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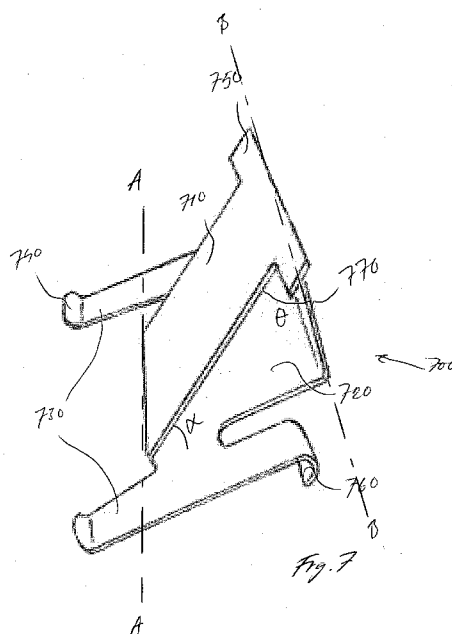
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(54) Title: STORING BOX TILTING DEVICE



(57) Abstract: The present invention relates to a storing box tilting device comprising a sliding part and a support part, said sliding part is essentially planar and having a surface plane building an angle α with a surface plane of said support part which is less than 45° , said support part is essentially planar and comprises a first and a second means for pivoting said tilting device and at least one first tilt stop means for restricting the tilting angle of said storing box tilting device in a first direction, said sliding part having a surface pointing away from said support part capable for carrying a storing box. Said sliding part further comprising at least one second tilt stop means for restricting the tilting angle of said storage box tilting device in a second direction.

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TITLE:

5 Storing box tilting device

TECHNICAL FIELD

The present invention relates to a storing box tilting
10 device according to the preamble of the independent claim.

BACKGROUND OF THE INVENTION:

In an assembly line, for instance vehicle engine assembly
15 line, material such as bolts, nuts, washers, engine
parts, etc are stored in boxes made of a plastic, metal
or cardboard material. These boxes are arranged on
shelves with a conveyor which may comprise rollers for
decreasing the friction of the bottom surface of the said
20 boxes to the shelves. The shelves/conveyors may be tilted
a few degrees for automatically transporting the boxes to
the front side of the shelf towards an assembler.
Replenishment of boxes is made from the backside, the
higher part of the shelf, which may be performed by a
25 robot.

Because of ergonomic reasons said shelves should be
arranged within a height range suitable for the
assembler, which means that said assembler should not be
30 forced to bend oneself far down or stretch oneself high
up in order to reach the content of said boxes. If
storage shelf systems should be built so that short
persons also could see the content of the boxes at the
highest shelf, said highest shelf would be placed
35 relatively low resulting in too few shelves and a
shortage of storage capacity. As an alternative the

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assembly company can only employ persons taller than a predetermined height which in some cases could be seen as discriminating and insulting for those in search of the work.

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SUMMARY OF THE INVENTION:

An object of the invention therefore to make it possible for short persons to be employed as an assembler at for instance an assembly line without having to decrease the storage capacity provided for such assembler.

This object is achieved by the features of the independent claims. The other claims and the description disclose advantageous embodiments of the invention.

According to a first aspect of the invention it is provided a storing box tilting device comprising a sliding part and a support part. Said sliding part is essentially planar and having a surface plane building an angle α with a surface plane of said support part which is less than 45° . Said support part is essentially planar and comprises a first and a second means for pivoting said tilting device and at least one first tilt stop means for restricting the tilting angle of said storing box tilting device in a first direction. Said sliding part having a surface pointing away from said support part capable for carrying a storing box. Said sliding part further comprising at least one second tilt stop means for restricting the tilting angle of said storage box tilting device in a second direction.

An advantage of the present invention is that boxes at elevated shelves may be overviewed by small persons.

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Another advantage of the present invention is that said storing box tilting device is easy to operate.

Still another advantage of the present invention is that
5 said storing box tilting device is easy and inexpensive to manufacture.

According to another example embodiment of the present invention said first and second means for pivoting said
10 tilting device is designed to fit at least partly around a first and second rollers respectively provided in a conveyor.

An advantage of this example embodiment of the present
15 invention is that said storing box tilting device will easily fit to existing conveyor lines.

According to another example embodiment of the present invention said storing box tilting device further
20 comprising a reinforcing part connected between said sliding part and said support part.

An advantage of this embodiment is that the shape of the storing box tilting device is maintained even
25 after/during tilting a heavy box.

According to still another example embodiment of the present invention said at least one first tilt stop means
30 comprises a box stop for prohibiting said storing box from sliding away from said tilting device when said at least one first tilt stop means is utilized.

An advantage of this embodiment is that the stop for the box is integrated in the storage box tilting device
35 making it possible to arrange said tilting device at different places on the conveyor.

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According to still another example embodiment of the present invention said at least one second tilt stop means is arranged as lateral extensions of said essentially planar sliding part and/or said at least one first tilt stop means is arranged as lateral extensions of said essentially planar support part.

An advantage of this embodiment is that the storing box tilting device may be manufactured from a single piece of material.

According to still another example embodiment of the present invention said at least one second tilt stop means and said first and second means for pivoting said tilting device is arranged in a plane parallel to shelf surface when utilizing said at least one second tilt stop means.

According to still another example embodiment of said sliding part is building an angle β with a support surface for said storing box tilting device when utilizing said at least one second tilt stop means, which angle β is less than 45° .

According to another aspect of the present invention it is provided a shelf system comprising a plurality of shelves where at least one shelf comprises a conveyor comprising at least a first and a second set of box support rollers laterally spaced apart. Said shelf system further comprising a storing box tilting device as described above.

BRIEF DESCRIPTION OF THE DRAWINGS

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The present invention together with the above mentioned and other objects and advantages may best be understood from the following detailed description of the embodiments, but not restricted to the embodiments, wherein is shown
5 schematically:

- fig. 1 is a side view of a conventional conveyor shelf system with tilted shelves planes provided with a number of storing boxes.
- fig. 2 is a side view of a similar conveyor shelf system as depicted in figure one together with the inventive storing box tilting device.
- fig. 3 is a side view of the storing box tilting device provided on a conveyor before the storing box is pulled over said tilting device.
- fig. 4 is a side view of the storing box tilting device provided on a conveyor when the storing box is started to be pulled over the tilting device.
- fig. 5 is a side view of the storing box tilting device provided on a conveyor when the storing box is horizontally provided on said tilting device and starting to tip over.
- fig. 6 is a side view of the storing box tilting device provided on a conveyor when the storing box is in its final position.
- fig. 7 is a first example embodiment of storing box tilting device according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

- 10 Figure 1 depicts a side view of a conveyor shelf assembly 100 comprising a first conveyor 110, a second conveyor 112, a third conveyor 114 and a fourth conveyor 116. The

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number of conveyors may vary depending on the sizes of the parts and boxes placed on it and four is just an example. In the example embodiment in figure 1 each of the conveyor 110, 112, 114 and 116 respectively comprises
5 a first set of rollers 130 and a second set of rollers (not shown in figure 1). Said first and second set of rollers 130 are laterally spaced apart and are supporting boxes 120 placed on the conveyor 110, 112, 114, 116. As depicted in figure 1, the conveyors are tilted at an
10 angle γ . Said angle γ is typically a few degrees, for instance 7 degrees. When sloping the conveyor towards for instance an assembler who is picking parts from the boxes in an assembly line, said boxes will be automatically transported on the conveyor to the assembler because of
15 the gravity. At the end of the conveyor there is a stop for prohibiting the box to fall down on the floor. New filled boxes are placed on the conveyor at an opposite side in relation to where the assembler, i.e., at the higher side of the conveyor shelf assembly 100, is
20 standing, usually this may be performed by a robot or by a human being. The tilting angle γ may not be too large because then there is a risk for the box to automatically turn over and fall on the floor when rolling on the conveyor 110, 112, 114, 116 to its stop.

25

As is illustrated in figure 1, the person standing in front of the conveyor shelf assembly may easily have a good overview of the contents of the boxes in the first, second and third conveyors, 110, 112 and 114 respectively
30 but not the fourth conveyor 116 at the top of the conveyor shelf assembly 100. The shorter the person is the greater the risk is that said person may not be able to overview the highest or even the second highest conveyor with boxes.

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Figure 2 illustrates how a person, despite not being tall enough for overlooking the contents of the box in the highest conveyor, according to the present invention is able to overview the content of the box on the highest conveyor 116. This is possible due to the inventive storing box tilting device 230, which in figure 2 is shown in its tilted and in use mode. The storing box tilting device is tilting one box at a time on said conveyor. It is designed to easily tilt and untilt the box despite its content, size and weight.

Figure 7 is an example embodiment of storing box tilting device 700 according to the present invention. Said storing box tilting device 700 comprising a sliding part 710 and a support part 720.

Said sliding part 710 is essentially planar and having a surface plane building an angle α with a surface plane of said support part 720 which is less than 45° . In an example embodiment said angle α is between $40-45^\circ$.

Said support part 720 is essentially planar and comprises a first and a second means 760 for pivoting said tilting device 700 and at least one first tilt stop means 730 for restricting the tilting angle of said storing box tilting device 700 in a first direction.

Said sliding part 710 having a surface pointing away from said support part 720 capable for carrying a storing box.

Said sliding part 710 further comprising at least one second tilt stop means 750 for restricting the tilting angle of said storage box tilting device 700 in a second direction.

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Said first and second means 760 for pivoting said tilting device 700 is designed to fit at least partly around a first and second rollers respectively provided in a conveyor.

5

In another example embodiment said first and second means 760 is a pin provided between two roller in said conveyor for securing the position of said storing box tilting device on said conveyor.

10

Between said first set of rollers 130 and said second set of rollers there may be an empty space or a solid or perforated floor.

15 Said at least one first tilt stop means 730 comprises a box stop 740 for prohibiting said storing box 120 from sliding away from said tilting device 700 when said at least one first tilt stop means 730 is utilized. Said box stop is provided spaced apart from an axis A-A. When the
20 box is resting against the box stop box said box may be supported with one of the edges to said box stop and another edge at said sliding part 710, i.e., said box is not resting with the whole bottom surface against said sliding part, but only one edge of said bottom surface,
25 when in said used mode.

Said at least one second tilt stop means 750 is arranged as lateral extensions of said essentially planar sliding part 710.

30

Sais first tilt stop means 730 and said second tilt stop means is arranged to stop against a part of said conveyor, either being a roller 130 or a supporting frame for said rollers 130.

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Said at least one first tilt stop means 730 is arranged as lateral extensions of said essentially planar support part 720.

5 Said at least one second tilt stop means 750 and said first and second means 760 for pivoting said tilting device 700 is arranged in a plane parallel to a conveyor surface when utilizing said at least one second tilt stop means 750.

10

Said sliding part 710 is building an angle β with a conveyor surface when utilizing said at least one second tilt stop means 750, which angle β is less than 45° . In one embodiment said angle β is between $20-30^\circ$, and in yet
15 another example embodiment said angle β is 25° .

A further reinforcing part 770 provided between the sliding part 710 and the supporting part may optionally be present. The storing box tilting device may be
20 manufactured from a single piece of metal. The final design is manufactured in the planar metal sheet, then said single piece of metal is folded around A-A and B-B. A free end of the sliding part 710 may be welded to a free end of the reinforcing part 770. In another example
25 embodiment said reinforcing part may be welded to the storing box tilting device as a separate unit. The reinforcing part may be arranged at other places between the sliding part 710 and the supporting part 720. In figure 7 said free end of the sliding part 710 is
30 building a sharp angle θ with the free end of the reinforcing part 770. In another example embodiment said free ends of the sliding part 710 and the reinforcing part may form a smooth curvature. The smooth curvature may facilitate a tipping over of the storing box tilting
35 device to an unused mode. This is because there may be at least one box arranged behind the storing box tilting

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device. If the free ends of the sliding part 710 and the reinforcing part 770 are built together to form a sharp angle, a tipping over of the storing box tilting device may be difficult because a sharp corner may get stuck at the box behind the storing box tilting device. If a smooth curvature is used instead in this part of the storing box tilting device, the tipping over to the unused mode may be done without getting stuck on the storing box behind said tilting device.

10

Figure 3-6 illustrates how to use the inventive storing box tilting device 700.

Figure 3 is a side view of the storing box tilting device 340 provided on a conveyor 310 before the storing box 320 is pulled over said tilting device 340 (unused mode). When the storing box tilting device 340 is in an unused mode said second tilt stop means 750 is resting against said conveyor 310. A box to be arranged on said storing box tilting device 340 may be provided with a handle 325 for pulling and pushing said box back and forth over the storing box tilting device.

Figure 4 depicts a side view of the storing box tilting device 440 provided on a conveyor 410 when the storing box 420 is started to be pulled over the tilting device 440. At this stage the box is sliding on said sliding part 710 of said storing box tilting device 440.

Figure 5 is a side view of the storing box tilting device 540 provided on a conveyor 510 when the storing box 520 is horizontally provided on said tilting device 540 and starting to tip over. At this stage the storing box is in an instable equilibrium, i.e., it is as easy to tip over to a used mode as to an unused mode. The position of the tilting means 760 with respect of the center of gravity

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of the tilting box will determine the equilibrium. For this reason the tilting means may be provided in said storing box tilting device 540 in such a way that when said box 520 is having its bottom surface parallel to a surface of said conveyor, which means that also sliding part 710 is parallel to the conveyor, said center of gravity of the box 520 and the tilting means 760 is lying at one and the same vertical line.

10 Figure 6 is a side view of the storing box tilting device 640 provided on a conveyor 610 when the storing box 620 is in its final position (used mode). In this figure one can see that the box is resting on said storing box tilting device 640 with two opposite edges forming an
15 outer boundary of a bottom surface of said box 620. Said sliding surface 710 is building an angle α with the conveyor which is the same as the angle between the supporting part and the sliding part.

20 A shelf system comprising a plurality of shelves where at least one shelf comprises a conveyor comprising at least a first and a second set of box support rollers laterally spaced apart. Said shelf system may further comprising a storing box tilting device.

25

The invention must not be regarded as being limited to the examples of embodiment described above, a number of further variants and modifications being feasible without departing from the scope of the following claims.

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CLAIMS

5 1. A storing box tilting device comprising a sliding
part and a support part, said sliding part is essentially
planar and having a surface plane building an angle α
with a surface plane of said support part which is less
than 45° , said support part is essentially planar and
10 comprises a first and a second means for pivoting said
tilting device and at least one first tilt stop means for
restricting the tilting angle of said storing box tilting
device in a first direction, said sliding part having a
surface pointing away from said support part capable for
15 carrying a storing box, **characterized in that** said
sliding part further comprising at least one second tilt
stop means for restricting the tilting angle of said
storage box tilting device in a second direction.

20 2. The storing box tilting device according to claim 1,
wherein said first and second means for pivoting said
tilting device is designed to fit at least partly around
a first and second rollers respectively provided in a
conveyor.

25

3. The storing box tilting device according to claim 1
or 2, further comprising a reinforcing part connected
between said sliding part and said support part.

30 4. The storing box tilting device according to any one
of claim 1-3, wherein said at least one first tilt stop
means comprises a box stop for prohibiting said storing
box from sliding away from said tilting device when said
at least one first tilt stop means is utilized.

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5. The storing box tilting device according to any one of the preceding claims, wherein said at least one second tilt stop means is arranged as lateral extensions of said essentially planar sliding part.

5

6. The storing box tilting device according to anyone of the preceding claims, wherein said at least one first tilt stop means is arranged as lateral extensions of said essentially planar support part.

10

7. The storing box tilting device according to any one of the preceding claims, wherein said at least one second tilt stop means and said first and second means for pivoting said tilting device is arranged in a plane parallel to shelf surface when utilizing said at least one second tilt stop means.

15

8. The storing box tilting device according to any one of the preceding claims, wherein said sliding part is building an angle β with a support surface for said storing box tilting device when utilizing said at least one second tilt stop means, which angle β is less than 45° .

20

9. A shelf system comprising a plurality of shelves where at least one shelf comprises a conveyor comprising at least a first and a second set of box support rollers laterally spaced apart, characterized in that said shelf system further comprising a storing box tilting device according to any one of claim 2-8.

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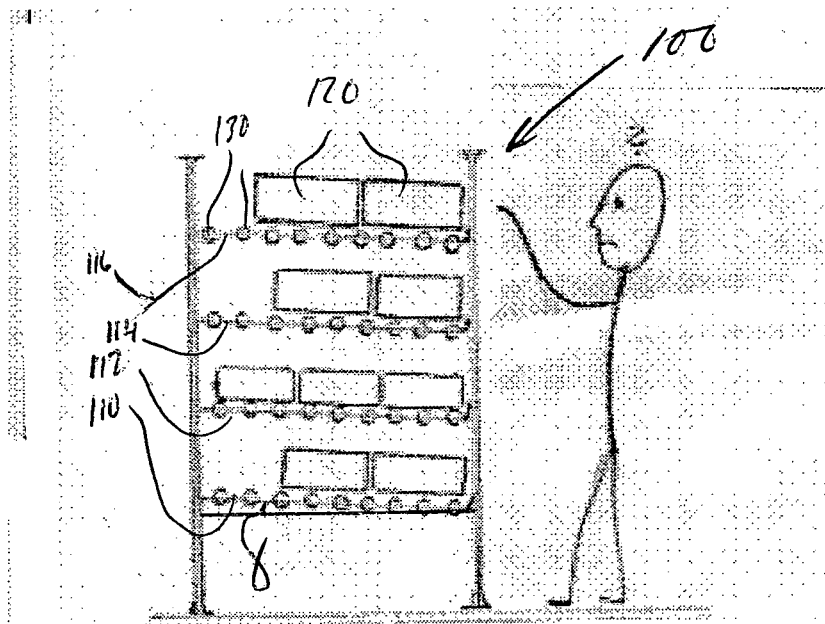


Fig. 1.

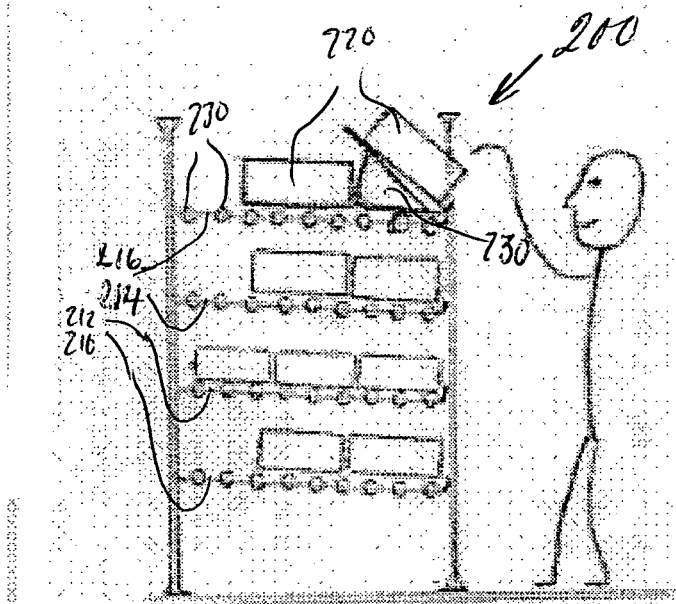


Fig. 2

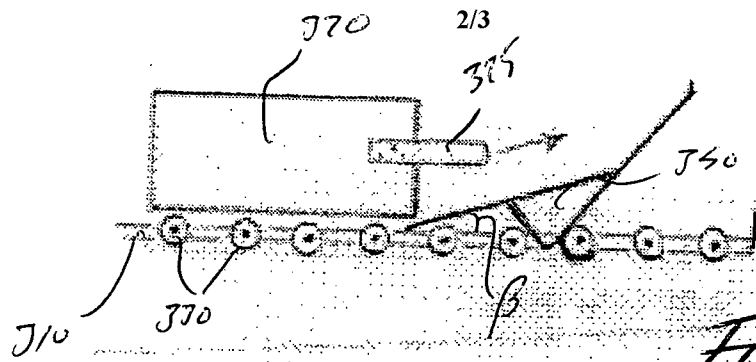


Fig. 3

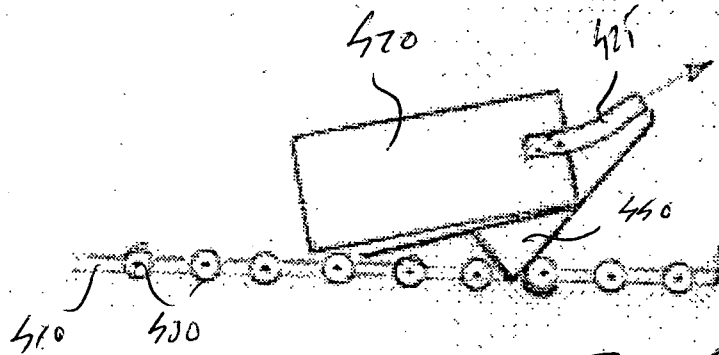


Fig. 4

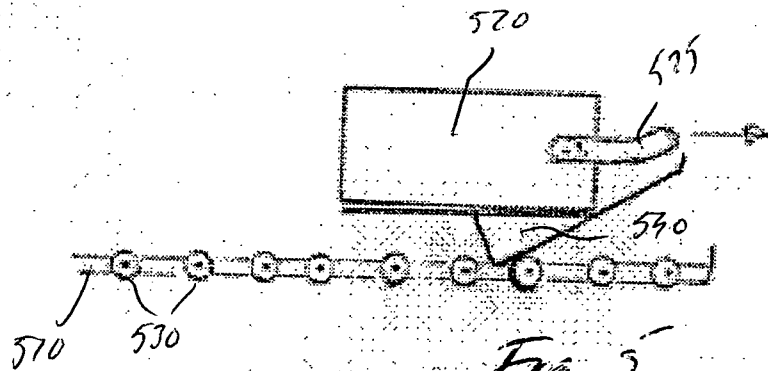


Fig. 5

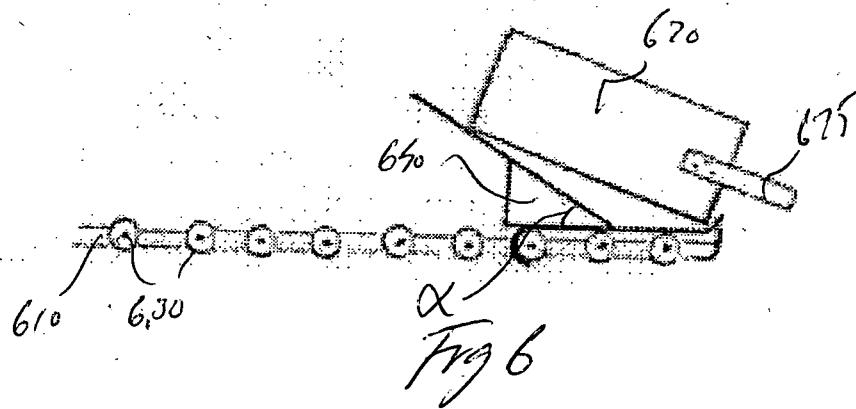
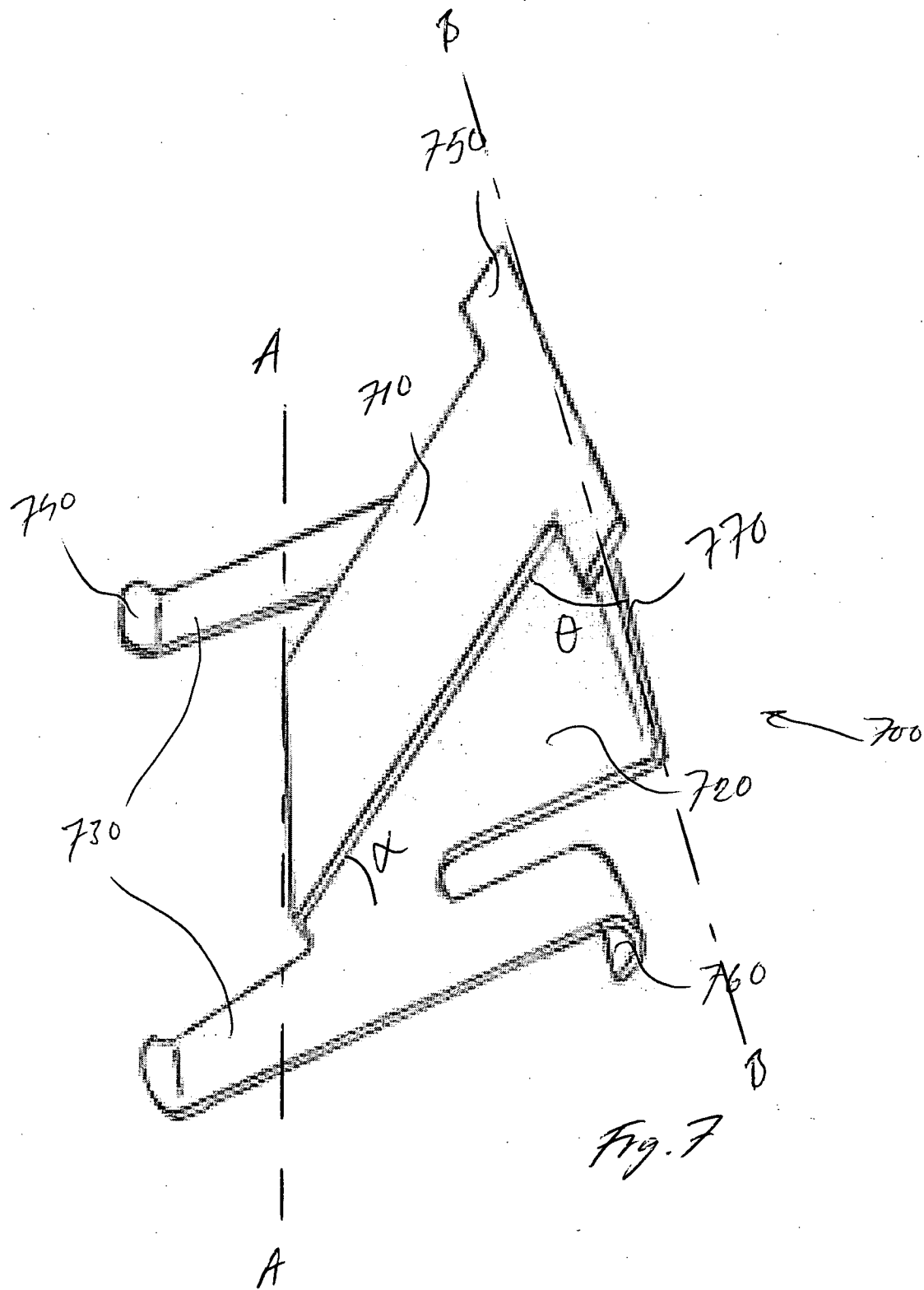


Fig. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2009/000261

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47F, A47G, A47B, B65G, B25H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 20090039040 A1 (T.J. JOHNSON ET AL), 12 February 2009 (12.02.2009), figures 1-7D, abstract --	1-9
A	FR 2429170 A1 (REGIE NATIONALE DES USINES RENAULT), 18 January 1980 (18.01.1980), whole document --	1-9
A	GB 2286576 A (N.S.M. SIMMONS), 23 August 1995 (23.08.1995), figures 1-5, abstract --	1-9
A	US 1345244 A (E. RILEY ET AL), 29 June 1920 (29.06.1920), whole document --	1-9

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 51030493 U (--), 28 August 1949 (28.08.1949), figures 1-9 -- -----	1-9

INTERNATIONAL SEARCH REPORT

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/SE2009/000261

US	20090039040	A1	12/02/2009	NONE
FR	2429170	A1	18/01/1980	NONE
GB	2286576	A	23/08/1995	NONE
US	1345244	A	29/06/1920	NONE
JP	51030493	U	28/08/1949	NONE