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(71) Applicant: **VKR Holding A/S**
2970 Hørsholm (DK)

(72) Inventors:
- **Henriksen, Jens-Ulrik Holst**
  2970 Hørsholm (DK)
- **Erdmann, Lars**
  2970 Hørsholm (DK)
- **Atzen, Bent**
  2970 Hørsholm (DK)

(74) Representative: **AWA Denmark A/S**
Strandgade 56
1401 Copenhagen K (DK)

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(54) **A WIND-PROOFING PAD, A KIT INCLUDING A PLURALITY OF WIND-PROOFING PADS AND A SEALING COLLAR FOR USE WHEN INSTALLING A WINDOW FRAME, AND METHOD FOR INSTALLING A WINDOW FRAME IN AN INCLINED ROOF STRUCTURE**

(57) A wind-proofing pad for use in wind-proofing an inclined roof structure with a window frame installed therein is disclosed. The pad comprises a first section configured to extend along a first inner side of the roof structure facing the roof opening, and a second section configured to extend along a second inner side. The first and second sections are interconnected along a connecting line. Further a kit including such pads and method for installing a window frame in a roof structure are disclosed. According to the method an installation frame is arranged on the roof structure, underroof sections are folded up along the inner side of the opening in the roof structure and attached to an exterior side of the installation frame. At least one pad is applied at each corner, so that an uninterrupted wind-proofing extending along the entire inner edge is provided, before installing the window frame.

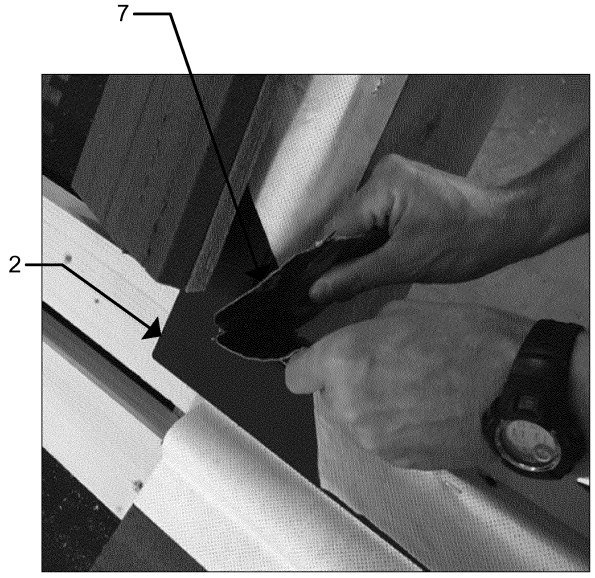

Fig. 5

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Description

[0001] The present invention relates to a wind-proofing pad for use in wind-proofing an inclined roof structure of a building with a window frame installed therein. The invention further relates to a kit including a plurality of wind-proofing pads and a sealing collar for use when installing a window frame, and to a method for installing a window frame in an inclined roof structure of a building, where said roof structure comprises rafters, a pliable underroof and battens adapted for supporting a roofing material.

[0002] During the installation of a window in an inclined roof including an underroof, an opening for the window frame is created by removing roofing material and cutting through the roof battens and the underroof, thereby interrupting the water- and wind-proofing.

[0003] In order to make the transition between the installed window frame and the underroof waterproof and prevent water leakage into the roof construction, a sealing collar also known as an underroof collar is usually applied. Such an underroof collar is known from EP0994992B1. The underroof collar is installed after the window frame, and possibly an insulation frame, has been installed in the opening. During the installation, the underroof collar is pulled over the window frame and attached to the outer side of the window frame, i.e. the side facing away from the frame opening. To fulfil its purpose, the underroof collar must be in close engagement with both the outer side of the window frame and the underroof of the roof structure next to the window. Careful installation of the underroof collar is therefore required, which means that the process is susceptible to errors caused by improper handling and time constraints.

[0004] The provision of an underroof collar also provides some wind-proofing, but to further improve the insulation at the transition between the window frame and the roof structure, the roof opening is often made slightly over-size and an insulating frame is arranged in the opening between the window frame and the roof structure. Such an insulating frame is known for example from EP2677092B1, but again improper handling and time constraints may result in the insulating frame not coming into close engagement with the window frame and/or the roof structure, thus leading to unsatisfactory insulation.

[0005] A still further attempt to provide wind-proofing of the roof opening is known from EP1518974A1. Here, sections of the underroof material, which were previously covering the roof opening, are folded over the battens at the top and bottom of the roof opening, and metal rails are arranged along the sides of the roof opening, so that they cover the spaces between ends of the battens, which were interrupted when making the roof opening. Bent sections at the ends of the rails overlap the folded underroof sections at the top and the bottom so that a continuous wind-proofing extending all along the inner side of the roof opening is formed. In order to secure the wind-proofing structure an additional wind-proofing tape is used along the sides of the roof opening. This method, however, suffers from the disadvantage that the rails are relatively costly to produce and that the metal used for the rails forms thermal bridges leading to a reduction of the thermal insulating properties of the finished structure.

[0006] It is therefore an object of the invention to provide a means for use in wind-proofing an inclined roof structure of a building with a window frame installed therein, which is relatively cheap, does not influence the thermal properties of the structure negatively, and has a low risk of error during installation. It is a further object of the invention to provide a method for installing a window frame in an inclined roof structure, which is relatively cheap, does not influence the thermal properties of the structure negatively, has wind-proofing, and has a low risk of error during installation.

[0007] The first object is achieved with a wind-proofing pad for wind-proofing an inner corner of a roof opening in an inclined roof structure of a building where a first and a second inner side of the roof structure delimiting the roof opening meet, said wind-proofing pad comprising:

a first section configured to extend along the first inner side of the roof opening, and
a second section configured to extend along the second inner side of the roof opening, wherein
the first and second sections are interconnected along a connecting line.

[0008] The wind-proofing pad can be used at a corner of a window mounting frame for use when installing a window frame in an inclined roof structure of a building, where an interior side of said mounting frame faces the interior of the building and an exterior side faces the exterior of the building and an inner side faces an opening delimited by the mounting frame, wherein the first section of the pad is configured to at least partially cover the exterior side, the interior side, and the inner side of a first member of the mounting frame, and the second section is configured to at least partially cover the exterior side, the interior side, and the inner side of a second member of the mounting frame.

[0009] Here, a mounting frame may be an installation frame as will be described with respect to other aspects of the invention below, or it may be an insulating frame arranged in a roof opening, or it may be a part of the roof structure, which delimits an opening for the window, for example auxiliary battens arranged around the window opening in the roof surface to help support the window frame.

[0010] By the first and second sections being interconnected along a connecting line, the first and second sections may, in a mounted condition, extend along two inner sides, extending orthogonally to each other, i.e. at a corner. The first and second sections may be made from separate pieces of material, which may be interconnected at the connecting line by an interconnecting means, such as adhesive, glue, tape, welds or seams. In one embodiment a strip is adhered to the first and second

sections to interconnect them, thereby providing a particularly flexible connection along the connecting line. The material forming the first section may thus be spaced from the material forming the second section and the gap may be covered by the strip. The strip may be made from the same material as one or both of the pads or may be made from a different material. Making the strip from an elastic material will allow a high degree of flexibility during mounting of the pad. Alternatively, the first and second sections may be made from one piece of material with a connecting line.

[0011] The pad may be folded at the connecting line in a state of delivery, such that the first and the second section lie in parallel planes, thereby facilitating easy and compact storage. The connecting line is moreover preferably pre-shaped in the material of the first and/or second sections and/or the interconnecting means. The connecting line may be made by for instance deforming, striking, or weakening material along the bending line, or by applying a strip, an adhesive or the like.

[0012] The pads may be fixed to the first and second inner sides or members of the mounting frame by fixation means, such as adhesive, to secure a wind-tight and reliable connection. Consequently, adhesive may be provided on a back side of the pad, which in use faces the inner side or the mounting frame. Preferably, adhesive is applied to the entire surface of both the first and second section. Alternatively, adhesive may be applied to a part of the surface of the first and/or second section, such as along the edges of the section(s). The adhesive is preferably applied during production, and thus a removable covering, such as paper, cardboard, foil, film, or the like, preventing the adhesive from adhering and/or setting during storage and transportation may be provided to the adhesive. The covering may be provided as one piece covering the entire adhesive surface of each of the first and second section. Preferably, the covering comprises several pieces of material, which may be removed individually to facilitate easier installation of the pad, as the entire adhesive surface is not necessarily exposed at once.

[0013] In an embodiment of the wind-proofing pad, the first section comprises:

> a first top section and a first side section, interconnected to the first top section along a bending line;
> and the second section comprises:
> a second top section and a second side section, interconnected to the second top section along said bending line.

[0014] Preferably, the first top section is configured to be applied to an exterior side of a roof structure along the first inner side or of a first member of a mounting frame, and the first side section is configured to at least partially cover an inner side of a roof structure or of the first member of the mounting frame. Similarly, the second top section is preferably configured to be applied to an exterior side of a roof structure along the second inner side or of a second member of the mounting frame, and the second side section is preferably configured to at least partially cover an inner side of a roof structure or of the second member of the mounting frame.

[0015] By the respective side sections and top sections being interconnected along a bending line, the pad may be folded into a position similar to its intended shape in the mounted condition, where the top sections in the folded condition extend in a plane substantially orthogonal to the plane of the side sections. Consequently, as the pad may be folded into the intended shape, i.e. the shape of a mounting frame corner, it may be self-positioning. Similar to the connecting line, the bending line is preferably pre-shaped. The preshaping may be made in a similar manner as explained with respect to the connecting line.

[0016] In a further embodiment of the wind-proofing pad, an end of each of the first and second top sections, said end extending along the connecting line, is angled, preferably by approximately 45 degrees, relative to a length direction extending in parallel to the inner side of the roof opening and to the plane of the roof in the mounted state. Typically, this will mean that the ends of the top sections are angled by approximately 45 degrees, relative to a corresponding end of the first and second side sections extending along the connecting line.

[0017] By an end of each of the first and second top sections being thus angled, the ends of the top sections adjoin along the connecting line in the folded condition so that they together form an L-shaped top section adapted for extending in parallel with the plane of the roof structure, while the side sections extend into the roof opening. This, in turn, allows for wind-proofing along the entire connecting line as well as further aids the wind-proofing pad in maintaining a shape substantially similar to its intended shape in a mounted condition. This, again, allows for an easy installation of the wind-proofing pad.

[0018] In yet another embodiment, the wind-proofing pad further comprises at least one brace providing additional stiffness to at least a part of at least one of the first and second sections.

[0019] The brace providing additional stiffness aids the wind-proofing pad in maintaining the intended shape in a mounted condition when the wind-proofing pad is in its folded condition, thereby facilitating easy installation. Preferably, a brace is provided on each top section of the pad. By one or both the top sections comprising a brace, the braces help the top pieces to lie correctly on the exterior side of the mounting frame or roof structure thereby reducing the risk of unintentional bending, folding, or creasing, thereby facilitating easy installation of the pad.

[0020] The brace may extend along the entire length and/or width of the top section, or it may extend along a part of the length and/or width thereof. The brace may be made from a hard plastic material, such as polymethylmethacrylate (PMMA), polyvinylchloride (PVC), poly-

ethylene (PE), such as high-density polyethylene (HDPE), or the like, from cardboard, from the application of a stiffening substance such as a hardened glue to the material of the pad, from a wire embedded in the material, etc.

[0021] In another embodiment of the wind-proofing pad, the first section further comprises:

a first bottom section configured to at least partially cover an interior side of a roof structure along the first inner side or of the first member of the mounting frame;

and the second section further comprises:

a second bottom section configured to at least partially cover an interior side of a roof structure along the second inner side or of the second member of the mounting frame.

[0022] The respective bottom sections may then be bent into place, i.e. around the respective member of the mounting frame or underneath an interior side of the roof structure. This, in turn, allows for an easy mounting, especially in the case where the pad is adhered to the mounting frame. Alternatively, the respective bottom sections may be interconnected to the respective side sections by means of a second bending line allowing the pad to be folded into it's intended shape even without being attached to the roof structure or mounting frame. The second bending line may be pre-shaped in the same manner as the first bending line and/or the connecting line.

[0023] The first and second bottom sections may be connected along the connecting line to form a preferably wind-tight connection along the connecting line when mounted. Hence, an end of each of the bottom sections may be angled relative to the end of the side sections, where the ends of these sections face the connecting line. The angle may be 45 degrees or may be less to allow for varying dimensions of the mounting frame or roof structure.

[0024] Alternatively, to further allow for larger widths of the mounting frame members or roof structure, the first and second bottom sections may in a mounted condition not be connected along the connecting line. Consequently, the ends of the bottom sections need not be angled relative to the end of the side sections.

[0025] The wind-proofing pad according to the invention may be used in combination with any of the other aspects of the invention or independently of any of these. Thus, the wind-proofing pad may be used without a sealing collar and/or an installation frame.

[0026] The second object is achieved with a method comprising the steps of:

A) creating a rectangular roof opening in the roof structure, thereby creating an inner side of the roof structure facing the roof opening, and where the part of the underroof previously covering the roof opening is divided into four underroof sections each extending along one side of the roof opening,

B) providing a sealing collar comprising an installation frame comprising top, bottom and side members, which meet at four corners and together define an inner edge delimiting a collar opening, at least when the installation frame is in the mounted condition, said collar opening being adapted for surrounding the window frame,

C) arranging the sealing collar on the exterior side of the roof structure so that the collar opening is substantially aligned with the roof opening when seen in a direction perpendicular to the plane of the roof structure,

D) attaching the installation frame to the battens,

E) folding the underroof sections up along the inner side of the roof structure and attaching them to an exterior side of the installation frame,

F) applying at least one wind-proofing pad at each corner of the sealing collar, so that two underroof sections are connected to the installation frame and/or to each other, and so that an uninterrupted wind-proofing extending along the entire inner edge is provided, and

G) inserting the window frame in the collar and roof openings.

[0027] By providing a sealing collar with an installation frame on the exterior side of the battens, dividing the part of the underroof previously covering the roof opening in four sections, and attaching them to the exterior side of the top, bottom and side members of the installation frame, respectively, a wind-proofing is established with a minimal use of new materials, i.e. there is no need for applying any additional wind-proofing tape along the entire circumference of the collar opening.

[0028] Moreover, the fact that the wind-proofing becomes an integrated part of the existing underroof means that the number of joints and hence the number of potential untightnesses is low.

[0029] The installation frame is preferably plate-shaped such that it, in a mounted condition, extends in a plane parallel to the plane of the roof surface. The installation frame is only required to have sufficient stiffness to span the gaps between the battens without any substantial sagging and to be suitable for supporting the four underroof sections. Accordingly, the amount of material needed is low and it can be made of relatively cheap materials such as for example a polymer sheet, such as e.g. a polyethylene (PE), polypropylene (PP), polyurethane (PU), polymethylmethacrylate (PMMA), or polycarbonate (PC) sheet, corrugate plastic board, or a material based on natural fibres, such as card-board, plywood, chip boards or fibre boards, or composites comprising one or more of these materials. The sheets could for example be massive, hollow, with channels, corrugated, having a honey-comb structure, or combinations of these. The material should allow for the installation

frame, in a mounted condition, to be dimensionally stable in a plane parallel to the plane of the roof surface, i.e. such that the collar opening maintains its dimensions.

[0030] Upon installation of a roof window on the installation frame, mounting brackets of the roof window intended for resting on battens will be on the installation frame. This may cause the window to be located higher than intended, relative to the roof surface. Thus, the material of the installation frame preferably allows for some deformation in the height direction, i.e. seen from an interior to an exterior side, of the installation frame upon installation of a roof window. This may for instance be achieved by the installation frame comprising channels in a longitudinal direction of one or more of the side members, allowing for local compression of the installation frame under the mounting brackets, in a mounted condition, due to the weight of a roof window mounted upon it. The installation frame may, alternatively or in combination therewith, comprise weakened portions, i.e. portions comprising less material, for receiving mounting brackets of a window. In a still further embodiment, sections of the installation frame, where the mounting brackets are intended to rest, are pre-compressed or made from a thinner material than the rest of the installation frame. The installation frame may include several such receiving sections adapted for different installation situations where the mounting brackets are attached to the window frame at different positions.

[0031] The installation frame may be a one-piece, monolithic structure, e.g. made from one piece of material, or may be made from a plurality of pieces joined together to form the installation frame. The installation frame is preferably made from a material having a thickness of less than 10 mm, measured from an interior side to an exterior side when in a mounted condition, and preferably about 1-4 mm. The thickness of the installation frame material may depend on the area of the roof opening and/or collar opening. The thickness of the installation frame may e.g. be defined as 1 mm per square meter area, measured in the plane of the roof surface, of the roof opening. The thickness of the material of the installation frame may furthermore depend on the type of material used.

[0032] As the underroof sections will often not be able to cover the entire inner surface of the roof opening, the pads are used for interconnecting them, either directly or by connecting each of them to the installation frame and/or to members of the roof structure. In a presently preferred embodiment, one pad interconnects two underroof sections and connects both of them to the installation frame.

[0033] The pads can be of many different designs, but it is presently preferred to use adhesive pads made from a material resembling that used for the underroof, and where the side provided with the adhesive may be provided with a cover layer in a state of delivery. The cover layer and/or the pad itself may be provided with instructions for use.

[0034] Such pads may also be used without the sealing collar, connecting the underroof sections to each other and to the roof structure e.g. being applied to battens or the like. The pads may alternatively or in combination therewith be used to tighten other joints, such as corner joints, between various elements e.g. battens, insulating material, flashings, coverings or the like.

[0035] Attachment of the pads is facilitated if one or more flaps at the inner edge of the installation frame are folded so that they project from the plane of the collar, downwards into the roof opening, and so that they line the inner surface at least at the corners. If the installation frame is made from a material, which is in itself wind-proof, and if any gap between the underroof sections are entirely spanned by these flaps, the pads need not be wind-proof. It is, however, presently preferred to use wind-proof pads.

[0036] Flaps projecting from the installation frame and downwards into the roof opening in the mounted state may also be used for positioning the sealing collar in relation to the roof opening and/or checking that the roof opening has the intended dimensions. If flaps are provided at two opposite sides of the collar opening and projecting from the inner edge, they should both come into engagement with the inner surface of the roof opening when the roof opening has the correct dimensions and the sealing collar is positioned correctly. This applies independently of the use of pads.

[0037] The installation frame may also be used for carrying insulating members adapted for forming an insulating frame in the mounted condition. In one embodiment, the method thus further includes the step of H) moving insulating members, which form part of the sealing collar and which are attached to the installation frame, from a first position, where they are arranged at an outer edge of the installation frame opposite the inner edge, to a second position, where they project into the roof opening and line at least a part of the inner side. Step H) is preferably performed before step G), since this is considered to involve the lowest risk of error, but it is also possible to insert the insulating members in a space between the window frame and the inner surface after mounting of the window frame.

[0038] Such integrated insulating members may be connected to the installation frame by a connector material having a width corresponding substantially to the width of the installation frame. One side of said connector material is preferably attached at the outer edge of the installation frame and the other side to the insulating member at the level, which is intended to be located at the inner edge of the of installation frame in the mounted state. In this way, the connector material ensures that the insulating member cannot be inserted too far into the roof opening, and the connection between the connector material and the insulating member may serve as a hinge, allowing the insulating member to be swung into the correct mounted position by turning about the inner edge of the installation frame.

[0039] Insulating members need not be present at all four sides of the sealing collar and the insulating members will often be of different designs. In one embodiment, at least one insulating member is provided with an interruption or weakening, which allows a part of the insulating member to be moved between an installation position and a mounted position in order to give room for other parts of the sealing collar, for tools used during installation, or for parts of the window frame. It is presently envisaged to provide such interruptions in order to give room for mounting brackets of the window frame so that they may come into direct contact with the installation frame and so that insulating material may be moved into position over the mounting brackets once they have been attached to the roof structure.

[0040] If the connector material is a strip of a sheet material identical to or resembling the material use for the underroof, it will further provide an additional wind-proofing by overlapping the underroof sections attached to the exterior side of the installation frame. In such cases the method may advantageously include the step of I) arranging secondary windproof pads at the corners of the installation frame, step I) being performed after step H) and preferably before step G). These secondary pads may be used for interconnecting the connector material associated with each insulating member and/or for connecting the connector material to the exterior side of the installation frame.

[0041] It is noted that if the sealing collar does not include insulating members, the roof opening may be provided with a separate insulating frame as known for example from EP2677092B1. If such an insulating frame is mounted before the underroof sections are attached to the exterior side of the installation frame, the inner side of the insulating frame will constitute the inner side of the roof opening.

[0042] It is also noted that insulating material may be arranged in the spaces formed between the battens, the underroof and the installation frame. Such insulating material may be arranged between the battens before mounting the sealing collar, be provided on the interior side of the installation frame, or inserted through openings between battens in the inner side of the roof opening.

[0043] When the window frame has been mounted in the roof opening it is usually attached to the roof structure in order to keep it in the intended position. This may be done by J) attaching the window frame to the roof structure by passing fasteners through the installation frame, said fasteners preferably being screws passing through openings in mounting brackets attached to the window frame. In this way the sealing collar too is secured to the roof structure. At the same time the window frame and the sealing collar are fixated in relation to each other, which may for example be relevant if the installation frame is made with a collar opening, which is larger than the outer dimensions of the window frame and/or if it is made of a low friction material.

[0044] In order to provide additional wind-proofing and water-proofing the method may further include the step of K) arranging an underroof collar made from a waterproof membrane on top of the sealing collar, attaching an inner edge of the underroof collar to the window frame, and attaching an outer edge of the underroof collar to the exterior side of the roof structure, said underroof collar possibly being attached to the installation frame in a state of delivery. Such underroof collars are well known to the skilled person, but have previously been delivered and mounted separately.

[0045] In one embodiment the underroof collar is attached in a rolled-up state at the outer edge of the top member of the installation frame so that it may rest on the roof structure above the roof opening until it is to be mounted without being in the way of other installation steps.

[0046] Above, the invention has been described with reference to a method where the roof opening is made before the sealing collar is applied, but step A) can also be performed after steps B) and C). In such cases, and where at least the inner edge of the installation frame is made from a substantially dimensionally stable material, the inner edge can be used as a guide for a cutting tool or a drawing aid for transferring a guiding pattern to the roof structure showing the intended position of the roof opening.

[0047] In a further aspect of the invention the object is achieved with a kit including a plurality of wind-proofing pads adapted for being attached to the sealing collar and to one or more underroof sections, and a sealing collar for use when installing a window frame in an inclined roof structure of a building, where said roof structure comprises rafters, underroof and battens adapted for supporting a roofing material, where an interior side of said roof structure faces the interior of the building and an exterior side faces the exterior of the building, where a rectangular roof opening has been created in the roof structure, and where the part of the underroof previously covering the roof opening has been divided into four underroof sections each extending along one side of the roof opening, said sealing collar being adapted for surrounding the window frame; said sealing collar comprising an installation frame comprising top, bottom and side members, which meet at four corners and together define an inner edge delimiting a collar opening, at least when the installation frame is in the mounted condition; said sealing collar having an exterior side adapted for facing the exterior of the building in the mounted state and an interior side adapted for being arranged against the exterior side of the roof structure so that the collar opening is substantially aligned with the roof opening when seen in a direction perpendicular to the plane of the roof structure; said installation frame being adapted for being attached to the exterior side of the battens; said installation frame being adapted for the attachment of the underroof sections to the exterior side of the installation frame; and said sealing collar being adapted for the attachment of at least one pad at each corner so that an uninterrupted wind-proofing

extending along the entire inner edge is provided.

[0048] Embodiments and advantages described above with reference to one aspect of the invention also applies to the other aspects of the invention unless otherwise stated.

[0049] In the following the invention will be described in more detail with reference to the drawing where

Fig. 1 shows a sealing collar with four insulating members and an underroof collar during installation at an opening in an inclined roof structure,
Fig. 2 shows the lower left-hand side of the sealing collar, corresponding to detail A in Fig. 1 seen from a different angle,
Fig. 3 corresponds to Fig. 2 but with underroof sections attached to the exterior side of the installation frame and seen from a slightly different angle,
Fig. 4 shows a pad for wind-proofing at a corner,
Fig. 5 shows the application of the pad in Fig. 4 to the corner in Figs 2-3,
Fig. 6 shows the corner in Figs 2-3 after the application of the pad in Fig. 4,
Fig. 7 shows the corner in Fig. 6 from a different angle after the insulating members have been turned into the roof opening,
Fig. 8 shows the application of a second pad to the corner in Fig. 7,
Fig. 9 shows a window frame mounted in the sealing collar and roof opening in Fig. 1,
Fig. 10 shows the upper left-hand side of the sealing collar, corresponding to detail B in Fig. 1 seen from a different angle and after the insulating members have been turned into the roof opening,
Fig. 11 shows the lower right-hand side of the sealing collar, corresponding to detail C in Fig. 1 seen from a different angle and after the insulating members have been turned into the roof opening,
Fig. 12 shows a different embodiment of a pad for wind-proofing at a corner,
Fig. 13 shows the wind-proofing pad of Fig. 12 in a folded condition,
Fig. 14 shows the wind-proofing pad of Fig. 13 from another angle, and
Fig. 15 shows a third embodiment of a pad for wind-proofing at a corner in a state of delivery.

[0050] A sealing collar 1 according to the invention is shown during mounting in an inclined roof structure 5 in Fig. 1.

[0051] The sealing collar 1 here includes an installation frame 2, four insulating members 31,32,33,34 and an underroof collar 4.

[0052] The roof structure 5 comprises rafters 57 supporting an underroof 51, counter battens 52, battens 53 and auxiliary battens 54. The battens are adapted for supporting a roofing material (not shown), which forms an exterior surface of the finished roof structure facing the exterior of the building.

[0053] In this case the rectangular roof opening 50 in the roof structure 5 was made prior to arranging the sealing collar 1 on the exterior surface of the battens 53, but it is also possible to make a provisional hole, arrange the sealing collar 1, and then use the installation frame as a cutting guide or a drawing aid determining the dimensions of the roof opening. If doing so, the installation frame can advantageously be attached to the battens and/or auxiliary battens prior to finishing the roof opening and/or the installation frame may include one or more stabilizing members hindering deformation of the collar opening, a stabilizing member for example being arranged within the collar opening.

[0054] The formation of the roof opening 50 means that an inner side of the roof structure facing the roof opening is formed, said inner side 55 being defined at least by the end surfaces of those battens 53, which were interrupted in order to make the roof opening.

[0055] When the roof opening 50 was made, the part of the underroof 51 previously covering the roof opening was divided into four underroof sections 56 each extending along one side of the roof opening. Only two of these underroof sections extending along the top side and right-hand side of the roof opening, respectively, are visible in Fig. 1, but it will be understood that like sections extend along the bottom side and left-hand side. In this case the underroof was cut along lines extending from each corner of the roof opening at an angle of approximately 45 degrees in relation to the two sides meeting at the respective corner, and a centre section of the part of the underroof previously covering the roof opening was removed. The remaining underroof sections 56 thus have a trapezoidal shape as may also be seen in Fig. 2. Other shapes are, however, also possible.

[0056] The installation frame 2 comprises a top member 21, a bottom member 22 and two side members 23,24, which meet at four corners and together define an inner edge 25 delimiting a collar opening. In this case the installation frame is monolithic, made from a single piece of material, but it may also be composed of several pieces of material, for example in order to allow the sealing collar to be delivered in a folded state. The installation frame might then be assembled when being arranged on the exterior surface of the roof structure.

[0057] In this embodiment the side members 23,24 of the installation frame are provided with weakenings (not visible) extending in their length directions, which has allowed a section 26 of each side member to be folded down into the roof opening 50 so that they line a part of the inner side 55 of the roof opening as may also be seen in Fig. 2. The joints between these sections and the rest of the installation frame thus defines the inner edge 25 of the sealing collar and the distance between the joints define the width of the collar opening. In this embodiment the folded down sections 26 extend over the entire length of the side members 23,24, but it is also possible to employ smaller local flaps, which may for example be positioned one at each corner in order to facilitate their use

for aligning the sealing collar with the roof opening.

[0058] Once positioned in relation to the roof opening 50, the sealing collar 1 is fixated in relation to the roof structure 5 by attaching the installation frame 2 to the roof structure. In this case the installation frame has been attached by means of staples 6 to the exterior sides of auxiliary battens 54 at the top and bottom and to the exterior sides of battens 53 along the sides. It is, however, also possible to attach the flap sections 26 to battens at the inner side of the roof opening.

[0059] Turning now to Fig. 3 it is seen how the underroof sections 56 have been folder up over the inner side 55 and onto the exterior side of the installation frame 2, where they have been attached by means of staples 6.

[0060] Fig. 4 shows a wind-proof adhesive pad 7, which is intended for covering the parts at the corner, which are not covered by the underroof sections 56 in Fig. 3.

[0061] Fig. 5 shows how the pad 7 is applied, and Fig. 6 shows the pad in the mounted state. As may be seen, the indents 71 at the centre of the pad, which may be supplemented with an embossed line or weakening (not shown) extending between them to facilitate bending, allows one pad 7 to extend over both the inner side 55 and the exterior side both at the bottom member 22 and at the side member 23. This provides an uninterrupted connection between the two underroof sections 56 and the installation frame 2, so that when pads 7 have been applied at all four corners an uninterrupted wind-proofing extending along the entire inner edge 25 is provided.

[0062] In Fig. 7 the insulating members 32,33 have been moved from their first position shown in the previous figures to a second position, where they project into the roof opening 50 and line at least a part of the inner side 55. As may be seen the connector material 35 connecting the insulating members 32,33 to the installation frame 2 has a width W corresponding substantially to the width of the installation frame and is at one side connected to the outer edge 27 of the installation frame, so that the connector material 35 lies flat over the exterior surface of installation frame. In addition to providing further wind-proofing, this means that the insulating members 31,32,33,34 cannot be inserted too deep into the roof opening 50, neither during mounting of the insulating member nor during subsequent mounting of the window frame.

[0063] Fig. 8 shows how the pieces of connector material 35 associated with the side and bottom insulating members 32,33, respectively, are interconnected and connected to the installation frame 2 by means of a secondary wind-proof adhesive pad 8. In this way wind-proofing is established not only at the interior and inner side but also at the exterior side of the installation frame 2. The secondary pad 8 should preferably extend over the entire width W of the installation frame so that wind cannot enter underneath the connector material at any place. In the embodiment shown the installation frame members are all of the same width W, but this need not be the case.

[0064] The pads 7, 8 are here described as being self-adhesive, but it will be understood that other types of pads may also be used, that they may have different sizes and shapes than shown, and that more pads may overlap each other.

[0065] Finally, the window frame 9 is mounted by inserted in the roof openings 50 and hence also in the collar opening as shown in Fig. 9. As may be seen, mounting brackets 91 for attaching the window frame to the roof structure 5 rest on the exterior side of the installation frame 2, either directly or with the connector material 35 of the insulating members sandwiched between them. When screws (not shown) are subsequently inserted in the holes in the mounting brackets, they will penetrate through the installation frame, thereby fixating the sealing collar 1 to the roof structure 5.

[0066] In order to make room for the mounting brackets 91 while still providing an insulation of the parts of the window frame 9 extending above the level of the exterior side of the battens 53, parts 36,37 of the insulating top and bottom members 31,32 have been arranged in an installation position and are adapted for being moved to a mounted position once the window frame has been secured.

[0067] Fig. 10 shows how an upper part 36 of the top insulating member 31 has been cut loose from the rest of the insulating member at level with the exterior side of the installation frame, and how this loosened part 36 is kept in a raised position. As may be seen, the upper part 36 has been further divided into a main part 361 and a holder part 362. The cut separating these two parts is oblique so that the holder part 362 is longer at the side facing away from the collar opening 10 than at the side facing the opening. By forcing the main part 361 away from the collar opening, past the projection thus formed by the holder part 362, the main part comes to rest on the outer side surface of the holder part. Once the mounting bracket (not shown in Fig. 10) has been secured to the auxiliary batten 54, the main part 361 is forced back over the holder part 361 so that it comes into engagement with the outer side of the window frame (not shown in Fig. 10). An adhesive may be used for keeping the main part 361 in engagement with the window frame or the mounting bracket, but as the projection formed by the holder part 362 will now hinder an outwards movement of the main part it is often not necessary.

[0068] The embodiment in Fig. 10 requires that the insulating member is made of an elastic and relatively soft material. Another embodiment, which is also suitable for non-elastic materials, is shown in Figs 9 and 11. Here an upper part 37 of the bottom insulating member 32 has been entirely separated from the rest of the insulating member and attached to a neighbouring upper part 38 be means of a piece of tape 39. The tape 39 functions as a hinge allowing the separated upper part 37 to be swung as shown by the arrow between an installation position (seen in Fig. 9), where it extends along the outer

side of the neighbouring upper part 38, and a mounted position (not shown), where is extends in continuation of the neighbouring upper part 38 along the outer side of the window frame (not shown in Fig. 11) and over the exterior side of the mounting bracket. Once in the mounted position the separated upper part 37 is preferably attached to the outer side of the window frame or to the mounting bracket. A temporary attachment of the separated upper part 37 in the installation position may also be advantageous.

[0069] This embodiment can be used at all sides of the sealing collar 1 and with virtually all types of insulating materials and all types of window frames.

[0070] Other embodiments of the insulating members are of course also possible, and it will be understood that the invention is not limited to methods, where insulating members project above the exterior side of the battens in the mounted state.

[0071] Another embodiment of a wind-proofing pad 7' is shown in Fig. 12. It comprises a first section 72 having a first top section 720, a first side section 722, separated from the first top section 720 by a bending line B, and a first bottom section 724. The first section 72 is connected to a second section 74 of similar design along a connecting line A. The connecting line A allows for the corner pad 7' to be folded to the shape shown in Fig. 13, allowing it to follow the angle of an inner corner in a similar manner as the pad 7 shown in Fig. 5. Thereby, the first section 72 may, in use, extend in parallel to one inner side at the corner and the second section 74 may, in use, extend in parallel to the other inner side.

[0072] In another embodiment, a similar corner pad (not shown) may be folded to follow an outer corner.

[0073] As seen in Fig. 13, showing the corner pad in a folded condition, the second section 74 comprises a second top section 740, a second side section 742, separated from the second top section 744 by the bending line B, and a second bottom section 744.

[0074] The bending line B extends, in the folded condition, along the first 72 and second section 74, as shown in Fig. 13, and is pre-shaped in the material. In another embodiment (not shown), the bending line B is not pre-shaped but may be formed when mounting the pad. In yet another embodiment, the bottom sections 724, 744 may be interconnected to the side sections 722, 742 by means of a bending line, similar to the bending line B.

[0075] As seen in Figs. 12 and 13, the first 72 and second section 74 are each made from one piece of wind-proof material, i.e. Tescon®Vana. Various other wind-proof, bendable materials may be used, such as PE, polyamide (PA), polypropylene (PP), and/or aluminium foil may be used in combination with or instead of this material. Similarly, the respective top sections 720, 740, side sections 722, 742, and bottom sections 724, 744, may be made from individual pieces of material interconnected by an interconnecting means, such as adhesive, welds, seams, or the like. The connecting and bending line(s) may be formed and/or pre-shaped in/by such interconnecting means.

[0076] In this embodiment, the first 72 and second sections 74 are interconnected by means of a strip 76 extending along the connecting line A. The strip 76 is formed from a material similar to the one of the first 72 and second sections 74 and is pre-shaped to form the connecting line A in the strip, thereby allowing for the pad 7' to be easily brought into the condition in Figs 13 and 14. The strip 76 is adhered to the first 72 and second sections 74 but may alternatively be welded, seamed, or the like onto the first 72 and/or second sections 74.

[0077] As shown in Figs. 12-14, the first top section 720 comprises a first brace 726 and the second top section 740 comprises a second brace 746. The braces 726, 746 are adhered to the pad 7' during manufacturing but may alternatively be welded or seamed thereto, integrated in the material of the pad, or adhered onto the pad 7' in-situ. The braces 726, 746 each extend along the entire length of their respective top sections 720, 740 and adjoin, when the pad 7' is in its folded condition at the connecting line. In an alternative embodiment, the braces 726, 746 extend over a part of the length of the respective top section 720, 740 and/or across the entire width of the respective top section 720, 740. Similar braces may instead of or in combination with the braces 726, 746 be applied to the side 722, 742, and/or bottom sections 724, 744. The braces 726, 746 are made from a relatively stiff material, i.e. PMMA. The braces 726, 746 may alternatively be made from another rigid material, preferably a hard plastic-type material, such as PVC, HDPE, polycarbonate, or any combination thereof.

[0078] Each of the first and second sections 72, 74 comprise an adhesive on a back side thereof covered by a first 728 and a second removable adhesive covering 748. The back side of the first section 72 with the first removable adhesive covering 728 is the surface shown in Fig. 12. The adhesive assists in attaching the pad 7' firmly to the two inner sides and/or members of the mounting frame after removal of the coverings 728, 748. Adhesive is here applied to the entire surface, except for the area covered by the braces 726, 746, of the back side of each of the first and second sections 72, 74. Alternatively, it may be applied to a part of the surfaces, such as in local dots or only the edges of the sections 72, 74, or it may be applied also to the braces 726, 746. The first 728 and second coverings 748 are here separated in two pieces that may be removed individually, as shown in Fig. 12 with respect to the first covering 728. Alternatively, the coverings 728, 748 may be made as one-piece or may be made from three or more pieces. As seen in Figs. 12 and 14, the glue coverings extend across the braces 726, 746, although not adhered to these. The coverings 728, 748 may in another embodiment only cover the area of the back side of the pad 7', which is provided with adhesive. The coverings 728, 748 are made from a paper material with a release coating but may be made from any disposable sheet material suitable for contact with the adhesive.

[0079] In another embodiment of the pad 7", shown in Fig. 15, the first top section of the first section (not shown in Fig. 15) and the second top section 740' of the second section 74' do not comprise braces. Instead, adhesive is provided on the entire surface of the first and second top sections 740' and the first (not shown in Fig. 15) and second adhesive coverings 748 are thus adhered to the entire surface of the first and second sections 74'. Apart from this the embodiment in Fig. 15 corresponds to that in Figs 12-14.

[0080] As shown in Fig. 15, the longitudinal ends of the first (not shown) and second top sections 740' facing the connecting line A are angled with an angle θ with respect to the end of the side section 742. The angle θ is here approximately 45 degrees to allow for the adjoined first and second top sections 740' to bend over approximately 90 degrees in relation to the side sections when the pad 7" is folded. It this way the adjoined top sections together form an L-shaped top section adapted for extending in parallel with the plane of the roof structure, while the side sections extend into the roof opening in a direction substantially perpendicular to the plane of the roof.

[0081] The same applies to the embodiment of the pad 7' shown in Figs. 12-14. As shown in Figs. 12-14 with respect to the pad 7', this allows for the ends of the side sections 720, 740 to adjoin at the connecting line A. Thereby the pad 7' automatically gets the shape shown in Figs. 13 and 14, said shape being similar to the intended shape in the mounted condition. This similarly applies to the pad 7" shown in Fig. 15 when in a folded condition (not shown).

[0082] As shown in Fig. 15, a longitudinal end of the bottom section 744 facing the connecting line A is angled with respect to the end of the side section 742, however with an angle smaller than 45 degrees. This means that the bottom sections will bend somewhat in relation to the side sections in the folded state as also seen in Figs 13-14, but not over 90 degrees as the top sections. Alternatively, the bottom section 744 may be angled with an angle similar to the angle θ of the end of the top section 740'.

[0083] In another embodiment (not shown) the longitudinal ends of the bottom sections 724, 744 are not angled relative to the ends of the side sections 722, 742. Instead the bottom sections 724, 744 are not interconnected at the connecting line A and the bottom sections 724, 744 thus do not adjoin in the folded state. In a still further embodiment (not shown), the pad 7', 7" is without bottom sections 724, 744.

[0084] It is to be understood that other embodiments of a pad may be utilised and structural as well as functional modifications may be made without departing from the scope of the present invention. It should furthermore be emphasised that the term "comprises"/"comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but not preclude the presence or addition of one or more features, integers, steps, components, or groups thereof.

Claims

1. A wind-proofing pad for use in wind-proofing an inclined roof structure of a building with a window frame installed therein, said pad comprising a first section configured to extend along a first inner side of the roof structure facing the roof opening, and a second section configured to extend along a second inner side of the roof structure facing the roof opening, wherein the first and second sections are interconnected along a connecting line.

2. A wind-proofing pad according to claim 1, wherein the first section comprises a first top section and a first side section, interconnected to the first top section along a bending line, and the second section comprises a second top section and a second side section, interconnected to the second top section along a bending line, wherein an end of each of the first and second top sections, said end extending along the connecting line, is angled, preferably approximately 45 degrees, relative to an end of the first and second side sections, said end extending along the connecting line.

3. A wind-proofing pad according to claim 1 or 2 further comprising at least one brace providing additional stiffness to at least a part of at least one of the first and second sections.

4. A wind-proofing pad according to one or more of claims 1-3, wherein an adhesive is provided on a back side of the pad, which is configured for facing the inner side of the roof structure when the pad is in use, said adhesive possibly being provided with a removable covering, such as paper, cardboard, foil, film, or the like.

5. A kit including a plurality of wind-proofing pads according to one or more of claims 1-4 and a sealing collar for use when installing a window frame in an inclined roof structure of a building, where said roof structure comprises rafters, underroof and battens adapted for supporting a roofing material, where an interior side of said roof structure faces the interior of the building and an exterior side faces the exterior of the building, where a rectangular roof opening having an inner side has been created in the roof structure, and where the part of the underroof previously covering the roof opening has been divided into four underroof sections each extending along one side of the roof opening, said sealing collar being adapted for surrounding the window frame comprising an installation frame comprising top, bottom and side members, which meet at four corners

and together define an inner edge delimiting a collar opening, at least when the installation frame is in the mounted condition,
having an exterior side adapted for facing the exterior of the building in the mounted state and an interior side adapted for being arranged against the exterior side of the roof structure so that the collar opening is substantially aligned with the roof opening when seen in a direction perpendicular to the plane of the roof structure,
said installation frame being adapted for being attached to the exterior side of the battens,
said installation frame being adapted for the attachment of the underroof sections to the exterior side of the installation frame, and
said sealing collar being adapted for the attachment of at least one wind-proof pad at each corner so that an uninterrupted wind-proofing extending along the entire inner edge is provided.

6. A kit according to claim 5, where the installation frame is plate-shaped, such that it, in a mounted condition, extends in a plane parallel to the plane of the roof surface, and is dimensionally stable in said plane.

7. A kit according to claim 5 or 6 where one or more flaps at the inner edge of the installation frame are adapted for being folded so that they project from the plane of the collar.

8. A method for installing a window frame in an inclined roof structure of a building, where said roof structure comprises rafters, underroof and battens adapted for supporting a roofing material, where an interior side of said roof structure faces the interior of the building and an exterior side faces the exterior of the building, and where said method comprising the steps of:

A) creating a rectangular roof opening in the roof structure, thereby creating an inner side of the roof structure facing the roof opening, and where the part of the underroof previously covering the roof opening is divided into four underroof sections each extending along one side of the roof opening,
B) providing a sealing collar comprising an installation frame comprising top, bottom and side members, which meet at four corners and together define an inner edge delimiting a collar opening, at least when the installation frame is in the mounted condition, said collar opening being adapted for surrounding the window frame,
C) arranging the sealing collar on the exterior side of the roof structure so that the collar opening is substantially aligned with the roof opening when seen in a direction perpendicular to the plane of the roof structure,
D) attaching the installation frame to the battens,
E) folding the underroof sections up along the inner side of the roof structure and attaching them to an exterior side of the installation frame,
F) applying at least one wind-proofing pad at each corner of the sealing collar, so that two underroof sections are connected to the installation frame and/or to each other, and so that an uninterrupted wind-proofing extending along the entire inner edge is provided, and
G) inserting the window frame in the collar and roof openings.

9. A method according to claim 8, where the installation frame is plate-shaped, such that it, after step D), extends in a plane parallel to the plane of the roof surface, and is dimensionally stable in said plane.

10. A method according to claim 8 or 9 where, during step C), one or more flaps on the installation frame are folded into the roof opening, so that they line the inner surface at least at the corners.

11. A method according to one or more of claims 8-10 further including the step of:
H) moving insulating members, which form part of the sealing collar and which are attached to the installation frame, from a first position, where they are arranged at an outer edge of the installation frame opposite the inner edge, to a second position, where they project into the roof opening and line at least a part of the inner side, step H) preferably being performed before step G).

12. A method according to claim 11, further including the step of:
I) arranging secondary windproof pads at the corners of the installation frame, step I) being performed after step H) and preferably before step G).

13. A method according to one or more of claims 8-12, further including the step of:
J) attaching the window frame to the roof structure by passing fasteners through the installation frame, said fasteners preferably being screws passing through openings in mounting brackets attached to the window frame.

14. A method according to one or more of claims 8-13, further including the step of:
K) arranging an underroof collar made from a waterproof membrane on top of the sealing collar, attaching an inner edge of the underroof collar to the window frame, and attaching an outer edge of the underroof collar to the exterior side of the roof structure, said underroof collar possibly being attached to the installation frame in a state of delivery.

15. A method according to one or more of claims 8-14, where step A) is performed after steps B) and C), and where at least the inner edge of the installation frame is made from a substantially dimensionally stable material and is used as a guide for a cutting tool or a drawing aid for transferring a guiding pattern to the roof structure showing the intended position of the roof opening.

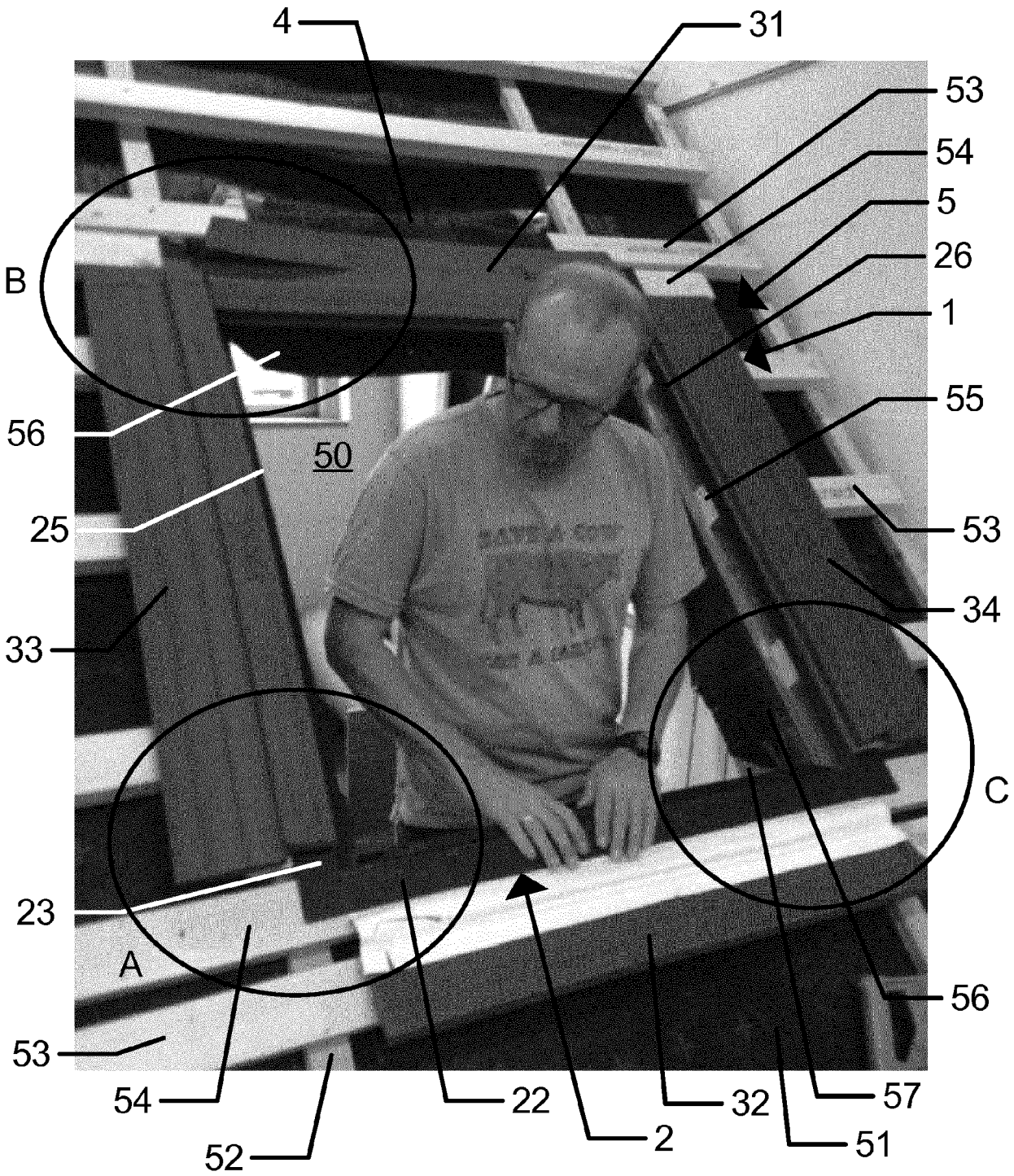

Fig. 1

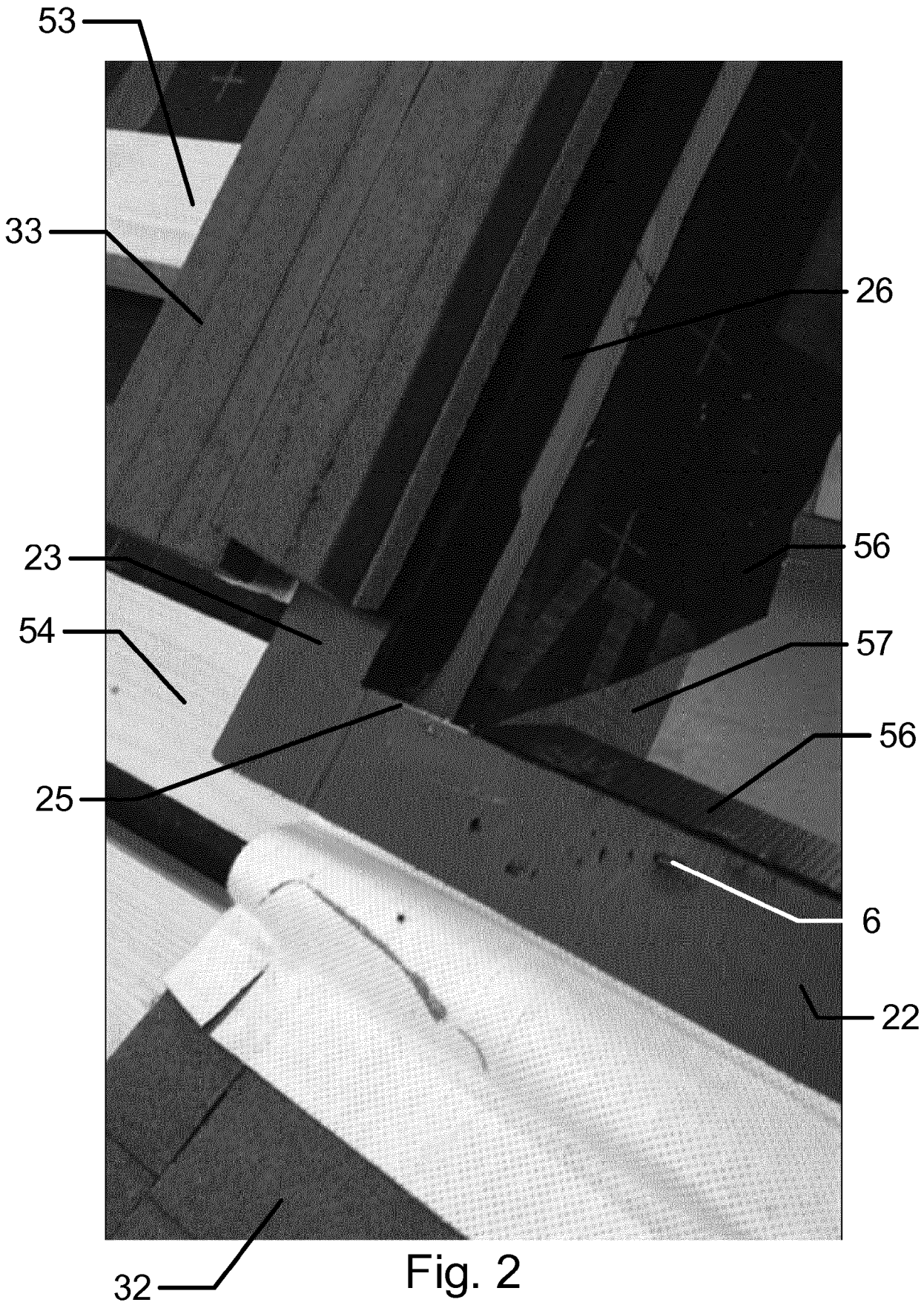

Fig. 2

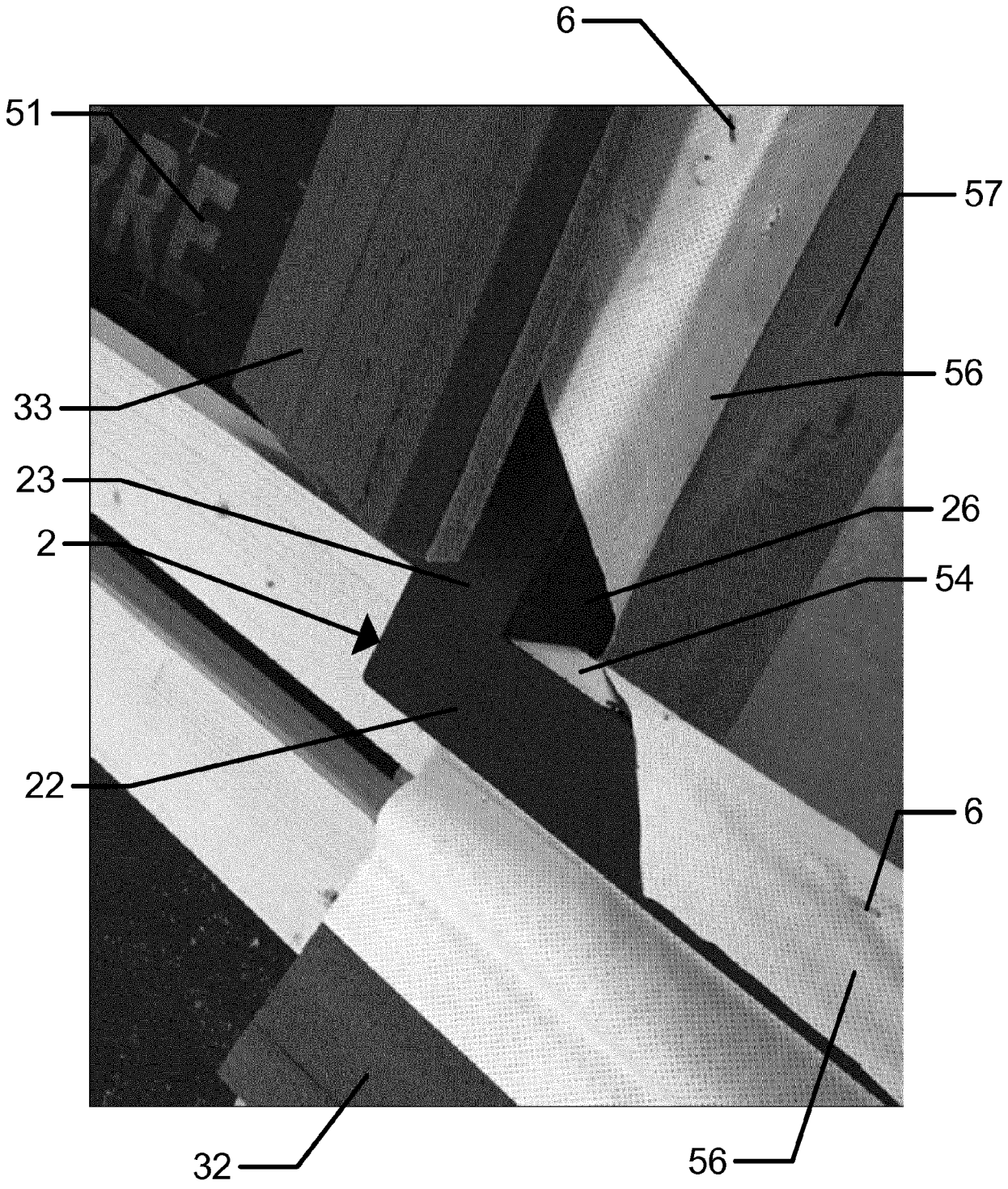

Fig. 3

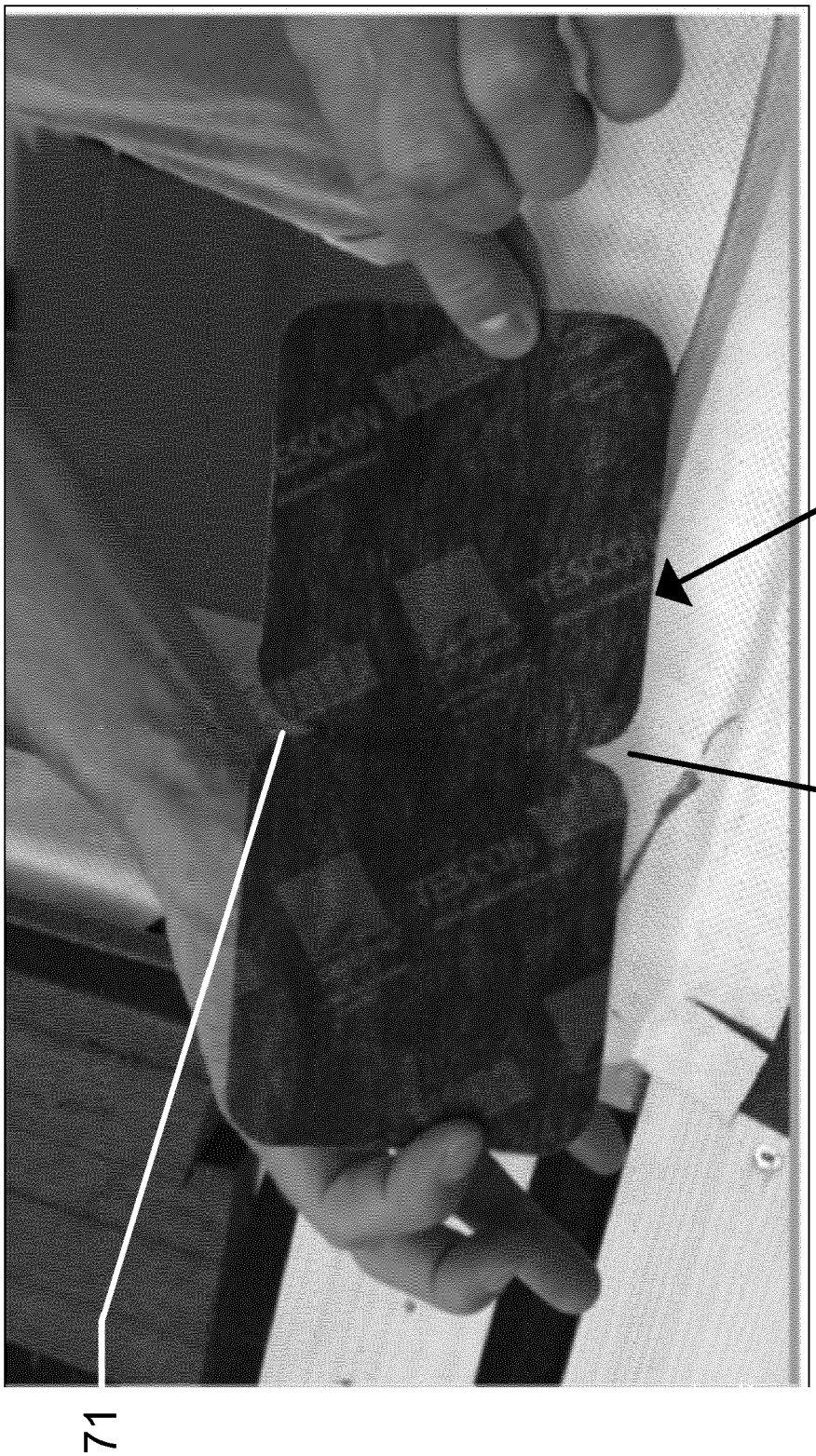

Fig. 4

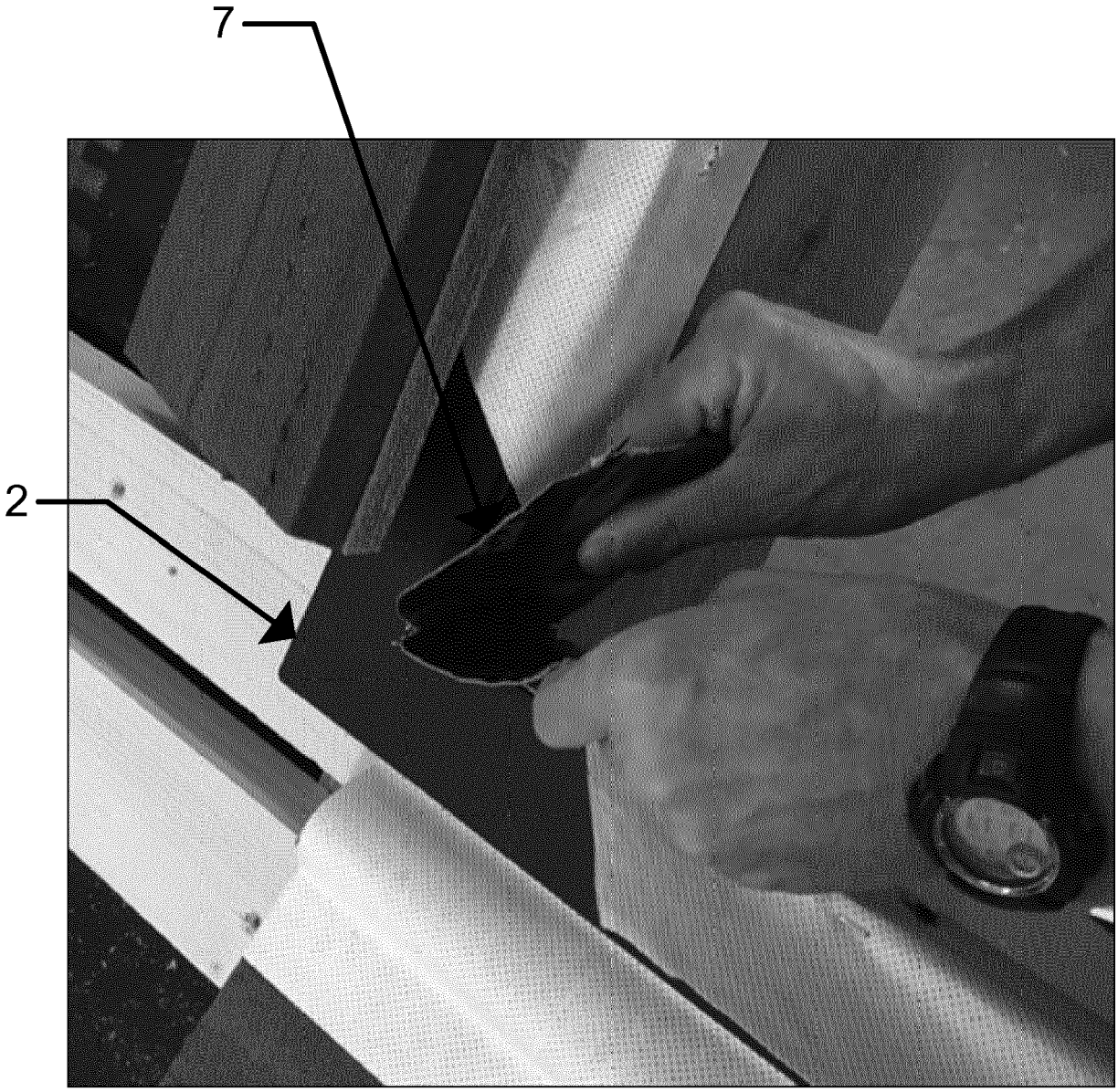

Fig. 5

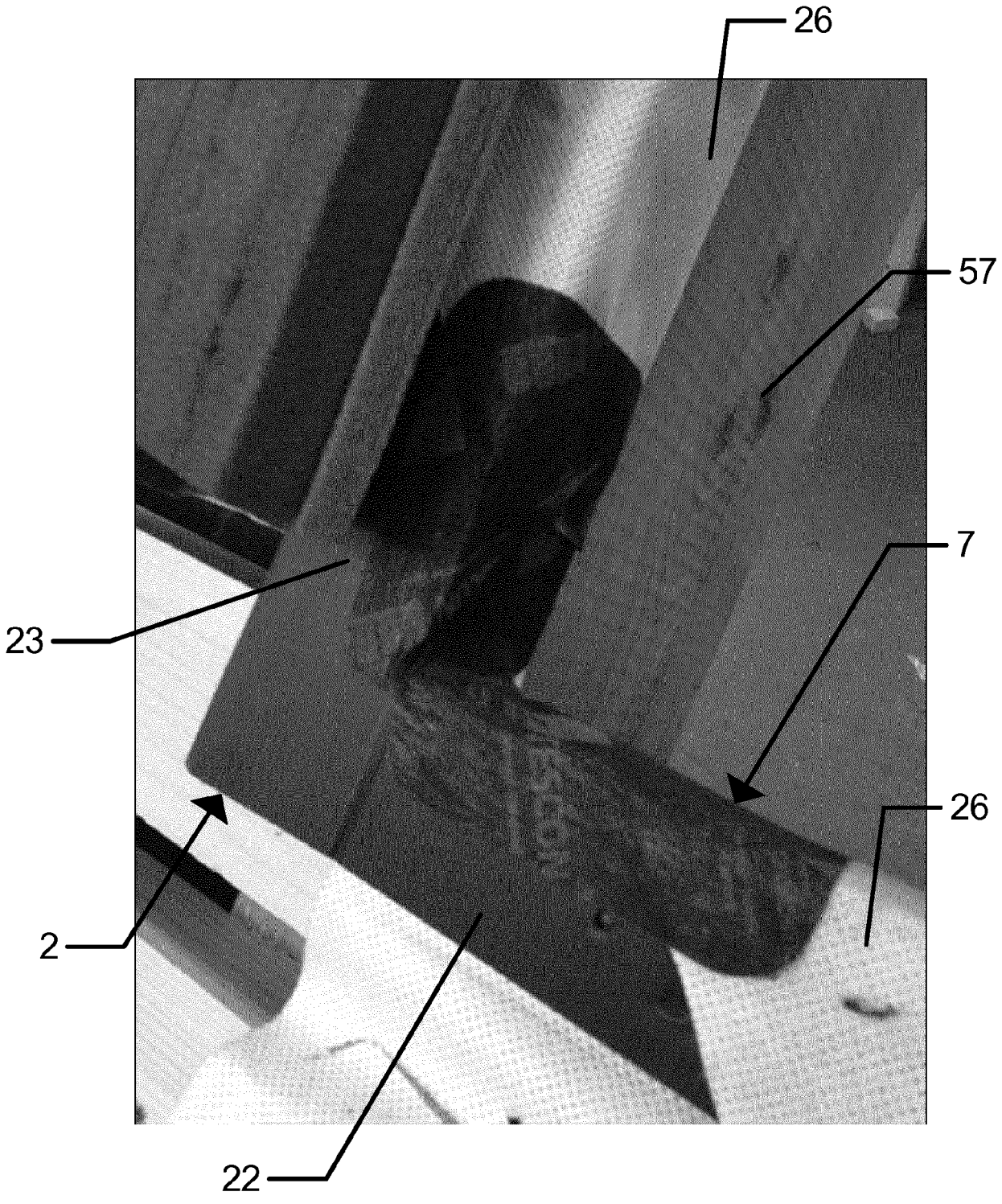

Fig. 6

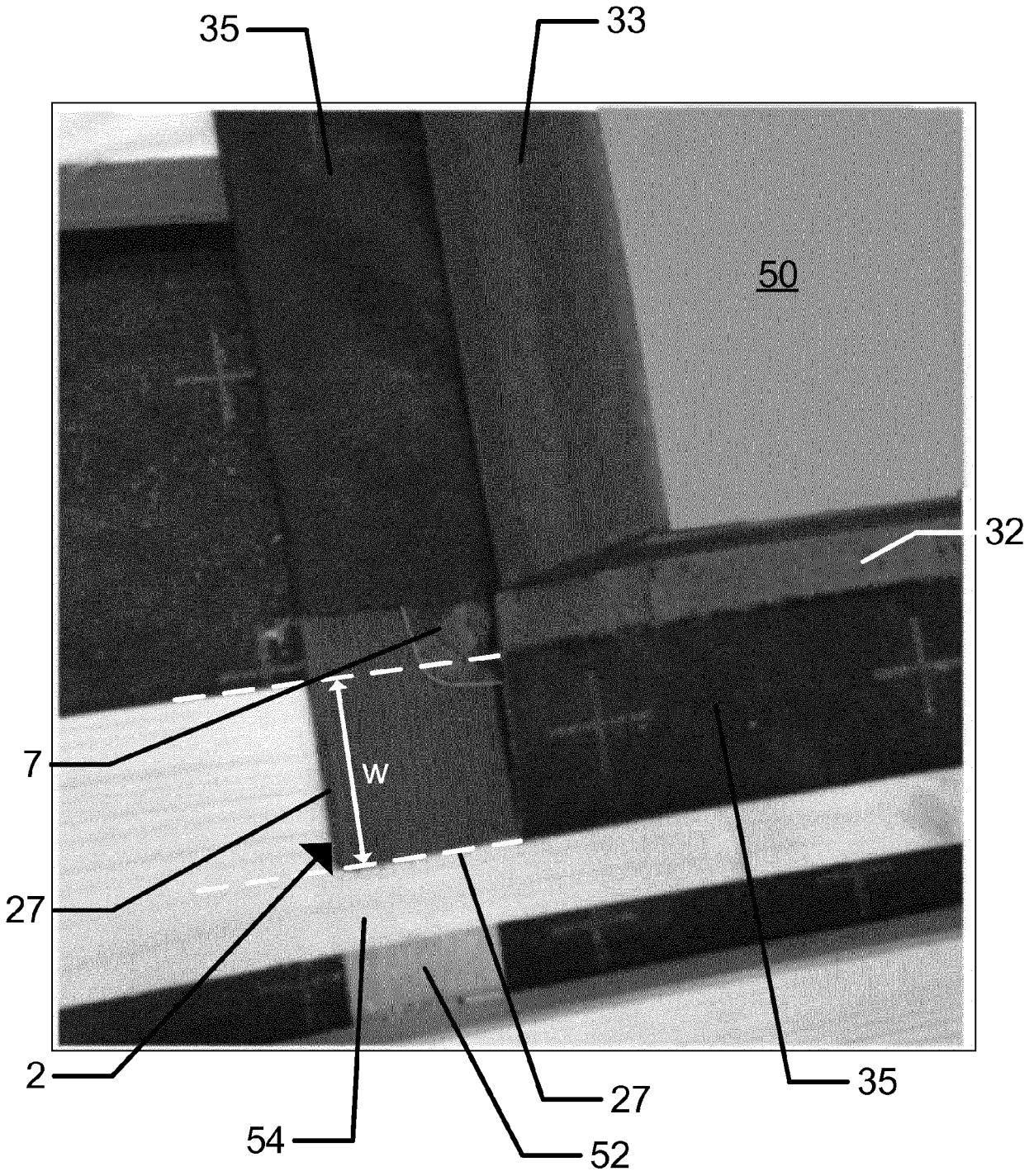

Fig. 7

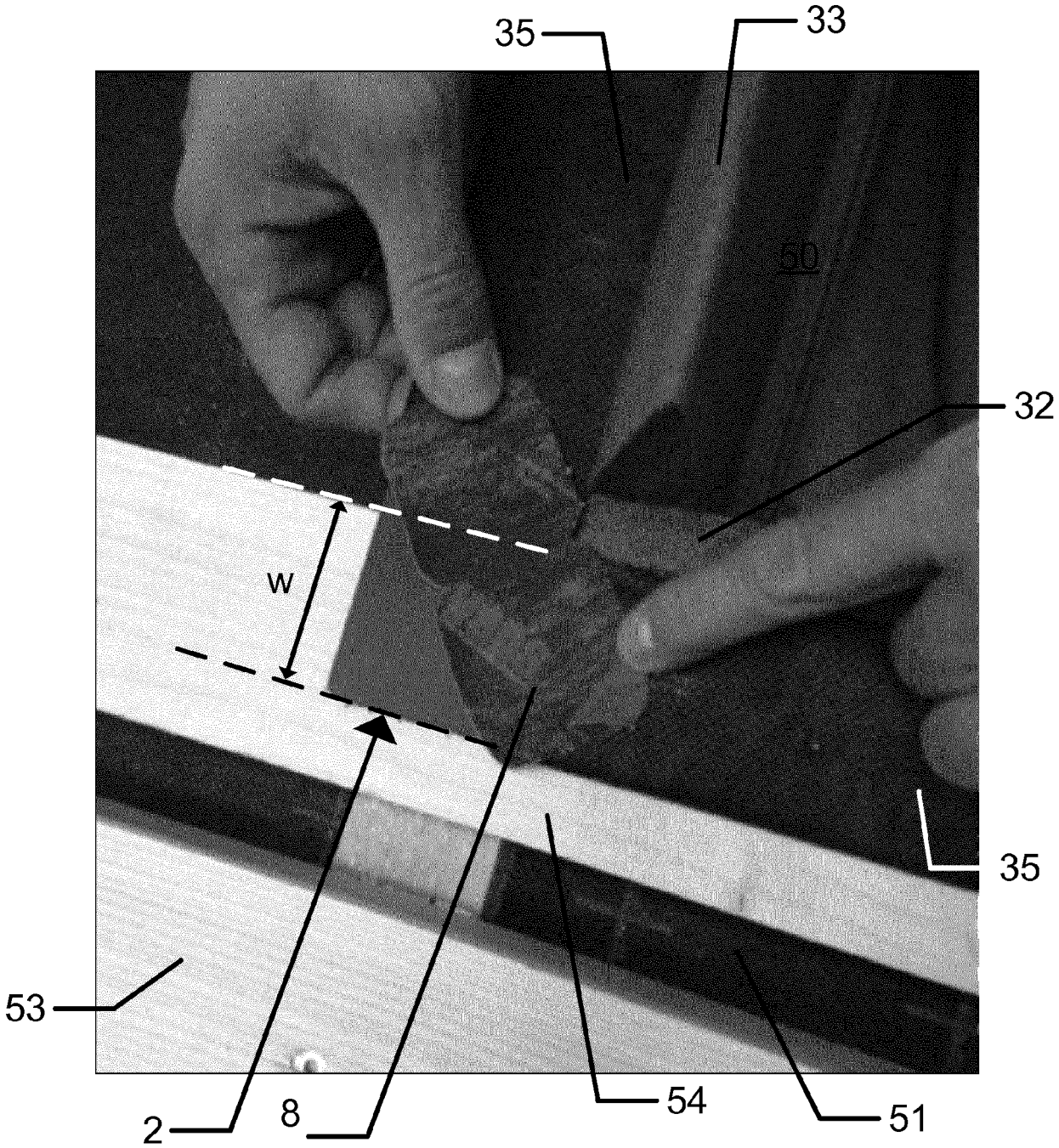

Fig. 8

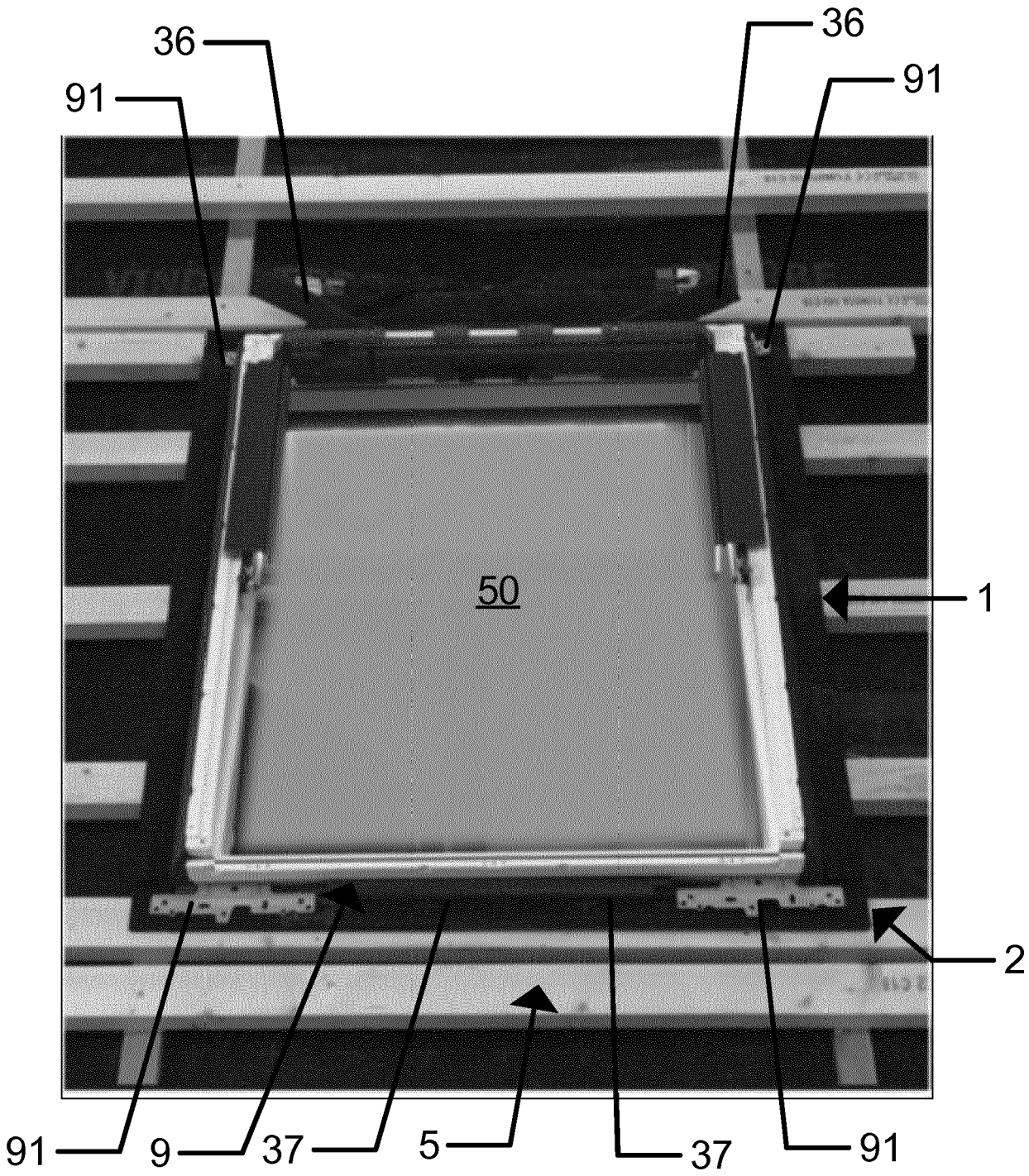

Fig. 9

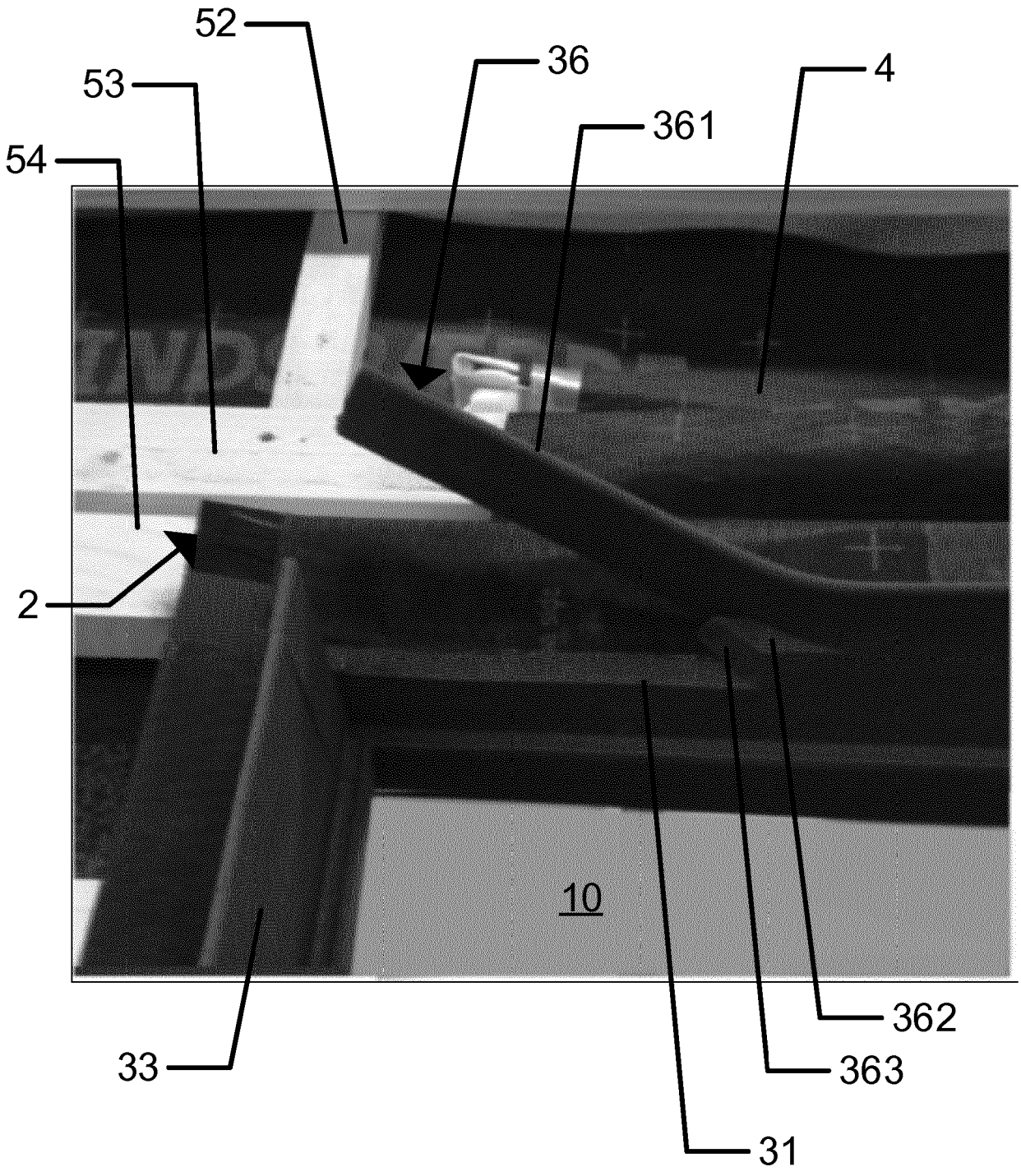

Fig. 10

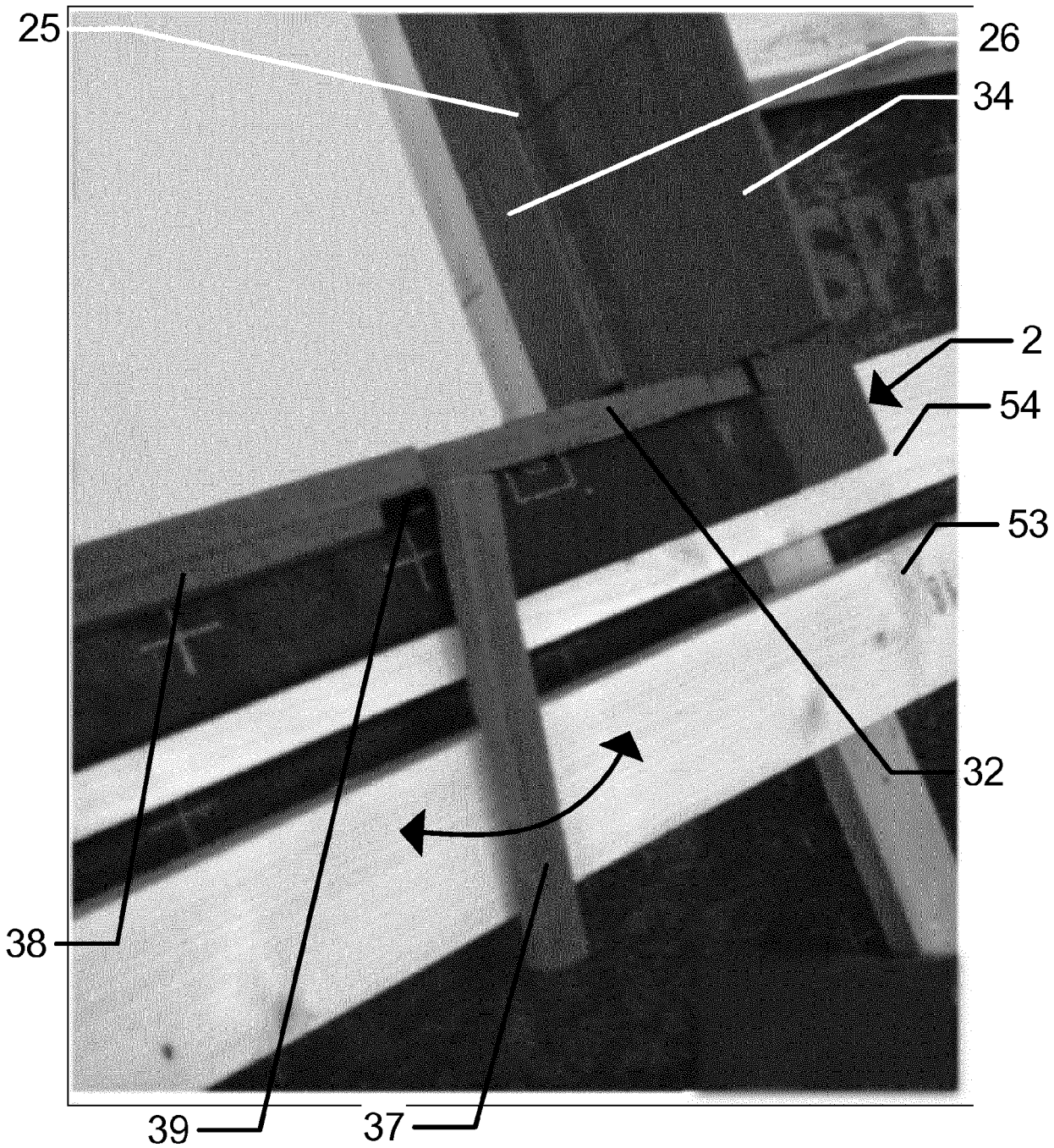

Fig. 11

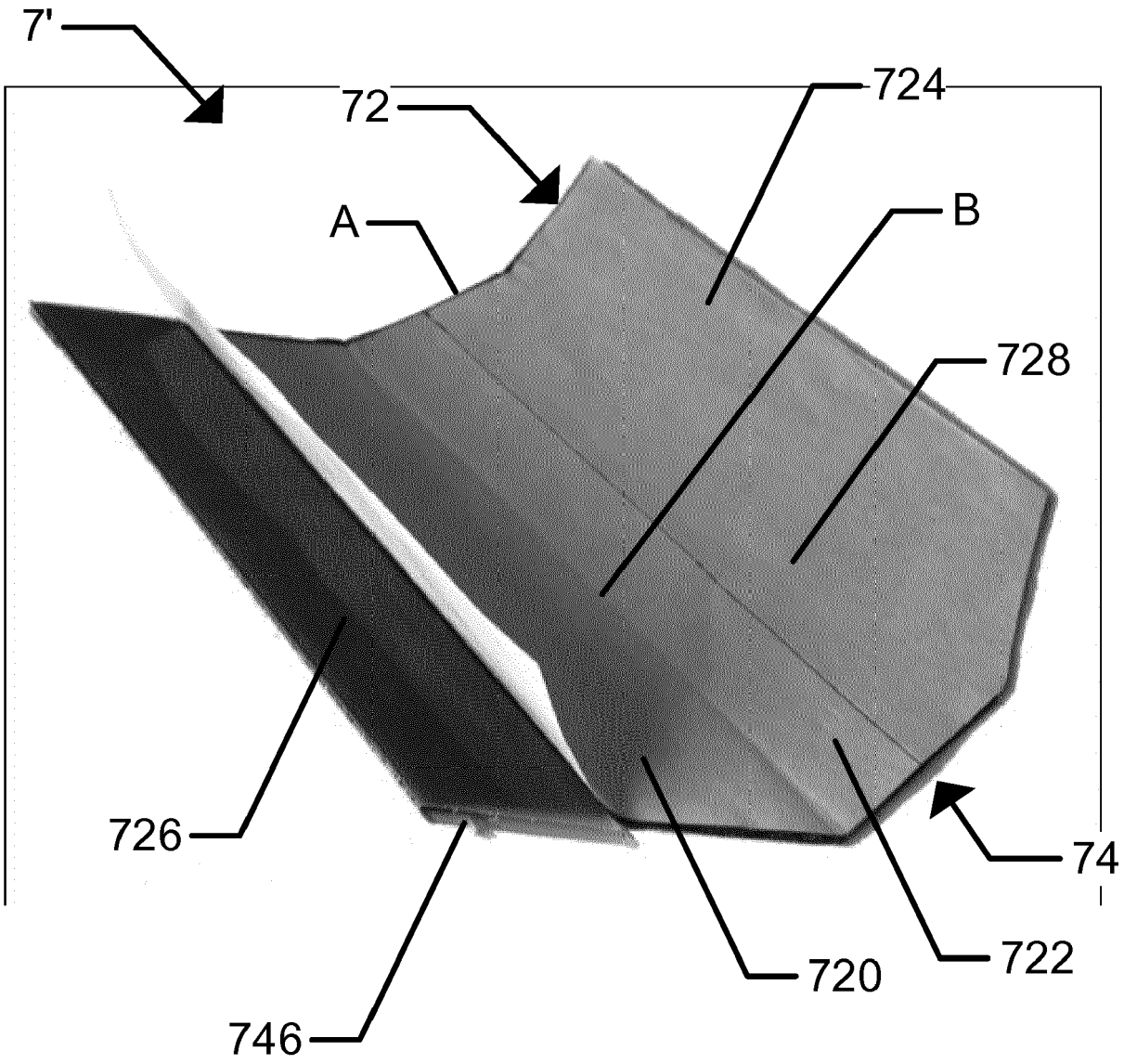

Fig. 12

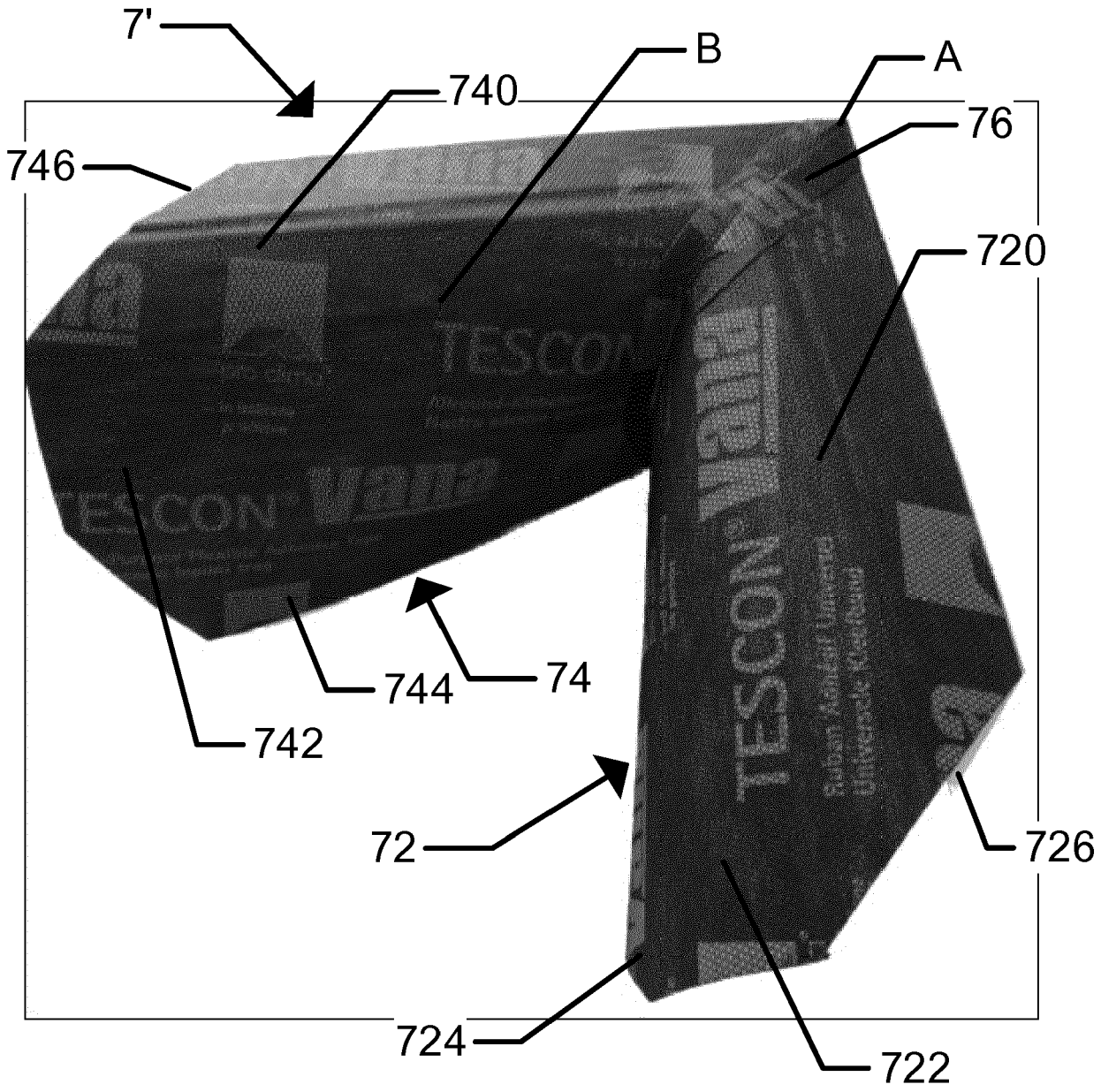

Fig. 13

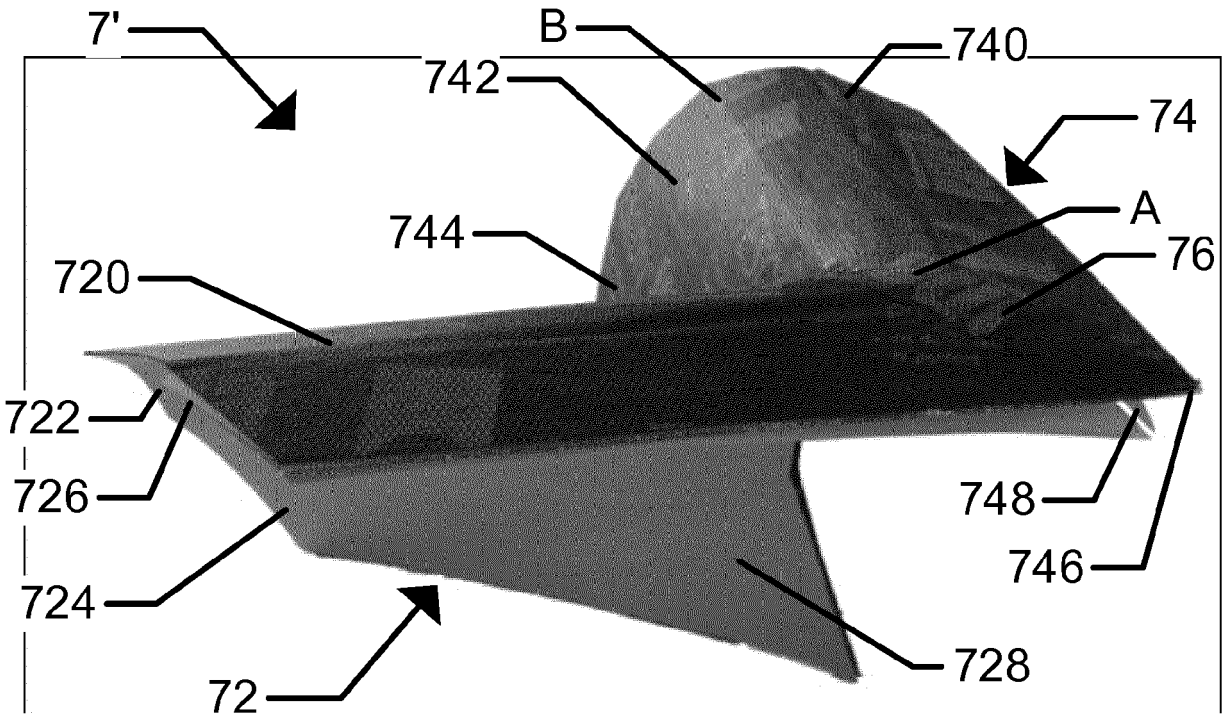
7'
B
740
742
74
A
744
76
720
722
726
748
746
724
728
72

Fig. 14

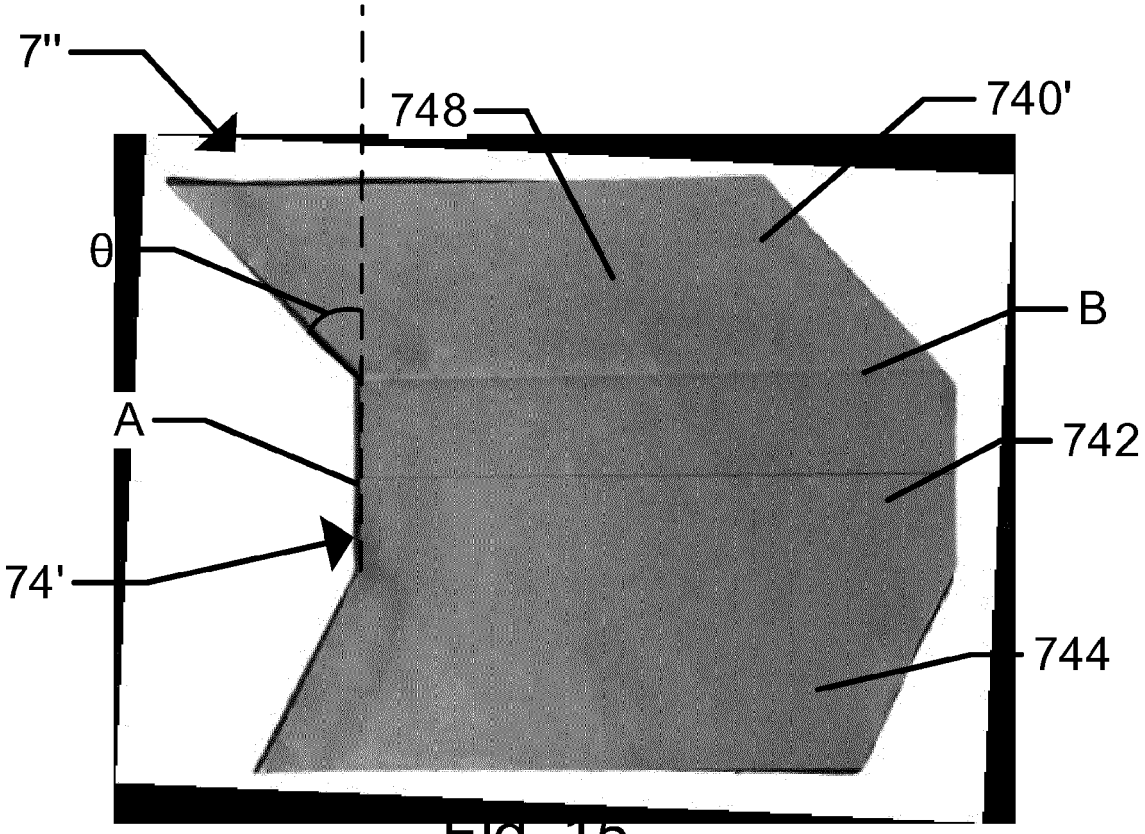
7"
748
740'
θ
B
A
742
74'
744

Fig. 15

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 18 6007

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 Y A	EP 2 947 219 A1 (ROTO FRANK AG [DE]) 25 November 2015 (2015-11-25) * figures 1,2,7,8,11-13,16-19,21 *	1 7 8-15	INV. E04D13/03 E04D13/147
A	EP 1 518 974 A1 (ROTO FRANK AG [DE]) 30 March 2005 (2005-03-30) * figures 1,4-10 *	1-8	
X Y A	DE 20 2004 020247 U1 (ROTO FRANK AG [DE]) 3 March 2005 (2005-03-03) * paragraphs [0009], [0010], [0017], [0018]; figures 1-2 *	1,4-6 7 8-15	
X	US 2017/138113 A1 (NORWOOD STEVEN A [US]) 18 May 2017 (2017-05-18) * paragraphs [0038] - [0040]; figures 4,5,17 *	1,2,4	
X	US 5 983 592 A (MAYLE ROBERT L [US]) 16 November 1999 (1999-11-16) * figures 3,5,6 *	1,2	TECHNICAL FIELDS SEARCHED (IPC) E04D E04B C09K C09J E06B
X	US 2010/263311 A1 (RYDEN BIRGITTA [SE]) 21 October 2010 (2010-10-21) * paragraph [0086]; figures 5,6,7a-7d *	1,2,4	
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