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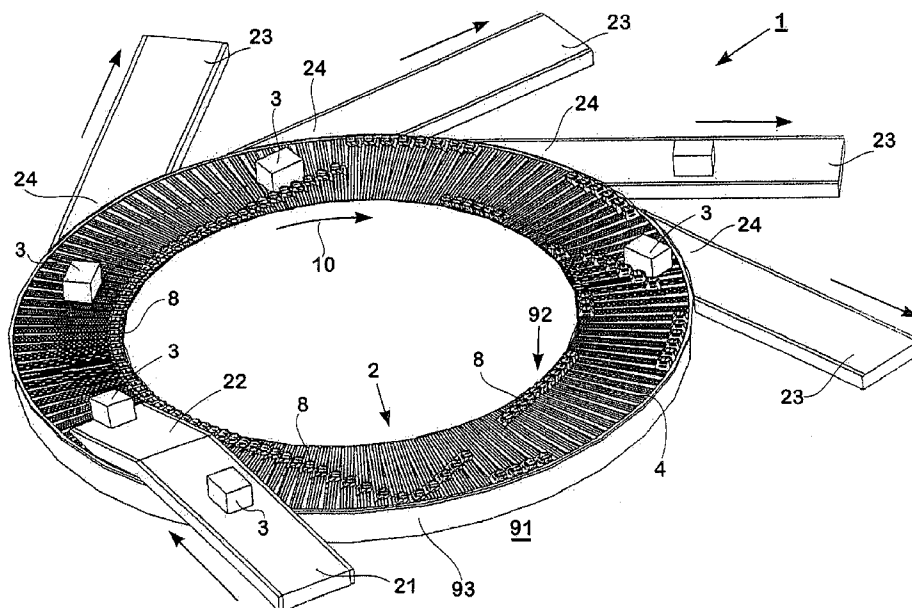
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(57) Abstract: The present invention provides a sorting device comprising a disc-shaped supporting surface (2), rotation means for rotating the supporting surface about the central axis of the disc shape, at least one discharge location (23) past which the supporting surface moves during rotation of the supporting surface, transfer means for selectively transferring a product present on the supporting surface from said supporting surface to a discharge location, said transfer means comprising guides (4) extending at least substantially in radial direction, which rotate along with the supporting surface, as well as pusher elements (8) which are movable along said rotating guides, which pusher elements are provided with guide means for guiding cooperation with associated rotating guides.

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Sorting device.

DESCRIPTION

The present invention relates to a sorting device. In the field of sorting products, such as packages for parcel post, it is known to create a junction of at least one supply conveyor, by means of which products to be sorted are supplied to the junction, and a number of discharge conveyors, by means of which products can be discharged from said junction. A sorting location is provided at the junction, from where a human operator can take products off the supply conveyor and subsequently place said objects on the supply end of a specific discharge conveyor. Sorting may for example take place on the basis of the destination of the product in question, on which information regarding said destination may be present, or in dependence on the dimensions and/or the nature of the product in question. The supply ends of the discharge conveyors are arranged round the operator, so that the operator must move left, right, up, down, forward and/or backward in order to place the product on the supply end of the selected discharge conveyor.

The object of the present invention is to provide a sorting device that can function as an alternative to the known sorting device, without the operation of the sorting device requiring human interference in the sorting process. It is explicitly noted in this regard that this does not categorically exclude human interference when using the sorting device according to the invention, for example for supplying products to be sorted to the sorting device. Within the context of the above object, the sorting device according to the invention comprises a disc-shaped supporting surface, rotation means for rotating the supporting surface about the central axis of the disc shape, at least one discharge location past which the supporting surface moves during rotation of the supporting surface, transfer means for selectively transferring a product present on the supporting surface from said supporting surface to a discharge location, said transfer means comprising guides extending at least substantially in radial direction, which rotate along with the supporting surface, as well as pusher elements which are movable along said rotating guides, which pusher elements are provided with guide means for guiding cooperation with associated rotating guides. The sorting device according to the invention makes it possible to provide a constructionally simple, and thus comparatively inexpensive automated device for sorting out products to at least one

discharge location as an alternative to the manual sorting of products by an operator. To contribute towards the sorting process, detection means may be provided for detecting information such as the nature, the dimensions and/or the destination of a product on the supply conveyor, on the basis of which information the control system associated with the sorting device will eventually control the sorting process. In the situation in which products are manually placed on the disc-shaped supporting surface, it is conceivable that said information is input by the person in question, for example by means of a keyboard or a touchscreen. Although the sorting device according to the invention will generally comprise a number of discharge locations in practice, it is also conceivable within the framework of the present invention that the sorting device has only one discharge location, in which case the sorting of the products comprises the discharging of products that are supplied to the sorting device in a specific order from the supporting surface in a different order at said one discharge location. This is made possible by having products pass the discharge location one or a number of times, if desired, without the product in question being transferred from the disc-shaped supporting surface at the discharge location, which would also be possible, of course, if a number of discharge locations would be used. Thus it is possible to change the order of products by means of the sorting device according to the invention.

To make it possible in a constructionally simple manner to drive the pusher elements so as to move said pusher elements along the rotating guides, the supporting surface is preferably provided with gaps extending at least substantially in radial direction, within which the pusher elements partially extend. Engagement of the pusher elements for moving said pusher elements along the rotating guides can thus take place under the disc-shaped supporting surface, where space is available for that purpose.

Preferably, longitudinal edges of said gaps at least partially form said rotating guides.

Alternatively, but more preferably in combination therewith, the rotating guides are at least partially provided (also) under the supporting surface. In this way a very stable guidance can be realized, which is capable of withstanding the impact loads that the pusher elements may experience upon coming into contact with products to be sorted. In addition, the present preferred embodiment, as well as the preceding preferred embodiment, has the advantage that the supporting surface

can actually be designed to be flat, because there is no need to provide means extending above the supporting surface as rotating guides.

According to a very advantageous preferred embodiment of the sorting device according to the invention, the transfer means comprise at least one stationary guide extending at an angle with respect to the rotating guides for each discharge location, as well as further guide means forming part of the pusher elements for moving an associated pusher element along an associated rotating guide as a result of the guiding cooperation between a further guide means and a stationary guide, whilst the sorting device further comprises selection means for selectively moving said further guide means into guiding cooperation with at least one stationary guide. Thus the possible movement of pusher elements along the rotating guides is effected by the rotation of the supporting surface. The selection means arrange for a further guide means to be moved into guiding or non-guiding cooperation with a stationary guide associated with a desired discharge location. It is also conceivable in this connection that the selection means are not operative for a discharge location located furthest downstream, seen from the position where products are placed onto the disc-shaped supporting surface, which functions as an overflow location. That is, the further guide means associated with all the pusher elements of the sorting device come into guiding cooperation with said most downstream stationary guide, and consequently products can by definition only remain present on the disc-shaped supporting surface during maximally one rotation thereof. Thus, products to be sorted which are placed onto the disc-shaped supporting surface cannot collide with products that have been placed on said supporting surface at a previous point in time, assuming that the supply of products to the disc-shaped supporting surface takes place at one and the same position at all times. Another good reason to use an overflow location might be the fact that use is made of a supply conveyor which does not supply products to the disc-shaped supporting surface from one side of said supporting surface but from the upper side thereof.

Very preferably, the supporting surface is at least partially made up of upper sides of section members extending in at least substantially radial direction, which section members function at least as the rotating guides. By configuring the supporting surface in this manner it becomes possible to use section members and associated pusher elements that have already proven their worth in practice, viz. as

parts of sorting devices that make use of such section members and pusher elements. Examples of such sorting devices are described in European patent applications EP-A-602694 and EP-A-484150. Some important advantages of the use of section members are: section members exhibit a good dimensional stability and shape stability and are thus quite suitable for use as guides, section members which are suitably configured, for example having a cavity, may have a relatively large bearing capacity, a designer will have much freedom in optimally designing a section, and the use of the section members makes it possible to realise a supporting surface having a modular structure, which is advantageous from a viewpoint of transport and storage.

For reasons of constructional simplicity it is preferable in that regard if the section members are rigidly interconnected at their ends via ring-shaped connecting members.

To prevent products from getting jammed between adjacent section members, which risk is greater on the radial outer side of the supporting surface and increases as the dimensions product to be sorted become smaller, it is advantageous if the supporting surface is further formed by upper sides of closing elements extending between adjacent section members.

To close the space between adjacent section members as well as possible, the upper sides of the closing elements are preferably wedge-shaped. The fact remains, however, that a gap may still be present between the upper sides of the section members and those of the closing elements, within which gap the pusher elements partially extend in accordance with a previously discussed preferred embodiment.

To obtain a very stable guidance of the pusher elements along the section members that function as rotating guides, it is preferable if the pusher elements surround the section members completely.

Preferably, the sorting device is provided with a discharge conveyor, at least at some of the discharge locations, for discharging products sorted out from the supporting surface. Using a discharge conveyor is an advantageous way of further reducing the extent of human interference when using a sorting device according to the invention.

Although it is conceivable within the framework of the present invention that products to be sorted are manually placed on the disc-shaped

supporting surface, this is preferably done by a supply conveyor, which connects to the supporting surface with a discharge end thereof. Consequently it is preferable if the sorting device comprises a supply conveyor for supplying products to be sorted to the supporting surface. The possibility to have the supply of products to be sorted to the supporting surface take place at a number of supply locations is explicitly left open in this preferred embodiment, whilst it is also possible to combine the automated supply of products to be sorted by a supply conveyor with the manual supply of products to be sorted.

The present invention will now be explained in more detail by means of a description of several variants of two preferred embodiments of a sorting device according to the present invention. In the description, reference will be made to the following figures:

Figure 1 is a perspective view of the main elements of a sorting device according to a first preferred embodiment of the invention;

Figures 2a and 2b are a top plan view and a sectional view, respectively, of the sorting device shown in figure 1;

Figure 3 is a top plan view of a part of the sorting device at the location of a discharge conveyor;

Figure 4 is a top plan view of a further detail of the sorting device;

Figures 5a and 5b are sectional views of two adjacent guide sections with the associated pusher shoes located on the inner side of the sorting device and on the outer side of the sorting device, respectively;

Figure 6 is a view comparable to figure 4 of a variant of the sorting device;

Figures 7a and 7b are sectional views of two adjacent guide sections with the associated pusher shoes located on the inner side of the sorting device and on the outer side of the sorting device, respectively;

Figure 8 is a perspective view of a closing element for use in the illustrated variant of the sorting device;

Figure 9 is a radial vertical sectional view of a part of the sorting device;

Figures 10a and 10b are views corresponding to figures 2a and 2b of a second preferred embodiment of a device according to the invention; and

Figure 11 is a tangential vertical sectional view of the environment

of a pusher shoe that forms part of the device shown in figures 10a and 10b.

Figure 1 shows the main elements of a sorting device 1. The sorting device 1 comprises a disc-shaped supporting surface 2, on which products 3 are present. The disc-shaped supporting surface 2, which might also be called a ring-shaped supporting surface, is made up of the at least substantially flat upper sides 4 of radially extending hollow guide sections 5 (also refer to figures 2a-5b). The guide sections 5 are rigidly interconnected at their ends via a vertically extending circular inner connecting plate 6 and a vertically extending circular outer connecting plate 7. It will be understood that the connecting plates 6 and 7 are in fact built up of a number of arcuate connecting plate members.

The hollow guide sections 5 are each surrounded by a pusher shoe 8, which pusher shoes are provided with an at least substantially block-shaped pusher body 9 above the flat upper sides 4 of the associated guide sections 5. The exact embodiment of the guide sections 5 and the associated pusher shoe 8 is not essential within the framework of the present invention. The guide sections 5 and the pusher shoes 8 as shown in the figures for the sorting device 1 are described in great detail in EP-A-602694, to which reference is made herein for the sake of convenience. Alternative embodiments of guide sections and associated pusher shoes, which might also be used as variants of the sorting device 1 within the framework of the present invention, are for example described in EP-A-444734, EP-A-484150, EP-A-559301, EP-A-782966, EP-A-784026, EP-A-1371584 or US-B-6283271. The above list should by no means be interpreted as being limitative. In addition to functioning as a supporting surface for the products 3, the guide sections 5 also function as guides for the pusher shoes 8, to which end the guide sections 5 and the pusher shoes 8 are provided with mating guide elements.

The supporting surface 2 is rotationally driven in the direction indicated by the arrow 10 about the vertical axis of the disc shape by drive means yet to be described in more detail.

The sorting device 1 further comprises a supply conveyor 21, the discharge end 22 of which terminates above and connects to the supporting surface 2, with the supply conveyor 21 being tangentially oriented with respect to the disc shape of the supporting surface 2. The sorting device 1 further comprises four successive discharge conveyors 23, which each tangentially connect to one side of the supporting surface 2 with a supply end 24 of the discharge conveyors 23 in

question.

As figure 1 shows, all the pusher shoes 8 are initially located on the inner side of the supporting surface 2 at the location of the supply conveyor 21 in the case of rotation of the supporting surface in the direction indicated by the arrow 10, and thus on the inner side of the discharge end 22 of the supply conveyor 21. By moving pusher shoes 8 located on the inner side of the product 3 radially outwards along the associated guide sections at a suitable moment, with the pusher shoes in question jointly forming a row that extends parallel to the discharge conveyor 23 in question, products 3 can be pushed onto a selected discharge conveyor, and thus a sorting process can be carried out.

Guide means yet to be described hereinafter are provided under the guide sections 5 to assist in moving the pusher shoes 8 radially outwards along the guide sections 5, which guide means guidingly co-operate with a guide wheel 31 provided on the underside of each pusher shoe 8 (figure 9), being rotatable about a vertical axis 32. The guide means comprise a circular stationary guide 41, 42 both on the inner side of the supporting surface 2 and on the outer side of the supporting surface 2, which stationary guides function to ensure that the pusher shoes 8 remain on the inner side and the outer side, respectively, of the supporting surface 2. The guide means further comprise in any case a stationary guide 43 for each discharge conveyor 23, which stationary guide extends from the inner circular stationary guide 41 to the outer circular stationary guide 42. The guide 43 extends parallel to the associated discharge conveyor 23. At the location where the stationary guide 43 branches off the circular stationary guide 41, switch means 44 are provided, whose action is controlled by control means (not shown) on the basis of further information about products 3 to be sorted, such as the dimensions, the weight, the nature and/or the destination of said products 3. Said information may have been obtained either manually or in an automated manner, for example by means of a camera system disposed at the location of the supply conveyor 21. At the location where the stationary guide 43 connects to the outer circular guide 42 again, the guide means comprise a transition 45, so that pusher shoes 8 moving along the path associated with the stationary guide 43 will move along the path of the outer circular guide 42 again at the end of the former path. A more detailed description of the guide means need not be given herein, since such guide means are already described inter alia in EP-A-628502 and, in addition, have already been used for quite some time by

Vanderlande Industries Nederland B.V. in a sorting device called Posisorter™.

Figures 2a and 2b provide more information about the way in which the disc-shaped supporting surface 2 can be rotated. To that end the sorting device 1 comprises a stationary, at least substantially circular frame 51 under the supporting surface 2, which is provided with regularly spaced-apart carrying wheels 52, 53 on the inner side and on the outer side, respectively, of the frame 51. Said carrying wheels 52, 53, which are rotatable about axes of rotation extending in radial, horizontal direction, support horizontal flange plates 54, 55, which are provided on the lower longitudinal edges of the inner connecting plate 6 and the outer connecting plate 7, respectively. Kinematically reversed, it would also be possible not to use stationary carrying wheels 52, 53, but instead thereof runners moving along with the supporting surface 2, which runners run on ring-shaped bearing surfaces.

On the inner side of the disc-shaped supporting surface 2, the sorting device 1 comprises a cross-shaped member having four arms 61, the ends of which are connected to the inner connecting plate 6. The cross-shaped member is journaled in a bearing 62, being rotatable about a vertical axis that coincides with the central axis of the disc shape of the supporting surface 2, for rotating the central shaft 63 that is connected to the cross-shaped member. Disposed under the cross-shaped member is the central shaft 63, which is provided with a sprocket wheel 64. Said central shaft 63 is rotationally driven by a driving motor 65 having a vertical outgoing shaft, to which a sprocket wheel 66 is mounted in the plane of the sprocket wheel 64, whilst a chain 67 is passed over the two sprocket wheels 64, 66.

Alternatively it is also possible to use a friction drive mechanism instead of an electric motor 65 with sprocket wheels 64, 66 and a chain 67 for driving the supporting surface 2. Said friction drive mechanism would comprise an electric motor of 71 in that case, which drives, via a transmission 72, an outgoing shaft 73 positioned directly below a circular, suspended vertical friction plate 74. Said friction plate 74 is rigidly connected to the cross-shaped member. Friction wheels 75, 76 engage the sides of the friction plate 74, which friction wheels are driven by the outgoing shaft 73 via a suitable transmission and which press against the friction plate 74 under a spring bias. Said bias makes it possible to provide some compensation in case the friction plate 74 should not extend entirely coaxial with the bearing 62.

Figures 4, 5a and 5b show that the wedge-shaped gaps 81 are present between adjacent guide sections 5. Depending on the dimensions and the shape of the products 3 to be sorted, there is a risk that products 3 will get jammed in one of said gaps 81. Because of the wedge shape of the gaps 81 this risk is greater on the outer side of the supporting surface 2, of course. To reduce this risk, a closing element 82 (figure 8) may be used in a variant of the sorting device 1. The closing element 82 comprises a double-bent plate 83 having a horizontal wedge-shaped supporting surface 84, which is aligned with the flat upper side 4 of the guide sections 5. At the ends, the closing element 82 is provided with fixing plates 85, 86, by means of which the closing element 82 can be fixed to the inner connecting plate 6 and the outer connecting plate 7, respectively. The wedge-shaped gaps 81 between adjacent guide sections 5 can be closed to a significant extent by means of the closing elements, although at least substantially rectilinear, relatively small gaps remain between each closing element 82 and the guide sections 5 adjacent thereto. Said gaps are in any case necessary in order to enable parts of the pusher shoes 8 to pass therethrough.

Figure 1 shows how the pusher shoes 8, insofar as they are still located on the inner side of the supporting surface 2, are moved to the outer side of the supporting surface 2 after having passed the most downstream discharge conveyor 23. For safety's sake, any products present on the supporting surface 2 on the outer side of the pusher shoes 8 in question will thus be pushed off the supporting surface 2 so as to prevent the products 3 in question from colliding with the supply conveyor 21. Although no provisions for collecting such products are shown in figure 1, it is very well possible to provide a further discharge conveyor comparable to the discharge conveyor 23 at the location indicated at 91, for example, which further discharge conveyor could for example extend under the supply conveyor 21, or simply to provide a collecting bin at the location indicated at 91. It should be considered in this regards that normally no products 3 will be present on the supporting surface 2 beyond the most downstream discharge conveyor 23. In principle all the products 3 that are supplied to the supporting surface 2 by the supply conveyor 21 are distributed over one of the four discharge conveyors 23. Any products that should nevertheless move off the supporting surface 2 at the location indicated at 91 could subsequently be returned to the supply conveyor 21 again in order to be supplied to the supporting surface 2 again.

It will be apparent to those skilled in the art that guides comparable to the guide 43 are provided under the guide sections in question for moving the pusher shoes 8 outwards after they have passed the most downstream discharge conveyor 23 and subsequently moving said pusher shoes inwards again. It is conceivable in that regard for a switch means, such as the switch means 44, to be provided at the location indicated at 92. On the other hand it is also possible that the circular shape of the guide 41 is interrupted at that location and blends into an outwardly extending guide, such as the guide 43. At the location indicated at 93, on the other hand, it is necessary to use a transition, such as the transition 45, since the pusher shoes 8 that have already been used for pushing a product 3 onto one of the discharge conveyors 23 will already be located on the outer side of the supporting surface 2 at that location.

At the location where the supply conveyor 21 supplies products 3 to the supporting surface 2 from the upper side in figure 1, it is of course also conceivable within the framework of the present invention that products 3 are supplied to the supporting surface 2 either manually or from one side of the supporting surface 2. In principle it is possible in that case to have products 3 rotate more than one full turn on the supporting surface 2. In this way it becomes possible to discharge products 3 that are supplied to the supporting surface 2 in a specific order from the supporting surface 2 again in a different order onto one of the discharge conveyors 23. In an extreme situation it would even be possible to provide only one discharge conveyor 23.

It is further noted that it is also conceivable within the framework of the present invention that one discharge conveyor or a number of discharge conveyors connect to the inner side of the disc-shaped supporting surface 2, in which case it will be best if the discharge conveyor in question passes over or underneath the supporting surface 2. It stands to reason that in that case sufficient space must be available on the inner side of the disc-shaped supporting surface 2 for such a discharge conveyor to pass therethrough. To that end it is for example conceivable that the means for rotating the supporting surface 2 in the direction indicated by the arrow 10 are not provided on the inner side of the supporting surface 2 but rather on the outer side thereof, or under the supporting surface 2. Also the supply of products 3 to be sorted may take place from the inner side of the disc-shaped supporting surface 2 for that matter.

In a further variant of the sorting device 2, use could be made of a non-rectilinear stationary guide between the circular guides 41 and 42 as an alternative to the rectilinear stationary guides 43, for example in order to reduce centrifugal forces acting on the products 3.

5 Although a first supply conveyor 21 and discharge conveyors 23 are used for supplying and discharging products to be sorted and sorted products, respectively, in the above-described preferred embodiments, it is alternatively also possible within the framework of the present invention that products are manually placed on the supporting surface 2, in which case it is possible, if desired, to refrain
10 from using a supply conveyor 21 and/or to substitute one discharge conveyor 23 or a number of discharge conveyors 23 for other discharge means, such as a chute or a container into which sorted products fall.

 As regards the drive of the supporting surface 2 it is noted that the supporting surface could also be driven by means of a linear motor having a
15 horizontally or vertically disposed reaction plate.

 Figures 10a and 10b, which are comparable to figures 2a and 2b, in combination with figure 11, show a second preferred embodiment of a sorting device 101 according to the invention. The sorting device 101 is different from the sorting device 2 in particular as regards the configuration of the supporting surface 102 and, consistent therewith, of the pusher shoes 108. The supporting surface 102 is formed
20 by a disc-shaped plate 103, in which radial grooves 104 are provided. The longitudinal edges 105, 106 of said grooves 104 function as guides for the pusher shoes 108, more specifically for the guide wheel 107 thereof, whilst the control of the pusher shoes 108 for moving the pusher shoes 108 in the longitudinal direction of the grooves 104 can be realized in the same manner as in the sorting device 1 by means of the guide wheel 131, which is comparable to the guide wheel 31. It will be understood that the plate 103 may be made up of a number of arcuate, contiguous plates in order to make it possible to manipulate and transport the plate 103 in a relatively simple manner. To increase the stiffness of the supporting surface 102,
25 and thus the load-bearing capacity of the supporting surface 102, it is furthermore conceivable to make use of radial stiffening ribs that extend downwards from the
30 disc-shaped plate 103 between the radial grooves 104.

CLAIMS

1. A sorting device comprising a disc-shaped supporting surface, rotation means for rotating the supporting surface about the central axis of the disc shape, at least one discharge location past which the supporting surface moves during rotation of the supporting surface, transfer means for selectively transferring a product present on the supporting surface from said supporting surface to a discharge location, said transfer means comprising guides extending at least substantially in radial direction, which rotate along with the supporting surface, as well as pusher elements which are movable along said rotating guides, which pusher elements are provided with guide means for guiding cooperation with associated rotating guides.

2. A sorting device according to claim 1, characterized in that said supporting surface is provided with gaps extending at least substantially in radial direction, within which the pusher elements partially extend.

3. A sorting device according to claim 2, characterized in that longitudinal edges of said gaps at least partially form said rotating guides.

4. A sorting device according to claim 2 or 3, characterized in that said rotating guides are at least partially provided under the supporting surface.

5. A sorting device according to any one of the preceding claims, characterized in that said transfer means comprise at least one stationary guide extending at an angle with respect to the rotating guides for each discharge location, as well as further guide means forming part of the pusher elements for moving an associated pusher element along an associated rotating guide as a result of the guiding cooperation between a further guide means and a stationary guide, whilst the sorting device further comprises selection means for selectively moving said further guide means into guiding cooperation with at least one stationary guide.

6. A sorting device according to any one of the preceding claims, characterized in that said supporting surface is at least partially made up of upper sides of section members extending in at least substantially radial direction, which section members function at least partly as the rotating guides.

7. A sorting device according to claim 6, characterized in that said section members are rigidly interconnected at their ends via ring-shaped connecting members.

8. A sorting device according to claim 6 or 7, characterized in that said supporting surface is further formed by upper sides of closing elements extending between adjacent section members.

9. A sorting device according to claim 8, characterized in that said upper sides of the closing elements are wedge-shaped.

10. A sorting device according to claim 6, 7, 8 or 9, characterized in that said pusher elements surround the section members completely.

11. A sorting device according to any one of the preceding claims, characterized in that said sorting device is provided with a discharge conveyor, at least at some of the discharge locations, for discharging products sorted out from the supporting surface.

12. A sorting device according to any one of the preceding claims, characterized in that said sorting device comprises a supply conveyor for supplying products to be sorted to the supporting surface.

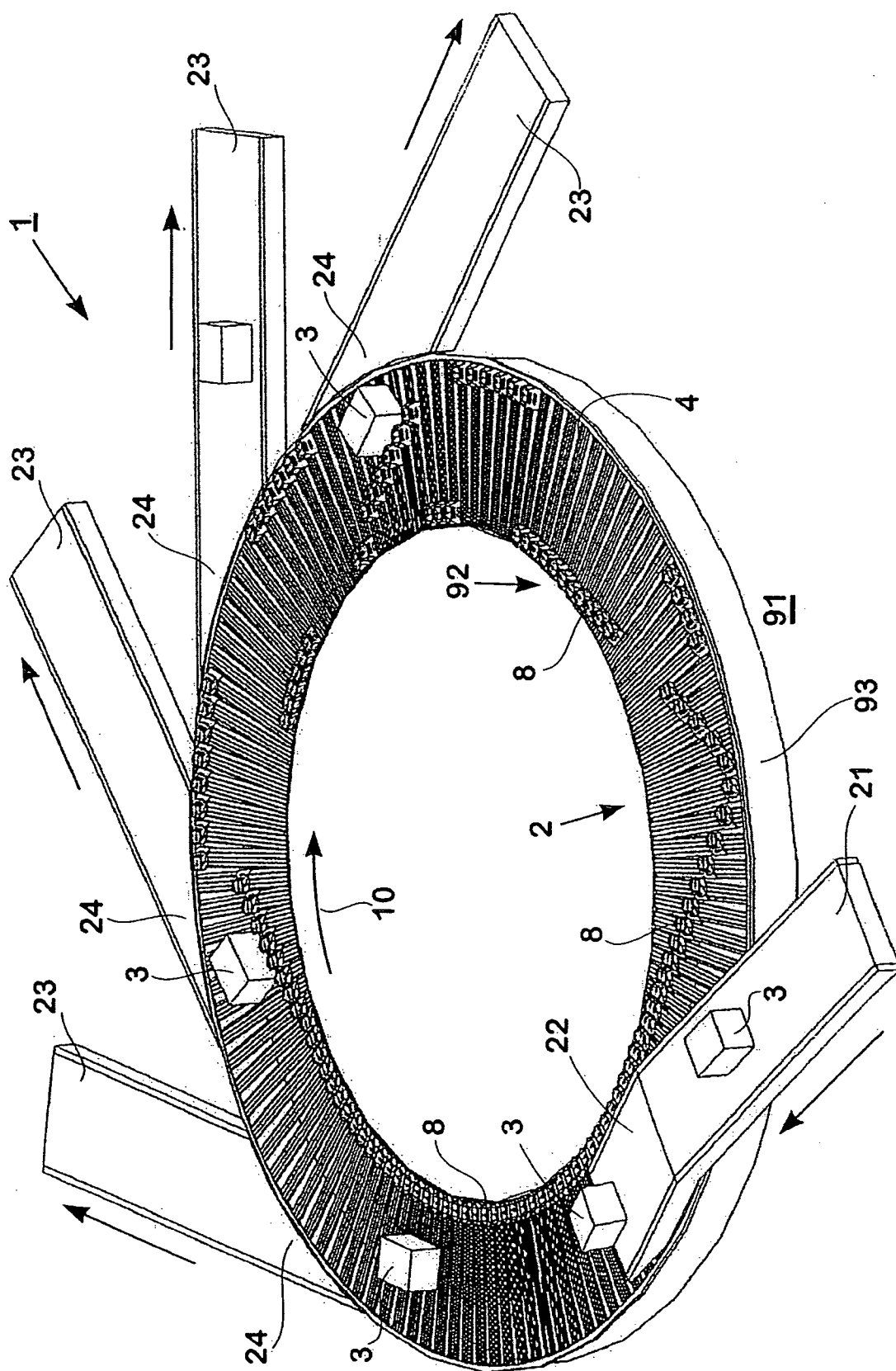
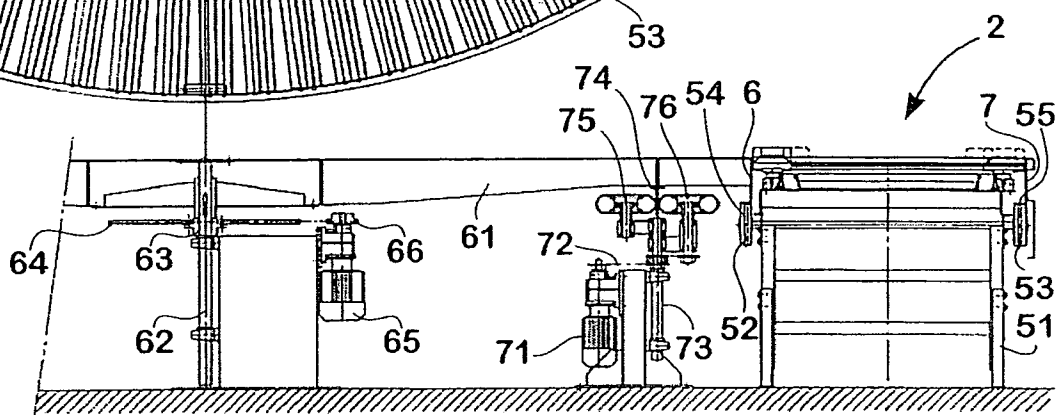
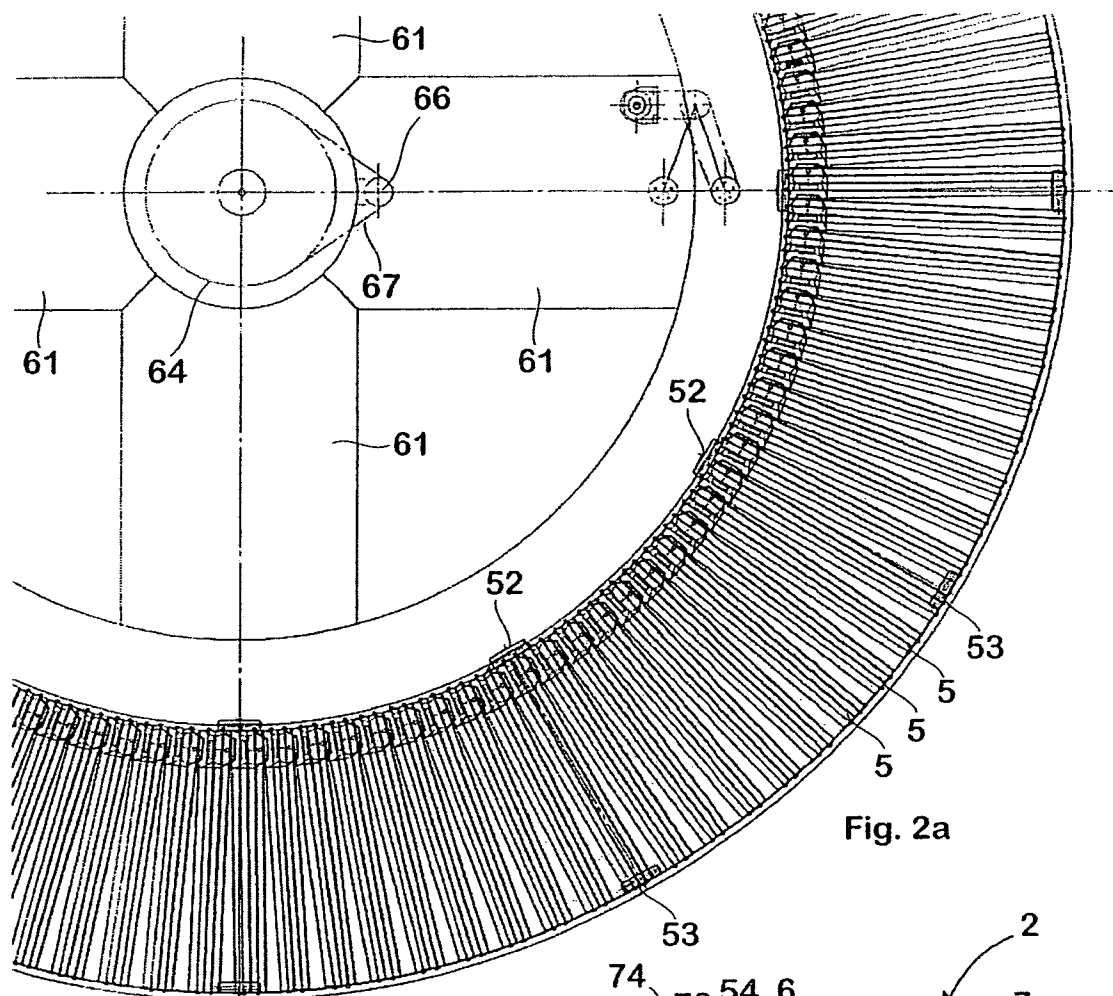


Fig.1



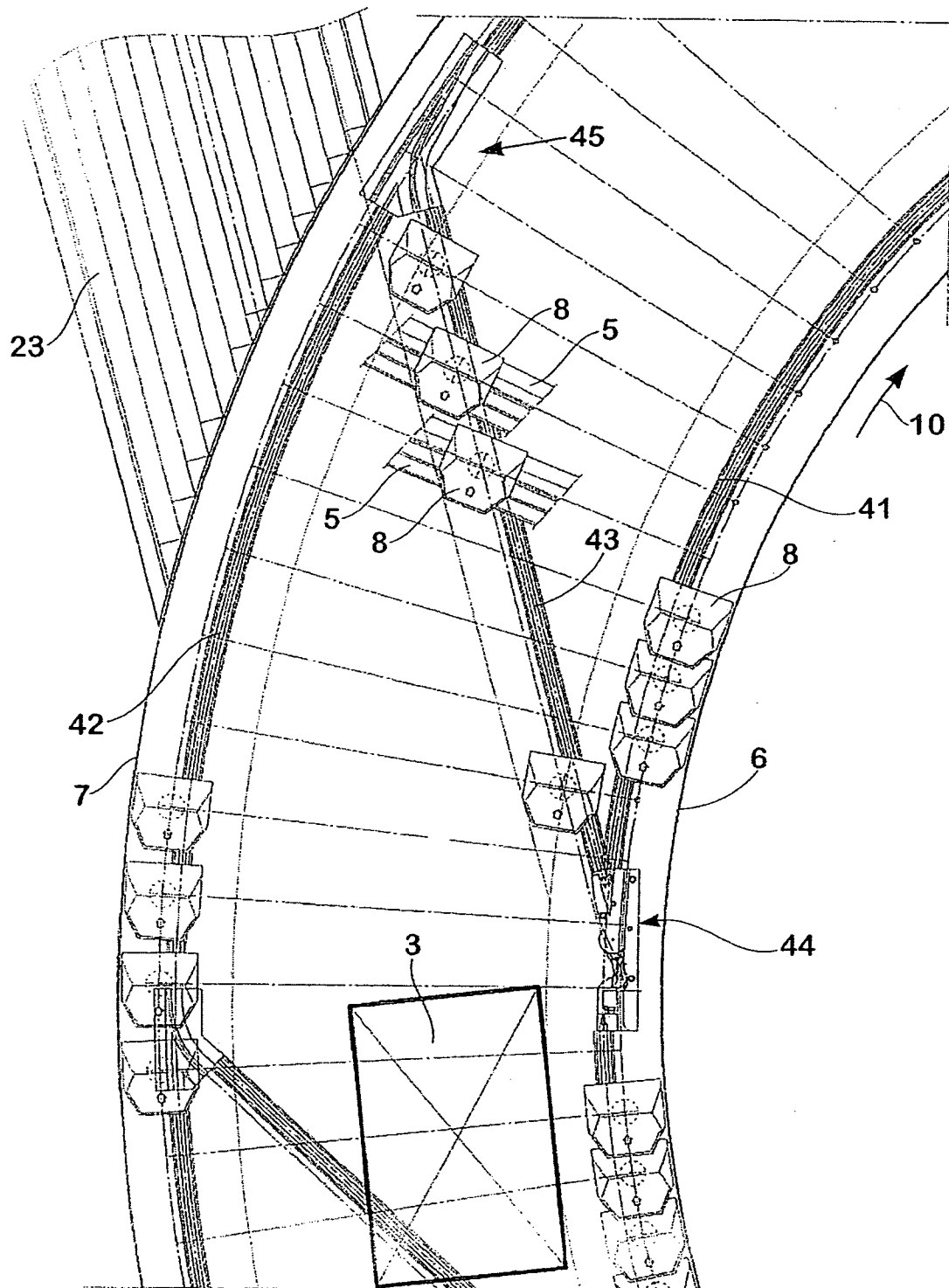


Fig. 3

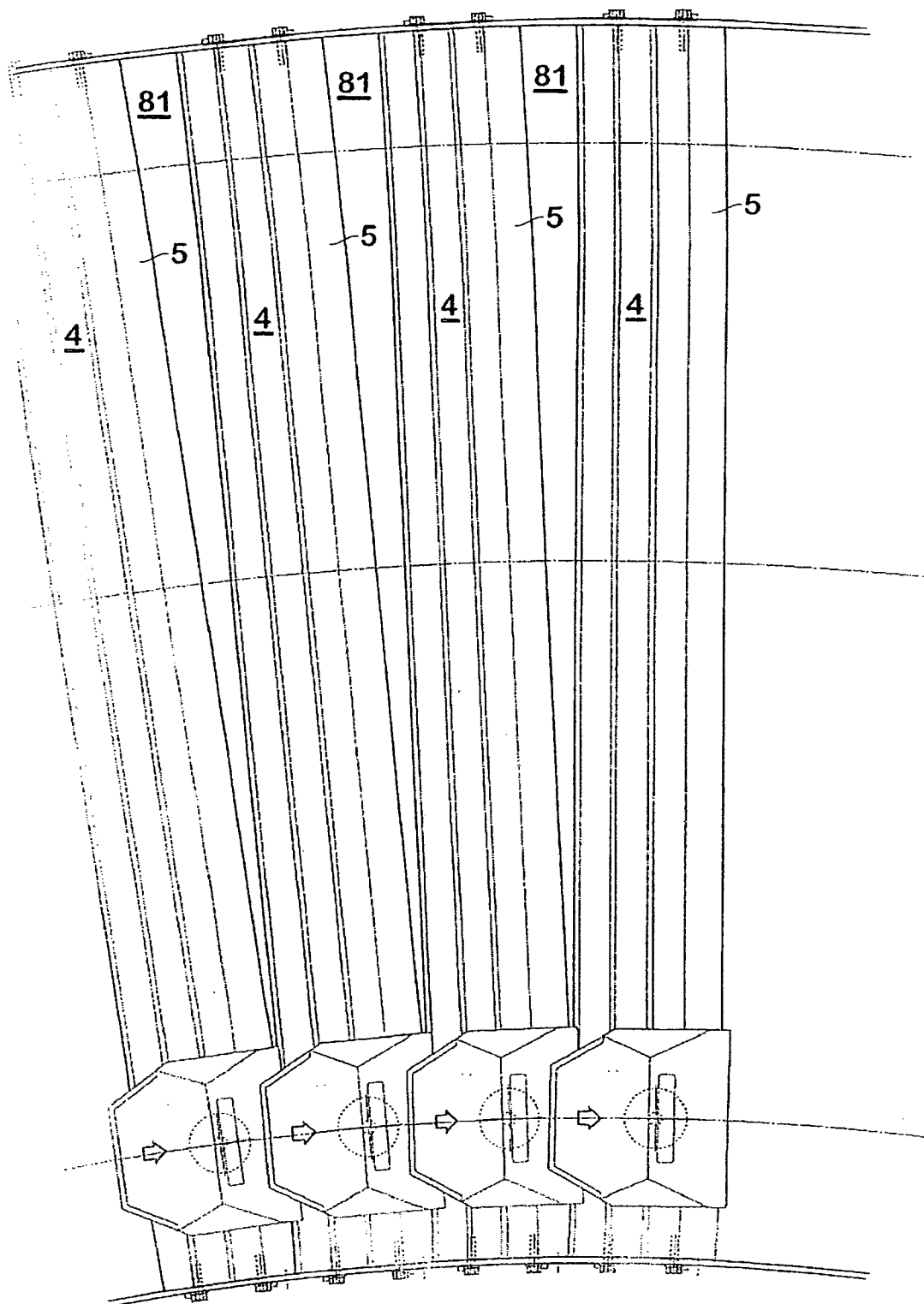


Fig. 4

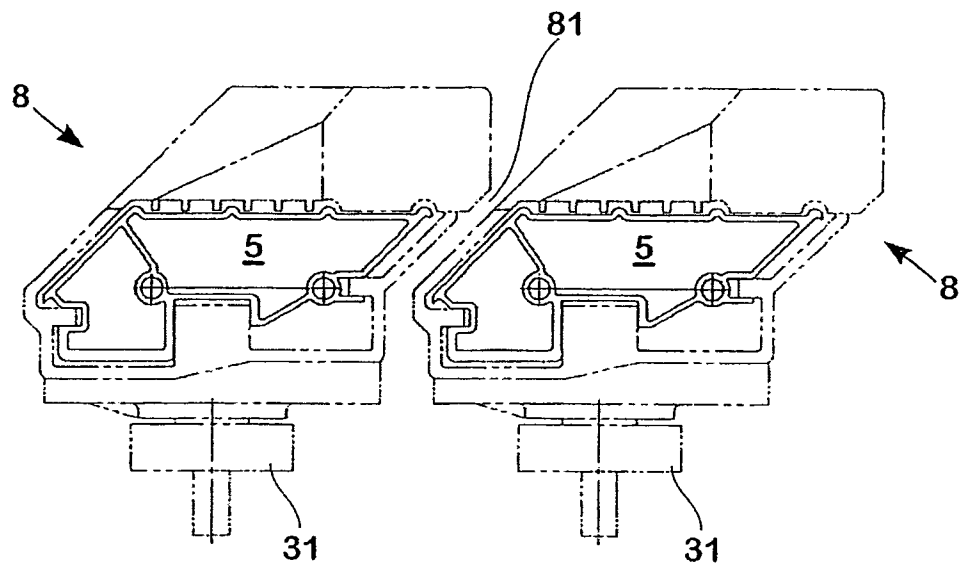


Fig. 5a

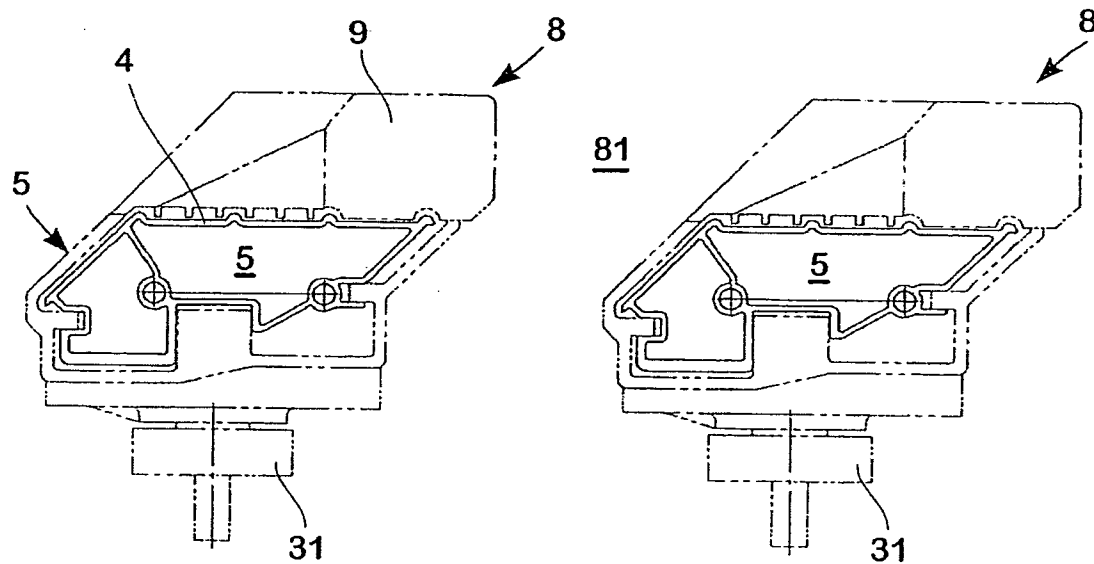


Fig. 5b

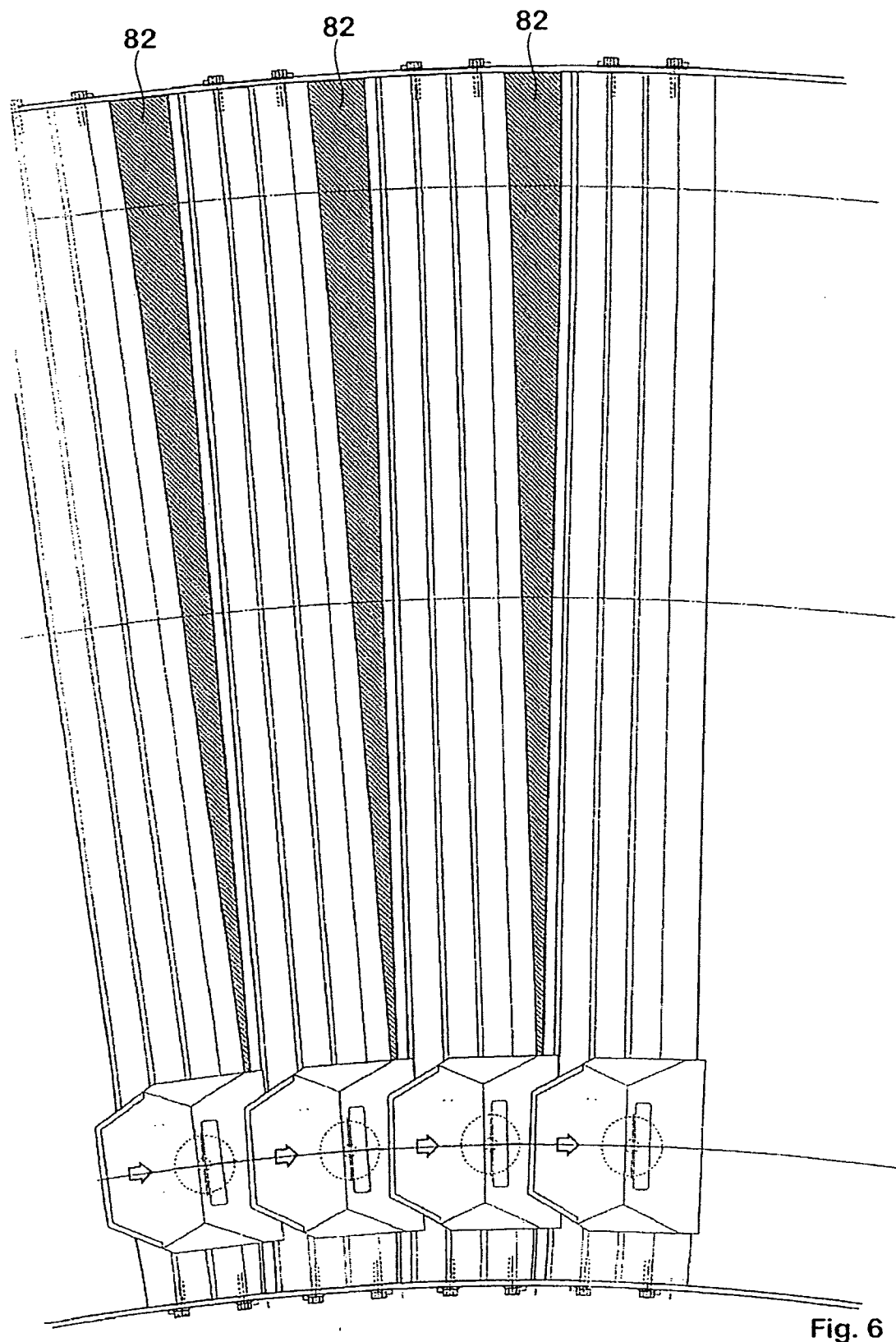


Fig. 6

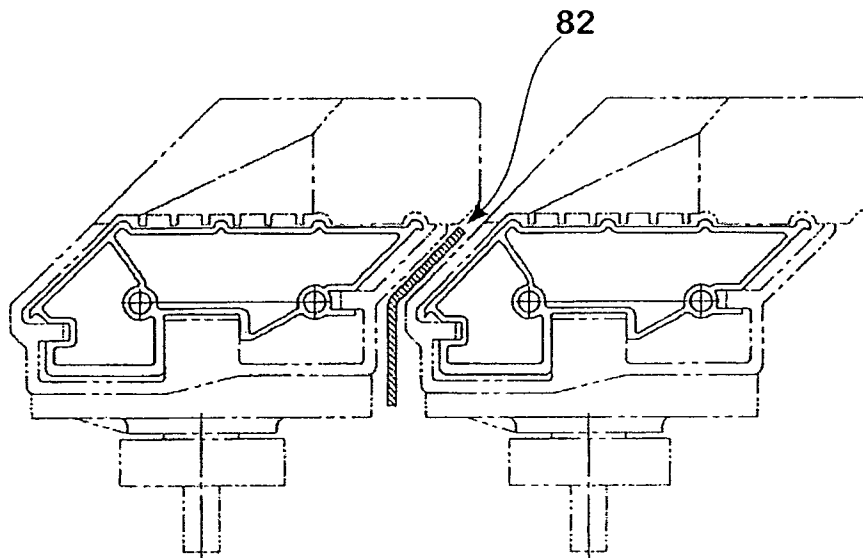


Fig. 7a

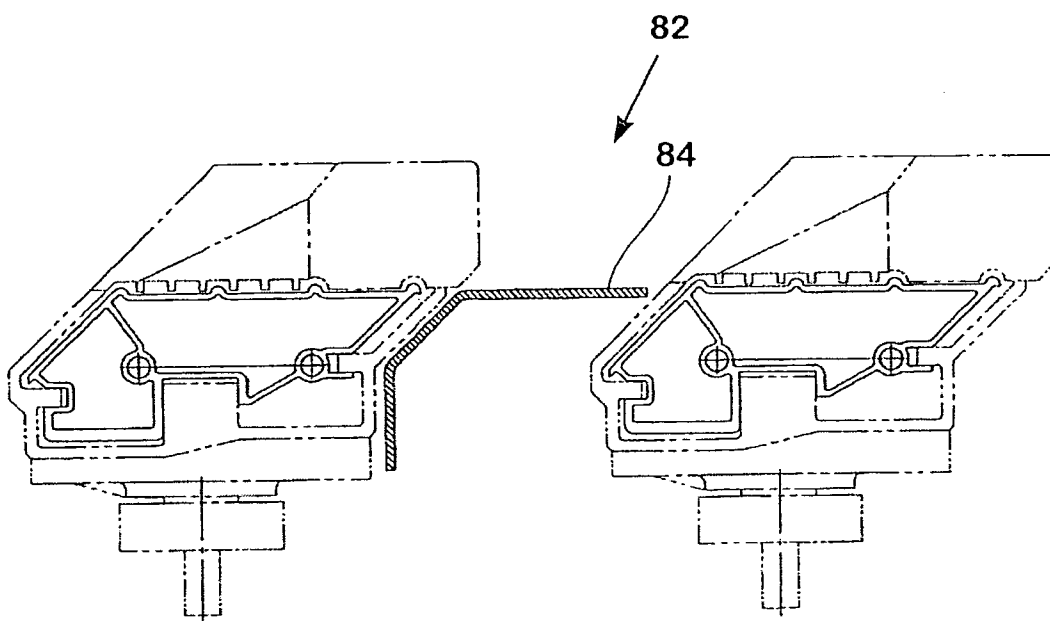
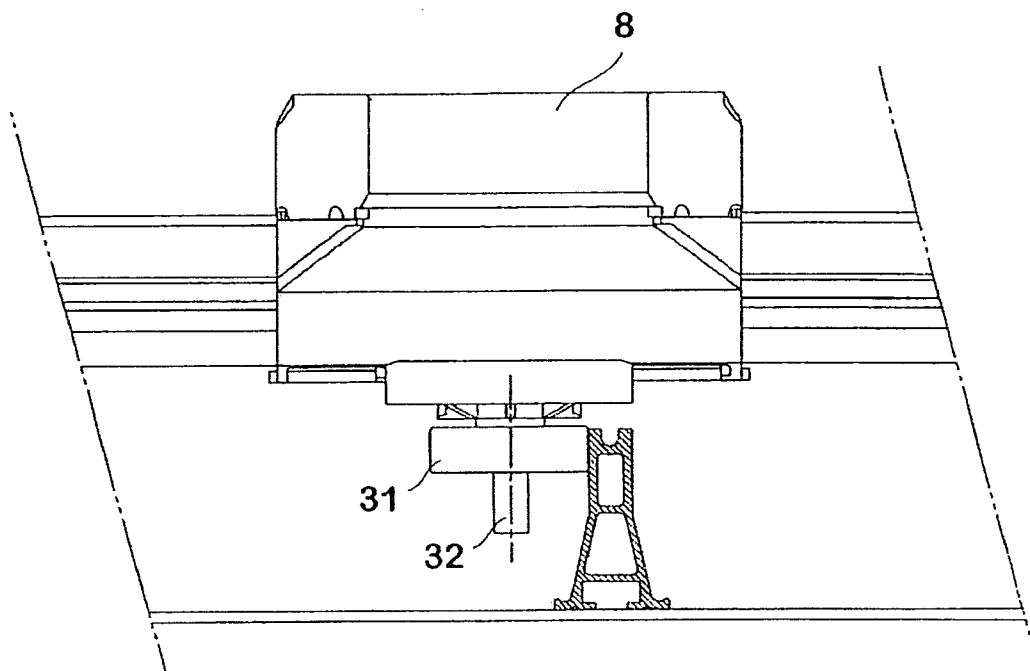
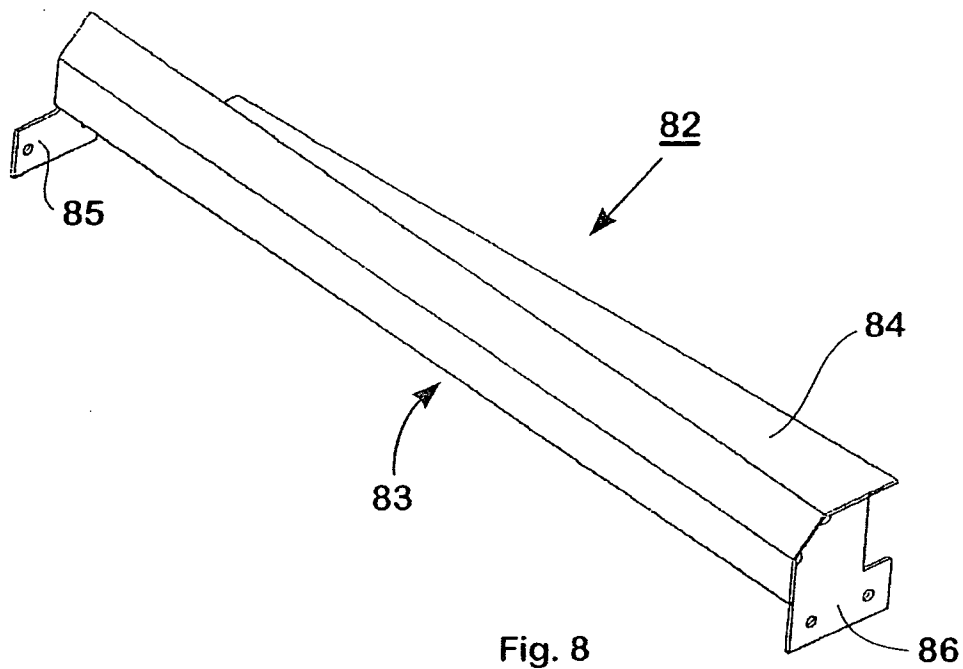
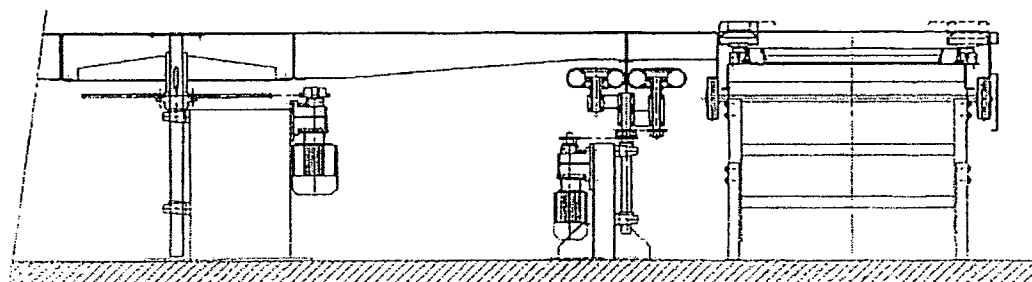
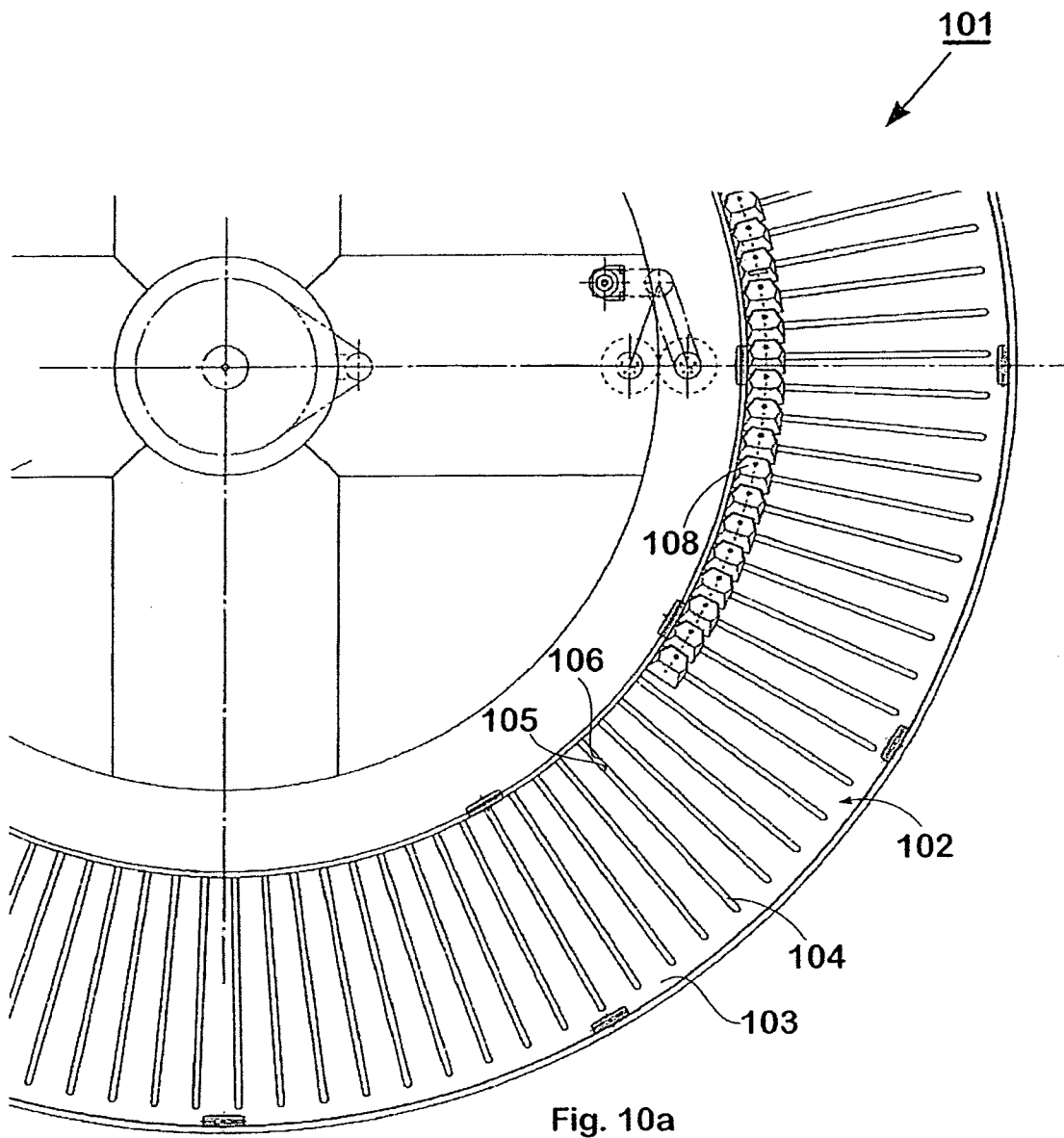


Fig. 7b





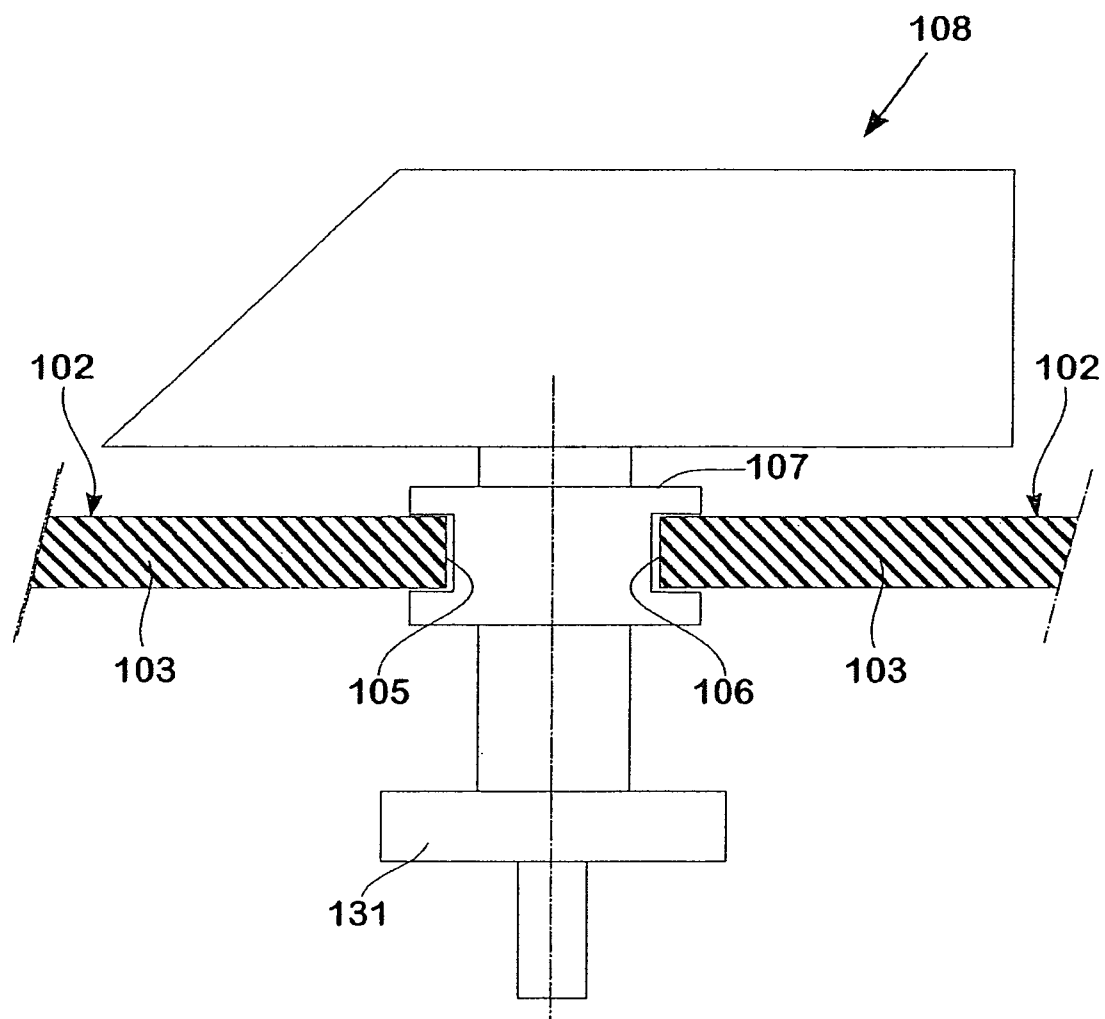


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No

PCT/NL2007/000237

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65G47/84

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)

B65G

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2003/221935 A1 (BARKLIN PER [DK] ET AL) 4 December 2003 (2003-12-04) -----	1
A	VOGL W: "HOCHLEISTUNGSSORTER IM TEST" TECHNISCHE RUNDSCHAU, EDITION COLIBRI AG., WABERN, CH, vol. 83, no. 38, 20 September 1991 (1991-09-20), pages 84-91, XP000240738 ISSN: 1023-0823 -----	1
A	EP 0 602 694 A1 (VANDERLANDE IND NEDERLAND [NL]) 22 June 1994 (1994-06-22) cited in the application -----	1
A	EP 0 484 150 A1 (RAPISTAN CORP [US] RAPISTAN DEMAG CORP [US]) 6 May 1992 (1992-05-06) cited in the application -----	1



Further documents are listed in the continuation of Box C.



See patent family annex.

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X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

28 November 2007

Date of mailing of the international search report

05/12/2007

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2007/000237

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003221935	A1	04-12-2003	NONE
EP 0602694	A1	22-06-1994	AT 164142 T 15-04-1998
		AT 194810 T 15-08-2000	
		DE 69317527 D1 23-04-1998	
		DE 69317527 T2 09-07-1998	
		DE 69329077 D1 24-08-2000	
		DE 69329077 T2 22-03-2001	
		ES 2114586 T3 01-06-1998	
		ES 2149544 T3 01-11-2000	
		JP 6255759 A 13-09-1994	
		NL 9202171 A 18-07-1994	
EP 0484150	A1	06-05-1992	AU 643562 B2 18-11-1993
		AU 8572391 A 07-05-1992	
		CA 2054416 A1 01-05-1992	
		DE 69107785 D1 06-04-1995	
		DE 69107785 T2 29-06-1995	
		JP 3201795 B2 27-08-2001	
		JP 5032309 A 09-02-1993	
		JP 3389225 B2 24-03-2003	
		JP 2001348119 A 18-12-2001	