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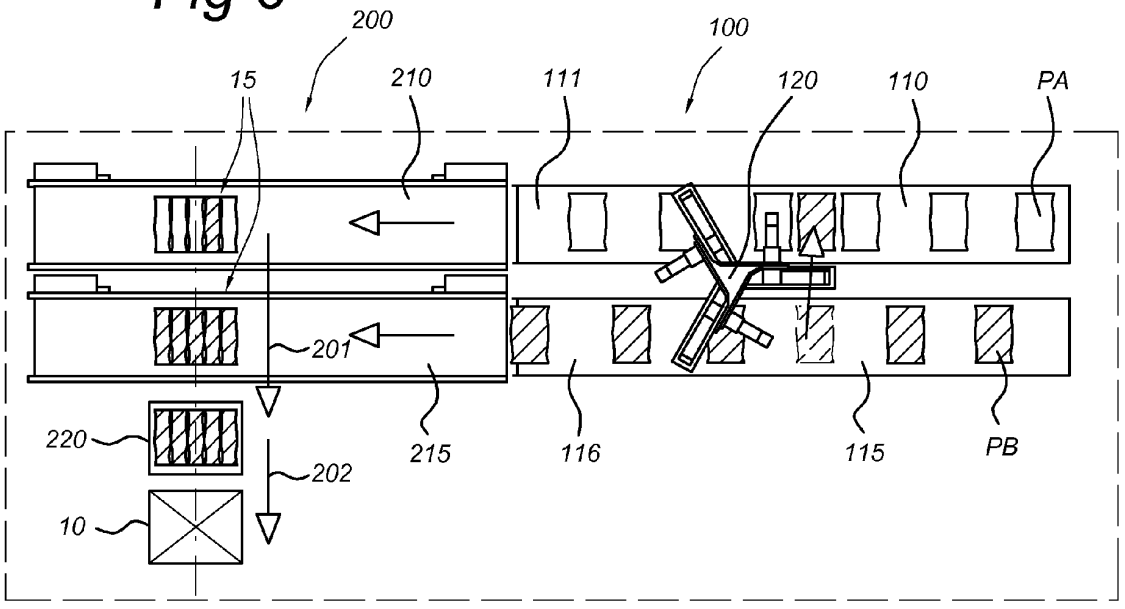
(54) Packing device for packing articles in a mix of varieties in a packing box, and such packing method

(57) A packing device (100) for packing articles (PA, PB, PC, P) of at least two varieties in a packing box (10) comprises a packing station (200) for collecting the articles and providing collected articles in the packing box; at least two supply lines (110, 115), each for supplying articles to the packing station (200) at a discharging end (111, 116) of each supply line in a predetermined mix of varieties of articles; and an exchange station (120) allowing exchange of articles in between supply lines. The packing station collects articles from the discharging (111, 116) end of the supply line in a row of articles of a predetermined mix of varieties, and it is configured for providing the row of articles in the packing box such that the row of articles extends from a front side of the packing box to a backside of the packing box, the front side being a viewing side of the packing box.

Fig 6



EP 2 631 185 A1

Description

[0001] The invention relates to a packing device and packing method for packing articles in a mix of varieties in a packing box.

[0002] Such a packing device and packing method are generally known. They are used, for instance, for packing bags with potato crisps in a carton packing box. The packing box can be put on for display in a supermarket to present the customers with a mix of bags of potato crisps having various flavours. The bags of potato crisps will be transported in a closed packing box to the supermarket, where (part of) its front side and/or its top side is removed to present the bags with crisps in the supermarket. Rows of bags are present in the box and each row, that extends from front side (viewing side) to back side of the packing box, may present a different flavour, for instance, two rows of a first flavour and two rows of a second flavour. In this example, both flavours are present in a 50%-50% mix. However, generally one flavour will be more popular than another flavour. For this reason, bags of the more popular flavour can be added to the rows of the less popular flavour replacing some bags of the less popular flavour to reach a desired mixing ratio of flavours in the packing box. One may also like to present three (or even more) flavours in the box, in a more or less equal mixing ratio, or only have some bags of the third flavour in the box, for instance, for introduction purposes of such a new, third flavour. A mixing ratio to be provided in a packing box may be dependent on the kind of articles to be mixed, on the chain of supermarkets that will sell the articles to the public, on a specific supermarket located within a certain location, etc.

[0003] It is desired to have an efficient packing method and packing device to provide a mix of a variety of articles, such as bags of potato crisps having various flavours, in the packing box. Such a packing method and packing device is not restricted to bags or bags of potato crisps. It may also relate to smaller cartons, containing some product, to be put on display in a packing box, bags containing a drink, etc. In general, it relates to providing a mix of articles of various variety in a packing box.

[0004] It is known to collect such articles in a row for extending from side to side in the packing box, and subsequently provide this row of articles in the packing box. However, such a row extending from side to side within the packing box generally will contain all or most varieties of articles. All these varieties have to be collected in more or less equal quantities, which is time consuming and requires quite some effort.

[0005] EP 1 268 317 discloses a packing device for packing articles of at least two varieties in a packing box. Each variety is supplied on its dedicated supply line. Each supply line of a single variety supplies to a further supply line on which the various varieties are positioned in a group in an order of varieties. At a packing station the group of varieties is transferred in receiving units, such as portion cartons. The packing device gathers the varieties delivered from the variety supply lines into equal groups of single varieties from each of the lines. The device cannot make arbitrary groups of varieties from the supply from the variety supply lines. Further, the speed of transferring groups of varieties into receiving units at the packing station is limited by the supply speed of the groups on the single further supply line.

[0006] DE 44 33 361 A discloses a device allowing mixture of the contents of four crates, each having a regular grid of receiving spaces. Each crate has initially bottles of a single variety in its receiving spaces that are arranged in four rows, but each crate having a different variety. Since there are four crates, there are four varieties. De device as disclosed mixes full rows of the crates such that each crate in the end contains one row of each variety. This implies that each crate contains four varieties of bottles, each variety in a single row. The document does not disclose separate supply lines. Further, the document does not disclose exchanging single products, but rows of products. Yet further, a row of one crate needs to be interchanged with a row of another crate. The device does not allow to provide an arbitrary mixture of varieties.

[0007] It is an object of the invention to solve at least some of the above drawbacks and/or limitations of known packing devices and packing methods.

[0008] The invention therefore provides a packing device for packing articles of at least two varieties in a packing box, said packing device comprising a packing station for collecting said articles and providing collected articles in said packing box; at least two supply lines, each for supplying said articles to said packing station at a discharging end of the respective supply line in a respective predetermined mix of varieties of articles; and an exchange station constructed and arranged to take an article from one of said supply lines and to position the article onto another one of said supply lines, each supply line supplying articles of a respective single variety to said exchange station, so as to allow each supply line to supply articles of multiple varieties in said respective predetermined mix at its discharging end to said packing station, wherein said packing station comprises a collecting arrangement for collecting articles from each discharging end of a respective supply line in a row of articles of said respective predetermined mix of varieties, and said packing station is configured for providing said row of articles in said packing box such that said row of articles extends from a front side of said packing box to a backside of said packing box, said front side being a viewing side of said packing box.

[0009] Furthermore, the invention therefore provides a packing method for packing articles of at least two varieties in a packing box, said packing method comprising supplying said articles in at least two supply lines, each supplying said articles in a respective predetermined mix of varieties, articles being supplied in a respective single variety from a charging end of each supply line, and being exchanged in between supply lines such as to supply articles in said respective predetermined mix of varieties

at each discharge end of the respective supply line; collecting said articles in rows of articles from each supply line, each row having said respective predetermined mix of varieties; and providing said rows of articles in said packing box such that each row of articles extends from a front side of said packing box to a backside of said packing box, said front side being a viewing side of said packing box.

[0010] To provide for a good and attractive display of articles in the packing box, that allows the customer to immediately recognize the articles on the display the packing device has said collecting arrangement configured for collecting articles from a supply line in a row of articles such that a back side of one article is directed towards a front side of an adjacent article, and has said packing station configured for providing said row of articles in said packing box such that front sides of said articles face in the direction of said front side of said packing box. It further provides for a corresponding packing method, wherein said articles are collected in a row such that a back side of one article is directed towards a front side of an adjacent article , and said row of articles is provided in said packing box such that front sides of said articles face in the direction of said front side of said packing box.

[0011] The invention recognizes that most or even all articles in a row extending from front side to back side of a packing box can consist of the same variety. It is therefore most efficient to collect articles according to such a row from front side to back side.

[0012] Moreover, rows extending from front side to back side of the packing box will generally contain more articles than rows extending from side to side, which will even add to the efficiency of the proposed packing device and packing method. Collection of articles in a row has to be slightly extended, but less rows have to be provided in the packing box. Since collection of articles is far more efficient than the step of providing the articles in the packing box, the proposed packing method and packing device will be even more efficient.

[0013] In a preferred embodiment, said articles having a front side, a back side, a top side, a bottom side and two flank sides, said collecting arrangement is configured to position said articles on a flank side while collecting them in a row. In a corresponding method said articles are collected such as to position said articles on a flank side while collecting them in a row. Such provides an efficient manner and stable manner of collecting rows of articles into a layer of articles.

[0014] Even more efficiently, said packing station is configured for collecting rows on top of each other such that flank sides of articles in a row support flank sides of articles in a next row, while rows are either collected directly in said packing box or collected in an intermediate step. In a corresponding method rows are collected on top of each other such that flank sides of articles in a row support flank sides of articles in a next row, while rows are either collected directly in said packing box or collected in an intermediate step.

[0015] In yet a further embodiment said packing station comprises a cassette for receiving multiple rows of articles to provide a layer or layers of articles for said packing box. In a corresponding method multiple rows of articles first are received in a cassette and subsequently are provided to said packing box as a layer or layers of articles.

[0016] Such a device and method provide a very convenient and efficient manner of collecting the articles, not posing certain limitations that might be present when directly providing articles in a packing box.

[0017] In yet a further and very efficient embodiment said packing station comprises a collecting arrangement for each supply line.

[0018] In a yet further preferred embodiment, said exchange station of the packing device comprises a buffer for articles, and the corresponding packing method optionally comprises buffering in said step of exchanging articles in between supply lines.

[0019] Such a buffer allows filling of empty spaces in a supply line, or filling the buffer when a supply line might be supplying articles at a too high speed. It further allows adding articles of a further minority variety to the mixed variety of articles.

[0020] In an embodiment said exchange station comprises an exchange arrangement that works according to a pick and place principle, such as a delta robot, and are in the corresponding method articles exchanged in between supply lines using a pick and place principle.

[0021] The invention will further be described in relation to the figures, in which the same or like reference symbols denote the same or like parts, and in which

Figure 1 shows a packing box having articles of two product varieties in a 50%-50% symmetrical mixture;
Figure 2 shows a packing box having articles of two product varieties in a 40%-60% asymmetrical mixture;
Figure 3 shows a packing box having articles of three product varieties in a 5%-40%-55% mixture;
Figure 4 shows a packing box having articles in a mixture of at least two product varieties distributed over two layers;
Figure 5 shows an article in the form of a bag of potato crisps;
Figure 6 shows an embodiment of a packing device according to the invention;
Figure 7 shows another embodiment of a packing device according to the invention; and
Figure 8 shows yet another embodiment of a packing device according to the invention.

[0022] A packing box 10 having articles PA, PB in a first product variety PA and a second product variety PB is shown in figure 1. The packing box is shown in a state for display, in which its top side and, in the embodiment shown, part of its front side 11 are removed to allow a view on the articles and to allow the articles to be taken out of the box. The front side 11 of the box is its viewing

side at which the articles are visible to the customer. The articles are supported by a bottom side of box 10, which is not visible. The articles PA, PB are arranged in rows 15 extending from front side 11 to back side 13 of the packing box, which further has two flank sides 12, of which only one is visible. Figure 1 shows two rows 15 of only articles PA and two rows of only articles PB. Articles PA and PB are present in a 50%-50% mixture.

[0023] Figure 2 also shows a packing box 10 having articles PA, PB in a first product variety PA and a second product variety PB. The packing box 10 itself is, in the embodiment shown, identical to the one shown in figure 1. The articles are, however, present in a 40%-60% mixture of product variety PA and product variety PB, respectively. Some articles of product variety PB are mixed into the rows containing articles of product variety PA.

[0024] The packing box of figure 3 has articles of even three product varieties PA, PB and PC. As shown, it is identical to the one of figure 2 but with an additional article of product variety PC mixed into a row of predominantly articles of product variety PB. The articles are provided in a 5%-40%-55% mixture of product varieties PC, PA and PB, respectively.

[0025] Figure 4 shows a packing box having two layers 16, 17 of articles of at least two product varieties. Bottom layer 16 can be as shown in figure 1,2 or 3.

[0026] Figures 1 to 4 all show that a single row predominantly consists of articles of predominantly one product variety. An article of another product variety, or even of multiple varieties are mixed with the predominant one product variety of that single row. The rows extent from a front or viewing side 11 of the packing box 10 to its back side 13. A front side P1 of the articles is directed to viewing side 11 of the packing box. In this way the articles are well recognized by the customer when the packing box is on display, since front side P1 of an article PA, PB, PC will provide identification of the product variety. A back side of an article in a row 15 will be directed to a front side of a next article in the row.

[0027] Figures 1 to 4 show the articles taking the form of a rectangular container, such as a carton containing some product like a drink. The articles also can take the form of a bag, such as shown in figure 5. Such a bag can, for instance, contain potato crisps. As is generally known, potato crisps are available in various flavours, and therefore the bags (articles) can present potato crisps of various flavours (product varieties). An article P has a front side P1, a back side P2, a bottom side P3, a top side P4 and two flank sides P5. In the embodiment shown in figure 5, a height (distance between bottom side and top side) of the flank sides is larger than a width (distance between flank sides) of the bottom and top sides. A depth (distance between front side and back side) of the flank sides is also smaller than the width of the top and bottom sides. Although figure 5 shows a bag, its description is equally applicable to any other applicable shape of a product, such as a rectangular shape.

[0028] An embodiment of a packing device 100 for packing articles PA, PB, PC, P into a packing box 10 is shown in figure 6. The packing device has two supply lines 100 and 115 for supplying articles PA and PB, respectively, each of a different product variety, to a packing station 200 that is part of the packing device 100. The articles PA, PB are positioned on either their front side or back side on the supply lines 110, 115. The packing device further has an exchange station 120 for exchanging articles PA, PB in between supply lines 110 and 115. A supply line only supplies articles of a single variety PA or PB, as indicated by the presence and absence of hatching in figure 6, from their respective charging ends to the exchange station 120. Exchange station 120 is adapted for exchanging articles PA from supply line 110 to supply line 115, or articles PB from supply line 115 to supply line 110. In figure 6 it is shown that in the present example only an article of product variety PB is exchanged from supply line 115 to supply line 110. Products are thus supplied in a predetermined mix of articles PA, PB at discharge ends 111 and 116 of the supply lines 110 and 115, respectively. The predetermined mix of articles by supply line 110 contains every now and then an article PB between predominantly articles PA in a mixture ratio as, for instance, shown in a row 15 of predominantly articles PA in figures 1 to 3. The predetermined mix of articles by supply line 111 contains only articles of product variety PB. The example shown in figure 6 could fill packing boxes 10 with articles PA and PB as shown in figures 1, 2 and 4.

[0029] Figure 7 shows an alternative of the packing device shown in figure 6. It shows that supply lines 110 and 111 are positioned at right angles to conveyers 210 and 215, respectively, of packing station 200, whereas in figure 6 they are positioned in line. Both in figures 6 and 7 the articles are aligned flank side to flank side.

[0030] Further, the embodiment of figure 7 shows two buffers for articles. Buffer 131 can be for articles PA or PB and can be used in the process whenever required. Buffer 130 contains articles of a third product variety PC. Buffers 130, 131 may be configured in any convenient and known fashion, for instance, as a stack of articles. In the example, articles PC need only be supplied as a minority in a packing box. A separate supply line need therefore not be required and a supply of articles PC provided in a buffer as a stack of articles may be sufficient. Exchange station 120 exchanges on the one hand, in the example shown, articles PB from supply line 115 to supply line 110, as described for figure 6. On the other hand, it also provides articles PC from buffer 130 onto supply line 115. Supply line 115 supplies articles PB and PC in a predetermined mix to its discharge end 116, and supply line 110 supplies articles PA and PB in a predetermined mix to its discharge end 111.

[0031] In alternative embodiments the articles may be aligned top side to bottom side on the supply lines. Would the articles be aligned top side to bottom side on the supply lines of figure 7, than they would arrive onto and be transported on the conveyers 210 and 215 of figure

7 as shown in figure 6. Such an embodiment is shown in figure 8. It shows articles PA, PB, PC positioned on supply lines 110, 115 over 90 degrees rotated with respect to their positioning on the supply lines of figure 7. The articles subsequently arrive in the packing station 200 in a manner as also shown in figure 6.

[0032] The exchange station can be embodied in various ways. In the embodiments shown it is configured as a pick-and-place robot, which takes the form as a so-called delta robot.

[0033] A predetermined mix, either or both ratio of articles or order of articles, can be altered dependent on the specific row that is to be filled in the packing box. The packing station according to the invention provides the flexibility to change the predetermined mix as required.

[0034] At their discharge ends 111, 116 the supply lines 110, 115 provide the articles to packing station 200. The articles are provided onto conveyers 210, 215 in the embodiments shown. On these conveyers, which act as a collecting arrangement, the articles are grouped to provide a row 15 for the packing box. This may be done in various ways, which are known as such. The conveyers may, for instance, have pockets (not shown) into which individual articles are received. When an article is received in one pocket, the conveyer will be stepped to a next position to receive a next article in an adjacent pocket. When a row 15 of articles is collected in adjacent pockets, the conveyer will move to a position from which the collected row of articles can be taken for provision into the packing box 10.

[0035] In the embodiments of figures 6 and 8, the articles are grouped together on their flank sides on conveyers 210 and 215 with the bottom sides of the articles facing towards packing box 10. A pick-and-place robot, not shown, is provided for picking up a row 15 of grouped articles and to provide it into a cassette 220, indicated by arrow 201, as an intermediate step before providing the articles in packing box 10. When a first row of articles is provided in cassette 220 from a first conveyer, a next row of articles is taken from the second conveyer and provided onto the first row in the cassette. EP 1 799 554 A and EP 1 979 234 A, both incorporated herein by reference, for instance, disclose a cassette that could be employed in the present invention. While a grouped row of articles is taken from the other conveyer, a next grouped row of a predetermined mix of articles is formed on the first conveyer. In this fashion a layer of rows of articles can be very quickly and efficiently provided in cassette 220. When a layer, or multiple layers, if applicable, of rows are provided in cassette 220, they can be pushed from the cassette into packing box 10, indicated by arrow 202. Both EP 1 799 554 A and EP 1 979 234 A also disclose such a pusher. Packing box 10 is for that purpose with its opened top side provided sideways facing towards conveyers 210 and 215. When the packing box is completely filled, it will be turned back again with its bottom side facing downwards. The articles are thus provided upright in the packing box in a manner as shown in figures 1, 2 or 4.

[0036] In the embodiment of figure 7, the articles are grouped together on their bottom sides on the conveyers. Again, a pick-and-place robot is provided for picking up a row of grouped articles from a conveyer. In this example, the row is provided directly into packing box 10, indicated by arrow 201, which box is provided with its opened top side facing upwards. The grouped row is thus provided with its bottom sides onto the bottom of the packing box. All rows of articles are provided generally alternating from both conveyers into the packing box to complete a layer of rows of articles in the box. A next layer may then be provided into the box, as required. The articles are thus provided upright in the packing box in a manner as shown in figures 3 or 4.

[0037] Various other embodiments within the scope of the invention can easily be derived by the person skilled in the art from the above description and accompanying claims.

Claims

1. Packing device (100) for packing articles (PA, PB, PC, P) of at least two varieties in a packing box (10), said packing device comprising:

   - a packing station (200) for collecting said articles and providing collected articles in said packing box;
   - at least two supply lines (110, 115), each for supplying said articles to said packing station (200) at a discharging end (111, 116) of the respective supply line in a respective predetermined mix of varieties of articles; and
   - an exchange station (120) constructed and arranged to take an article from one of said supply lines and to position the article onto another one of said supply lines, each supply line supplying articles of a respective single variety to said exchange station (120), so as to allow each supply line to supply articles of multiple varieties in said respective predetermined mix at its discharging end (111, 116) to said packing station (200),
   wherein said packing station comprises a collecting arrangement (210, 215) for collecting articles from each discharging end of a respective supply line (110, 115) in a row (15) of articles of said respective predetermined mix of varieties, and said packing station (200) is configured for providing said row of articles in said packing box (10) such that said row of articles extends from a front side (11) of said packing box to a backside (13) of said packing box, said front side being a viewing side of said packing box (10).

2. Packing device according to claim 1, wherein said collecting arrangement (210, 215) is configured for

collecting articles from a supply line (110, 115) in a row of articles such that a back side (P2) of one article is directed towards a front side (P1) of an adjacent article , and said packing station (200) is configured for providing said row (15) of articles in said packing box (10) such that front sides of said articles face in the direction of said front side (11) of said packing box.

3. Packing device according to any one of the preceding claims, said articles (PA, PB, PC, P) having a front side (P1), a back side (P2), a top side (P4), a bottom (P3) side and two flank sides (P5), wherein said collecting arrangement (210, 215) is configured to position said articles on a flank side (P5) while collecting them in a row (15).

4. Packing device according to claim 3, wherein said packing station is configured for collecting rows (15) on top of each other such that flank sides (P5) of articles in a row support flank sides of articles in a next row, while rows are either collected directly in said packing box (10) or collected in an intermediate step.

5. Packing device according to any one of the preceding claims, wherein said packing station comprises a cassette (220) for receiving multiple rows of articles to provide a layer or layers (16, 17) of articles for said packing box (10).

6. Packing device according to any one of the preceding claims, wherein said exchange station (120) comprises a buffer (130, 131) for articles.

7. Packing device according to any one of the preceding claims, wherein said packing station comprises a collecting arrangement (210, 215) for each supply line (110, 115).

8. Packing device according to any one of the preceding claims, wherein said exchange station (120) comprises an exchange arrangement that works according to a pick and place principle.

9. Packing device according to claim 8, wherein said exchange arrangement comprises a delta robot.

10. Packing method for packing articles (PA, PB, PC, P) of at least two varieties in a packing box (10), said packing method comprising:

- supplying said articles in at least two supply lines (110, 115), each supplying said articles in a respective predetermined mix of varieties, articles being supplied in a respective single variety from a charging end of each supply line, and being exchanged in between supply lines such as to supply articles in said respective predetermined mix of varieties at each discharge end (111, 116) of the respective supply line, each exchange being to take an article from one of said supply lines and to position the article onto another one of said supply lines; - collecting said articles in rows (15) of articles from each supply line, each row having said respective predetermined mix of varieties; and
- providing said rows of articles in said packing box (10) such that each row of articles extends from a front side (11) of said packing box to a backside (13) of said packing box, said front side being a viewing side of said packing box.

11. Packing method according to claim 10, wherein said articles are collected in a row (15) such that a back side (P2) of one article is directed towards a front side (P1)of an adjacent article , and said row of articles is provided in said packing box (10) such that front sides of said articles face in the direction of said front (11) side of said packing box.

12. Packing method according to claim 10 or 11, said articles having a front side (P1), a back side (P2), a top side (P4), a bottom side (P3) and two flank sides (P5), wherein said articles are collected such as to position said articles on a flank side (P5) while collecting them in a row (15).

13. Packing method according to claim 12, wherein rows (15) are collected on top of each other such that flank sides (P5) of articles in a row support flank sides of articles in a next row, while rows are either collected directly in said packing box (10) or collected in an intermediate step.

14. Packing method according to any one of claims 10 to 13, wherein multiple rows (15) of articles first are received in a cassette (220) and subsequently are provided to said packing box (10) as a layer or layers (16, 17) of articles.

15. Packing method according to any one of claims 10 to 14, wherein said method optionally comprises buffering of articles in said step of exchanging articles in between supply lines (110, 115).

Fig 1

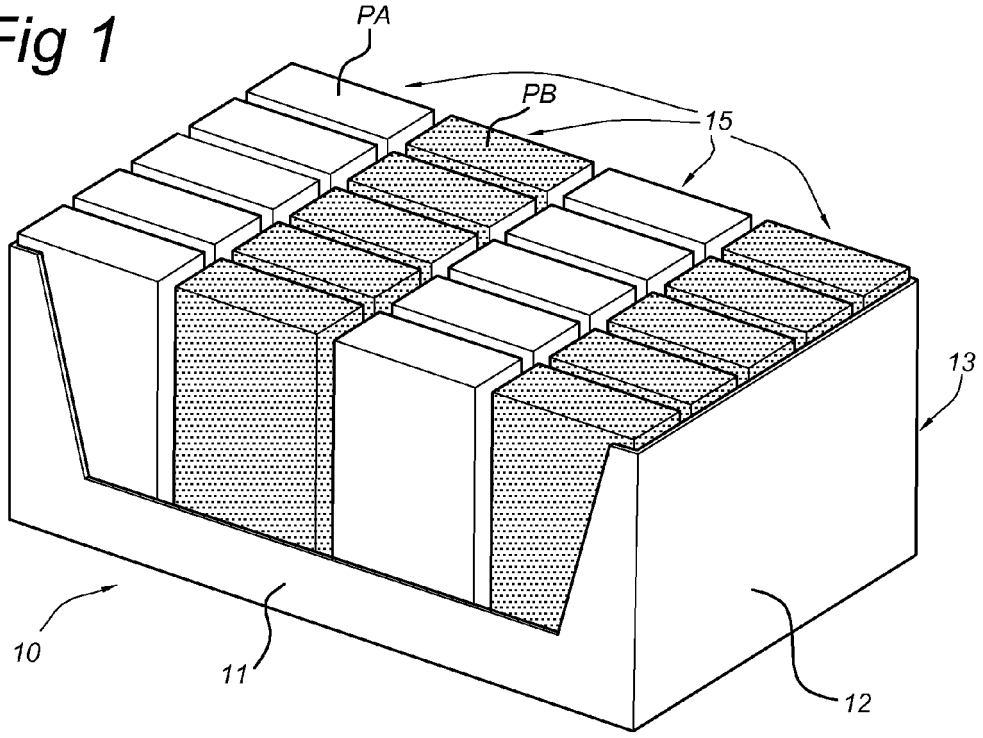


Fig 2

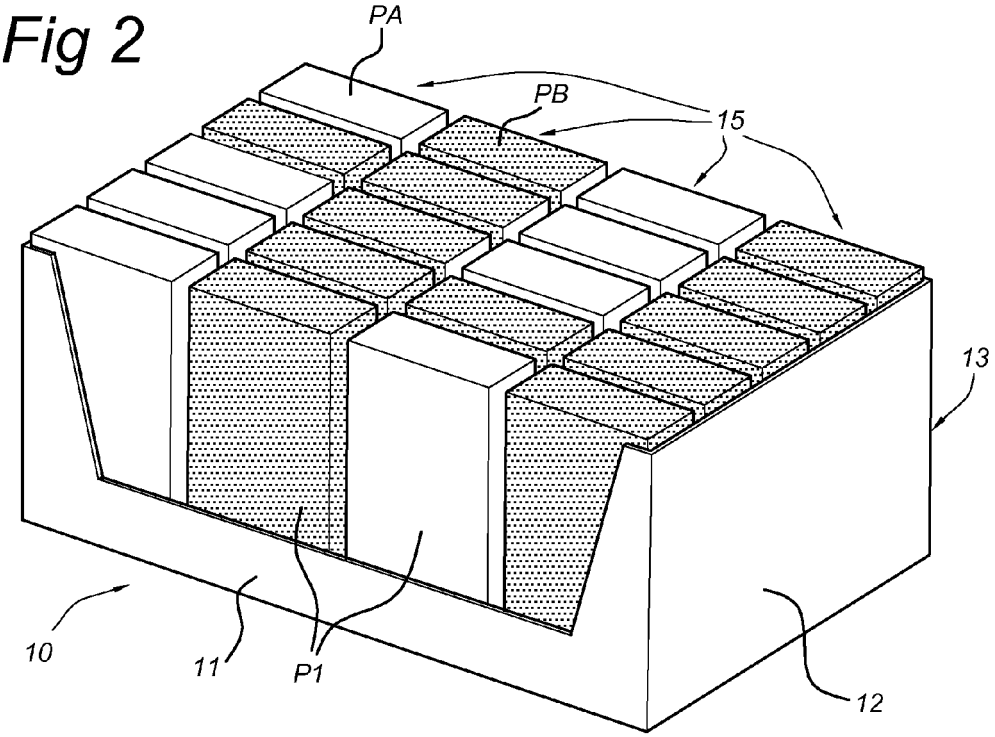


Fig 3

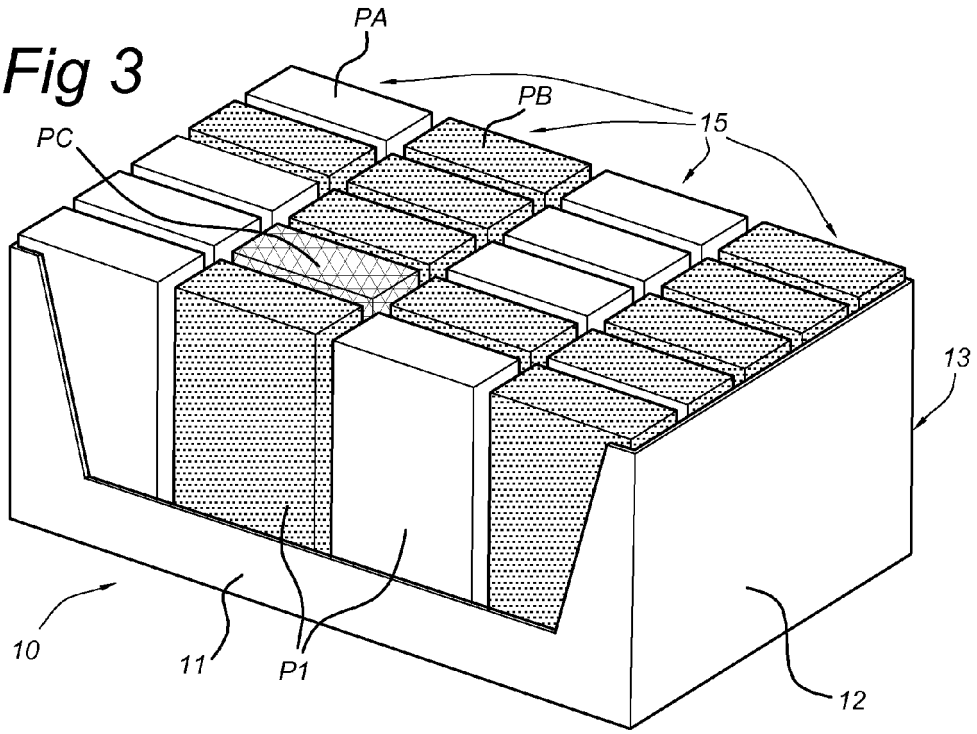
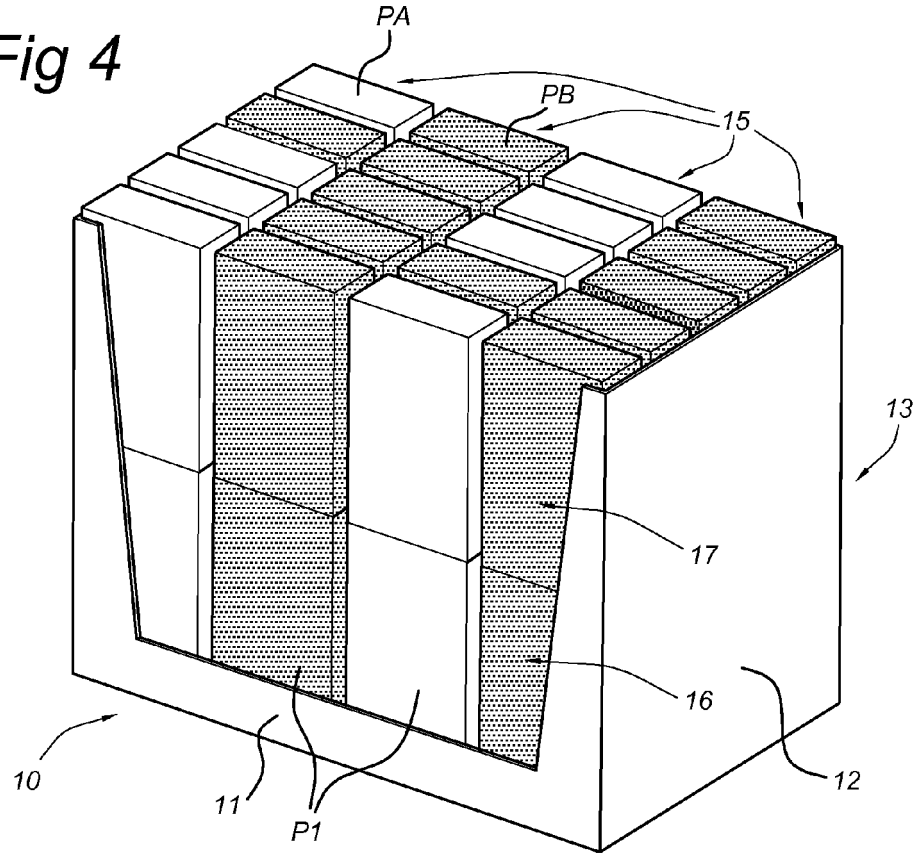


Fig 4



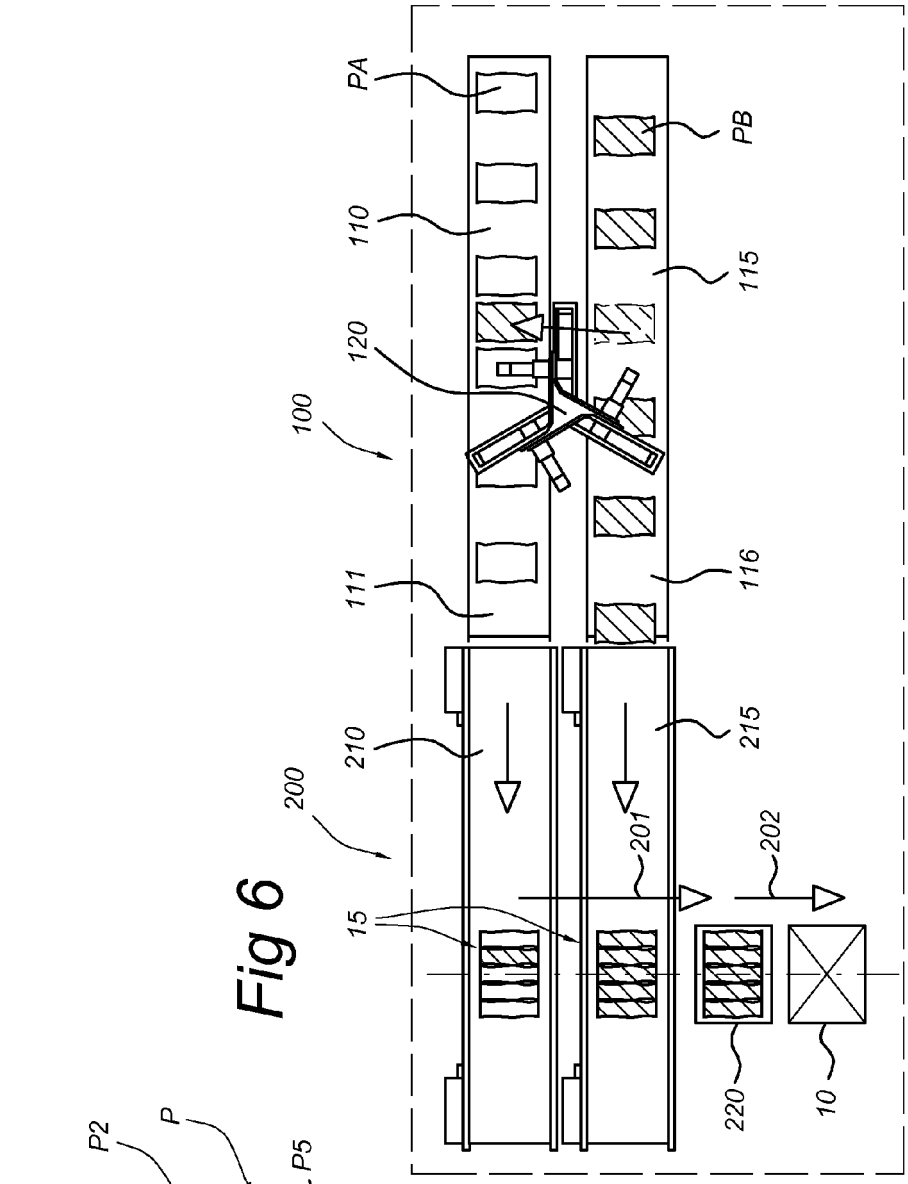

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Fig 6

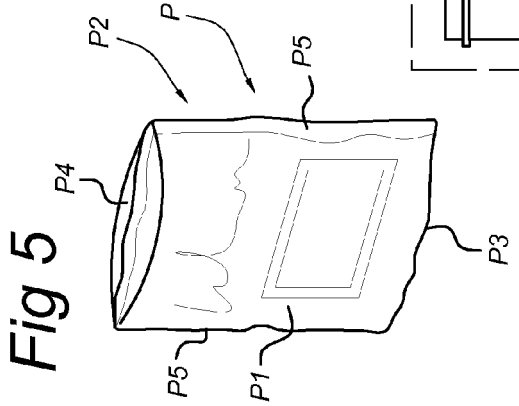
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Fig 5

Fig 7

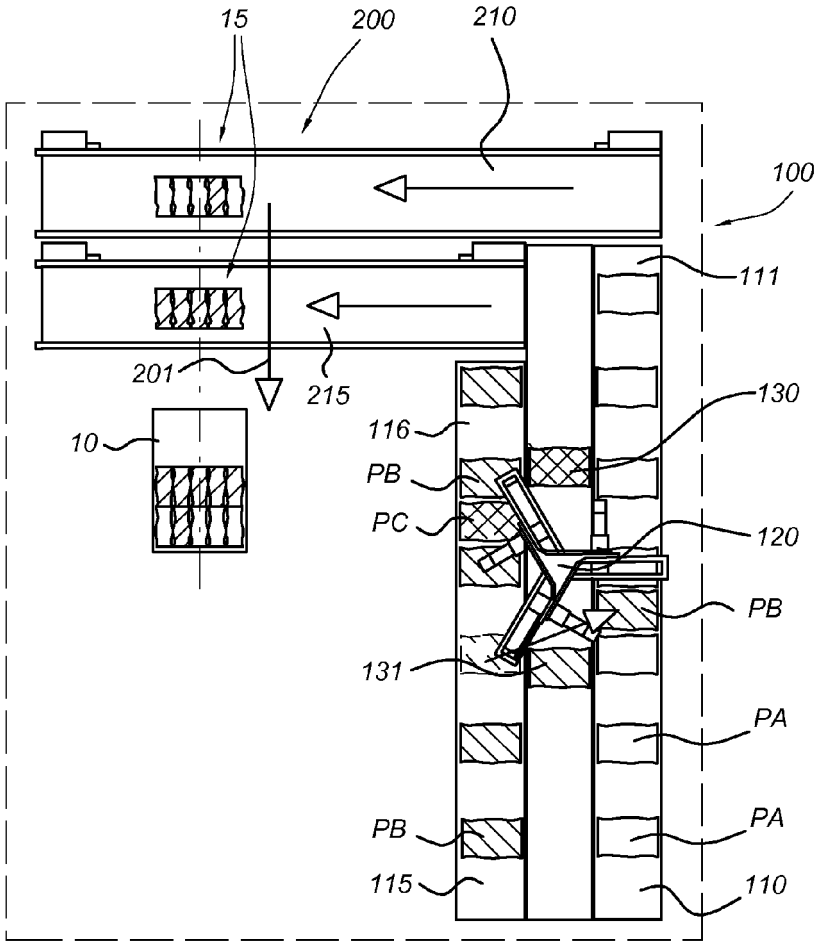
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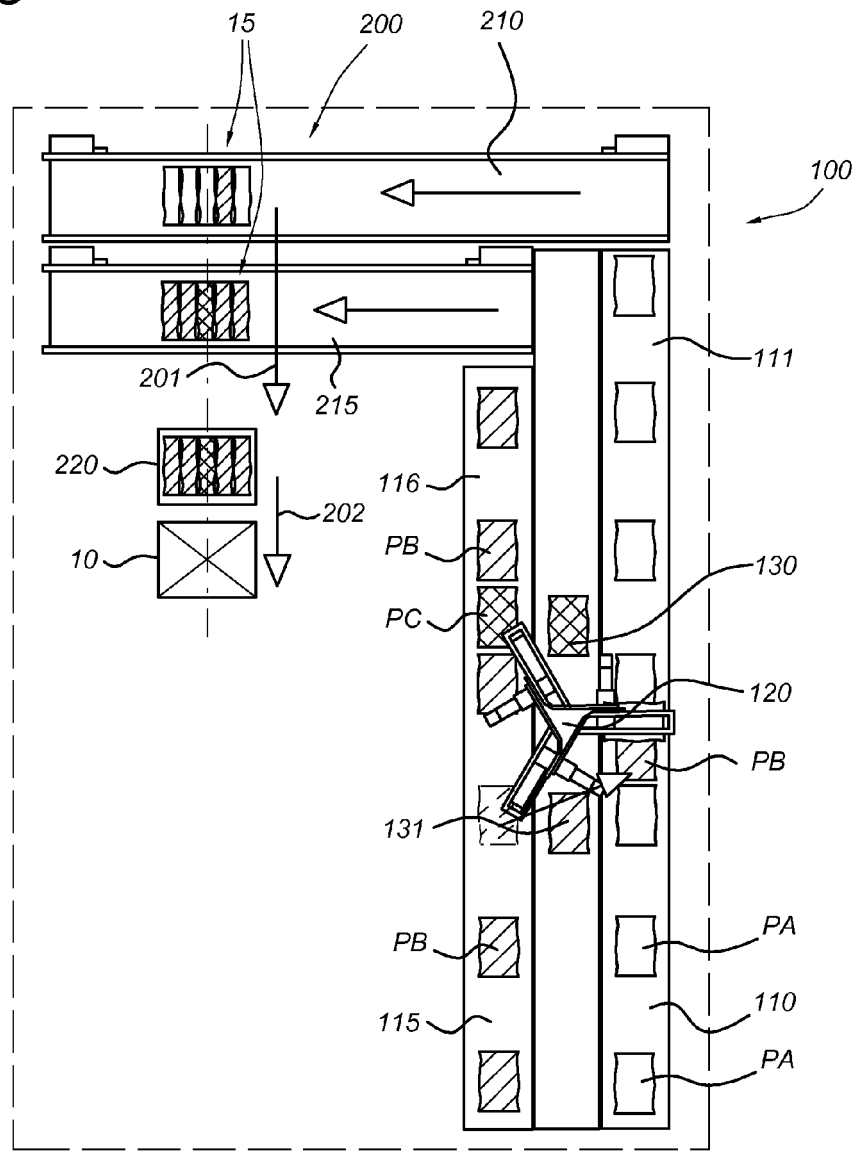
Fig 8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EUROPEAN SEARCH REPORT

Application Number
EP 13 15 6148

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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