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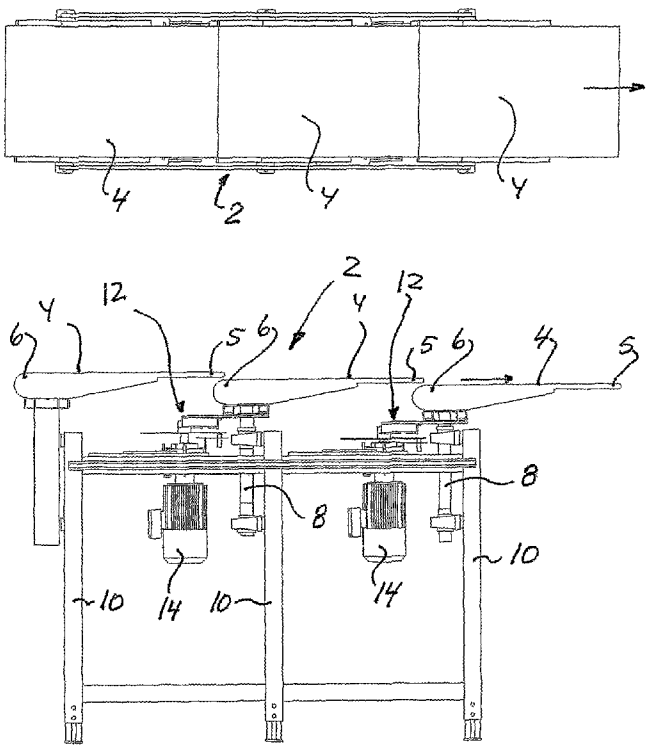
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(54) Title: SORTING CONVEYOR SYSTEM



(57) Abstract: A conveyor system for sorting specific items that are supplied in random sequence via a feeding conveyor, and including a number of rowwise arrayed sorting means (4) which are arranged to direct the items to specific receiving positions at at least one side of the sorting means (4), which are constituted by relatively short individually driven belt conveyors (4) which are pivotably suspended on mainly vertical turning shafts (8), and which at a foremost end part (5) project in over the next belt conveyor (4) in the row, and where at the foremost end part (5) and some distance to the rear, the pivotable belt conveyor (4) is designed with low height as a foremost reversing roller and a reversing roller disposed some distance to the rear of the foremost roller have small diameter. By means of simple technical measures it hereby becomes possible to counteract the said drawbacks of corresponding prior art conveyor systems and to achieve further advantages that are very essential and new in the application.

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Sorting Conveyor System

Field of the Invention

The present invention concerns a conveyor system for sorting items and of the kind indicated in the preamble of claim 1.

Background of the Invention

By prior art conveyor systems for sorting items, there is used relatively complicated and very costly mechanical constructions in the receiving positions directing items laterally out to predetermined receiving positions at both sides of the conveyor system, e.g. in the shape of mechanisms for tilting a conveyor section opposite the receiving station, or in the form of mechanical arms that may be turned in over the conveyor system for moving a predetermined item out to a desired receiving position.

From postal sorting systems, it is furthermore known with so-called tip conveyors, where respective conveyor sections are adapted to tilt opposite a predetermined receiving position with the intention of moving out a predetermined item in the said receiving position. Also, here there is a case of relatively complicated and very costly mechanical constructions.

Object of the Invention

It is the purpose of the invention to provide a new and improved conveyor system of the kind specified in the introduction, and which by means of simple technical measures enables counteracting the said drawbacks by corresponding prior art conveyor systems, and furthermore to achieve essential and new application advantages.

Description of the Invention

The conveyor system according to the invention is characterised in that the sorting means are constituted by relatively short individually driven belt conveyors which are pivotably suspended on mainly vertical turning shafts, and which at a foremost end part project in over the next belt conveyor in the row. By means of simple technical measures it hereby becomes possible to counteract the said drawbacks of

corresponding prior art conveyor systems and furthermore to achieve advantages that are very essential and new in the application.

It is to be particularly emphasised that the conveyor system according to the invention can be used almost universally for sorting out very different items, which may vary both in size and in weight with great speed and capacity, e.g. from box packings of up to 30 kg to very light plastic bags with a content in the form of e.g. a few electric fuses.

The conveyor system according to the invention is suitably designed so that at the foremost end part, the pivotable belt conveyor is designed with low height as a foremost reversing roller has small diameter.

And the conveyor system according to the invention is furthermore preferably designed so that at the foremost end part and some distance to the rear, the pivotable belt conveyor is designed with low height as a foremost reversing roller and a reversing roller disposed some distance to the rear of the foremost roller have small diameter.

With the purpose of achieving optimal operation of the conveyor system according to the invention, it is particularly advantageous that the mainly vertical turning shaft for the pivotable belt conveyor is disposed at a rearmost end of the belt conveyor, and is provided with a pivot control mechanism, preferably extending rearwards, and which is adapted to interact with a control arm connected to a pivot motor.

The conveyor system according to the invention is furthermore suitably designed so that the pivot control mechanism is designed with mutually parallel, downwards open guide sections that are interspaced and adapted for receiving guide rollers of the control arm, and that the spacing between the guide rollers on the control arm is the same as the spacing between the guide sections.

With regard to control, the conveyor system according to the invention is designed so that the engagement between the guide rollers of the control arm and the guide

sections is arranged so that the guide rollers engage both guide sections when the control arm is transversely disposed in relation to a longitudinal centre axis of the pivotable belt conveyor, corresponding to the latter not being turned outwards.

With the object of delivering items to a receiving position to the left side, the conveyor system according to the invention is suitably designed so that the engagement between the guide rollers of the control arm and the guide sections is arranged so that a left one of the guide rollers engages a left one of the guide sections when the control arm is turned clockwise, corresponding to the pivotable belt conveyor being turned outwards about 45° to the left side in relation to a longitudinal centre axis.

With the object of delivering items to a receiving position to the left side, the conveyor system according to the invention is suitably designed so that the engagement between the guide rollers of the control arm and the guide sections is arranged so that a right one of the guide rollers engages a right one of the guide sections when the control arm is turned counterclockwise, corresponding to the pivotable belt conveyor being turned outwards about 45° to the right side in relation to a longitudinal centre axis.

In a particularly simple way, the conveyor system according to the invention may be designed so that the pivot control mechanism includes position control means in the form of induction sensors that are adjustably mounted in curving slots, and which interact with plate-shaped position guide members.

The conveyor system according to the invention is preferably designed so that each of the belt conveyors includes an electric drive motor which is adapted to accelerate the belt conveyor at least when turned laterally outwards in relation to a longitudinal centre axis with the purpose of moving items out to a receiving position.

Description of the Drawing

The invention is now explained more closely in connection with the drawing, in which:

Fig. 1 shows a plan view of an embodiment of a sorting member of a conveyor system according to the invention, as seen from above;

Fig. 2 shows the sorting member of a conveyor system according to the invention shown in Fig. 1 as seen from the side;

Fig. 3 shows the sorting member of a conveyor system according to the invention as shown in Fig. 1, as seen from above and with a foremost belt conveyor turned out to the left in relation to a central longitudinal axis;

Fig. 4 shows the sorting member of a conveyor system according to the invention as shown in Fig. 1, as seen from above and with a foremost belt conveyor turned out to the right in relation to a central longitudinal axis;

Fig. 5 shows the sorting member of a conveyor system according to the invention as shown in Fig. 1, as seen from above and with an middle belt conveyor turned out to the left in relation to a central longitudinal axis;

Fig. 6 shows the sorting member of a conveyor system according to the invention as shown in Fig. 1, as seen from above and with an middle belt conveyor turned out to the right in relation to a central longitudinal axis;

Fig. 7 shows the mutual position and engagement of individual parts of the pivot control mechanism when the belt conveyor is not turned outwards in relation to a central longitudinal axis;

Fig. 8 shows the mutual position and engagement of individual parts of the pivot control mechanism when the belt conveyor is turned out to the left in relation to a central longitudinal axis;

Fig. 9 shows the mutual position and engagement of individual parts of a pivot control mechanism when the belt conveyor is turned out to the right in relation to a central longitudinal axis; and

Fig. 10 shows a detailed view of the individual parts of an embodiment of a pivot control mechanism for a conveyor system according to the invention.

Detailed Description of the Invention

The sorting member 2 shown in Figs. 1 – 6 for a conveyor system according to the invention in the shown embodiment consists of three relatively short belt conveyors 4, which, as shown in Fig. 2, are designed with a foremost reversing roller with small diameter so that a foremost end part 5 has very little height or thickness. Hereby the said foremost end part 5 of the belt conveyor 4 is allowed to project in over a rearmost end part 6 of the next belt conveyor 4 in the row. The sorting member 2 may of course consist of a much larger number of belt conveyors 4, corresponding to the desired number of receiving positions, as each belt conveyor 4 can serve a right and a left receiving position.

At a rearmost end part 6, each of the belt conveyors 4 are pivotably suspended on a strong vertical turning shaft 8 which is mounted at the side of strong vertical frame parts 10. At the rear, the belt conveyors 4 are provided with a pivot control mechanism 12 which is operated by electric gear motors 14. The pivot control mechanism 12 includes a control arm 16 which is rotationally rigidly connected to the gear motor 14, and which at opposite ends has upright journals 18 for guide rollers 20.

As most clearly illustrated in Figs. 7 – 9, the guide rollers 20 are adapted to interact or engage with downwards open guide sections 22, which as a part of the pivot control mechanism 12 project to the rear centrally from the belt conveyor 4, and which are disposed in parallel and with spacing corresponding to the spacing between the guide rollers 20 on the said control arm 16.

When the belt conveyor 4 is not turned out with the object of sorting out items, i.e. when the belt conveyor 4 e.g. assumes a position as rearmost or foremost in fig. 6, the control arm 16 assumes a transverse position, as shown in Fig. 7, where both guide rollers 20 engage both guide sections 22.

With the intention of turning the belt conveyor 4 to the left side relative longitudinal axis, the control arm is turned clockwise to the position sho where a guide roller 20 engages the bottom of left guide section 22, while the control arm 16 is disposed externally to the left side along the back side of the belt conveyor 4, i.e. this is turned to the left with the object of sorting out items to a given receiving position at the left side of the conveyor system according to the invention.

With the intention of turning the belt conveyor 4 to the right side relative to a central longitudinal axis, the control arm 16 is turned counterclockwise to the position shown in fig. 9, where a guide roller 20 engages the bottom of right guide section 22, while the control arm 16 is disposed externally to the right side along the back side of the belt conveyor 4, i.e. this is turned to the right with the object of sorting out items to a given receiving position at the right side of the conveyor system according to the invention.

In Fig. 10 appears some details of the pivot control mechanism 12 in the form of a plate-shaped fitting 24 which is fastened externally of a gear box 26 for the gear motor 14, and which is designed with two curving slots 28 in which two induction sensors 30 are mounted. With the object of positioning the turning movement of the belt conveyor 4, the sensors 30 interact with at least one upper curving plate 32 in such a way that termination of the plate 32 or cutouts at the edge of it can be read by the induction sensors 30.

For example, the conveying speed of the belt conveyors 4 may be of the magnitude 1 m/s, but it would be possible, especially when the belt conveyor 4 is turned out at one side with the object of sorting out items, to accelerate the belt conveyor 4 with the object of increasing the sorting capacity of the conveyor system.

CLAIMS

1. A conveyor system for sorting specific items that are supplied in random sequence via a feeding conveyor, and including a number of rowwise arrayed sorting means (4) arranged to direct the items to specific receiving positions at at least one side of the sorting means, **characterised in that** the sorting means are constituted by relatively short individually driven belt conveyors (4) which are pivotably suspended on mainly vertical turning shafts (8), and which at a foremost end part (5) project in over the next belt conveyor (4) in the row.

2. Conveyor system according to claim 1, **characterised in that** at the foremost end part (5), the pivotable belt conveyor (4) is designed with low height as a foremost reversing roller has small diameter.

3. Conveyor system according to claim 1, **characterised in that** at the foremost end part (5) and some distance to the rear, the pivotable belt conveyor (4) is designed with low height as a foremost reversing roller and a reversing roller disposed some distance to the rear of the foremost roller have small diameter.

4. Conveyor system according to claim 1, **characterised in that** the mainly vertical turning shaft (8) for the pivotable belt conveyor (4) is disposed at a rearmost end (6) of the belt conveyor (4), and is provided with a pivot control mechanism (12), preferably extending rearwards, and which is adapted to interact with a control arm (16) connected to a pivot motor (14).

5. Conveyor system according to claim 4, **characterised in that** the pivot control mechanism (12) is designed with mutually parallel, downwards open guide sections (22) that are interspaced and adapted for receiving guide rollers (20) of the control arm (16), and that the spacing between the guide rollers (20) on the control arm (16) is the same as the spacing between the guide sections (22).

6. Conveyor system according to claim 4-5, **characterised in that** the engagement between the guide rollers (20) of the control arm (16) and the guide sections (22) is

arranged so that the guide rollers (20) engage both guide sections (22) when the control arm (16) is transversely disposed in relation to a longitudinal centre axis of the pivotable belt conveyor (4), corresponding to the latter not being turned outwards.

7. Conveyor system according to claim 4-5, **characterised in that** the engagement between the guide rollers (20) of the control arm (16) and the guide sections (22) is arranged so that a left one of the guide rollers (20) engages a left one of the guide sections (22) when the control arm (16) is turned clockwise, corresponding to the pivotable belt conveyor (4) being turned outwards about 45° to the left side in relation to a longitudinal centre axis.

8. Conveyor system according to claim 4-5, **characterised in that** the engagement between the guide rollers (20) of the control arm (16) and the guide sections (22) is arranged so that a right one of the guide rollers (20) engages a right one of the guide sections (22) when the control arm (16) is turned counterclockwise, corresponding to the pivotable belt conveyor (4) being turned outwards about 45° to the right side in relation to a longitudinal centre axis.

9. Conveyor system according to any preceding claim, **characterised in that** pivot control mechanism (12) includes position control means in the form of induction sensors (30) that are adjustably mounted in curving slots (28), and which interacts with plate-shaped position guide members (32).

10. Conveyor system according to claim 7 or 8, **characterised in that** each of the belt conveyors (4) includes an electric drive motor which is adapted to accelerate the belt conveyor (4) at least when turned laterally outwards in relation to a longitudinal centre axis with the purpose of moving items out to a receiving position.

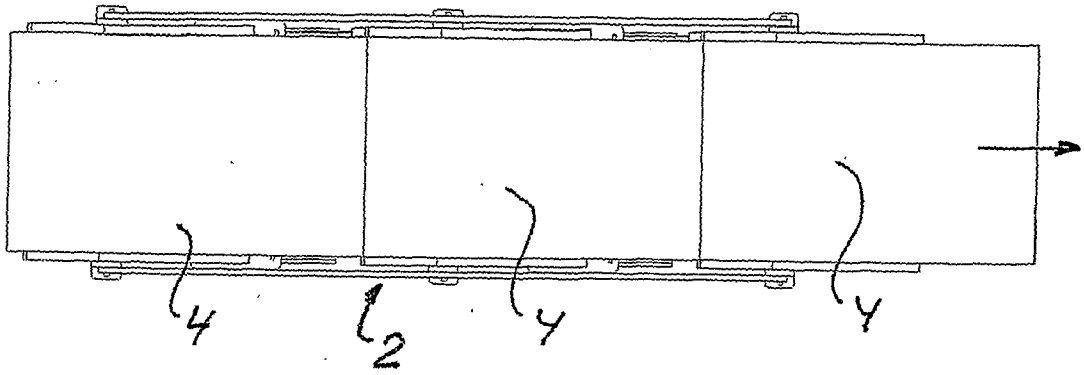


Fig. 1

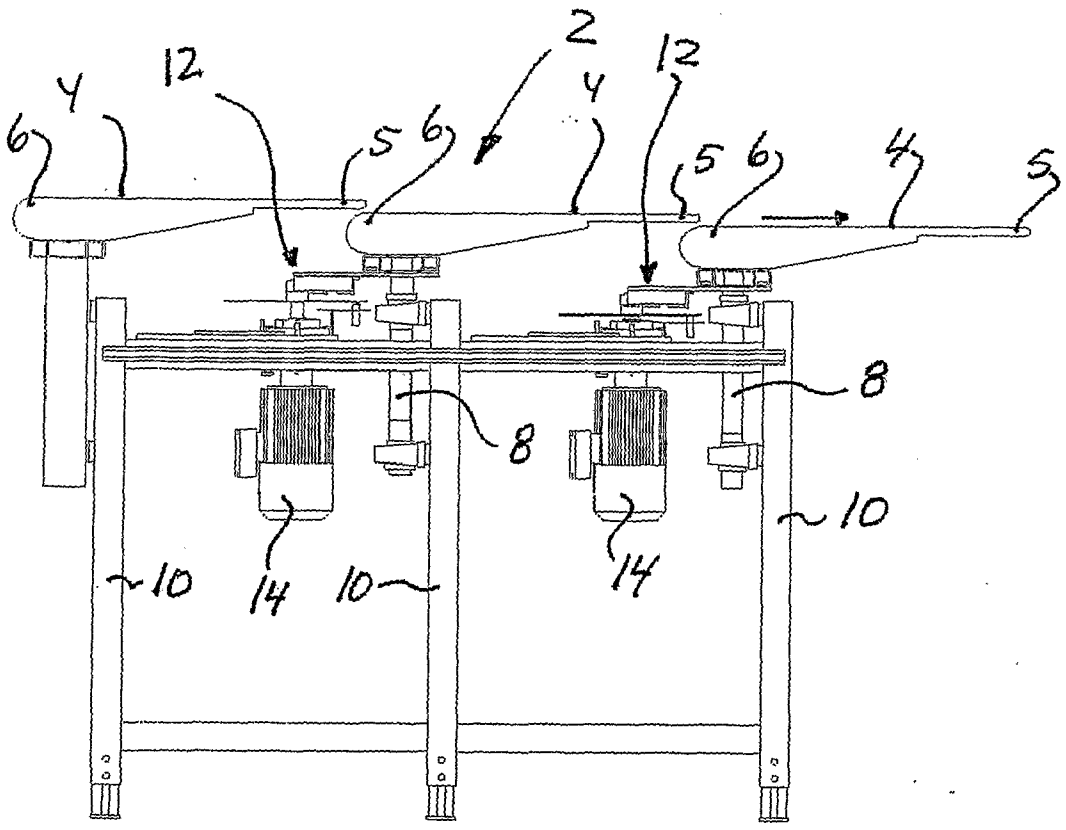


Fig. 2

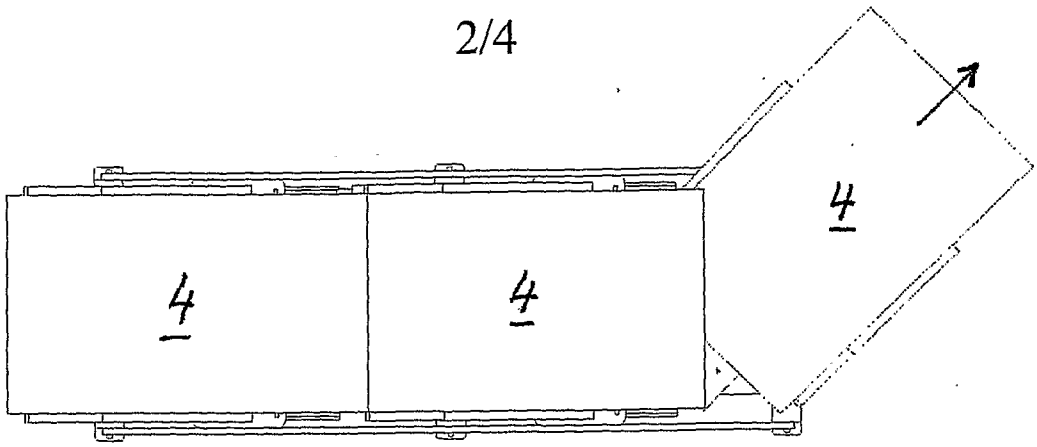


Fig. 3

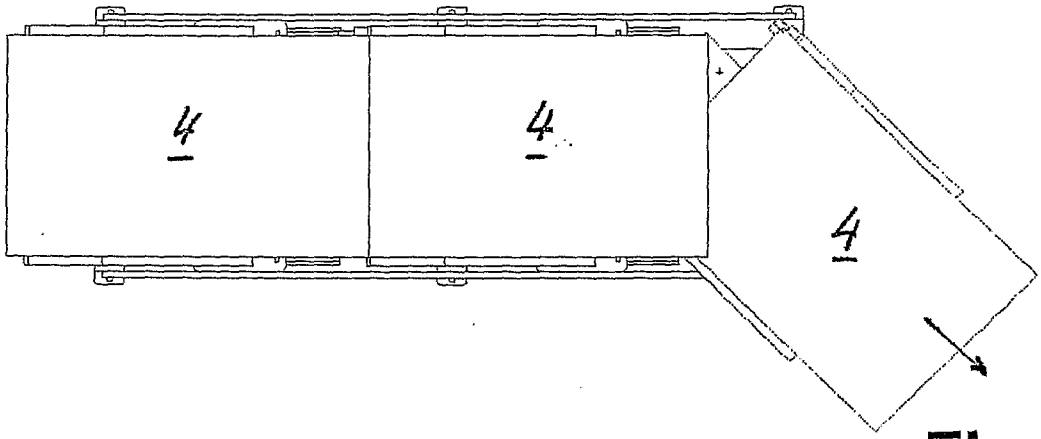


Fig. 4

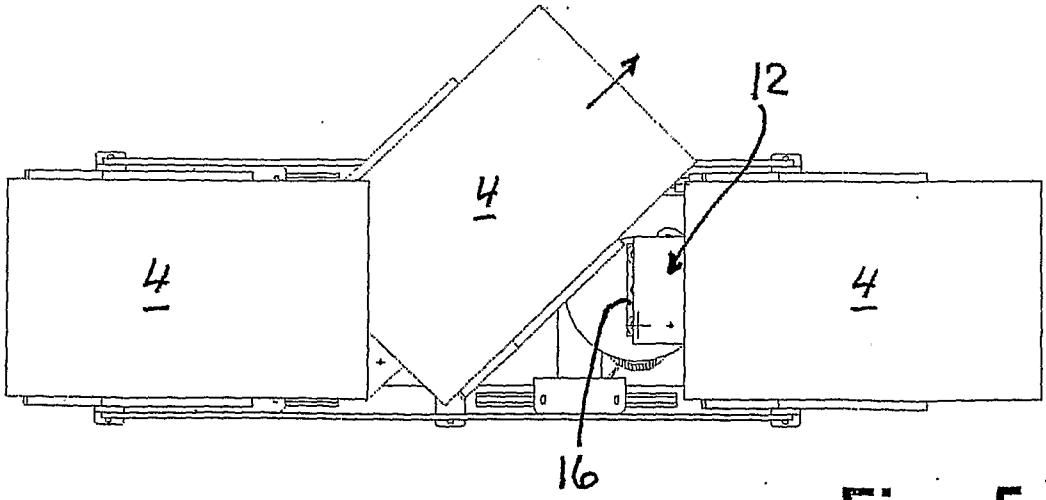


Fig. 5

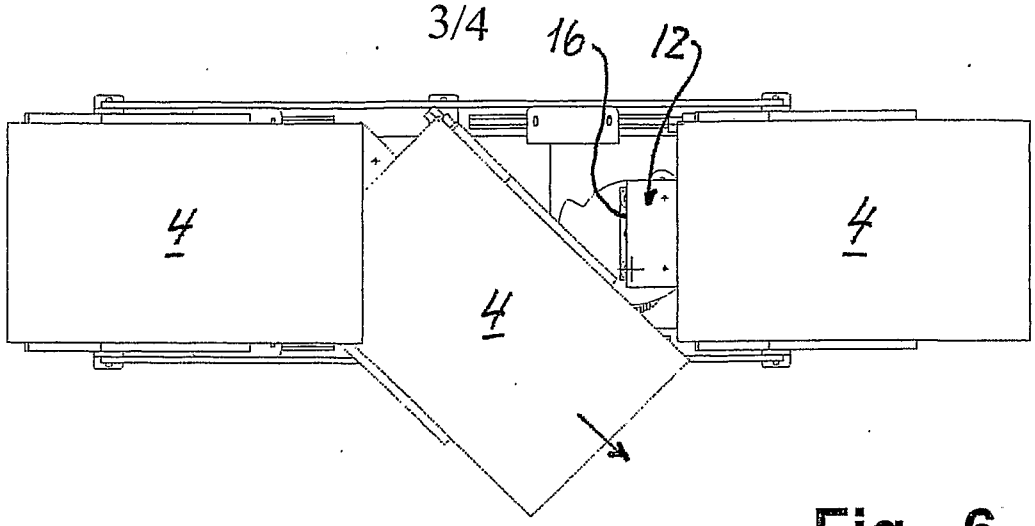


Fig. 6

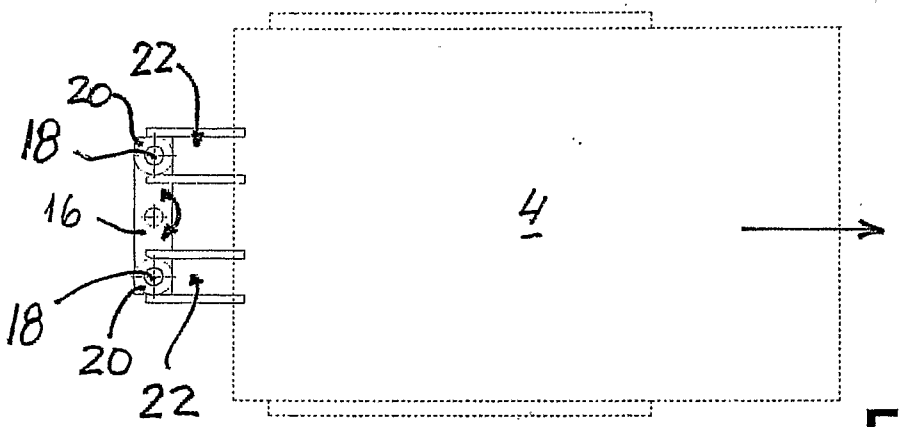


Fig. 7

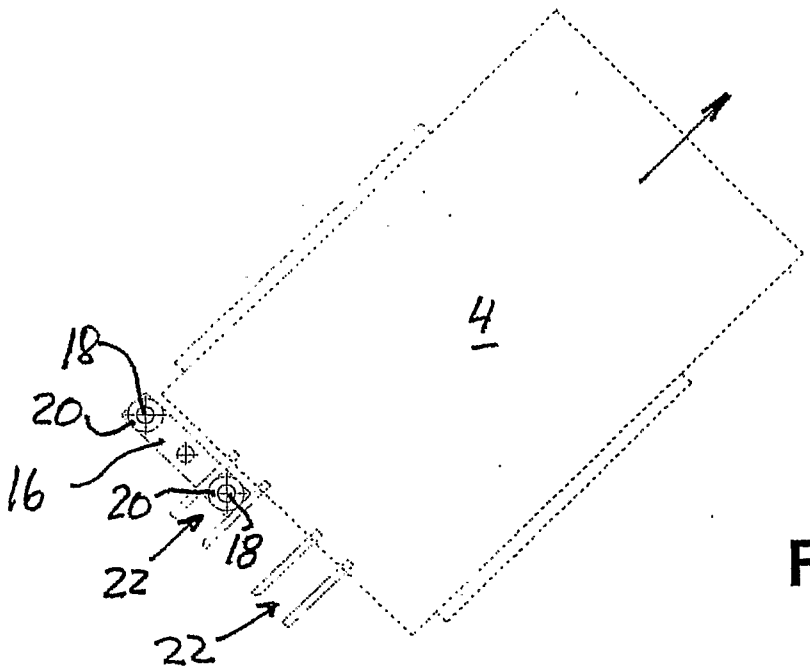


Fig. 8

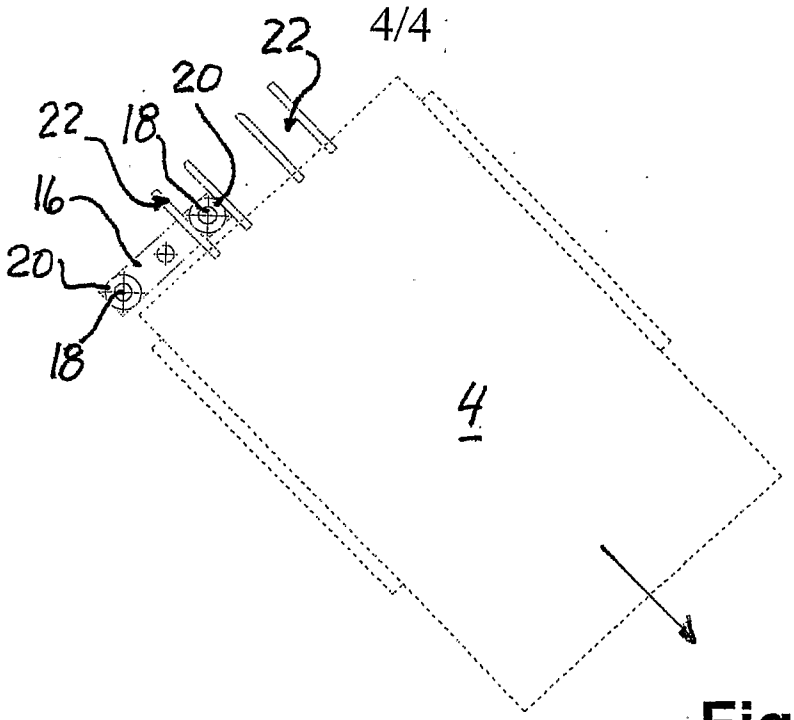


Fig. 9

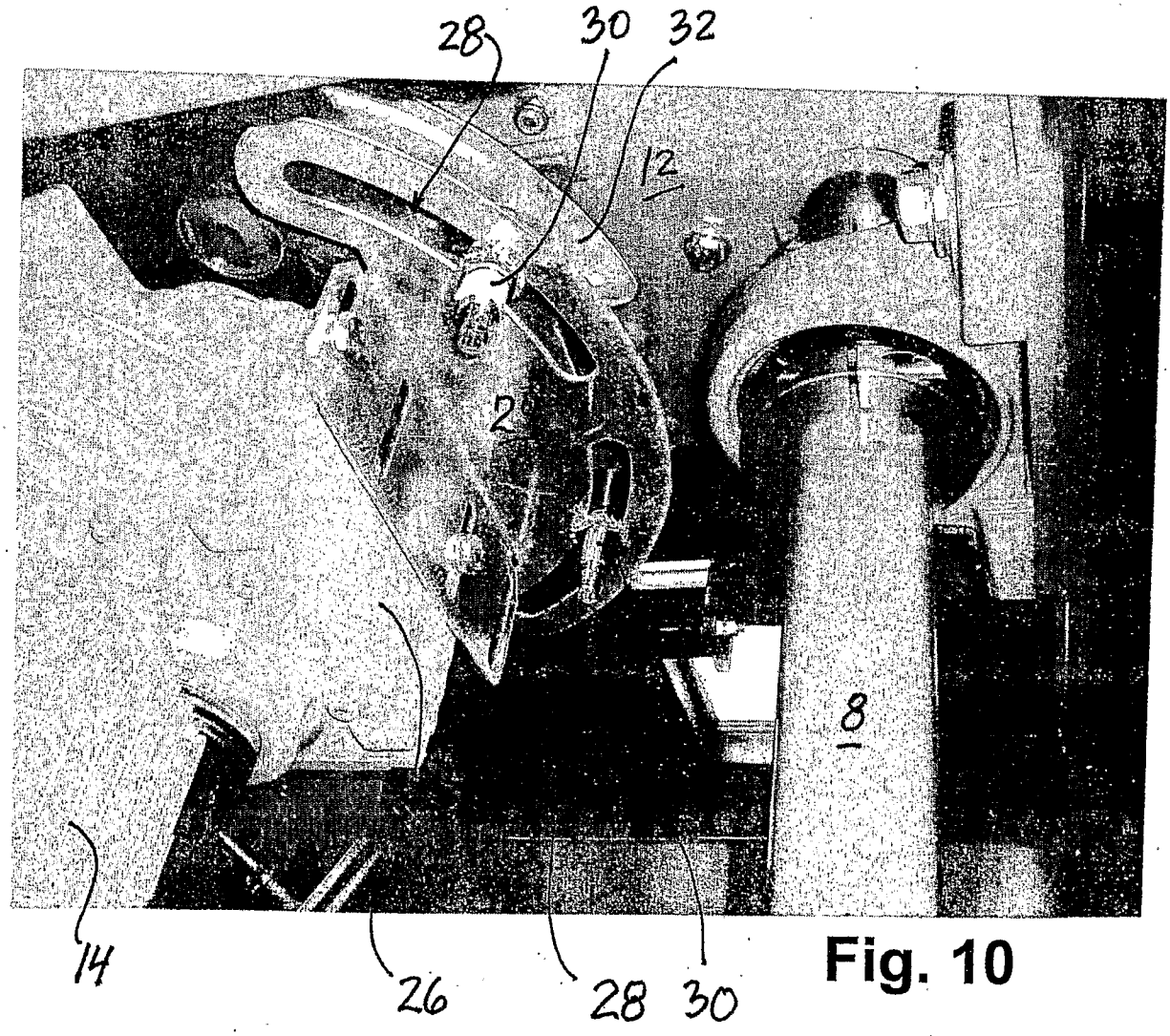


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK2007/000231

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: B65G, B07C

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

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Y	WO 9715405 A1 (LICENTIA PATENT-VERWALTUNGS-GMBH), 1 May 1997 (01.05.1997), page 5, figures 1-3, abstract ---	1-3,9
Y	WO 2005032940 A1 (TELAIR INTERNATIONAL AB), 14 April 2005 (14.04.2005), page 8 - page 9, line 5, figure 4, abstract ---	1-3,9
Y	JP 61211217 A, DAIICHI KOGYO KK, 1986-09-19: (abstract) Retrieved from: EPODOC database Original document: Figures 1-4 ---	1-3,9

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
18 Sept 2007	20 -09- 2007
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INTERNATIONAL SEARCH REPORT

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

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A	US 5188210 A (MALOW), 23 February 1993 (23.02.1993), figures 1-3, abstract ---	1-3,9
A	FR 2104687 A (BERTHELAT ROBERT JACQUES), 21 April 1972 (21.04.1972), page 3, figure 1 --- --------	1-3,9

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B65G 47/64 (2006.01)
B65G 47/46 (2006.01)

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Cited literature, if any, will be enclosed in paper form.

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