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

(11) **EP 2 199 217 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.06.2010 Bulletin 2010/25

(51) Int Cl.:
B65B 21/06 *(2006.01)* ***B65B 35/44*** *(2006.01)*
B65B 59/00 *(2006.01)*

(21) Application number: **09178660.8**

(22) Date of filing: **10.12.2009**

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

(30) Priority: **12.12.2008 IT MI20082213**

(71) Applicant: **OCME S.r.l.**
43122 Parma (PR) (IT)

(72) Inventor: **Gatteschi, Emanuele**
43121 Parma (PR) (IT)

(74) Representative: **Branca, Emanuela et al**
Barzanò & Zanardo Milano S.p.A.
Via Borgonuovo, 10
20121 Milano (IT)

(54) **Device selecting groups of objects for feeding packaging machines and respective selection method**

(57) A selector device of groups of objects for feeding packaging machines comprises a plurality of independent selection units (20_i), arranged according to rows side-by-side and parallel to each other, and a spacer belt conveyor (30) associated to a compacting pusher (32), wherein each of the independent selection units (20_i) comprises a conveyor (21_i), a feedback motor (22_i) and a photocell (23_i) for controlling the position of a first object (100) in the longitudinal feeding direction (F), and wherein the spacer belt (30) comprises its own motor (31) for feeding the objects (100) at a higher speed with respect to the selection units (20_i).

A selection method of groups of objects for feeding packaging machines is also an object of the present invention.

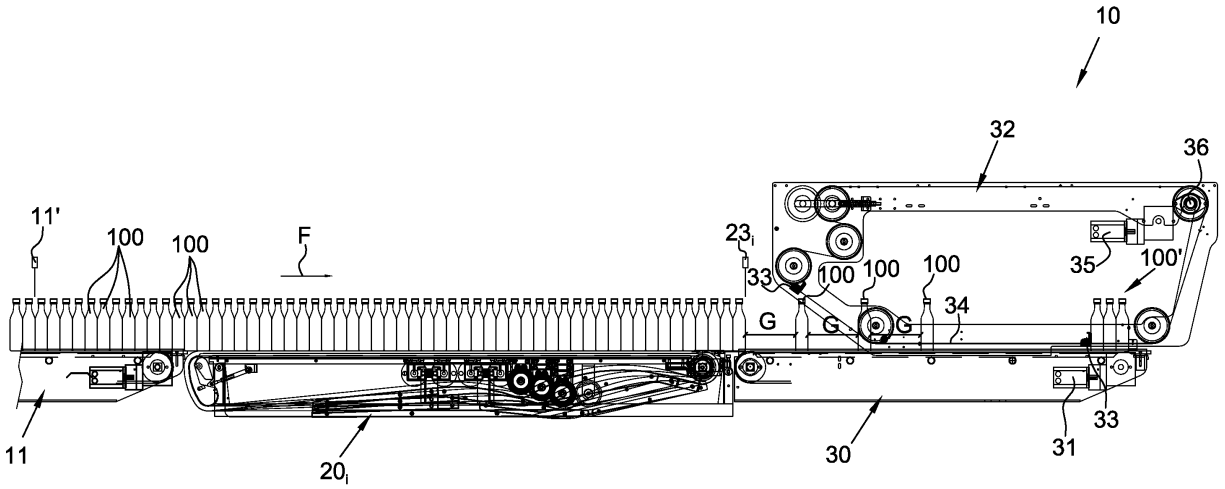

Fig. 1

EP 2 199 217 A1

Description

[0001] The present invention refers to a selector device of groups of objects for feeding packaging machines and to a respective selection method.

[0002] It is known that packaging machines are fed upstream by a device which operates to select the number of objects, usually coming from a gathering conveyor, for example bottles, tins, cases, clusters or packets, which shall subsequently form the final package, for example a box or a bundle.

[0003] Known selector devices, are basically of two types: intermittent or continuous.

[0004] Intermittent selector devices block, for example by means of a press device, the flow of objects coming from a gathering conveyor, arranged along a variable number of rows, for the period of time required to insert a transversal bar, which subsequently spaces groups of objects from each other on a spacer belt for feeding a packaging.

[0005] These systems have speed limits in that the objects advance with an intermittent motion, which above all causes the ensuing stability problems, in particular regarding high and thin products such as bottles.

[0006] Continuous selector devices instead comprise, motor-driven transversal bars synchronized with the feeding of the object, mounted on which are "fingers" which are inserted between the objects to be selected in order to gather them into the amounts making up the groups to be fed to the packaging machine.

[0007] The groups thus gathered are thus spaced from each other on a spacer belt by inserting transversal bars for feeding a packaging machine. This configuration allows high speed operations in that the feeding of the objects occurs continuously.

[0008] However, there arises a drawback in that the "fingers" must be inserted between the objects, usually at the base thereof. Thus, the objects must have a shape capable of allowing the insertion of the "fingers".

[0009] Another drawback is given by the fact that the bars at times must be replaced upon changing the format, i.e. according to the dimensions of the objects and the number of rows.

[0010] The operation principle of the aforedescribed known continuous and intermittent selector devices is based on the fact that the transversal bars or the bars with the "fingers" are respectively inserted between the objects withholding the pressure of the conveyors upstream. The bars dose, at controlled speed, the feeding of the objects in phase with the other devices of the packaging machine.

[0011] An operating drawback of such devices actually lies in the fact that it is entirely based on the principle of controlling the thrust on the objects to be packaged. The thrust, i.e. the pressure, is generated by the friction of the objects on the conveyors, and thus it is influenced by the weight of the objects themselves, by the shape thereof and by the physical conditions of the conveyors, which may be dirty, clean, lubricated, dry.

[0012] Furthermore, the current market trend is that of making containers having more and more irregular shapes and having smaller space for the introduction of the "fingers" therebetween. In particular, regarding plastic material containers, the trend is that of reducing the weight and hence the cost, but obtaining extremely flaccid and deformable bottles which poorly bear pressures being subjected to permanent deformations which cause further reduction of the space for introducing the "fingers".

[0013] Object of the present invention is that of providing a selector device of groups of objects for feeding packaging machines and a respective selection method which does not require generating pressure to be controlled.

[0014] Another object of the present invention is that of obtaining a selector device of groups of objects for feeding packaging machines and a respective selection method which do not employ mechanical devices interfering with the objects limiting the flexibility of the machine, in particular in the format change of the objects to be selected.

[0015] Another object of the present invention is that of obtaining a selector device of groups of objects for feeding packaging machines and a respective method particularly simple and functional, at low costs.

[0016] These objects according to the present invention are attained by providing a selector device of groups of objects for feeding packaging machines and a respective selection method as outlined in the independent claims.

[0017] Further characteristics are outlined in the dependent claims.

[0018] Characteristics and advantages of a selector device of groups of objects for feeding packaging machines and a respective selection method according to the present invention shall be more apparent from the following exemplifying and nonlimiting description, referring to the attached schematic drawings, wherein:

figure 1 is a side view of a selector device of groups of objects for feeding packaging machines, subject of the present invention, arranged downstream of a gathering conveyor, represented according to a first operating mode;

figure 2 is a plan view of figure 1, wherein some objects and components are partly removed for the sake of representation simplicity;

figure 3 shows the selector device of groups of objects for feeding packaging machines, subject of the present invention, represented in a second operating mode;

figure 4 is a plan view of figure 3, wherein some objects and components were partly removed for the sake of clearness.

[0019] Referring to the figures, shown is a selector de-

vice of groups of objects for feeding packaging machines indicated as a whole with 10, suitable to be arranged between a gathering conveyor 11, schematically shown in figures 1 and 2, and a packaging machine, not shown.

[0020] The gathering conveyor 11 is always kept full of objects through a minimum gathering photocontrol 11', of the known type, which stops the machine when the photocontrol is free of objects.

[0021] Objects 100, which must be selected into groups 100', also referred to as packages, in order to be packaged, for example include bottles, tins, cases, clusters, packets or other products, which shall subsequently form, associated in groups 100', an end package, which for example may be a box or bundle.

[0022] The selector device of groups of objects for feeding packaging machines 10, according to the invention, comprises a plurality of independent selection units 20_i, with i being from 1 to n, in the example represented by 1 to 8, arranged according to rows side-by-side and parallel to each other. Each of the selection units 20_i comprises an independent conveyor 21_i, for example a belt, chain or carpet conveyor, an independent feedback motor 22_i and an independent photocell 23_i for controlling the position of the first object 100 of the selection units 20_i in the longitudinal feeding direction F of the selection device 10 (figure 1), arranged at the lower end of each selection unit 20_i.

[0023] Each conveyor 21_i of the corresponding selection unit 20_i is mounted on an independent slide 24_i for adjustment according to the dimensions of the objects 100, which occurs in the transversal direction with respect to the feeding direction F.

[0024] Such adjustment may be obtained by means of manual devices, schematised in the figures by means of handwheels, or by means of feedback independent actuators in position to attain automatic adjustment.

[0025] The selector device of groups of objects for feeding packaging machines 10, according to the invention, further comprises, downstream of the selection units, a spacer belt conveyor 30 for objects, moved by an own motor 31 at a higher speed with respect to the selection units 20_i, so that the objects 100 conveyed thereon are spaced by a predetermined amount, which can be constant and equivalent to G or variable, for example between G_{max} and G_{min}, depending on the dimensions of the package, dependent on the operating mode of the selector device 10, respectively schematized in figures 1-2 and 3-4.

[0026] Arranged at a position overlying the spacer belt 30 is a compacting pusher 32 comprising a plurality of transversal bars 33 mounted on a chain 34 driven by its own motor 35. The transversal bars 33 are controlled in position by an encoder 36.

[0027] A machine control unit, not shown, is used to control the nominal speed of the conveyors 21_i of the selection units 20_i, identical for all conveyors 21_i used, which can be constant or variable depending on the operating mode of the selector device 10, as respectively shown in figures 1-2 and 3-4. The nominal speed depends on the number of objects 100 making up the group 100' to be packaged, on the theoretical dimension of the object 100 and on the number of groups 100' to be packaged per minute, i.e. on the production speed.

[0028] Depending on the configuration and the number of objects 100 that make up the group 100' to be packaged not all selection units 20_i are necessarily used.

[0029] The nominal speed of each conveyor 21_i, is then corrected by the respective photocell 23_i depending on the actual dimension of the objects 100 and possible slipping or deviation that may occur on the various rows.

[0030] In particular, the photocells 23_i detect the actual position of each single object 100 making up the group 100' to be packaged, check the position deviation with respect to the theoretical expected point, thus they accelerate or decelerate the respective motors 22_i of the selection units 20_i by a calculated amount in order to obtain the expected theoretical point. The expected theoretical point, is calculated and controlled by the encoder 36.

[0031] The spacer belt 30 is always driven faster than the conveyors 21_i of the selection units 20_i and therefore the objects 100 are conveyed thereon spaced in the feeding direction F by the predefined amount G or G_{max} or G_{min}.

[0032] According to a first operating mode, schematised in figures 1 and 2, the speed of the spacer belt 30 is constant, just as the nominal speeds of the conveyors 21_i of the selection units 20_i.

[0033] The distance G interposed between the successive objects 100 of each row transported on the spacer belt 30 is thus constant and such to theoretically allow the introduction of the transversal bars 33 between two successive objects 100 of each row. After feeding the number of objects 100 making up the group 100' to be packaged to the conveyor belt 30, a position predefined for the insertion of the transversal bar 33 between successive objects 100 of each row is identified. As a matter of fact, the bars 33 are introduced between successive groups 100', as schematically shown in figure 1.

[0034] The transversal bar 33, controlled in position by the encoder 36, successively follows the group 100' on the spacer belt 30 at a speed higher with respect to that of the belt 30 and thus compacts the objects 100 belonging to the group 100' to be packaged, which are at a more advanced position with respect to the bar 33 in the feeding direction F, pushing them up to arrange them in a compact manner.

[0035] According to a second operating mode, schematised in figures 3 and 4, the speed of the spacer belt 30 is constant, but the nominal speeds of the conveyors 21_i of the selection units 20_i are variable, but always lower than the speed of conveyor belt 30. In particular, when the conveyors 21_i of the selection units 20_i move forward at their maximum speed, the objects 100 are fed to the spacer belt 30 spaced by a minimum predetermined amount G_{min}. Upon the slowing down of the conveyors

21_i of the selection units 20_i, the objects 100 are fed to the spacer belt 30 spaced by a maximum predetermined amount G_{max}.

[0036] The transversal bars 33 are introduced between successive groups 100' of objects 100, as schematically shown in figure 3, at a predetermined position identified by the maximum distance between the products G_{max}.

[0037] Analogously to the description regarding the first operating mode, the transversal bar 33, controlled in position by the encoder 36, successively follows the group 100' on the spacer belt 30 at a speed higher with respect to that of the belt 30 and thus compacts the objects 100 belonging to the group 100' to be packaged, which are at a more advanced position with respect to the bar 33 in the feeding direction F, pushing them up to arrange them in a compact manner.

[0038] Furthermore, the selector device of groups of objects for feeding packaging machines 10, according to the invention, is self-learning upon variation of the dimensions of the objects 100 to be packaged and according to the number of objects arranged on the longitudinal and transversal axis of the device. As a matter of fact, alongside transversal adjustment of the distance between the selection units 20_i, which may be automated, by means of the control unit it is possible to program the operation of the selection units 20_i, i.e. the nominal speed and corrections thereof, according to the format of the objects. Also the operation of the spacer belt 30 and compacting pusher 32 may be programmed according to the format of the objects 100 and to the groups 100' to be packaged.

[0039] In the selector device of groups of objects for feeding packaging machines, according to the invention, selection of the objects according to groups to be packaged is advantageously obtained by continuously feeding each single row of objects at controlled speed and position in an independent manner. For such purpose each row is moved by an autonomous motor with respective connection device which, continuously and in real time, corrects possible time deviations of the objects with respect to the expected theoretical point and thus to the devices arranged downstream in the packaging machine.

[0040] The selector device of groups of objects for feeding packaging machines and the respective selection method subject of the present invention have the advantage of providing the selection without the help of mechanical devices which, alongside risking damaging the objects and slowing the feeding, also require to be replaced upon variation of the format of the objects to be selected.

[0041] The selector device of groups of objects for feeding packaging machines and the respective selection method thus conceived are susceptible to various variants and modifications, all falling within the scope of the invention; furthermore, all details may be replaced by technically equivalent elements. In practice, the materials used, as well as the dimensions, may vary depending on the technical requirements.

Claims

1. Selector device of groups of objects for feeding packaging machines **characterised in that** it comprises a plurality of independent selection units (20_i), arranged according to side-by-side and parallel rows, and a spacer belt conveyor (30) associated with a compacting pusher (32), wherein each of said independent selection units (20_i) comprises a conveyor (21_i), a feedback motor (22_i) and a photocell (23_i) for the control of the position of a first object (100) in the longitudinal feeding direction (F), and wherein said spacer belt conveyor (30) comprises an own motor (31) for the feeding of said objects (100) at a greater speed in relation to the selection units (20_i).

2. Device according to claim 1, **characterised in that** said compacting pusher (32) comprises a plurality of transversal bars (33) mounted on a chain (34) moved by an own motor (35), wherein said transversal bars (33) are controlled in position by an encoder (36).

3. Device according to claim 2, **characterised in that** each of said conveyors (21_i) of said selection units (20_i) is mounted on an independent slide (24_i) for the transversal adjustment with respect to the machine axis depending on the dimensions of the objects (100).

4. Device according to claim 3, **characterised in that** it comprises a machine control unit for the control of a nominal speed of the conveyors (21_i) of said selection units (20_i) depending on the number of objects (100) making up the group (100') to be packaged, on the theoretical dimension of said objects (100) and on the number of groups (100') to be packaged per minute.

5. Device according to claim 1, **characterised in that** said photocells (23_i) are placed at a front end of said selection units (20_i).

6. Selection method of groups of objects for feeding packaging machines, **characterised in that** it comprises the phases of

   - continuously feeding objects (100) to be grouped, according to parallel rows and independently, with a nominal speed and position controlled in a feeding direction (F);
   - correcting continuously and in real time possible timing deviations in the feeding direction (F) of said objects (100) in relation to an expected theoretical point;

- spacing said objects (100) by a predefined amount (G, G_{max}, G_{min}) during the feeding in direction (F);
- compacting a group (100') of spaced objects (100) made up of a predefined number of objects (100) to be packaged.

7. Method according to claim 6, **characterised in that** said spacing phase of said objects (100) by a predefined amount (G, G_{max}, G_{min}) during the feeding in direction (F) is achieved by moving a spacer belt conveyor (30), placed downstream, at a greater speed in relation to the nominal speed of conveyors (21_i) arranged in parallel and upstream from said spacer belt conveyor (30).

8. Method according to claim 7, **characterised in that** said phase of continuously feeding objects (100) to be grouped occurs at a constant nominal speed, said objects (100) being spaced by a constant predefined amount (G).

9. Method according to claim 7, **characterised in that** said phase of continuously feeding objects (100) to be grouped occurs at a variable nominal speed, said objects (100) being spaced by a variable predefined amount (G_{max}, G_{min}), wherein said distance is minimum (G_{min}) between objects (100) belonging to the same group (100') and maximum (G_{max}) between groups (100') of subsequent objects (100), said maximum distance (G_{max}) being obtained by slowing down said upstream conveyors (21_i).

10. Method according to claim 6, **characterised in that** said phase of compacting the objects (100) in groups (100') comprises the phases of

- identifying a predefined position between two subsequent objects (100) of each row, wherein said predefined position is between groups (100') of subsequent objects (100), and
- pushing in the feeding direction (F) the objects (100) belonging to a group (100') to be packaged, at a greater speed in relation to the feeding, up to their compacting.

11. Method according to claim 10 **characterised in that** it is controlled by a programmable control unit for an automatic format change of the objects (100) and the groups (100'), wherein the nominal feeding speed, correction, spacing and compacting are predeterminable and variable with the number of objects (100) making up the group (100') to be packaged, the theoretical dimension of the objects (100) and the number of groups (100') to be packaged per minute.

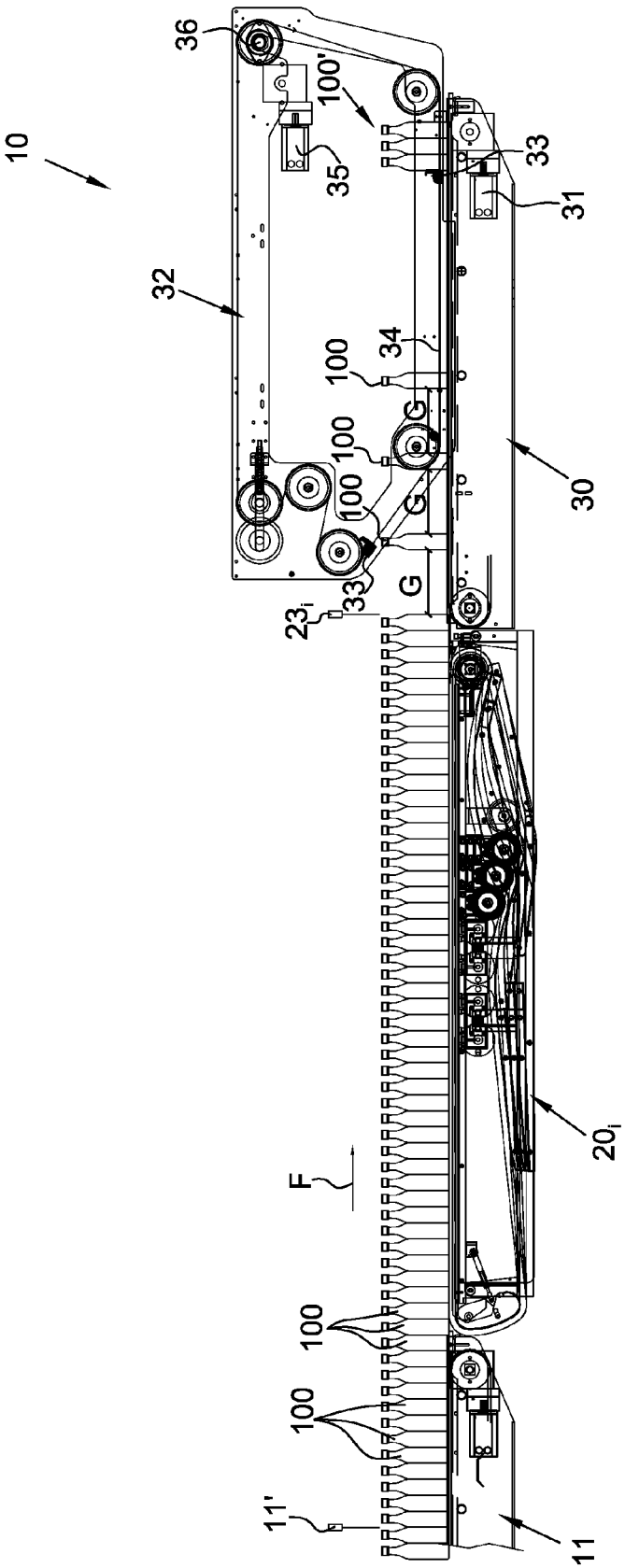
10
36
100'
35
33
31
32
34
100
100
100
G
G
G
30
33
23i
F
100
100
11'
11
20i

Fig. 1

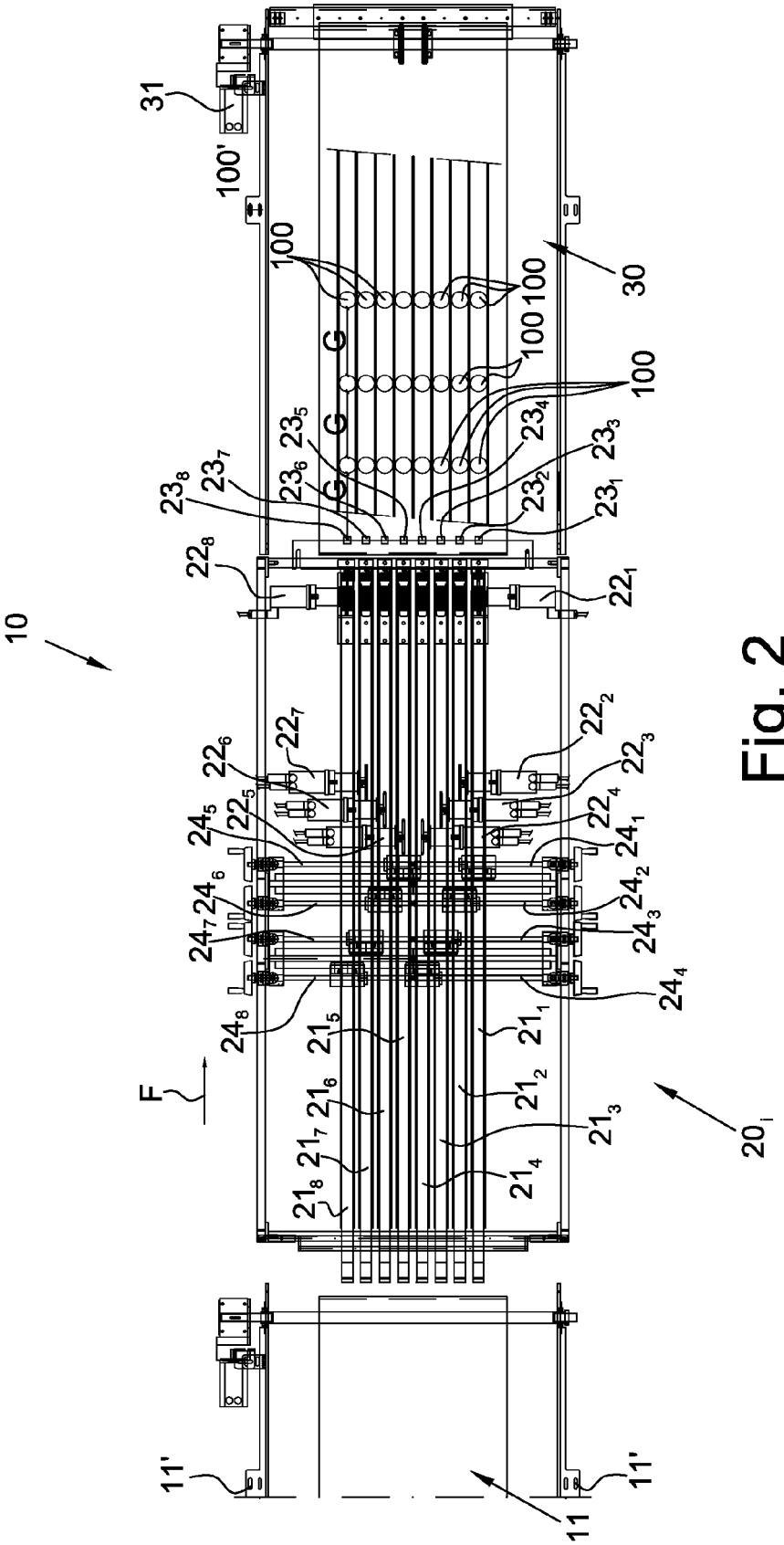
10
31
100'
100
30
G
23_5
23_6
23_7
23_8
23_4
23_3
23_2
23_1
22_8
22_1
22_7
22_6
22_5
24_5
24_6
24_7
24_8
22_2
22_3
22_4
24_1
24_2
24_3
24_4
21_5
21_1
21_6
21_2
21_7
21_3
21_8
21_4
F
20_1
11'
11

Fig. 2

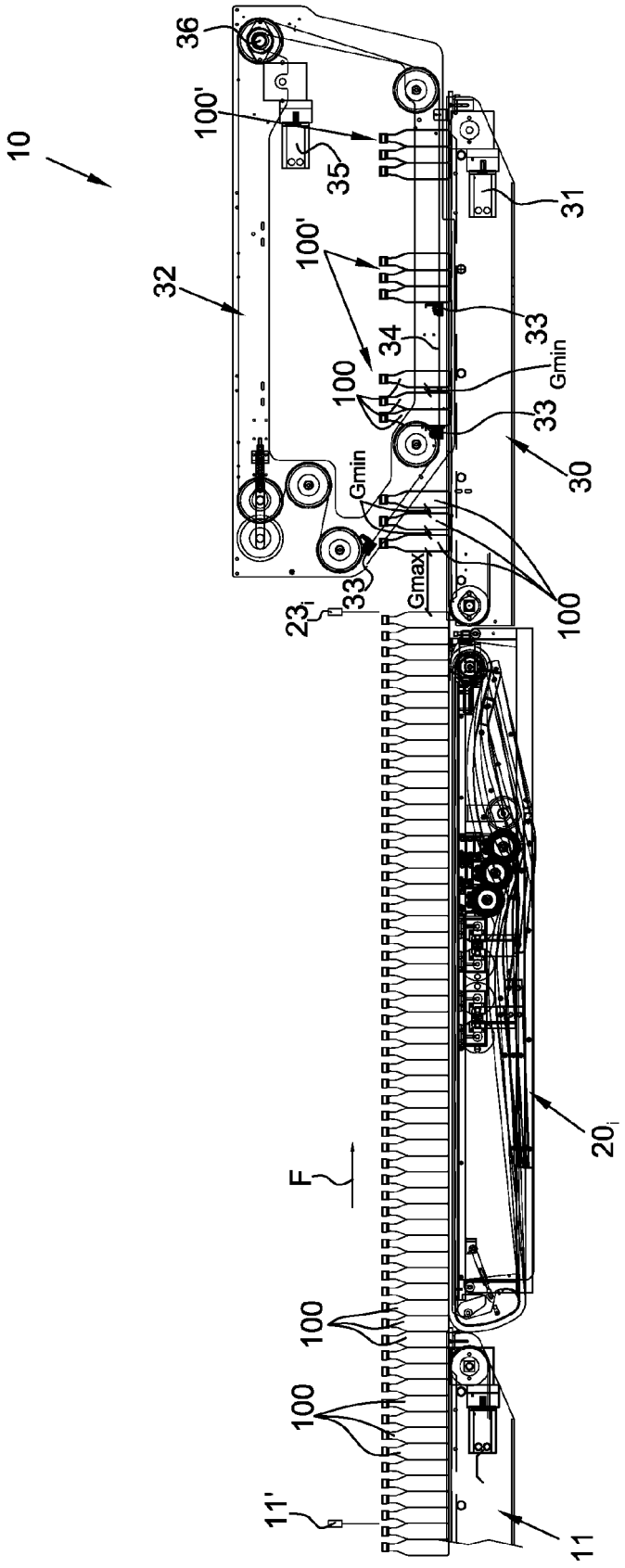
10
36
100'
35
31
32
100'
33
34
100
Gmin
33
Gmin
30
Gmin
33
Gmax
100
23i
20i
F
100
100
11'
11

Fig. 3

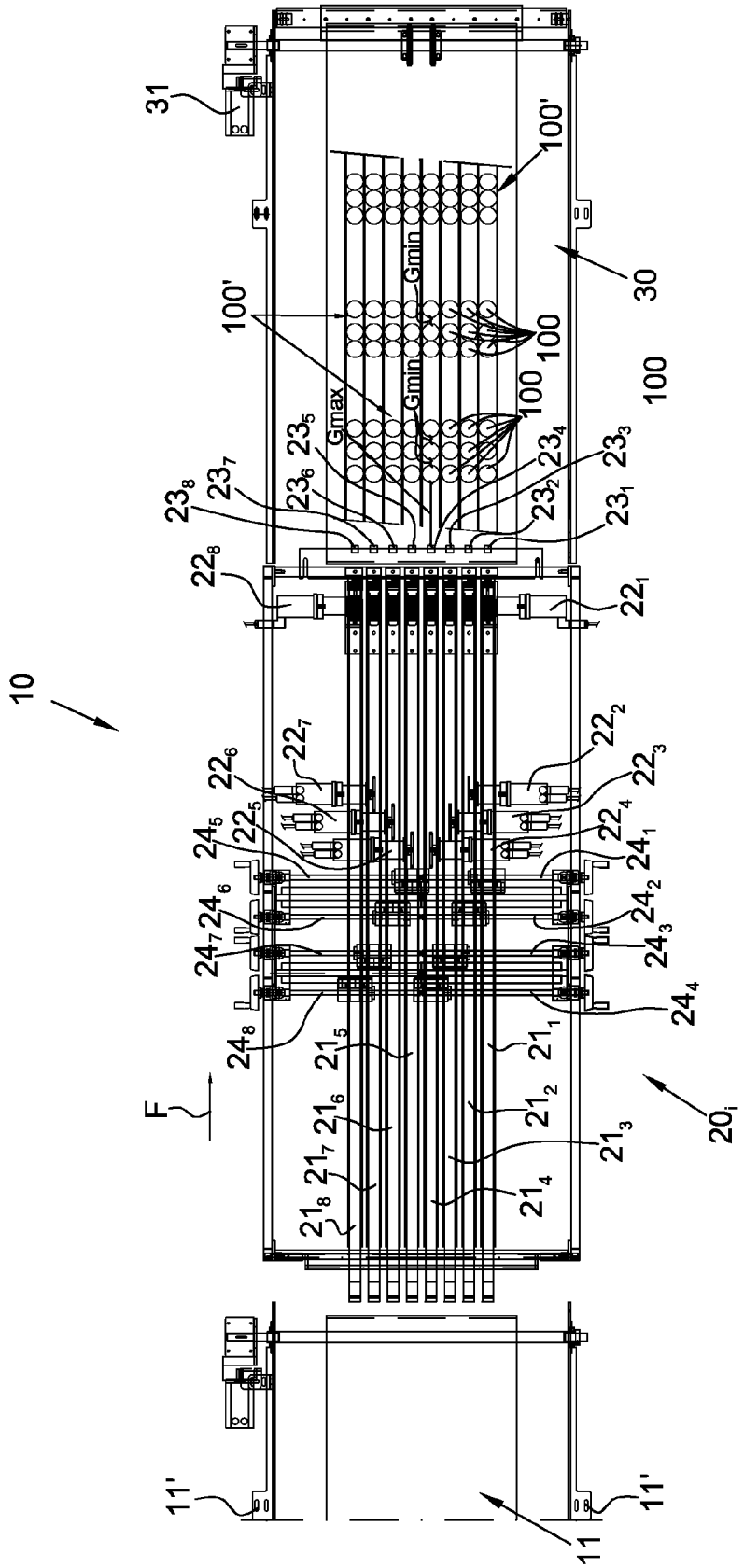
31
100'
30
Gmin
100'
100
Gmax
Gmin
100
100
23_5
23_4
23_3
23_8
23_7
23_6
23_2
23_1
22_8
22_1
10
22_7
22_2
22_6
22_3
22_5
22_4
24_5
24_1
24_6
24_2
24_7
24_3
24_4
24_8
21_5
21_1
F
21_6
21_2
20_i
21_7
21_3
21_4
21_8
11'
11'
11

Fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 17 8660

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	US 5 667 055 A (GAMBETTI MARIO [IT]) 16 September 1997 (1997-09-16) * abstract * * figures 1,2,1a * * column 3, line 47 - line 50 *	1-11	INV. B65B21/06 B65B35/44 B65B59/00
A	US 2004/154902 A1 (SCHOENECK RICHARD JEROME [US] ET AL) 12 August 2004 (2004-08-12) * abstract * * figures 1,2 * * page 3, paragraph 36 *	1-11	
A	US 3 194 382 A (NIGRELLI BIAGIO J ET AL) 13 July 1965 (1965-07-13) * column 2, line 50 - column 3, line 60 * * figures 1-3 *	1-11	
A	EP 0 287 845 A (SEITZ ENZINGER NOLL MASCH [DE]) 26 October 1988 (1988-10-26) * the whole document *	1-11	TECHNICAL FIELDS SEARCHED (IPC)
A	US 6 131 372 A (PRUETT DANIEL W [US]) 17 October 2000 (2000-10-17) * abstract * * column 15, line 52 - column 18, line 34 *	1-11	B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 March 2010	Damiani, Alberto

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 09 17 8660

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.

16-03-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5667055 A	16-09-1997	AU 2317895 A	05-12-1995
		DE 69500173 D1	10-04-1997
		DE 69500173 T2	12-06-1997
		EP 0707555 A1	24-04-1996
		ES 2099000 T3	01-05-1997
		WO 9531390 A1	23-11-1995
		IT BO940215 A1	16-11-1995
US 2004154902 A1	12-08-2004	AU 2003300339 A1	06-09-2004
		WO 2004071891 A2	26-08-2004
US 3194382 A	13-07-1965	NONE	
EP 0287845 A	26-10-1988	BR 8801431 A	08-11-1988
		DE 3710528 A1	20-10-1988
		ES 2029294 T3	01-08-1992
		JP 63288814 A	25-11-1988
		US 4844234 A	04-07-1989
US 6131372 A	17-10-2000	NONE	

EPO FORM P0459

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