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Remarks:
In accordance with the last part of Article 14 (2) EPC the applicant has filed a text with which it is intended to bring the translation into conformity with the original text of the application.

(54) **Improved packaging machine, for packaging products by wrapping them with a continuous web of packaging film**

(57) A packaging machine (1), for packaging products (2) by wrapping them with a continuous web (3) of packaging film, comprises a support and feed surface (4) to which a generic product (2) to be packaged can be associable; a ring (5), parallel with the support and feed of the product (2) surface (4), able to rotate - translate relative to its axis of movement (6), transversal to the surface (4); and an operating station (7), supporting a reel (8) which supplies the web (3) and integral with the ring (5). The station (7) can rotate - translate together with the ring (5) in such a way that it supplies the continuous web (3) of packaging film on the product (2). The station (7) comprises actuator means (25) and an air accumulator tank (9), the latter being directly connected to the ring (5) and used to supply the actuator means (25).

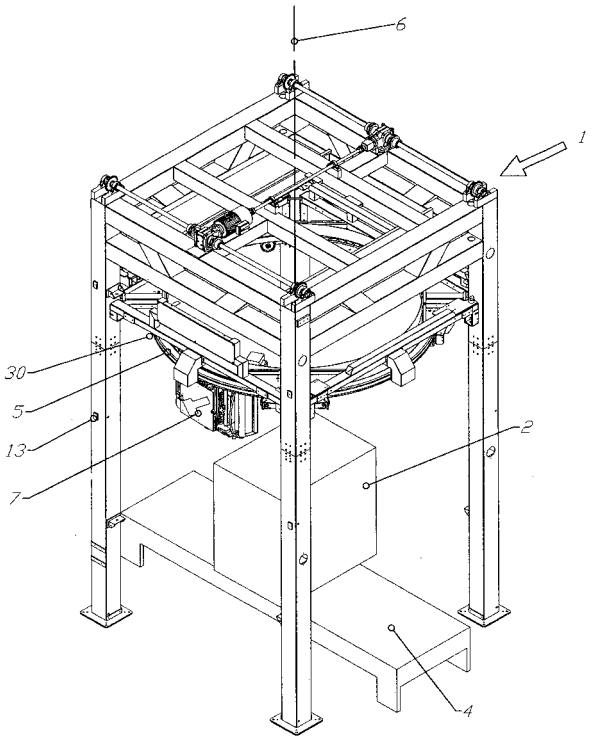

FIG. 1

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Description

[0001] The present invention relates to the packaging of products by wrapping them with a plastic film and, more specifically, it relates to an improved packaging machine.

[0002] Packaging products by wrapping them with packaging film is a known technique in which the products to be packaged are covered with a wrapper designed to contain them, which is formed directly on the product by gradually wrapping it with a continuous web of plastic film, placed on the product in the form of a plurality of successive coils, suitably offset.

[0003] In some cases the film is pre-stretched, immediately before it is released on the product, so that, once released on the product, the wrapper formed tends to tighten spontaneously on the product as a result of a contraction caused by the spring back of the material used to make the film.

[0004] The packaging technique referred to above is implemented by a relatively large variety of machines. Such machines, although all sharing the packaging formation mechanism described above, differ from one another due to a different technical or functional concept which allows them to classed as belonging to one technological family rather than to another.

[0005] A characteristic type of known machines is rotary ring wrapping machines. The general architecture of such machines involves the presence of a fixed, horizontal product support and feed surface and a structure supporting a horizontal ring above the product support and feed surface. The ring can rotate about its axis coinciding with the vertical axis of the product support and feed surface. The ring support structure can translate longitudinally to the axis of the ring, towards or away from the product support surface. The ring supports an operating station, suspended relative to the product support and feed surface, which includes a reel of packaging film and a complex set of actuator parts.

[0006] When the product to be packaged, located on top of the product support and feed surface and supported by a pallet, reaches the vertical axis of the ring, said ring, translating longitudinally to its own axis, together with its structure, circumscribes the product to be packaged, at each point of the latter's height. In contrast, rotation of the ring about its own axis causes the operating station integral with it to follow a circumferential trajectory relative to the product to be packaged.

[0007] In short, the combination of the rotation and translation of the ring, suitably co-ordinated with one another, allow the generation of the spiral-shaped wrapping which, as the web is unwound from the reel, gradually forms the wrapper which contains the product.

[0008] The performance of such machines is basically dependent on three characteristic parameters: the maximum diameter of the ring; the speed of rotation of the ring; and the length of the ring translation stroke.

[0009] The maximum diameter of the ring is a significant parameter for the maximum size of the product which can be packaged.

[0010] Obviously: the larger the diameter of the ring, the larger the size of the product which can be packaged.

[0011] As regards the speed of rotation of the ring, obviously: the higher the speed, the faster the packaging cycle, that is to say, machine productivity.

[0012] However, a large diameter and high speed of rotation generate significant centrifugal forces, the latter being even more intense if along with the speed and diameter there are considerable masses rotating integral with the ring, that is to say, considerable masses relating to the operating station supported by the ring.

[0013] Intense centrifugal forces heavily influence the machine structure, its overall dimensions, reliability and even operating safety. Since the market requires the possibility of packaging products that are increasingly large and at increasingly high speeds, the known machines of the type described above are becoming increasingly complex and large in terms of their strength structures and in general also more expensive.

[0014] On the other hand, the known machines generally use electric motors as actuators for the operating station parts. As the machine performance increases, these motors become more powerful and heavier, until the increase in centrifugal forces caused by the increase in the dimensions of the ring and in the demand for increasingly high speeds, are added to by another critical state increase, due to an increase in the masses rotating and translating integral with the ring.

[0015] Therefore, the aim of the present invention is to overcome the above-mentioned disadvantages by allowing an increase in operating performance in machines of the type described above, without appreciably increasing the centrifugal forces, or in any case increasing them much less than they would be, vice versa, for known machines with similar performance.

[0016] Accordingly, the present invention achieves this aim with a rotary ring packaging machine, able to operate on large products and/or at high speed, without this meaning that it is subjected to particularly intense centrifugal forces, thanks to the smaller masses suspended relative to the ring.

[0017] The technical features of the present invention, in accordance with the above aim, are clear from the content of the claims herein, in particular claim 1, and from any of the claims directly or indirectly dependent on claim 1.

[0018] The advantages of the invention are more evident in the detailed description which follows, with reference to the accompanying drawings, which illustrate a preferred embodiment without limiting the scope of the invention, in which:

- Figure 1 is a perspective overall view of the machine in accordance with the present invention;
- Figures 2 and 3 are partial views of a detail of the machine illustrated in Figure 1, seen from two different viewpoints;

- Figure 4 is a partial view of another detail of the machine illustrated in Figure 1.

[0019] With reference to the accompanying drawings, in Figure 1 the numeral 1 denotes as a whole a packaging machine for packaging products 2 by wrapping them with a continuous web 3 [Figure 3] of packaging film.

[0020] The web 3 consists of a thin plastic film, designed to be elastically deformed by traction and designed to subsequently and spontaneously contract on the product 2 due to the spring back of the material used to make it.

[0021] The machine 1 basically comprises a horizontal product support and feed surface 4, for supporting a generic product 2 to be packaged; and a ring 5 supporting an operating station 7 in turn fitted with a reel 8 from which the continuous web 3 of packaging film is supplied.

[0022] The product support and feed surface 4 is devised in such a way that, once the product is loaded on it, normally resting or stacked on a pallet, the product can be transferred into the machine 1 for packaging and then, once packaged, it can be extracted from the machine 1 and sent to its destination. The product support and feed surface 4 may therefore be devised, for example, in such a way that it has an integrated roller conveyor and/or in any case suitable product 2 conveyor means, motor driven if necessary.

[0023] The ring 5 is supported by a structure 30 in turn supported by a machine 1 fixed structure 13. The ring 5 is angled so that it is parallel with the product support and feed surface 4 and can move: rotating relative to its own structure 30, and translating, together with its structure, relative to the overall machine 1 structure 13. In short, the ring 5 is capable of rotation - translation relative to its own axis of movement 6 which is vertical and transversal to the product support and feed surface 4. The ring 5 can also be associated with the product 2 to be packaged so that it can circumscribe it at any point of its height, above the product support and feed surface 4.

[0024] The operating station 7 is integral with the ring 5 so that, as a result of the pulling motion transmitted to it by the ring 5, which rotates about its own axis 6, the station 7 can rotate - translate together with the ring 5, thus being able to supply on the product 2, using known methods, the continuous web 3 of packaging film which, placed in the form of wrapping with gradually increasing height along the product 2, forms a wrapper which contains the product.

[0025] Figures 2 and 3 show how the station 7 comprises, more specifically, a set of operating means 26 including: a reel 8 support unit 15, a film tensioning and return roller unit 16, a film pre-stretching unit 17 and a dancing roller 18 opposed by a spring 23 which maintains film tension.

[0026] These operating means 26 can all be driven by pneumatic actuators, labelled 25 as a whole, in particular comprising linear actuators, that is to say, pneumatic cylinders, some of which are visible in the accompanying drawings and are labelled 19, 20, 21 and 22.

[0027] The operating station 7 is supplied by an air accumulator tank 9, for supplying the pneumatic actuator means 25, which is directly connected to the ring 5.

[0028] Figure 4 shows how the ring 5 has a hollow, tubular structure, with the tank 9 directly integrated with it.

[0029] In other words, the ring 5 itself acts as a tank, since it can accumulate the air necessary to activate the pneumatic actuator means 25 in its inner cavity 14.

[0030] During machine 1 operation, when the air in the tank 9 is used up it can be topped up cyclically. For this purpose, the ring 5 comprises pneumatic refilling means 10, or 11 and 12, for automatically refilling the tank 9 with air, regularly replacing the air consumed by the operating station 7 during packaging of the various products 2.

[0031] Figure 4 shows how the refilling means 10 comprise in particular a nozzle 11 and a valve 12 which can be connected to one another. The nozzle 11 is supported by the ring 5 support structure 30. The valve 12 is supported directly by the ring 5.

[0032] The tank 9 is refilled by connecting the valve 12 and the nozzle 11 in such a way that their axes are opposite one another. This connection is made when they reach a condition in which they are not moving relative to one another, with respect to the rotation between the ring 5 and the structure 30 supporting it.

[0033] The tank 9 is refilled cyclically. For simple construction and the advantage of a simple machine 1 management program, the tank is refilled every cycle. However, considering the low air absorption required by the station 7 operating means 26, the tank could be refilled after a greater number of operating cycles, for example, every two cycles, or even every five cycles.

[0034] It should be noticed that the decision to fit the operating station 7 with pneumatic actuator means 25 allows - compared with known machines fitted with electrical actuators having equal power - a noticeable reduction, all other conditions being equal, in the machine 1 suspended masses, and, more specifically, a reduction in the extent of the masses eccentrically rotating relative to the axis of rotation 6 of the ring 5. This has a positive effect on machine 1 performance, since the machine can operate without its structures being oversized and at operating speeds decidedly higher than those of the known machines.

[0035] It should also be emphasised that the possibility of using pneumatic energy instead of electrical energy also allows the additional advantage of operating stations 7 whose actuators are significantly less expensive.

[0036] Another advantage and further construction simplification are offered by the fact that the nozzle 11 and the valve 12 can also act as mechanical stop means 27, at the end of the stroke, for the rotation of the ring 5. This allows the use of very reliable and strong pneumatic limit switches which, as well as indicating when one of the limit positions of the ring 5 rotation stroke has been reached, allow positive implementation of a check device designed to perform a simple and safe check of correct

machine 1 operation.

[0037] Finally, it should be noticed that the use of pneumatic actuator means 25, supplied through the ring 5, adds to the many advantages already described the additional advantage of greater intrinsic machine 1 safety relative to the danger of electrocution and/or relative to any flammability of the products being packaged.

[0038] The invention described may be modified and adapted in many ways without thereby departing from the scope of the inventive concept. Moreover, all of the details of the invention may be substituted by other, technically equivalent elements.

Claims

1. A packaging machine, for packaging products (2) by wrapping them with a continuous web (3) of packaging film, comprising a support and feed surface (4) to which a generic product (2) to be packaged can be associable; a ring (5), parallel with the surface (4), able to rotate - translate relative to its axis of movement (6), transversal to the surface (4); an operating station (7), supporting a reel (8) which supplies the web (3) and integral with the ring (5), the station (7) being able to rotate - translate together with the ring (5) in such a way that it supplies the continuous web (3) of packaging film on the product (2), the machine (1) being **characterised in that** the station (7) comprises pneumatic actuator means (25) and an air accumulator tank (9), the tank (9) being directly connected to the ring (5) and used to supply the actuator means (25).

2. The machine according to claim 1, **characterised in that** the tank (9) can be refilled with air cyclically during machine (1) operation.

3. The machine according to claims 1 and 2, **characterised in that** the tank (9) is integrated in a ring (5) support structure (30).

4. The machine according to claim 3, **characterised in that** the ring (5) has a tubular shape, the tank (9) being incorporated inside said tubular shape.

5. The machine according to any of the foregoing claims, **characterised in that** the ring (5) comprises pneumatic refilling means (10; 11, 12) designed to automatically refill the tank (9) with air.

6. The machine according to claim 5, **characterised in that** the refilling means (10) comprise a nozzle (11) and a valve (12) which can be connected to one another.

7. The machine according to claim 6, **characterised in that** the valve (12) is supported by the ring (5) and the nozzle (11) is supported by the ring (5) support structure (30), it being possible to connect the valve (12) and the nozzle (11) to one another when it is reached a condition in which the movement of the ring (5) relative to the support structure (30) has stopped.

8. The machine according to claim 7, **characterised in that** the valve (12) and the nozzle (11) can be connected to one another when the rotating movement of the ring (5) relative to its support structure (30) has reached an end of stroke position.

9. The machine according to claim 8, **characterised in that** the connection between the valve (12) and the nozzle (11) is made at the end of stroke point of at least the rotation of the ring (5).

10. The machine according to any of the foregoing claims, **characterised in that** the valve (12) and the nozzle (11) can be connected to one another cyclically.

11. The machine according to claim 10, **characterised in that** the valve (12) and the nozzle (11) can be connected to one another at each packaging cycle.

12. The machine according to claim 10, **characterised in that** the valve (12) and the nozle (11) can be connected to one another at intervals separated by multiple packaging cycles.

13. The machine according to any of the foregoing claims, **characterised in that** integrated in the nozzle (11) and the valve (12) there are mechanical stop means (27) at least for the rotating movement of the ring (5).

14. The machine according to clam 1, **characterised in that** the axis of movement (6) of the ring (5) is vertical.

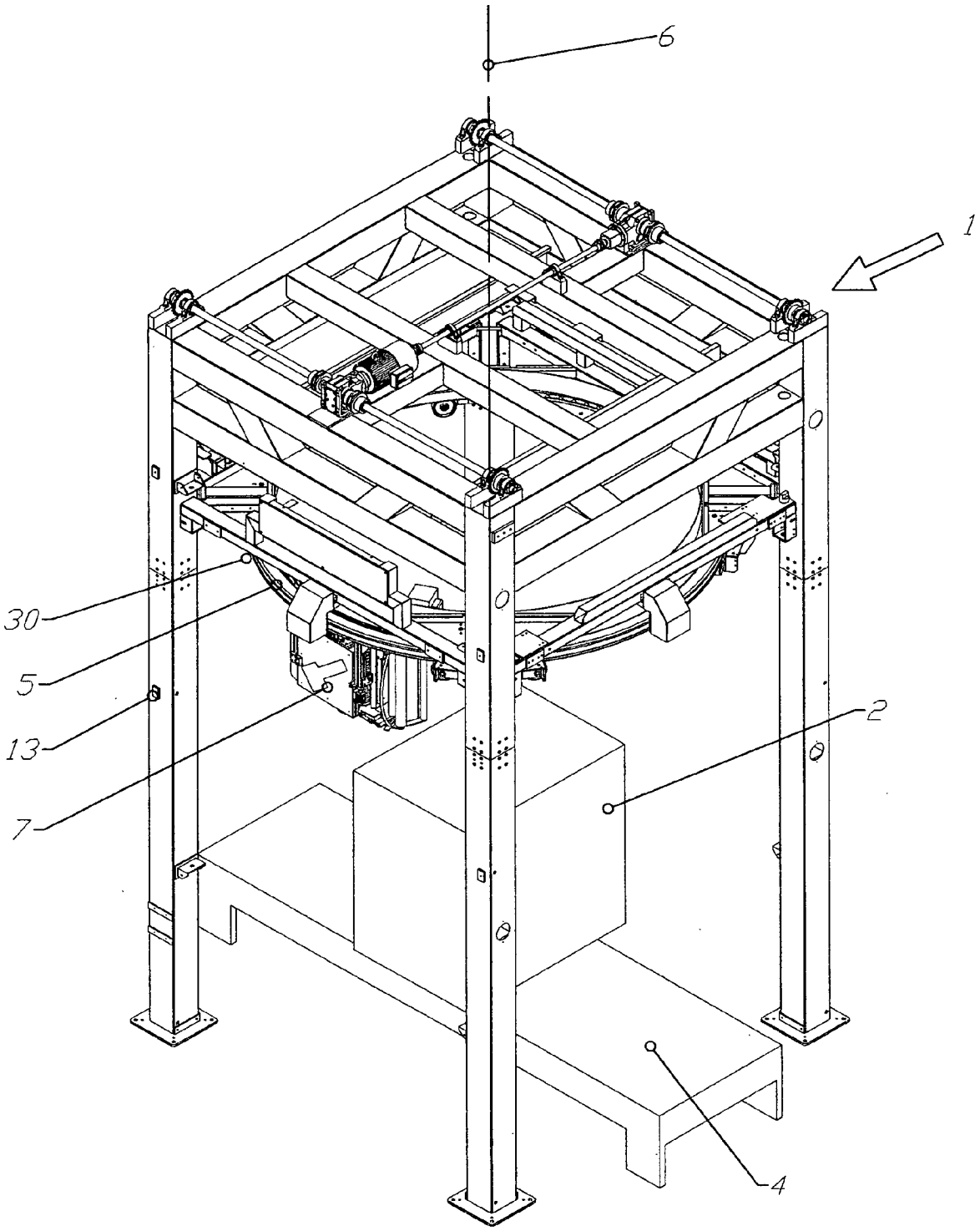

FIG. 1

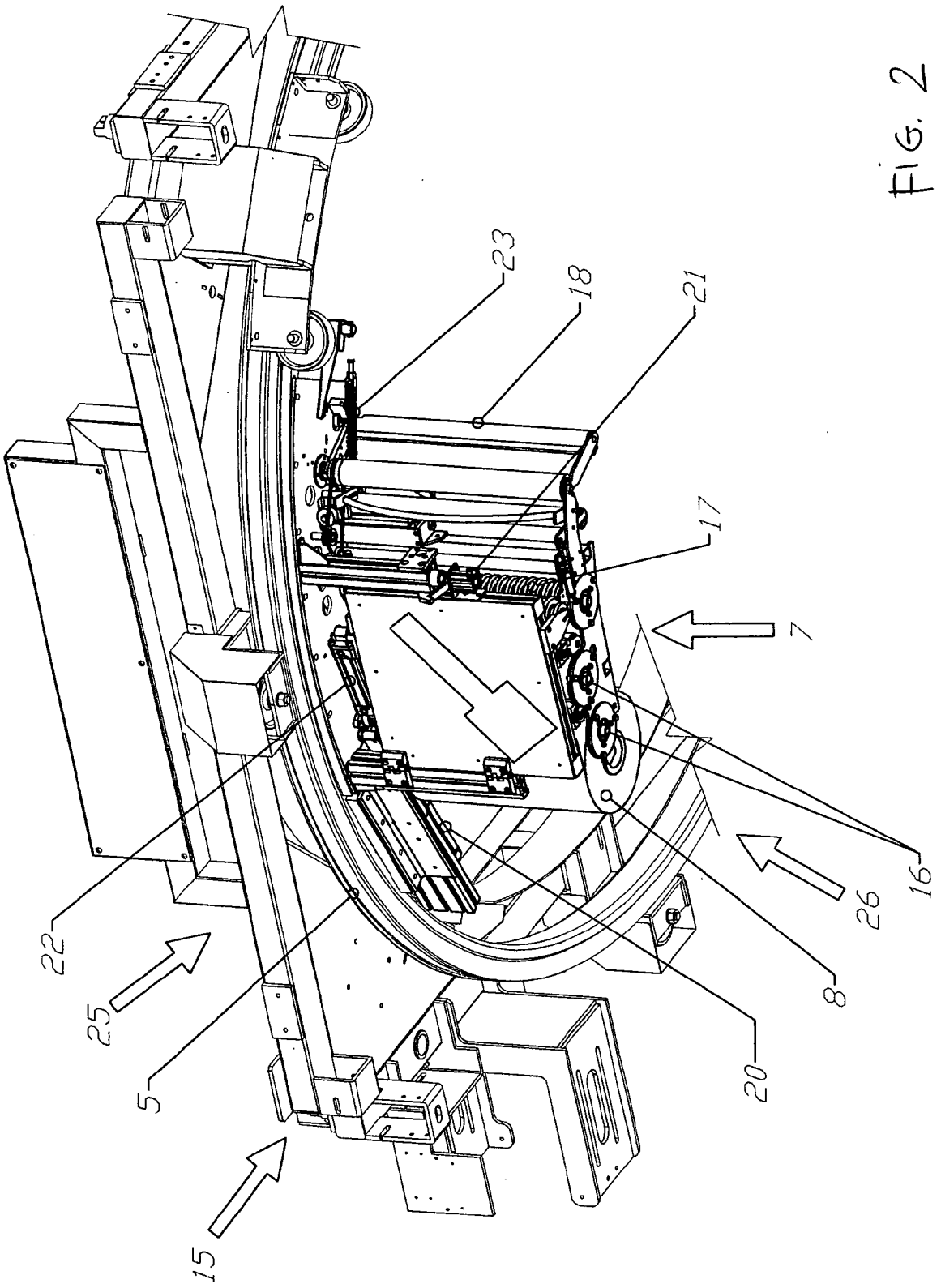

Fig. 2

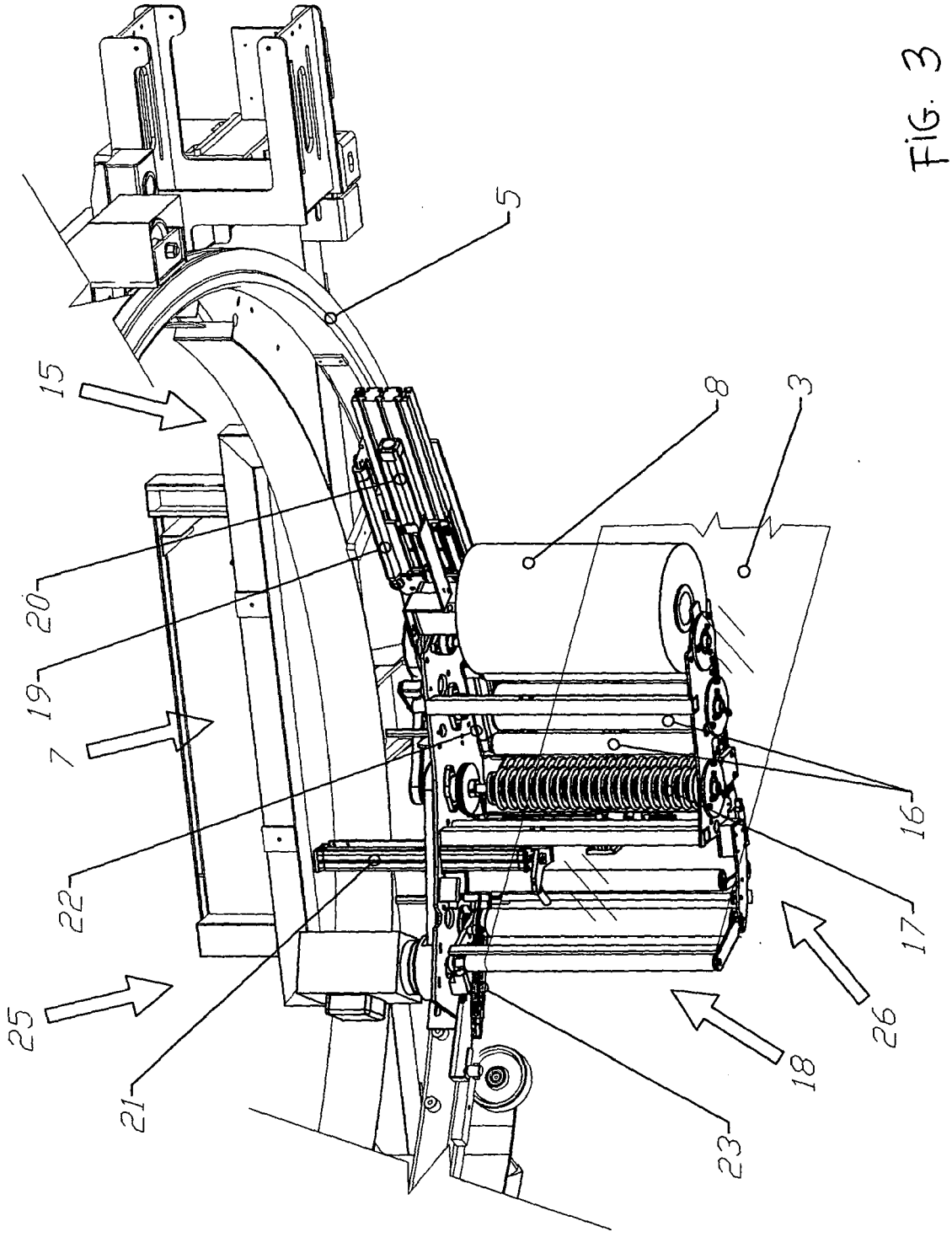

FIG. 3

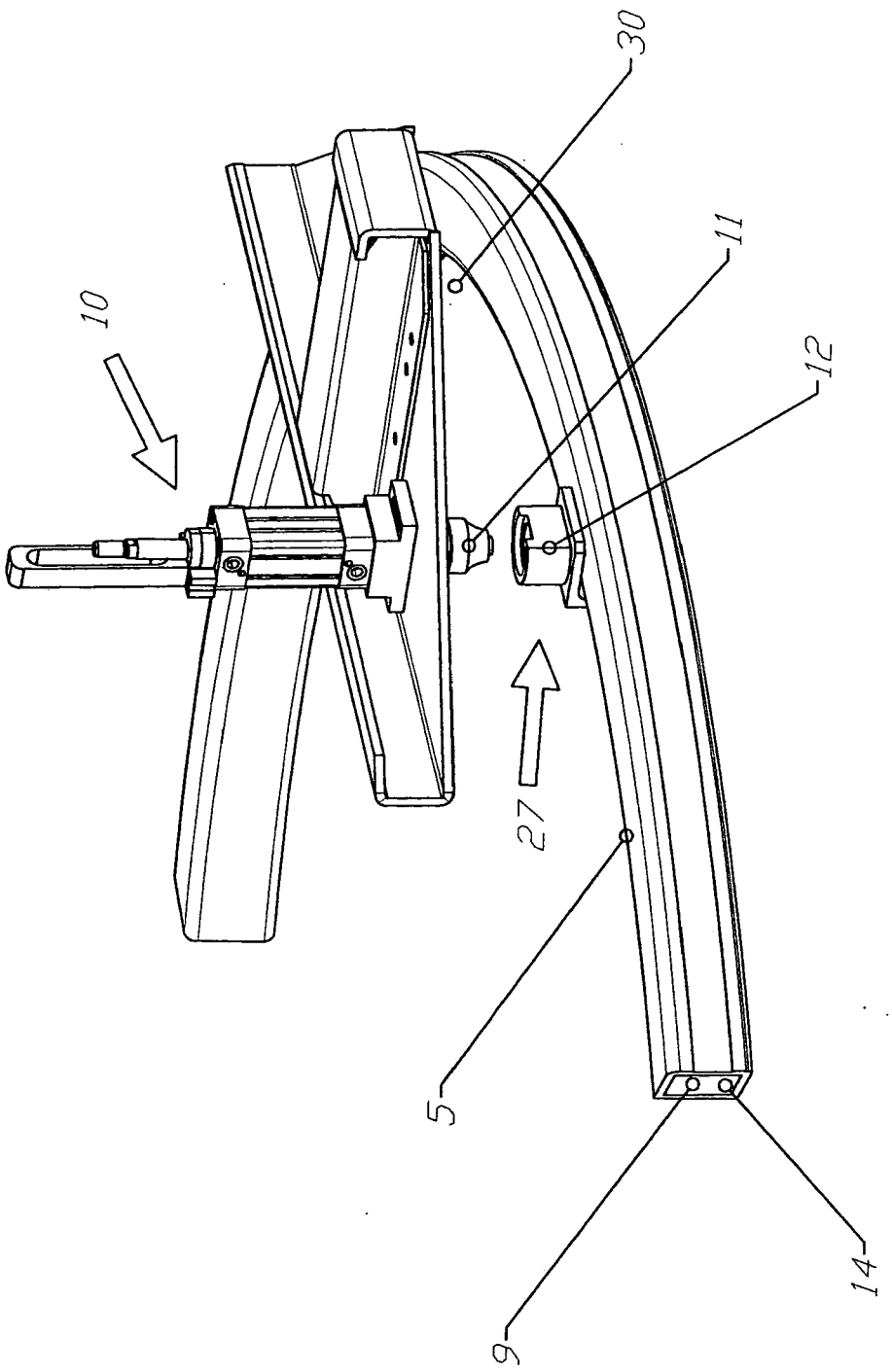

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 06 42 5062

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 311 725 A (MARTIN ET AL) 17 May 1994 (1994-05-17) * the whole document * -----	1-14	INV. B65B11/02
A	EP 1 452 445 A (OY M. HALOILA AB) 1 September 2004 (2004-09-01) * abstract * -----		
			TECHNICAL FIELDS SEARCHED (IPC) B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	5 July 2006	Ungureanu, M

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05-07-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5311725 A	17-05-1994	CA 2100903 A1	31-01-1994
EP 1452445 A	01-09-2004	AU 2004200800 A1	16-09-2004
		BR 0400548 A	28-12-2004
		CA 2459124 A1	27-08-2004
		CN 1541895 A	03-11-2004
		FI 20030304 A	28-08-2004
		JP 2004256175 A	16-09-2004
		MX PA04001947 A	25-04-2005
		NZ 531285 A	29-04-2005
		US 2004226271 A1	18-11-2004

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