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(54) WINDOW OR DOOR PROFILE AND METHOD FOR COMPOSING SUCH PROFILE AND DEVICE APPLIED THEREBY

(57) Window or door profile that is composed of two half-shells (6) in the form of profiles made from a metal such as aluminium or steel which are connected by an insulator (7) in the form of a profile made from a hard thermally insulating material, whereby the half-shells (6) are provided with an undercut groove (8) delimited by at least one deformable lip and whereby the undercut grooves (8) of the half-shells (6) are located opposite each other and with their openings facing each other, whereby the longitudinal edges (12) of the insulator (7) are only clampedly held in line with the undercut grooves (8) of the half-shells (6), **characterised in that** the insulator (7) substantially has the shape of a slat cut from a flat sheet, the longitudinal edges (12) of which are elastically clamped in the grooves (8) of the half-shells (6) by elastic deformation of the at least one deformable lip without plastic deformation of the material of the half-shells (6) around the grooves (8).

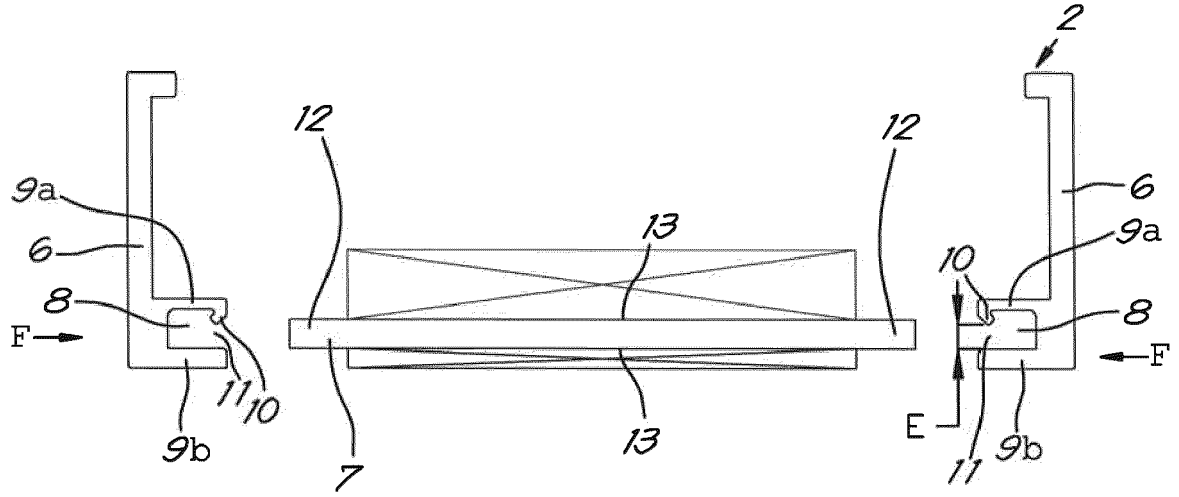

Fig.3

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Description

[0001] The present invention relates to a window or door profile.

[0002] In particular, the invention is intended for an insulated composed window or door profile that is composed of two half-shells in the form of profiles from a metal such as aluminium or steel which are connected to each other by an insulator in the form of a profile made from a hard thermally insulating material, whereby the half-shells are provided with an undercut groove delimited by at least one deformable lip and whereby the longitudinal edges of the insulator are clampedly held in the undercut grooves (8) of the half-shells.

[0003] To this end, conventionally the insulator is provided with longitudinal edges with a dovetailed cross-section and the longitudinal edges are clamped in the grooves (8) of the half-shells through plastic deformation of the deformable lip by bending over the lip by rolling in or the like, resulting in the permanent clamping of the dovetailed longitudinal edge.

[0004] The current insulators have extruded profiles with a relatively complex spatial shape, such that extrusion is required, such that the choice of materials is limited to materials with a low melting temperature.

[0005] Consequently said insulators are, for example, not suitable for application in fire-resistant or fire-retardant windows and doors.

[0006] Moreover, the method for rolling in the dovetailed longitudinal edges is relatively complex and requires a relatively complex machine.

[0007] Moreover, for every insulator width a separate extrusion mould is required.

[0008] The purpose of the present invention is to provide a solution to one or more of the aforementioned and other disadvantages.

[0009] To this end, the invention relates to a window or door profile that is composed of two half-shells in the form of profiles made from a metal such as aluminium or steel which are connected by an insulator in the form of a profile made from a hard thermally insulating material, whereby the half-shells are provided with an undercut groove delimited by at least one deformable lip and whereby the undercut grooves of the half-shells are located opposite each other and their openings face each other, whereby the longitudinal edges of the insulator are only clampedly held in the undercut grooves of the half-shells, characterised in that the insulator substantially has the shape of a slat cut from a flat sheet, the longitudinal edges of which are elastically clamped in the grooves of the half-shells by elastic deformation of the at least one deformable lip without plastic deformation of the material of the half-shells around the grooves.

[0010] Because a substantially flat slat is used as insulator, its production does not necessarily require extrusion, such that the associated limitations in the field of materials with a low melting temperature do not apply.

[0011] For example, the insulators can simply be cut from a flat sheet with a thickness that is slightly greater than the opening of the grooves in the half-shells.

[0012] This allows the longitudinal edges of the insulator simply to be pushed into the grooves of the half-shells, such that the deformable lip or the deformable lips of the grooves are pushed slightly apart, just enough for elastically bending the lip or the lips without permanent plastic deformation, but still sufficient to permanently develop a big elastic clamping force for a strong connection between the insulator and the half-shells and to hold the profile together only by clamping without requiring extra means for this such as the use of glue, screws, or the like.

[0013] The connection can thus be realised very easily simply by pushing the grooves of the half-shells transversely over the longitudinal edges of the insulator.

[0014] This therefore implies a very easy method and device to compose such window and door profiles according to the invention.

[0015] Moreover, such insulators are also cheap to produce starting from a sheet wherefrom the insulators can simply be cut to the desired width of the insulator.

[0016] In principle, the cut straight edges do not need any posttreatment such as rounding or chamfering, although this is not excluded, such that production costs can be saved.

[0017] The desired width of the insulator can also simply be cut from the sheet, for example as a function of the thickness of the panel for which the profile is intended.

[0018] According to a preferred embodiment variant, the insulator, which substantially has the shape of a slat cut from a flat sheet, has a width to thickness ratio between 8 and 40. It is understood that such slim insulator requires support against buckling at the time of assembly.

[0019] If necessary a thicker sheet may also be used, whereby the longitudinal edges of the cut insulator are machined to give it the desired thickness for elastic clamping in the grooves of the half-shells or to provide a chamfer or rounding for a better guidance of the insulator upon insertion in a groove of a half-shell.

[0020] The choice of a thicker sheet and thus a thicker insulator allows the strength of the composed profile to be adapted depending on the application, whereby for example in the case of a leaf of a window or door, stronger profiles are needed than for a fixed frame.

[0021] The undercut grooves of the half-shells can be provided with an inwardly protruding edge on the elastic lip and the longitudinal edges of the insulator can be provided with a slit in which the inwardly protruding edge of the half-shells can hook into.

[0022] In case of a profile for a fire-resistant window or fire-resistant door the insulator of a composed profile according to the invention can easily be shielded on one or on both sides by attaching a strip to it which improves the fire-resistant properties. For example, this relates to materials which will start to foam and/or cool down as a result of a chemical reaction when heated.

[0023] Because the insulator is flat, flat strips of said material which are easy to apply by gluing or the like, can

also be used.

[0024] The invention also relates to a simple method for composing a window or door profile starting from two half-shells in the form of profiles made from a metal such as aluminium or steel which are connected to each other by an insulator in the form of a profile made from a hard thermally insulating material, whereby the half-shells are provided with an undercut groove delimited by at least one elastically bendable lip and whereby the longitudinal edges of the insulator are clamped in the undercut grooves of the half-shells, characterised in that the method starts from a substantially flat slat-shaped insulator with longitudinal edges the thickness of which is slightly greater than the width of the opening of undercut grooves, whereby the method comprises the following steps:

- positioning the half-shells at a distance from each other and with the undercut grooves opposite each other and with their openings facing each other;
- positioning the longitudinal edges of the insulator in line with and facing the grooves of the half-shells;
- laterally pressing together the half-shells under pressure for the elastic clamping of the longitudinal edges of the insulator in the grooves by a permanent elastic deformation of the at least one elastically bendable lip;
- supporting the insulator on both sides of the insulator to prevent buckling of the insulator when pressing the half-shells.

[0025] In practice, pressing the half-shells over the longitudinal edges can be realised by guiding the half-shells together with the insulator in between through a narrowing tapering tunnel-shaped guide, the sidewalls of which are symmetrically located relative to a median plane and form a narrowing guide for the half-shells.

[0026] For example, pulling the loose half-shells together with the loose insulator through the tunnel or pushing them through by means of driven pressure rollers suffices then.

[0027] The invention also relates to a device for producing a window or door profile that is composed of two half-shells in the form of profiles made from a metal such as aluminium or steel which are connected to each other by an insulator in the form of a profile made from a hard thermally insulating material, whereby the half-shells are provided with an undercut groove delimited by at least one elastically bendable lip and whereby the longitudinal edges of the insulator are clampedly held in the undercut grooves of the half-shells, whereby the device contains the following:

- alignment and support means for positioning and holding the grooves of the half-shells opposite each other with the longitudinal edges of the insulator opposite the grooves in between;
- pressing means to press the half-shells toward each other for clamping the longitudinal edges of the insulator in the grooves by a permanent elastic deformation of the at least one elastically bendable lip.

[0028] With the intention of better showing the characteristics of the invention, a few preferred embodiments of a composed window or door profile according to the invention and a method and device for the composition applied thereby are described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

figure 1 schematically shows a cross-section in the frame of a glass window composed of profiles according to the invention;
figure 2 separately shows the composed profile according to the invention of figure 1;
figures 3 and 4 show the loose components of the profile of figure 2 for assembly and illustrate the method for composing the profile;
figures 5 to 8 respectively show different variants of a composed profile according to the invention;
figure 9 schematically shows a device according to the invention for composing the profile of figure 2;
figures 10 and 11 show a cross-section, respectively according to the lines X-X and XI-XI;
figure 12 illustrates the use of moulds for application of the method according to the invention;
figure 13 shows the application of the moulds of figure 12 in a device like that of the figures 9 and 10 but in an adapted shape;
figure 14 shows a variant of the moulds of figure 12.

[0029] The window 1 of the cross-section of figure 1 contains a substantially U-shaped window profile 2 according to the invention with two parallel legs between which a glass panel or other panel 3 is integrated in the known way, the edges of which are clamped by means of seals 4 between the legs and rests on glazing bead supports 5.

[0030] The window profile 2 is shown separately in figure 2 and is composed of two half-shells 6 which form the legs of the window profile 2 and an insulator 7 which connect the half-shells 6 with each other.

[0031] The half-shells 6 are made of aluminium or steel or another metal, whereas the insulator 7 is made of a thermally, insulating, hard and rigid material.

[0032] The half-shells 6 are provided with an undercut groove 8 on their facing sides which in this case is delimited by two upstanding lips, respectively 9a and 9b, one lip 9a of which is provided with an inwardly facing edge 10 to form an undercut.

[0033] The openings 11 of the grooves 8 are facing each other.

[0034] The insulator 7 is in this case executed as a flat slat which for example, is cut from a sheet and the longitudinal edges 12 of which are elastically clamped in the grooves 8 of the half-shells 6.

[0035] The half-shells 6 are held together by one single

slat-shaped insulator 7 with a width to thickness ratio between 8 and 40. Such slim insulator allows less material to be used, whereas it is still sufficiently strong in a composed window construction and as a bearer for the glazing bead supports 5.

[0036] The thickness D of the insulator 7 is chosen slightly greater than the width E of the opening 11 of the grooves 8 of the half-shells 6 in unmounted resting condition as shown in figure 3, such that in assembled condition the longitudinal edges 12 of the insulator 7 are clampedly held between the lips 9 of the grooves 8, whereby the clamping force is sufficient to hold the profile in mounted condition in a glass window.

[0037] The shape and the dimensions of the insulator 7 and the grooves 8 are chosen such that said clamping is elastic without permanent plastic deformation of the material of the half-shells 6 around the grooves 8.

[0038] The shape and dimensions required for this can be calculated or experimentally determined.

[0039] The method for composing the window profile 2 is schematically shown in figure 3.

[0040] To this end, the insulator 7 is applied between two support surfaces, whereby the longitudinal edges 12 to be clamped protrude on either side, and the half-shells 6 are positioned on either side of the insulator 7 with the grooves 8 aligned opposite the free longitudinal edges 12 of the insulator 7 as shown in figure 3.

[0041] Subsequently the half-shells 6 are pressed toward each other on the level of the insulator 7 with a force F to clamp the longitudinal edges 12 in the grooves 8, preferably to the end in the grooves 8 as shown in figure 4.

[0042] Upon clamping together, the support surfaces 13 prevent the insulator 7 from buckling up or down.

[0043] The method is thus very simple and does not require a complex shape of the insulator 7.

[0044] For a better guidance of the longitudinal edges 12 in the opening 11 of the grooves 8, the inwardly oriented edges 10 on the lips 9a may be in a slightly diagonal position to form a conical entrance and/or the longitudinal edges 12 of the insulator 7 may be slightly chamfered or rounded as shown in figure 5.

[0045] The example of figure 1 relates to a fire-resistant window 1 whereby on either side of the insulator 7, above and below, a fire-resistant or fire-retardant strip 14 is applied as also shown in figure 5, said strips 14, as is known, having for example foaming and/or cooling properties when exposed to high temperatures as can be the case in case of fire.

[0046] In that case it is recommended that the insulator 7 as well has a higher fire resistance than the current extruded insulators which by definition must be made of extrudable materials with a low melting temperature.

[0047] Thanks to the simple flat shape of the insulator 7 according to the invention, it is not necessary to resort to extrusion of the insulator 7, but a sheet material can be used with a higher melting temperature which is, for example, higher than 300°C.

[0048] An example of such material is a sheet made of polyodice with a thickness of 3 mm.

[0049] Figure 6 shows a window profile 2 according to the invention with a thicker insulator 7 in this case, of which the longitudinal edges 12 to be clamped have been made to the right thickness D by milling or the like to obtain the desired elastic clamping force in the half-shells 6 upon clamping.

[0050] The greater thickness of the insulator 7 between the half-shells 6 allows said composed window profile 2 to be applied for windows 1 with a greater load, for example in the case of a leaf where a greater strength is required than in the case of a fixed frame.

[0051] In the case of figure 6, a slit 15 is additionally developed lengthways in the longitudinal edges 12 of the insulator 7 to be clamped, in which the aforementioned inwardly protruding edge 10 of the lips 9a can hook into as shown in figure 6.

[0052] Figures 7 and 8 show two other variants of a composed window profile 2 according to the invention, in which in this case, one or respectively both, half-shells 6 are made in two parts, with a detachable section 6a.

[0053] Figures 9 and 10 shown an example of a device 16 for application of the method as described above.

[0054] In this example, the device 16 contains two parallel sheets 17 on top of each other and at a distance from each other which form the upper wall 17a and lower wall 17b respectively of a tunnel-shaped guide 18 through which the half-shells 6 and insulator 7 to be pressed together will be guided for application of the method according to the invention, and this in a guide direction A indicated with an arrow A in figure 9.

[0055] The sidewalls of the tunnel-shaped guide 18 are formed by two series of pressure rollers 19, each on another side and symmetrically to a median plane M-M' of the tunnel, whereby the relative distance W between the successive pressure rollers 19 becomes increasingly shorter in a linear way in the aforementioned guide direction from the entrance of the tunnel up to the exit.

[0056] The support surfaces 13 for the insulator 7 are formed by fixed profilings of the upper wall 17a and the lower wall 17b at a distance from each other such that the insulator 7 can be guided through with a minimum of play between the support surfaces 13.

[0057] Guiding grooves 20 are provided in the upper wall 17a for guiding the upper edge of the half-shells 6 in a direction tangential to the pressure rollers 19 with a certain play as shown in dashed line in figure 9.

[0058] In the profiling of the lower support surface 13 of the insulator 7, recesses 21 are provided for supporting the half-shells 6 with the grooves 8 directly opposite the longitudinal edges 12 of the insulator 7.

[0059] There is sufficient space next to the support surfaces 13 for the elastic movement of the lips 9 upon clamping the insulator 7.

[0060] The device 16 is further provided with a drive (not shown in the figures) to push or pull the half-shells 6 through the tunnel together with the insulator 7 in the longitudinal direction in the guide direction A, for example

by means of a wind-up cable on a winch set up downstream from the tunnel.

[0061] The use of the device 1 is very simple and as follows.

[0062] The half-shells 6 are forced through the tunnel with the insulator 7 in between.

[0063] The outsides of the half-shells 6 thereby come into contact with the pressure rollers 19 which gradually force the half-shells 6 more and more in the direction of the median plane M-M' and the insulator 7. The pressure rollers 19 exercise a compressive force F whereby the grooves 8 slide over the longitudinal edges 12 of the insulator 7.

[0064] Figure 10 shows the situation on the level of the first pressure rollers 19 at the entrance of the tunnel where the insulator 7 is still loose, whereas in figure 11 a same situation is shown on the level of the last pressure rollers 19 at the exit of the tunnel where the longitudinal edges 12 of the insulator 7 are completely pushed into the grooves 8 of the half-shells 6 and in this way a ready-for-use composed window profile 2 is obtained that only still needs to be sized to the correct length or may undergo a further finish without however requiring further deformation of the lips 9 of the grooves 8 of the half-shells 6.

[0065] Figures 12 and 13 show a slightly adapted device with a flat upper and lower wall 17a and 17b, whereby in that case moulds are used for supporting the half-shells 6 and the insulator 7 and holding them in line during their passage through the device 16.

[0066] To this end, an outer mould 22 is used in the form of two U-profiles 23 which with their openings facing each other are pulled between the pressure rollers 19 and are supported in a laterally slideable way between the upper and lower wall 17a and 17b of the tunnel.

[0067] Said U-profiles 23 are slid over the half-shells 6 and support the half-shells 6 in a vertical position over the length of the half-shells 6.

[0068] Analogously, the loose insulator 7 is supported in the outer mould 22 by an inner mould 24 with a top mould 24a and a bottom mould 24b with support surfaces 13 between which the insulator 7 is applied and which are mounted in a laterally slideable way between the legs of the outer mould 22.

[0069] The assembly of moulds 22 and 24 with the integrated half-shells 6 and insulator 7 is then guided between the pressure rollers 19 of the device of figure 13, such that the U-profiles 23 of the outer mould 22 together with the half-shells 6 are forced toward each other, ultimately resulting in clamping of the insulator 7 between the half-shells 6 as shown in figure 13.

[0070] A variant of an inner mould 24 is shown in figure 14, whereby in this case the top mould 24a and the bottom mould 24b consist of two loose parts which are each mounted separately in a laterally slideable way in the outer mould 22.

[0071] The drive of the half-shells 6, the insulator 7 and if necessary the moulds 22 and 24 can be done in any way, for example by a wire cable wound on a winch or by the pressure rollers 19 executed as pulling wheels 19 with their own drive.

[0072] It is understood that instead of pressure rollers 19, solid straight tunnel walls can also be applied in teflon or in other material with a low shear strength.

[0073] When in the above a direction or position is indicated such as above/under, lateral, in front of/behind etc. this should not be considered as an absolute indication but more as an indication relative to the figures.

[0074] The present invention is by no means limited to the embodiments described as an example and shown in the drawings, but a window or door profile according to the invention and a method and device for composing such profile can be realised in all kinds of forms and dimensions, without departing from the scope of the invention.

Claims

1. Window or door profile that is composed of two half-shells (6) in the form of profiles made from a metal such as aluminium or steel which are connected by an insulator (7) in the form of a profile made from a hard thermally insulating material, whereby the half-shells (6) are provided with an undercut groove (8) delimited by at least one deformable lip and whereby the undercut grooves (8) of the half-shells (6) are located opposite each other and their openings are facing each other, whereby the longitudinal edges (12) of the insulator (7) are only clampedly held in line with the undercut grooves (8) of the half-shells (6), **characterised in that** the insulator (7) substantially has the shape of a slat cut from a flat sheet, the longitudinal edges (12) of which are elastically clamped in the grooves (8) of the half-shells (6) by elastic deformation of the at least one deformable lip without plastic deformation of the material of the half-shells (6) around the grooves (8).

2. Window or door profile according to claim 1, **characterised in that** the insulator (7) is of the same thickness over its entire width.

3. Window or door profile according to claim 1, **characterised in that** the section of the insulator (7) extending between the half-shells (6) is made thicker than the longitudinal edges (12) clamped in the grooves (8).

4. Window or door profile according to any one of the previous claims, **characterised in that** the longitudinal edges (12) of the insulator (7) are provided with a slit extending in the longitudinal direction and that the elastic lips of the half-shells (6) are provided with an inwardly protruding edge with which the lips are hooked into the aforementioned slit.

5. Window or door profile according to any one of the previous claims, **characterised in that** it is a fire-resistant profile whereby the insulator (7)between half-shells (6) is shielded on one or on both sides by a strip made from fire-resistant or fire-retardant material.

6. Window or door profile according to any one of the previous claims, **characterised in that** it is a fire-resistant profile whereby the insulator (7) is made in a material with a melting temperature that is higher than 300°C.

7. Method for composing a window or door profile starting from two half-shells (6) in the form of profiles made from a metal such as aluminium or steel which are connected to each other by an insulator (7) in the form of a profile made from a hard thermally insulating material, whereby the half-shells (6) are provided with an undercut groove (8) delimited by at least one elastically bendable lip and whereby the longitudinal edges (12) of the insulator (7) are clamped in the undercut grooves (8) of the half-shells (6), **characterised in that** the method starts from a substantially flat slat-shaped insulator (7) with longitudinal edges (12), the thickness of which is slightly greater than the width of the opening (11) of undercut grooves (8), whereby the method comprises the following steps:

- positioning the half-shells (6) at a distance from each other and with the undercut grooves (8) opposite each other and with their openings facing each other;
- positioning the longitudinal edges (12) of the insulator (7) in line with and facing the grooves (8) of the half-shells (6);
- laterally pressing together the half-shells (6) under pressure for the elastic clamping of the longitudinal edges (12) of the insulator (7) in the grooves (8) by a permanent elastic deformation of the at least one elastically bendable lip;
- supporting the insulator (7) on both sides of the insulator (7) to prevent buckling of the insulator (7) when pressing the half-shells (6).

8. Method according to claim 7, **characterised in that** the difference between the thickness of the longitudinal edges (12) of the insulator (7) and the width of the grooves (8) is chosen such that after executing the method, the insulator (7) is clamped permanently elastically in the grooves (8) of the half-shells (6) and this without plastic deformation of the material of the half-shells (6) around the groove.

9. Method according to claim 7 or 8, **characterised in that** pressing the half-shells (6) over the longitudinal edges (12) is realised by guiding the half-shells (6) together with the insulator (7) in between through a narrowing tapering tunnel-shaped guide, the sidewalls of which are symmetrically located relative to a median plane and form a narrowing guide for the half-shells (6).

10. Device for composing a window or door profile that is composed of two half-shells (6) in the form of profiles made from a metal such as aluminium or steel which are connected to each other by an insulator (7) in the form of a profile made from a hard thermally insulating material, whereby the half-shells (6) are provided with an undercut groove (8) delimited by at least one elastically bendable lip and whereby the longitudinal edges (12) of the insulator (7) are clampedly held in the undercut grooves (8) of the half-shells (6) **characterised in that** the device contains the following:

- alignment means for positioning and holding the loose half-shells (6) with their grooves (8) opposite each other with the insulator (7) in between with its longitudinal edges (12) opposite the grooves (8) and support means on both sides of the insulator (7) to prevent buckling of the insulator (7) ;
- pressing means to press the half-shells (6) toward each other for clamping the longitudinal edges (12) of the insulator (7) in the grooves (8) by a permanent elastic deformation of the at least one elastically bendable lip;

11. Device according to claim 10, **characterised in that** the pressing means are formed by a narrowing tapering tunnel-shaped guide the sidewalls of which taper in a guide direction and by a drive to push or pull the half-shells (6) together with the insulator (7) in the longitudinal direction in the guide direction through the tunnel.

12. Device according to claim 10 or 11, **characterised in that** the alignment and support means for the insulator (7) are formed by two support surfaces at a distance from each other which but for a minimum play is equal to the thickness of the insulator (7).

13. Device according to any one of the claims 10 to 12, **characterised in that** the alignment and support means for the half-shells (6) are formed by an outer mould in the form of two U-shaped profiles which are applied around the half-shells (6) with their openings facing each other and at a distance from each other.

14. Device according to claim 12 and 13, **characterised in that** the alignment and support means for the insulator (7) are formed by an inner mould which is applied in a laterally slideable way in the outer mould.

15. Device according to claim 14, **characterised in that** the outer mould and the inner mould extend over the length of the half-shells (6) and insulator (7) to be connected and that the aforementioned drive is provided to pull or push both moulds together with the half-shells (6) and the insulator (7) through the tunnel-shaped guide.

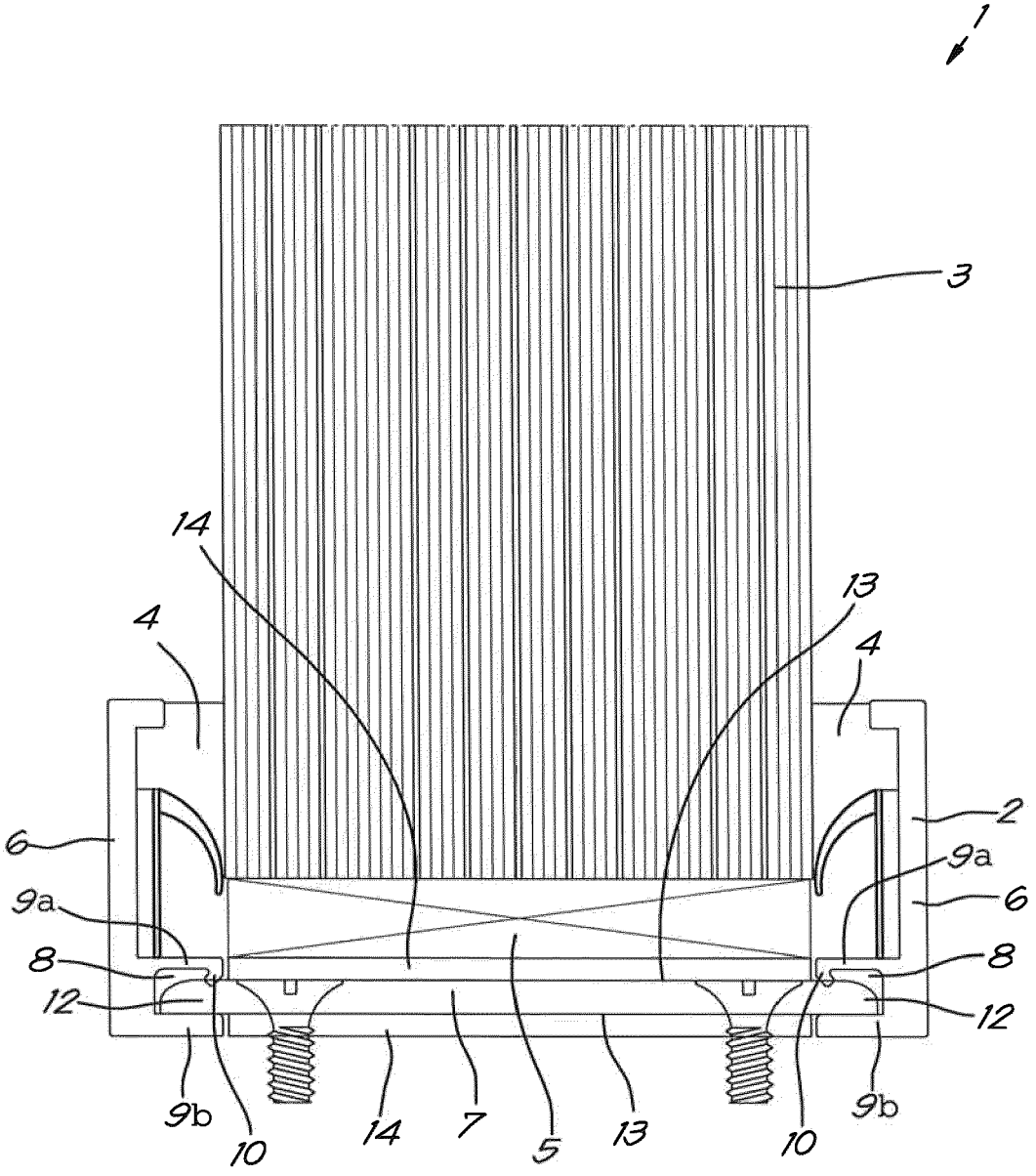


Fig. 1

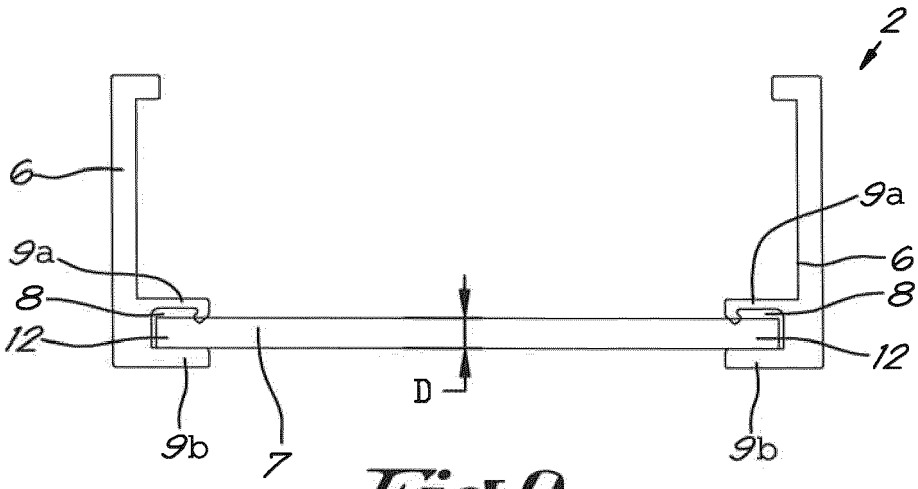


Fig.2

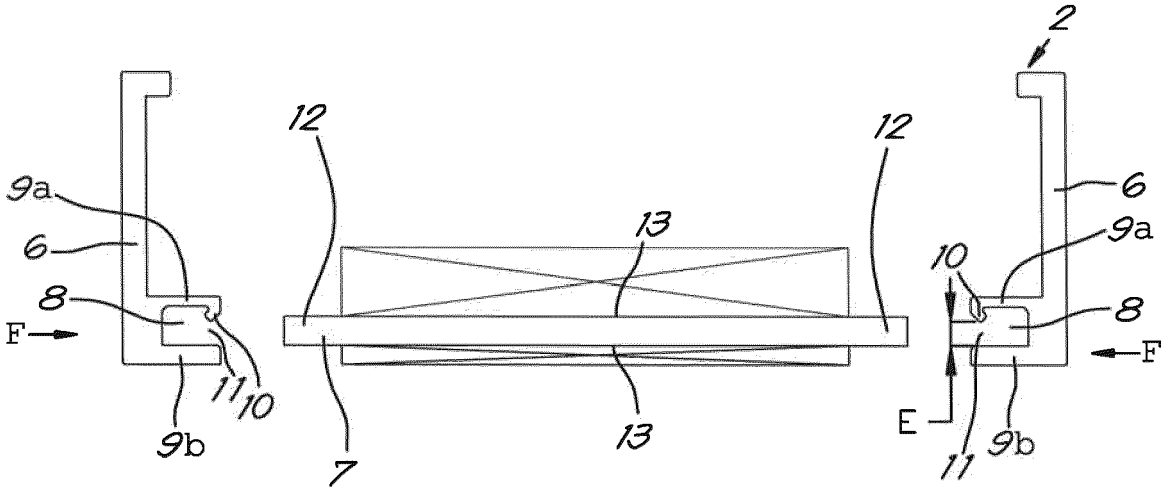


Fig.3

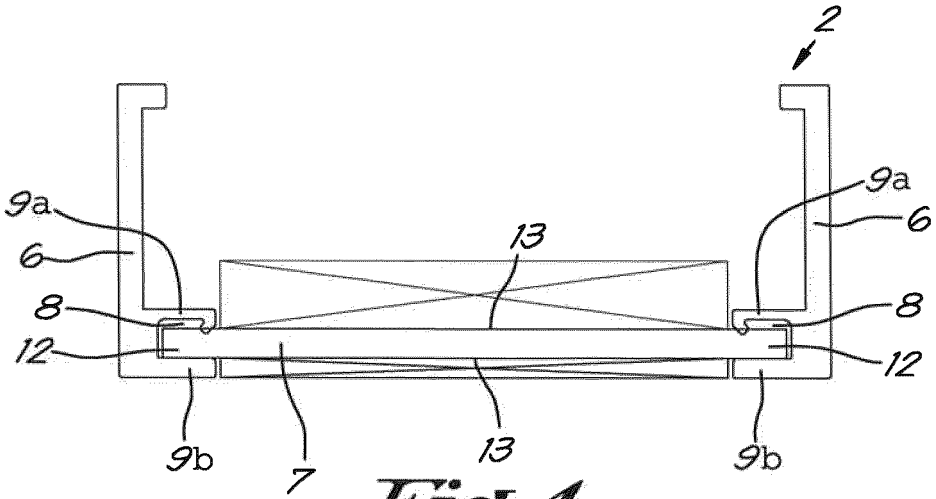


Fig.4

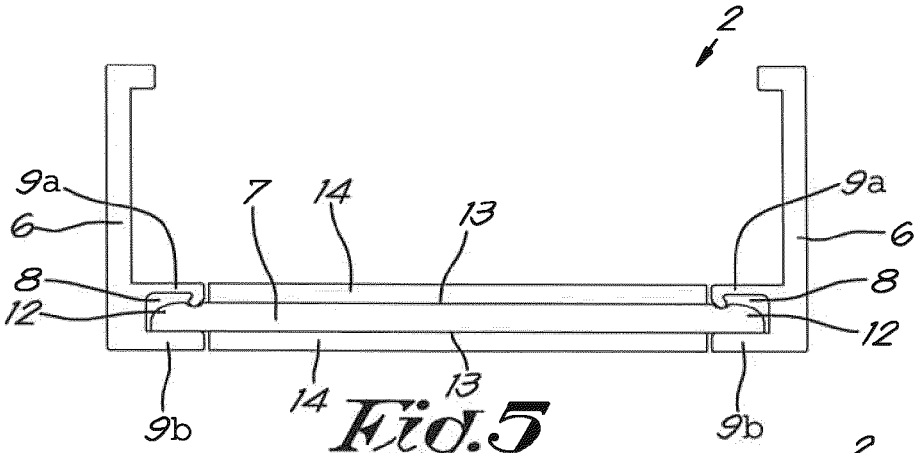


Fig.5

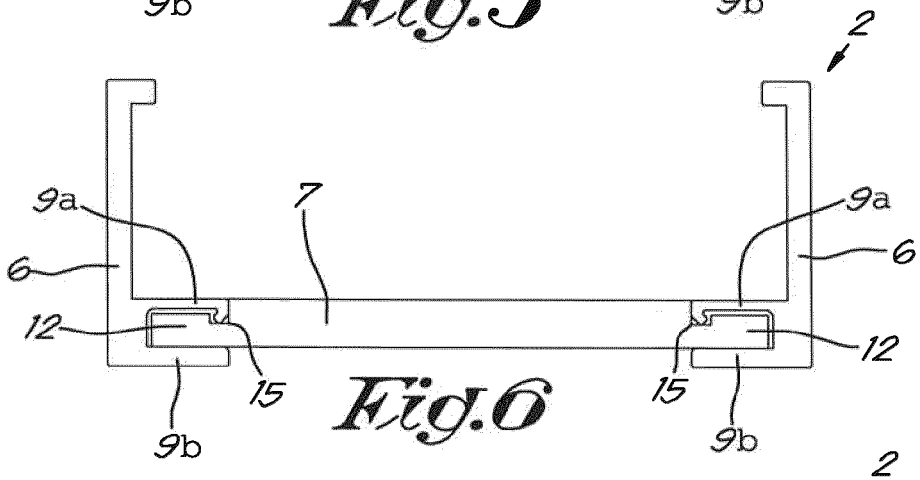


Fig.6

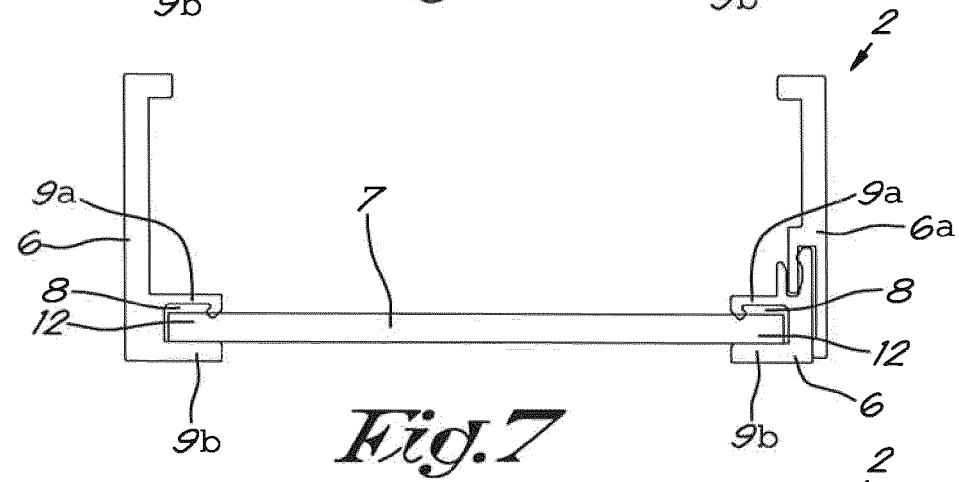


Fig.7

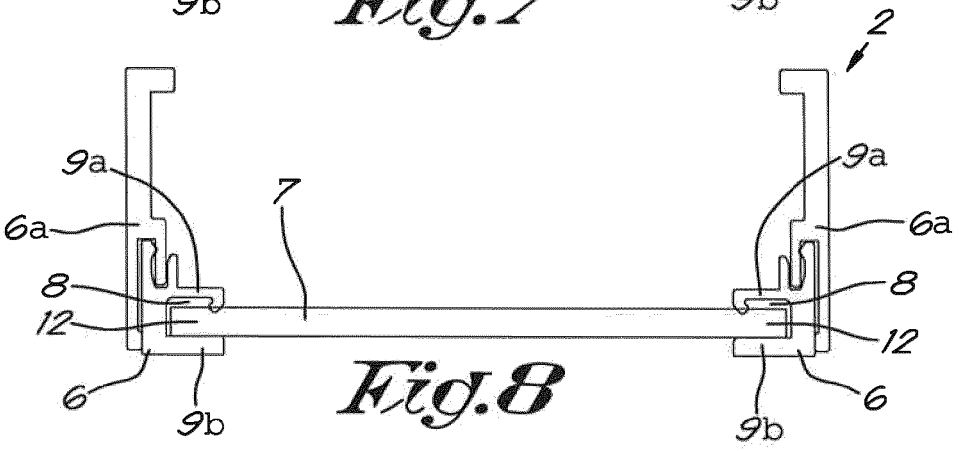


Fig.8

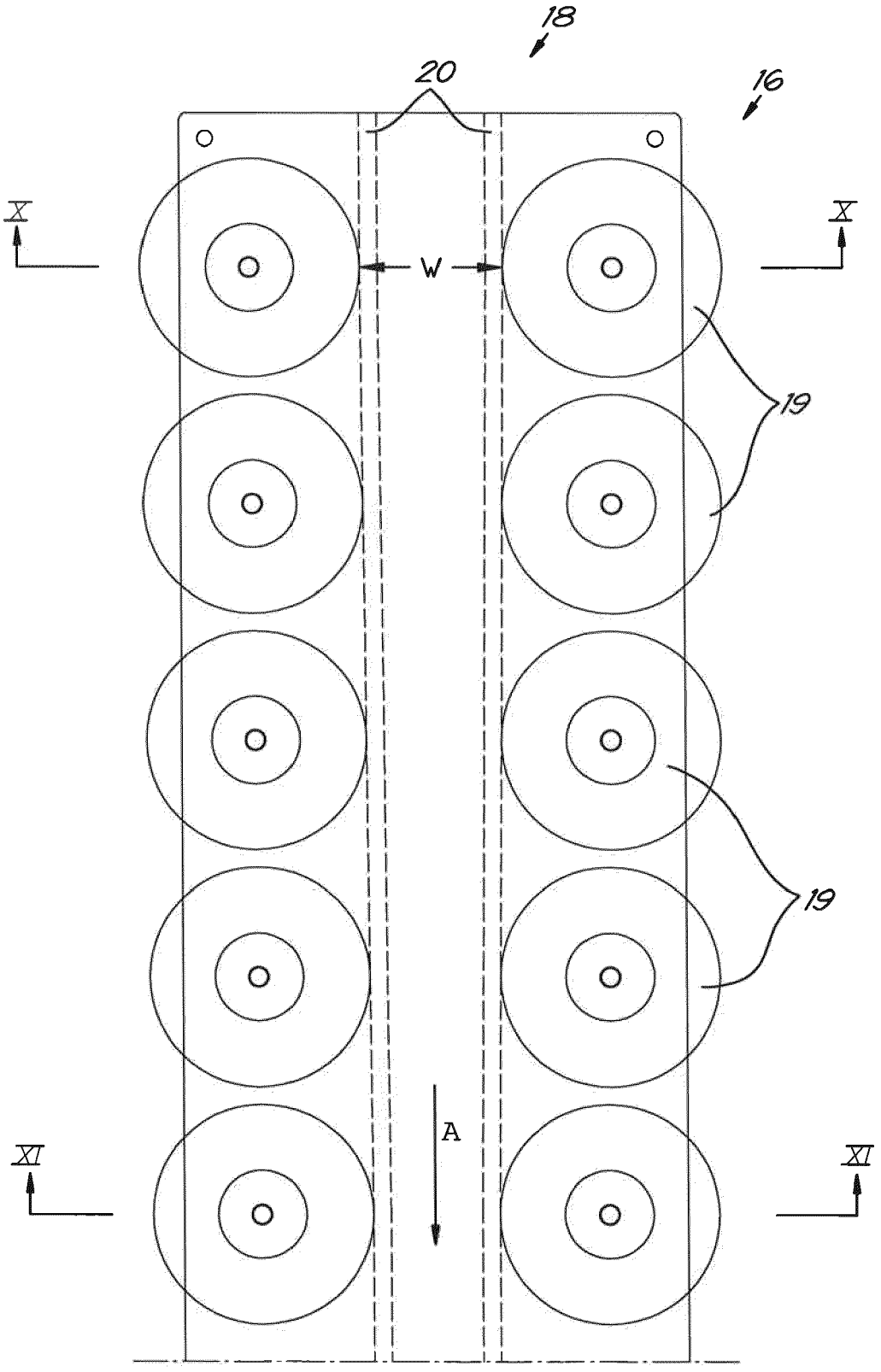
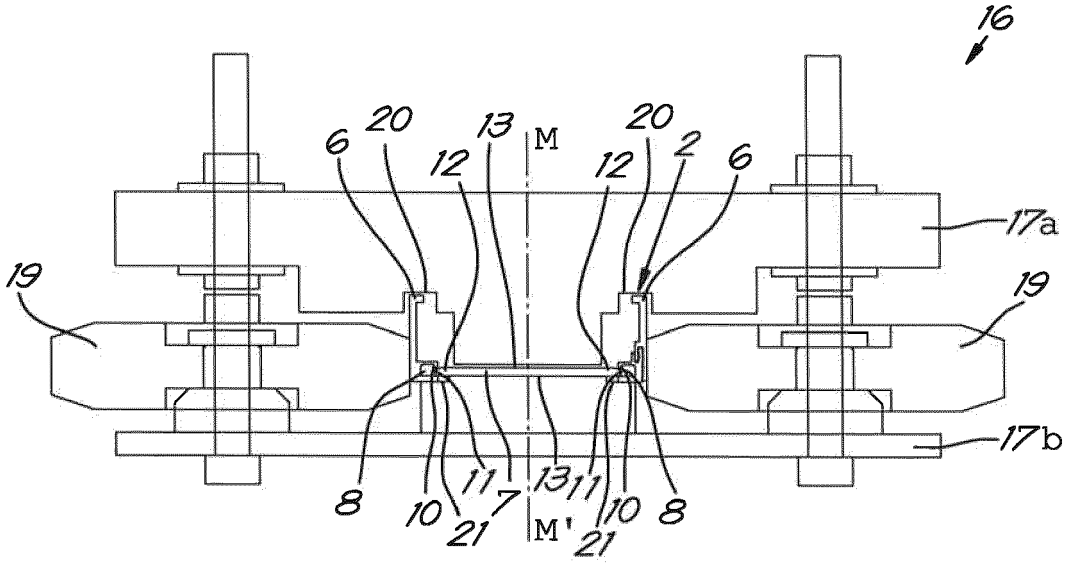


Fig.9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M'
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Fig.10

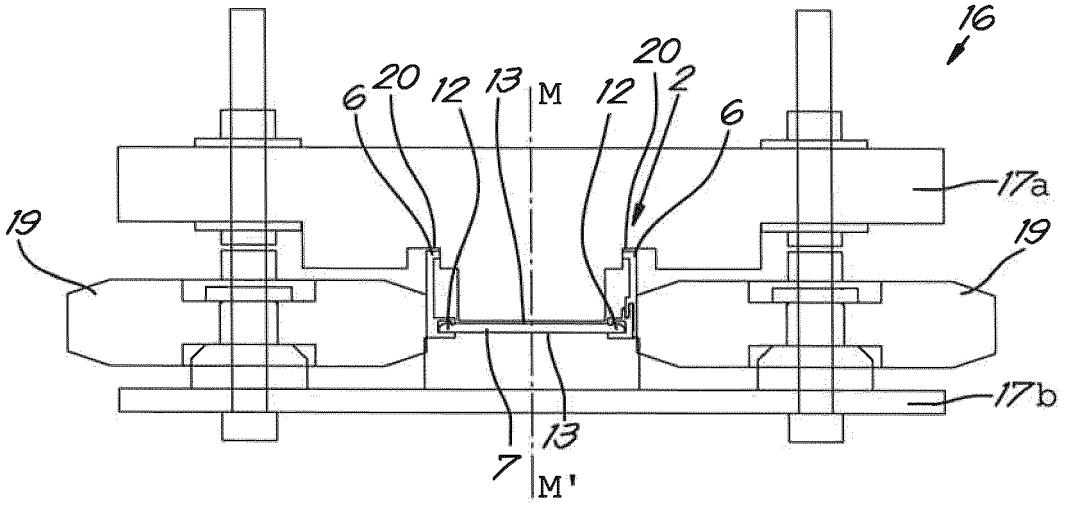
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Fig.11

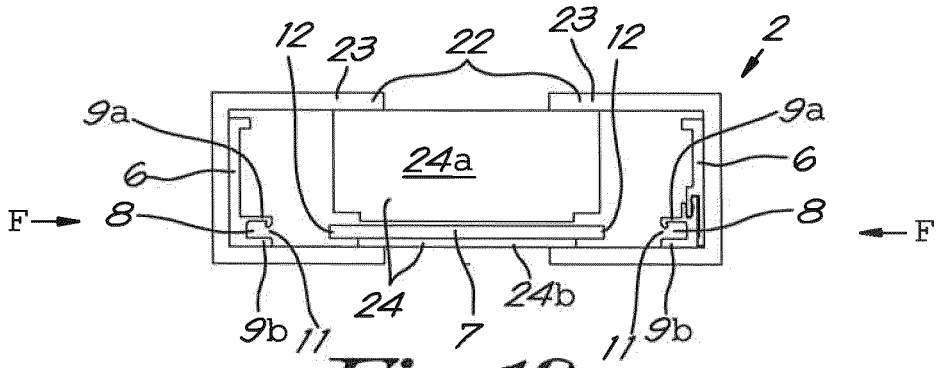

Fig. 12

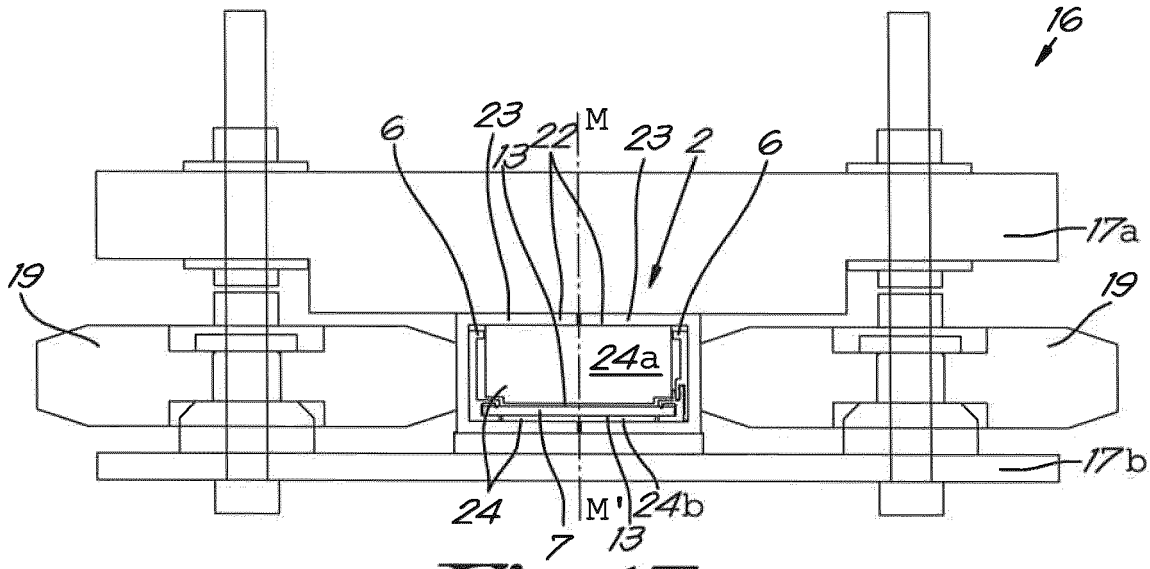

Fig. 13

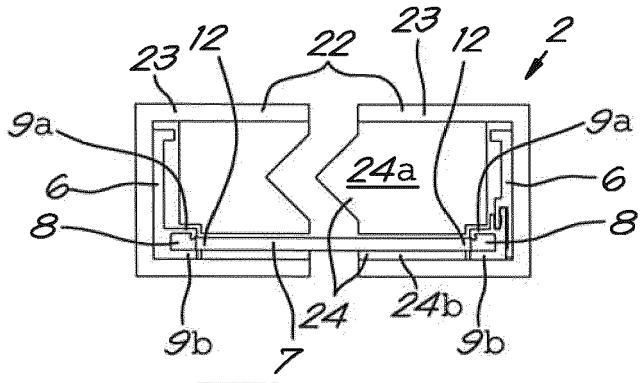

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 22 15 7738

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E06B B23P

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 July 2022	Blancquaert, Katleen

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