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(71) Applicant: **NORSK HYDRO ASA**  
**0240 Oslo (NO)**

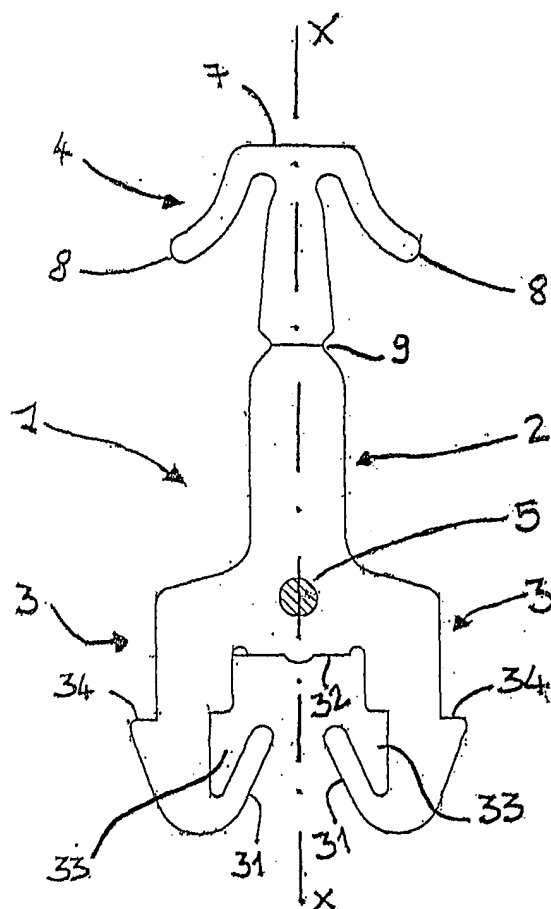
(72) Inventor: **Dampierre, Maurizio**  
**20060 Ornago (Milano) (IT)**

(74) Representative: **Colombo, Stefano Paolo et al**  
**Marchi & Partners S.r.l.**  
**Via Pirelli, 19**  
**20124 Milano (IT)**

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(54) **Reversible seal for an open-joint aluminium door or window frame**

(57) A seal for an open-joint door or window frame is described, said seal comprising a central body, two legs able to engage together with a tooth of a section and a flat top end surface, in which said seal is symmetrical with respect to a longitudinal plane and said top end surface is substantially perpendicular to said longitudinal plane. The seal is shaped so as to allow efficient positioning of ends cut at 90° (so as to form a corner seal) also without the need for a corner piece. In order to improve the sealing action in the corner, the seal parts may be glued to each other.



**Fig. 1**

## Description

**[0001]** The present invention relates to the sector of aluminium door and window frames and in particular relates to a reversible seal for an aluminium door or window frame of the open joint type, a corner piece for use together with said seal and a method for forming a corner seal in an open-joint frame.

**[0002]** For decades aluminium door and window frames which are made by suitably assembling portions of sections have been known. In particular aluminium door and window frames of the double rabbet type or open joint type are known. In this latter type of frame, a central seal - also known as a weatherproof strip - is envisaged, being fixed to the frame. When a leaf of a window, door or the like is closed, it rests against the contact seal. The sealing effect is improved by the difference in pressure between the external environment and the internal environment.

**[0003]** The problem with the contact strips of open-joint door or window frames arises in the region of the corners of the frame. In fact, the seal strip must be suitably connected in the corner zones in order to ensure a perfect heat and water tight seal.

**[0004]** This operation is performed at present by cutting at 45° two parts of the seal and gluing together the end of the two seal parts so as to form an angle of 90°. This solution is simple and advantageous from a cost point of view. However, if gluing is not performed perfectly, sealing of the frame is poor. In any case, with the passing of time, the sealing effect often diminishes because the glued joint deteriorates.

**[0005]** In order to overcome the abovementioned drawback, vulcanized rubber corner pieces are available on the market, these allowing the two seal parts cut at 90° (instead of 45°) to be joined together. In this case also, the ends are glued to the vulcanized rubber corner piece. As a result of the vulcanized rubber corner piece gluing is easier and the sealing effect is improved. The drawback of this solution, however, consists in the cost. Many door and window manufacturers, precisely in order to avoid the cost of the vulcanized rubber corner piece, continue to cut the seals at 45° and simply glue their ends together.

**[0006]** Seals are known from DE 17 09 450 A1 (Zahel, Guenther, Dipl.-Ing.), DE 100 43 544 A1 (Deflex-Dichsysteme GMBH) and DE 202 13 859 U1 (Henkenjohann, Johann).

**[0007]** In particular, Figure 3 of DE 100 43 544 A1 shows two parts of seal cut at 90° which are arranged so as to form an angle of 90°. The seal of DE 100 43 544 A has a "Z" (or "S") cross section which is not reversible. DE 100 43 544 A1 fails to show pieces of seal mounted on respective aluminium sections. The Applicant has noticed that when two parts of such shaped seals are mounted on corresponding 90° assembled aluminium sections, perfect heat and water tight seal is not provided. In fact, there is not a continuous contact between the top

surface of the horizontal seal part and the cross section surface of the vertical seal part. Weak areas or even openings can be formed because of the "S" or "Z" cross sectional shape of the seal. Heat and/or water is not prevented to pass through such weak areas or openings. The seal of DE 100 43 544 A1 has a "Z" (or "S") shaped central body but it has not two separate legs able to engage together with a tooth of an aluminium section. The seal is not symmetrical with respect to a longitudinal plane and the top end surface of the seal is not perpendicular to the longitudinal plane.

**[0008]** The object of the present invention, in the light of the known solutions which are not entirely satisfactory, is to provide a shaped seal in such a way as to allow joining together, in an effective manner, of the two ends cut at 90° and the formation of a right angle also without the need for a corner piece.

**[0009]** The above object, together with others, is achieved by a seal for an open-joint aluminium door or window frame which is substantially symmetrical with respect to a longitudinal plane and is therefore reversible.

**[0010]** Conveniently, the seal according to the invention is more rigid along the legs which are used to join the seal to the section and along the main body and is softer in the region of its head portion, so as to ensure a better sealing action.

**[0011]** In order to improve the sealing effect in the corner, the two seal parts may be glued to each other.

**[0012]** According to a first aspect, a seal for an open-joint door or window frame, for example made of aluminium, is provided, said seal comprising a central body, two legs able to engage together with a tooth of a section and a head portion with a flat top end surface. The seal is symmetrical with respect to a longitudinal plane and the top end surface is substantially perpendicular to the longitudinal plane.

**[0013]** Preferably, the legs terminate substantially in the form of an arrow head.

**[0014]** The seal preferably also comprises two lugs which project from said top end surface.

**[0015]** The seal preferably also comprises a wire for limiting the extension of the said seal. The wire may be positioned along the longitudinal plane of symmetry, in the terminal part of the central body, in the vicinity of the legs. Typically it extends over the entire length of the seal.

**[0016]** Conveniently, the seal is formed so that it is more rigid along the legs and the central body and is softer in the region of the head portion.

**[0017]** According to another aspect, the present invention provides a corner piece able to be used with two seal parts according to any one of the preceding claims so as to form a corner seal in an open-joint frame, and comprises a solid body with two outer edges and two inner edges perpendicular to each other. An engaging seat is formed along at least one of the outer edges so as engage with a tooth of the section on which the corner piece is mounted.

**[0018]** The engaging seat is preferably substantially

U-shaped, preferably with pointed free ends.

**[0019]** Suitably shaped lugs for surrounding the ends of the two seal parts are preferably provided along the inner edges of the corner piece.

**[0020]** According to a third aspect, the present invention provides a method for forming a corner seal in an open-joint frame, comprising the steps of: providing a first and a second seal part as defined above; cutting at 90° at least one end of said first and second seal part; engaging the legs of the first seal part with a tooth of a first section and arranging the end of the first seal part, cut at 90°, substantially against a corresponding tooth of the second section; engaging the legs of the second seal part with the tooth of the second section and arranging the end of the second seal part, cut at 90°, substantially against the top end surface of the first seal part.

**[0021]** The method comprises preferably also the step of gluing the first seal part to the second seal part along the top end surface of the first seal part.

**[0022]** A detailed description of the invention now follows, provided purely by way of a non-limiting example, to be read with reference to the accompanying illustrations in which:

- Figure 1 is a view, on a larger scale, of an embodiment of the seal according to the present invention;
- Figure 1 a is a view, on a larger scale, of a frame portion and open-joint leaf with the seal according to Figure 1;
- Figure 2 shows an axonometric view of a corner piece able to be used in combination with the seal according to the present invention;
- Figures 3, 4 and 5 show various steps by means of which a corner seal is formed in an open-joint frame;
- Figures 6a, 6b, 6c show various working steps for forming, in a corner of an open-joint door or window frame, a corner seal by means of two seal parts according to the invention cut at 90°.

**[0023]** An embodiment of the seal 1 according to the present invention is shown in cross-section in Figure 1. The seal 1 comprises an elongated central body 2, two legs 3 and a head portion 4. The seal 1 has a form which is substantially symmetrical with respect to a longitudinal plane X-X. Preferably there is a constriction or neck 9 between the central body 2 and the head portion 4.

**[0024]** The two legs 3 form a U (an overturned U in Figure 1). Each leg 3 terminates in an arrow head for engaging with a T-shaped tooth 20 of a section 21 as shown in Figure 1a. In particular, in the embodiment shown in Figure 1, each leg 3 is provided with a flexible finger 31 directed towards the inside of the U, in particular directed towards a flat end surface 32 of the U. A seat 33 is envisaged in the leg 33 for each flexible finger 31. During joining of the seal 1 to the section 20, the finger 31 is housed inside its seat 33 and then returns substantially into the initial position when joining together of seal and section has been completed (Figure 1 a). Conven-

iently, the arrow head of each leg defines a shoulder 34 able to co-operate with another tooth of the section 21, as shown again in Figure 1 a.

**[0025]** A wire 5 is envisaged, being embedded in the seal 1, in order to limit the length of the said seal. Preferably, the wire 5 is situated along the longitudinal plane X-X, in the terminal part of the central body 2, in the vicinity of the legs 3. The wire 5 extends along the whole length of the seal 1.

**[0026]** The head portion 4 comprises a top end surface 7 and two lugs 8. The top end surface 7 is preferably flat and substantially perpendicular to the longitudinal plane X-X. The two lugs 8 are symmetrically inclined with respect to the longitudinal plane X-X and extend from the ends of the top end surface.

**[0027]** Preferably, the piece 1 is made of rubber by means of an extrusion process. Suitable materials may be EPDM and silicone, without in any way being limited to these.

**[0028]** Conveniently, according to a preferred embodiment, the seal 1 is formed so as to have a more rigid part and a softer part. Preferably, the more rigid part and the softer part are made of the same material, but the density is suitably changed in the two parts. The more rigid part is that of the legs 3 which engage with the tooth of the section and the central body 2. The softer part is that of the head portion 4 which provides the sealing effect by means of the lugs 8.

**[0029]** Therefore, according to the invention, a seal which is symmetrical with respect to the plane X-X and therefore reversible is provided. The shape of the seal according to the invention allows it to be snap-engaged onto the tooth 20 of the section 21 without positioning problems. Mounting of the seal 1 is therefore more rapid than mounting of known seals for open-joint frames.

**[0030]** As will be easily understood by a person skilled in the art, the seal 1 according to the present invention allows the formation of corners by cutting at 90° two seal parts, indicated by 1H and 1V. Hereinbelow, the letter "H" will be used to indicate a horizontal component and the letter "V" a vertical component. Reference should in any case be made to Figures 6a, 6b, 6c and 6d for a better understanding. As regards the horizontal seal part 1 H, it is obvious that the central body 2 and the head portion 4 will rest against the upper surface of the T-shaped tooth 20V of the vertical section 21V, with which same tooth 20V the vertical seal part 1V engages. Before arranging the horizontal seal part 1 H next to the vertical part 21V, glue may be added, as shown in Figure 6a. As regards the vertical seal part 1V, it is obvious that the central body 2 and the head portion 4 will rest against the top end surface 7 of the horizontal seal part. A corner seal with a sealing performance better than that of the known seals is thus created simply (performing 90° cuts is easier to perform than 45° precision cuts) and cheaply. The seal parts 1 H and 1V may, if necessary, be glued together, as shown in Figure 6c.

**[0031]** Therefore, differently from the seal of DE 100

43 544 A1, having a "Z" (or "S") shaped central body, in the seal according to the present invention the rectilinear central body 2 and the head portion 4 rest against the top surface of the T-shaped tooth 20V of the vertical section 21V. This results in a perfect heat and water tight seal between the T-shaped tooth 20V and the cross section surface of the seal. In the seal of DE 100 43 544 A1 water and/or moisture can pass through. In the seal of the present invention there is provided a full sealing both in vertical and in horizontal directions.

**[0032]** The present invention also provides a corner piece 10 able to be used with the seal 1 in order to form corner seals in open-joint frames. The corner piece 10 makes it even easier, more practical and convenient to form the abovementioned corners and improves the aesthetic appearance of the said corners. Conveniently, the corner piece 10, which is shown in Figure 2, is made of rubber, preferably by means of moulding. Preferably, it is made of a material having rigidity properties similar to the material used for the legs of the seal 1. According to a preferred embodiment, the corner piece 10 is made of the same material used for the legs of the seal 10. In particular, the corner piece 10 is made of nylon or EPDM.

**[0033]** The corner piece 10 comprises a solid body with two outer edges 11, 12 and two inner edges 13, 14 perpendicular to each other. An engaging seat 15 is formed along at least one of the outer edges 11, 12 so as to engage with a tooth of the section on which the corner piece 10 will be mounted. The engaging seat 15 is substantially U-shaped, preferably with two arrow-head legs or the like. The inner edges 13, 14 form surfaces against which the ends of a horizontal seal and vertical seal rest. Conveniently, suitably shaped lugs 13', 14' are provided along the inner edges 13, 14.

**[0034]** The surfaces of the edges 13, 14 and if necessary the facing surfaces of the lugs 13', 14' form gluing areas. Glue is spread over the gluing areas so as to glue the horizontal seal 1 H and the vertical seal 1V to the corner piece 10.

**[0035]** Figures 3, 4 and 5 show various steps by means of which a corner of a seal in an open-joint frame is formed. The corner piece 10 is inserted (Figure 3), causing the engaging seat 15 to engage with the seal engaging tooth 20H of the section 20.

**[0036]** Then (Figure 4) glue 18 is preferably spread over the gluing areas 13, 13', 14, 14' of the corner piece 10. Finally, two seal parts 1 H, 1V, cut at 90°, are engaged with the respective teeth 20H, 20V of the horizontal section and the vertical section and pushed against the corner piece 10. A precise, lasting and aesthetically pleasing glued joint is thus obtained.

## Claims

1. Seal (1) for an open-joint door or window frame, comprising a central body (2), two legs (3) able to engage together with a tooth (20) of a section (21) and a

head portion (4) with a flat top end surface (7), in which said seal (1) is symmetrical with respect to a longitudinal plane (X-X) and said top end surface (7) is substantially perpendicular to said longitudinal plane (X-X).

2. Seal (1) according to Claim 1, in which said legs (3) terminate substantially in the form of an arrow head.

3. Seal (1) according to Claim 1 or 2, in which it also comprises two lugs (8) which project from said top end surface (7).

4. Seal (1) according to any one of the preceding claims, in which it also comprises a wire (5) for limiting the extension of the said seal.

5. Seal (1) according to Claim 4, in which the wire (5) is positioned, along the longitudinal plane of symmetry (X-X), in the terminal part of the central body (2) in the vicinity of the legs (3).

6. Seal (1) according to any one of the preceding claims, **characterized in that** it is formed so that it is more rigid along the legs (3) and the central body (2) and is softer in the region of the head portion (4).

7. Corner piece (10) able to be used with two seal parts (1H, 1V) according to any one of the preceding claims so as to form a corner seal in an open-joint frame, comprising a solid body with two outer edges (11, 12) and two inner edges (13, 14) perpendicular to each other, an engaging seat (15) for engaging with a tooth (21 H, 21V) of the section (20H, 20V) on which the corner piece (10) is mounted being formed along at least one of the outer edges (11, 12).

8. Corner piece (10) according to Claim 7, in which the engaging seat (15) is substantially U-shaped, preferably with pointed free ends.

9. Corner piece (10) according to Claim 7 or 8, in which suitably shaped lugs (13', 14') for surrounding the ends of the two seal parts (1H, 1 V) are provided along the inner edges (13, 14).

10. Method for forming a corner seal in an open-joint frame, comprising the steps of:

- providing a first and a second seal part (1H, 1 V) according to any one of Claims 1-6;
- cutting at 90° at least one end of said first and said second seal part (1 H, 1 V);
- engaging the legs (3) of the first seal part (1 H) with a tooth (20H) of a first section (21 H) and arranging the end of the first seal part (1H), cut at 90°, substantially against a corresponding tooth (20V) of the second section (21V);

- engaging the legs (3) of the second seal part (1V) with the tooth (20V) of the second section (21V) and arranging the end of the second seal part (1V), cut at 90°, substantially against the top end surface (7) of the first seal part (1 H). 5

**11.** Method according to Claim 10, also comprising the step of gluing the first seal part (1H) to the second seal part (1V) along the top end surface (7) of the first seal part (1 H). 10

**12.** An open-joint door or window frame comprising at least a vertical section (1V) and a horizontal section (1H) which are connected together as to form an angle of 90°, wherein said vertical section (1V) comprises a T-shaped tooth (20V) having a top surface, wherein said horizontal section (1H) comprises a T-shaped tooth (20V) having a top surface, wherein a first length of seal is connected with either one of said horizontal section and said vertical section, and wherein a second length of seal is connected with either one of said vertical section and said horizontal section, respectively, wherein each length of seal comprises a central body (2), two legs (3) engaging together with one of the section teeth (20H, 20V) and a head portion (4) with a flat top end surface (7), in which said seal (1) is symmetrical with respect to a longitudinal plane (X-X) and said top end surface (7) is substantially perpendicular to said longitudinal plane (X-X). 15  
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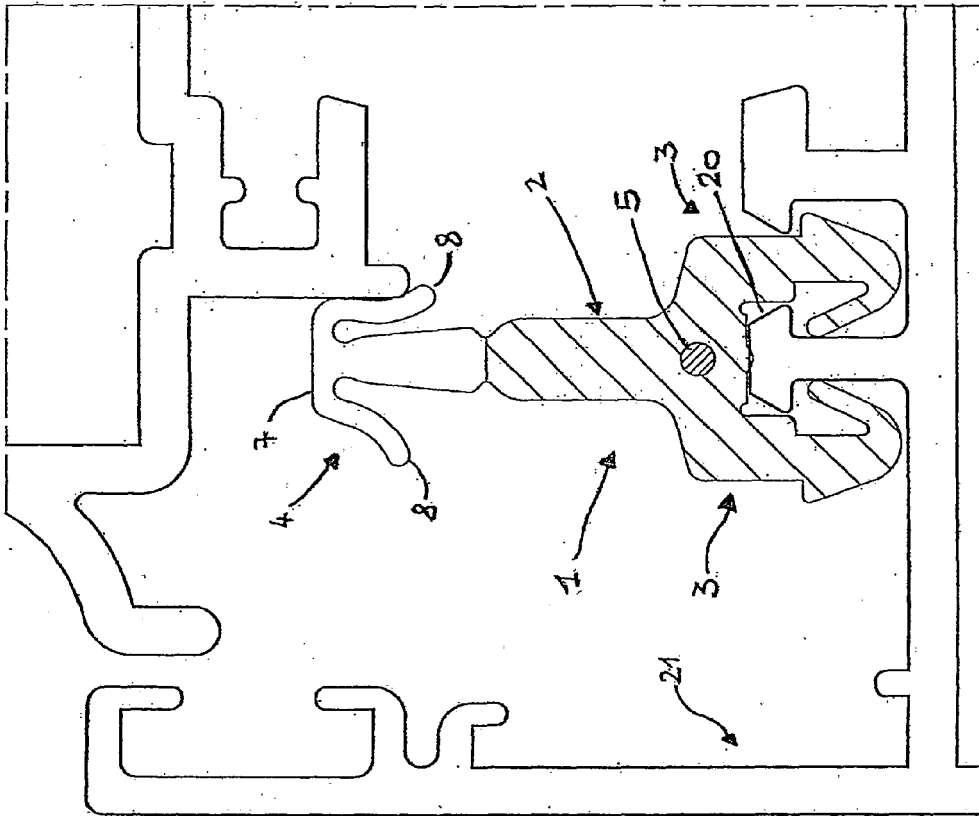


Fig. 1a

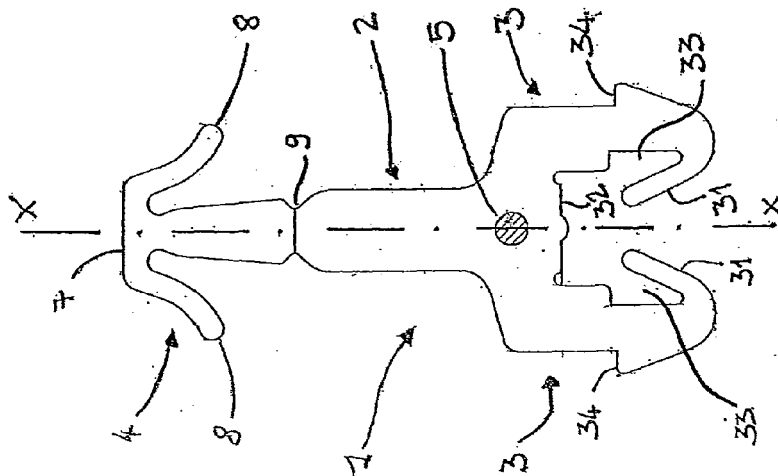


Fig. 1

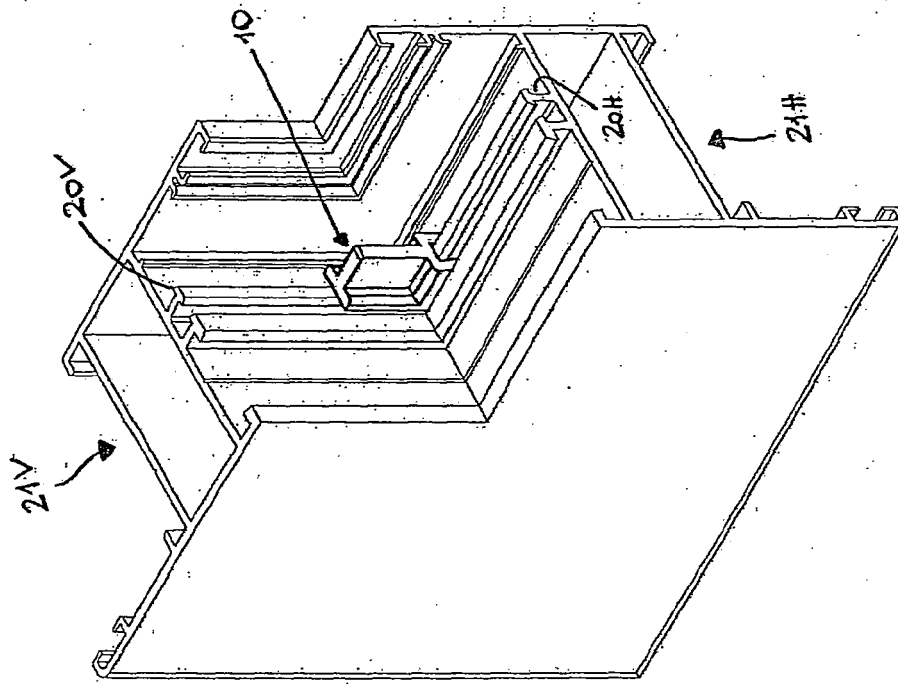


Fig. 3

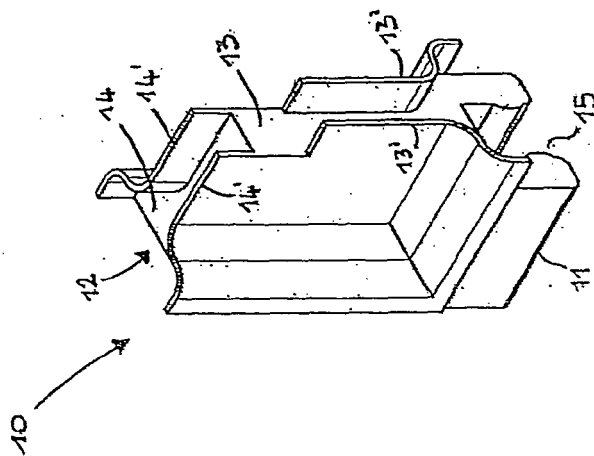


Fig. 2

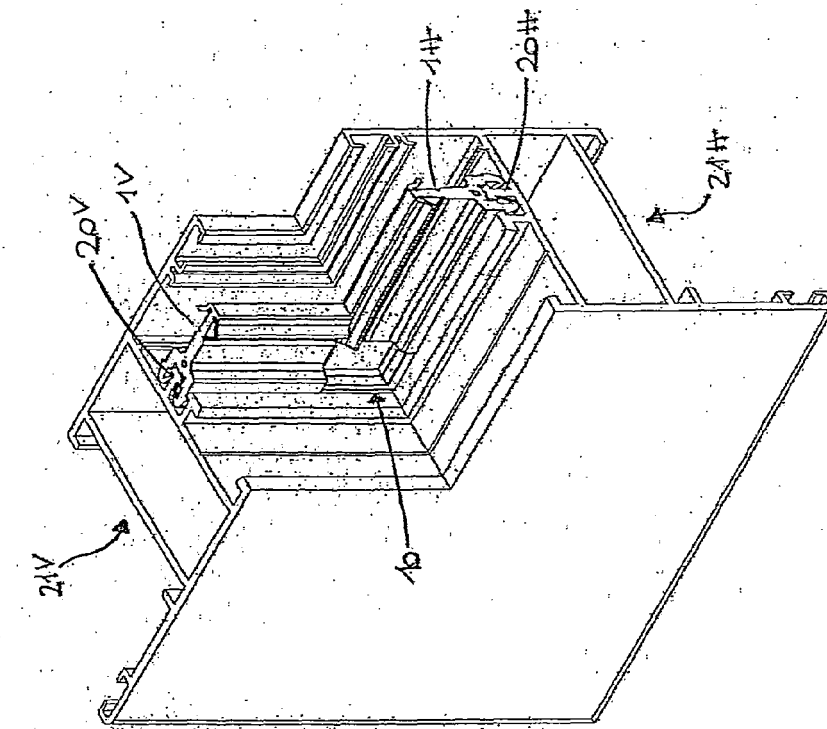
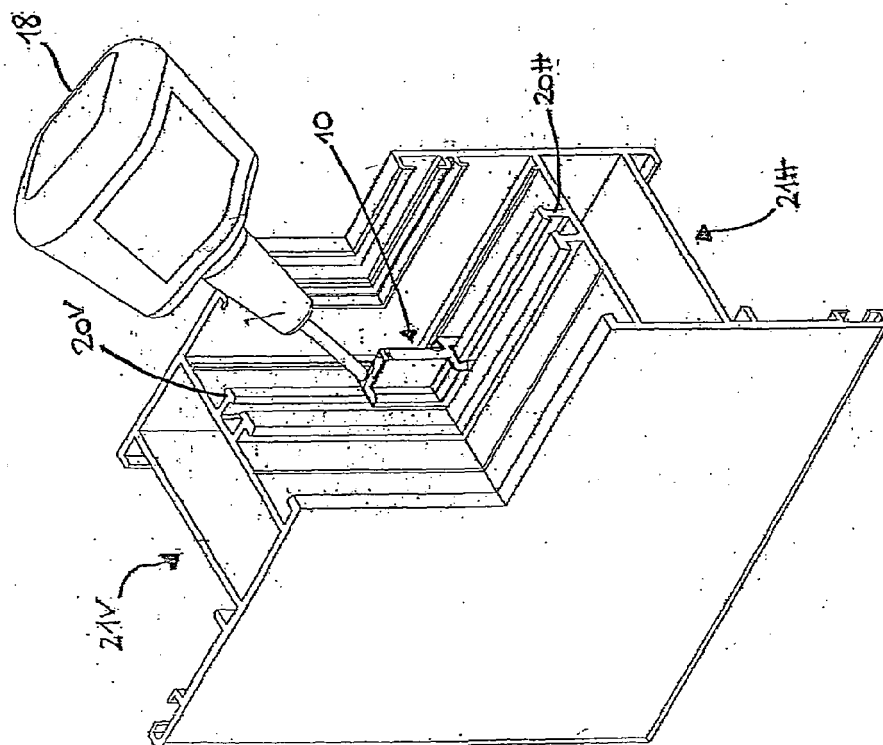
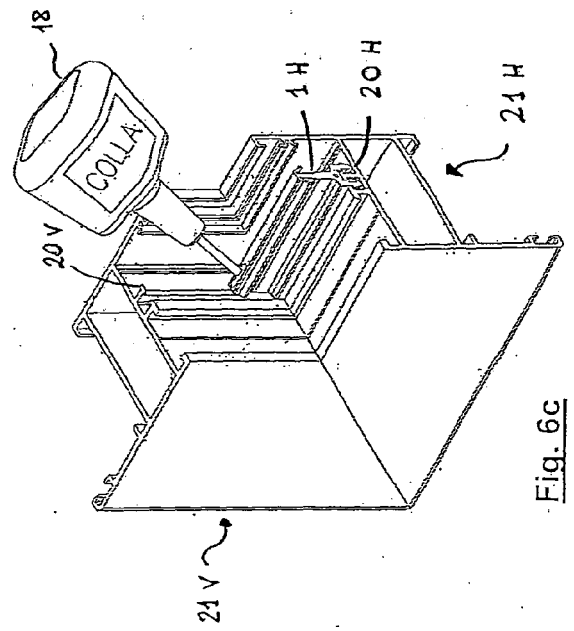
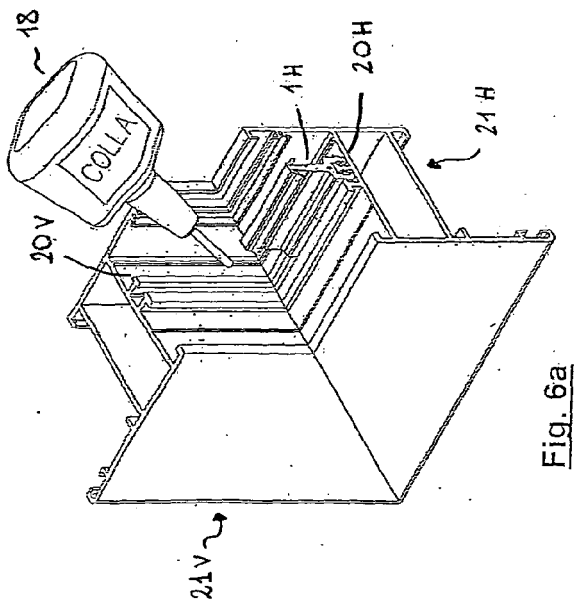
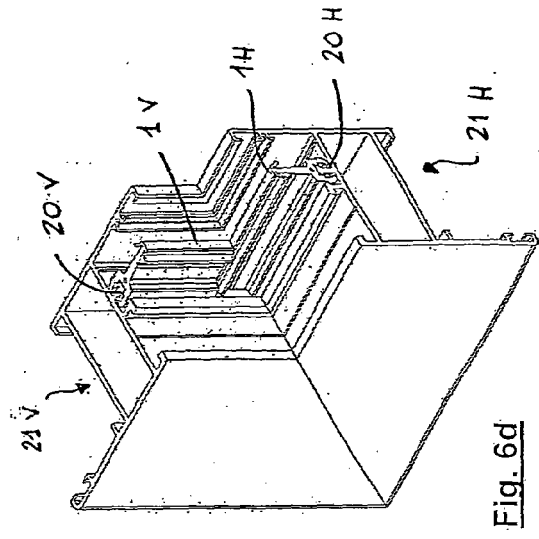
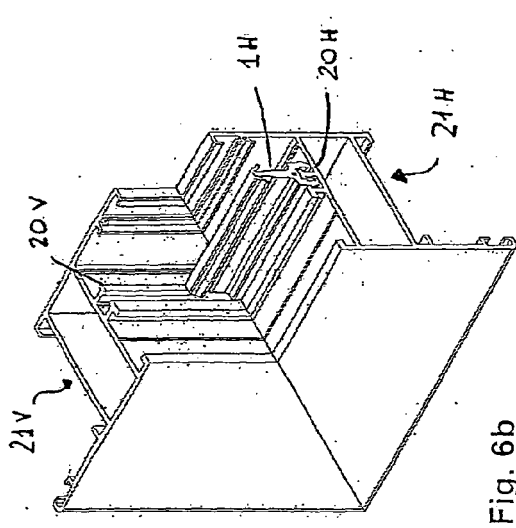


Fig. 5



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European Patent  
Office

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Application Number  
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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                             |                                  |                                         |
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