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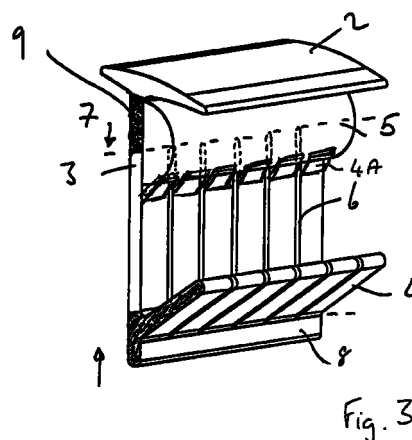
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(54) **Sealing gasket and method of making and inserting the same**

(57) A sealing gasket (1) as well as methods of making and inserting the same in a gap, e.g. between a window pane and a window frame, are described, which includes a support strip (3) made of form-stable material and including lateral mechanical weaknesses (6) distributed along the support strip (3). A substantially continuous elastic sealing material (5) is attached to the side of the support strip (3) and overlaps the mechanical weaknesses (6) at least partially. Optionally, retaining lips (4) may be provided.

The gasket has the advantage that the seal is formed in the gap between the window pane and frame and not outside this gap, even in the corners of the window.



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Description

[0001] The present invention relates to a sealing gasket which may be used with windows or similar and which may be adapted for application around corners as well as a method of manufacturing the sealing gasket. The sealing gasket in accordance with the present invention is suited for automatic or manual insertion.

TECHNICAL BACKGROUND

[0002] Fig. 1 is a schematic representation of a typical window 20 which includes a fixed window frame 22 which may be fixed in a wall or similar and a movable window 21. One or more solid, e.g. glass or transparent plastic, plates or panes 10, 12 may be arranged in a window frame or sash 15. The window frames 15, 22 may be made from wood, plastic, e.g. PVC, or metal such as aluminium. For example, the movable window frame 15 may be made from wood into which a groove is machined for the plates 10, 12 to form frame elements 16, 17. A separate wooden bead may also be used which is glued or nailed into place to form frame element 17 the window pane(s). Access to machined grooves is more limited than when a bead is used. The frame elements 16, 17 of the movable frame 15 are typically spaced (13, 14) from the outer surfaces of the plate(s) or pane(s) 10, 12. These spaces 13, 14 vary in size depending upon the tolerances of manufacture of the frame 15, the elements 16, 17 and the plate(s) 10, 12 and may also vary with changes in temperature and humidity. Conventionally, the spaces 13 and 14 have been filled with putty which is applied by hand and is a time consuming, laborious and skill-sensitive manual operation.

[0003] Various attempts have been made to replace conventional putty with pre-fabricated sealing strips. One problem with applying pre-fabricated sealing strips occurs in the 90° corners of the window. One proposal for providing a seal in the corner of a window is described in WO 97/48869. The known solution involves placement of elastomeric gaskets along the horizontal and vertical spaces between the window frame and the glass pane in such a way that one of the gaskets rests against the upper surface of the other gasket under a certain pressure to provide a seal. The disadvantage of this known technique is that two individual strips of gasket must be used of precisely defined lengths which complicates the placement of the gaskets and makes the method unsuitable for automatic production of original windows.

[0004] An attempt to provide a pre-fabricated seal is described in FR 2 336 610 which comprises a strip made of a rigid material attached to a strip of elastic material in a form which may be approximately described as a "T". The elastic material forms the top of the "T" and lies completely outside the groove between the window frame and the window pane. The elastic

material seals on the one side to the window pane and on the other to the upper surface of the window frame. The seal is provided mainly by flexing or bending of the elastic material which means that the seal pressure is low and the seal is sensitive to surface irregularities. The rigid material is provided with lateral cuts which open up in the window corners leaving the elastic material poorly supported in the 90° bend. The problems with this known sealing gasket have been described in EP 632 184.

[0005] EP 632 184 describes a completely elastomeric gasket which fits around both sides of a window pane. Like FR 2 336 610 it relies in part on an elastic material to form a seal outside the groove between the window frame and the window. Mechanical weakness are provided along the gasket one of which opens up in each corner leaving the top most sealing lip to seal around the corner. This upper sealing lip is poorly supported around the corner over an angle of about 90°. Any distortion of this upper lip in the corner may result in a poor seal. There is a natural tendency for the gasket to remain straight so that it may pull away from sharp corners. Additional sealing lips or areas may be provided within the groove and these are severed by the process of forming the weaknesses.

[0006] EP-243 305 describes an elastomeric gasket which is designed to replace putty. The known gasket has a "T" shape with two sealing lips on one side of the stem of the "T". The bar of the "T" which forms the upper sealing lip seals outside the groove between the window pane and the frame and the lower lip seals at or just above the groove. At the corners of the window, incisions are made in the gasket so that at least one of the sealing lips extends over the corner region in an interrupted manner. One problem with this known gasket is that the incision(s) must be placed at an appropriate position or positions in the gasket and this has to be determined based on the particular window which is being sealed and is very sensitive to the exact dimensions thereof. Further the cutting depth has to be controlled precisely. This need for accurate dimensioning and a special procedure for the corners complicates automatic production of original windows. Further, the seal in the corner is also provided by an elastic material mainly outside the groove between the window frame and the window pane and this seal is mainly provided by bending or flexing of the elastic material, i.e. low pressure. The disadvantages of this known gasket are described in DE 42 28 874.

[0007] DE 42 28 874 describes a gasket including a longitudinal tube-like sealing part and a base strip, both of elastomeric material. The tubular sealing part seals at the top of the groove between the frame and the window pane by compression of thereof. Slits are provided in the base part up to the elastomeric material which open up in the corners allowing the tubular part to follow around the corner. The disadvantages of this known gasket are described in EP 652 346 and include loss of

longitudinal stability of the gasket caused by the slits and permanent deformation of the tubular sealing part during storage in rolled form.

[0008] EP 652 346 describes an elastomeric sealing gasket having an upper and lower sealing lip, the seal being provided by bending or flexing of the sealing lips. The lower sealing lip includes a plurality of notches or incisions which leave a narrow material web of at least 0.1 millimetre at regular intervals along the strip. In the straight portions the webs remain intact whereas in the corners of the window the notches open up to allow the gasket to rest in a corner without the formation of folds. The disadvantage with this known gasket is that it is made completely of elastomeric material and therefore its placement between the window pane and the frame may be difficult, e.g. it may be necessary to press down the gasket slightly further than required in order to compensate for any compression of the gasket and spring back of the elastomeric material. Further, the elastomeric material may have a high coefficient of friction on the surface of the window frame or on the window pane such that the force required to make it slip may be quite high or, alternatively, it is necessary to use some a slip agent such as soapy water to ease insertion. The problem with high frictional forces is particularly troublesome with wooden frames which may have a rough surface. In addition, the main seal to the window pane and to the window frame lies outside the groove between the window pane and the frame. This means that in the corners the slightest wrinkling or distortion of the thick upper sealing lip may result in loss of the seal. Further, depending on the stiffness of the upper sealing lip the gasket may have a tendency to straighten in the corners which may move the upper sealing lip away from the window frame in the corner. The problems with this known gasket which include loss of seal in the corners are mentioned in EP 828 055.

[0009] The gasket of EP-828 055 is similar in form to the gasket described in EP-652 346 and suffers from similar problems. The differences are that the notches are in the form of webs which do not necessarily tear through at the window corners and the formation of a tubular sealing part is abandoned and replaced with a foam rubber strip. If the sealing strip is very soft it can make insertion into the groove between the window pane and the window frame more difficult as, when it is compressed it expands sideways and may hinder the insertion. Further, the large potential compression of the bulk foam material means that it is not possible to be completely sure how deep the gasket is in the groove thus making the selection of a suitable end point for automatic insertion more difficult.

[0010] It is an object of the present invention to provide a sealing gasket for window frames and a method of manufacturing the same, which allows either automatic or manual insertion or both types of insertion.

[0011] It is another object of the present invention to provide a sealing gasket and a method of making the

same, which is easier to insert than those conventional sealing strips described above.

[0012] It is another object of the present invention to provide a sealing gasket and a method of making the same, which provides a reliable seal when the seal goes through an angle, e.g. of 90° or less.

SUMMARY OF THE INVENTION

[0013] The present invention includes a sealing gasket, in particular for insertion between a window pane and a window frame, comprising a flexible, elongate support strip of form-stable material; an elastically deformable longitudinal substantially continuous sealing strip at least contacting a side of the support strip; and a plurality of lateral mechanical weaknesses pre-fabricated along the support strip, the mechanical weaknesses extending laterally across the support strip and the sealing strip overlapping the weaknesses at least partially.

[0014] The present invention also includes unit of a frame and a plate, there being a gap between the frame and the plate, further comprising a sealing gasket within the gap, the sealing gasket comprising a flexible, elongate support strip of form-stable material; an elastically deformable longitudinal substantially continuous sealing strip at least contacting a side of the support strip; and a plurality of lateral mechanical weaknesses pre-fabricated along the support strip, the sealing strip forming a seal within the gap.

[0015] The present invention also includes the method of applying a foamable paste to a support including a plurality of openings to form a substantially continuous sealing strip, the sealing strip bridging at least some of the openings.

[0016] The present invention also includes a method of producing a sealing gasket, in particular for insertion between a window pane and a window frame; comprising the steps of: producing an elongate support strip from a form-stable material; forming a plurality of lateral mechanical weaknesses along the length of the support strip; and longitudinally at least contacting an elastically deformable substantially continuous sealing strip along the support strip, the sealing strip overlapping the mechanical weaknesses at least partially.

[0017] The present invention also includes a method of inserting a gasket into a gap between a frame and a plate, the gasket including a support strip of form-stable material and an elastically deformable, substantially continuous sealing strip attached thereto, the frame having a corner, the method comprising the steps of: inserting the gasket into the gap to thereby elastically deform the substantially continuous sealing strip to thereby form a seal within the gap which is continuous around the corner.

[0018] In the description of any of the embodiments of the present invention, the mechanical weaknesses may be defined as pre-defined rupturable or pre-defined

splittable mechanical weaknesses. These weaknesses may be ruptured when the gasket has to follow a corner, e.g. of an angle of 90° or less in a window, or, for instance, the curve of an oval or circle around an oval or circular window.

[0019] The dependent claims define further individual embodiments of the present invention. The present invention, its advantages and embodiments will now be described with reference to the following drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 shows schematically window to which the present invention may be applied.

Fig. 2 shows schematically a cross-sectional view of a sealing gasket in accordance with one embodiment of the present invention.

Fig. 3 is a schematic three-dimensional view of the gasket of Fig. 2.

Fig. 4 is a schematic representation of a cross-sectional view through a window to which gaskets in accordance with the present invention have been applied.

Fig. 5 is a schematic representation of gaskets according to the present invention applied in the corner of a window.

Fig. 6 is a view of a gasket in accordance with the present invention in a corner region of a window.

Figs. 7 and 8 are schematic representations of a further gasket in accordance with the present invention.

Figs. 9 and 10 are schematic layouts of machinery for producing gaskets in accordance with the present invention.

Figs. 11a to e show further embodiments of gaskets according to the present invention.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

[0021] The present invention will be described with reference to certain embodiments and to certain drawings but is not limited thereto but only by the claims. In particular, a gasket or sealing strip for sealing window panes to window frames by insertion therebetween will be described but the invention is not limited thereto but may include sealing strips in accordance with the attached claims which may be used for other purposes, such as gaskets for the lids of boxes, containers, barrels, etc.

[0022] Fig. 2 is a schematic representation of a cross sectional view of one embodiment of the sealing gasket 1 in accordance with the present invention and Fig. 3 is a three-dimensional representation of this sealing gasket 1. The sealing gasket 1 includes a support strip 3 which is longer than it is wide. The strip 3 may be

made from any suitable form stable material. By form stable is meant that the material of the support strip 3 is a solid which may only be compressed under high loadings at room temperature. Form stability as meant in the present invention does not prevent the strip 3 from being flexible, i.e. bendable, this being dependent on its thickness and the material chosen. Flexible plastic materials such as polyurethane, polyamides, e.g. nylon, polyethylene, PVC or polypropylene are particularly preferred. It should be understood that the thickness of the support strip 3 is such that the strip is sufficiently flexible, for instance, for rolling up into a roll for packaging and transportation and also flexible enough for automatic insertion into the groove between a window pane and the window frame from a cartridge or roll. It is also preferred if the material used for the support strip 3 has a lower coefficient of friction on wooden or glass surfaces than conventional elastomeric (rubber) materials. The strip 3 has two major surfaces which are the two large surfaces of the strip 3.

[0023] On one edge of the support strip 3 a decorative cap 2 may be optionally provided. Cap 2 may be made from a material which is softer and more conformable than the material used for support strip 3. Preferably the decorative cap 2 may be made from an extrudable, thermoplastic rubber or a thermoplastic elastomer or similar, for example Santoprene™ supplied by Advanced Elastomer Systems, USA. Cap 2 may also serve as a secondary seal outside the groove between the window pane and the window frame similar in function to the elastic seal material described in FR 2 336 610.

[0024] Contacting and preferably attached to at least one major surface or side of the support strip 3 a longitudinally applied deformable substantially continuous sealing strip 5 is provided which may have the cross-sectional form of a circle, oval, pear-or drop-shape, semicircle, semi-polygon or any other suitable form for compression sealing against the outer surface of a window pane or the window frame. As shown in Fig. 2 the strip 5 is close to or abutting the decorative cap 2 but the present invention is not limited thereto. The compressibility of the sealing strip 5 may be selected depending upon the application. Where the gasket 1 is placed in the gap between a window pane and a window frame the gasket may merely form a seal or may also assist in the positioning and support of the pane. In the former case the sealing strip 5 may be made from a soft, compressible material, e.g. a rubber or elastomer foam. On the other hand for support and positioning of a window (a glazing seal) the strip 5 is preferably made from a relatively hard rubber. The material for forming the sealing strip 5 may be a foamed rubber or a rubber material having an air space or spaces within it in order to render this material easily but elastically compressible. The compression sealing strip 5 may therefore be made from an elastic material whose Shore hardness can be over a wide range depending upon the applica-

tion involved. For instance, the range may be from 45 Shore 00 up to 60 Shore A. Typically, the material for the sealing strip 5 is suitable for a service temperature of -40 to + 50°C and has an elongation to break greater than 200%, more preferably greater than 250%. Preferably, the material for the sealing strip has a tensile strength of between 30 and 200 N/cm².

[0025] Projecting away from the support strip 3 at some suitable position, a retaining lip 4 may be provided which may be formed integrally with the support strip 3 from form stable material. Optionally, an additional location lip 4A may be provided which is located so that it protects the sealing strip 5 when the gasket 1 is inserted into the gap between the window pane and frame. Additional location lip 4A may be made from the same material as the support strip 3 or the cap 2 and preferably has a low coefficient of friction on wood or glass so that insertion pressures are reduced even when the coefficient of friction of the sealing strip 5 is high.

[0026] At regular intervals along the sealing gasket 1 mechanical weaknesses 6 in the support strip 3 are provided. These mechanical weaknesses 6 extend over a region 7 within the support strip 3 such that they leave an optional narrow solid first longitudinal margin 9 at the edge adjacent to the cap 2 and optionally a second narrow longitudinal margin 8 at the other edge of the support strip 3. Preferably, the mechanical weaknesses 6 extend across the width of the support strip 3 over the region 7 and also extend through any retaining or locating lips 4 or 4A. In accordance with the present invention the mechanical weaknesses 6 extend underneath the sealing strip 5 to a certain degree. Sealing strip 5 is preferably substantially continuous, i.e. the mechanical weaknesses 6 are not formed in sealing strip 5. In all the embodiments of the present invention the mechanical weaknesses 6 are designed so that the support strip 3 ruptures or splits laterally along the lines defined by them, for example when the gasket 1 has to go around a corner in a window frame or follow the curved contour of an oval window. The mechanical weaknesses 6 in accordance with any embodiment of the present invention may be described as pre-defined splittable or pre-defined rupturable mechanical weaknesses 6. The mechanical weaknesses 6 may be slits, perforations, grooves, e.g. kiss-cut grooves, thermally embrittled lines, e.g. using a laser, or similar. The mechanical weaknesses 6 provided may be slits which extend right to the edge of the support strip 3 remote from the decorative cap 2 and the strip is held together by an adhesive paper tape applied to the support strip 3 on the side remote from the sealing strip 5.

[0027] The sealing gasket 1 in accordance with the first embodiment is for installation between a window pane or panes 10, 12 and window frame elements 16 and 17 as shown schematically in Figure 4. The sealing gasket 1 may be inserted by automatic equipment or equally well by hand into the spaces 13, 14 between the outer surfaces of the plates 10 and 12 and the inside

surfaces of the frame elements 16, 17. The form stable material which makes up the support strip 3 is easy to insert using automatic equipment and it does not compress as is known for elastomeric materials. Further, its preferable low coefficient of friction on the surface of the window pane 10, 12 or on the surface of the frame elements 16, 17 reduces the insertion force required. The decorative and optional sealing cap 2 may be relatively thin so that even if it is compressed a little by the insertion force the position of the gasket 1 in the grooves 13, 14 may be estimated relatively accurately by automatic sensing equipment. Hence, the end point of insertion can be determined reliably. Where a retaining lip 4 is provided on the support strip 3, corresponding location notches 18, 19 may be provided in the frame elements 16, 17, respectively so that when the sealing gasket 1 has reached the desired depth in the spaces 13, 14 the retaining lip 4 enters the notches 18, 19 to prevent the sealing gasket 1 from being displaced vertically out of the space 13, 14. The decorative cap 2 deforms against the window pane 10, 12 and the frame element 16, 17 in order to provide a smooth and aesthetic appearance to the sealing gasket similar to that which has been conventionally provided by putty. Further, the decorative cap may also provide a secondary sealing function against the window pane 10, 12 and the top of frame elements 16, 17. The decorative cap 2 may be coloured with any suitable pigment in order to provide the required aesthetic effect.

[0028] The sealing strip 5 may be dimensioned in such a way that an adequate seal is provided against the window frame element 16, 17 independent of the manufacturing tolerances of the window. In contrast to the conventional gaskets, the seal provided by the sealing strip 5 is within the spaces 13, 14 between the window pane 10, 12 and the frame elements 16, 17. The material used for the sealing strips 5 has preferably a low compression set so that the seal against the window element 16, 17 or the window pane 10, 12 is stable over time. Preferably, the sealing strip 5 material has a compression set of less than 10% in accordance with the French specification NFT 46.011, 70°C. Accordingly, it is preferred if the material of the sealing strip 5 is a cross linked rubber foam however the present invention is not limited thereto. It is included within the scope of the present invention that the sealing strip 5 may be placed on one side of the support strip 3 as shown in Figs. 2 to 4 but the sealing strip 5 may also be placed alternatively or additionally on the other side of the support strip 3 so that it provides a compression seal between the support strip 3 and the window pane 10, 12. In contrast to conventional solutions a main seal of gasket 1 is provided by compression of a bulk of deformable material (sealing strip 5) within the gap between pane and frame and not alone by the flexing of sealing lips outside this gap although the present invention includes additional sealing lips, e.g. the cover 2. The present invention also includes within its scope the use of sealing strips 5

including or having the form of sealing lips which lie within the gap between the window pane and frame.

[0029] In the corners of the window, the mechanical weaknesses 6 are placed under a tensile stress as the gasket 1 is inserted into the corner and at least one mechanical weakness opens up to follow the shape of the corner (local breaking of the second margin 8). The sealing strip 5 being flexible, elastic and conformable, follows the corner to provide a continuous seal in the corner of the window as shown schematically in Fig. 5. It is preferred if the sealing strip 5 remains attached to the longitudinal margin 9. Sealing strip 5 preferably remains within the gap between window pane and frame within the corner as well as either side thereof thus avoiding the loss of the flexible seal as is characteristic of the gaskets known from FR 2 366 610 and EP 575 937. The sealing strip 5 is preferably so dimensioned that when it comes under longitudinal tension in a corner of a window its cross-section distorts in such a way that a good seal is still maintained. Preferably, the sealing strip 5 substantially maintains its thickness in the direction across the gap or gaps 13, 14 between the window pane 10, 12 and the window frame elements 16, 17 when under tension. If this dimension of the sealing strip 5 is substantially maintained when the strip 5 comes under tension, then the thickness of the sealing strip 5 parallel to the space 13, 14 will reduce but a good seal will still be maintained. The preferably cross-section for sealing strip 5 is oval, tear-drop form or similar.

[0030] The penetration of the mechanical weaknesses 6 partially or completely beneath the sealing strip 5 allows the size of the continuous margin 9 of the support strip 3 to be made very small, e.g. 1 - 4 mm. The size or width of the solid margin 9 need only be sufficient to provide mechanical stability during the manufacturing process of the support strip 3 and gasket 1 as well as subsequent handling. Because the solid margin 9 is narrow it can easily deform to the 90 degree bend in the corner of the window without forming wrinkles or other forms of distortion. Further, the tensile stresses and compression stresses caused by bending of the solid strip 9 are low because of its narrow width. The mechanical weaknesses 6 penetrate under the substantially continuous sealing strip 5 and the compression force on the sealing strip 5 from the window frame elements 16, 17 and/or from the window panes 10, 12 compresses the elastomeric sealing strip 5 into the spaces 6 as shown schematically in Fig. 6 thus providing a seal through the sealing strip 3. The margin 9 may be dispensed with and instead the mechanical weakness may be completely across the support strip 3. In order to hold the elements 6 together an adhesive paper tape may be applied to the support strip 3 on the opposite side from the sealing strip 5. Where the gasket is to be inserted into a narrow gap the support strip 3 is preferably a flat thin strip, e.g. 5 to 35 mm wide and 0.3 to 2 mm thick. The present invention includes however, that the support strip 3 has a three dimensional form which

clips into a wider groove as is known in principle from FR 2 336 610 but without the inventive features of the present invention. Further, sealing strip 5 is preferably made of a soft elastic foam material with good conformability.

[0031] A further sealing gasket 1 in accordance with another embodiment of the present invention is shown schematically in Figs. 7 and 8. It includes a form stable support strip 3 similar to that described with respect to Figs. 2 and 3 above. Optionally, it may be provided with retaining lips 4 or locating lips 4A (not shown in Fig. 7 or 8) for securing the sealing gasket 1 in the space 13, 14 between a window frame element 16, 17 and a window pane 10, 12 as described for the previous embodiment. The other edge of the support strip 3 which is remote from any locating lip 4 may be encapsulated in a soft elastically deformable sealing strip 5 which is preferably made from a cross-linked foam rubber as described with respect to the sealing gasket 1 of Figs. 2 and 3. The encapsulation 5 may also have a cross-sectional shape so that it also assumes some of the appearance and functions of the decorative and secondary sealing cap 2 of the first embodiment.

[0032] As best shown in Fig. 8, mechanical weaknesses 6 are provided at a plurality of positions spaced along the support strip 3 and small support bridges 6a may be provided to maintain the mechanical integrity of the support strip 3 during manufacture and installation up to the point when the gasket 1 is inserted at a corner of a window. Alternatively, or additionally a thread or wire may be included within encapsulation 5 to maintain its longitudinal stability. In the corner the bridges are broken so that the sealing gasket 1 is shaped smoothly to the corner as has been described with respect to the sealing gasket 1 of Figs 2 and 3. The sealing strip 5 is preferably so dimensioned that when it comes under longitudinal tension in a corner of a window its cross-sectional form distorts in such a way that a seal is maintained. Preferably, the sealing strip 5 substantially maintains its thickness in the direction across the gap 13, 14 between the window pane 10, 12 and the window frame elements 16, 17. If this dimension is maintained, and the sealing strip 5 comes under tension, then the thickness of strip 5 in a direction parallel to the space 13, 14 will reduce.

[0033] Methods of manufacture of the sealing gaskets 1 in accordance with the present invention will be described with reference to Figs. 9 and 10. As shown schematically in Fig. 9 extrusion presses 21, 22 may co-extrude or tandem extrude the decorative and secondary sealing cap 2 and the support strip 3 of the sealing gaskets 1 described above with respect to Figs. 2 and 3. Alternatively, where there is no decorative cap 2, a single extruder 21 may be used for extruding the support strip 3. The support strip 3 is drawn off from the extruders 21, 22 by means of a conventional haul-off device 24 such as a caterpillar through a conventional cooling device 23, for instance a water bath. The form stable

strip 3 is then provided with weaknesses 6, for instance slits, by a suitable stamping, slitting, embossing, or heat treating machine 25 before application of the foam rubber sealing strip 5 at the dispensing head 26. A machine for forming mechanical weaknesses is described in EP 632 184. The foamable material which is to form sealing strip 5 after curing is preferably applied in fluid form, e.g. in the form of a paste. Such materials may be applied with a low pressure dispensing machine. The dispensing head 26 and associated equipment may be, for instance, a low pressure dispensing device for dispensing foamable and cross-linkable elastomeric compounds to form the sealing strip 5 as described for instance in US 4,405,603 or for example in US 5,641,438. By low pressure dispensing head is meant that the foamable material exits the nozzle of the device at such a pressure that it can be applied to a substrate as a reasonably stable three-dimensional paste rather than being sprayed onto or co-extruded with strip 3 under high pressure. The present invention includes the continuous application of a foamable paste onto a substrate which includes mechanical weakness in the forms of openings and the paste bridges at least some of the openings to form a compression seal once it is cured. The paste is preferably a curable foamable polymer, rubber or elastomeric including thermoplastic rubber and elastomer materials. Sealing gasket 1 may then be taken up on a suitable drum 29. Suitable foamable materials for sealing strip 5 may be interpenetrating network sealants as described in EP 326 704, US 5,391,610 or US 5,250,607 which are all included herein by reference.

[0034] An alternative method of producing a sealing gasket 1 in accordance with the present invention is shown schematically in Fig. 10. Extruders 21 and 22, cooling bath 23 and haul off device 24 may be similar or identical to those described with respect to the equipment shown in Figure 9. Similarly, the equipment 25 for producing the mechanical weaknesses 6 in the support strip 3 may also be similar to or identical to that described with respect to Fig. 9. In accordance with this embodiment of the present invention the rubber sealing strip 5 is not extruded or dispensed directly onto the sealing strip 3 in a fluid form but is prefabricated by extrusion or any other suitable manufacturing method before application to sealing strip 3. The pre-fabricated and preferably pre-cured sealing strip 5 may be fed from a suitable pay out drum 31 and may be mechanically attached to or at least contacted with the support strip 3. The attachment of strip 5 to sealing strip 3 may be, for example, by means of adhesive or mastic. For example, a hot melt pressure sensitive adhesive may be applied onto the sealing strip 5 and/or the support strip 3 immediately before bringing these two together and fixing them together by means of applying pressure and/or heat. Alternatively, the support strip 3 may include suitable fins or lips which allow a mechanical fixation or entrapment of the sealing strip 5 at a suitable location

on the support strip 3. Other methods of fixing the sealing strip to the support strip 3 are included within the scope of the present invention, for example, where applicable ultrasonic welding or thermal welding may be used to join the soft rubber sealing strip 5 to the form stable support strip 3.

[0035] With reference to the gasket 1 described with reference to Figs. 7 and 8, the elastically deformable encapsulation 5 may be applied after the formation of the mechanical weaknesses by tandem extrusion or application using a low pressure dispensing device described above. Alternatively, the encapsulation 5 may be formed independently of the support strip 3 and the two attached to each other by pushing the support strip 3 into the encapsulating sealing strip 5. The sealing strip 5 may be attached to the support strip 3 merely by a mechanical interference fit between the two or may be alternatively or additionally fixed with an adhesive or other mechanical fixation methods. For instance, alternatively or additionally mechanical projections, barbs or hooks may be formed in support strip 3 which project therefrom and lock into or dig into the elastic material of the sealing strip 5 to prevent subsequent separation thereof. Alternatively or additionally the elastic sealing encapsulation 5 may be heat sealed to the support strip 3.

[0036] Figs. 11a to e show further individual embodiments of the gasket 1 of the present invention. Items with the same reference numbers refer to the same items as in Figs. 2 or 3. All these embodiments provide an additional reinforcing means for the retaining lip 4 of Figs. 2 or 3 or 7 and 8. In Fig. 11a an additional strip of elastic, preferably foam material is applied underneath the retaining lip 4 at the same time as the application of the same material to form the sealing strip 5. The elastic strip 5A reinforces the retaining lip 4 and provides added security for retention of the gasket 1. In Fig. 11b the sealing strip has been applied in such a way (e.g. with two parallel and close nozzles so that two streams of sealant fuse together, but one nozzle delivers less amount of sealant than the other) as to form a sealing strip 5 with pear or tear-drop shape. The smaller end of strip 5 may be located so that it functions as the additional strip 5a of Fig. 11a to reinforce the retaining strip 4. Fig. 11c shows a further embodiment in which the sealing strip 5 is placed away from the decorative cap 2 and more towards the retaining lip 4. By this means additional support of the lip 4 may be achieved as has been described for Figs. 11a and b. In Fig. 11d the retaining lip 4 is formed integrally with support strip 3 and is of such a form as to enter a groove in a window frame and retain the gasket 1. In Fig. 11e the retaining function of the retaining lip 4 of Fig. 11a is further enhanced by the incorporation of a rod of elastic material 5A located and adapted to the support strip 3 in such a way that the retaining function of the lip 4 is enhanced.

Claims

1. A sealing gasket, in particular for insertion between a window pane and a window frame, comprising a flexible, elongate support strip of form-stable material; an elastically deformable longitudinal substantially continuous sealing strip at least contacting a side of the support strip; and a plurality of lateral mechanical weaknesses pre-fabricated along the support strip, the mechanical weaknesses extending laterally across the support strip and the sealing strip overlapping the weaknesses at least partially. 5 10
 2. A unit of a frame and a plate, there being a gap between the frame and the plate, further comprising a sealing gasket within the gap, the sealing gasket comprising a flexible, elongate support strip of form-stable material; an elastically deformable longitudinal substantially continuous sealing strip at least contacting a side of the support strip; and a plurality of lateral mechanical weaknesses pre-fabricated along the support strip, the sealing strip forming a seal within the gap. 15 20
 3. The gasket of claim 1 or the unit of claim 2, further comprising a decorative strip applied longitudinally on the support strip, the decorative strip preferably being made from a conformable material. 25
 4. The gasket or the unit of any previous claim, wherein the gasket includes a retaining lip extending away from the support strip. 30
 5. The gasket or the unit according to any previous claim wherein the sealing strip is made from a curable elastomeric sealant. 35
 6. The gasket or the unit according to any previous claim, further comprising a location lip extending away from the sealing strip and located so that the sealing strip is protected when the same is inserted into a gap. 40
 7. A method of producing a sealing gasket, in particular for insertion between a window pane and a window frame; comprising the steps of: producing an elongate support strip from a form-stable material; forming a plurality of lateral mechanical weaknesses along the length of the support strip; and longitudinally at least contacting an elastically deformable substantially continuous sealing strip along the support strip, the sealing strip overlapping the mechanical weaknesses at least partially. 45 50
 8. A method of inserting a gasket into a gap between a frame and a plate, the gasket including a support strip of form-stable material and a elastically deformable, substantially continuous sealing strip 55
- attached thereto, the frame having a corner, the method comprising the steps of: inserting the gasket into the gap to thereby elastically deform the substantially continuous sealing strip to thereby form a seal within the gap which is continuous around the corner.
9. A method of applying a foamable paste to a support including a plurality of openings to form a substantially continuous sealing strip, the sealing strip bridging at least some of the openings.
 10. A method according to any of claims 7 to 9, further comprising the step of forming the sealing strip from a curable elastomeric sealant.
 11. The method according to any of claims 7 to 10, wherein the sealing strip is made of a foam.

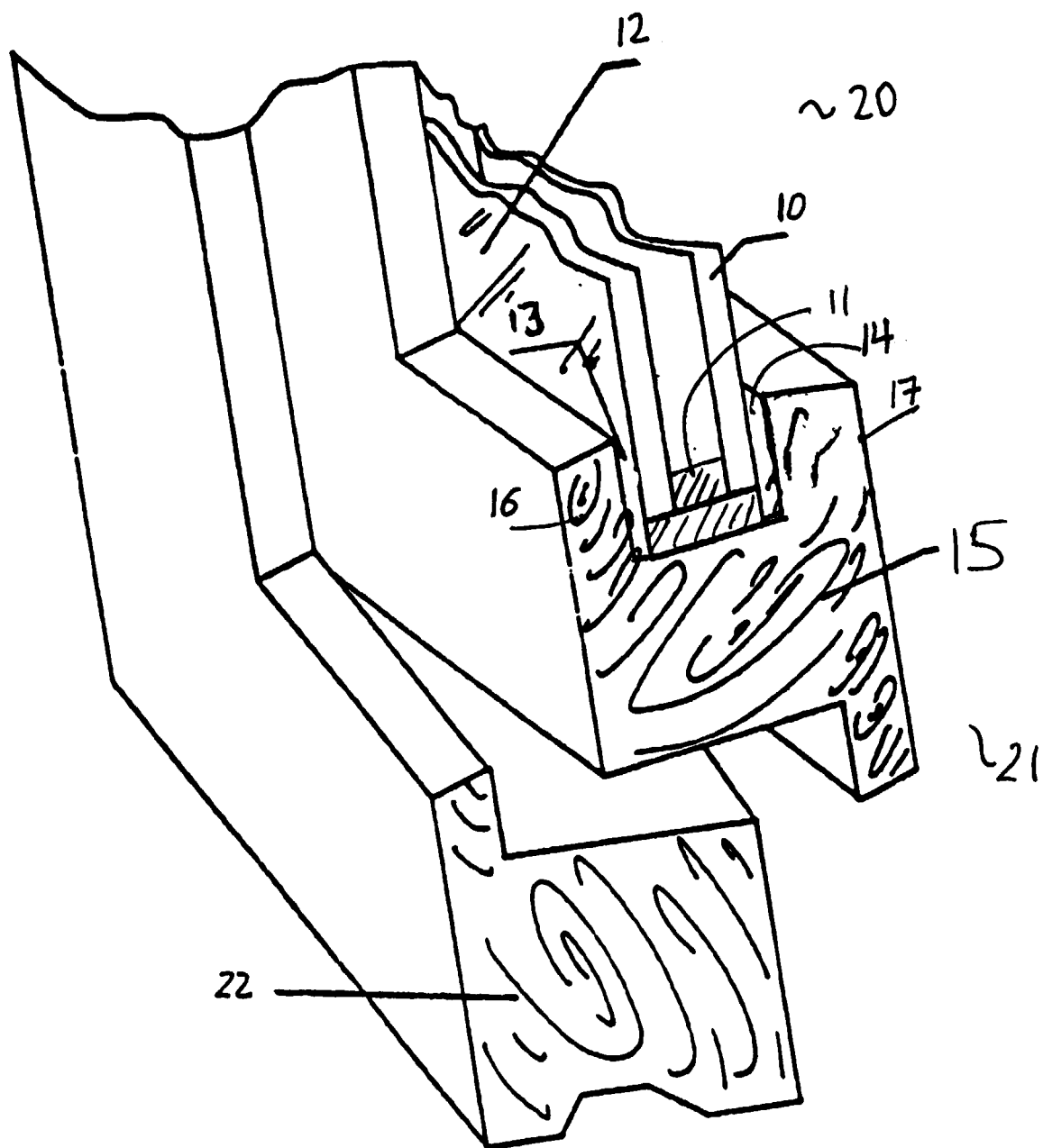
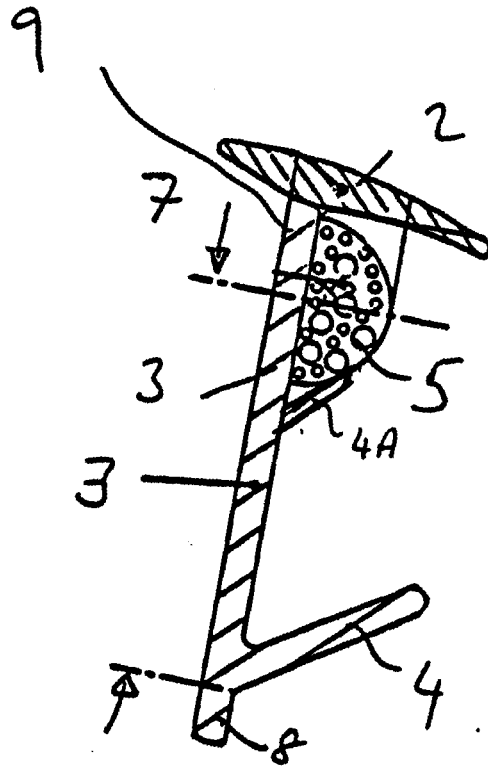
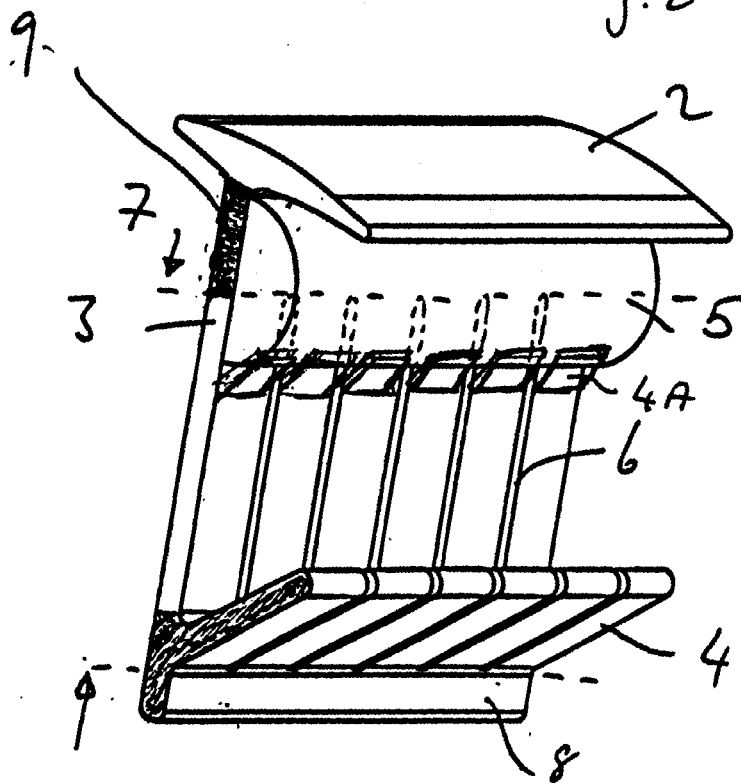


Fig. 1



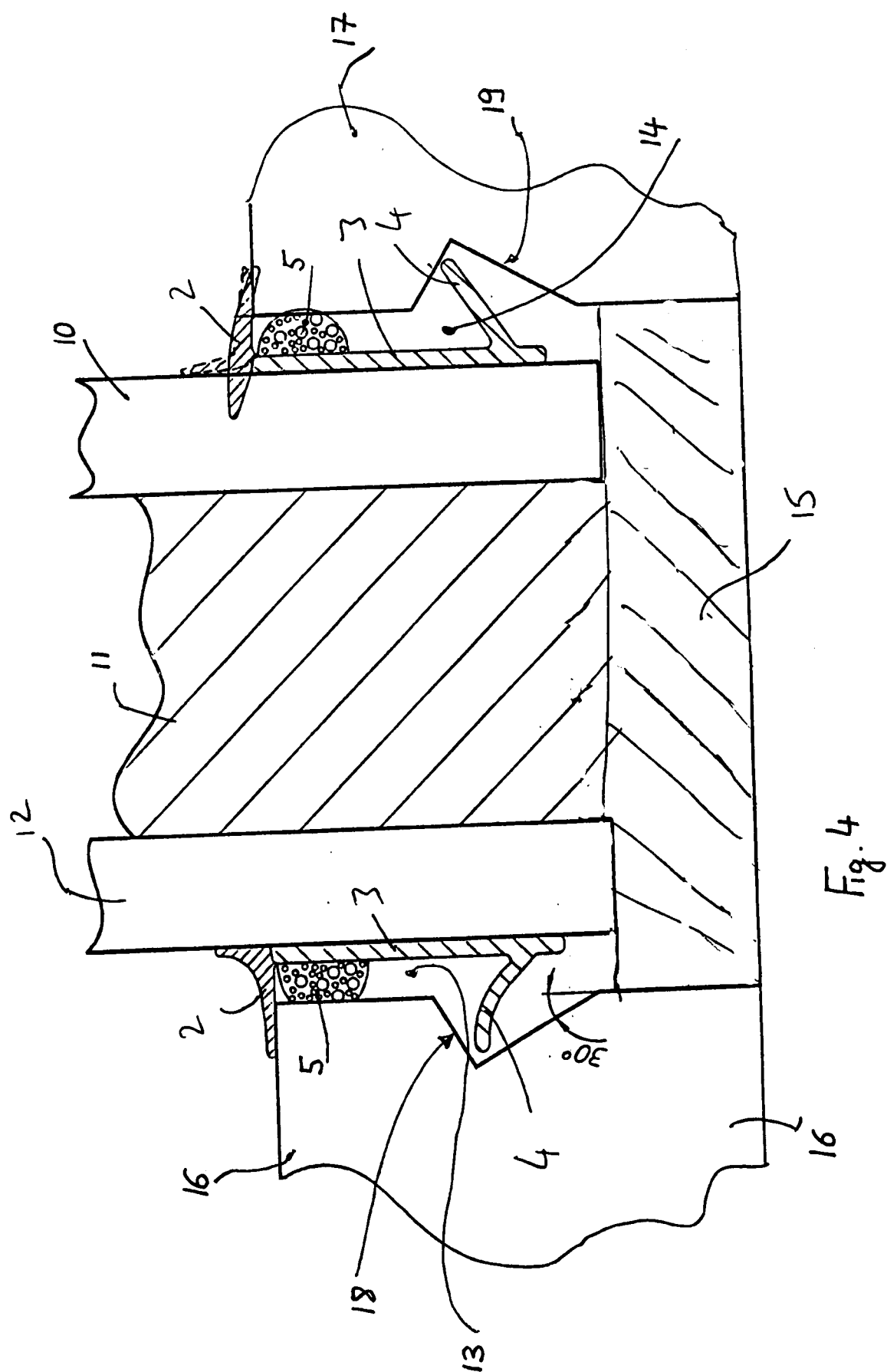
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Fig. 2



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Fig. 3



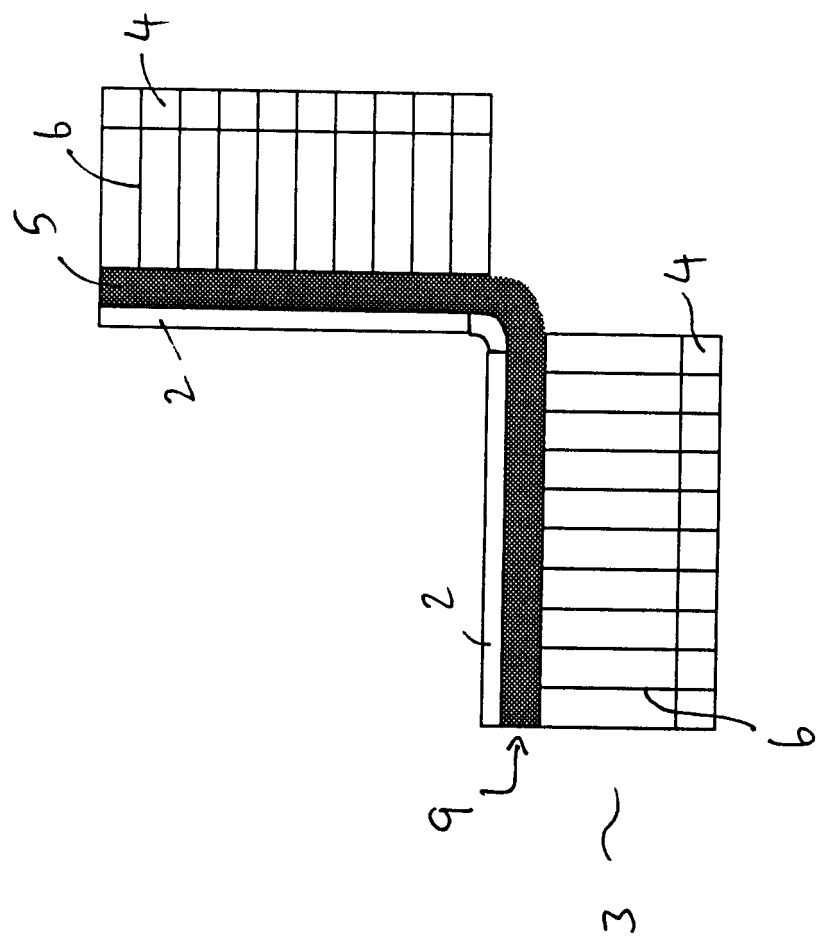


Fig. 5

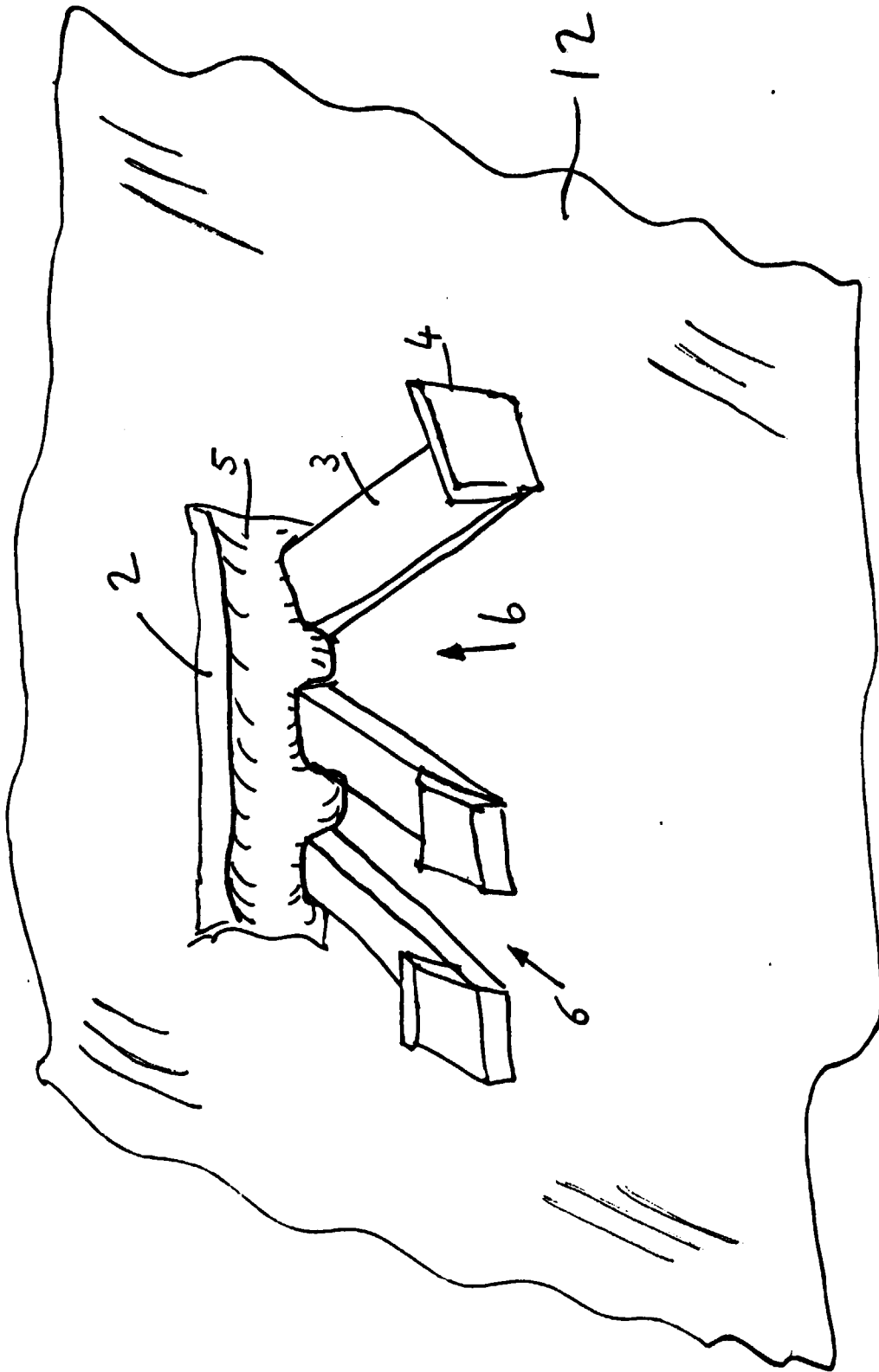


Fig. 6

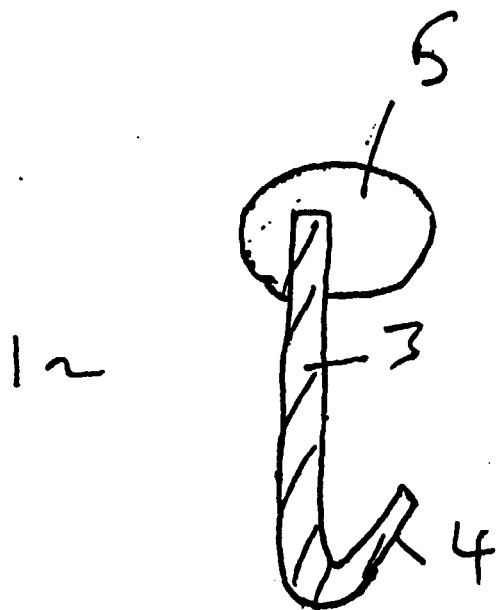


Fig. 7

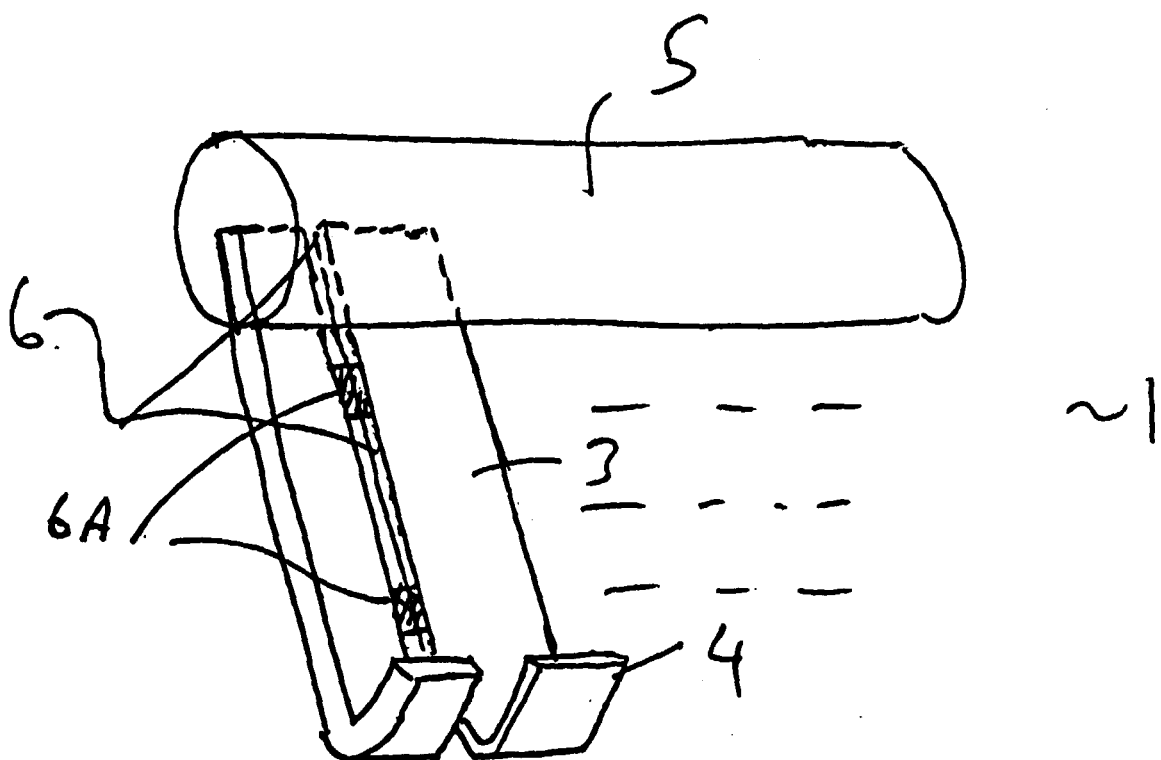


Fig. 8

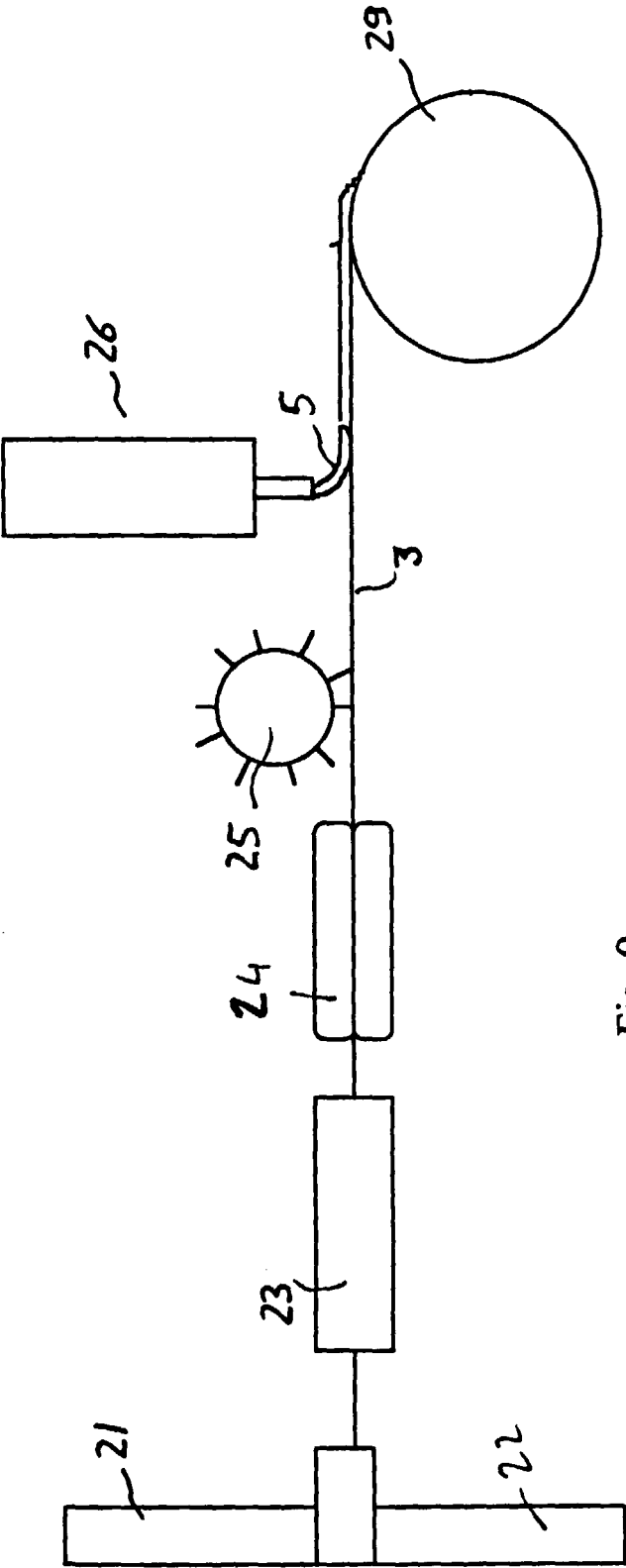


Fig. 9

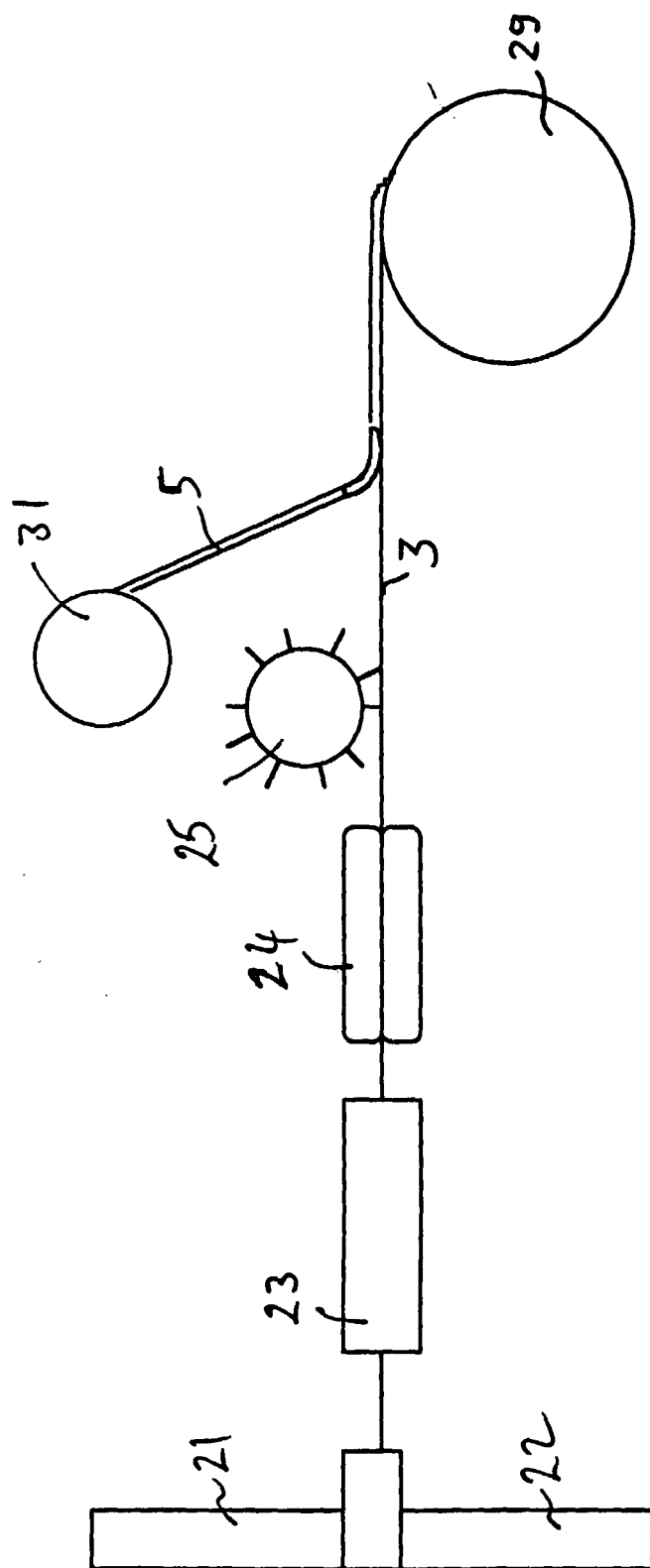


Fig. 10

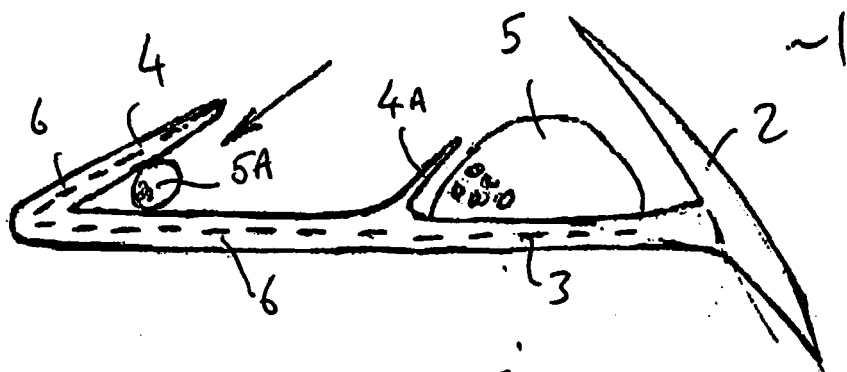


Fig. 11a

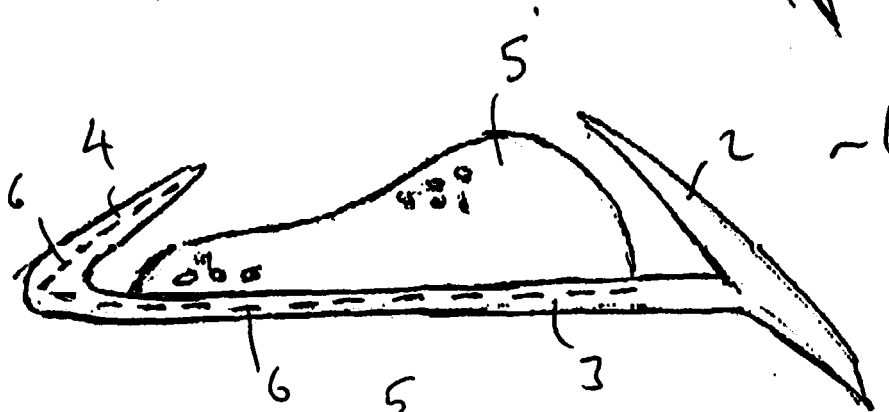


Fig. 11b

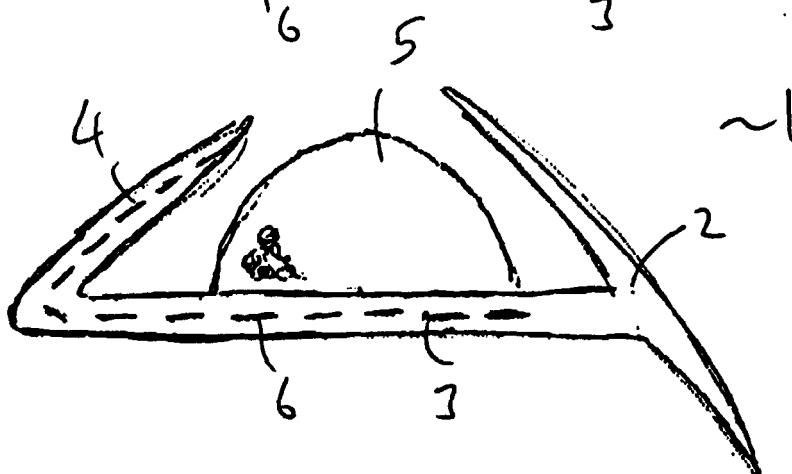


Fig. 11c

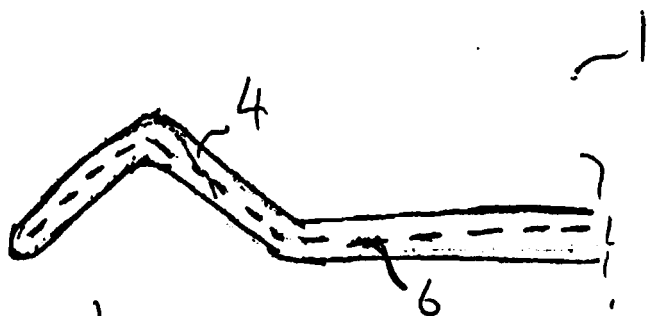


Fig. 11d

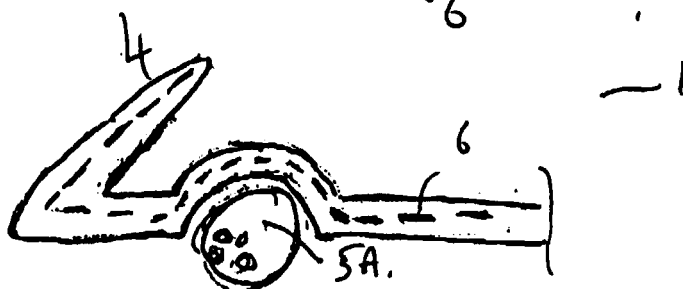


Fig. 11e



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 4252

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 May 1999	Examiner Depoorter, F
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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