

(19)



(11)

EP 1 569 863 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
27.01.2010 Bulletin 2010/04

(51) Int Cl.:
B66C 1/66 ^(2006.01) **E04G 21/16** ^(2006.01)

(21) Application number: **03812187.7**

(86) International application number:
PCT/FI2003/000822

(22) Date of filing: **05.11.2003**

(87) International publication number:
WO 2004/050530 (17.06.2004 Gazette 2004/25)

(54) MECHANISM FOR LIFTING A PREFABRICATED SANDWICH UNIT

MECHANISMUS ZUM HEBEN EINER VORGEFERTIGTEN SANDWICHEINHEIT

MECANISME PERMETTANT DE SOULEVER UNE UNITE PREFABRIQUEE EN SANDWICH

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK**
Designated Extension States:
LT LV

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(30) Priority: **03.12.2002 FI 20025056**

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(43) Date of publication of application:
07.09.2005 Bulletin 2005/36

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WO-A1-93/20004

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Description

[0001] The present invention relates to a mechanism for lifting a prefabricated sandwich unit, according to the preamble of claim 1.

[0002] The prefabricated unit to be lifted by means of a lifting mechanism of the invention may contain, for example, a core element of mineral wool fiber, having its two opposite surfaces provided with surface layers of e.g. plastic-coated sheet metal. The handling of such prefabricated units requires delicate lifting to avoid damage, and one solution for this has been described in the Applicant's prior FI patent 89473. It is an object of the present invention to provide an improved lifting mechanism, which allows a wide thickness fluctuation range for prefabricated units, for example 80-240 mm, and which is relatively simple in design and easy to operate.

[0003] In order to fulfill this objective, a lifting mechanism of the invention is characterized in that the gripping member is adapted to be laterally movable with respect to the frame member for adapting the lifting mechanism for prefabricated units of various thicknesses between 80-240 mm, the lifting mechanism further comprising elements for locking the gripping member relative to the frame member while said first and second coupling profiles are in position in the bead sections (5a or 5b) of the unit's opposite surface layers.

[0004] The invention will now be described in more detail with reference to the accompanying drawings, in which:

- Fig. 1 shows schematically one prefabricated sandwich unit hoistable by means of a lifting mechanism of the invention,
- Fig. 2 shows schematically a process of mounting a mechanism of the invention on one flank of a prefabricated unit to be lifted,
- Fig. 3 shows in a perspective view one embodiment for a lifting mechanism of the invention, and
- Figs. 4A, 4B show schematically some optional tongue-and-groove designs for a hoistable prefabricated unit.

[0005] Fig. 1 shows schematically a core member 2 of mineral wool fiber, having surface layers 3 and 4 of sheet metal pasted to both of its main surfaces. Each surface layer has its upper part formed with a bead section 5a, constituting a tongue member 7 for a tongue-and-groove joint with a space 6a formed thereinside. Respectively, each surface layer 3 and 4 has its lower part formed with a bead section 5b, constituting a groove member 8 for a tongue-and-groove joint, the groove member 8 and the surface layer's inner face defining a space 6b therebe-

tween. The resulting prefabricated sandwich unit is intended for use as wall elements set on top of or adjacent to each other. Instead of mineral wool, the core member 2 may consist of some other heat insulating material, such as e.g. polyurethane, the bottom surface of the bead section's 5a, 5b innermost edge and the core member's top surface preferably defining therebetween a clearance, through which the lifting mechanism has its gripping member insertable under the bead for lifting the unit with the lifting mechanism. This clearance is necessary as polyurethane is harder than mineral wool, whereby the gripping member does not penetrate just as readily inside the core member.

[0006] Fig. 2 shows schematically a process of positioning a lifting mechanism 10 of the invention under the tongues 7 constituted by the bead sections present on the unit's top side by means of coupling profiles 12, 13 and respectively 16, 17. In addition, represented by reference numeral 27 is a downward-directed claw member of the coupling profiles, which, in the process of placing the lifting mechanism in position, penetrates inside the core member and, thus, at the same time, eliminates a relative lateral movement between the lifting mechanism and the unit being lifted.

[0007] Fig. 3 illustrates in more detail one embodiment for a lifting mechanism of the invention. The lifting mechanism 10 comprises a frame member, which in the present embodiment comprises a fork-like element, whose legs are at one end thereof connected to each other by an edge component 21 constituting the coupling profile 12, 13. The coupling profile comprises a gutter element 13 and an upright wall 12 present at its forward edge. In the embodiment of fig. 2, the upright wall 12 bears against the bottom of the space 6a inside the tongue 7, the lift being essentially based upon the upright wall's 12 top edge. Between the frame member's legs 11 is fitted a gripping member 15, designed as a slide element and having a coupling profile 16, 17 at one edge 22 thereof. In the illustrated embodiment, the gripping member 15 is provided at its end closer to the coupling profile with laterally protruding slide pins 24 accommodated in a hollow inner space 23 of the frame member's legs 11, allowing a sliding motion of the gripping member 15 relative to the frame member for adapting the lifting mechanism 10 for prefabricated units of various thicknesses. In addition, each leg of the frame member has a locking element 19 connected thereto by way of a joint pin 25, which in the present embodiment is in the shape of L. The locking element penetrates partially inside the leg member 11, such that a shorter arm 20 passes through the hollow leg of the frame member 11, extending into a hollowed central section 26 of the gripping member 15 for locking the gripping member 15 relative to the frame member 11 as the coupling elements are located in the bead sections 5a of the opposite surface layers. The frame member is preferably so dimensioned that the outer end of the frame member's legs 11 and the outer end of the gripping member 15 are located above the

respective bead section 5a as the lifting mechanism is in a secured condition, whereby the unit to be lifted is more securely locked in its position. The frame member is further provided with lifting eyes 14a, 14b and the gripping member 15 has its top surface provided with lifting eyes 18a, 18b, respectively. In each case, the lifting eyes 14a, 14b and 18a, 18b are provided near the coupling profile 12, 13 and respectively 16, 17, whereby, upon inserting lifting ropes or similar lifting means in the lifting eyes and upon lifting a unit to an upright position, the unit being lifted settles in a balanced position regardless of the unit's thickness as the lifting eyes are located close to the surface layer. The lifting ropes or similar lifting means are preferably adapted to pass from one lifting eye 14a of the frame member to the diagonally opposite lifting eye 18b of the gripping member 15 (and respectively from eye 14b to eye 18a), such that, in the process of lifting a horizontally positioned prefabricated unit to a vertical position, each surface layer 3, 4 is subjected to a substantially equal load, thus eliminating a risk of ripping off the surface layers.

[0008] The foregoing embodiment deals with lifting a unit in its horizontal position from under the tongues 7 present on the top side, and terms associated with this position have been used in the description and claims, such as e.g. the upright wall 12 and the downward-directed claw member 27, but such terms are only used in an effort to simplify the presentation with no intention to limit the discussed elements to this particular position. For example, it is also conceivable to use the lifting mechanism in such a way that a unit to be lifted is in a vertical position and the lifting mechanism is preferably placed on each vertical side, whereby the upright wall 12 and the claw members 27 are in a horizontal position and the lifting mechanism is located under both the tongues 7 and the grooves 8 in the spaces 6a and 6b, respectively. In addition, it is conceivable to use the lifting mechanism in the case of a so-called circum-matched prefabricated unit, in which e.g. one horizontal side and one vertical side are provided with a tongue and the other horizontal side and the other vertical side are respectively provided with a groove. The inventive lifting mechanism is useful also in the case of truncated units with bead sections (5a or 5b) on one side only. Furthermore, instead of or in addition to the bottom of the space 6a, the lifting mechanism may have its coupling profile bearing against some other part of the bead section for lifting a unit.

[0009] The tongues 7 and the grooves 8 may have profiles which are even considerably different from those depicted in figs. 1 and 2. Figs. 4A and 4B illustrate by way of example some optional profile shapes for the tongue 7.

Claims

1. A mechanism for lifting a prefabricated sandwich unit, said unit (1) comprising a core element (2) of a

heat insulating material and surface layers (3, 4) present on its two opposite main surfaces, said surface layers being laminated on the core element by applying the same with a bonding agent to the core element's opposite main surfaces and said surface layers including bead sections (5a, 5b) at least on one side of the unit, the lifting mechanism being adapted to be placed for a lifting operation on said side of the unit provided with the bead sections (5a or 5b), the lifting mechanism (10) comprising a frame member, having one longitudinal edge (21) thereof formed with a first coupling profile (12, 13) for engagement with the bead section of the unit's one surface layer (3), and a gripping member (15) having one edge (22) thereof formed with a second coupling profile (16, 17) for engagement with the bead section of the unit's other surface layer (4), **characterized in that** the gripping member (15) is arranged to be laterally movable relative to the frame member for adapting the lifting mechanism (10) for prefabricated units of various thicknesses between 80-240 mm, the lifting mechanism further comprising elements (19, 20) for locking the gripping member (15) relative to the frame member while said first and second coupling profiles (12, 13 and 16, 17) are in position in the bead sections (5a or 5b) of the unit's opposite surface layers (3, 4).

2. A mechanism as set forth in claim 1, **characterised in that** at least one of said first and second coupling profiles (12, 13 or 16, 17) is designed as a gutter-shaped (13, 17) structure, including an upright wall (12, 16) whereby, when the coupling profile is in position, the wall (12, 16) reaches the bottom of a space (6) inside the bead.
3. A mechanism as set forth in claim 1 or 2, **characterized in that** the frame member and the gripping member are provided with fastening elements (14, 18) for lifting elements.
4. A mechanism as set forth in any of the preceding claims, **characterized in that** the frame member further includes claw elements (27) which, in the process of positioning the lifting mechanism, penetrate into the core element (2), thus preventing a lateral movement between the lifting mechanism and the unit to be lifted.

Patentansprüche

1. Mechanismus zum Heben einer vorgefertigten Sandwicheinheit, wobei die Einheit (1) ein Kernelement (2) aus einem wärmedämmenden Material umfasst, und Oberflächenschichten (3, 4), welche an ihren zwei gegenüberliegenden Hauptflächen vorhanden sind, wobei die Oberflächenschichten an

das Kernelement laminiert sind, durch Anbringen derselben mit einem Klebstoff an den gegenüberliegenden Hauptflächen des Kernelements, und wobei die Oberflächenschichten Falzabschnitte (5a, 5b) wenigstens an einer Seite der Einheit aufweisen, wobei der Hebemechanismus angepasst ist, für einen Hebevorgang an der Seite der Einheit, welche mit den Falzabschnitten (5a oder 5b) versehen ist, angeordnet zu werden, wobei der Hebemechanismus (10) ein Rahmenteil umfasst, welches einen Längsrand (21) desselben aufweist, der mit einem ersten Koppelprofil (12, 13) ausgebildet ist, zum Eingriff mit dem Falzabschnitt der einen Oberflächenschicht (3) der Einheit, und ein Greifteil (15), welches einen Rand (22) desselben aufweist, der mit einem zweiten Koppelprofil (16, 17) ausgebildet ist, zum Eingriff mit dem Falzabschnitt der anderen Oberflächenschicht (4) der Einheit, **dadurch gekennzeichnet, dass** das Greifteil (15) angeordnet ist, seitwärts beweglich zu sein, relativ zu dem Rahmenteil, zum Anpassen des Hebemechanismus (10) für vorgefertigte Einheiten von verschiedener Dicke zwischen 80 und 240 mm, wobei der Hebemechanismus ferner Elemente (19, 20) umfasst, zum Verriegeln des Greifteils (15), relativ zu dem Rahmenteil, während das erste und das zweite Koppelprofil (12, 13 und 16, 17) in den Falzabschnitten (5a oder 5b) der gegenüberliegenden Oberflächenschichten (3, 4) der Einheit in Position sind.

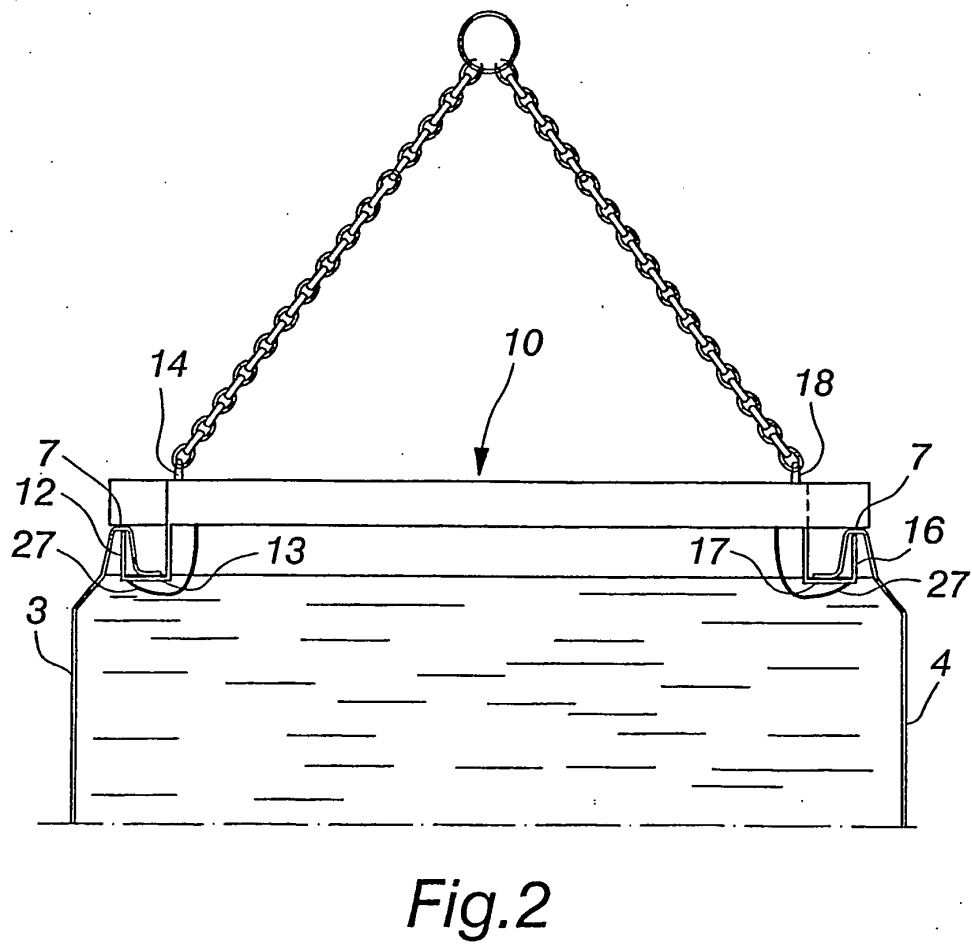
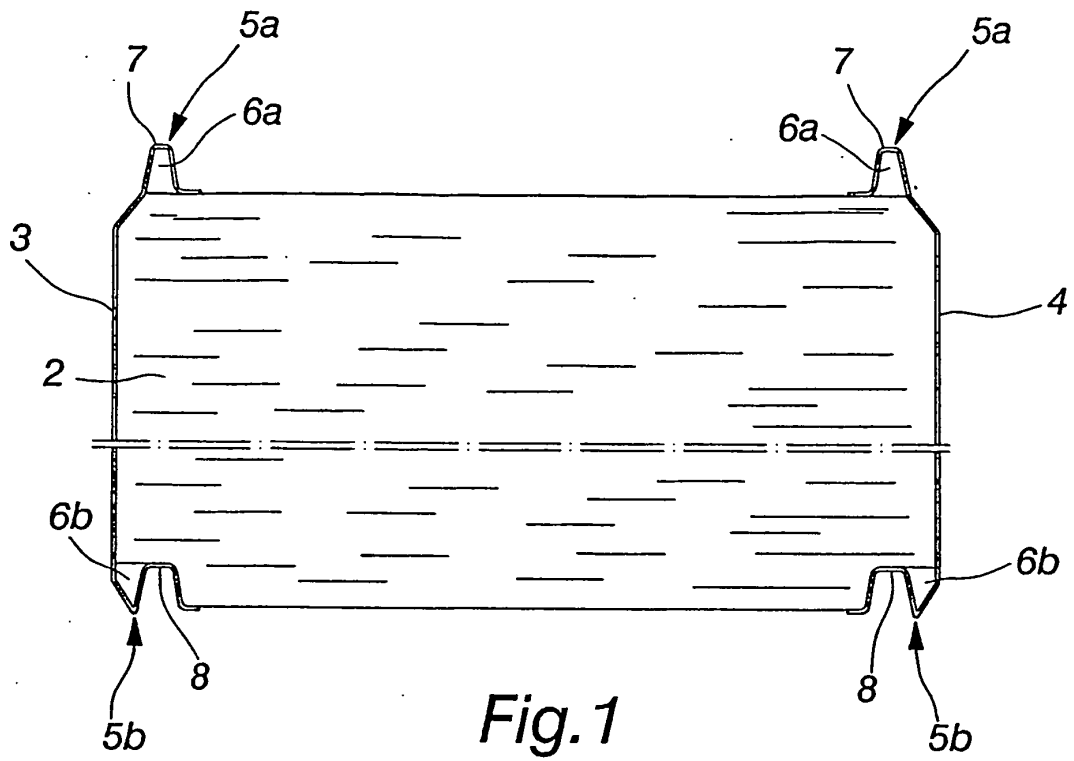
2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet, dass** wenigstens eines des ersten und des zweiten Koppelprofils (12, 13 oder 16, 17) als eine rillenförmige Konstruktion (13, 17) gestaltet ist, welche eine aufrechtstehende Wand (12, 16) aufweist, wobei, wenn das Koppelprofil in Position ist, die Wand (12, 16) den Grund eines Freiraums (6) innerhalb des Falzes erreicht.
3. Mechanismus nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Rahmenteil und das Greifteil mit Befestigungselementen (14, 18) für Hebeelemente versehen sind.
4. Mechanismus nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Rahmenteil ferner Krallenelemente (27) umfasst, welche, im Prozess des Positionierens des Hebemechanismus, in das Kernelement (2) eindringen, wodurch sie eine Seitwärtsbewegung zwischen dem Hebemechanismus und der zu hebenden Einheit verhindern.

Revendications

1. Mécanisme destiné à soulever une unité en sandwich préfabriquée, ladite unité (1) comprenant un

élément central (2) constitué d'un matériau d'isolation thermique et de couches de revêtement (3, 4) prévues sur ses deux surfaces principales opposées, lesdites couches de revêtement étant contre-collées sur l'élément central, par application d'un agent adhésif sur les surfaces principales opposées de l'élément central, et lesdites couches de revêtement comprenant des sections de bourrelet (5a, 5b) d'au moins un côté de l'unité, le mécanisme de levage étant adapté pour être placé dudit côté de l'unité pourvue des sections de bourrelet (5a ou 5b), en vue d'une opération de levage, le mécanisme de levage (10) comprenant un élément cadre possédant un bord longitudinal (21) formé avec un premier profilé d'accouplement (12, 13) destiné à s'engager dans la section de bourrelet de l'une des couches de revêtement (3) de l'unité, et un élément de préhension (15) possédant un bord (22) formé avec un deuxième profilé d'accouplement (16, 17), destiné à s'engager dans la section de bourrelet de l'autre couche de revêtement (4) de l'unité, **caractérisé en ce que** l'élément de préhension (15) est conçu pour être mobile latéralement par rapport à l'élément cadre, pour l'adaptation du mécanisme de levage (10) à des unités préfabriquées de différentes épaisseurs, entre 80 et 240 mm, le mécanisme de levage comprenant en outre des éléments (19, 20) destinés au blocage de l'élément de préhension (15) par rapport à l'élément cadre, tandis que lesdits premiers et deuxièmes profilés d'accouplement (12, 13 et 16, 17) sont en position dans les sections de bourrelet (5a ou 5b) des couches de revêtement opposées (3, 4) de l'unité.

2. Mécanisme selon la revendication 1, **caractérisé en ce qu'**au moins l'un parmi lesdits premiers et deuxièmes profilés d'accouplement (12, 13 ou 16, 17) est conçu comme une structure en forme de gouttière (13, 17), comprenant une paroi verticale (12, 16), de sorte que, lorsque le profilé d'accouplement est en position, la paroi (12, 16) atteint le fond d'un espace (6) à l'intérieur du bourrelet.
3. Mécanisme selon l'une des revendications 1 ou 2, **caractérisé en ce que** l'élément cadre et l'élément de préhension sont pourvus d'éléments de fixation (14, 18) pour des éléments de levage.
4. Mécanisme selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'élément cadre comprend en outre des éléments de pince (27), qui, pendant le positionnement du mécanisme de levage, pénètrent dans l'élément central (2), empêchant ainsi un mouvement latéral entre le mécanisme de levage et l'unité à soulever.



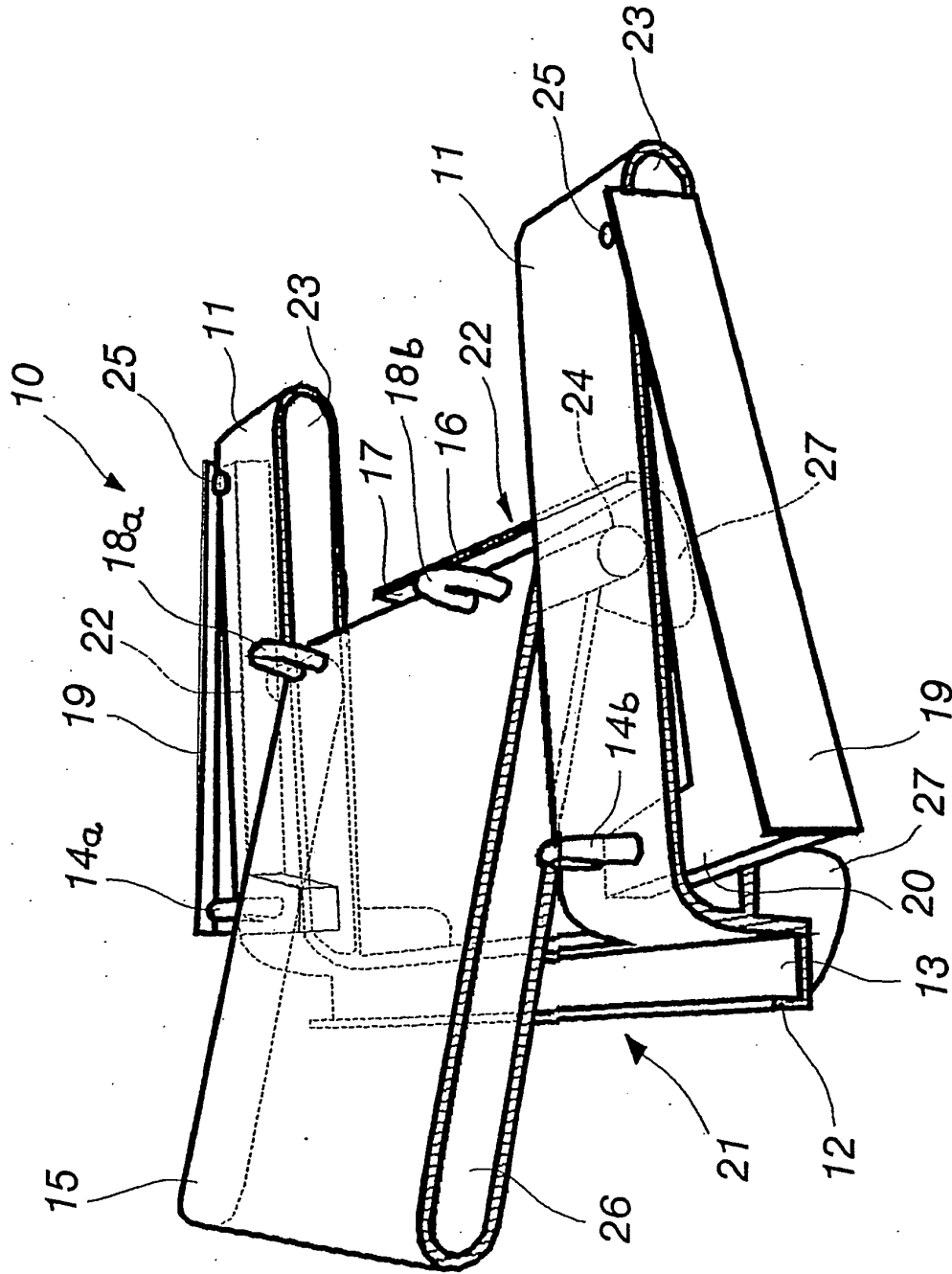


Fig.3

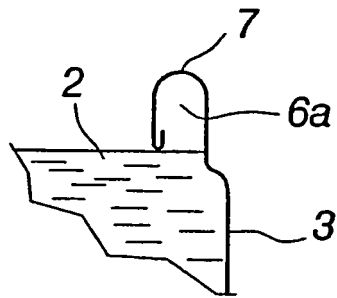


Fig.4A

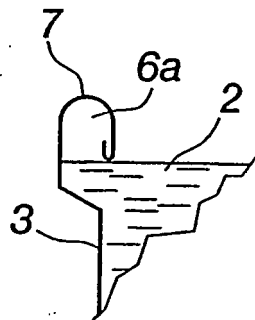


Fig.4B

REFERENCES CITED IN THE DESCRIPTION

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