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(54) Title: DEVICE FOR FEEDING PRODUCTS TO BE PROCESSED AND PICKING UP PROCESSED PRODUCTS FOR OPERATING MACHINES OF THE TYPE WITH A ROTARY CARROUSEL

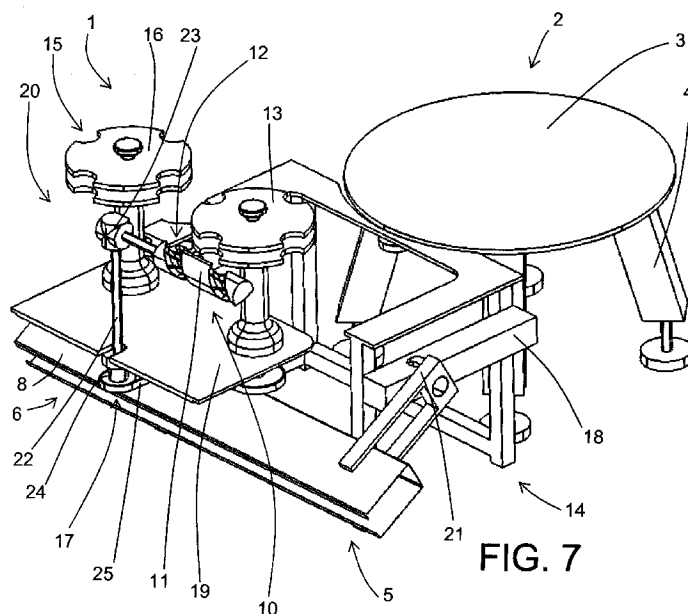


FIG. 7

(57) Abstract: A device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carousel comprises first feed means (5) for products to be processed which are operatively coupled with spacing means (10) for spacing out at a predetermined interval the products to be processed in arrival, and second feed means (6) for the processed products. A first and a second transfer star-wheel (13), (16) are rotatably mounted on a supporting structure (14). There are special rotation means (17) for rotating the first star-wheel (13) and the second star-wheel (16). The supporting structure (14) comprises a first, fixed part (18) and at least a second part (19) which is removably mounted on the first part (18). At least the first and second star-wheels (13), (16) and the rotation means (17) are mounted on the second part (19) of the supporting structure (14) together with which they form an interchangeable module (20).

Description

Device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel

Technical Field

This invention relates to a device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel. In the sector such devices are also known as front modules and are
5 designed to connect the operating machine with a carrousel to the rest of the production line.

In particular, this invention is designed to be applied to labelling machines and the like (for example, filling machines, etc.). Reference is therefore made to that type of machine below, although the same considerations may also apply to
10 any other type of operating machines with a carrousel.

Background Art

As is known, in operating machines with a carrousel the products (such as containers to be labelled) are fed one by one by supporting elements distributed
15 along the outside of the carrousel. Around the carrousel there are one or more operating units (such as labelling devices) which carry out the operations required, for example applying labels, on each product which reaches them.

The products to be processed (such as bottles to be labelled) are fed to the carrousel by a feed device which also unloads processed products (such as labelled
20 bottles).

Said device usually comprises a fixed structure. Mounted on the fixed structure is a conveyor belt for feeding the products, both those to be labelled (in an upstream position relative to the direction in which the conveyor belt runs) and those already labelled (in a downstream position relative to the direction in which

the conveyor belt runs). The conveyor belt is positioned a predetermined distance from the carrousel and interposed between the belt and the carrousel there are two transfer star-wheels, one loading star-wheel and one unloading star-wheel. The transfer star-wheels comprise one or more disks moved in such a way that they rotate about their central axis which is positioned vertically. Moreover, along its outer edge each star-wheel is equipped with a plurality of holders which are evenly spaced out and each designed to contain a single product. In particular, in the most widespread embodiments the products may be held between the holders (in which they are only partly inserted) and a fixed, shaped guide panel surrounding a predetermined stretch of the star-wheel extension (from the conveyor belt to the carrousel along the star-wheel rotation trajectory).

The star-wheels are positioned in such a way that each of their holders is positioned at a carrousel supporting element at the moment when it is aligned along a line which is radial relative to the carrousel and passing through the centre of the respective star-wheel. Moreover, the speed of the star-wheel is controlled in such a way that the tangential speed of the holders is equal to the tangential speed of the carrousel supporting elements. Each star-wheel is also positioned substantially at a tangent to the conveyor belt so that a product supported by the belt can enter a holder.

For the loading star-wheel only, there is also a screw feeder present which is positioned parallel with the conveyor belt and partly above it, for spacing out the products to be processed which in this way can be fed one at a time to the loading star-wheel.

Obviously, the movements of the star-wheels, the carrousel, the belt and the screw feeder are synchronised. At present, this is done by one or more mechanical transmissions located below the various elements which transmit motion to them from the carrousel shaft.

However, this prior art technology has several disadvantages.

In particular, depending on the type of product to be processed and its dimensions, different star-wheels and screw feeders usually have to be used.

Consequently, when a size change-over has to be performed (that is to say, the device must be adapted to move products of a different shape or size), the star-wheels and the screw feeder must be disassembled and substituted with the most suitable ones. In particular, each star-wheel and the screw feeder must be
5 disassembled from the respective supporting shafts and substituted with others of the most suitable size.

However, said operation is relatively time-consuming, partly due to the fact that the various parts must be assembled in such a way that they are synchronised. In some cases this may involve the need to modify even the various mechanical
10 transmissions.

Obviously, all of this has a negative impact on plant productivity, particularly in cases in which regular size change-overs are required.

Disclosure of the Invention

15 In this situation the technical purpose forming the basis of this invention is to provide a device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carousel which overcomes the above-mentioned disadvantages.

In particular, the technical purpose of this invention is to provide a device
20 for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carousel which allows size change-over operations to be performed faster than for the prior art devices.

The technical purpose specified and the aims indicated are substantially achieved by a device for feeding products to be processed and picking up
25 processed products for operating machines of the type with a rotary carousel as described in the appended claims.

Brief description of the drawings

Further features and the advantages of this invention are more apparent in
30 the detailed description, with reference to the accompanying drawings which

illustrate several preferred, non-limiting embodiments of a device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel, in which:

Figure 1 is a schematic axonometric view of a first embodiment of a device
5 for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel, made in accordance with this invention, in the operating condition;

Figures 2 to 4 illustrate a series of steps which can be carried out with the device of Figure 1 for performing a size change-over;

10 Figures 5 to 7 illustrate a series of steps similar to those of Figures 3 and 4 which can be carried out with a second embodiment of a device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel, made in accordance with this invention;

15 Figure 8 is a schematic view from below of several parts of the device of Figure 1; and

Figure 9 is a schematic view from below of several parts of the device of Figures 4 and 7.

20 Detailed Description of the Preferred Embodiments of the Invention

With reference to the accompanying drawings, the numeral 1 denotes as a whole a device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel, made in accordance with this invention.

25 In the accompanying drawings, in particular, the device 1 according to this invention is illustrated close to the supporting frame 2 of a labelling machine with a carrousel. For greater clarity, the carrousel and the other parts of the labelling machine are not illustrated (in practice the carrousel rotates relative to the vertical central axis of the circular upper surface 3 formed by the frame 2 and supported by
30 the relative legs 4).

The device 1 for feeding and picking up products comprises first feed means 5 for products to be processed and second feed means 6 for processed products. Advantageously, these may be two conveyor belts.

However, in the preferred embodiment illustrated in the accompanying drawings, the first feed means 5 and the second feed means 6 are formed by a single apparatus 7 comprising a sliding frame 8 on which, in the known way, a single conveyor belt is mounted. In particular, in the accompanying drawings the sliding frame 8 has a C-shaped cross-section with the open part pointing upwards and equipped with two flanges 9 extending towards each other which act as a support for the active side of the conveyor belt and, consequently for the products transported on it. In the accompanying drawings from 1 to 7 the belt is not illustrated, but in practice it runs from right to left.

Operatively coupled with the first feed means 5 (that is to say, in the embodiment illustrated, to the portion of the apparatus 7 forming them) there are spacing means 10 for spacing out at a predetermined interval the products to be processed arriving on the first feed means 5. In particular, in the embodiment illustrated the spacing means 10 comprise a screw feeder 11 rotating with a horizontal axis positioned partly above the sliding frame 8 so that in practice it interacts with the products to be processed arriving on the conveyor belt. In particular, the screw feeder 11 has a spiral channel 12 shaped in such a way that it can partly accommodate a product to be processed of a predetermined size.

At the screw feeder 11, on the opposite side of the first feed means 5, the device 1 also comprises a first transfer star-wheel 13 rotatably mounted on a device 1 supporting structure 14, and operatively coupled with the first feed means 5 and to the spacing means 10, for picking up one product to be processed at a time and feeding it to a labelling machine carousel.

In the accompanying drawings from 1 to 7 (in which the products to be processed are fed from right to left) the first transfer star-wheel 13 rotates clockwise about a central axis of rotation and the outside of the star-wheel is equipped with a plurality of recesses 15 designed to accommodate a product to be

processed. The shape and size of the recesses 15 depend on the shape and size of the product to be processed.

The first star-wheel 13 and the screw feeder 11 are also positioned and synchronised in such a way that in its position closest to the screw feeder 11 each
5 recess 15 is directly opposite the screw feeder 11 spiral channel 12 so that a product to be processed can be contained partly in the recess 15 and partly in the channel 12. Both the first star-wheel 13 and the screw feeder 11 are also moved in a synchronised fashion so as to observe that coupling for all of the recesses 15. It should also be noticed that, in the known way, in the embodiments illustrated the
10 device 1 is equipped with means for adjusting the position of the screw feeder 11, not illustrated in the accompanying drawings, which allow the screw feeder 11 to be moved relative to the first feed means 5 in a direction transversal to that of product movement. In this way, the screw feeder 11 may be moved between a first position in which it is partly above the first feed means 5 (position not illustrated),
15 and a second position in which it is moved laterally relative to the first feed means 5 (as shown in the accompanying drawings). The adjusting means are designed both to adjust the position of the screw feeder 11 based on the products to be spaced out, and, in the accompanying drawings, to allow movement of the first feed means 5 as described in more detail below.

20 Even if not illustrated in the accompanying drawings, downstream of the screw feeder 11 (relative to the direction of feed of the products to be processed) advantageously there is, in the known way, a guide panel having the shape of an arc of a circle centred on the axis of rotation of the first star-wheel 13, and designed to keep the products to be processed in the recesses 15 of the first star-
25 wheel 13 until they arrive at the carrousel.

The device 1 according to this invention also comprises a second transfer star-wheel 16 rotatably mounted on the supporting structure 14 and operatively coupled with the second feed means 6, for releasing to the latter a processed product previously picked up from the labelling machine carrousel. The second
30 star-wheel 16 is structurally the same as the first star-wheel 13, rotates in the same

direction and is coupled with a second guide panel (not illustrated) which surrounds it from a position in which a recess 15 of the second star-wheel 16 is at the carrousel to a position in which said recess 15 is at the second feed means 6. In this way, a processed product passes from the carrousel to a recess 15 of the second star-wheel 16 and from the latter to the second feed means 6.

The device 1 also comprises rotation means 17 which, in practice, make the first star-wheel 13, the second star-wheel 16 and the spacing means 10 (that is to say, the screw feeder 11) rotate in such a way that they are synchronised with each other and with the carrousel of the machine to which the device 1 is applied.

However, it should be noticed that the structure of the device 1 described so far is similar to that of prior art devices. Therefore, further technical details are not considered necessary herein. However, similarly, in other embodiments structures may be used which are partly different to that described so far.

According to this invention, the supporting structure 14 on which the transfer star-wheels are mounted comprises a first, fixed part 18 and at least a second part 19 which is removably mounted on the first part 18. In other words, the second part 19 of the supporting structure 14 may be mounted on the first, fixed part 18 or removed from it as required.

In particular, in this invention mounted on the second part 19 of the supporting structure 14 are both the first star-wheel 13 and the second star-wheel 16 as well as the respective rotation means 17. Moreover, advantageously, in the preferred embodiment the spacing means 10 are also mounted on the second part 19 of the supporting structure 14.

In this way, the second part 19 of the supporting structure 14, the first star-wheel 13, the second star-wheel 16, the rotation means 17 and, if mounted on the second, mobile part 19 of the supporting structure 14, the spacing means 10, form an interchangeable module 20.

In the preferred embodiment the device 1 disclosed comprises at least two different interchangeable modules 20 which can be mounted in turn on the first, fixed part 18 of the supporting structure 14. In particular, each interchangeable

module 20 is equipped with a first star-wheel 13, a second star-wheel 16 and a screw feeder 11 for moving a predetermined group of products whose shape and dimensions are within a predetermined range. Consequently, by simply substituting a module 20 with a different module it is possible to proceed with a size change-over.

Moreover, in the most complete embodiments the device 1 comprises a number of first star-wheels 13, of second star-wheels 16 and, if necessary of screw feeders 11, greater than the number of second parts of the supporting structure 14. The star-wheels and the spacing means 10 are mounted on the second part 19 of the supporting structure 14 so that they can be removed and substituted with others of a different size.

Therefore, in general, it would be sufficient to have only two second parts 19 of the supporting structure 14 to guarantee device 1 maximum versatility. Whilst one second part 19 is used, the other may be set up with the star-wheels 13, 16 and the screw feeder 11 best suited to the next size change-over.

In the preferred embodiment, to guarantee easy substitution of the interchangeable modules 20, the first feed means 5 and/or the second feed means 6 (both in the accompanying drawings) can move relative to the supporting structure 14 between a first position in which they are operatively coupled respectively with the first star-wheel 13 and with the second star-wheel 16 and they prevent removal of the interchangeable module 20 from the supporting structure 14, and a second position in which they are uncoupled from the respective star-wheels 13, 16 and allow removal of the interchangeable module 20 from the first, fixed part 18 of the supporting structure 14.

In particular, the first feed means 5 and/or the second feed means 6 may be able to move relative to the supporting structure 14 by rotation (as in the accompanying drawings), translation (solution not illustrated) or by more complex composite movements (also not illustrated).

In the embodiment in Figures 1 to 4, the first feed means and the second feed means 6 can move relative to the supporting structure 14 by rotation about an

axis which in practice is positioned vertically. In contrast, Figures 5 to 7 show an alternative embodiment in which the axis of rotation in practice is horizontal (also parallel with the direction of product feed on the first feed means 5 and on the second feed means 6, which, in the embodiments illustrated is horizontal and straight).

In both of the cases illustrated the movement of the feed means is achieved by a mechanical rotation relative to the first, fixed part 18 of the supporting structure 14 by one or more sliding frame 8 supporting arms 21.

As already indicated, advantageously the distancing means 10 are also mounted on the second part 19 of the supporting structure 14 and are part of the interchangeable module 20. However, in the case of the embodiments illustrated, the feed means are a possible obstacle to the movement of the first and second feed means 5, 6 located between the star-wheels 13, 16 and the spacing means 10. Consequently, in the preferred embodiments the spacing means 10 can also move relative to the second part 19 of the supporting structure 14 between an operating position in which they are operatively coupled with the first star-wheel 13 and in which the first feed means 5 in their first position are interposed between the first star-wheel 13 and the spacing means 10 (Figure 1), and a home position in which they are uncoupled from the first star-wheel 13 and in which at least the first feed means 5 can be moved from their first position to their second position (Figures 2 and 5). It should be noticed that in the embodiments illustrated the movement of the spacing means 10 from the operating position and the home position requires prior movement of the screw feeder 11 from its first position to its second position.

In particular, in the embodiments illustrated the movement of the spacing means 10 is achieved by vertically translating a transmission and supporting shaft 22 which is connected, by a corner drive 23 to the screw feeder 11, and fitted in such a way that it can slide axially with a pulley 24 forming part of the rotation means 17.

The latter elements are schematically illustrated in Figures 8 and 9 which

show the interchangeable module 20 and the frame 2 of the carrousel seen from below.

According to this invention, the rotation means 17 comprise the part for movement of the various parts which is integral with the second part 19 of the supporting structure 14. Therefore, they may adopt different configurations depending on the embodiments. In particular, whilst in the embodiments illustrated they are mechanical transmissions powered by an external movement source, in other embodiments they may comprise one or more motors integral with the second part 19 of the supporting structure 14.

In the embodiments illustrated the rotation means 17 comprise a driving belt 25 (or chain) looped along a path formed by three main pulleys 26, 27, 24 respectively fitted to the rotation shaft 28 of the first star-wheel 13, to the rotation shaft 29 of the second star-wheel 16 and to the supporting shaft 22 of the spacing means 10, a first transmission pulley 30 and four idler rollers 31 (designed to clamp the belt 25 around the pulleys). The first transmission pulley 30 is, in practice, coupled with a corresponding second transmission pulley 32 mounted on the carrousel and made to rotate by a general pulley 33 integral with the carrousel shaft 34, by means of an idler pulley 35. The coupling between the first transmission pulley 30 and the second transmission pulley 32 is made in such a way that the driving belt 25 is clamped between them (Figure 8) so that the movement of the second transmission pulley 32 is transmitted to the first transmission pulley 30 and to the belt 25. Since the first transmission pulley 30 is located inside the loop formed by the belt 25, to uncouple the rotation means 17 from the second transmission pulley 32 the interchangeable module 20 can simply be moved away from the carrousel (Figure 9).

However, in other embodiments the coupling between the first transmission pulley 30 and the second transmission pulley 32 is achieved by meshing two gear wheels which are integral with the two pulleys.

It should be noticed that in Figures 8 and 9 the first, fixed part 18 of the supporting structure 14 is shown with a dashed line only to highlight its

positioning relative to the mobile part.

Therefore, in general, the rotation means 17 comprise at least one mechanical transmission connected to the first star-wheel 13 and to the second star-wheel 16 and which can be coupled (by a friction coupling as in the accompanying drawings or by meshing), when the interchangeable module 20 is mounted on the first, fixed part 18 of the supporting structure 14, with a movement system integral with the carrousel.

Finally, in the embodiments illustrated, the second part 19 of the supporting structure 14 is coupled with the first, fixed part 18 by a sliding movement in a direction which is radial relative to the carrousel (that is to say, perpendicular to the direction of product feed).

Operation of the device 1 according to this invention is similar to that of any prior art device 1 as regards feeding the products to be processed to the operating machine and the removal of processed products.

The device 1 according to this invention differs from the prior art devices as regards the method for performing size change-overs.

When the size of the products to be processed must be changed, it is first useful to prepare separately, while the machine completes the previous processing, an interchangeable module 20 equipped with specific transfer star-wheels 13, 16 and specific spacing means 10.

At the moment of the size change-over, first the spacing means 10 are brought to their home position (Figure 2). Then the feed means are rotated into their second position (Figures 3 and 5).

At that point, if necessary the spacing means 10 may be returned to their operating position (Figures 3 and 6), and the interchangeable module 20 used up to that moment can be separated from the first, fixed part 18 of the supporting structure 14 and substituted with the module previously prepared.

By repeating the steps indicated above in reverse order it is therefore possible to rapidly return the device 1 to the operating condition.

To guarantee synchronisation of the various mobile components with each

other and with the carrousel, there may be special reference elements available to the technician in the sector.

This invention brings important advantages.

5 Thanks to this invention, it was possible to provide a device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel, which allows size change-over operations to be carried out much faster than for prior art devices, with a significant advantage in terms of productivity particularly in plants in which regular size change-overs are required.

10 It should also be noticed that this invention is relatively easy to produce and that even the cost linked to implementing the invention is not very high.

The invention described above may be modified and adapted in several ways without thereby departing from the scope of the inventive concept.

15 Moreover, all details of the invention may be substituted with other technically equivalent elements and in practice all of the materials used, as well as the shapes and dimensions of the various components, may vary according to requirements.

Claims

1. A device for feeding products to be processed and picking up processed products for operating machines of the type with a rotary carrousel, comprising:
- a supporting structure (14);
 - first feed means (5) for products to be processed;
 - 5 spacing means (10), operatively coupled with the first feed means (5), for spacing out at a predetermined interval the products to be processed arriving on the first feed means (5);
 - a first transfer star-wheel (13) rotatably mounted on the supporting structure (14) and operatively coupled with the first feed means (5) and with the
 - 10 spacing means (10) for, in practice, picking up one product to be processed at a time and feeding it to a labelling machine carrousel;
 - second feed means (6) for processed products;
 - a second transfer star-wheel (16) rotatably mounted on the supporting structure (14) and operatively coupled with the second feed means (6) for, in
 - 15 practice, releasing to the latter a processed product previously picked up from the labelling machine carrousel; and
 - rotation means (17) for rotating the first star-wheel (13) and the second star-wheel (16);
 - the device being characterised in that the supporting structure (14)
 - 20 comprises a first, first part (18) and at least a second part (19) removably mounted on the first part (18), also being characterised in that at least the first star-wheel and the second star-wheel (16) and the rotation means (17) are mounted on the second part (19) of the supporting structure (14), and also being characterised in that the second part (19) of the supporting structure (14), the first star-wheel (13),
 - 25 the second star-wheel (16) and the rotation means (17) form an interchangeable module (20).

2. The device according to claim 1, characterised in that the first feed means (5) and/or the second feed means (6) can move relative to the supporting structure (14) between a first position in which they are operatively coupled respectively with the first star-wheel (13) and/or with the second star-wheel (16) and they prevent removal of the interchangeable module (20) from the supporting structure (14), and a second position in which they are uncoupled from the first star-wheel (13) and the second star-wheel (16) and allow removal of the interchangeable module (20) from the first, fixed part (18) of the supporting structure (14).
3. The device according to claim 2, characterised in that the first feed means (5) and/or the second feed means (6) can move relative to the supporting structure (14) by rotation.
4. The device according to claim 3, characterised in that the first feed means (5) and/or the second feed means (6) can move relative to the supporting structure (14) by rotation about an axis which in practice is horizontal or vertical.
5. The device according to any of the foregoing claims, characterised in that the first feed means (5) and the second feed means (6) are formed by a single apparatus (7).
6. The device according to claims 4 and 5, characterised in that the apparatus (7) forms a straight horizontal direction of feed for the products and also being characterised in that the axis of rotation is parallel with said straight direction.
7. The device according to any of the foregoing claims, characterised in that the spacing means (10) are also mounted on the second part (19) of the supporting structure (14) and are part of the interchangeable module (20).

8. The device according to claims 2 and 7, characterised in that the spacing means (10) can move relative to the second part (19) of the supporting structure (14) between an operating position in which they are operatively coupled with the first star-wheel (13) and in which the first feed means (5) in their first position are interposed between the first star-wheel (13) and the spacing means (10), and a home position in which they are uncoupled from the first star-wheel (13) and in which at least the first feed means (5) can be moved from their first position to their second position.

9. The device according to any of the foregoing claims, characterised in that the rotation means (17) comprise at least one mechanical transmission connected to the first star-wheel (13) and to the second star-wheel (16) and which can be coupled, when the interchangeable module (20) is mounted on the first, fixed part (18) of the supporting structure (14), with a movement system integral with the carrousel.

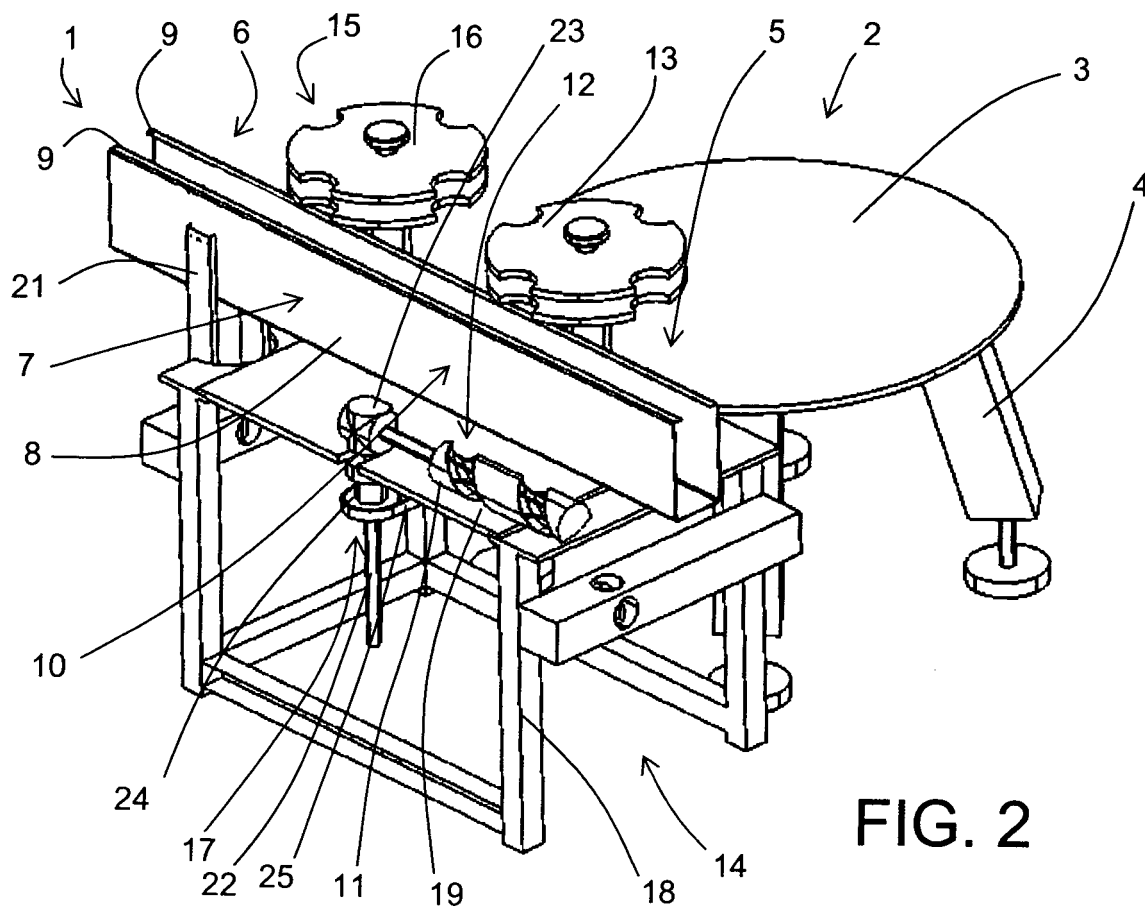
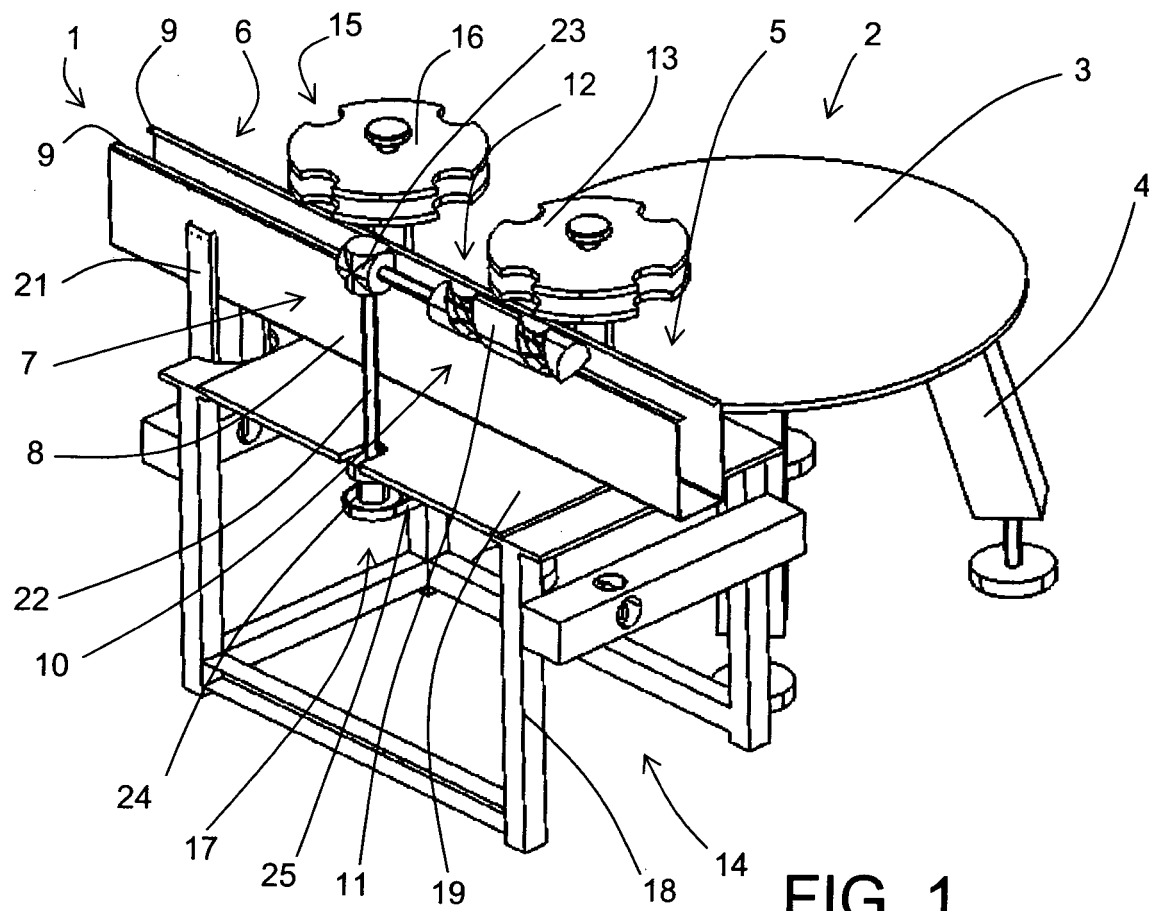
10. The device according to claim 9, characterised in that the mechanical transmission comprises a friction or meshing coupling for connection to the movement system integral with the carrousel.

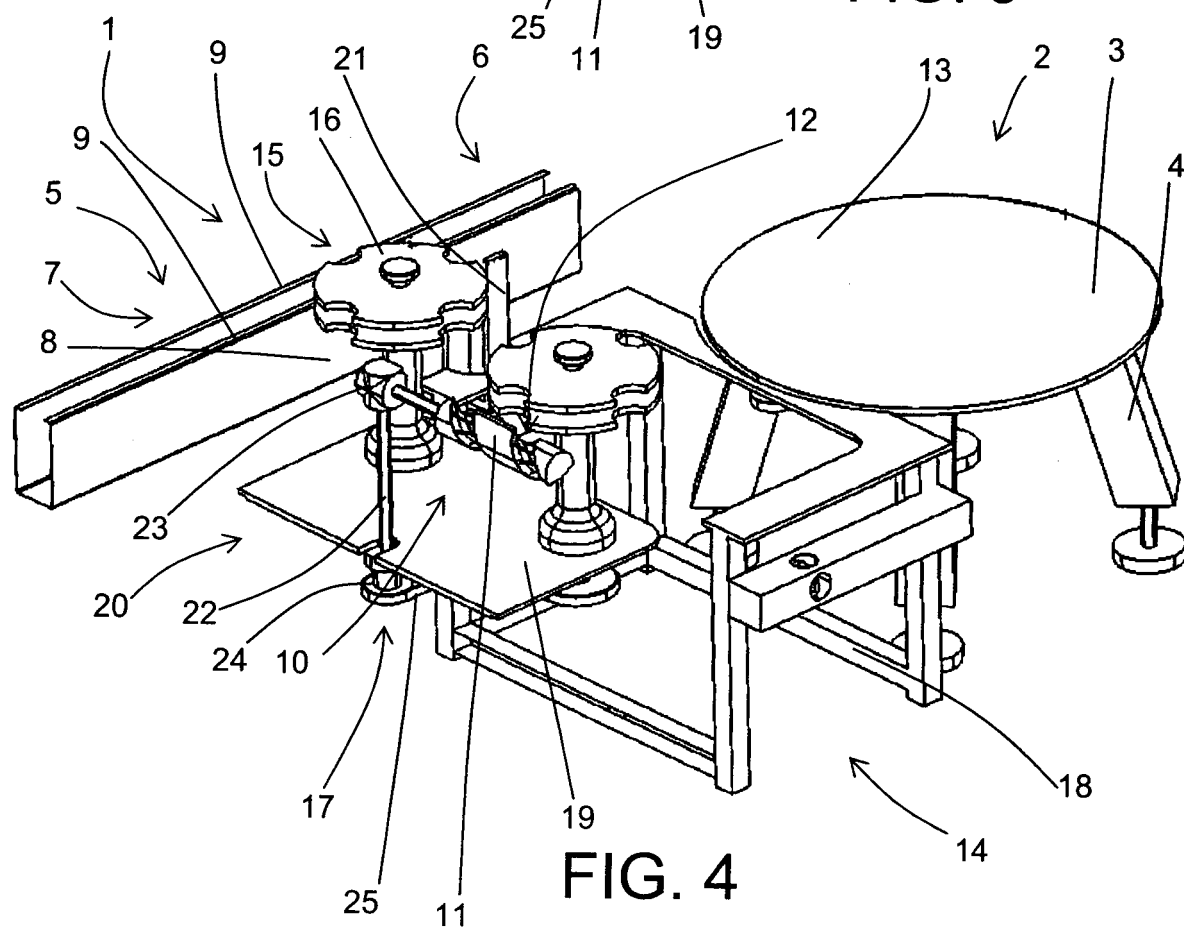
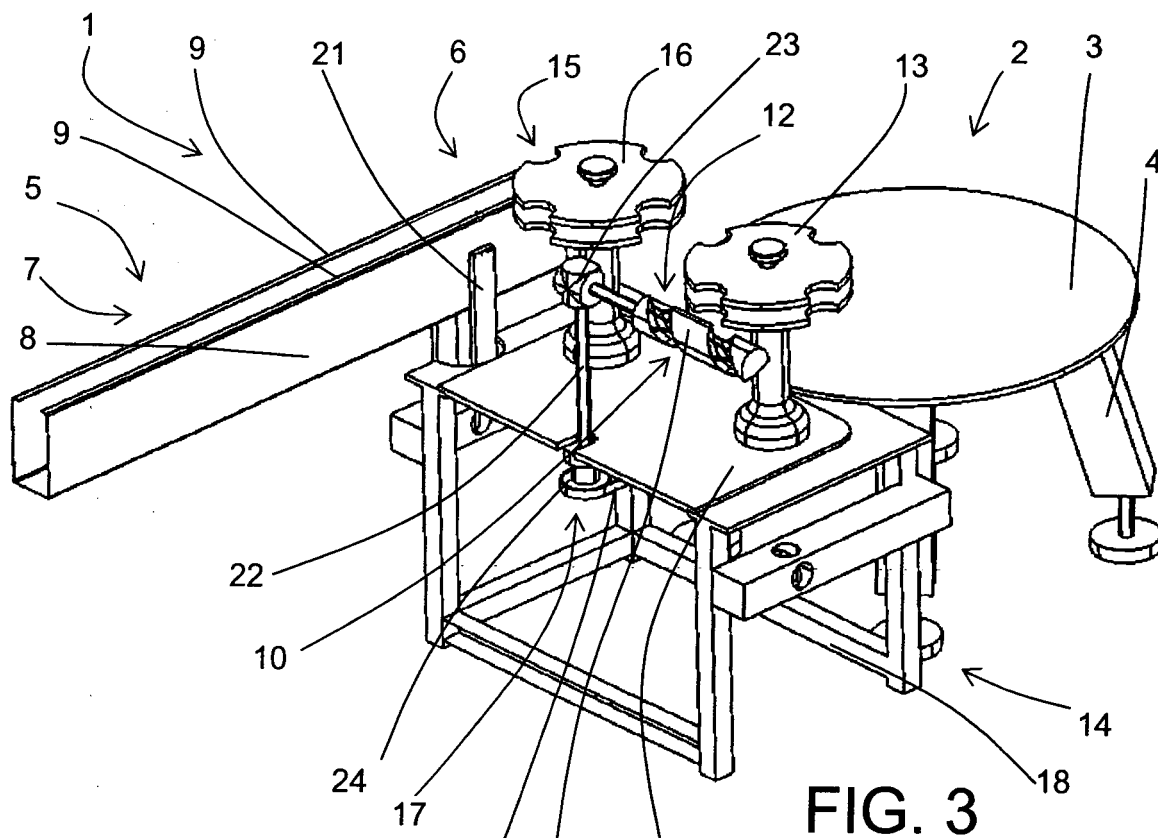
11. The device according to any of the foregoing claims, characterised in that the spacing means (10) comprise a rotary screw feeder (11) and also being characterised in that the rotation means (17) are also connected to the screw feeder (11) for making it rotate in such a way that it is synchronised with the first star-wheel (13).

12. The device according to any of the foregoing claims, characterised in that the second part (19) of the supporting structure (14) is slidably coupled with the first, fixed part (18).

13. The device according to any of the foregoing claims, characterised in that it comprises at least two different interchangeable modules (20).

14. An operating machine with a rotary carrousel, characterised in that it
5 comprises a device (1) according to any of the foregoing claims.





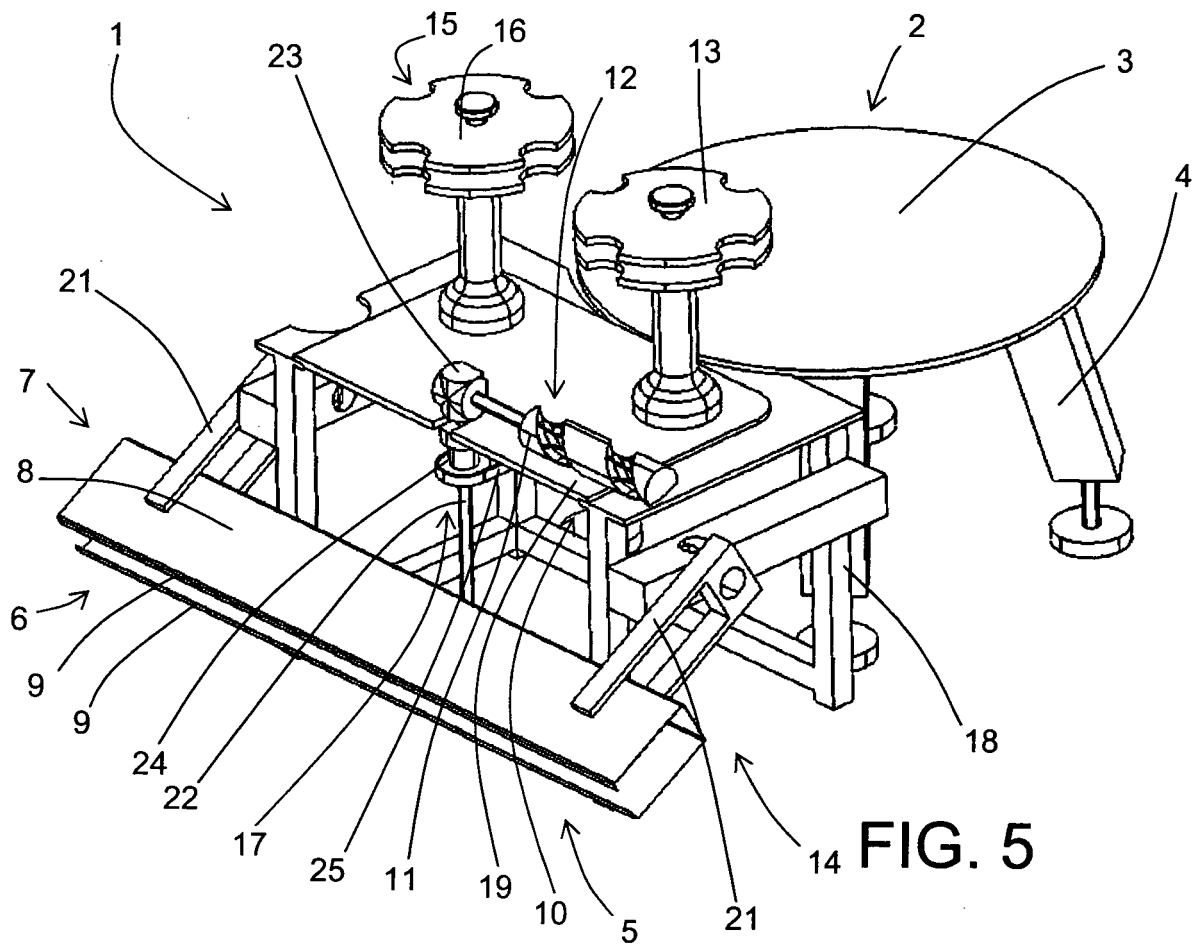


FIG. 5

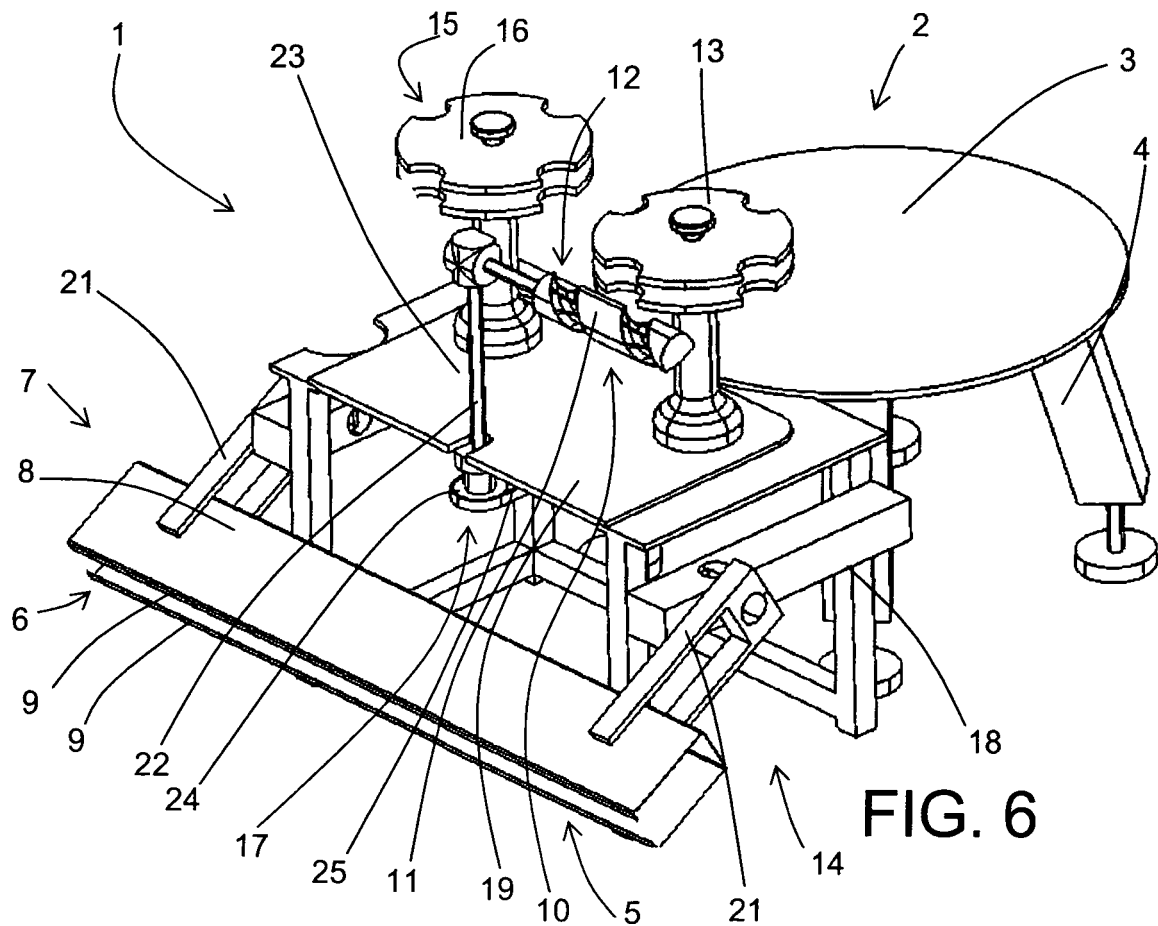
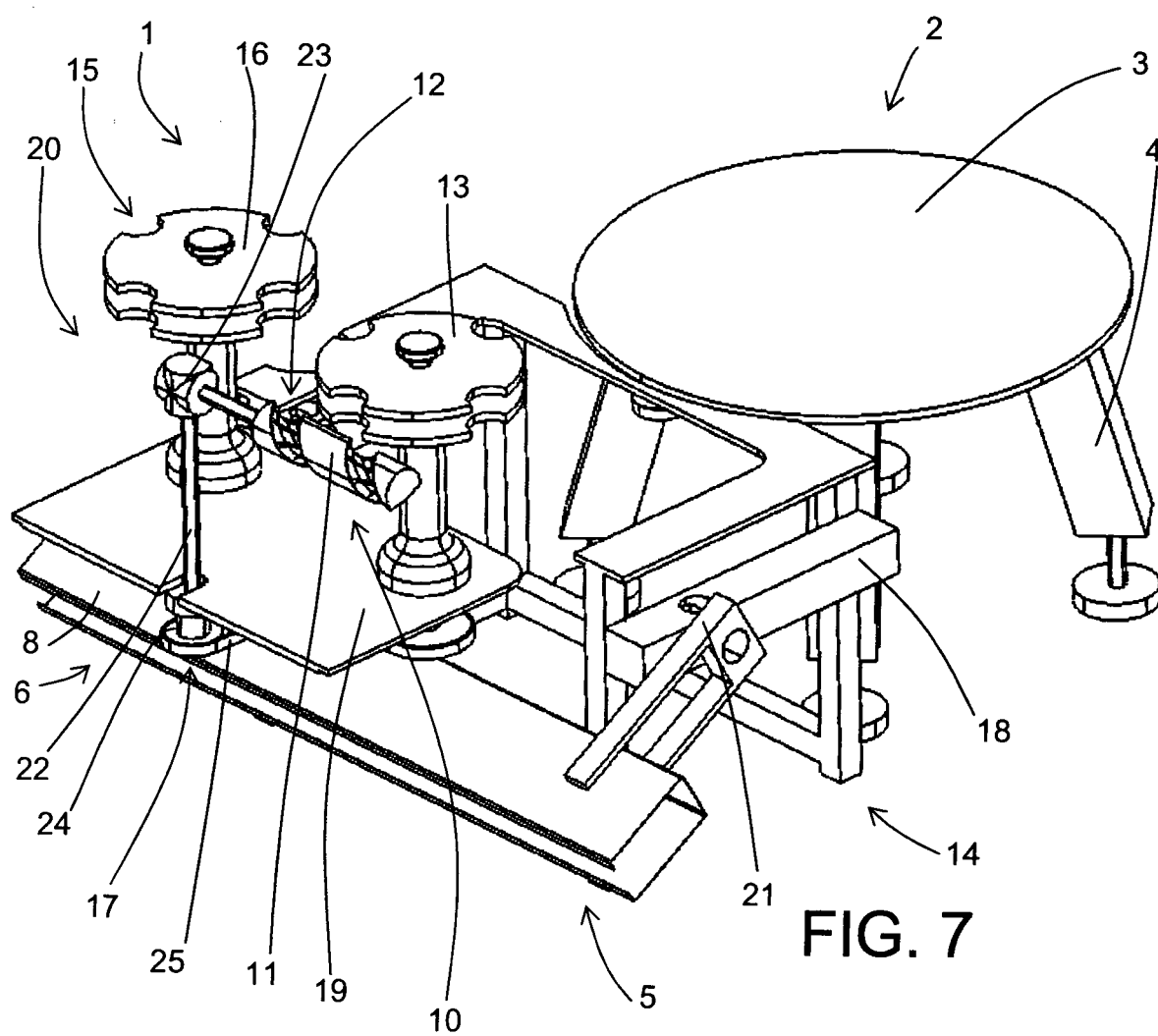


FIG. 6



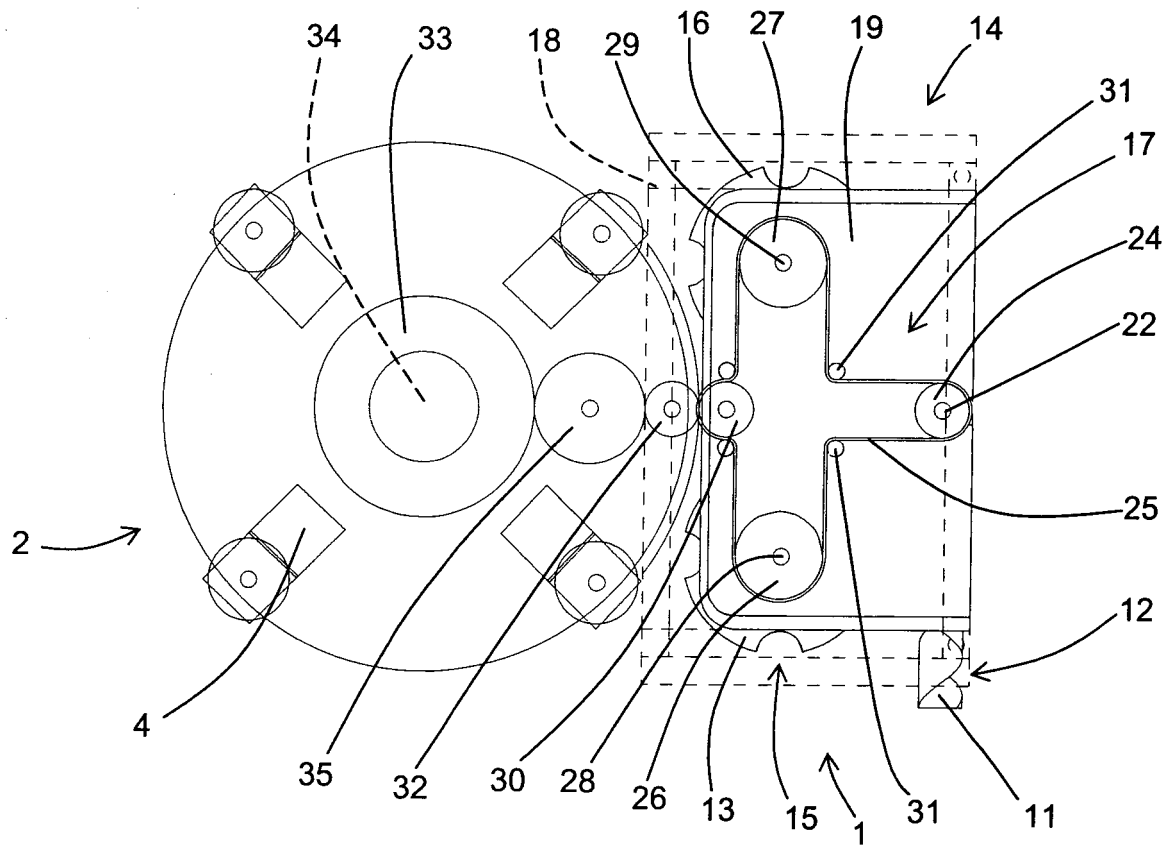


FIG. 8

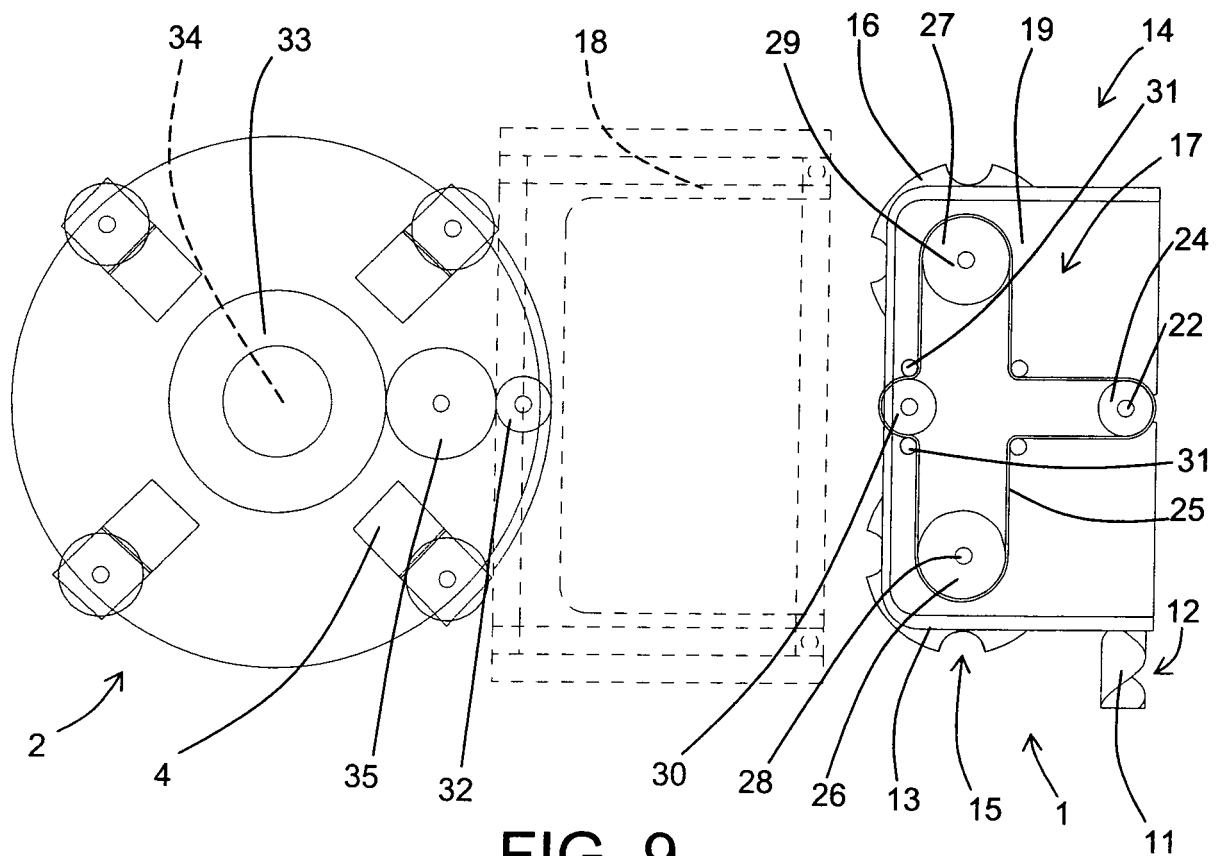


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No

PCT/IT2009/000460

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65G47/84 B65C9/00 B67C7/00
ADD.

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 B65C B67C

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.
X	WO 03/024861 A1 (KRONES AG [DE]; EDER ERICH [DE]) 27 March 2003 (2003-03-27) page 6, line 9 - page 7, line 8 page 11, paragraphs 2,3; figures 1,3 -----	1,5,7,9, 11,13,14
A	DE 197 41 476 A1 (KRONSEDER MASCHF KRONES [DE] KRONES AG [DE]) 18 March 1999 (1999-03-18) claims 1-3; figure 1 -----	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
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- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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- *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.
- *G* document member of the same patent family

Date of the actual completion of the international search

7 July 2010

Date of mailing of the international search report

14/07/2010

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IT2009/000460

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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			AT 295333 T 15-05-2005
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