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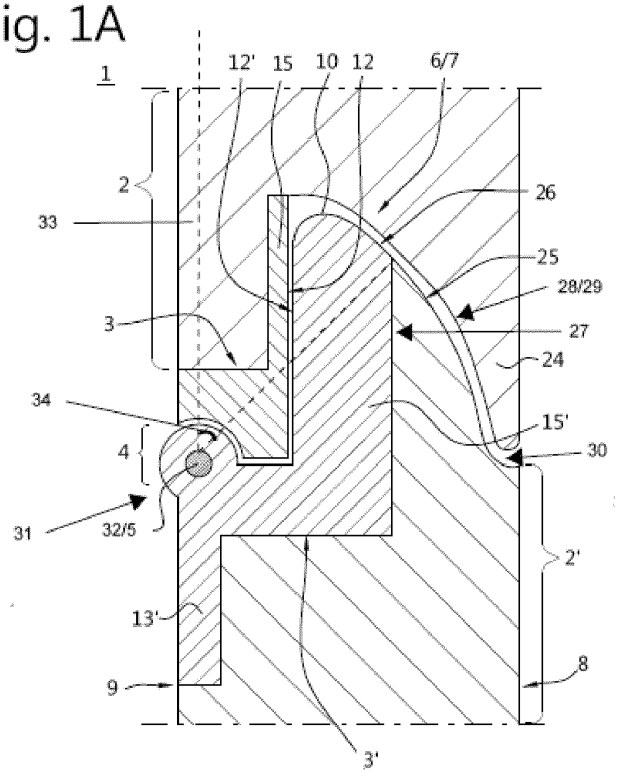
(54) **SECTIONAL DOOR AND HINGE SYSTEM FOR SECTIONAL DOORS**

(57) In a first aspect, the present invention relates to a sectional gate comprising a first and a second panel, further provided with a first hinge profile and a second hinge profile, in which the first hinge profile and/or the edge portion of the first panel form a grooved surface, and in which the second hinge profile and/or the edge portion of the second panel form a tongued surface, for finger-safe cooperation with the grooved surface. In particular, the tongued surface comprises a proximal and distal tongued surface, formed by the edge portion of the second panel and the second hinge portion, respectively. In further aspect, the invention also relates to a panel, a kit for forming a sectional gate, and a hinge system for sectional gates.

Fig. 1A



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Description

TECHNICAL DOMAIN

[0001] The invention relates to hinge systems for sectional gates, and to sectional gates as such.

STATE OF THE ART

[0002] Sectional gates are essentially known in the state of the art. Such gates comprise a plurality of panels arranged along each other in a mutually hinge way.

[0003] In a closed gate configuration, the panels are arranged adjacently in a vertical way, and they close off the gate opening. From this configuration, they can be moved upwards along a predetermined path, into an open configuration. Thereby, the panels are hidden mostly horizontally/hanging in an inclined way, for example along the ceiling of a closable inner space.

[0004] Important characteristics of sectional gates are o.a. the look, durability, maintenance friendliness, material cost, production cost, insulation value, draught and moisture proofing, the total mass and rigidity. Furthermore, special attention is paid to the safety of sectional gates. For example, the design of the panels is often such that no fingers can get clasped when mutually hinge. Said sectional gates are also said to be "finger-safe". Often, the panel edges are thereto formed as a "groove", on the one hand, and a "tooth" or "tongue", on the other hand.

[0005] EP 0 623 724 describes a sectional gate that is composed of PU full-foamed sandwich panels with steel outer coating. Each panel comprises extruded hinge portions at the bottom and at the top. These hinge portions do not only ensure a mutual hinge connection, but also the finger-safe cooperation of the panels. For the latter, the hinge portions are respectively designed as tongue and groove. They are an integral portion of the sandwich panels, as a result of which they cannot be replaced individually.

[0006] Moreover, sometimes, it can be desirable to make the panels from a natural material such as wood. For structural reasons, however, there are some important restrictions as to the material choice of the panels. Especially, a tongued and grooved design is very fragile and wear-sensitive. More generally, the panel material, together with the design of the hinge means, should allow a sufficiently robust coupling. For these reasons, relatively heavy, wood panels are applied only rarely.

[0007] EP 2 118 418 describes another hinge system for sectional gates. The system provides a male and a female edge profile, for a mutual hinge connection cooperation. Along the front side, the male hinge profile moreover contributes to the finger safety, by means of a bent wing. A disadvantage is that this profile significantly determines the look of the sectional gate, which can be undesirable from an aesthetic point of view.

[0008] Furthermore, DE 10 2015 205 655 describes two hinge profiles for a sectional gate. It is about two aluminium extruded profiles that can be coupled in a hinge way. Such profiles can be attached to the edge portions of a foam plate by means of screws, for forming a sectional gate panel. Again however, the hinge profiles significantly determine the look of the gate.

[0009] WO 1994 05887 also describes an upper profile portion and a lower profile portion for coupling panels. The profile portions have curved sections that mutually interact, at a certain distance from their pivoting connection. At least one of the curved sections is coupled to the hinge point via an inclined flange (in an angle). The profile portions (with their curved sections) are mounted against the inner sides of the panels. They broaden, as it were, the lower and upper edges of the panels. The panels are insulated at the inside. As a result, they are thicker.

[0010] Finally, US 2007 000 623 describes and shows a sectional gate of which the panels are composed of an outer layer + insulating filling material. Typically, it is about full-foamed sandwich panels. In a closed state, blocking elements (provided along the upper edges of the panels) push against sealing blocks (provided along the lower edges of the panels). Thus, there is a certain sealing. It is however uncertain if a detached blocking element and sealing block offer a sound sealing. Also, because the edges of the sandwich panels are only resistant to a limited compressive force. At frequent charging and relieving (when closing and opening the gate), the coating and/or the insulation foam can be affected by fatiguing.

[0011] The present invention aims to find a solution for at least some of the above-mentioned problems.

[0012] Thereby, the invention provides a new type of sectional gate and corresponding hinge system, in which at least one of said characteristics is improved. In particular, the invention is directed to a free choice of material for the panels, while guaranteeing the sturdiness and durability. Thereby, preferably, also the look of the sectional gate can significantly be directed.

[0013] In particular, the invention is directed to a maximum sturdiness and durability. Thereby, the look of the sectional gate should be affected by the hinge profiles as little as possible; preferably, the look is determined maximally by the choice of material of the panels. In closed state, the sectional gate should be moisture- and draught-proof.

SUMMARY OF THE INVENTION

[0014] In a first aspect, the invention relates to a sectional gate of claim 1, comprising at least a first and a second panel, and an associated first and second hinge profile. A tongued and grooved surface thereby provides a finger safety. In particular, the tongued surface comprises a proximal and distal tongued surface, which proximal tongued surface is formed by an edge portion of the second panel, and which distal tongued surface is formed by the second hinge portion.

[0015] Typically, that hinge portion is made from a

wear-resistant, sturdy and/or tough material. Thereby, it provides the same characteristics at the tongue tip, as a result of which it is stronger and will wear/break off less quickly. On the other hand, this reinforcement is very selective. In any case, the hinge portions now not only ensure the hinge function, but moreover also at least partially the finger safety. Thereby, they form the most complex/fragile portions, namely the hinge means and the tongue tip. Indeed, the proximal portion of the tongued surface is constituted by the upper edge of the panel, as a result of which said hinge portion is only minimally, or not at all, visible from the front side of the gate. Thus, the panel itself significantly determines the look of the gate. Preferably, the hinge portions are also only minimally visible from the back side of the gate.

[0016] Preferably, the grooved surface is formed partially by the first panel, and partially by the first hinge portion. Preferably, the tongued surface is formed partially by the second panel, and partially by the second hinge portion. The hinge portions thus ensure, on the one hand, the hinge, and, on the other hand, the coating of the most fragile portions of the tongue and groove.

[0017] In a further preferred embodiment according to claim 2, both hinge profiles comprise a reinforcing rib and an attachment lip, both parallel to the associated panel, and optionally in line with each other. In WO 1994 05887, on the contrary, the inclined "flange" is placed in an angle. An advantage is that such attachment lips can easily be anchored in slots, provided thereto along the edge portions of the panels. Optionally, they are glued in such slots. The reinforcement ribs are also parallel to the panels. With a correct profiling of the panel edge portions, they are thus covered automatically by the panels, when inserting the attachment lips (according to the height direction). Preferably, the reinforcement ribs are covered partially by the panels. Optionally, they are glued thereto. This ensures further sturdiness. Preferably, each panel extends to the corresponding hinge means. An important advantage is also that the reinforcement ribs themselves are not visible. The hinge profiles are thus not or barely visible, from the inside of the sectional gate.

[0018] In further aspects, the invention also relates to a panel of claim 10, and to a kit of claim 11.

DESCRIPTION OF THE FIGURES

[0019]

Figure 1A shows a detail of a schematic cross-section of a sectional gate, according to a possible embodiment.

Figure 1B shows another detail of a schematic cross-section of a sectional gate, according to another possible embodiment.

Figures 2A and 2B respectively show a cross-section and an exploded cross-section of a sectional gate, according to another alternative embodiment of the invention.

Figures 3A-D show a number of steps when hinge a first panel and a second panel according to the embodiment of figures 2A and 2B.

Figures 4A and 4B show two other cross-sections of hinge systems according to possible embodiment of the present invention.

DETAILED DESCRIPTION

[0020] The invention relates to a sectional gate, to a panel for sectional gates, to a kit for forming a sectional gate, and to a hinge system for sectional gates.

[0021] Unless otherwise specified, all terms used in the description of the invention, including technical and scientific terms, shall have the meaning as they are generally understood by the worker in the technical field of the invention. For a better understanding of the description of the invention, the following terms are explained specifically.

[0022] "A", "an" and "the" refer in the document to both the singular and the plural form unless clearly understood differently in the context. "A segment" means for example one or more than one segment.

[0023] When "approximately" or "about" are used in the document together with a measurable quantity, a parameter, a period or moment, etc., variations of +/-20% or less, preferably +/-10% or less, more preferably +/-5% or less, still more preferably +/-1% or less, and even still more preferably +/-0.1% or less than and of the cited value are meant, as far as such variations apply to the invention that is described. It will however be clearly understood that the value of the quantity at which the term "approximately" or "about" is used, is itself specified.

[0024] The terms "include", "including", "consist", "consisting", "provide with", "contain", "containing", "comprise", "comprising" are synonyms and are inclusive or open terms that indicate the presence of what follows, and that do not exclude or prevent the presence of other components, characteristics, elements, members, steps, known from or described in the state of the art.

[0025] The citation of numeric intervals by means of end points includes all integers, fractions and/or real numbers between the end points, including these end points.

[0026] "Sectional gates" are known as such by the skilled worker. Generally, such gates comprise two or more elongated "panels" that are coupled to each other in a hinge way, along their upper and lower edge portions. Preferably, each panel essentially extends according to a corresponding "panel plane". Thereby, at each panel, a "height direction" can be defined, which is oriented according to the panel plane, between the upper and lower edge portion. The "thickness direction", on the other hand, extend perpendicularly to the panel plane, between

a "front side" and a "back side" of the panel. Thereby, the partial opening of two mutually coupled panels typically corresponds to the a mutual hinge connection of the panels, towards their back side. Finally, the "width direction" is perpendicular to the height and thickness directions, and is also situated in the panel plane. Typically, the width direction extends between two front sides of the panel. Close to these front sides, the panels are preferably provided with guiding means, for opening and closing the sectional gate along guiding rails.

[0027] In a first aspect, the invention relates to a sectional gate comprising at least a first and a second panel, further provided with a hinge system for a mutually hinge coupling of said panels, the hinge system comprising:

- a first hinge portion, connected to an edge portion of the first panel, in which the first hinge portion and/or said edge portion form a groove with a backward grooved surface, and
- a second hinge portion, connected to an edge portion of the second panel, in which the second hinge portion and/or said edge portion form a tongue with a forward tongued surface, for finger-safe cooperation with the grooved surface,

which hinge portions are configurable in a mutually hinge way between a closed state and a partially open state, in which states the tongued surface, seen from a front side of the second panel, is covered by the grooved surface respectively to a more or less degree. In particular, the tongued surface comprises a proximal and distal tongued surface, which proximal tongued surface is formed by the edge portion of the second panel, and which distal tongued surface is formed as the second hinge portion.

[0028] The attachment of the hinge portions to the corresponding edge portions can be realized in any way. According to a number of non-limiting embodiments, use is thereby made of chemical attachment means (e.g. glue), mechanical attachment means (e.g. screws, nails, clips), and/or any combination thereof. In the case of mechanical attachment means, the hinge portions are optionally provided with attachment holes.

[0029] The sectional gate is finger-safe. Thereto, the panels fit into each other by means of tongued and grooved surfaces. In particular, close to the edge portion of the first panel, a backward grooved surface is provided, directed to the back side of the first panel.

[0030] Close to the edge portion of the second panel, a forward tongued surface is provided, directed to the front side of the second panel. At the a mutual hinge connection of the panels, the tongued surface moves into the grooved surface, in such way that no fingers can be clasped along the front side. Tongued and grooved surfaces for finger-safety are known as such for sectional gates.

[0031] Preferably, said tongued surface essentially has a convex shape. Preferably, said grooved surface essentially has a concave shape. Preferably, the tongued and grooved surface essentially have a complementary shape. Preferably, the tongued and grooved surface each have a curved shape, of which the bending centres are situated close to the mutual rotational axis of the respective panels.

[0032] In the "closed state" of two mutually coupled panels, the panel planes extend in line. In the "partially open state", on the other hand, the panel planes are in an angle. The panels are brought from the closed state into the partially open state, by mutually hinge them, towards the back side. This corresponds with the passage of the tongued surface within the grooved surface, in which a portion of the tongued surface is released, i.e. it is no longer covered by the grooved surface.

[0033] In particular, the tongued surfaces seem to be very fragile at the tongue top and tongue tip, as a result of which there are some strong restrictions as to the material in which they can be made. Therefore, not any kind of panel material is also appropriate for forming the (complete) tongue and/or the (complete) tongued surface. The present invention provides a solution therefore; indeed, the tongued surface comprises a proximal and distal tongued surface, which proximal tongued surface is formed by the edge portion of the second panel, and which distal tongued surface is formed by the second hinge portion. The term "distal" should be interpreted here as the most distant protruding portion of that surface, i.e. the portion situated the closest to the tongue tip. The term "proximal" should be interpreted here as situated more central with respect to the panel, i.e. the portion comprising or enclosing the tongue base. Preferably, the proximal portion and the distal portion of the tongued surface are mutually adjoining, according to the height direction of the panel and the associated hinge portion.

[0034] An important advantage is that the hinge portion is typically made from a wear-resistant, sturdy and/or tough material. Thereby, the hinge portion provides the same characteristics at the tongue tip, as a result of which it is stronger and will wear/break off less quickly. On the other hand, this reinforcement is very selective, and only at the level of the tongue tip (which is the more fragile portion). As a result, one can save on the material and the extent of the hinge portion. In any case, the hinge portions now not only ensure the hinge function, but moreover also at least partially the finger safety of the sectional gate. Thereby, they completely ensure the most complex/fragile portions, namely the hinge means and the tongue tip.

[0035] However, at least a portion (i.e. the proximal portion of the tongued surface) is formed by the upper edge of the panel. As a result, the hinge portion is only minimally visible, or not visible at all from the front side of the gate. Thus, the panel itself significantly determines the look of the gate. Preferably, seen from the front side, the hinge portion covers the tongue tip minimally and maximally 95% of the complete tongue height, more preferably minimally 5% of the tongue height, more prefera-

bly maximally 85%, and more preferably maximally 75%.

[0036] In a further or alternative embodiment, the hinge portions essentially extend over the complete width of the panels. Thereby, they offer strength to the panels (e.g. resistance against bending), over their complete width. Consequently, the mechanical requirements of the panel material itself are less stringent. For example, a plastic panel or a wood panel could also be used. Of course, the invention is not limited to any of these.

[0037] In a further or alternative embodiment, in the closed state and seen from the front side, the distal tongued surface is completely covered by the grooved surface. Thereby, the distal tongued surface (formed by the second hinge profile) is not visible from the front side of the sectional gate, at least in the closed state. Thus, the second hinge profile does not influence in any way the look of the gate. More in particular, from the front side, in closed state, the look of the sectional gate is preferably determined by the choice of material of the panels and/or by the chosen surface treatment (e.g. a surface layer such as varnish, lacquer, polishing wax or a print) onto these panels. Preferably, in closed state and seen from the front side, the visible portion of the tongued surface is completely comprised by the proximal tongued surface (and thus formed by the panel edge). The second hinge portion only coats the fragile nose tip.

[0038] In a further or alternative embodiment, the grooved surface comprises a proximal and distal grooved surface, which distal grooved surface is formed by the edge portion of the first panel, and which proximal grooved surface is formed by the first hinge portion. Both hinge portions ensure both the a mutual hinge connection of the panels, and a portion of the finger safety. Optionally, the edge portion of the first panel comprises a panel lip, which forms the distal grooved surface. In any case, the hinge portions are preferably not visible from the front side of the gate, in any case in the closed state. Possibly, the hinge portions are also not visible in a partially open state from the front side of the gate. This is certainly not necessarily the case.

[0039] In a further or alternative embodiment, the panels comprise wood. Wood is a material which "lives" and can warp to a certain extent (e.g. under the influence of temperature or moisture). On the other hand, it is crucial that the tongued surface (and/or grooved surface) retain their shape and are wear-resistant, because of the finger safety. A deformed tongued surface, for example, will wear, tear and/or break off more easily when it is moved within the grooved surface. An advantage is that a portion of the fragile tongued surface is now already formed by the hinge portion, and thus not by the wood panel edge portion. Preferably, the hinge profile thereby extends over the complete width. Thereby, the hinge portions offer resistance against warping/bending of the panels, over their complete width.

[0040] In a possible embodiment, the panels are multi-layered. For example, they comprise a massive basic layer of thermally modified wood (lighter, but more durable) and a decorative finishing layer of hardwood. These layers extend according to the panel planes. However, the invention is not at all limited thereto.

[0041] In a further or alternative embodiment, at least one hinge portion comprises an attachment lip, extending according to the corresponding panel plane. Such attachment lips allow a simple attachment of the hinge portion in or along the panel edge. In a further embodiment, the attachment lip extends in the corresponding panel. Optionally, the attachment lip is glued in a slot provided thereto in an edge portion of the panel. It is typical for wood panels that the wood thread essentially extends according to the panel plane. Gluing of an attachment lip in a slot, parallel to the wood thread, thereby enables a rigid mutual attachment. Preferably, it is about insertion slots where the attachment lips can easily be slit in. Preferably, the slots are adapted for inserting the attachment lips according to the height direction of the panels.

[0042] In a further embodiment, the hinge portion further comprises a reinforcing rib, extending between a hinge means and a finger safety means of the hinge portion. In a further embodiment, the attachment lip and the reinforcing rib are in line. Thereby, they offer a large resistance against bending of the panels, in which it is referred to figures 2A-B and the corresponding figure description.

[0043] In a further or alternative embodiment, said hinge portions are hinge profiles, with an essentially invariant cross-section. Optionally, one of both hinge profiles thereby possesses a mouth, appropriate for engaging in a hinge way into a ridge of the other hinge profile. An advantage is that such hinge profiles provide the distal tongued surface (and optionally the proximal grooved surface) over the complete width of the panels. Moreover, all kinds of hinge profiles are easy to produce by means of extrusion. Optionally, the hinge profiles comprise aluminium. In a further or alternative embodiment, said ridge comprises a recess.

[0044] In a further or alternative embodiment, the sectional gate further also comprises a closing means, which closing means fits to the distal tongued surface in the closed state. The distal tongued surface is thereby made of the same material as the hinge profile. As a result, it can typically resist a higher pressure, and it is waterproof. Consequently, it can offer a better sealing.

[0045] Preferably, the first hinge profile encloses a channel, in which a sealing strip is provided. Preferably, the second hinge profile forms a tongue tip. In the closed state, the tongue tip is adjacent to the closing means. This means that the sealing is formed between the two hinge profiles. The hinge profiles are sufficiently strong, so that the tongue tip can be pushed with force against the sealing. Moreover, the hinge profiles are typically made of a material that in itself is impermeable for water (e.g. aluminium, plastic, composite, ...). As a result, the moisture- and draught-proof sealing is guaranteed, in the closed state.

[0046] In a second aspect, the invention relates to a

panel comprising a lower edge portion and an upper edge portion, which panel is connected to a hinge portion along at least one of said edge portions, in which the hinge portion and/or said edge portion form a tongue with a forward tongued surface, for a finger -safe cooperation with a grooved surface of a further panel. In particular, said tongued surface comprises a proximal and distal tongued surface, which proximal tongued surface is formed by the edge portion, and which distal tongued surface is formed by the hinge portion. Preferably, the panel is appropriate for cooperation with one or more similar panels, for forming a sectional gate according to the first aspect of the invention. Thereby, the same characteristics and advantages can be repeated.

[0047] In a third aspect, the invention relates to a kit comprising at least a first panel, a second panel and a hinge system, which hinge system comprises a first and a second hinge portion, for attachment at and along edge portions of said panels. In particular, the kit is thereby appropriate for forming a sectional gate according to the first aspect of the invention. Thereby, the same characteristics and advantages can be repeated.

[0048] In a fourth aspect, the invention relates to a hinge system for sectional gates, the hinge system comprising a first and a second hinge portion, appropriate for attachment at and along the edge portions of a first and a second panel, and provided with hinge means for a mutual hinge connection with respect to a rotational axis, in which the first hinge portion is configurable with respect to the second hinge portion in a hinge way between a close state, in which it is directed according to a closing direction of the second hinge portion, and a partially open state, in which the second hinge portion further forms a tongue portion with a forward tongued surface, for finger -safe cooperation with a grooved surface. In particular, said tongued surface extends forward in a curved way to a support edge, in an angle of maximum 90° with the closing direction, seen from the rotational axis. Preferably, said support edge is appropriate for connection to a panel edge. When coupling two sectional gate panels by means of such hinge system, that hinge system is preferably not or barely visible from the front side of the gate, at least in a closed state.

[0049] Preferably, said tongued surface extends in an angle of significantly less than 90°, preferably between 5° and 89°, more preferably less than 85°, more preferably less than 75°, and more preferably less than 65°, for example in an angle of approximately 35°, approximately 45° or approximately 55°.

[0050] Preferably, the hinge system is appropriate for coupling of panels into a sectional gate according to a first aspect of the invention.

[0051] In the following, the invention will be described by means of non-limiting examples and figures illustrating the invention, and not meant to be interpreted as limiting the scope of the invention.

[0052] **Figure 1A** shows a detail of a schematic cross-section of a sectional gate **1,** according to a possible embodiment. The sectional gate **1** comprises a first **2** and a second panel **2',** en is further provided with a hinge system **31** with a corresponding first **3** and second hinge portion **3'.** These hinge portions **3, 3'** are connected to the panels **2, 2'.** The shown panels **2, 2'** and hinge portions **3, 3'** are in their mutual closed state. Thereby, the panel planes are mainly in line, and the first panel **2** and hinge portion **3** are directed according to a closing direction **33** of the second panel **2'** and hinge portion **3'.** At a button **4,** the hinge portions **3, 3'** are however hinged to each other by means of a pen **5.** Via a hinge movement of the first **2** with respect to the second panel **2',** in the direction of the rear side **9** of the second panel **2',** they can consequently be brought into a partially open state. Hereby, it is referred to figure 3D (indeed drawn from a fixed position for the first panel **2** and hinge portion **3**).

[0053] The lower edge portion of the first panel **2** now forms a downward groove **7** together with the first hinge portion **3.** More in particular, the hinge portion **3** comprises a reinforcement rib **15** with a forward adjoining surface **12.** Moreover, the first panel **2** forms a rearward, concave grooved surface **28, 29;** together, these surfaces **12, 28, 29** enclose the groove **7.** On the other hand, the upper edge portion of the second panel **2'** forms an upward tongue **6,** together with the second hinge portion **3'.** The second hinge portion **3'** namely comprises a reinforcement rib **15'** with a rearward adjoining surface **12',** ending in a tongue tip **10.** Along the front side **8,** the forward convex tongued surface **25, 26** is also partly formed by this reinforcement rib **15'** (i.e. the distal tongued surface **26**), and partly by the second panel **2'** (i.e. the proximal tongued surface **25**). In the closed state, said adjoining surfaces **12, 12'** are moreover situated against and/or along each other, as shown in the figure. In a partially open state, the space in between has increased.

[0054] Preferably, the tongue **6** and groove **7** extend with an essentially invariable cross-section according to the width direction, i.e. perpendicular to the plane of the figure. Thereby, the tongue tip **10** shown in cross-section forms an upper edge. According to method known as such, the tongue **6** and groove **7** ensure a finger safety. For example, when mutually hinge the panels **2, 2',** the tongues surface **25, 26** will extend within the grooved surface **28, 29,** with approximately a constant distance in-between. Exactly for this purpose, the tongue **6** describes the forward, convex tongued surface **25, 26** which is form-fitting within a rearward, concave grooved surface **28, 29.** The bending centre for these curved surfaces is moreover situated approximately at the rotational axis **32.** Furthermore, the opening **30** along the front side **8** preferably doesn't make a squeezing movement, or this opening **30** at least stays sufficiently wide at all times so that no fingers get clasped.

[0055] Along the front side **8,** the first panel **2** also forms a panel lip **24.** Consequently, in the closed state, the first panel **2** (and in particular the formed grooved surface **28, 29**) covers the distal tongued surface **26,** as well as a large portion of the proximal tongued surface **25,** seen

from the front side **8.**

[0056] Moreover, the distal tongued surface **26** extends in a curved way in the direction of the front side **8,** in an angle **34** of approximately 45° (measured from the rotational axis **32,** and from the closing direction **33** of the second panel **3'**). Thereby, the distal tongued surface **26** extends till a support edge **27,** where the hinge portion **3'** fits to the panel **2'.**

[0057] **Figure 1B** shows another detail of a schematic cross-section of a sectional gate **1,** according to a possible embodiment. A difference with the embodiment of figure 1A is that the first hinge portion **3** now comprises a reinforcement rib **15** ending in a curved transverse arm **14.** This curved transverse arm **14,** which is portion of the first hinge portion **3,** forms a rearward, proximal grooved surface **28.** The remaining portion of the grooved surface **28, 29,** or the distal grooved surface **29,** is formed by the edge portion of the first panel **2.**

[0058] **Figures 2A and 2B** respectively show a cross-section and an exploded cross-section of a sectional gate **1,** according to another alternative embodiment of the invention. The sectional gate **1** comprises a first **2** and a second panel **2',** further provided with a hinge system **31** with a first **3** and a second hinge portion **3'.** Preferably, it is about hinge profiles (i.e. with an essentially constant transverse section in the width direction, transverse to the plane of the figure). Both hinge portions **3, 3'** can be attached to the edge portions of the corresponding panels **2, 2'** in a form-fitting way. In particular, they provide attachment lips **13, 13',** parallel to the panel planes, which attachment lips **13, 13'** can be received in corresponding slots **21, 21'** provided thereto in the panels **2, 2'** (see figure 2B). The first hinge portion **3** comprises a ridge **18** that can engage in a hinge way into a mouth **20** of the second hinge portion **3'.** In particular, the ridge **18** is provided with a recess **19,** so that the hinge portions **3, 3'** can also be coupled and disconnected in a hinge way. Hereby, it is referred to figures 3A-D. Optionally, a wear-resistant mouthpiece is also provided in the mouth, for example comprising a polyamide such as nylon.

[0059] Each of both hinge portions **3, 3'** now comprises a reinforcement rib **15, 15',** extending according to the corresponding panel plane, and in line with the associated attachment lip **13, 13'.** With this design, the hinge portions **3, 3'** offer a lot of resistance against downward bending; they offer rigidity to the panels **2, 2'.** Moreover, the reinforcement ribs **15, 15'** thereby coat a pair of two opposing adjoining surfaces **12, 12'** that extend against and/or along each other in the closed state (see figure 2B). In this way, they avoid the breaking-off of fragile tongue portions and/or groove portions, for example in case of strong wind.

[0060] The reinforcement rib **15** of the first hinge portion **3** extends between the ridge **18** and a forward transverse arm **14.** This transverse arm **14** forms a channel **17** for receiving a closing means **16,** and further also a proximal grooved surface **28.** As a closing means **16,** a rubber band can for example be used. In the closed state, the distal tongued surface **26** also fits here (see figure 2B). The proximal grooved surface **29,** on the other hand, is formed by a panel lip **24** along the lower edge of the first panel **2.** In this way, the distal tongued surface **26,** at least in the closed state of the panels **2, 2',** is completely covered. The panel lip **24** also comprises a flange **23,** so that the hinge profile **2** is concealed in the panel edge (see figure 2B). The global, rearward grooved surface **28, 29** is essentially convex. Close to the flange **23,** the grooved surface **28, 29** indeed deviates locally from the global convex shape, without thereby harming the finger safety.

[0061] The reinforcement rib **15'** of the second hinge portion **3'** extends between the mouth **20** and, close to the tongue tip **10,** a forward transverse arm **14'.** This transverse arm **14'** extends forward in a curved way to a support edge **27,** in an angle **34** of approximately 45° with the closing direction **33,** seen from the rotational axis **32.** The transverse arm **14'** thereby forms a forward and convex, distal tongued surface **26.** The support edge **27** is appropriate to fit a plateau **11** provided at the panel edge of the second panel **2'.** In such a design, it is not necessary to form the possibly fragile panel material into a sharp tip, as is the case in the embodiments of figures 1A-B. This contributes to the rigidity of the tongue. Also, an eroded tongue portion of a used panel **2'** could be removed to a certain extent, for forming a plateau **11.** Panels **2, 2'** obtained in this way can subsequently be coupled by means of a hinge system **31** according to the present invention. Also, in the present embodiment, the second panel **2'** forms a proximal tongued surface **25.** The global, forward tongued surface **25, 26** thereby possesses a convex shape. In any case, the second hinge profile **3'** (typically composed of a wear-resistant, strong en rigid material) already ensures the fragile end of the tongue **6.**

[0062] **Figures 3A-D** show a number of steps when hinge a first panel **2** (provided with a first hinge portion **3**) with a second panel **2'** (provided with a second hinge portion **3'**), according to the embodiment of figures **2A** and **2B.**

[0063] In figure 3A, the panels **2, 2'** are in a mutually disconnected state, in an approximately perpendicular angle. In figure 3B, a first mouth lip **35** is placed along the recess **19** over the ridge **18.** The recess **19** can thereto of course have another shape. For example, the recess is a flattened facet along a further essentially cylindrical ridge **18.** In a similar way, this facet then allows a passage of the mouth lip(s) **35.** In figure 3C, both lips **35, 35'** fit over the ridge **18.** Via a hinge movement of the tongue **6** into the groove **7,** the hinge portions **3, 3'** can now be coupled in a hinge way, as shown in figure 3D. At the reverse operation of mutually coupled hinge portions **3, 3',** they can be disconnected in a hinge way. In a possible embodiment, figure 3D shows the maximum open state of the two panels **3, 3'** at normal use, e.g. when opening and closing the gates. Only for coupling the panels (e.g. at installation), and for disconnecting the panels **3, 3'**

(e.g. at destruction or maintenance), they are brought into an even further opened state, as shown in figure 3C.

[0064] **Figures 4A and 4B** show two other cross-sections of hinge systems **31** according to possible embodiment of the present invention. A difference with the hinge system **31** of figures 2A-B and 3A-D is that the tongue portion **6** is further reinforced, and has a closed profile this time. However, this interferes with the extrusion process of the hinge profiles. Preferably, both hinge portions **3, 3'** are thus completely "open" hinge profiles, as in the previous embodiments. Preferably, this is actually generally the case, for the different aspects of the present invention. Another difference is that in figure 4A, the ridge **18** possesses a hollow shape. The recess **19** thereby provides access to an internal cavity in the ridge **18.** On the other hand, the mouth **20** in figure 4B (this time portion of the first hinge portion **3**) possesses a shell shape closely contained between the ridge **18** and outer mouth **20'** (portion of the second hinge portion **3'**). This time, the ridge **18** is thereto not provided with a recess. However, in both embodiments, the hinge portions **3, 3'** can still be couple and disconnected in a hinge way.

[0065] The enumerated elements on the figures are:

1. Sectional gate
2. Panel
3. Hinge portion
4. Button
5. Pen
6. Tongue/tongued portion
7. Groove
8. Front side
9. Rear side
10. Tongue tip
11. Plateau
12. Adjacent surface
13. Attachment lip
14. Transverse arm
15. Reinforcement rib
16. Closing means
17. Channel
18. Ridge
19. Recess
20. Mouth
21. Slot
22. Panel lip
23. Flange
24. Panel lip
25. Proximal tongued surface
26. Distal tongued surface
27. Support edge
28. Proximal grooved surface
29. Distal grooved surface
30. Opening
31. Hinge system
32. Rotational axis
33. Closing direction
34. Angle
35. Mouth lip

[0066] It will be understood that the present invention is not limited to the embodiments described above and that some adjustments or changes can be added to the described examples and figures without changing the scope of the enclosed claims.

Claims

1. A sectional gate **1** comprising at least a first **2** and a second panel **2',** further provided with a hinge system **31** for a mutual hinge connection of said panels **2, 2',** the hinge system **31** comprising:

   - a first hinge profile **3,** connected to an edge portion of the first panel **2,** in which the first hinge profile **3** and/or said edge portion form a groove **7** having a groove surface **28, 29** facing backward, and
   - a second hinge profile **3,** connected to an edge portion of the second panel **2',** in which the second hinge profile **3'** and/or said edge portion form a tongue **6** having a tongue surface **25, 26** facing forward, for finger-safe cooperation with the groove surface **28, 29,**

   which hinge profiles **3, 3'** are configurable in a mutually hinge way between a closed position and a partially open position, in which respective positions the tongue surface **25, 26,** seen from a front side **8** of the second panel **2',** is covered by the groove surface **28, 29** in a greater or lesser extent, and **characterized in that** the tongue surface **25, 26** comprises a proximal **25** and a distal tongue surface **26,** which proximal tongue surface **25** is formed by the edge portion of the second panel **2',** and which distal tongue surface **26** is formed by the second hinge profile **3'.**

2. The sectional gate **1** of claim 1, **characterized in that** the hinge profiles **3, 3'** each comprise an attachment lip **13, 13'** and a reinforcement rib **15, 15',**

   - which reinforcement rib **15, 15'** extends between a finger safety means **14, 14'** and a hinge means **18, 20** of the hinge profile **3, 3',** and
   - which attachment lip **13, 13'** extends into a corresponding panel **2, 2',**

   in which the attachment lips **13, 13'** and the reinforcement ribs **15, 15'** are parallel to the corresponding panels **2, 2'.**

3. The sectional gate **1** of claim 2, in which the attachment lips **13, 13'** and the respective reinforcement ribs **15, 15'** are in line.

4. The sectional gate **1** of any one of the claims 2-3, in which the respective reinforcement ribs **15, 15'** respectively form a forward adjoining surface **12** and a rearward adjoining surface **12',** which adjoining surfaces **12, 12'** are adjoining in the closed state.

5. The sectional gate **1** of any of the claims 2-4, in which the reinforcement ribs **15, 15'** adjoin at least at one side to a panel surface.

6. The sectional gate **1** of any one of the claims 2-5, in which the reinforcement ribs **15, 15'** are covered by the corresponding panels **2, 2'.**

7. The sectional gate **1** of any one of the previous claims, in which the first hinge profile **3** contributes to the groove surface **28,** and moreover encloses a channel **17** for receipt of a closing means **16.**

8. The sectional gate **1** of claim 7, in which the second hinge profile **3'** contributes to the tongue surface **26,** and moreover forms a tongue tip **10** adjoining to the closing means **16,** in the closed state.

9. The sectional gate **1** of any one of the previous claims, **characterized in that** the panels **2, 2'** comprise wood.

10. The sectional gate **1** of any one of the previous claims, **characterized in that** the edge portions of the panels **2, 2'form** longitudinal slots **21, 21'** in which the attachment lips **13, 13'** are contained.

11. A panel **2'** comprising a lower edge portion and an upper edge portion, which panel **2'** is connected to a hinge profile **3'** along at least one of said edge portions, in which the hinge profile **3'** and/or said edge portion form a tongue **6** with a forward tongue surface **25, 26,** for finger-safe cooperation with a groove surface **28, 29** of a further panel **2,** and in which said tongue surface **25, 26** comprises a proximal **25** and a distal tongue surface **26,** which proximal tongue surface **25** is formed by the edge portion, and which distal tongue surface **26** is formed by the hinge profile **3', characterized in that** the panel **2** is adapted for forming a sectional gate **1** of any one of the previous claims 1 to 10.

12. A kit comprising at least a first panel **2,** a second panel **2'** and a hinge system **31,** which hinge system **31** comprises a first **3** and a second hinge profile **3',** for attachment at and along edge portions of said panels **2, 2',** and **characterized in that** the kit is adapted for forming a sectional gate **1** of any one of the previous claims 1 to 10.

13. A hinge system **31** for sectional gates **1,** the hinge system **31** comprising a first **3** and a second hinge profile **3',** appropriate for attachment at and along the edge portions of a first **2** and a second panel **2',** and provided with hinge means **18, 20** for a mutual hinge connection with respect to a rotational axis **32,** in which the first hinge profile **3** is configurable with respect to the second hinge profile **3'** in a hinge way between a closed state, oriented according to a closing direction **33** of the second hinge profile **3',** and a partially open state, and in which the second hinge profile **3'** further forms a tongue portion **6** with a forward tongue surface **26,** for finger-safe cooperation with a groove surface **28, 29,** and in which said tongue surface **26** extends forward in a curved way to a support edge **27,** in an angle **34** of maximum 90° with the closing direction **33,** seen from the rotational axis **32, characterized in that** the first and the second hinge profile **3, 3'** both form an attachment lip **13, 13'** and a reinforcement rib **15, 15',** which lips **13, 13'** and ribs **15, 15'** extend parallel in the closed state.

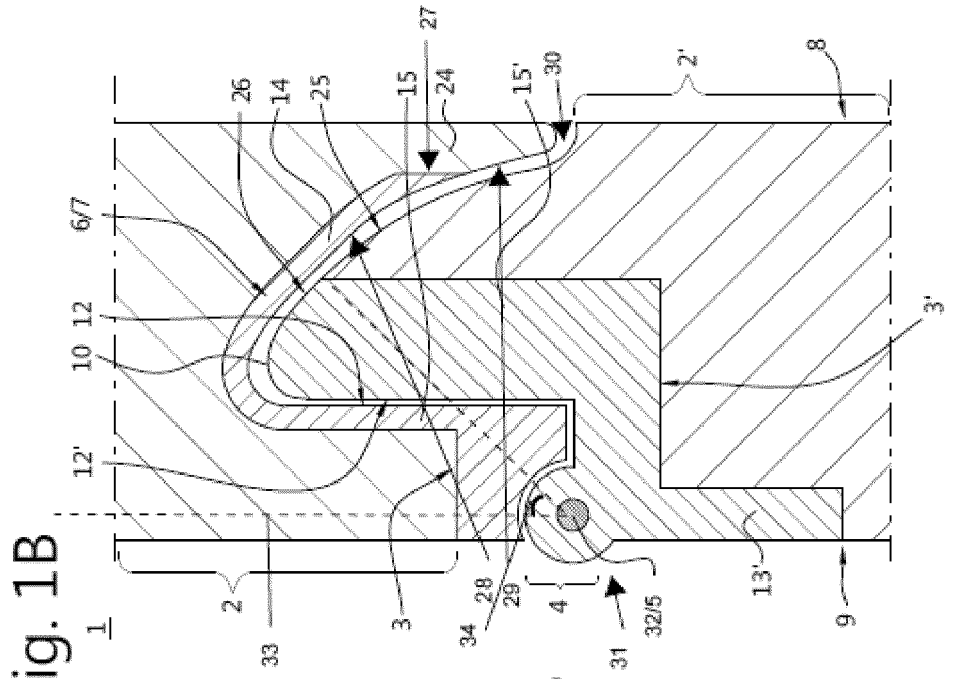
Fig. 1B
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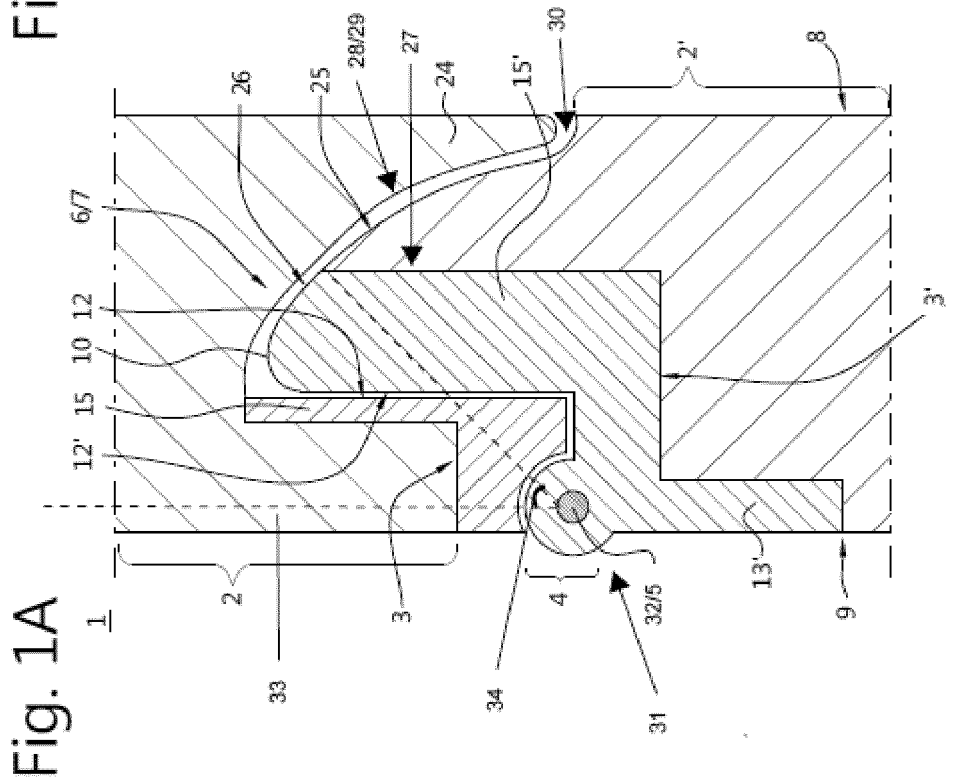
Fig. 1A
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Fig. 2A

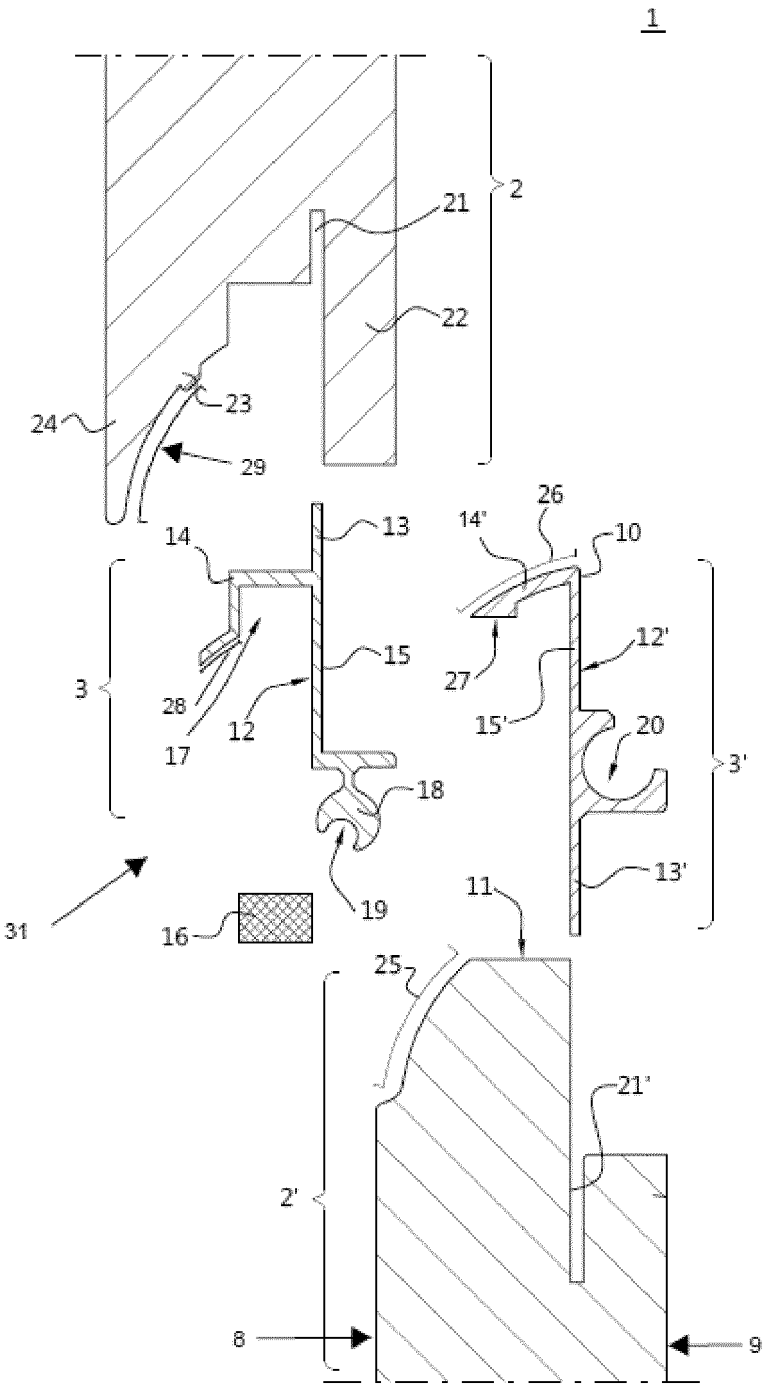
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Fig. 3B

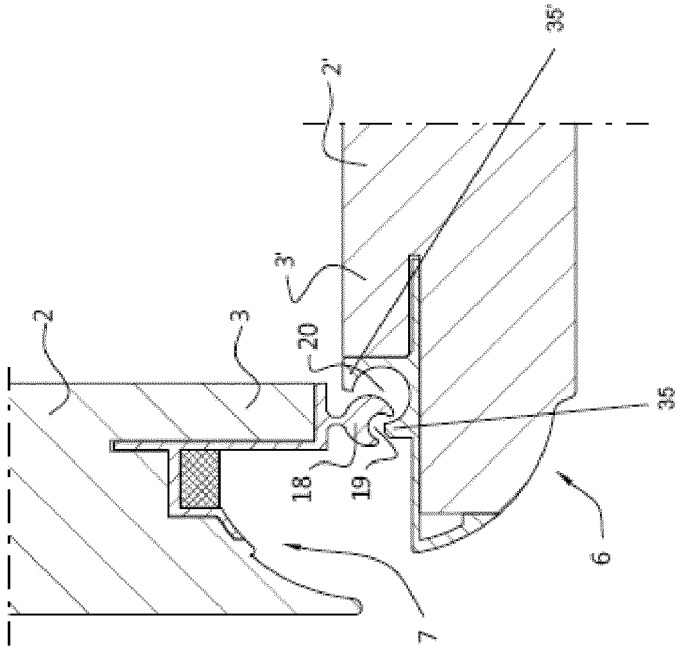

Fig. 3A

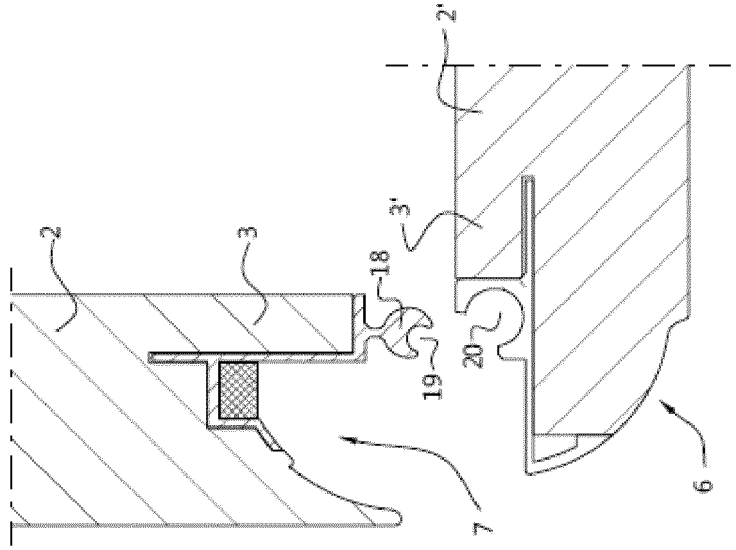

Fig. 3D

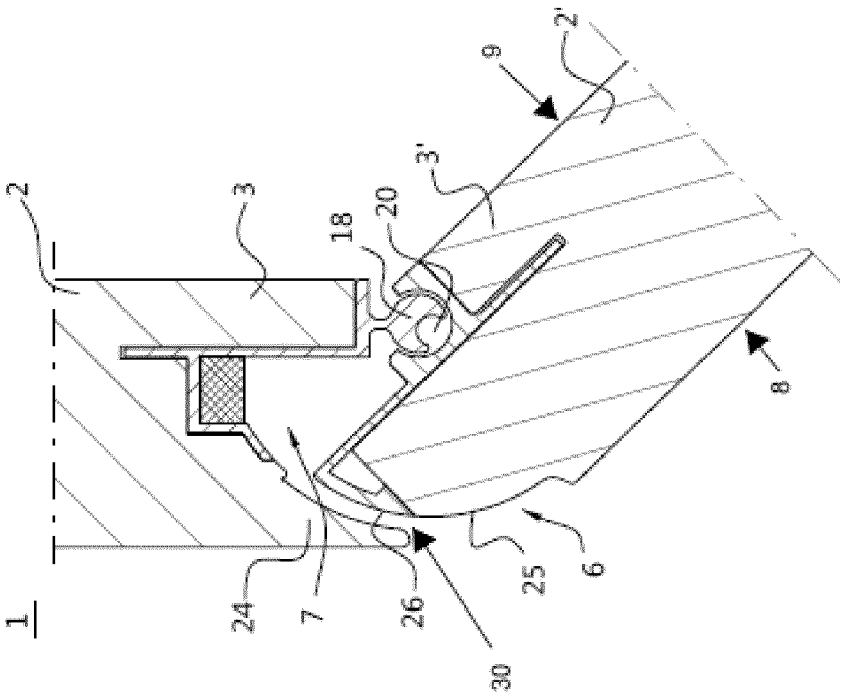

Fig. 3C

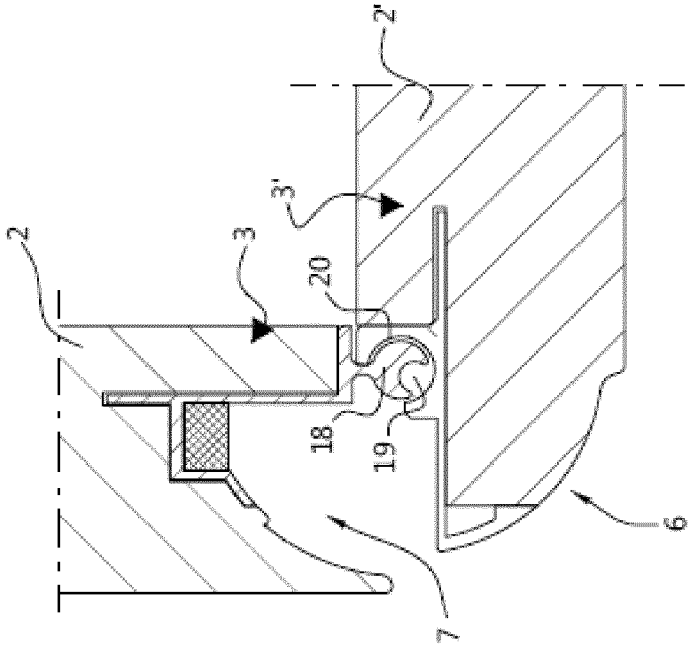

Fig. 4B

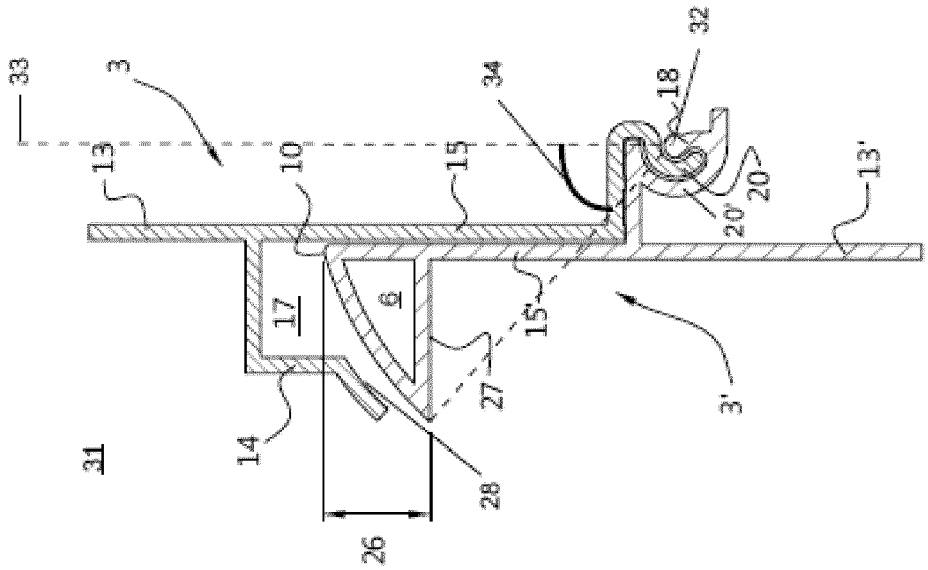
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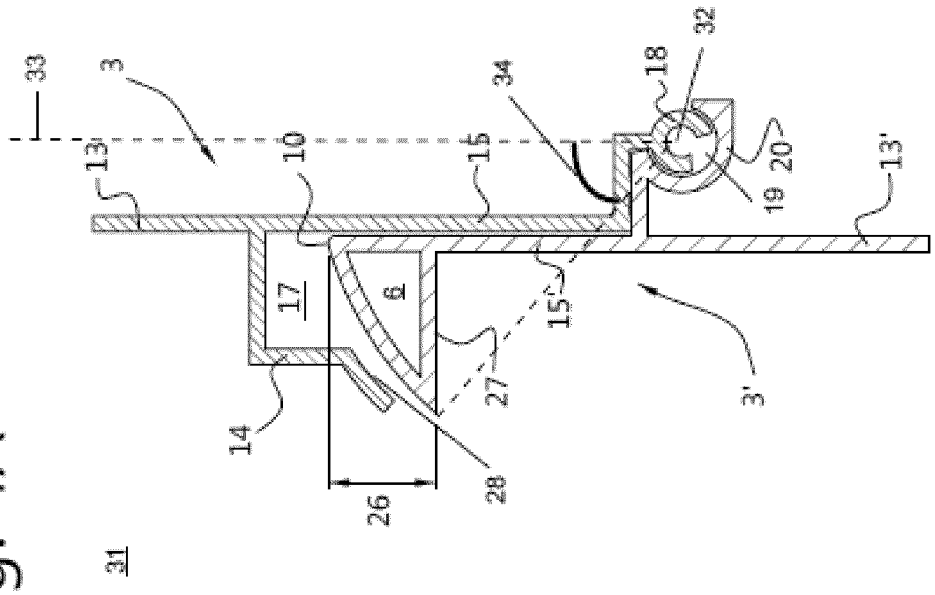
Fig. 4A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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

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