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

(11) EP 2 933 199 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
21.10.2015 Bulletin 2015/43

(21) Application number: **14425045.3**

(22) Date of filing: **16.04.2014**

(51) Int Cl.:
B65B 57/14 *(2006.01)* ***B65B 65/00*** *(2006.01)*
B65G 47/51 *(2006.01)* ***B65G 47/71*** *(2006.01)*
B65B 5/06 *(2006.01)*

(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 RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **PAI Industriale S.p.A.**
20121 Milano (IT)

(72) Inventors:
- **Vitaloni, Alberto**
  20121 Milano MI (IT)
- **Miotti, Daniele**
  20121 Milano MI (IT)

(74) Representative: **Acco, Stefania et al**
Perani & Partners
Piazza San Babila, 5
20122 Milano (IT)

(54) Method of controlling production of savory product and apparatus therefor

(57) A method of controlling production and packaging of savory products, particularly fried savory snacks, in an apparatus comprising a continuous-flow fryer and a product distribution line having, along its length, a plurality of product transfer points to a plurality of respective feed lines for feeding products to packaging machines. An apparatus for production and packaging of savory snacks is also disclosed, which comprises a control system for controlling and, when needed, adjusting the savory snack production rate according to the detected amount of fried products exiting the fryer, and to the packaging rate of the packaging machine in the most downstream feed line with respect to the fryer.

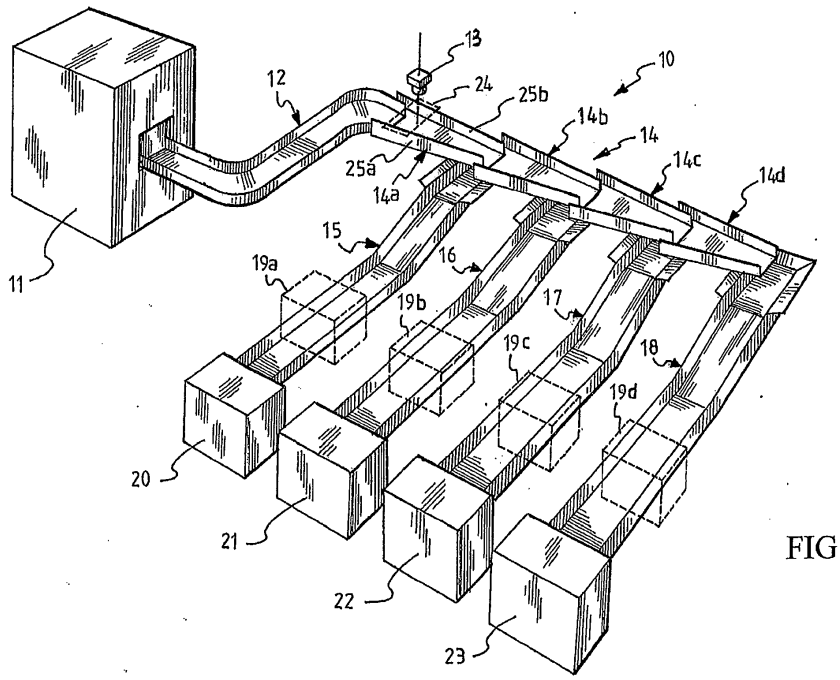

FIG. 1

EP 2 933 199 A1

Description

Field of the Invention

[0001] The present invention relates to a method of controlling production and packaging of savory snacks, particularly fried savory snacks. The present invention also relates to an apparatus for production and packaging of savory snacks provided with a control system.

Background art

[0002] In processes for producing savory edible products, particularly fried savory snacks, such as potato chips, corn snacks, rice snacks and others, a continuous flow fryer is usually employed, with the cooked products at the output thereof being placed in a conveyor connected to the fryer. In snack production, fried products are packed by introducing, or more generally by arranging, a given amount (in number or weight) of pieces in a package, such as a pillow bag. The continuous-flow process for production and packaging of snacks is mainly governed by the output volume of fried products from the fryer, which in turn depends on the amount of products, by unit time, which may be fried in the fryer and conveyed through the fryer to the output thereof.

[0003] If a problem occurs in a stage of the process downstream from the fryer, such as jamming in the bagging machine, the throughput of fried products from the fryer cannot be processed regularly, and the whole process must be stopped to solve the problem.

[0004] A possible solution to this problem consists in providing a temporary storage area for products at the output of the fryer, and upstream from the area in which they are conveyed to the next processing stations. The storage area, which may be implemented in various known forms, acts as a "buffer" for the products exiting the fryer, thereby allowing servicing to take place in the process stages affected by the problem, without the need to perform action directly on the fryer. The Applicant noticed that the presence of a buffer for storage of cooked products adds bulk to the process line, and involves the additional drawback of exposing products to air for relatively long times, which will degrade their quality, especially in case of potato chips, before packaging, which typically occurs in a controlled environment. There may also be different air exposure times for products before bagging. This will introduce variations in moisture absorbed by products, thereby affecting product quality consistency.

Summary of the invention

[0005] In a continuous process, savory snack packaging machines, such as bagging machines, are configured for operation with a given packaging rate, which is defined as number of packages that come out of the machine per unit of time, corresponding to a nominal operation rate of the machine, optimal for the process. The nominal packaging rate is selected to be compatible with the output volume of fried products exiting the continuous-flow fryer, considering the configuration of the production and packaging apparatus, for example depending on the number of the fried product conveyor lines that branch off the conveyor line for product removal from the fryer.

[0006] Any deviation from the nominal packaging rate that exceeds tolerance levels indicates the occurrence of a problem, which may have taken place between the output of the fryer and the packaging machine, e.g. in the snack feeding flow into the packaging machine or in the packaging machine itself.

[0007] In an apparatus comprising a plurality of feed lines that convey fried savory snacks to their respective packaging machines, a problem occurring in any line causes process anomalies in the line farthest from the fryer and may thus affect the entire process flow.

[0008] The Applicant realized that a temporary storage station may be avoided in the process when a control is implemented on the output volume from a continuous-flow fryer according to the packaging rate of the feed line further downstream from the fryer and on the actual quantity of fried products conveyed from the output of the fryer to the plurality of feed lines.

[0009] As used herein, the term savory snacks is intended to preferably define savory snacks with a bulk density ranging from 0.02 to 0.15 kg/liter.

[0010] The present invention relates to a method of controlling production and packaging of savory products as defined in claim 1, and to an apparatus for production and packaging of savory products as defined in claim 11.

Brief description of the figures

[0011]

Figure 1 schematically shows an apparatus for production and packaging of savory snacks.

Figure 2 is a block diagram of a system for controlling production and packaging of savory snacks according to an embodiment of the present invention.

Detailed description

[0012] Figure 1 schematically shows an apparatus for production and packaging of savory snacks in accordance with an embodiment consistent with the present invention. Without affecting the generality of the present invention, this detailed description will particularly refer to the production of potato chips to be packaged in pillow bags.

[0013] The apparatus, generally indicated by reference numeral 10, comprises a continuous-flow fryer 11 having a product-removal output connected to a product-removal conveyor line 12, which is configured to continuously remove the potato chips exiting the fryer and to convey them to the next processing stations. The prod-

uct-removal conveyor line 12 is, for example, a motor-driven conveyor belt. The fryer 11 may be a conventional machine that includes a conveyor system that receives slices of raw potatoes, controls immersion of the latter through an oil tank and ejects the slices of cooked potatoes from the fryer.

[0014] The product-removal conveyor line 12 conveys the fried products that come out of the fryer 11 to a distribution conveyor line 14, which is connected to the line 12 and extends in a distribution direction, longitudinally of the product feed direction. Therefore, the distribution conveyor line extends longitudinally from a proximal end to a distal end relative to the product-removal output of the fryer. A sensor 13 is provided for detecting the amount of product that comes out of the fryer 11. The apparatus 10 further comprises a plurality of feed conveyor lines 15, 16, 17 and 18, each extending in a direction transverse to the distribution direction, in such position as to be able to receive material from the distribution conveyor line 14. The distribution conveyor line 14 has a plurality of material transfer points, arranged in the distribution direction, for transferring material to the respective plurality of feed conveyor lines. It is to be understood that the number of feed conveyor lines is purely indicative and that, as used in the present disclosure and claims, the term plurality of conveyor lines shall be intended as at least two conveyor lines.

[0015] The sensor 13 for detecting the amount of potato chips that come out of the fryer is configured to detect the amount of material being fed through a detection area 24, which is indicated in the figure with a broken line. The detection area 24 is arranged along the distribution direction upstream from the first material transfer point, i.e. the transfer point closest to the product-removal conveyor line 12. Thus, the product amount detection sensor 13 detects the actual amount of savory snacks exiting the fryer. In the embodiment shown in Figure 1, the distribution conveyor line 14 comprises a first vibrating table 14a connected to the product-removal conveyor line 12 and provided with two lateral retaining walls 25a and 25b for lateral retention of products. The sensor 13 is located at the first vibrating table 14a, which means that the detection area 14 is within the length of the first table.

[0016] More generally, in the embodiment of Figure 1, the distribution conveyor line 14 is a modular vibrating conveyor belt which comprises a plurality of longitudinally-extending vibrating tables 14a, 14b, 14c and 14d, arranged along the distribution conveyor line. The vibrating tables are connected in pairs in the distribution direction. Preferably, each vibrating table has two sidewalls for lateral retention of the products as they are being fed. The number of vibrating tables will preferably match the number of feed conveyor lines. The connection between adjacent tables is such that, in a first operating position, the two tables are in mutually abutting or partially overlapping relationship in the distribution direction, for material to be transferred from the upstream table to the downstream table, with respect to the distribution direction and, in a second operating position, the two adjacent tables are moved away from each other in the distribution direction, thereby creating an opening for the products to fall on a respective feed conveyor line. It is to be understood that the feed conveyor lines are placed below the distribution conveyor line. In this embodiment, the opening between two adjacent tables is the transfer point whereat products are transferred to the feed lines and connects the distribution line to the underlying feed line. In the usual ways, opening of adjacent tables can be actuated by a material distribution control system, to convey respective amounts of material to one or more feed conveyor lines. It is to be understood that the opening mechanism can be selectively actuated to form openings to the feed conveyor lines 15-18, including the case in which openings to all feed conveyor lines 15-18 may be actuated. Figure 1 shows an exemplary operating state, in which the distribution conveyor line conveys fried snacks to the last feed line 18 only.

[0017] In the embodiment of Figure 1, the sensor 13 is a level sensor which is configured to measure the level of fried snacks in the detection area 24, i.e. the fried snacks moving along the first vibrating table 14a. As is known in the art, an ultrasound sensor may be used for this purpose, to detect the distance between the upper surface of the fried snacks as they are being fed through the detection area and the detection surface of the sensor.

[0018] The sensor may be placed upstream from the connection between the distribution line 14 and the first feed conveyor line 15.

[0019] Each feed conveyor line is preferably a conveyor belt that is driven for longitudinally feeding the material that has been transferred from the distribution conveyor line to a respective packaging machine 20, 21, 22 and 23 for packaging of the fried product by introducing a given amount (number or weight) of pieces in a package, such as a pillow bag. Without wishing to limit the present invention, reference will be made hereinafter to bagging machines as packaging machines. Pillow bags are typically sealed bags that contain the savory snacks in a preferably inert atmosphere, adapted for food property preservation.

[0020] The process for production and packaging of savory snacks may comprise a surface treatment step of the snacks. In certain preferred embodiments, this treatment step comprises a step of flavoring the savory snacks by using a food flavoring machine, known per se, which is adapted to distribute flavors on the snacks, e.g. by spray-drying of flavoring agents. In the embodiment of Figure 1, a respective flavoring machine 19a, 19b, 19c and 19d, through which the savory snacks pass and exit flavored, is arranged on each feed conveyor lines 15, 16, 17 and 18. Each flavoring machine is located between the connection of the respective feed line with the distribution line 14 and the bagging machine of such line.

[0021] Although this is not shown in Figure 1, each of the bagging machines 20-23 may be connected by a con-

veyor belt to a respective case packing machine, which is placed downstream from the bagging machine and is designed to introduce a plurality of pillow bags into a carton.

[0022] A continuous-flow fryer is generally designed to produce a given amount of potato chips in a unit of time, wherein such value may be expressed as an output volume or mass per unit of time, hereinafter referred to as production rate of fried snacks (coming out of the fryer). In known ways, the production rate is electronically controlled by controlling operating parameters of the machine, such as the flow of incoming products (i.e. slices of raw potatoes or, optionally, unsliced raw potatoes if the fryer has a slicer at its input), oil bath temperature, and product feed rate through the oil bath. For this purpose, the fryer is equipped with a control station which provides, as output data, the production rate of fried products at the output of the machine, i.e. to the product-removal conveyor line. The fryer is designed to accept a tolerance on the nominal production rate value of fried snacks, which means that the fryer may operate within a range of values centered about the nominal value, which ensures both efficient operation of the machine and satisfactory quality of the output fried product. For example, an acceptable deviation is $\pm 10\%$. More generally, assuming that R_n is the nominal value of fried snack production rate and ΔR_n is the tolerance range, an acceptable production rate for the process is a value R_f that falls in the range $(R_n-\Delta R_n, R_n+\Delta R_n)$.

[0023] As is generally known in the field of automated processes for production of packaged products, each bagging machine is equipped with a control station configured to control the product input process and the bagging process and provides, as output data, the product bagging rate, which may be expressed as a number of bags, or more generally of packages, that come out of the machine per unit of time. Bagging machines operate with a nominal bagging rate.

[0024] The Applicant noticed that, if a problem occurs in the product distribution line, which has a plurality of product transfer points along its length, to a respective plurality of lines for feeding products to packaging machines, such problem will be found in the last feed line, i.e. the most downstream line in the process flow, with respect to the fryer.

[0025] According to the present disclosure, the apparatus comprises a control system for controlling and, when needed, adjusting the savory snack production rate according to the detected values of amount of fried products that come out of the fryer, and of the packaging rate of the packaging machine in the last feed conveyor line.

[0026] Figure 2 is a block diagram of this control system. The sensor 13 is electronically connected, via a control line 31, to a control unit 30 which is adapted to receive control signals from the sensor, which are representative of the detected amount of material, and hence of the amount of products conveyed from the fryer into the distribution line 14. The control unit 30 is also electronically connected to the control station of the fryer 11 via a control line 32. The control station of the bagging machine 23, which is placed on the fourth feed line 18, i.e. the last feed line with respect to the output of the fryer along the distribution line 14, is electronically connected to the control unit 30 via a control line 33. The control unit 30 is configured to acquire, as is usually done by exchanging electronic control signals, the actual value of the amount of material as detected at the output of the fryer by the sensor and the actual value of the packaging rate of the bagging machine of the last feed line and to adjust the fried snack production rate value at the output from the control station of the fryer as a function of the input data.

[0027] By referring to a level sensor as the sensor for detecting the amount of material that comes out of the fryer, a nominal value of material level is stored in the control unit, and is preferably associated with a nominal value of fried product production rate, R_n.

[0028] The control unit 30 is configured to carry out a control method, which comprises:

(a) acquiring a product level value detected by the level sensor,

(b) comparing the detected level value with a predetermined nominal threshold level value to determine whether the detected level value is equal to or higher or lower than the nominal threshold level value,

(c) if the detected level value is determined to differ from (be higher or lower than) the nominal level value, acquiring a packaging rate value from the control station of the packaging machine 23 and comparing the acquired packaging rate value with a nominal packaging rate value,

(d) if the detected level value is determined to be lower than the nominal level value in the result of step (b) and the acquired packaging rate value is determined to be lower than the nominal packaging rate value in the result of step (c), adjusting the production rate of the fryer by increasing the production rate value by a first predetermined amount, and

(e) if the detected level value is determined to be higher than the nominal level value and the acquired packaging rate value is determined to be equal to or higher than the nominal packaging rate value, adjusting the production rate of the fryer by decreasing the production rate value by a second predetermined amount, and

[0029] The increase or decrease of the production rate value of the fryer in steps (d) and (e) is temporary, which means that the fryer is operated at a value that is decreased or increased by a predetermined amount for a given interval of time, which will be referred to hereinafter as an adjustment time interval. In one embodiment, the increase or decrease of the production rate value is applied for an adjustment time of from 30 seconds to 3 minutes, preferably of one minute. At the end of the adjustment time interval, steps (a) and (b) of the method are

repeated to check whether the conditions of steps (c), (d) and (e) still exist.

[0030] If, as a result of steps (b) and (c), the detected level value is determined to be lower than the threshold level value and the acquired packaging rate value is determined to be equal to the nominal packaging rate value, then the control unit does not instruct the control station of the fryer to take actions, and the steps (a) and (b) of the process are repeated to check whether the conditions of step (c) still exist and, if the acquired product amount value differs from the nominal value, then the method will proceed with checking the conditions of steps (d) and (e). If, as a result of steps (b) and (c), the detected level value is determined to be higher than the threshold level value and the acquired packaging rate value is determined to be lower than the nominal packaging rate, then the control unit does not instruct the control station of the fryer to take actions, and the steps (a) and (b) of the process are repeated to check whether the conditions of step (c) still exist and, if the acquired product amount value differs from the nominal value, then the method will proceed with verifying the conditions of steps (d) and (e).

[0031] If the result of step (b) is that the detected level value is equal to the nominal level value, then the control unit repeats the step (a) of the process.

[0032] Therefore, the control unit is configured to execute a decision process based on the input data, namely the amount of products detected at the output of the fryer and the current packaging rate.

[0033] Preferably, the first and second predetermined amounts in the production rate adjustment steps (d) and (e) are equal.

[0034] Preferably, the predetermined amount for adjustment of the production rate of the fryer, δR_n, is lower than the tolerance ΔR_n. In one embodiment, the predetermined amount for adjustment of the production rate of the fryer is $\delta R_n = 0.1 \Delta R_n$. In some embodiments, the first and second predetermined amounts have equal absolute values of from 0.5% to 3%, and are preferably of 1%.

[0035] In one embodiment, the adjustment time interval is the same for the increase and the decrease of the production rate of the fryer and is of one minute.

[0036] Preferably, for each level value detected by the sensor, the control unit determines whether such value deviates from the nominal level value by a deviation value higher (in terms of absolute value) than a predetermined threshold deviation value associated with the operating tolerance range ΔR_n for the machine operation about the nominal operation value R_n. A deviation value higher than the threshold deviation value is indicative of the operation of the fryer in conditions that may not guarantee the quality of the output products.

[0037] Preferably, the step (b) of the control method further comprises determining whether the level deviation value as detected by the sensor has a higher absolute value than the threshold deviation value and, in the positive, providing as output an indication that the threshold deviation has been exceeded. This output indication may be implemented in various forms, e.g. by displaying the information on a screen, which can be seen by an operator, or by triggering an alarm sound signal. If the level deviation value as detected by the sensor has an absolute value lower than or equal to the threshold deviation value, then the production rate control system will proceed with executing step (c).

[0038] While the invention has been described with reference to a fryer in which edible products float or are immersed in boiling oil, it is to be understood that the above-described method may be applied also to a continuous-flow savory snack production process that uses a different continuous-flow cooker, such as a microwave, infrared or ohmic cooker.

Claims

1. A method of controlling production and packaging of savory products in an apparatus comprising a continuous-flow fryer (11) having a fried savory product-removal output, and configured to operate with an output production rate of fried products, a fried product distribution conveyor line (14) connected to the fryer to receive the fried savory products that come out of the fryer, the distribution conveyor line extending longitudinally from a proximal end to a distal end with respect to the output of the fryer and being provided, along its length, with a plurality of product transfer points to a respective plurality of feed conveyor lines (15-18) for feeding fried products to respective packaging machines (20-23), which are configured to package the fried products in packages, wherein the plurality of feed conveyor lines comprises a last feed conveyor line (18) arranged most downstream from the product-removal output of the fryer, and the packaging machine (23) of the last feed conveyor line (18) is configured to produce a number of packages per unit time, defined by a packaging rate, the method comprising:

(a) detecting a value of amount of fried products that come out of the fryer, by using a sensor (13),
(b) determining whether the detected fried product amount value is higher or lower than a predetermined nominal fried product amount value,
(c) if the detected product amount value is determined to be higher or lower than the nominal product amount value in the result of step (b), acquiring a packaging rate value from the packaging machine of the last feed line and determining whether the acquired packaging rate value is equal to, higher than or lower than a predetermined nominal packaging rate,
(d) if the detected product amount value is determined to be lower than the predetermined nominal product amount value in the result of step (b) and the packaging rate value is deter-

mined to be lower than the nominal packaging rate value in the result of step (c), adjusting the production rate of the fryer by increasing the production rate value by a first predetermined amount, and
(e) if the detected product amount value is determined to be higher than the predetermined nominal product amount value in the result of step (b) and the acquired packaging rate value is determined, in the result of step (c), to be equal to or higher than the nominal packaging rate value, adjusting the production rate of the fryer by decreasing the production rate value by a second predetermined amount.

2. A method as claimed in claim 1, wherein in steps (d) and (e) the increase and decrease of the production rate of the fryer is applied for a respective predetermined interval of time, preferably of from 30 seconds to 3 minutes.

3. A method as claimed in claim 2, which comprises repeating the steps (a) to (e) a plurality of times.

4. A method as claimed in any of the preceding claims, which further comprises:

(f) if, as a result of steps (b) and (c), the product amount value detected by the sensor is determined to be lower than the predetermined nominal product amount value and the acquired packaging rate value is determined to be equal to the nominal packaging rate value, repeating the steps (a) to (e), and
(g) if, as a result of steps (b) and (c), the detected product amount value is determined to be higher than the predetermined nominal product amount value and the acquired packaging rate value is determined to be lower than the nominal packaging rate value, repeating the steps (a) to (e).

5. A method as claimed in any of the preceding claims, which further comprises: if, as a result of step (b), the detected product amount value to be equal to the predetermined nominal product amount value, repeating the steps (a) to (e).

6. A method as claimed in any of the preceding claims, wherein the step (b) further comprises determining whether the product amount value detected by the sensor is higher, in absolute value, than a threshold deviation value with respect to the predetermined nominal amount value and, in the positive, providing an output indicating that the threshold deviation has been exceeded.

7. A method as claimed in any of the preceding claims, wherein the sensor (13) of the amount of fried products is a level sensor, the output fried product amount value is a level value and the predetermined nominal amount value is a nominal level value.

8. A method as claimed in any of the preceding claims, wherein the sensor (13) is arranged in such a position that its detection area (24) is on the distribution conveyor line (14) upstream from the upstreammost product transfer point of the plurality of transfer points.

9. A method as claimed in any of the preceding claims, wherein the fryer is configured to operate with an output fried product production rate R_f ranging from R_n-ΔR_n to R_n+ΔR_n, where R_n is a nominal fried snack production rate value and ΔR_n is the tolerance on the nominal value R_n and wherein the first and second predetermined amounts of steps (d) and (e) is a respective value $\delta R_n < \Delta R_n$.

10. A method as claimed in claim 8, wherein ΔR_n is about 10% of R_n and δR_n is about 10% of ΔR_n.

11. An apparatus for production and packaging of savory products, comprising:

• a continuous-flow fryer (11) having a fried savory product-removal output, and configured to operate with an output fried product production rate,
• a fried product distribution conveyor line (14) connected to the fryer to receive the fried savory products that come out of the fryer, the distribution conveyor line extending longitudinally from a proximal end to a distal end with respect to the output of the fryer and being provided, along its length, with a plurality of product transfer points to a respective plurality of feed conveyor lines (15, 16, 17, 18) for feeding fried products that come from the distribution line to respective packaging machines (20, 21, 22, 23), which are configured to package the fried products in packages, and
• a sensor (13) for detecting the amount of products that come out of the fryer, which is configured to detect the amount of products that are fed along the distribution conveyor line, and is arranged upstream from the upstreammost product transfer point of the plurality of transfer points,
wherein the plurality of feed conveyor lines comprise a last feed conveyor line (18) arranged most downstream from the product-removal output of the fryer, and the packaging machine (23) of the last feed conveyor line (18) is configured to produce a number of packages per unit time, defined by a packaging rate,
the apparatus being **characterized in that** it

comprises a control unit (30), which is electronically connected to the sensor (13), to the packaging machine (23) of the last feed line and to the fryer (11) and is configured to receive the current amount value of fried products from the sensor and the current packaging rate value from the packaging machine and to carry out an automatic control process, comprising:

(a) detecting a value of amount of fried products that come out of the fryer, by using the sensor (13),
(b) determining whether the detected fried product amount value is higher or lower than a predetermined nominal amount value of fried products,
(c) if the detected product amount value is determined to be higher or lower than the nominal product amount value, acquiring a packaging rate value from the packaging machine of the last feed line and determining whether the packaging rate value is equal to, higher than or lower than a predetermined nominal packaging rate,
(d) if the detected product amount value is determined to be lower than the predetermined nominal amount value in the result of step (b) and the packaging rate value is determined to be lower than the nominal packaging rate value in the result of step (c), adjusting the production rate of the fryer by increasing the production rate value by a first predetermined amount, and
(e) if the detected fried product amount value is determined to be higher than the predetermined nominal amount value in the result of step (b) and the acquired packaging rate value is determined, in the result of step (c), to be equal to or higher than the nominal packaging rate value, adjusting the production rate of the fryer by decreasing the production rate value by a second predetermined amount.

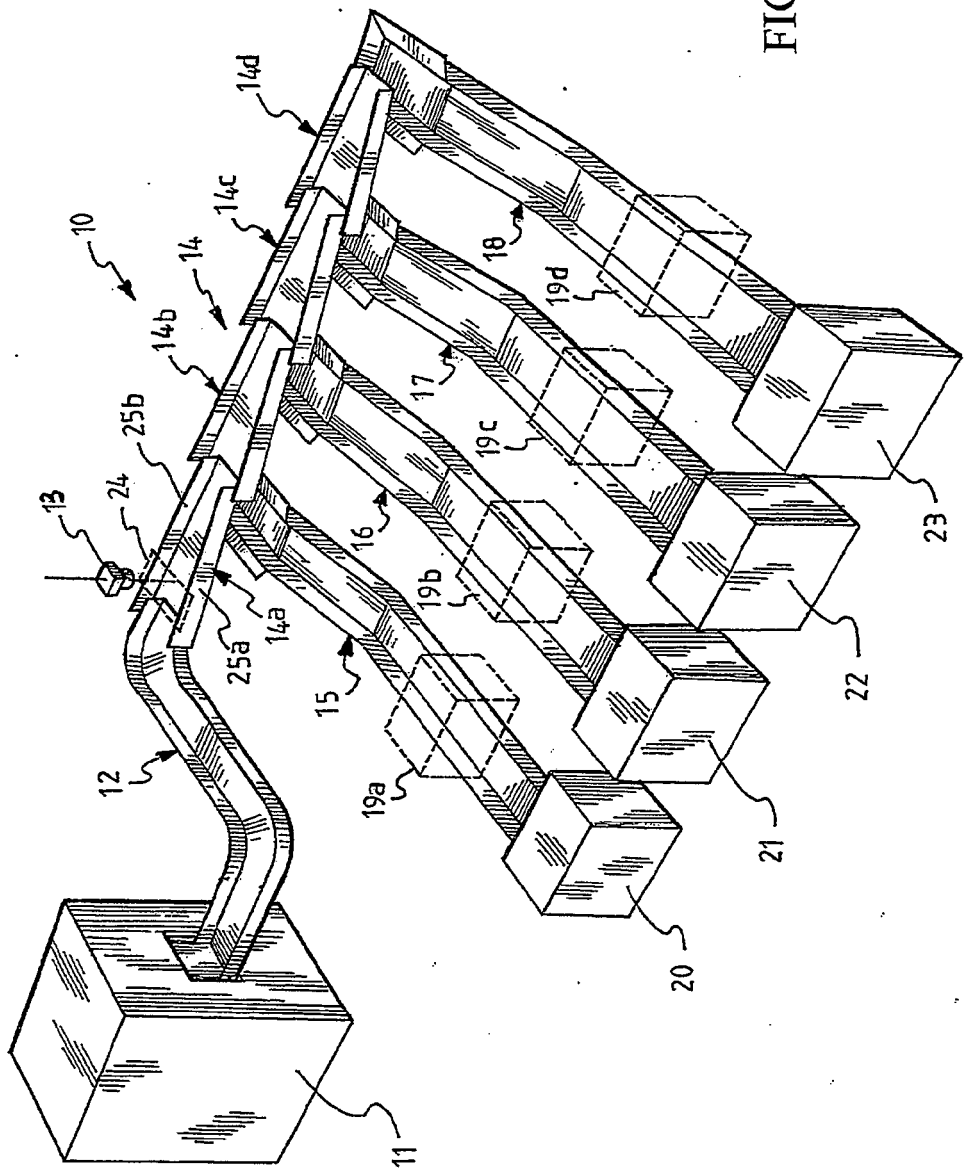
10
11
12
13
14
14a
14b
14c
14d
15
16
17
18
19a
19b
19c
19d
20
21
22
23
24
25a
25b

FIG. 1

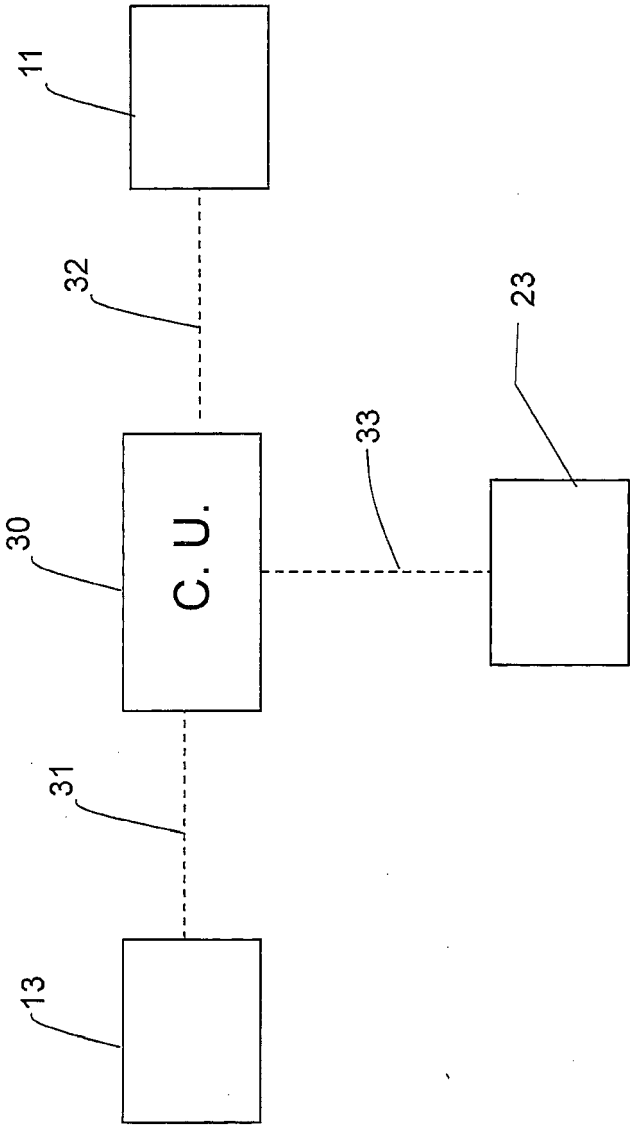

FIG. 2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 14 42 5045

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2009 016645 U1 (HASTAMAT VERPACKUNGSTECHNIK GMBH [DE]) 21 April 2011 (2011-04-21) * paragraph [0015] - paragraph [0024]; figures 1-3 *	1,11	INV. B65B57/14 B65B65/00 B65G47/51 B65G47/71 B65B5/06
A	WO 01/27568 A1 (RECOT INC [US]; BREWER MARVIN VINCENT [US]) 19 April 2001 (2001-04-19) * paragraph 2 - page 11; figures 3a,3b *	1,11	
A	WO 02/060791 A1 (RECOT INC [US]; BREWER MARVIN VINCENT [US]) 8 August 2002 (2002-08-08) * abstract *	1,11	

TECHNICAL FIELDS SEARCHED (IPC)

B65B
B65G
G01G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	28 October 2014	Ungureanu, Mirela

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

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 42 5045

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 202009016645 U1	21-04-2011	DE 202009016645 U1	21-04-2011
		WO 2011069578 A1	16-06-2011
WO 0127568 A1	19-04-2001	AR 027191 A1	19-03-2003
		AU 7877400 A	23-04-2001
		BR 0015010 A	18-06-2002
		CA 2386874 A1	19-04-2001
		CN 1378641 A	06-11-2002
		CO 5280110 A1	30-05-2003
		EP 1222444 A1	17-07-2002
		JP 3814534 B2	30-08-2006
		JP 2003517407 A	27-05-2003
		MX PA02003690 A	23-10-2002
		TW 463944 U	11-11-2001
		US 6235998 B1	22-05-2001
		WO 0127568 A1	19-04-2001
WO 02060791 A1	08-08-2002	BR 0206714 A	01-06-2004
		CA 2433845 A1	08-08-2002
		CN 1489545 A	14-04-2004
		JP 2004523443 A	05-08-2004
		KR 20030070613 A	30-08-2003
		MX PA03006853 A	31-05-2004
		TW 530152 B	01-05-2003
		US 2003127302 A1	10-07-2003
		WO 02060791 A1	08-08-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82