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

(11) Publication number: **0 245 226 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87850139.4**

(22) Date of filing: **28.04.87**

(51) Int. Cl.⁴: **B 65 B 25/14**, B 65 H 31/06

(30) Priority: **09.05.86 FI 861963**

(43) Date of publication of application: **11.11.87 Bulletin 87/46**

(84) Designated Contracting States: **DE FR GB IT**

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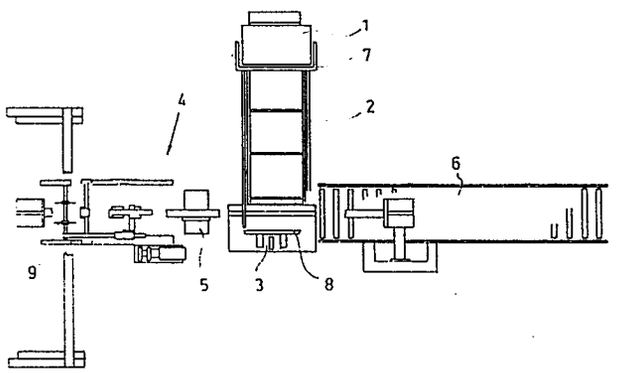
(54) Method and apparatus for packaging paper products and printed matter.

(57) A method for packaging paper products and printed matter, such as envelopes, from a production line into packaging boxes. At present, slow and difficult manual packaging methods are used. The present invention solves the problem by using a method by which the products are grouped into bundles of a desired size by means of a special bundling device (4), from which the bundles are transferred into boxes by means of a packaging device (5) moving between the bundling device and the box.



EP 0 245 226 A1

METHOD AND APPARATUS FOR PACKAGING PAPER PRODUCTS AND PRINTED MATTER

The present invention relates to a method for packaging paper products and printed matter, such as envelopes, from a production line into packaging boxes, and an apparatus for applying the said method.

At present, packaging lines are used in which a supply wheel placed at the end of a production line deposits the products in succession on a reception bench in an upright position, so that they form a continuous line. A counter provided in the supply wheel controls a separating means that pushes up e.g. every 50th envelope (or sheet), so that the packer who works at the bench can keep count of the products he/she has placed in the box. Once a box has been filled, the packer closes it and lifts it onto a pallet.

A manual packaging method like this has the drawback that the packer has an extremely monotonous and burdensome job. Another problem is the difficulty of keeping count of the products placed in each box, because, instead of putting in the required number of products in a single batch, the packer has to fill the box by smaller quantities at a time. Therefore, the packaging phase constitutes a 'bottleneck' in the production line and involves a relatively high cost of work. Further drawbacks are the inexactness of the number of products contained in the finished packages and the unevenness of the bundle in each box.

The object of the present invention is to achieve a method which is free of the drawbacks referred to and enables the whole production and packaging process to be considerably accelerated, and to provide an apparatus for applying this method.

The method of the invention is characterized in that the products are grouped into bundles of a desired size by means of a special bundling device, from which the bundles are transferred into boxes by means of a packaging device moving between the bundling device and the packaging box.

The apparatus applying the method of the invention, designed for packaging paper products and printed matter, such as envelopes, from a production line into packaging boxes and employing a supply wheel or a similar device to supply the envelopes or sheets of paper from the production line into the packaging stage, is characterized in that the apparatus incorporates a transfer carriage to receive the products from the supply wheel and a packaging device moving between the transfer carriage and the packaging box to move the bundles of products from the transfer carriage into the box.

An advantageous embodiment of the apparatus of the invention is characterized in that the transfer carriage is movable and that that end of the carriage which is farther away from the supply wheel constitutes a back stop for the products supplied by the wheel, so that the transfer carriage will move forward as the number of products on the carriage increases.

Another advantageous embodiment of the apparatus of the invention is characterized in that as soon as a bundle of the desired size has been accumulated on the transfer carriage, the carriage moves to the packaging device, which is provided with a grasper that grabs the bundle and places it in the box.

A further advantageous embodiment of the apparatus of the invention is characterized in that the transfer carriage is able to switch between two speeds of movement in the horizontal plane, one speed corresponding to the speed of movement of the products when a bundle is being accumulated on the carriage, while the other speed is higher and is used for the transfer of finished bundles.

A packaging method and apparatus using this kind of automation has the following advantages over previously known solutions: The packaging apparatus takes care of a job that is unpleasant and burdensome to a human worker; the products packed can be counted more accurately as human errors and the multiple effects of errors made by the separating device are eliminated; the bundle in the box is evenly and neatly

formed. Moreover, the solution of the invention enables the production line to be used more effectively (at full capacity) and a completely automatic packaging line to be implemented.

In the following, the invention is described in detail by the aid of an example relating to an advantageous embodiment, reference being made to the drawings attached, wherein:

Fig. 1 is a diagrammatic representation of the apparatus of the invention for packaging paper products or printed matter into packaging boxes, shown in top view.

Fig. 2 is a diagram showing some of the various stages of the process of accumulation of the products into bundles and the transfer of the bundles in a progressive sequence.

The packaging line, placed immediately after the production line, consists of the following assemblies: box magazine 1, box conveyor 2, packaging station 3, reception and bundling device 4, packaging device 5 and roller conveyor 6.

The box magazine 1, placed in an upright position, comprises a frame in which the boxes are stacked and a box supplier 7. The box conveyor 2, preferably a belt conveyor, is located between the box magazine 1 and the packaging station 3. The packaging station 3 incorporates the necessary equipment 8 for identifying, positioning, securing and pushing out the boxes.

The reception and bundling device 4 comprises a bench surface 10 (fig. 2), a transfer carriage 11 and various stops. The device incorporates auxiliary stops 12, attached on a shaft above the bench, which are capabe of pendulous motion about their fixed shaft. The motion is returned by means of a spring.

The transfer carriage 11 is provided with stops 13, hereinafter referred to as "collector stops", attached to the rear end of the

carriage. The carriage is also provided with separator stops 14, operated pneumatically and movable in the vertical direction.

The transfer carriage 11 moves forward in the horizontal plane either at a speed corresponding to the speed of movement of the products when received on the carriage or at a higher speed when a finished bundle is being transferred. The higher speed is also used for returning the carriage. The carriage is driven e.g. by means of a ball-and-screw spindle operated by an electric motor. The power transmission system also uses a clutch/brake combination to make the carriage capable of the accurate and fast accelerating movements required by the packaging system.

The packaging device 5 is e.g. a portal-type robot having two intermediate stop positions and provided with a grasper that is capable of vertical movement and so constructed that it is able to handle the entire bundle as one batch, cope with different product sizes and grasp the bundle between the stops of the bundling device. The filled boxes are removed by the roller conveyor 6.

The operation of the packaging line is as follows: Empty boxes are manually stacked in the box magazine 1. The box feeder 7 pulls the bottommost box out of the stack onto the box conveyor 2, which moves by suitable steps. The conveyor 2 transfers the box onto the packaging station 3, where it is positioned and secured by means of appropriate equipment 8.

The supply wheels 9 placed at the end of the production line supply the products (e.g. envelopes) one by one onto the bench 10 under the reception and bundling device 4. The bundle gradually accumulated leans againgst the collector stops 13. The transfer carriage 11, driven by a ball-and-screw spindle in a stepwise manner, moves forward on its track, laid longitudinally across the bench, at a speed corresponding to the rate of accumulation of the products.

As soon as the number of products in the bundle reaches the limit set in the counter, the separator stops 14 shoot up from between the supply wheels 9 to separate the finished bundle from the continuously accumulating lot. The transfer carriage 11 quickly moves the finished bundle to the reception point of the robot 5. At this time, the bundle is held between the collector stops 13 and the separator stops 14. As the transfer carriage moves off, the auxiliary stops 12 descend to provide a temporary back stop for the new bundle until the carriage 11 returns.

The grasper of the packaging device or the robot 5 opens and descends over the transfer carriage 11 to fetch the finished bundle held between the stops 13 and 14. The separator stops 14 then descend below the bench surface 10 and the transfer carriage returns. The auxiliary stops 12 are now turned up and the new bundle goes on accumulating against the collector stops 13. The stepping motion of the transfer carriage starts again and the process continues as before.

The grasper of the robot 5 grabs the bundle by pressing it together from the sides. The grasper then moves on until it is directly above the box on the packaging station and then descends into the box, opens and goes up, leaving the bundle in the box. The robot 5 then returns to its place above the reception and bundling device 4 to be ready for the next bundle.

CLAIMS

1. Method for packaging paper products and printed matter, such as envelopes, from a production line into packaging boxes, c h a r a c - t e r i z e d in that the products are grouped into bundles of a desired size by means of a special bundling device (4), from which the bundles are transferred into boxes by means of a packaging device (5) moving between the bundling device and the box.

2. Apparatus applying the method of claim 1, designed for packaging paper products and printed matter, such as envelopes, from a production line into packaging boxes and employing a supply wheel (9) or a similar device to supply the envelopes or sheets of paper from the production line into the packaging stage, c h a r a c t e r i z e d in that the apparatus incorporates a transfer carriage (11) to receive the products from the supply wheel (9) and a packaging device (5) moving between the transfer carriage and the packaging box to move the bundles of products from the transfer carriage into the box.

3. Apparatus according to claim 2, c h a r a c t e r i z e d in that the transfer carriage (11) is movable and that that end of the carriage which is farther away from the supply wheel (9) constitutes a collector stop (13) for the products supplied by the wheel, so that the transfer carriage will move forward as the number of products on the carriage increases.

4. Apparatus according to claim 2 or 3, c h a r a c t e r i z e d in that as soon as a bundle of the desired size has been accumulated on the transfer carriage (11), the carriage will move to the packaging device (5), which is provided with a grasper that grabs the bundle and places it in the packaging box.

5. Apparatus according to one of the claims 2-4, c h a r a c t e r - i z e d in that the transfer carriage (11) is able to switch between two speeds of movement in the horizontal plane, one speed corresponding to the speed of movement of the products when a bundle is being accumulated, while the other speed is higher and is used for the transfer of finished bundles.

6. Apparatus according to one of the claims 2-5, c h a r a c t e r - i z e d in that the transfer carriage (11) is driven by means of a ball-and-screw spindle operated by an electric motor, a clutch/brake combination and a flywheel being used in the power transmission system.

7. Apparatus according to one of the claims 2-6, c h a r a c t e r - i z e d in that the transfer carriage (11) is provided with pneumatically operated separator stops (14).

8. Apparatus according to one of the claims 2-7, c h a r a c t e r - i z e d in that it incorporates auxiliary stops (12), operated pneumatically and capable of pendulous movement about their fixed shaft, which serve as temporary stops behind the bundle of products accumulated while the transfer carriage (11) is taking a finished bundle to the packaging device (5).

9. Apparatus according to one of the claims 2-8, c h a r a c t e r - i z e d in that the packaging device (5) is a portal-type robot provided with two intermediate stop positions and a grasper that moves in the vertical direction.

10. Apparatus according to one of the claims 2-9, c h a r a c t e r - i z e d in that it incorporates a roller conveyor (6) for removing the filled packaging boxes.

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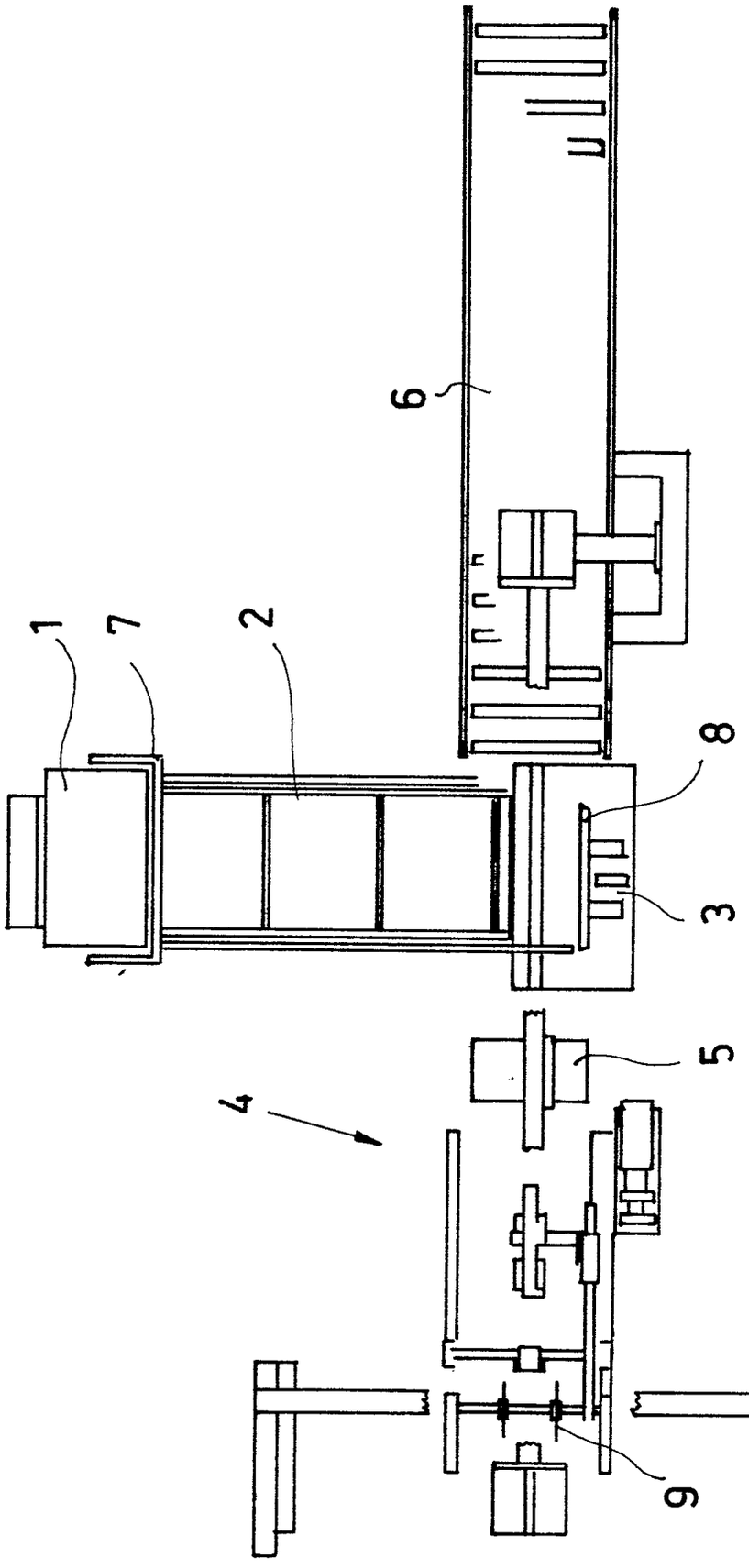

Fig.1

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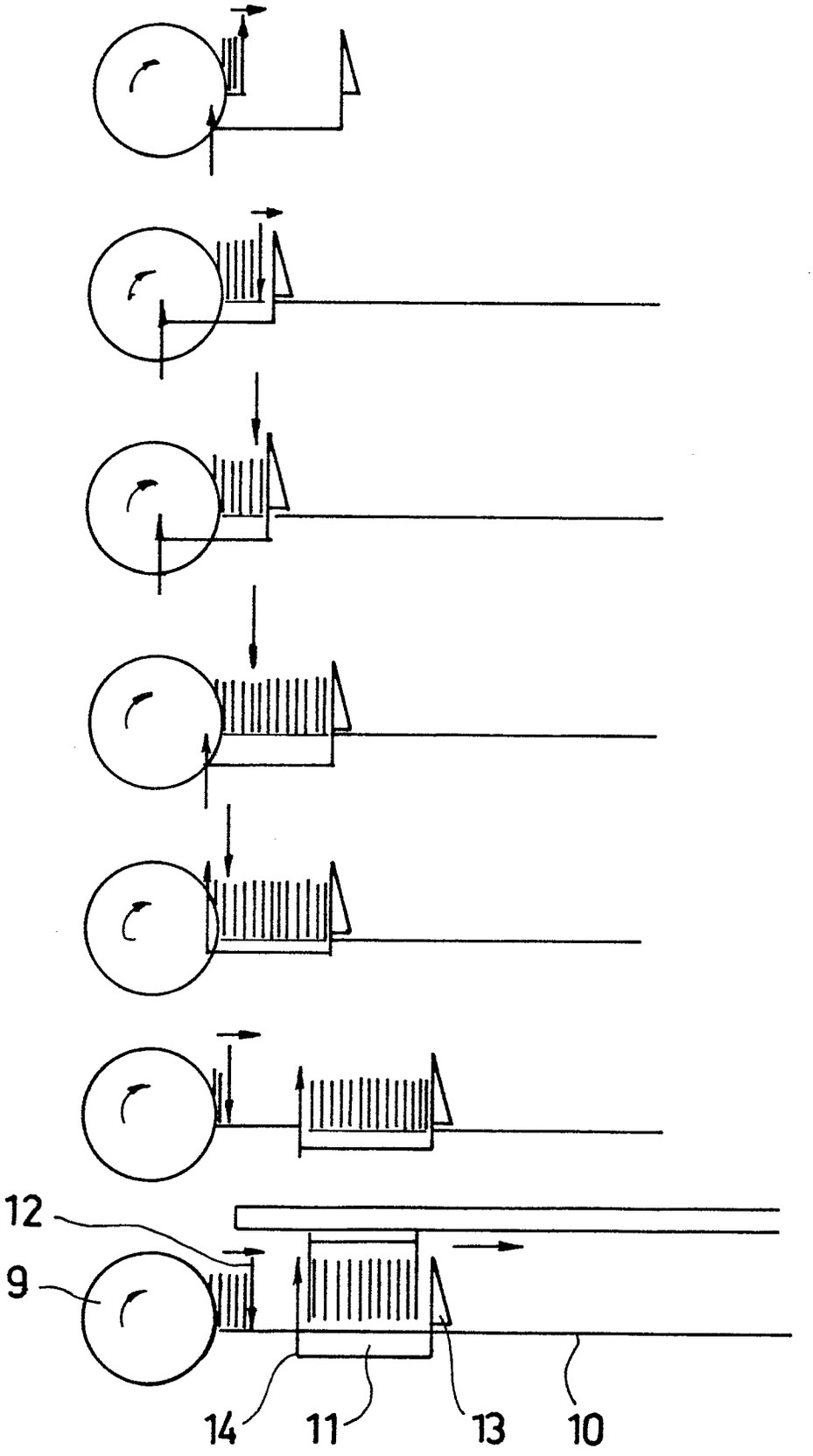

Fig.2

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EUROPEAN SEARCH REPORT

0245226
Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 87850139.4

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl 4)
X	DE - A1 - 2 546 594 (STANZT. GMBH RÖDER) * Fig. 1 *	1	B 65 B 25/14 B 65 H 31/06
A		2-4	
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X	DE - B - 1 237 490 (AKERLUND R. RAUSING)	1	
A	* Totality *	2-4	
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A	CH - A5 - 607 979 (SISENCA S.A.) * Fig. 1-5; abstract *	1-8	
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A	CH - A - 546 668 (PROCTER & GAMBLE COMP.) * Claims *	1,2	

TECHNICAL FIELDS SEARCHED (Int. Cl 4)

B 65 B 5/00
B 65 B 25/00
B 65 B 27/00
B 65 B 35/00
B 65 B 43/00
B 65 H 1/00
B 65 H 29/00
B 65 H 31/00
B 65 H 33/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	06-08-1987	MELZER

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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