(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 404 830 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.01.2012 Bulletin 2012/02

(51) Int Cl.:
B65B 35/32 *(2006.01)* ***B65B 35/44*** *(2006.01)*
B65B 35/54 *(2006.01)*

(21) Application number: **10168611.1**

(22) Date of filing: **06.07.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

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Remarks:
The references to the drawing(s) no. 4 are deemed to be deleted (Rule 56(4) EPC).

(54) **Machine for cartoning of products with multirow feeding**

(57) Machine for cartoning of products (P) with multirow feeding, comprising: a section (1) of entry of said products (P); a first conveyor (3) with single grouping and continuous motion, which receives the products from said input section and releases them to a second conveyor (9) with intermittent motion, wherein said second conveyor (9) is controlled to obtain a predefined grouping of the products, independent of the multirow feeding.

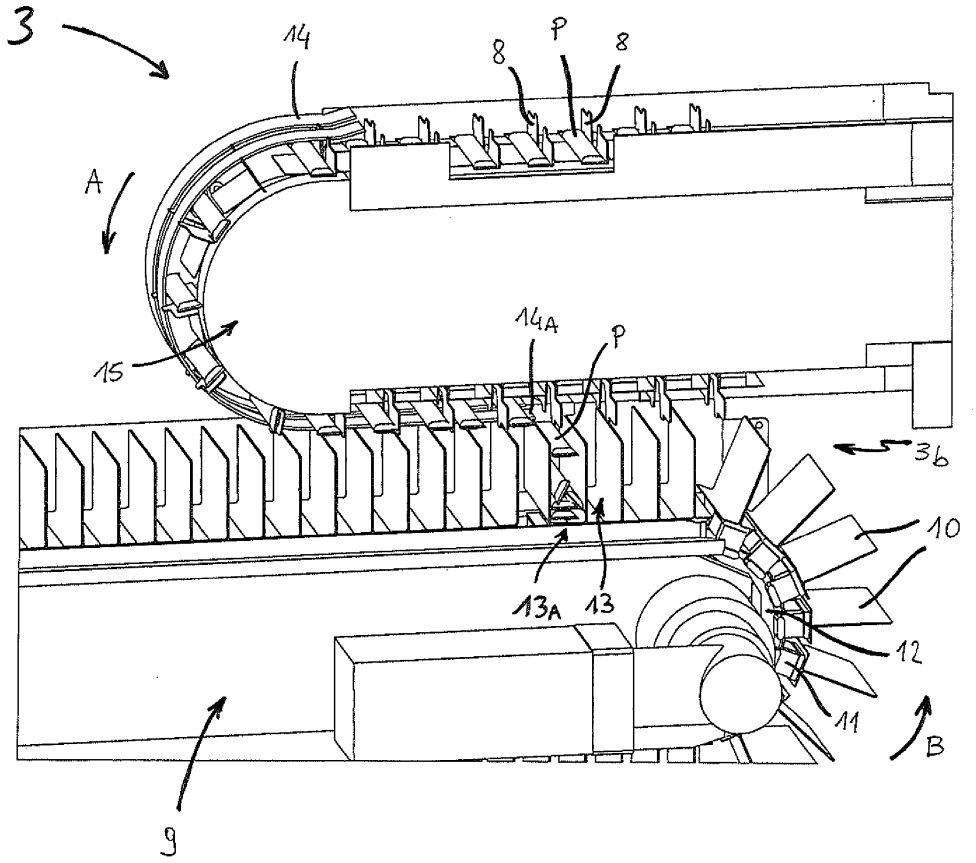


FIG. 3

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Description

Field of application

[0001] The present invention relates to the field of machines for cartoning of products with multirow feeding.

Prior art

[0002] Machines with multirow feeding are a known type of cartoning machines. This term of "multirow" feeding refers to the fact that the cartoning machine receives in input the products (placed on a conveyor, belt or other system of translation) arranged side by side in several substantially parallel rows. The number of rows can be any, for example 6 or 12 rows. Due to this arrangement in rows the products are actually fed by groups (batches) having a number of products corresponding to the number of the rows.

[0003] The machines with multirow feeding are used typically for products having an elongated shape and a small unitary size, which are well suited to this transport configuration. A typical example is represented by stick packs.

[0004] The stick pack, as is well known, is a package having an elongated shape, made of paper or plastic, formed by a substantially tubular body closed at the two ends, for example by sealing or gluing. The stick pack experienced a rapid diffusion especially in the field of individually packed products. By way of an example, it is widely used for soluble products, including coffee, powdered drinks, etc., sugar or sweeteners, dressings such as oil, vinegar, sauces, etc., in single-portion packs, which are popular in the field of fast food restaurants for reasons of hygiene and practicality; pharmaceutical products in small or medium dosage, especially in soluble powder, and others. The stick pack is appreciated by manufacturers, in that it allows a certain saving in material, and by customers.

[0005] There is therefore a growing interest in this type of package and, consequently, in the related secondary cartoning machines, for example intended to carton a certain number of finished stick packs, i.e. filled with product and closed, inside cardboard boxes or packets. And, due to their narrow elongated shape, the stick packs are generally transported in a multirow formation.

[0006] To summarise, the growing market interest in the stick pack forces the demand for increasingly high flexibility and performances also of the related secondary cartoning machines. In the following, reference will be made to the processing of products in stick packs, by way of a preferred embodiment, the invention being however of general application to both primary and secondary cartoning machines with multirow feeding.

[0007] In general terms a technical problem tackled by cartoning machines with multirow feeding consists in managing the product grouping, i.e. the number of products that the machine has to load in each of the cartons.

[0008] In the prior art the arrival of the products is managed with drop hoppers which collect the batch of products and load it in a transport system forming one or more groups. This solution however is not fully satisfactory: it imposes a considerable limitation, i.e. it allows only multiple or submultiple groupings of the number of rows of feeding. A batch of products arriving at the machine which, as mentioned above, is formed by the same number of product units as the number of rows, can be:

- managed as unique group, intended for a single cartoning possibly with successive groups, obtaining cartons which contain a number of products which is equal to or a multiple of the number of rows,
- or divided into subgroups, obtaining cartons which contain a number of product units corresponding to an exact submultiple of the number of rows.

[0009] The number of rows is normally set by the lines upstream of the cartoning machine (for example the machines which fill and seal respective stick packs and/or the transport system); consequently the cartoning machine is somewhat "rigid" in respect of the format change, being forced to manage multiples or submultiples of the aforesaid number of rows.

[0010] In other words, the basic operations of the cartoning machine can be identified as receiving the products, their grouping and the so-called loading, referring with this term to the arrangement of the products inside the cartoning, and in the prior art of multirow machines the grouping performed by the loading is substantially constrained to the entrance of the machine itself.

[0011] This limitation is particularly felt for mass consumption products, such as the already mentioned freeze-dried coffee or powder preparations for soluble drinks, and so on. In this field, both format changes and promotional offers a involving some free product are fairly common. It is assumed, for example, a machine with 10-rows feeding and configured to output packs of 20 products. A request from the client to produce batches of packs with a 10% extra product (i.e. 22 products), for example for promotional purposes, would be difficult and expensive (if not impossible) to fulfil, the number of products (22) not being an exact multiple of the number of rows.

[0012] Another disadvantage of the prior art is that it does not allow a reliable check as to whether the number of products loaded in a carton corresponds effectively to what is required. The product units transported in multirow formation - for example the aforementioned stick pack - are normally lightweight and small in size, and the probability of an error (product shortage, product fall) is relatively high. The known hopper-based machines therefore suffer a relatively high risk of forming a package out of specification.

Summary of the invention

[0013] The object of the invention is to overcome the abovementioned disadvantages. The invention sets out to provide a machine for cartoning of products with multirow arrival capable of managing any grouping, not necessarily multiple or submultiple of the number of rows in input, as well as capable of reliably providing that the grouping corresponds to the specifications.

[0014] These objects are achieved with a machine for cartoning of products with multirow feeding, comprising: an input section of said products; a first conveyor with single grouping and operating with continuous motion, positioned to receive the products from said input section; a products transfer section from said first conveyor to a second conveyor; said second conveyor having an advance motion which is intermittent and coordinated with the motion of the first conveyor, obtaining a predefined grouping of the products on said second conveyor.

[0015] The first conveyor and the second conveyor each comprise a plurality of product-carrying pockets or cells or equivalent means. Herein below the term of cell will be used generically. The first conveyor with single grouping comprises cells configured to receive each a single product unit. The cells of the second conveyor can contain any number of products. Preferably said first and said second conveyor are linear, i.e. they impose to the products a translation movement along a predefined path.

[0016] According to one of the aspects of the invention, the input section comprises a drop hopper, said first conveyor with single grouping being positioned to receive the products directly from said hopper and convey them towards said transfer section to the second conveyor.

[0017] In a preferred embodiment the first conveyor is made with a conveyor belt which operates according to a closed circuit; in the transfer section the first conveyor is located above the second conveyor, the advancing directions of the first and second conveyor being on parallel planes. More preferably, in the transfer zone the two conveyors have opposite advancing sense, so obtaining a counter-flow transfer of the products.

[0018] The second conveyor can serve directly a carton loading section, equipped for example with a top loading robot or with product insertion members, such as for example linear pushers. In a preferred embodiment the second conveyor is represented by a servo train conveyor. Said conveyor, which is known in the art, comprises essentially a plurality of servo trains with independent control and motor drive, so that a train can be synchronised with the motion of the first conveyor, while another train can be synchronised at the same time with the loading system (for example robot or other insertion member).

[0019] The intermittent advance motion of the second conveyor is coordinated with the speed of the first conveyor, in continuous motion, to determine the number of products that are loaded in each of the cells or of the servo trains of the second conveyor.

[0020] An aspect of the invention provides that the machine is equipped with at least one counting device associated with the product transfer section, and disposed for the single count of the product units which are released from the first to the second conveyor. Said counting device can be used to make available a signal enabling the intermittent advance movement of said second conveyor. In other words the invention allows the control system of the machine to advance the second conveyor only upon a check that the number of product units in a cell (or train) corresponds to the specification. It should be noted that said count is made possible by the single grouping of the first conveyor.

[0021] The invention allows substantially to remove the link between the multirow input and the load grouping. The grouping imposed by the multirow input is split by loading the products one by one on the first conveyor; at the passage from the first to the second conveyor the groups of products are newly formed, yet without any constraint of compatibility (multiple or submultiple) with the input, the grouping being determined solely by the coordination between the first and the second conveyor.

[0022] In short, the first conveyor operates as an element of interface between the input section of the machine, forced to the multirow feeding, and the loading section. In observance of the general continuity, a machine according to the invention is virtually capable of obtaining any grouping in the cartons and is capable of easily modifying the grouping without affecting the input. The single count also allows the machine to automatically correct a product shortage. The control can maintain a cell or train of the second conveyor in a loading position until the consent of the counting system, so that possible "gaps" on the first conveyor do not generate an error in the loading, for example a missing product in a package.

[0023] A preferred application of the invention consists of a machine for secondary cartoning of products in stick packs.

[0024] Another aspect of the invention consists of a method for loading products fed with a multirow formation into cartons, comprising at least the following steps: loading of the products on a first conveyor, with single grouping; transfer of the products from said first conveyor to a second conveyor; said first conveyor having a continuous advance motion and said second conveyor having advance motion which is intermittent and coordinated with the motion of the first conveyor, obtaining a defined grouping of the products on said second conveyor.

[0025] The advantages of the invention, which have been mentioned above, will be more apparent with the aid of the following description, referred to a nonlimiting example.

Description of the drawings

[0026]

Fig. 1 represents schematically some elements of a

machine according to an embodiment of the invention.

Fig. 2 is a detail of Fig. 1.

Fig. 3 is a detail of a possible embodiment of the invention, with reference to the zone of transfer of the products from the first to the second conveyor.

Fig. 4 is a block diagram of a method of loading of products into cartons, the products being fed in a multirow formation, according to a mode of implementation of the invention.

Detailed description of the invention

[0027] Referring to the drawings, a cartoning machine receives products in stick packs arranged in multirow configuration. The products arrive via a multitrack chute 1 in a hopper 2 and are loaded one by one in product-carrying cells of a first conveyor 3 with continuous motion.

[0028] Said conveyor 3 operates in a closed circuit between a product receiving zone 3a and a product delivery zone 3b, and is constituted substantially by a conveyor belt actuated by a motor 4. The conveyor 3 preferably has a path as illustrated, with a rising tilted section passing from the loading zone 3a to the delivery zone 3b. In the zone 3a the products are released directly by the drop hopper 2 into cells of the conveyor 3.

[0029] The loading into the conveyor 3 is exemplified in Fig. 2. The stick packs are fed to tracks defined between walls 5 of the loading chute 1, arriving at the hopper 2 in a multirow formation, contained in compartments 6. The example refers to an input of twelve products at a time, i.e. twelve rows. The opening of said hopper 2 causes the products to drop from the compartments 6 into a corresponding number of cells 7 of the conveyor 3 below, at the zone 3a. Each cell 7 carries a single product P. In the example the cells 7 are defined by metal or plastic pockets 8 attached to a conveyor belt.

[0030] The interface between the first conveyor 3 and the second conveyor, denoted generally by 9, is shown in Fig. 3.

[0031] The second conveyor 9 in the example is a servo train conveyor with intermittent movement. It comprises a plurality of servo trains, each being formed by a plurality of pockets 10 which define product receiving cells 13. Each of said cells 13 can contain a product P or possibly a plurality of products P adjacent or stacked one above the other.

[0032] A set of pockets 10, connected to a respective conveyor belt 12, forms a servo train. The conveyor 9 comprises at least two conveyor belts with independent control and motor drive and, consequently, at least two servo trains which are driven in an independent manner. In the example the pockets 10 are attached to the respective conveyor belt with blocks 11 which allow quick fitting and change.

[0033] The second conveyor 9 feeds a loading section of the products inside the cartons, which can be for example cardboard packets. This section can be made with a known technique and according to the relevant needs and therefore is not described in detail. For example the second conveyor 9 can feed a loading system comprising a top loading robot or a series of inserting members which transfer the products directly into the cartons, More specifically, the second conveyor 9, realized with the above-mentioned servo-trains technique, can be driven in such a way that at least one servo train is charged to receive products from the continuous conveyor 3, while another servo train feeds said loading system. The content of one or more of said cells 13, according to the configuration of the machine, corresponds to the carton grouping, i.e. to the number of products per each carton.

[0034] A closing assembly can be provided downstream the loading section, still according to a per se known technique.

[0035] Fig. 3 shows an embodiment wherein a return portion of the first conveyor 3 is positioned directly above a portion of the second conveyor 9, so that the products P pass from the cells 7 of the first conveyor to the cells 13 of the second conveyor below by a free falling. Guides 14 are provided around the pulley 15 of the conveyor 3 which extend to an end 14A, beyond which the product P falls into a cell 13A below. In the figure, the cell 13A is then located in the actual zone of transfer of the products from one conveyor to the other.

[0036] The sense of the advance of the conveyors 3 and 9 is denoted by A and B, respectively. It can be noted in the figure that the sense A of advance of the first conveyor 3 is opposite to sense B of advance of the conveyor 9, in the transfer section 3b.

[0037] The described arrangement with a section of the first conveyor above the second conveyor, and counter-flow movement on parallel planes, is advantageous in terms of the compact size, in particular reducing the overall length dimension, and of the constructional simplicity.

[0038] The machine comprises an optical sensor (not shown) which allows the single count (one by one) of the products passing from the continuous conveyor 3 to the cell 13A of the conveyor 9. In the example the sensor can be positioned at the end 14A of the guide 14 to detect the products which one after the other fall into the cell 13A. When the loading of products is completed, the conveyor 9 moves one step forward, bringing the next cell into the loading position. It is clear that the control system, thanks to the counting sensor, can receive the information of the number of products which have actually passed into the cell 13A and, therefore, can enable the forward movement of the conveyor 9 only when said number corresponds to the functioning specification of the machine. The machine can thus manage any "gaps" (product shortage) on the conveyor 3. If for example one of the cells 7 is empty, the system can delay the forward movement of the second conveyor 9 until the correct

number of products is present in the cell 13A.

[0039] It is also clear that the machine is capable of generating any grouping on the successive conveyor 9 and then in the cartons, due to the products being loaded singularly one by one on the conveyor 3.

[0040] When a train on the conveyor 9 is full, it moves forward quickly to the loading section while a next train is positioned with the first cell in the position 13A of Fig. 3.

[0041] The method according to the invention is exemplified in the diagram of Fig. 4. It comprises substantially a step 100 of products arrival in a multirow formation; a step 101 of single transport of the products; a step 102 of grouping; a step 103 of loading in cartons. The operation of single count of the product units, indicated by the block 104, is carried out between the steps 101 of transport and 102 of grouping.

[0042] In the example of Figs. 1-3, the step 100 of arrival takes place at the hopper 1; the step 101 of single transport is operated by the first conveyor 3; the grouping step 102 takes place during the passage of the products into the second conveyor 9, thanks to the coordination between the latter and the first conveyor 3.

Claims

1. Machine for cartoning of products (P) with multirow feeding, comprising:

   - an input section (1) of said products (P);
   - a first conveyor (3) with single grouping and operating with continuous motion, disposed to receive the products from said input section;
   - a products transfer section (3b) from said first conveyor (3) to a second conveyor (9);
   - said second conveyor (9) having an advance motion which is intermittent and suitably coordinated with the motion of the first conveyor, obtaining a predefined grouping of the products on said second conveyor.

2. Machine according to claim 1, comprising a loading section for loading the products into cartons, said loading section being fed by said second conveyor (9).

3. Machine according to claim 1 or 2, said input section comprising a drop hopper (2) and said first conveyor (3) with single grouping being disposed to receive the products directly from said hopper and to convey them towards said transfer section (3b) to the second conveyor (9).

4. Machine according to any one of the previous claims, said first conveyor comprising cells (7) configured to contain each a single unit of said products (P); said second conveyor comprising cells (13) configured to contain one of said products or a plurality of said products.

5. Machine according to any one of the previous claims, said second conveyor (9) being made with a conveyor comprising a plurality of servo trains, each servo train being formed by a plurality of pockets (10) which define product receiving cells (13), the pockets of each servo train being connected to a respective conveyor belt (12); the conveyor comprising at least two conveyor belts and respective servo trains with independent control and motor drive.

6. Machine according to any one of the previous claims, comprising at least one counting device associated with said products transfer section (3b) and disposed for the single count of the product units (P) transferred by the first conveyor (3) to the second conveyor (9).

7. Machine according to claim 6, wherein said counting device supplies an enabling signal for the step by step advancement of said second conveyor(9).

8. Machine according to any one of the previous claims, wherein said first conveyor (3) is formed with a closed circuit conveyor belt and a section of path of the first conveyor, at said transfer section, is located above the second conveyor (9), allowing the passage of the products from the first to the second conveyor by free falling.

9. Machine according to claim 8, the directions of advance of the first (3) and second (9) conveyor being situated on parallel planes in the products transfer section (3b).

10. Machine according to claim 9, the sense of the advance movement (A, B) of said first conveyor and second conveyor being opposite in the products transfer section.

11. Machine according to any one of the previous claims, the machine being a machine for secondary packaging of products in stick packs.

12. A method for the loading in cartons of products fed with a multirow formation, comprising at least the following steps:

    - loading of the products on a first conveyor (3), with single grouping;
    - transfer of the products from said first conveyor (3) to a second conveyor (9);
    - said first conveyor (3) having a continuous forward motion and said second conveyor (9) having forward motion which is intermittent and coordinated with the motion of the first conveyor, with obtaining of a defined grouping of the prod-

ucts on said second conveyor.

13. Method according to claim 12, wherein a single count of the products is carried out during the step of transfer of the products from said first conveyor to said second conveyor.

14. Method according to claim 12 or 13, wherein the products are loaded directly from said second conveyor inside said cartons.

15. Method according to one of claims 12 to 14, said products being represented by stick packs of elongated shape, formed by a substantially tubular body closed at the two ends.

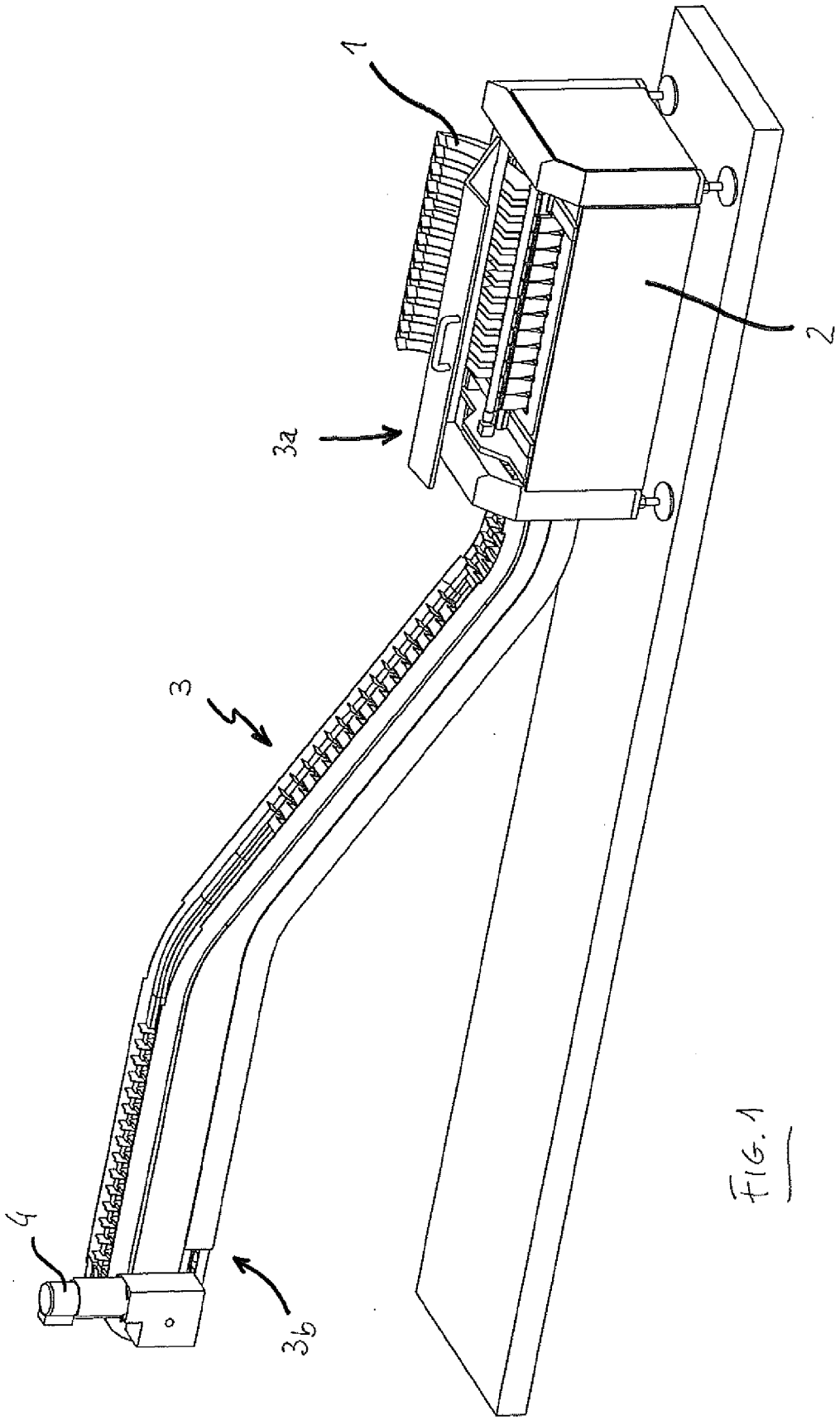


FIG. 1

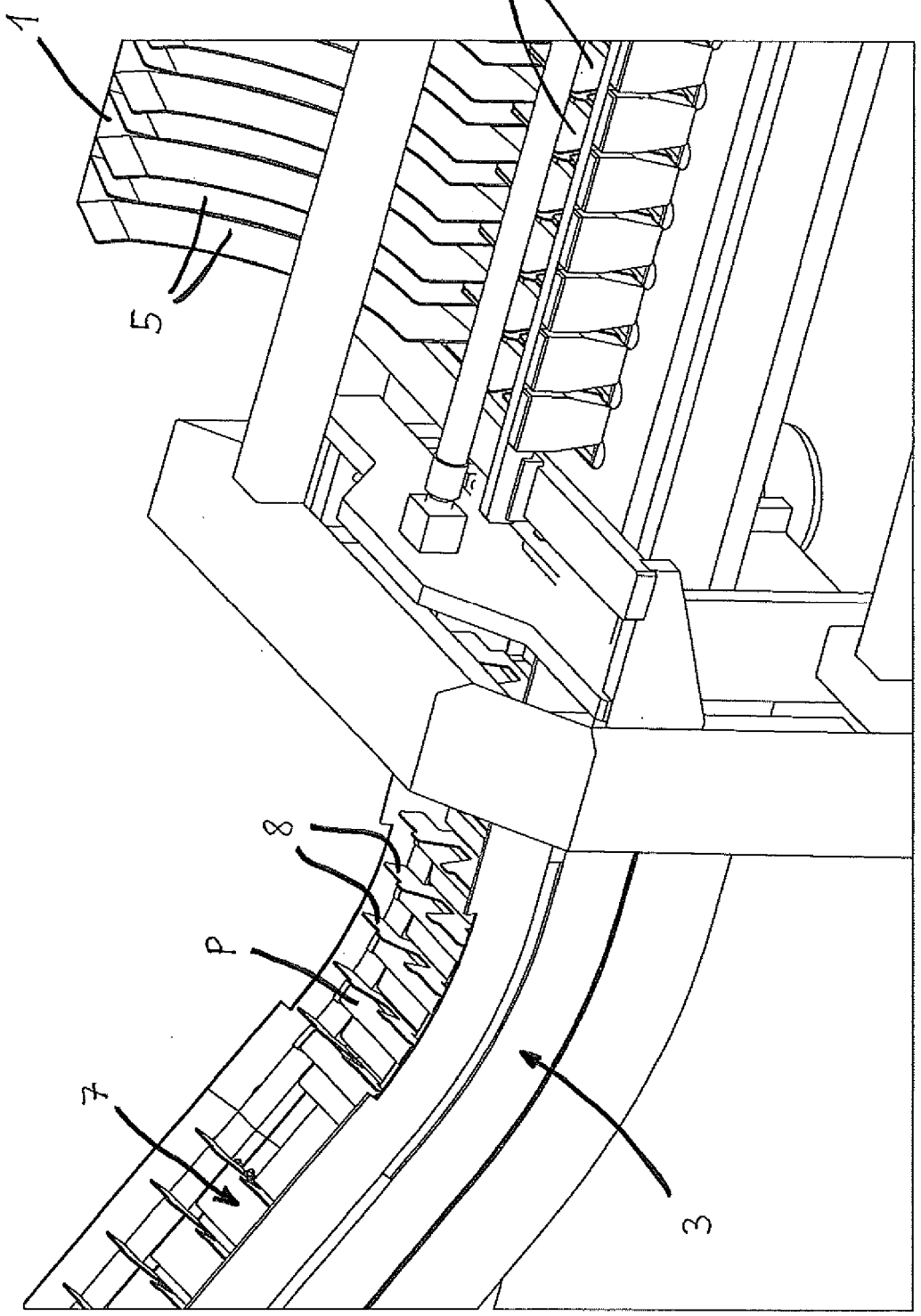
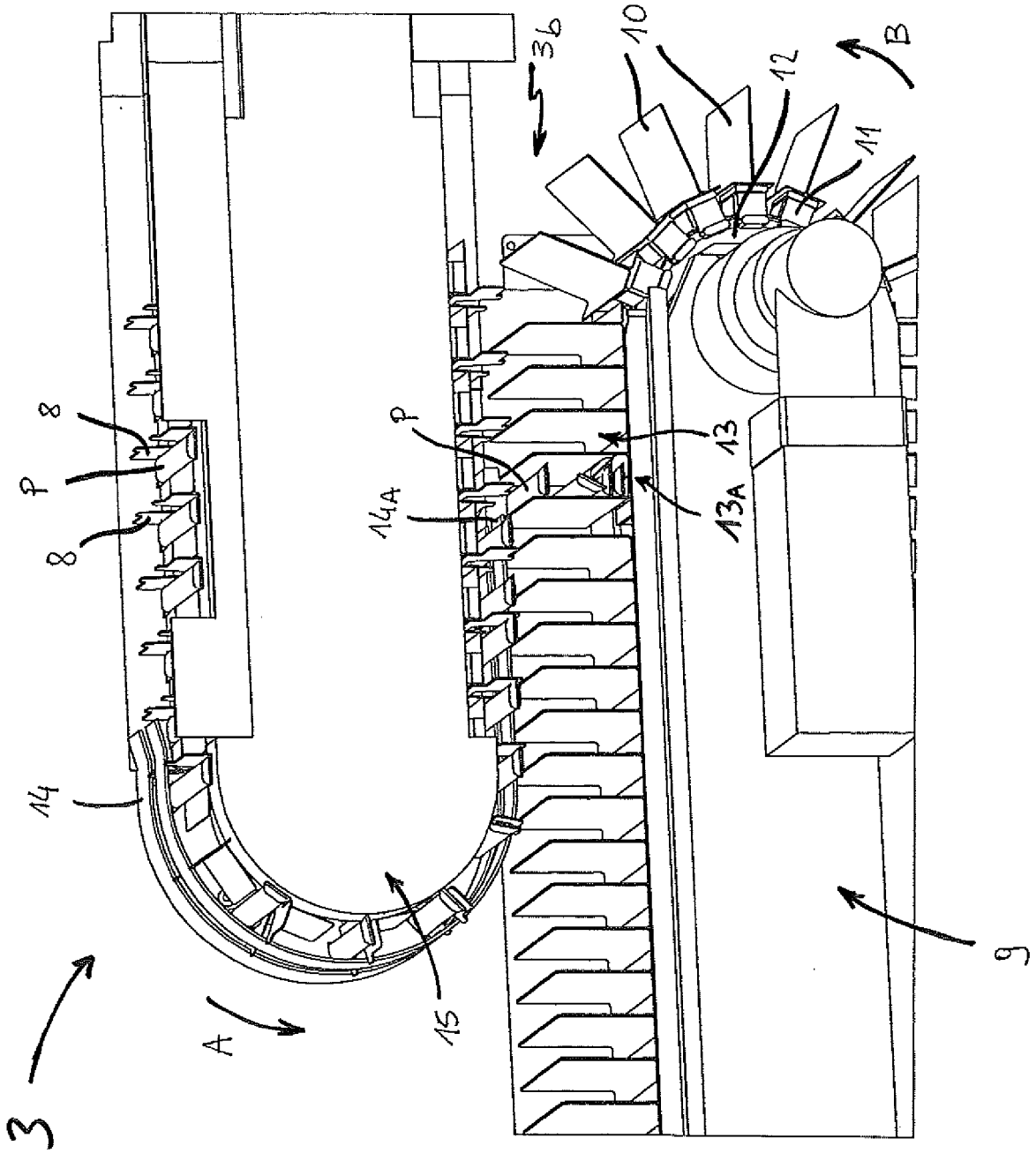


FIG. 2

FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 10 16 8611

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 602 583 A1 (MARCHESINI GROUP SPA [IT]) 7 December 2005 (2005-12-07)	1,2,4-15	INV. B65B35/32 B65B35/44 B65B35/54
Y	* column 12 - column 42 *	3	
Y	US 4 356 682 A (MANCINI DEREK V) 2 November 1982 (1982-11-02) * figures 2,3 *	3	

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	7 March 2011	Yazici, Baris

CATEGORY OF CITED DOCUMENTS

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07-03-2011

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