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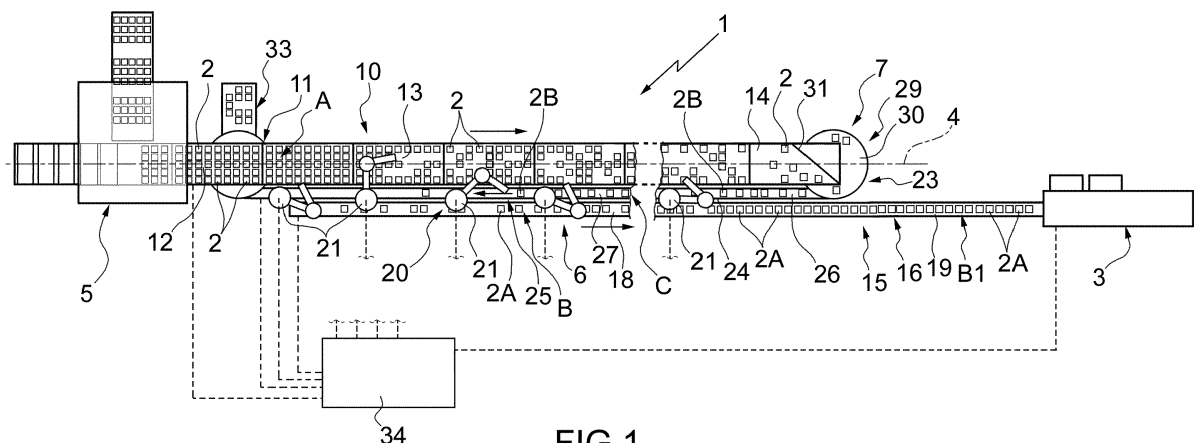
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(54) **METHOD AND PLANT FOR FEEDING PRODUCTS, IN PARTICULAR CONFECTIONERY PRODUCTS, TO A PACKAGING MACHINE**

(57) In a station (6) for transferring products (2) by means of robots (21), some of the products (2) entering on an input conveyor (10) are transferred onto at least one conveyor (15) that feeds at least one packaging machine (3); the products (2) that have not been transferred are conveyed by such input conveyor (10) to a retrieval

station (7) and, from the latter, are re-introduced into the transfer station (6) in a counter-flow direction by means of a retrieval conveyor (24) and, thus, picked up by the robots (21) and placed on the output conveyor (15) among the products being conveyed on said output conveyor (15).



**FIG.1**

## Description

**[0001]** The present invention relates to a method and to a plant for feeding products to a packaging machine.

**[0002]** In particular, the present invention relates to a method and to a plant for feeding confectionery products to a wrapping machine, to which the following disclosure specifically refers but without any loss of generality.

**[0003]** In the field of product supply in general, the use of a main or feeding conveyor is known, in which a feeding line receives the products to be conveyed in a loading station, passes through a transfer station in which the loaded products are transferred and enters a retrieval station in which the products that were not transferred in the transfer station are retrieved. In the transfer station there are several pick-up and transfer robots, which are arranged side by side and pick up the products in sequence from the feeding line and transfer them in ordered manner onto another feeding line, of an output conveyor which conveys them to the packaging machine.

**[0004]** Depending on the solution that is used, the feeding lines convey respective flows of the products in a same direction, i.e. in a co-flow, or in opposite directions, i.e. in a counter-flow.

**[0005]** Any products that are not transferred by the robots and are placed in the retrieval station are picked up manually or by means of dedicated robots in said retrieval station and placed in specific containers or left loose, and subsequently taken back to the loading station.

**[0006]** Alternatively, the products to be retrieved are placed, again either manually or by means of dedicated robots, on a section of the feeding conveyor arranged between the loading station and the transfer station so as to become part of the flow of products entering said transfer station.

**[0007]** Although plants of the type described above, known in the prior art, are used, they fall short of being satisfactory, especially as regards the retrieval of products not transferred in the transfer station.

**[0008]** In any case, the use of robots in the retrieval station to pick up the products to be retrieved makes the plant complex and increases production and operating costs.

**[0009]** All of the plants known in the prior art are bulky.

**[0010]** When the products are conveyed in co-flow, it is often difficult to form an orderly and continuous sequence of products on the output conveyor, i.e. without leaving any gaps where one or more products are missing. This inevitably causes further problems when the products are sent to a packaging or wrapping machine, as in the case of confectionery products.

**[0011]** In all cases, retrieving products that have not been transferred in the transfer station is a complicated and expensive process and the retrieval of all the products that are sent to the retrieval station is not always guaranteed, resulting in an inevitable and far from insignificant loss of production.

**[0012]** The purpose of the present invention is to pro-

vide a product feeding plant which overcomes the problems described above in a simple and cost-effective manner and, in particular, is efficient, reliable and easy and economical to implement and has limited overall dimensions.

**[0013]** According to the present invention there is provided a plant for feeding products, in particular confectionery products, to a packaging machine; the plant comprising a product transfer station; a retrieval station for retrieving products not transferred in said transfer station; a product feeding conveyor having a first transport section extending through said transfer station, and an unloading section arranged in said retrieval station; at least one output conveyor for the output of at least some of said products from said transfer station and having a second transport section extending in said transfer station; actuating means to move said first and second transport sections in rectilinear directions parallel to one another and in a same feeding direction; a plurality of robots located in said transfer station and suitable to move at least some of the products from the first transport section to said second transport section; and retrieval means for retrieving the products from said retrieval station; the plant being characterised in that said retrieval means comprise at least one retrieval conveyor having a product input section communicating with said retrieval station and a third transport section, extending in said transfer station, parallel to said first and second transport sections, and additional actuating means for actuating said third transport section to move said third transport section in the opposite direction to the feeding directions of said first and second transport sections.

**[0014]** Preferably, but not necessarily, in the plant described above, said first, second and third sections are coplanar.

**[0015]** The present invention also relates to a method for feeding products, in particular confectionery products, to a packaging machine.

**[0016]** According to the present invention there is provided a method for feeding products, in particular confectionery products, to a packaging machine using a plant as defined in claim 1; the method comprising the steps of conveying the products to be transferred through a product transfer station by means of a first transport section of a feeding conveyor, of picking up at least some of the products to be transferred, by means of robots, and transferring them to a second transport section of an output conveyor arranged in said transfer station; the second transport section conveying the transferred products in a second direction parallel to the first direction and in the same feeding direction as the products to be transferred, of conveying, by means of said feeding conveyor, the non-transferred products onto said second transport section in a product retrieval station, and of retrieving the products arranged in said retrieval station; the method being characterised in that the retrieval of said products arranged in the retrieval station is achieved by moving said products to be retrieved onto a retrieval conveyor;

by inserting said products into said transfer station by conveying them in the transfer station along a parallel and opposite direction to the feeding directions of the products to be transferred and being transferred, arranged on the first and, respectively, on the second transport section; by picking up the products to be retrieved using the same robots used to transfer the products from the first to the second feeding line; and by arranging them on said second transport section of the output conveyor among the products being conveyed by said output conveyor.

**[0017]** The present invention will now be described with reference to the accompanying drawings, illustrating a non-limiting embodiment thereof, in which:

figure 1 is a plan and substantially block diagram view of a first preferred embodiment of a plant for feeding products to a packaging machine, produced according to the teachings of the present invention; figure 2 is similar to figure 1 and illustrates a second preferred embodiment of the plant for feeding products to a packaging machine according to the present invention; and

figure 3 is similar to figure 2 and illustrates an alternative embodiment of a detail in figure 2.

**[0018]** In figure 1, denoted as a whole by reference numeral 1 is a plant for feeding products 2 in general, and confectionery products in particular, to a operating machine, in the specific case a packaging machine 3 of a type known in the prior art and not described in detail.

**[0019]** The plant 1 comprises, upstream of the packaging machine 3 along a rectilinear product feeding direction indicated by reference numeral 4, an input or product loading station 5, a product transfer station 6 and a station 7 for retrieving products not transferred in the station 6.

**[0020]** Again with reference to figure 1, between the loading station 5 and the retrieval station 7, the plant 1 comprises a motor-powered conveyor 10 for conveying the products 2 loaded in the station 5. The conveyor 10 comprises a transport section 11, suitable to convey a plurality of products 2 in orderly ranks or loose in the direction 4 towards the station 7. The section 11 comprises, in turn, an input section 12 communicating with the station 5, an intermediate horizontal transport section 13 passing through the station 6 and an evacuation section 14 leading into the station 7.

**[0021]** Again with reference to figure 1, between the station 6 and the machine 3, the plant 1 comprises a motor-powered output conveyor 15, suitable, in use, to convey the products towards the machine 3 in a direction parallel to the direction 4 and in the same feeding direction of the products 2 conveyed by the conveyor 10. In the particular example described herein, the output conveyor 15 comprises a delivery section 16, in turn comprising a horizontal transport section 18 extending inside the station 6 at the side of the section 13 and a transfer

section 19 communicating with an inlet of the machine 3.

**[0022]** The section 18 is coplanar with the section 13 and transversely spaced from said section 13. In the station 6, in a position that is preferably, but not necessarily, raised with respect to the sections 13 and 18, the plant 1 comprises a group 20 of robots 21 of the type known in the prior art for picking up and transferring the products 2, distributed along the direction 4.

**[0023]** Lastly, again with reference to figure 1, the plant comprises a assembly 23 for retrieving the products entering the station 7. The assembly 23, in turn, comprises a motor-powered retrieval conveyor 24, which extends from the station 7 and passes through the station 6 and is operated to return products arriving in said station 7 to the station 6.

**[0024]** In the particular example described herein, the conveyor 24 comprises a delivery line 25 movable in the opposite direction to the feeding directions of the delivery sections 11 and 16 and, in turn, comprising an input section 26 communicating with the retrieval station 7 and a horizontal transport section 27 parallel to the direction 4. Conveniently, the section 27 extends between the sections 13 and 18 in a position coplanar with said sections 13 and 18. Furthermore, conveniently, the sections 13, 18 and 27 are arranged alongside one another so that the pick-up and transfer strokes of the robots 21 are reduced to a minimum.

**[0025]** The assembly 23 further comprises a deflector 29, which in turn comprises a horizontal support table 30 and a fixed or adjustable tilt partition 31, which extends upwards from the table 30 to divert the products 2 towards the input section 26 of the retrieval conveyor 24.

**[0026]** Upstream of the station 6, the assembly 23 comprises a product extraction device 33, of a type known in the prior art, into which the conveyor 24 leads after passing through the station 6.

**[0027]** Again with reference to figure 1, the conveyors 10, 15 and 24 and the robots 21 are controlled by a plant control unit, denoted by reference numeral 34. The unit 34 may be an independent unit or configured to communicate with the packaging machine 3 to synchronise the feeding of the products.

**[0028]** In use, the conveyor 10 conveys a flow A of products 2 in orderly ranks, as in the example described here, or loose, through the station 6. In the station 6, the products 2 are picked up in sequence and transferred by the robots 21 onto the section 16 of the conveyor 15 to create a discontinuous flow B of transferred products, indicated by reference numeral 2A (figure 1). Said section 16 conveys the flow B in sequence towards the inlet of the machine 3.

**[0029]** The products 2 not picked up by the robots 21 stay on the section 11 and are first conveyed into the station 7 above the table 30 and then diverted by the partition 31 onto the line 25 of the conveyor 24 to form a discontinuous flow C of retrieved products, indicated by reference numeral 2B, on said line 25. The line 25 carries the products 2B into the station 6 between the flows A

and B and in the opposite direction to the feeding direction of said flows A and B. In the station 6, the robots 21 pick up the retrieved products 2B and deposit them on the section 16 of the conveyor 15, incorporating them in the discontinuous flow B so as to form and transfer an orderly and continuous sequence B1 of products 2A towards the machine 3. In order to retrieve all of the products 2B entering the station 6, the robots 21 are controlled by the unit 34, to give priority to picking up the retrieved products 2B from the section 27 of the retrieval conveyor 24.

**[0030]** Any retrieved products 2B that are not picked up by the robots 21 in the station 6 are carried back, again by the line 25 of the conveyor 24, to the removal station 33 where they are placed in containers and removed.

**[0031]** The embodiment illustrated in figure 2 relates to a plant 35, which differs from the plant 1 for certain construction details and the components of which are denoted using the same reference numerals used to denote the corresponding parts of the plant 1.

**[0032]** The plant 35 comprises two output conveyors 15 arranged on opposite sides of the conveyor 10 to convey respective ordered sequences B1 of products 2A towards respective machines 3, and a retrieval assembly 36, which differs from the assembly 23 in that it comprises two retrieval conveyors 24 with respective transport sections 27 extending into the station 6 between the section 13 and the respective section 18. The assembly 36 further comprises two deflectors 37 arranged on the table 30 and converging towards one another and towards the station 6 to divide the products entering the station 7 and divert them towards a respective conveyor 24.

**[0033]** In figure 3, three plants 35 are arranged parallel to one another to feed respective machines 3.

**[0034]** The plants 35 share a common loading station 5 and are fed by a sorting assembly 40, which is located immediately downstream of the station 5 and upstream of the feeding conveyors 10 and is controlled by the unit 34 to receive the products 2 from the station 5 and distribute them among the conveyors 10.

**[0035]** Conveniently, the sorting assembly 40 comprises a buffer 41 for temporarily storing the products coming from the station 5 and which is also controlled by the control unit 34.

**[0036]** From the above description it is clear that, above all, the plants 1, 35 described herein simplify the retrieval of the products 2 not transferred onto the conveyor or conveyors 15 feeding the respective machines 3. This is essentially due to the fact that the products 2B to be retrieved are sent back to the transfer station 6, conveyed inside said station 6 in a counter-flow direction with respect to the products entering said station 6, and are picked up and placed on the conveyors 15 so as to form part of the flows B sent to the machines 3.

**[0037]** In addition to this, the products 2B are picked up in the station 6 by the same robots that are used to transfer the products 2 conveyed by the conveyor 10, that is to say, using robots that are already present in the plant without the need for additional or dedicated robots,

thus limiting the costs involved and the overall dimensions.

**[0038]** The reduction of the costs and of the overall dimensions of the plants 1 and 35 is also due to the method used to return the retrieved products 2B to the station 6. In addition to a normal motor-powered return conveyor, the plant also comprises simple static diverting and conveying walls that are much more straightforward and economical than the dedicated robots used in the known solutions.

**[0039]** Lastly, the creation of a counter-flow of retrieved products 2B inside the transfer station 6 not only permits the re-insertion of almost all of the products, but also always permits the formation of an ordered and continuous sequence of products on the conveyor or conveyors 15, so that all the problems associated with the feeding of discontinuous sequences, or of sequences in which there are gaps where products have not been transferred, are eliminated at source.

**[0040]** Lastly, from the above description it is clear that modifications and variations may be made to the plants 1 and 35 described herein.

**[0041]** In particular, the different sections of the conveyors need not be aligned in a rectilinear direction or parallel to the direction 4, but could form different angles between them.

**[0042]** Moreover, the groups 20 of robots 21 could be arranged in a different way from that described herein by way of example, and the sections 13, 18 and 27 could be arranged differently inside the station 6. Specifically, the sections 13, 18 and 27 need not be coplanar.

## Claims

1. Plant for feeding products, in particular confectionery products, to a packaging machine; the plant comprising a product transfer station; a retrieval station for retrieving products not transferred in said transfer station; a product feeding conveyor having a first transport section extending through said transfer station, and an unloading section arranged in said retrieval station; at least one output conveyor for the output of at least some of said products from said transfer station and having a second transport section extending in said transfer station; actuating means to move said first and second transport sections in rectilinear directions parallel to one another and in a same feeding direction; a plurality of robots located in said transfer station and suitable to move at least some of the products from the first transport section to said second transport section; and retrieval means for retrieving the products from said retrieval station; the plant being **characterised in that** said retrieval means comprise at least one retrieval conveyor having a product input section communicating with said retrieval station and a third transport section, extending in said transfer station, parallel to said

- first and second transport sections, and additional actuating means for actuating said third transport section to move said third transport section in the opposite direction to the feeding directions of said first and second transport sections. 5
2. Plant as claimed in claim 1, **characterised in that** said first, second and third sections are coplanar.
  3. Plant as claimed in claim 2, **characterised in that** said third transport section extends longitudinally between said first and second transport sections. 10
  4. Plant as claimed in any one of the preceding claims, **characterised in that** said retrieval means further comprise fixed deflecting means arranged in said retrieval station to push said products to be retrieved towards the input section of said retrieval conveyor. 15
  5. Plant as claimed in claim 4, **characterised in that** said fixed deflecting means comprise at least one sloping partition. 20
  6. Plant as claimed in any one of the preceding claims, **characterised by** comprising a pair of said output conveyors and a pair of said retrieval conveyors; in said transfer station, the second transport sections being arranged on opposite longitudinal sides of said feeding conveyor and each of said third transport sections extending between said feeding conveyor and a respective said second transport section. 25 30
  7. Plant as claimed in claim 6, **characterised by** comprising a product loading station and sorting means arranged downstream of said loading station and upstream of said feeding conveyor to direct the products arriving from said loading station along a first and at least a second different path. 35
  8. Plant as claimed in claim 7, **characterised in that** said sorting means comprise a buffer for temporarily storing said products. 40
  9. Method for feeding products, in particular confectionery products, to a packaging machine using a plant as defined in claim 1; the method comprising the steps of conveying the products to be transferred through a product transfer station by means of a first transport section of a feeding conveyor, of picking up at least some of the products to be transferred, by means of robots, and transferring them to a second transport section of an output conveyor arranged in said transfer station; the second transport section conveying the transferred products in a second direction parallel to the first direction and in the same feeding direction as the products to be transferred, of conveying, by means of said feeding conveyor, the non-transferred products onto said second transport section in a product retrieval station, and of retrieving the products arranged in said retrieval station; the method being **characterised in that** the retrieval of said products arranged in the retrieval station is achieved by moving said products to be retrieved onto a retrieval conveyor; by inserting said products into said transfer station by conveying them in the transfer station along a parallel and opposite direction to the feeding directions of the products to be transferred and being transferred, arranged on the first and, respectively, on the second transport section; by picking up the products to be retrieved using the same robots used to transfer the products from the first to the second feeding line; and by arranging them on said second transport section of the output conveyor among the products being conveyed by said output conveyor.
  10. Method as claimed in claim 9, **characterised in that** the transfer of the products to be retrieved on the second transport section of the output conveyor is alternated with the transfer of the products picked up by the first transport section.
  11. Method as claimed in claim 9 or 10, **characterised in that** in said transfer station the products to be transferred are conveyed along respective coplanar rectilinear directions.
  12. Plant as claimed in any one of the claims from 9 to 11, **characterised in that** the products to be retrieved are moved inside said transfer station by conveying them between a flow of products to be transferred and a flow of transferred products.
  13. Method as claimed in any one of the claims from 9 to 12, **characterised in that** the movement of said products to be retrieved, arranged in said retrieval station, is achieved by moving the products onto a support surface and pushing the products towards said retrieval conveyor without lifting them from the support surface.
  14. Method as claimed in any one of the claims from 9 to 13, **characterised in that** the products to be transferred are fed to a sorting assembly and the transferred products are sorted onto two or more product feeding conveyors in the transfer station.
  15. Method as claimed in claim 14, **characterised in that** at least some of said products are stored in a storage buffer during the sorting of the products. 55

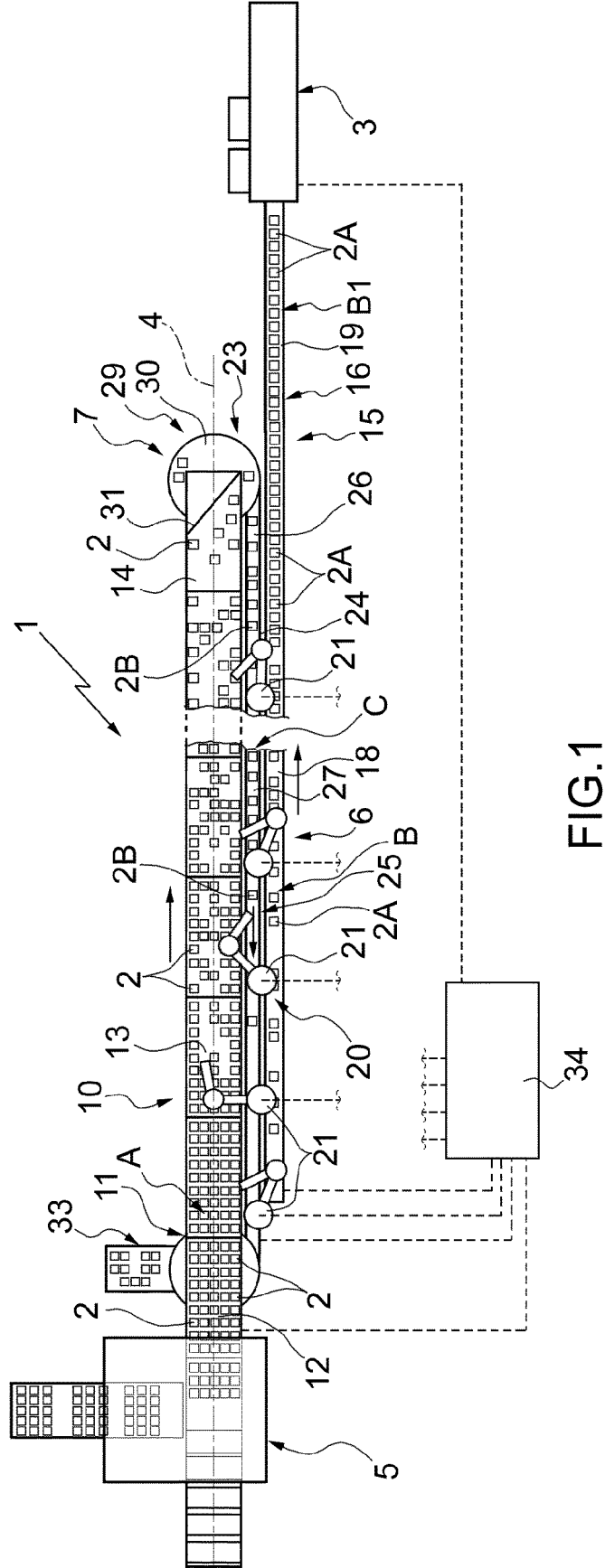


FIG.1

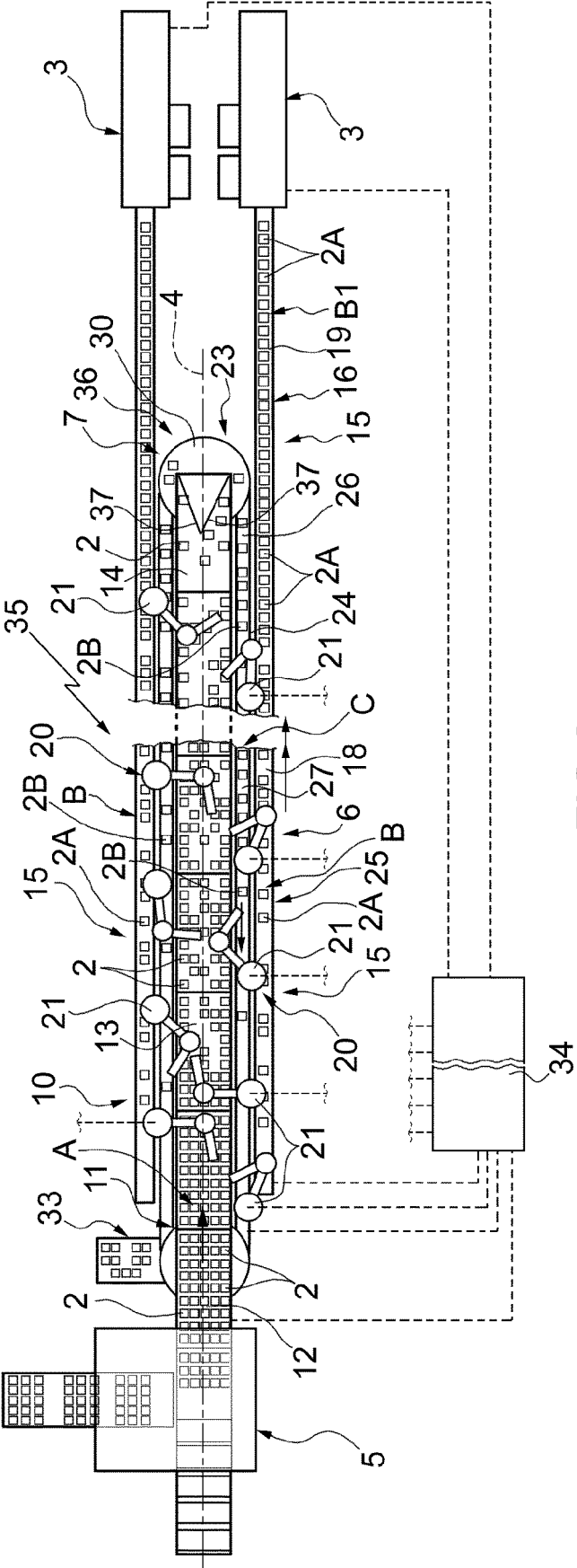


FIG.2

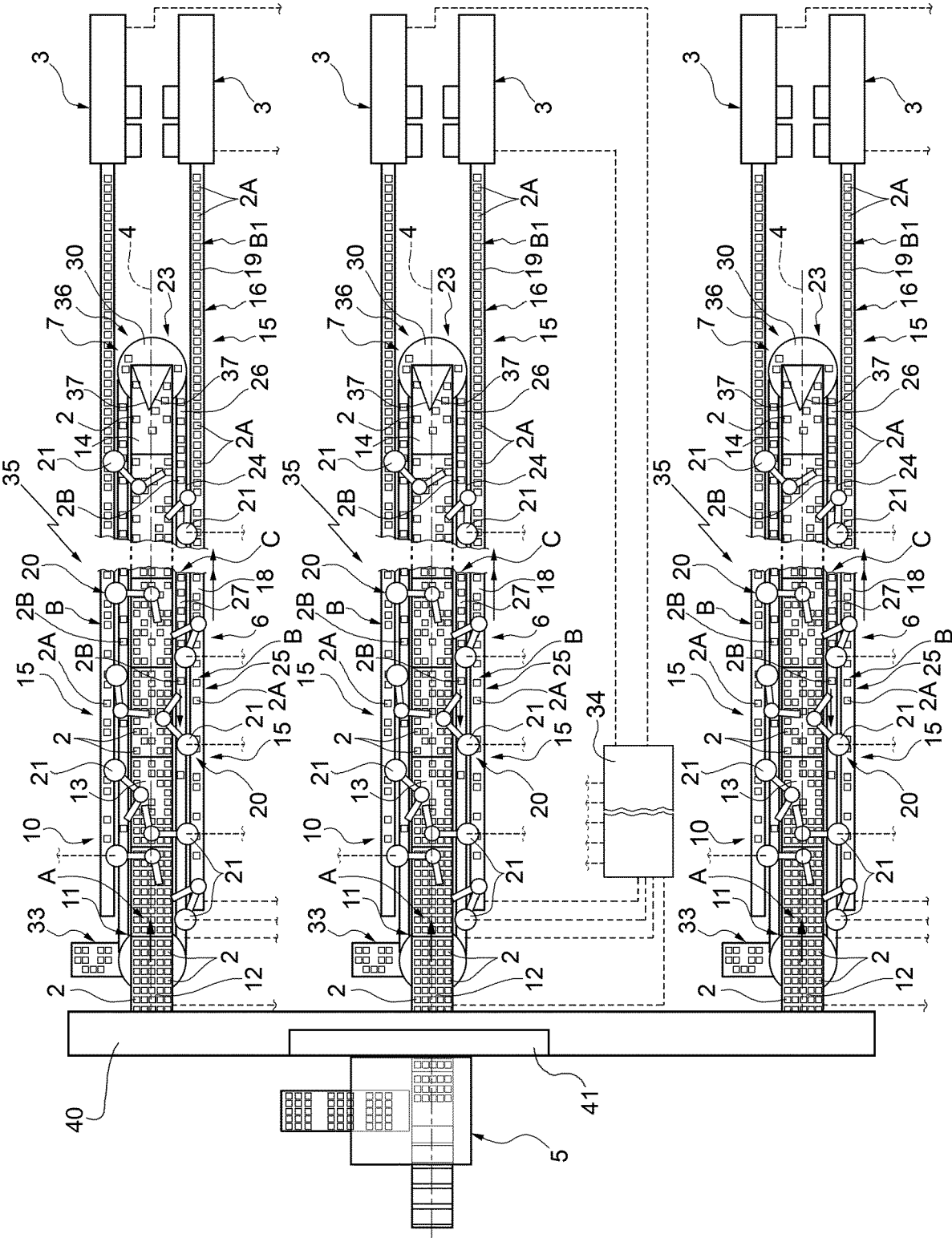


FIG.3





## EUROPEAN SEARCH REPORT

Application Number  
EP 17 16 7164

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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Place of search		Date of completion of the search	Examiner
Munich		31 May 2017	Lawder, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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