at least the adjacent parts of the surfaces 22. Likewise, if the substrate is viewed in the direction of arrow C in Fig. 2, then the observer will see, predominantly or entirely, the darker areas a, D of the concave-curved surfaces 22 and end edges 23 of the ridges 20.

[0075] Instead of using light and dark coloured (or patterned) areas, an example of a very effective embodiment is where pictorial images are used. An example of an image, which may be, for example, printed onto a vinyl film prior to applying to a profiled surface, is shown in Fig. 4. Here the images of an ellipse and a diamond have been split and printed onto a strip of vinyl such that the vinyl or other suitable material (see Fig. 4 c) can be overlaid onto a profiled surface. In this example, with reference to Fig. 2, the vinyl would be carefully applied such that all the separate elements of the ellipse's image, E, would fall on sequential downwardly directed concave sides 22. The elements of the diamond, R, would be applied to sloping sides 21. In this way, an observer looking from position A or B could see a fully coherent image of the diamond, whilst the image of the ellipse would be completely hidden from view. When the observer moved to position C, only a fully coherent image of an ellipse could be seen. As the viewer passes from one side to the other, the transition from one image to the other is exceptionally visually striking. This results from the undercut nature of part of the downwardly directed side, in particular a concave curved side which serves initially to hide the image of the ellipse but then, as the observer passes by, the image of the ellipse is rapidly revealed as the image of the diamond disappears from view. The effect also benefits from the increased surface area provided by the sloping and curved surfaces, compared to a flat panel.

[0076] The substrates that have been described may form a wall of a room, with ridges running vertically and / or horizontally or a ceiling. It is also possible to apply the profiled surface according to the invention to a curved, not plain, carrier or backing structure. Also in such case, the substrate will provide its different visual effects to an observer, depending on viewing angles.

[0077] The principles of the invention may be applied to the surface of an enormous variety of articles, including signs, furniture and appliances. The structure, substrate or other article may comprise a flat panel onto which the profiled surface is applied. The profiled surfaces of the structure, substrate or other articles or the substrate carrying the profiled substrate or other articles may be formed of a wide variety of materials, including plaster, glass, polymer material, metal such as aluminium, steel or stainless steel, concrete and foam.

[0078] The colouring patterns or images for the different areas may be applied to the structure, substrate or other article, after it has been manufactured, for example by painting, spraying or otherwise. The image instead may be projected onto the surfaces. Instead, the image may be applied to the underside of a transparent or translucent profiled sheet. Instead, the colouring may be incorporated into the material of the structure, substrate or other article or of the ridge during the course of its manufacture.

[0079] For example, the colouring or pattern may be carried on a sheet or film of polymeric material, which is then superimposed over the front surface of a substrate pre-formed with a series of wave shaped ridges. The sheet or film is then applied to the substrate under heat and pressure, to deform the sheet or film to conform to the surface relief profile of the substrate. The sheet or film could be bonded to the substrate by means of adhesive carried on or applied to either the underside of the sheet or the front surface of the substrate. The colouring, pattern or image may be applied to the front sur-

face of the sheet or film, before it is applied to the substrate, by any suitable means, for example printing by offset litho printing or screen printing. The sheet is registered in position relative to the substrate, before application thereto, to ensure the successive contrasting colours on the sheet are registered to the opposite sides of the successive ridges of the substrate. The ratio between the section applied to the sloping side and the downwardly directed side preferably is between 1 to 0,3 and 1 to 0,8, more preferably between 1 to 0,4 and 1 to 0,6.

[0080] Moreover, variations on the basic profiled surface having a downwardly directed, undercut side can be used for different or enhanced effects, but all have a common feature that some part of the downwardly directed side is totally hidden from the view of an observer positioned directly in front of a series of ridges. For example, the shape or material properties of such ridges may be varied along the length of individual ridges or they may vary from ridge to ridge along a series of ridges. A further example is an arrangement to achieve more than one transition of images as the observer's viewing angle changes. With reference to Fig. 5 and 2, a perturbation 71 within the curve of a downwardly directed side 22 of ridge 20 can be used to change the image of a small section of that side with the viewing angle. A carefully positioned reflecting region 70, incorporated within the profile, can be used to reflect, indicated by broken arrow p an image from the perturbation to appear at selected viewing angles. Such an effect might be used on every ridge of a series, or may be used selectively. For example, it could be used to give the image that from one specific viewing angle, on the ellipse shown in Fig. 4 b, a star S is twinkling.

[0081] Fig. 6 shows schematically a method for the manufacture of a structure, substrate or other article according to the invention.

[0082] A pre-printed layer 60, e.g. as shown in Fig. 4 c, is fed into a sheet-former 61 together with a sheet 62 of material like polymeric material, steel or aluminium and formed into the substrate 63 as shown in Fig. 2 a.

[0083] As mentioned previously, the substrates may be formed of a wide variety of materials. For example, the substrate may be formed from a planar sheet of metal (for example galvanised steel or aluminium) or other material, which is passed through a machine which deforms the sheet to a corrugated form to provide the successive ridges. The colouring may be applied subsequently. Instead, the colouring may be applied initially, e.g. by printing onto one side of a planar sheet of polymeric material (e.g. biodegradable polycarbonate), which is then deformed to corrugated form.

[0084] The colouring D and L may comprise areas of plain colouring, or may be patterned. Moreover, the colouring preferably comprises pictorial images (which may incorporate lettering), whether of figurative, landscape, architectural or commercial nature (e.g. company logos). An example of such pictorial images is given in Fig. 4 and has previously been described. This arrangement can be used to give changing images and an illusion of movement as an observer passes a long panel or wall etc.

[0085] The applicant reserves the right to disclaim in the present application, to the extent required by applicable patent law, any subject matter contained or claimed in the application no. PCT/GB/2003/004289, including any information which the skilled person would directly and unambiguously read from that document.

Claims

1. A structure, substrate or other article having a profiled surface comprising a plurality of profiled, in a length direction extending ridges, each ridge having a peak and on opposite sides of the peak a sloping side and an opposite, downwardly directed side ending at the end remote from the peak in a valley **characterised in that** the downwardly directed side comprises an undercutting part which is directed back under the peak of the ridge.

2. A structure, substrate or other article according to claim 1 **characterised in that** the undercutting part of the downwardly directed side is curved.

3. A structure, substrate or other article according to any of the preceding claims **characterised in that** the undercutting part of the downwardly directed side is concave-curved.

4. A structure, substrate or other article according to any of the preceding claims **characterised in that** the sloping side and the downwardly directed side meet at an acute angle to each other.

5. A structure, substrate or other article according to any of the preceding claims **characterised in that** the sloping side and the downwardly directed side of at least one ridge present at least partly coloured or patterned areas or images in a contrasting manner.

6. A structure, substrate or other article according to any of the preceding claims **characterised in that** the sloping sides and / or the downwardly directed sides are provided with colouring or patterning which form a pictorial image.

7. A structure, substrate or other article according to any of the preceding claims **characterised in that** at least one downwardly directed side or sloping side has regions with distinct optical, physical or mechanical properties.

8. A structure, substrate or other article according to

any of the preceding claims **characterised in that** the pitch and / or the shape and / or the optical properties and / or the material of the ridges present on the profiled surface vary with the position of the ridges in the structure, substrate or other article.

9. A structure, substrate or other article according to any of the preceding claims **characterised in that** the structure, substrate or other article is manufactured through extrusion of a metal, preferably aluminium or a polymeric material.

10. A structure, substrate or other article according to any of the preceding claims **characterised in that** the structure, substrate or other article is applied to a carrier whereby the structure, substrate, other article or substrate is at least for a part translucent and whereby between the carrier and the structure, substrate or other article a coloured pattern or image bearing intermediate layer is applied.

11. A structure, substrate or other article according to any of the preceding claims **characterised in that** coloured, patterned or image bearing areas are embedded in at least one of the sloping sides and / or downwardly directed sides.

12. A structure, substrate or other article according to any of the preceding claims **characterised in that** the structure, substrate or other article is provided with means for projecting coloured or patterned areas on at least one of the sloping sides and / or downwardly directed sides.

13. A structure, substrate or other article according to any of the preceding claims **characterised in that** the structure, substrate or other article has the form of a panel and at least two panels are provided with coupling means for coupling two or more panels.

14. A structure, substrate or other article according to any of the preceding claims **characterised in that** at least one of the downwardly directed side and sloping side of at least one ridge is provided with a photovoltaic element.

15. Method for the manufacture of a structure, substrate or other article according to any of the preceding claims **characterised in that** a sheet or strip shaped product is rolled into the structure, substrate or other article.

16. Method according to claim 15 **characterised in that** prior to rolling, the sheet or strip shaped product is provided with a coloured, patterned or image bearing layer or a photovoltaic elements comprising layer such that after rolling a desired optical or photovoltaic effect is achieved.

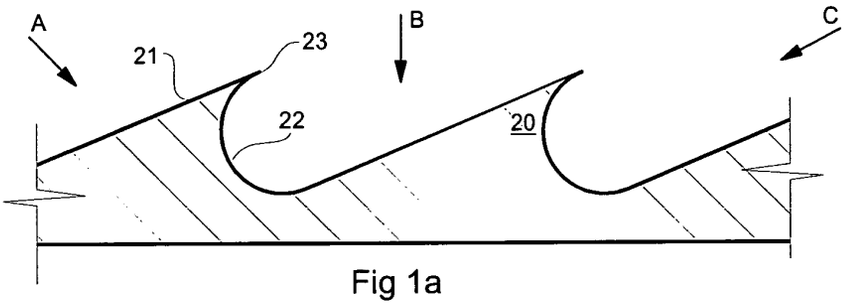

Fig 1a

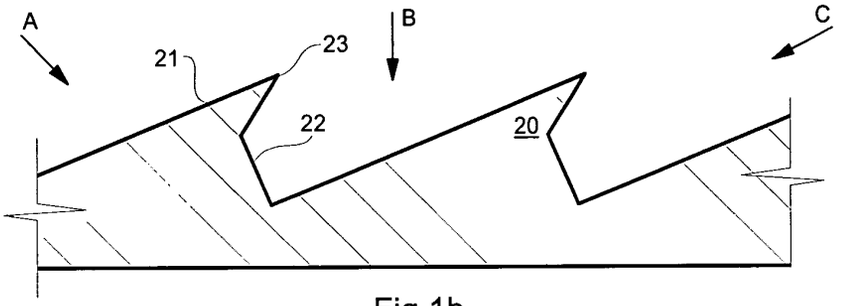

Fig 1b

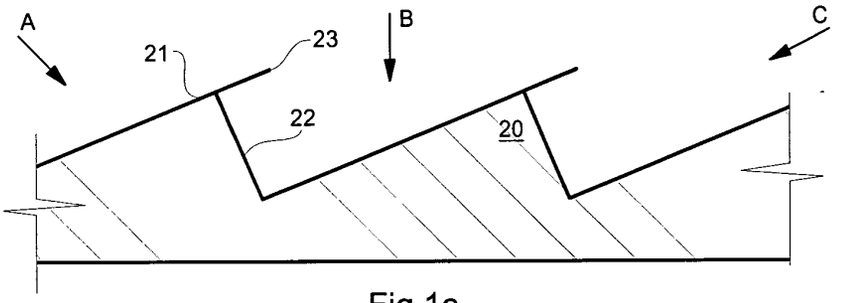

Fig 1c

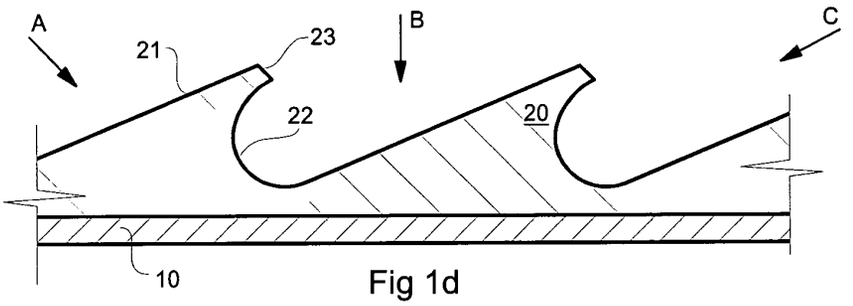

Fig 1d

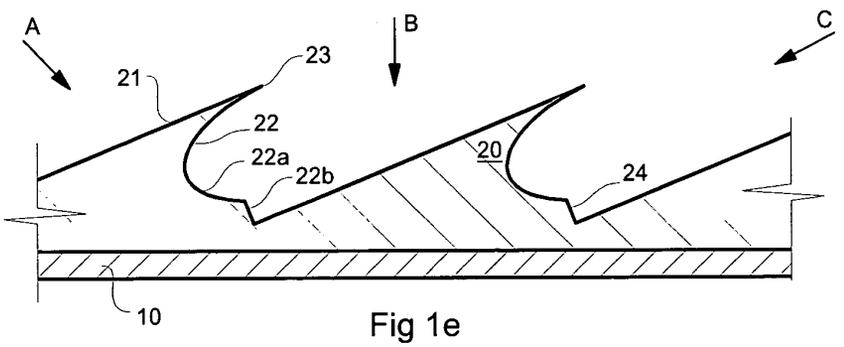

Fig 1e

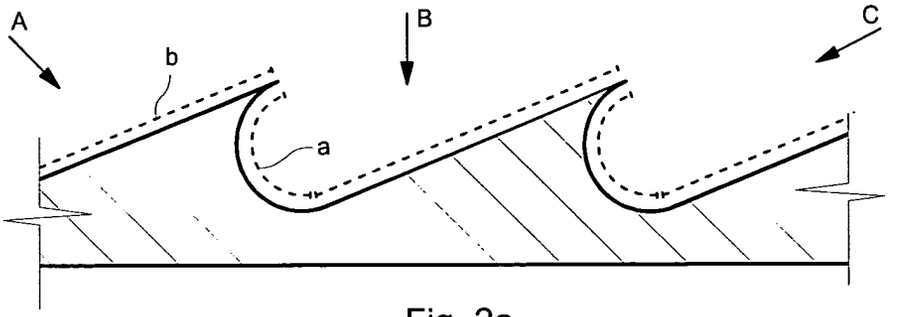

Fig. 2a

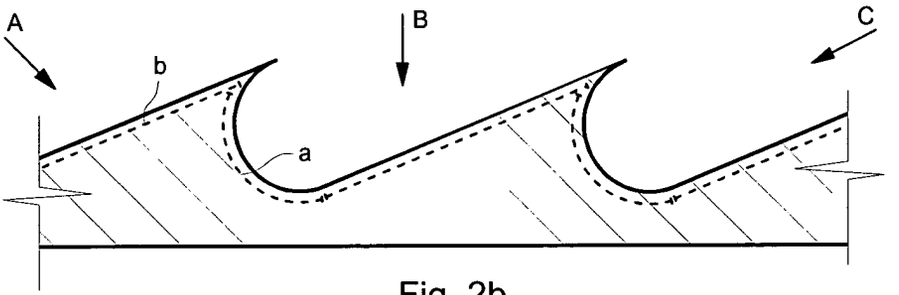

Fig. 2b

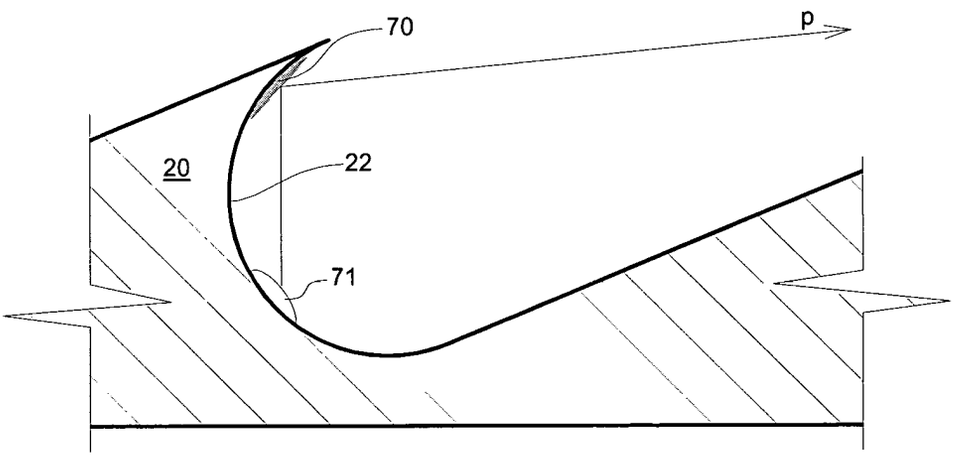

Fig. 5

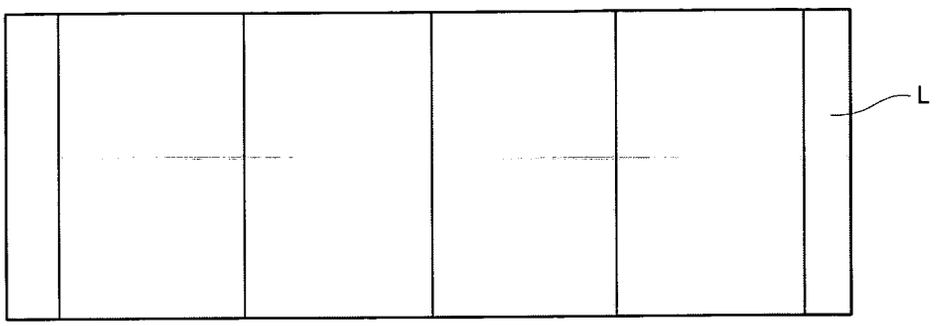

Fig. 3a

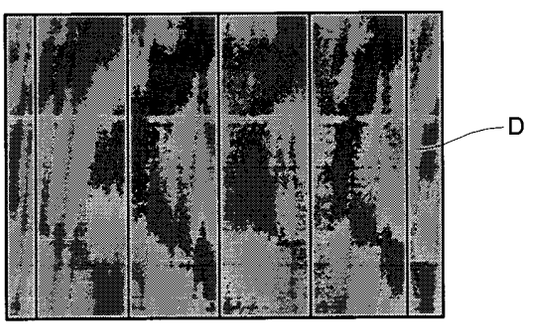

Fig. 3b

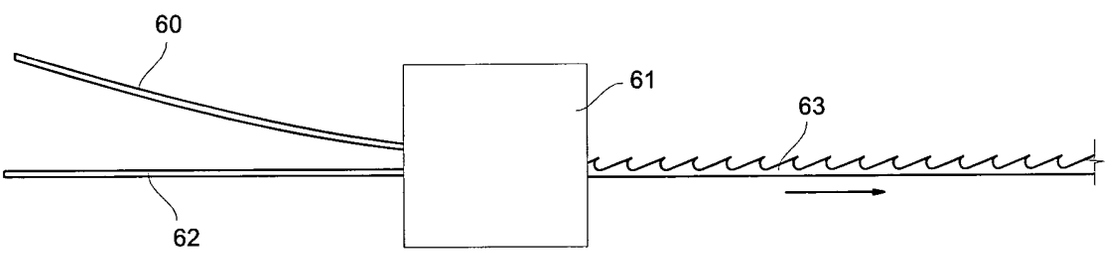

Fig.6

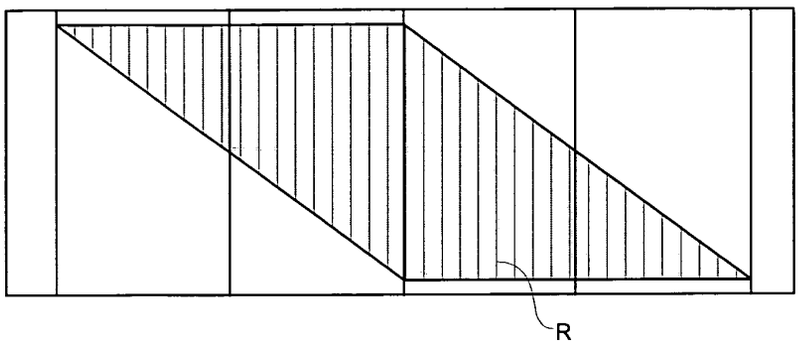

Fig. 4a

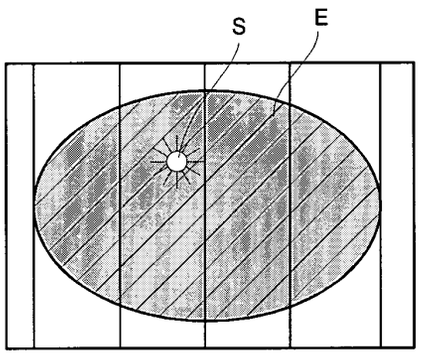

Fig. 4b

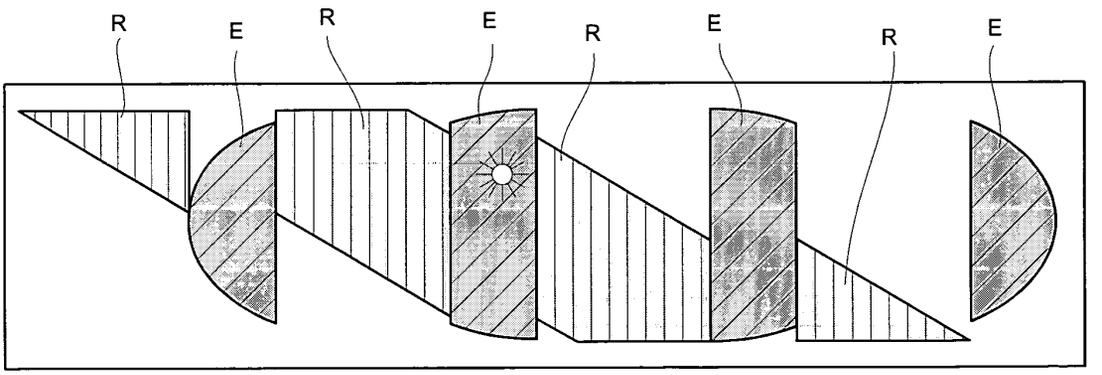

Fig. 4c

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 25 2630

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.7)
X Y	BE 787 583 A (BEUKELAERS GUY) 18 December 1972 (1972-12-18) * page 2, paragraph 2 - page 5, paragraph 1; claims 3,4; figures 4,7,8 *	1-8,11, 13,15,16 10	G09F19/14
Y A	GB 1 510 021 A (WYCKOFF C) 10 May 1978 (1978-05-10) * page 2, line 95 - page 3, line 128; figures 1,2; example 2 *	10 1-9, 11-15	
A	GB 2 382 053 A (ALLINSON JOHN FREDERICK) 21 May 2003 (2003-05-21) * the whole document *	1-15	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
G09F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 October 2004	Pavlov, V

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 04 25 2630

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.

27-10-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
BE 787583 A	18-12-1972	BE 787583 A1	18-12-1972
GB 1510021 A	10-05-1978	AU 503320 B2	30-08-1979
		AU 8005975 A	14-10-1976
		CA 1032516 A1	06-06-1978
		CA 1036833 A1	22-08-1978
		FR 2274736 A1	09-01-1976
		IT 1035990 B	20-10-1979
		JP 989717 C	18-03-1980
		JP 51007728 A	22-01-1976
		JP 54021720 B	01-08-1979
		SE 403809 B	04-09-1978
		SE 7505639 A	15-12-1975
		US 4040760 A	09-08-1977
GB 2382053 A	21-05-2003	NONE	

EPO FORM P0459

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