



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 310 429 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
14.05.2003 Bulletin 2003/20

(51) Int Cl.7: **B65B 23/06**

(21) Application number: **02257339.8**

(22) Date of filing: **22.10.2002**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SK TR**
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor: **Nambu, Kunio, c/o Nabel Co., Ltd.
Nagaokakyo-City, Kyoto 617-0836 (JP)**

(74) Representative: **Senior, Alan Murray
J.A. KEMP & CO.,
14 South Square,
Gray's Inn
London WC1R 5JJ (GB)**

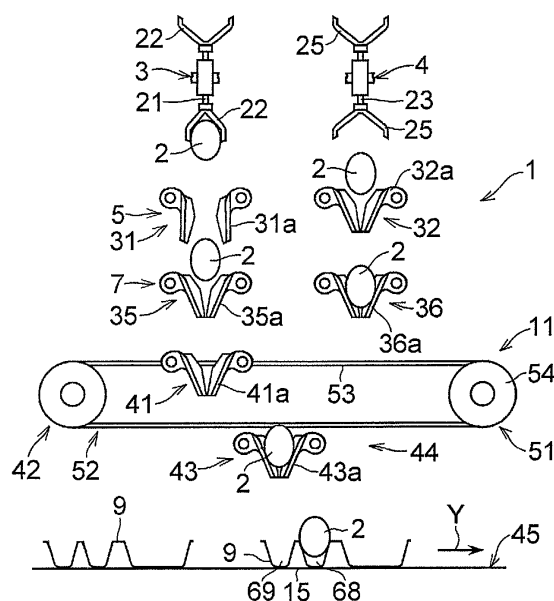
(30) Priority: **23.10.2001 JP 2001325219**

(71) Applicant: **Nabel Co., Ltd.
Nagaokakyo-City, Kyoto 617-0836 (JP)**

(54) **Apparatus for sorting and packaging articles**

(57) An apparatus for sorting and packaging articles (2) includes: a plurality of sorting and distributing devices (3,4) which are translated with respect to each other and respectively convey articles (2), and sort and distribute the articles on the basis of their attribute; a first accommodating and delivering mechanism (5,6) for accommodating the articles distributed from each of the sorting and distributing devices in correspondence with each of the sorting and distributing devices and for delivering the accommodated articles; a second accommodating and delivering mechanism (7,8) for accommodating the articles distributed from the first accommodating and delivering mechanism (5,6) in correspondence with each of the sorting and distributing devices and for delivering the accommodated articles; and a common packaging mechanism (11,12) which, in common to the articles from each of the sorting and distributing devices, accommodate the articles delivered from the second accommodating and delivering mechanism (7,8), and fill and package the accommodated articles in a predetermined container (9), wherein the common packaging mechanism has an accommodating and filling device (44) for filling the accommodated articles in the container (9) in conformity with a filling form determined on the basis of an attribute of the articles.

FIG. 1



EP 1 310 429 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention:

[0001] The present invention relates to an apparatus for sorting and packaging eggs, fruits, and the like.

Description of the Related Art:

[0002] In general, an apparatus for sorting and packaging eggs, for example, is comprised of a raw egg conveyor, a measuring device, a transfer device, a distributing conveyor, and packaging devices. Namely, eggs supplied by the raw egg conveyor are subjected to measurement of their individual weight by the measuring device, are then moved onto the transfer device, and are conveyed in a single row to the packaging devices by the single-line distributing conveyor.

[0003] The packaging devices are provided for the respective weight classifications of the eggs, e.g., 2L, L, M, MS, S, 2S, and nonstandards. The eggs conveyed in a single row by the distributing conveyor are sorted and distributed to a receiving portion of the packaging device corresponding to the weight classification to which they belong. Then, when one row of eggs, e.g., five eggs, in a number for accommodation in a container such as a packaging pack are collected in the receiving portion, the packaging device collectively discharges the relevant five eggs as a group into the container.

[0004] In conjunction with the trend in recent years toward manufacturing larger apparatuses for sorting and packaging eggs, their egg processing capability has improved remarkably to more than 30,000 eggs per hour, but there has been a demand for further improvement in the processing capability. To cope with such a demand, it is generally conceivable to increase the speed of the distributing conveyor for conveying the eggs in the single row or provide a plurality of lines of distributing conveyors.

[0005] However, since the eggs are very liable to become damaged, there is a limit to increasing the speed of the distributing conveyor, and if a plurality of lines of distributing conveyors are provided and the number of packaging devices is increased correspondingly, a large space is required and this arrangement is uneconomical.

[0006] The distribution of the weight of eggs has a certain dispersion in which, with a central value (central egg weight) set as an apex, the farther away from the central value, the more the number of eggs in each weight classification decreases. Therefore, it can be expected that eggs are concentrated on a packaging device corresponding to a particular weight classification depending on cases. If eggs of the same standard are concentrated, though temporarily, in a particular packaging device and its processing capability is exceeded, it results in a

decline in the overall processing capability of the apparatus.

[0007] To cope with the demand for improvement of the processing capability, an apparatus disclosed in JP-A-6-211213 (U.S. Pat. No. 5,232,080) has been proposed. In this proposed apparatus, first-stage receiving portions whereby eggs which are released from a four-track distributing conveyor according to their weight classifications are respectively received one by one on a predetermined number of accommodating seats are provided underneath the respective tracks of the distributing conveyor. A transfer conveyor for transferring the predetermined number of eggs received from the first-stage receiving portions is provided below the first-stage receiving portions. Further, final-stage receiving portions are disposed whereby the predetermined number of eggs released from the transfer conveyor are collectively received by or into a predetermined number of accommodating seats and are collectively released to a container on a container conveyor.

[0008] However, with this apparatus, since the receiving portions provided underneath the distributing conveyor receive the eggs released from the distributing conveyor, and release them immediately to the transfer conveyor serving as the packaging device, there is a problem in that the temporary concentration of the eggs directly leads to a decline in the overall processing capability of the apparatus.

[0009] In addition, JP-A-7-291213 discloses an apparatus which prevents a decline in the overall processing capability of the apparatus by coping with the temporary concentration of the eggs in a particular packaging device while enhancing the processing capability by providing two lines of distributing conveyors each adapted to convey eggs in a single row without increasing the number of packaging devices.

[0010] However, with the apparatus disclosed in JP-A-7-291213, since the receiving position of a pool section when the eggs are received from first-stage receiving portions and the release position of the pool section when the eggs are released to final-stage receiving portions are set at the same location (bent portion), the eggs cannot be released to the final-stage receiving portions while an empty pool section having no eggs accommodated in its accommodating seats is continuing the operation of receiving the eggs at the receiving position. Namely, in the apparatus disclosed in JP-A-7-291213, for instance, in a case where the eggs are continuously concentrated in both two lines of distributing conveyors, the pool sections corresponding to the two lines of distributing conveyors continuously perform the operation of receiving the eggs from the first-stage receiving portions. During this receiving operation, the eggs cannot be released from the pool sections to the final-stage receiving portions, so that the final-stage receiving portions are in an idle state. Hence, there is a problem in that the processing capability of the apparatus in and after the final-stage receiving portions drops.

[0011] In addition, in a case where eggs having different sizes depending on the relative weight of the eggs are sorted into weight classifications and are packaged for each weight classification, containers corresponding to the respective weight classifications are supplied. However, since such a container has accommodating seats arranged at intervals corresponding to the weight classification, unless the charging, transfer, and the like of the eggs into the container are effected with these intervals, packaging is undesirably effected in a state in which eggs have jumped out of the container and empty seats are present, i.e., the number of eggs lacks, or the eggs are accommodated in the container without being properly seated in the accommodating seats, resulting in the difficulty in sealing the container or the breakage of the eggs.

[0012] The above-described problems can occur not only in the sorting and packaging apparatus for sorting eggs according to their weight classifications and packaging them according to these weight classifications, but also in the sorting and packaging apparatus for sorting fruits or the like according to their attributive classifications of such as weight, size, length, color, and the like and packaging them according to these classifications.

SUMMARY OF THE INVENTION

[0013] The present invention has been devised in view of the above-described circumstances, and it is an object of the present invention to provide a sorting and packaging apparatus in which even if two or more articles are translated, it is unnecessary to increase the number of packaging devices correspondingly, and in which even if articles of a particular attribute are temporarily concentrated, it is possible to appropriately cope with the concentration to favorably avoid the situation of such as the interruption of sorting and packaging, thereby making it possible to enhance the processing capability, as desired.

[0014] Another object of the present invention is to provide a sorting and packaging apparatus which makes it possible to sort and package articles without the occurrence of such problems as a shortage in the number of articles, the difficulty in sealing the container, and the breakage of the articles.

[0015] To these ends, in accordance with a first aspect of the invention, there is provided an apparatus for sorting and packaging articles, comprising: a plurality of sorting and distributing means for respectively conveying articles, and sorting and distributing the articles on the basis of their attribute, the plurality of sorting and distributing means being adapted to be translated with respect to each other; first accommodating and delivering means for accommodating the articles distributed from each of the sorting and distributing means in correspondence with each of the sorting and distributing means and for delivering the accommodated articles

therein; second accommodating and delivering means for accommodating the articles delivered from the first accommodating and delivering means in correspondence with each of the sorting and distributing means and for delivering the accommodated articles therein; and common packaging means for accommodating the articles delivered from the second accommodating and delivering means, and for filling and packaging the accommodated articles therein in a predetermined container, in common to the articles from each of the sorting and distributing means, wherein the common packaging means has accommodating and filling means for filling the accommodated articles therein in the container in conformity with a filling form determined on the basis of an attribute of the articles.

[0016] In accordance with the sorting and packaging apparatus according to the first aspect of the invention, since the common packaging means has the accommodating and filling means for filling the accommodated articles therein in the container in conformity with the filling form determined on the basis of the attribute of those articles, the articles can be filled, as required, in the container without an error, and the articles can be sorted and packaged without causing the occurrence of such problems as a shortage in the number of articles, the difficulty in sealing the container, and the breakage of the articles.

[0017] In the apparatus for sorting and packaging articles in accordance with a second aspect of the invention, the common packaging means further has selectively collecting and delivering means for selectively collecting and accommodating with respect to each of the sorting and distributing means the articles delivered from the second accommodating and delivering means and for delivering the accommodated articles therein, and the accommodating and filling means is adapted to accommodate the articles delivered from the selectively collecting and delivering means.

[0018] In the apparatus for sorting and packaging articles in accordance with a third aspect of the invention, the second accommodating and delivering means is adapted to selectively deliver the accommodated articles therein with respect to the articles from each of the sorting and distributing means, and the selectively collecting and delivering means is adapted to selectively collect and accommodate with respect to each of the sorting and distributing means the articles delivered from the second accommodating and delivering means in synchronism with the selective delivery of the articles by the second accommodating and delivering means.

[0019] In the apparatus for sorting and packaging articles in accordance with a fourth aspect of the invention, the first accommodating and delivering means is adapted to collectively deliver an accommodated group of articles therein, the second accommodating and delivering means is adapted to accommodate in correspondence with each of the sorting and distributing means the group of articles collectively delivered from the first ac-

commodating and delivering means and to collectively deliver the accommodated group of articles therein, the common packaging means is adapted to accommodate the group of articles delivered from the second accommodating and delivering means and to fill and package the accommodated group of articles therein in a predetermined container, the selectively collecting and delivering means is adapted to selectively collect and collectively accommodate with respect to each of the sorting and distributing means the group of articles from the second accommodating and delivering means and deliver the accommodated group of articles therein, and the accommodating and filling means is adapted to accommodate the group of articles delivered from the selectively collecting and delivering means and fill the accommodated group of articles therein in the container in conformity with the filling form determined on the basis of the attribute of the articles.

[0020] In accordance with the sorting and packaging apparatus according to the second to fourth aspects of the invention, the common packaging means is adapted to accommodate in common to the articles from each of the sorting and distributing means the articles delivered from the second accommodating and delivering means, and fill and package those accommodated articles therein in a predetermined container. Further, the packaging means has the selectively collecting and delivering means for selectively collecting and accommodating the articles in the second accommodating and delivering means concerning each of the sorting and distributing means and for delivering those accommodated articles. Accordingly, even if a plurality of sorting and distributing means are provided which are translated with respect to each other and respectively convey articles, and sort and distribute the articles on the basis of their attribute, it is unnecessary to increase the number of packaging devices correspondingly. Moreover, since the second accommodating and delivering means is adapted to accommodate the articles delivered from the first accommodating and delivering means in correspondence with each of the sorting and distributing means, and to deliver the accommodated articles, i.e., since the second accommodating and delivering means functions as a standby means (buffer means), even if the articles of a particular attribute are temporarily concentrated, these articles can be temporarily set on standby in the second accommodating and delivering means, and an abnormal situation such as the interruption of sorting and packaging can be favorably avoided, thereby making it possible to enhance the processing capability, as desired.

[0021] As in the apparatus for sorting and packaging articles in accordance with a fifth aspect of the invention, the selectively collecting and delivering means in a preferred example includes a group of accommodating seat members for accommodating the articles delivered from the second accommodating and delivering means and reciprocating means for reciprocating the group of ac-

commodating seat members to allow the group of accommodating seat members to selectively collect with respect to each of the sorting and distributing means the articles delivered from the second accommodating and delivering means.

[0022] The reciprocating means may be comprised of an electromagnetic actuator unit, a fluid pressure cylinder unit, or an endless belt device for reciprocating the group of accommodating seat members.

[0023] Further, as in the apparatus for sorting and packaging articles in accordance with a sixth aspect of the invention, the reciprocating means is preferably adapted to reciprocate the group of accommodating seat members so that a reciprocating speed after the collection of the articles becomes slower than a reciprocating speed of the group of accommodating seat members for the collection of the articles.

[0024] If the reciprocating means is arranged as described above, the collection of the articles can be effected at high speed, and the collected articles can be delivered to the accommodating and filling means without causing such as the breakage of the collected articles.

[0025] As in the apparatus for sorting and packaging articles in accordance with a seventh aspect of the invention, the accommodating and filling means in a preferred example has a group of accommodating seat members for accommodating the articles delivered from the selectively collecting and delivering means or the articles delivered from the second accommodating and delivering means, as well as vertically moving means for vertically moving the group of accommodating seat members.

[0026] In the accommodating and filling means, by vertically moving the group of accommodating seat members by the vertically moving means, the accommodation of the articles from the selectively collecting and delivering means or the articles from the second accommodating and delivering means and the filling of the articles in the accommodating and filling means can be effected without causing such as an accommodation error, a filling error, and the breakage of the articles.

[0027] In accordance with an eighth aspect of the invention, in the apparatus for sorting and packaging articles according to the above-described seventh aspect of the invention, the accommodating seat members of the group of accommodating seat members for accommodating the articles delivered from the selectively collecting and delivering means or the articles delivered from the second accommodating and delivering means are provided such that an interval between adjacent ones of the accommodating seat members is variable, and the accommodating and filling means has interval changing means for changing the interval between adjacent ones of the accommodating seat members of the group of accommodating seat members on the vertical movement of the group of accommodating seat members by the vertically moving means.

[0028] As in the apparatus for sorting and packaging articles in accordance with a ninth aspect of the invention, one of the filling forms in the present invention includes an interval between adjacent ones of accommodating seats of the container, and the interval changing means is adapted to change the interval between adjacent ones of the accommodating seat members of the group of accommodating seat members such that the interval between adjacent ones of the accommodating seat members of the group of accommodating seat members is made to conform to an interval between adjacent ones of the articles delivered from the selectively collecting and delivering means or the articles delivered from the second accommodating and delivering means and to the interval between adjacent ones of the accommodating seats of the container on the vertical movement of the group of accommodating seat members by the vertically moving means.

[0029] In accordance with the sorting and packaging apparatus according to the eighth and ninth aspects of the invention, the accommodation of articles from the selectively collecting and delivering means or articles from the second accommodating and delivering means, and the filling of articles in the accommodating and filling means, which do not cause such as an accommodation error, a filling error, and the breakage of articles, can be effected in one action through the cooperation of the vertically moving means and the interval changing means. Consequently, it is possible to realize high-speed sorting and packaging.

[0030] In the sorting and packaging apparatus according to the eighth or ninth aspect of the invention, the accommodating seat members of the group of accommodating seat members for accommodating the articles delivered from the selectively collecting and delivering means or the articles delivered from the second accommodating and delivering means are preferably arranged in a row and are formed as an accommodating seat member row as in the case of the sorting and packaging apparatus in accordance with a 10th aspect of the invention. In this case, the interval changing means may include resilient members disposed between adjacent ones of the accommodating seat members of the accommodating seat member row which are movable with respect to each other, as well as one-end-side moving means for moving the accommodating seat member on one end side of the accommodating seat member row toward the accommodating seat member on another end side thereof in response to a movement of the accommodating seat member row by the vertically moving means, and the one-end-side moving means may include a pressing member for pressing the accommodating seat member on the one end side of the accommodating seat member row and an arm member which, at one end portion thereof, is rotatably connected to the pressing member and which, at another end portion thereof, is positionally adjustable and is supported rotatably.

[0031] As in the sorting and packaging apparatus in accordance with an 11th aspect of the invention, the interval changing means in the sorting and packaging apparatus according to the 10th aspect of the invention may further include other-end-side moving means for moving the accommodating seat member on the other end side of the accommodating seat member row toward the accommodating seat member on the one end side thereof in response to the movement of the accommodating seat member row by the vertically moving means, and in this case, the other-end-side moving means may include another pressing member for pressing the accommodating seat member on the other end side of the accommodating seat member row and another arm member which, at one end portion thereof, is rotatably connected to the other pressing member and which, at another end portion thereof, is positionally adjustable and is supported rotatably. In addition, as in the sorting and packaging apparatus in accordance with a 12th aspect of the invention, the interval changing means in the sorting and packaging apparatus according to the 10th aspect of the invention may further include a fixing member for fixing the accommodating seat member on the other end side of the accommodating seat member row.

[0032] In the present invention, the articles may be any one of eggs, fruits, and the like, and their attribute may be their size, weight, length, or color, or a combination of at least two of these attributes. As in the apparatus for sorting and packaging articles in accordance with a 13th aspect of the invention, preferably, the articles are eggs, and the attribute is the weight of the eggs. In this case, the sorting and distributing means is adapted to downwardly release the eggs with their long axes set substantially vertically to distribute the eggs, and the accommodating and delivering means is adapted to accommodate the eggs from above and collectively release from below to deliver the accommodated eggs therein.

[0033] In a preferred example, to prevent the concurrence of the delivery of articles to the packaging means concerning articles from one sorting and distributing means and the delivery of articles to the packaging means concerning articles from another sorting and distributing means, the second accommodating and delivering means is adapted to effect these deliveries selectively.

[0034] In the present invention, the selective collection and the selective delivery are effected on the basis of at least one of the number of articles being presently accommodated in the first accommodating and delivering means, the number of articles and the number of groups of articles being presently accommodated in the second accommodating and delivering means, and the number of articles which are to be distributed to the first accommodating and delivering means and are present in the sorting and distributing means, preferably such that the number of articles sorted and packaged per unit

time becomes maximum.

[0035] As containers (packaging containers) in which the articles are filled in the present invention, various containers are preferably used on the basis of the attribute of the articles. In the case where eggs are used as the articles, the containers may be transparent packs or paper packs each containing a total of 10 eggs in two rows each consisting of 5 eggs or paper trays each containing a total of 30 eggs in 5 columns x 6 rows. Preferably, each accommodating seat member may form a pocket for accommodating the article.

[0036] In accordance with the invention, it is possible to provide a sorting and packaging apparatus in which even if two or more articles are translated, it is unnecessary to increase the number of packaging devices correspondingly, and in which even if articles of a particular attribute are temporarily concentrated, it is possible to appropriately cope with the concentration to favorably avoid the situation of such as the interruption of sorting and packaging, thereby making it possible to enhance the processing capability, as desired.

[0037] In addition, in accordance with the invention, it is possible to provide a sorting and packaging apparatus which makes it possible to sort and package articles without the occurrence of such problems as a shortage in the number of articles, the difficulty in sealing the container, and the breakage of the articles.

[0038] A detailed description will be given hereafter of the embodiments of the present invention on the basis of the illustrated preferred examples which concern eggs as articles, but the present invention is not limited to these embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

Fig. 1 is an explanatory view of a preferred embodiment of the invention as taken along line I - I in the direction of arrows shown in Fig. 2;

Fig. 2 is a schematic plan view of the apparatus for sorting and packaging eggs in accordance with the embodiment of the invention;

Fig. 3 is a side elevational view of the sorting and packaging apparatus shown in Fig. 1;

Fig. 4 is a diagram explaining the operation of the sorting and packaging apparatus shown in Fig. 1;

Fig. 5 is an explanatory diagram of another preferred embodiment of the invention;

Fig. 6 is an explanatory diagram of still another preferred embodiment of the invention; and

Fig. 7 is an explanatory diagram of a further preferred embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0040] Referring now to the accompanying drawings,

a detailed description will be given of a preferred embodiment of the invention in which eggs are used as articles.

[0041] A sorting and packaging apparatus in accordance with this embodiment shown in Figs. 1 to 3 is comprised of: a plurality of, in this embodiment two, sorting and distributing means 3 and 4 which are translated with respect to each other, convey eggs 2 serving as articles in an X direction in a single row, and sort the eggs 2 according to weight classifications L and M on the basis of their attribute, i.e., weight in this embodiment, and distribute them; accommodating and delivering means 5 and 6 for accommodating the eggs 2 distributed from each of the sorting and distributing means 3 and 4 in correspondence with each of the sorting and distributing means 3 and 4, and for collectively delivering a group of eggs 2 accommodated therein, i.e., a group of five eggs 2 in this embodiment; accommodating and delivering means 7 and 8 for accommodating the group of eggs 2 collectively delivered from the accommodating and delivering means 5 and 6 in correspondence with each of the sorting and distributing means 3 and 4, and for collectively delivering that accommodated group of eggs 2 selectively with respect to the eggs 2 from each of the sorting and distributing means 3 and 4; and common packaging means 11 and 12 which, in common to the eggs 2 from each of the sorting and distributing means 3 and 4, accommodate the group of eggs 2 selectively delivered from the accommodating and delivering means 7 and 8, and fill and package that accommodated group of eggs 2 in predetermined containers, i.e., in this embodiment, transparent containers 9 used for the eggs 2 of the weight classification L and each having 10 pockets to contain 10 eggs in a total of two rows each consisting of 5 eggs and transparent containers 10 used for the eggs 2 of the weight classification M and each having 10 pockets to contain 10 eggs in a total of two rows each consisting of 5 eggs.

[0042] The processing of sorting and packaging is generally effected in a series of processes involving washing, arrangement (arrangement of pointed ends in order), inspection, weight measurement, distribution (sorting), and packaging. In a sorting and packaging apparatus 1 shown in Figs. 1 to 3, a washing device, an arranging device, an inspecting device, and a weight measuring device are omitted. The eggs 2 are distributed after being sorted into the weight classifications L and M as described above on the basis of the weight measured by the weight measuring device, and the eggs 2 in the weight classification L are packaged in the containers 9, while the eggs 2 of the weight classification M are packaged in the containers 10. A set 17 which is comprised of the accommodating and delivering means 5 and the accommodating and delivering means 7, which are disposed above an endless conveyor belt 15 for conveying the containers 9, and the packaging means 11 including the conveyor belt 15, as well as a set 18 which is comprised of the accommodating and delivering

means 6 and the accommodating and delivering means 8, which are disposed above a conveyor belt 16 for conveying the containers 10, and the packaging means 12 including the conveyor belt 16, are constructed in a mutually similar manner. Therefore, a detailed description will be given hereafter of the set 17 comprised of the accommodating and delivering means 5, the accommodating and delivering means 7, and the packaging means 11, and the set 18 will be described as required. It should be noted that in a case where the eggs 2 are sorted into seven weight classifications including 2L, L, M, MS, S, 2S, and nonstandards, at least seven sets each comprised of one accommodating and delivering means, another accommodating and delivering means, and the packaging means are installed correspondingly.

[0043] The sorting and distributing means 3 and 4 are respectively constructed in a similar manner. The sorting and distributing means 3 includes an endless distributing conveyor 21 caused to travel in an X direction and a plurality of fingers 22 attached to the distributing conveyor 21 at equal intervals and adapted to hold the eggs 2, the distributing conveyor 21 being installed parallel to a distributing conveyor 23 of the sorting and distributing means 4. Also, the sorting and distributing means 4 includes the endless distributing conveyor 23 caused to travel in the X direction and a plurality of fingers 25 attached to the distributing conveyor 23 at equal intervals and adapted to hold the eggs 2. When the egg 2 corresponding to the weight classification L among the eggs 2 being held is transported to and arrives at a position above an empty accommodating seat member in an accommodating seat member row 31 serving as a corresponding group of accommodating seat members of the accommodating and delivering means 5, the fingers 22 are adapted to cancel holding, downwardly release the relevant egg 2 with its long axis set substantially vertically, and distribute it to the empty accommodating seat member. Similarly, the fingers 25 are adapted to downwardly release the egg 2, which corresponds to the weight classification L, with its long axis set substantially vertically and distribute it to an empty accommodating seat member in an accommodating seat member row 32 serving as a corresponding group of accommodating seat members of the accommodating and delivering means 5.

[0044] In a case where empty accommodating seat members capable of releasing the eggs 2 corresponding to the weight classification L are not present in the accommodating seat member row 31, i.e., in a case where the accommodating seat member row 31 is temporarily full with the eggs 2 corresponding to the weight classification L, the fingers 22 are adapted to hold such eggs 2 corresponding to the weight classification L as they are and temporarily release those eggs 2 at a downstream position as viewed in the X direction. The eggs 2 thus released are arranged to be returned to the original position so as to be utilized again in sorting and packaging. Alternatively, the fingers 22 may be operated

such that the egg 2 which could not be released to any accommodating seat member of the accommodating seat member row 31 is circulatingly transported until any one of the accommodating seat members of the accommodating seat member row 31 becomes empty. The same applies to the fingers 25 as well.

[0045] The accommodating and delivering means 5 is comprised of the accommodating seat member row 31 disposed below the distributing conveyor 21 and consisting of five openable accommodating seat members 31a to 31e arranged in a row horizontally in the X direction for accommodating from above the eggs 2 released downward and distributed from the fingers 22 as the weight classification L on the basis of the measured weight, as well as the accommodating seat member row 32 disposed below the distributing conveyor 23 and consisting of five openable accommodating seat members (only the accommodating seat member 32a is shown) arranged in a row horizontally in the X direction for accommodating from above the eggs 2 released and distributed from the fingers 25 as the weight classification L on the basis of the measured weight. When the eggs 2 of the weight classification L are accommodated in all of the five accommodating seat members 31a to 31e in the closed state, the accommodating seat member row 31 is adapted to open the respective accommodating seat members 31a to 31e to collectively release from below such five eggs 2 and deliver them downward. Also, the accommodating seat member row 32 is arranged in the same way as the accommodating seat member row 31, and when the eggs 2 of the weight classification L are accommodated in all of the five accommodating seat members in the closed state including the accommodating seat member 32a, the accommodating seat member row 32 is adapted to open the respective accommodating seat members including the accommodating seat member 32a to collectively release from below the five eggs 2 and deliver them downward.

[0046] The accommodating and delivering means 7 is comprised of accommodating seat member rows, i.e., two accommodating seat member rows 35 and 36 in this embodiment, which serve as a plurality of accommodating seat member groups for respectively accommodating in correspondence with each of the sorting and distributing means 3 and 4 five eggs 2 collectively delivered from the accommodating and delivering means 5. The arrangement provided is such that one of the two accommodating seat member rows 35 and 36 is selected, and the five eggs 2 accommodated in that accommodating seat member row are collectively delivered.

[0047] The accommodating seat member row 35 is disposed below the accommodating seat member row 31 corresponding to the sorting and distributing means 3 and consists of five openable accommodating seat members 35a to 35e arranged in a row horizontally in the X direction for accommodating from above the five eggs 2 released and delivered collectively from the ac-

accommodating seat member row 31. Meanwhile, the accommodating seat member row 36 is disposed below the accommodating seat member row 32 corresponding to the sorting and distributing means 4 and consists of five openable accommodating seat members (only the accommodating seat member 36a is shown) arranged in a row horizontally in the X direction for accommodating from above the five eggs 2 released and delivered collectively from the accommodating seat member row 32.

[0048] In a case where the eggs 2 are accommodated in all of the five accommodating seat members 35a to 35e in the closed state, when those accommodated eggs 2 are selected so as to be delivered to the packaging means 11, the accommodating seat member row 35 is adapted to open the respective accommodating seat members 35a to 35e to collectively release from below the five eggs 2 and deliver them downward. Also, the accommodating seat member row 36 is arranged in the same way, and in a case where the eggs 2 are accommodated in all of the five accommodating seat members in the closed state including the accommodating seat member 36a, when those accommodated eggs 2 are selected so as to be delivered to the packaging means 11, the accommodating seat member row 36 is adapted to open all the accommodating seat members including the accommodating seat member 36a to collectively release from below the five eggs 2 and deliver them downward.

[0049] To prevent the concurrence of the delivery of the five eggs 2 from the accommodating seat member row 35 to the packaging means 11 concerning the eggs 2 from the sorting and distributing means 3 and the delivery of the five eggs 2 from the accommodating seat member row 36 to the packaging means 11 concerning the eggs 2 from the sorting and distributing means 4, the accommodating and delivering means 7 is adapted to effect these deliveries selectively. Also, on the basis of at least one of the number of the eggs 2 being presently accommodated in the accommodating and delivering means 5, the number of the eggs 2 being presently accommodated in the accommodating and delivering means 7 and the number of groups of eggs each consisting of five eggs accommodated therein, and the number of the eggs 2 determined to be distributed to the accommodating and delivering means 5 and being present in the sorting and distributing means 3 and 4, i. e., the number of the eggs 2 being transported by the sorting and distributing means 3 and 4 in this embodiment, the accommodating and delivering means 7 is adapted to select five eggs 2 to be delivered to the packaging means 11 concerning the eggs 2 from each of the sorting and distributing means 3 and 4 so as to minimize the number of those eggs 2 that correspond to the weight classification L but are held as they are by the fingers 22 and 25 without being distributed to the accommodating and delivering means 5 and are temporarily released at a downstream position as viewed in

the X direction so as to be utilized again in sorting and packaging.

[0050] Accordingly, the accommodating and delivering means 7 is arranged such that even in a case where the eggs 2 are accommodated earlier in, for example, the accommodating seat members including the accommodating seat member 36a in the accommodating seat member row 36 and the eggs 2 have not yet been accommodated in the accommodating seat members 35a to 35e in the accommodating seat member row 35, the accommodating seat members 35a to 35e in the accommodating seat member row 35 collectively accommodate the eggs 2 from the accommodating seat member row 31 before the accommodating seat members including the accommodating seat member 32a in the accommodating seat member row 32 become full because the number of eggs 2 corresponding to the weight classification L and being transported by the sorting and distributing means 3 is quite more numerous than the number of eggs 2 corresponding to the weight classification L and being transported by the sorting and distributing means 4. Further, in a case where there is a possibility that the accommodating seat members 31a to 31e in the accommodating seat member row 31 thereby emptied become full again, the accommodating and delivering means 7 preferentially selects the five eggs 2 accommodated in the accommodating seat members 35a to 35e in the accommodating seat member row 35 as the eggs 2 to be delivered to the packaging means 11, without selecting the five eggs 2 accommodated earlier in the accommodating seat members including the accommodating seat member 36a in the accommodating seat member row 36.

[0051] Namely, the accommodating and delivering means 7 is adapted to select from between the accommodating seat member rows 35 and 36 the eggs 2 to be delivered to the packaging means 11 such that the number of eggs 2 corresponding to the weight classification L and sorted and packaged per unit time becomes maximum.

[0052] The packaging means 11 is adapted to collectively accommodate five eggs 2 delivered from the accommodating seat member rows 35 and 36 of the accommodating and delivering means 7. More specifically, the packaging means 11 is comprised of a selectively collecting and delivering means 42 having a plurality of accommodating seat members, i. e., five accommodating seat members 41a to 41e in this embodiment, which, in synchronism with the selective delivery of the five eggs 2 by the accommodating and delivering means 7, selectively collect and collectively accommodate the five eggs 2 selectively delivered from the accommodating and delivering means 7, concerning each of the sorting and distributing means 3 and 4, and which collectively deliver the accommodated five eggs 2; an accommodating and filling means 44 having a plurality of accommodating seat members, i. e., five accommodating seat members 43a to 43e in this embodiment, for col-

lectively accommodating the five eggs 2 delivered from the selectively collecting and delivering means 42 and for collectively delivering the accommodated five eggs 2 and filling them in the container 9 in conformity with a filling form determined on the basis of the weight of those eggs 2, i.e., in this embodiment in conformity with an interval L2 between two rows of accommodating seats 68 and 69 (each row consisting of five accommodating seats) of the container 9 determined on the basis of the weight classification L; and a container transporting means 45 for intermittently transporting the containers 9 in a Y direction perpendicular to the X direction.

[0053] The accommodating seat members 41a to 41e are openable and are arranged horizontally in a row in the X direction so as to accommodate from above the five eggs 2 selectively released collectively and delivered from the accommodating seat member rows 35 and 36. An accommodating seat member row 41 consisting of such accommodating seat members 41a to 41e serving as a group of accommodating seat members is disposed below the accommodating seat member rows 35 and 36 movably in the Y direction so as to be capable of being selectively located below each of the accommodating seat member rows 35 and 36.

[0054] The selectively collecting and delivering means 42 has, in addition to the accommodating seat member row 41, a reciprocating means 51 for reciprocating the accommodating seat member row 41 in the Y direction and the direction opposite thereto so as to selectively collect the eggs 2 delivered to the accommodating seat member row 41 from the accommodating and delivering means 7, in synchronism with the selective delivery of the five eggs 2 by the accommodating and delivering means 7 concerning each of the sorting and distributing means 3 and 4. The reciprocating means 51 has an endless belt device 52 in this embodiment, and the endless belt device 52 includes a pair of endless belts 53 connected to the respective ends of the accommodating seat member row 41, as well as a drive mechanism 54 including a drive pulley and a driven pulley for reciprocating the endless belt 53 in the Y direction and the direction opposite thereto. When the eggs 2 in the accommodating seat member row 35 are selected as the eggs 2 to be delivered to the packaging means 11, the above-mentioned reciprocating means 51 is adapted to move the accommodating seat member row 41 to a position below the accommodating seat member row 35 by causing the endless belt 53 to travel. Meanwhile, when the eggs 2 in the accommodating seat member row 36 are selected as the eggs 2 to be delivered to the packaging means 11, the reciprocating means 51 is adapted to move the accommodating seat member row 41 to a position below the accommodating seat member row 36 by causing the endless belt 53 to travel. Further, when the five eggs 2 are collectively accommodated by the accommodating seat member row 41 from the accommodating seat member row 35 or 36, the reciprocating means 51 is adapted to move the ac-

commodating seat member row 41 accommodating those five eggs 2 to a position above an accommodating seat member row 43 consisting of the accommodating seat members 43a to 43e. In addition, the reciprocating means 51 is adapted to reciprocate the accommodating seat member row 43 such that the reciprocating speed of the accommodating seat member row 41 to the position above the accommodating seat member row 43 after the collection of the five eggs 2 becomes slower than the reciprocating speed of the accommodating seat member row 41 to the position below the accommodating seat member row 35 or 36 for collecting the five eggs 2.

[0055] The accommodating seat member row 41 in the closed state is adapted to collectively accommodate from above the five eggs 2 released collectively from the accommodating seat member row 35 or 36. Further, in a case where the eggs 2 are accommodated in all of the five accommodating seat members 41a to 41e in the closed state, when those accommodated eggs 2 are determined to be delivered to the accommodating seat member row 43, the accommodating seat member row 41 is adapted to open the respective accommodating seat members 41a to 41e to collectively release from below the five eggs 2 and deliver them downward.

[0056] The accommodating seat members 43a to 43e of the accommodating seat member row 43 which collectively accommodate the eggs 2 delivered from the selectively collecting and delivering means 42 are arranged horizontally in a row in the X direction and are provided so as to be displaceable with respect to each other horizontally in the X direction so that the interval in the X direction between adjacent ones of the five eggs 2 accommodated from the accommodating seat member row 41 can be made to correspond to the filling interval L2 in the X direction between adjacent ones of the eggs 2 in the container 9. The accommodating seat member row 43 serving as a group of accommodating seat members in the closed state is adapted to collectively accommodate from above the five eggs 2 released collectively from the accommodating seat member row 41. Further, in a case where the eggs 2 are accommodated in all of the five accommodating seat members 43a to 43e in the closed state, when those accommodated eggs 2 are determined to be delivered to the container 9, the accommodating seat member row 43 is adapted to open the respective accommodating seat members 43a to 43e to collectively release from below the five eggs 2 and deliver them downward.

[0057] In addition to the accommodating seat member row 43 for collectively accommodating the eggs 2 delivered from the selectively collecting and delivering means 42, the accommodating and filling means 44 includes a vertically moving means 56 for vertically moving the accommodating seat member row 43, as well as an interval changing means 55 for changing an interval L1 between adjacent ones of the accommodating seat members 43a to 43e of the accommodating seat mem-

ber row 43 on the vertical movement of the accommodating seat member row 43 by the vertically moving means 56. The interval changing means 55 is adapted to change the interval L1 between adjacent ones of the accommodating seat members 43a to 43e of the accommodating seat member row 43 such that, in the accommodating seat member row 43, the interval in the X direction between adjacent ones of the five eggs 2 accommodated from the selectively collecting and delivering means 42 is made to conform to the filling interval L2 in the X direction between adjacent ones of the eggs 2 in the container 9, i.e., such that the interval L1 between adjacent ones of the accommodating seat members 43a to 43e of the accommodating seat member row 43 is made to conform to the interval between adjacent ones of the eggs 2 delivered from the selectively collecting and delivering means 42 and to the interval L2 in the X direction between adjacent ones of the accommodating seats 68 and 69 of the container 9 on the vertical movement of the accommodating seat member row 43 by the vertically moving means 56.

[0058] The vertically moving means 56 is adapted to move the accommodating seat members 43a to 43e in a Z direction which is a vertical direction perpendicular to the direction of arrangement of the accommodating seat members 43a to 43e, i.e., the X direction.

[0059] The vertically moving means 56 consists of a fluid cylinder unit or the like which, in the case of filling in the container 9 the five eggs 2 accommodated in the accommodating seat members 43a to 43e, lowers the accommodating seat member row 43 to move it to a vicinity of a position above the container 9, and which, in the case of accommodating in the accommodating seat members 43a to 43e the five eggs 2 delivered from the accommodating seat members 41a to 41e, raises the accommodating seat member row 43 to move it to a vicinity of a position below the accommodating seat members 41a to 41e.

[0060] The interval changing means 55 is comprised of resilient members 57 consisting of coil springs, leaf springs, rubber, or the like disposed between adjacent ones of the mutually movable accommodating seat members 43a to 43e of the accommodating seat member row 43; a one-end-side moving means 59 for moving the accommodating seat member 43e on one end side of the accommodating seat member row 43 toward the accommodating seat member 43a on the other end side as the accommodating seat member row 43 is moved downward by the vertically moving means 56; and a fixing member 58 for fixing the accommodating seat member 43a on the other end side in the accommodating seat member row 43.

[0061] The one-end-side moving means 59 includes a pressing member 61 for pressing the accommodating seat member 43e on one end side among the accommodating seat members 43a to 43e, as well as an arm member 63 which, at one end portion thereof, is rotatably connected to the pressing member 61 and which, at

the other end portion 62 thereof, is positionally adjustable and is supported rotatably.

[0062] As shown in Fig. 4, the one-end-side moving means 59 is adapted to move the accommodating seat members 43b to 43e toward the accommodating seat member 43a, while accompanying the shrinkage of the respective resilient members 57, by pressing the accommodating seat member 43e on one end side through the pressing member 61 by the arm member 63 in conjunction with the rotation of the arm member 63 as the accommodating seat member row 43 is lowered by the actuation of the vertically moving means 56.

[0063] The arm member 63 is arranged such that the other end portion 62 can be rotatably fixed to a position 65, 66, 67 or the like. Consequently, the arm member 63 is positionally adjustable at the other end portion 62. For example, in a case where the other end portion 62 is rotatably supported at the position 65, as the accommodating seat member row 43 is lowered, the accommodating seat member 43e can be moved toward the accommodating seat member 43a such that the interval in the X direction between adjacent ones of the five eggs 2 accommodated from the selectively collecting and delivering means 42, i.e., the interval L1 of adjacent ones of the accommodating seat members 43a to 43e, conforms to the filling interval L2 in the X direction of the container 9 for the eggs 2 of the weight classification L. The same also applies to a case where the other end portion 62 is rotatably supported at the position 66, and the accommodating seat member on one end side can be moved toward the accommodating seat member on the other end side such that the interval in the X direction between adjacent ones of the five eggs 2 accommodated from the accommodating means of the packaging means 12, i.e., the interval between adjacent ones of the accommodating seat members of that accommodating means, can be made to conform to the filling interval in the X direction of the container 10 for the eggs 2 of the weight classification M. The same also applies to a case where the other end portion 62 is rotatably supported at the position 67 or the like.

[0064] The above-mentioned interval changing means 55 is arranged such that the accommodating seat member 43a on the other end side among the accommodating seat members 43a to 43e is fixed by the fixing member 58, and the accommodating seat member 43e on one end side is pressed by the arm member 63 through the pressing member 61 to move the accommodating seat members 43b to 43e toward the accommodating seat member 43a while accompanying the shrinkage of the respective resilient members 57, thereby allowing the interval L1 between adjacent ones of the accommodating seat members 43a to 43e to conform to the filling interval L2 in the X direction of the container 9 for the eggs 2 of the weight classification L. In other words, the interval L1 is made to conform to the filling interval L2 by pressing on one side alone. However, an arrangement may be alternatively provided such that

the fixing member 58 is formed as another pressing member equivalent to the pressing member 61, and an other-end-side moving means equivalent to the one-end-side moving means 59 and having this other pressing member and another arm member equivalent to the aforementioned arm member 63 is provided, whereby the accommodating seat members 43a to 43e arranged in a row are pressed in such a manner as to be clamped from both sides through cooperation of such an other-end-side moving means and the above-mentioned one-end-side moving means 59 to thereby allow the interval L1 between adjacent ones of the accommodating seat members 43a to 43e to conform to the filling interval L2 in the X direction of the container 9.

[0065] The container transporting means 45 has the conveyor belt 15 and a drive mechanism (not shown) for causing the conveyor belt 15 to intermittently travel in the Y direction. The arrangement provided is such that when five accommodating seats 68 in the first row of an empty container 9 are disposed below the accommodating seat members 43a to 43e, and five eggs 2 are collectively filled in the five accommodating seats or pockets 68 in the first row from the accommodating seat members 43a to 43e, five empty accommodating seats 69 in the second row of that container 9 are disposed below the accommodating seat members 43a to 43e. Thereupon, when five eggs 2 are collectively filled in the five accommodating seats or pockets 69 in the second row from the accommodating seat members 43a to 43e, the container 9 in which the eggs 2 are filled in all the accommodating seats 68 and 69 is moved in the Y direction, and five accommodating seats 68 in the first row of a new empty container 9 are disposed below the accommodating seat members 43a to 43e.

[0066] With the above-described sorting and packaging apparatus 1, the common packaging means 11 is adapted to accommodate in common to the eggs 2 from each of the sorting and distributing means 3 and 4 the eggs 2 delivered from the accommodating and delivering means 7, and fill and package those accommodated eggs 2 in the container 9. Further, the packaging means 11 has the selectively collecting and delivering means 42 for selectively collecting and accommodating the eggs 2 in the accommodating and delivering means 7 concerning each of the sorting and distributing means 3 and 4 and for delivering those accommodated eggs 2. Accordingly, even if two sorting and distributing means 3 and 4 are provided which are translated with respect to each other and respectively transport the eggs 2 and sort and distribute those eggs 2 on the basis of their weight, it is unnecessary to increase the number of the packaging means 11 correspondingly. Moreover, since the accommodating and delivering means 7 is adapted to accommodate the five eggs 2 delivered from the accommodating and delivering means 5 in correspondence with each of the sorting and distributing means 3 and 4, i.e., since the accommodating and delivering means 7 functions as a standby means (buffer

means), even if the eggs 2 of the weight classification L are temporarily concentrated, these eggs 2 can be temporarily set on standby in the accommodating and delivering means 7, and an abnormal situation such as the interruption of sorting and packaging can be favorably avoided, thereby making it possible to enhance the processing capability, as desired.

[0067] Further, according to the sorting and packaging apparatus 1, since the common packaging means 11 has the accommodating and filling means 44 for accommodating the eggs 2 delivered from the selectively collecting and delivering means 42 and for filling those accommodated eggs 2 in the container 9 in conformity with the filling interval L2 determined on the basis of the weight of those eggs 2, the eggs 2 can be filled, as required, in the container 9 without an error, and the eggs 2 can be sorted and packaged without causing the occurrence of such problems as a shortage in the number of eggs 2, the difficulty in sealing the container 9, and the breakage of the eggs 2.

[0068] Further, according to the sorting and packaging apparatus 1, since the reciprocating means 51 is adapted to reciprocate the accommodating seat member row 41 so that the reciprocating speed after the collection of the eggs 2 becomes slower than the reciprocating speed for collecting the eggs 2, the collection of the eggs 2 can be effected at high speed, and the collected eggs 2 can be delivered to the accommodating and filling means 44 without causing such as the breakage of the collected eggs 2.

[0069] In addition, according to the sorting and packaging apparatus 1, by vertically moving the accommodating seat member row 43 by the vertically moving means 56, the accommodation of the eggs 2 from the selectively collecting and delivering means 42 and the filling of the eggs 2 in the accommodating and filling means 44 can be effected without causing such as an accommodation error, a filling error, and the breakage of the eggs 2.

[0070] Furthermore, according to the sorting and packaging apparatus 1, the accommodation of the eggs 2 from the selectively collecting and delivering means 42 which does not cause such as an accommodation error, a filling error, and the breakage of the eggs 2 and the filling of the eggs 2 in the accommodating and filling means 44 can be effected in one action through the cooperation of the vertically moving means 56 and the interval changing means 55. Consequently, it is possible to realize high-speed sorting and packaging.

[0071] Incidentally, although in the above-described sorting and packaging apparatus 1 the reciprocating means 51 for reciprocating the accommodating seat member row 41 in the Y direction and in the direction opposite thereto is constructed by including the endless belt device 52, the reciprocating means 51 may be alternatively constructed by including a fluid pressure cylinder unit 71, as shown in Fig. 5. The fluid pressure cylinder unit 71 has a piston rod 72 with the accommodat-

ing seat member row 41 fixed thereto and a cylinder 73 for extending and contracting the piston rod 72, and is adapted to extend and contract the piston rod 72 by the supply and discharge of fluid pressure to and from the cylinder 73.

[0072] In addition, although in the above-described case the sorting and packaging apparatus 1 is comprised of the two sorting and distributing means 3 and 4, the sorting and packaging apparatus 1 may be alternatively further comprised of sorting and distributing means 75 similar to the sorting and distributing means 3 and 4 in addition to the sorting and distributing means 3 and 4, as shown in Fig. 6. In this case, the accommodating and delivering means 5 may be further comprised of an accommodating seat member row 76 used for the sorting and distributing means 75 and similar to the accommodating seat member rows 31 and 32 in addition to the accommodating seat member rows 31 and 32. In addition, the accommodating and delivering means 7 may be further comprised of an accommodating seat member row 77 used for the sorting and distributing means 75 and similar to the accommodating seat member rows 35 and 36 in addition to the accommodating seat member rows 35 and 36.

[0073] Also in the case where the sorting and distributing means 75, the accommodating seat member row 76, and the accommodating seat member row 77 are provided in addition to the sorting and distributing means 3 and 4, the accommodating seat member rows 31 and 32, and the accommodating seat member rows 35 and 36 which are shown in Fig. 6, the sorting and packaging apparatus 1 may be comprised of the selectively collecting and delivering means 42 such as the one shown in Figs. 1 to 3 or Fig. 5. Alternatively, however, as shown in Fig. 6, the selectively collecting and delivering means 42 may be comprised of a circulatingly moving means 82 having an endless belt device 81 for circulatingly moving the accommodating seat member row 41. In this case, accommodating seat member rows 83 serving as a plurality of other groups of accommodating seat members may be provided in addition to the accommodating seat member row 41 to continuously circulating move the plurality of accommodating seat member rows 83 together with the accommodating seat member row 41 by the circulatingly moving means 82. The selective delivery of the eggs 2 from any one of the accommodating seat member rows 35, 36, and 77 to any one of the empty accommodating seat member row 41 and accommodating seat member rows 83, as well as the selective collection from any one of the accommodating seat member rows 35, 36, and 77 by any one of the empty accommodating seat member row 41 and accommodating seat member rows 83, may be effected in synchronism with the timing when a accommodating seat member row selected to effect collection among the empty accommodating seat member row 41 and accommodating seat member rows 83 arrives at a position below an accommodating seat member row selected to ef-

fect the release of the eggs 2 among the accommodating seat member rows 35, 36, and 77. In addition, even if any one of the accommodating seat member row 41 and the accommodating seat member rows 83 accommodating the five eggs 2 arrives at a position above the accommodating seat member row 43, in a case where the accommodating seat member row 43 is still in the state of accommodating the five eggs 2, and it is hence impossible to deliver the five eggs 2 to the accommodating seat member row 43 from any one of the accommodating seat member rows 83 accommodating the five eggs 2, such any one of the accommodating seat member row 41 and the accommodating seat member rows 83 accommodating the five eggs 2 may be circulatingly moved so as to arrive at a position above the accommodating seat member row 43 repeatedly.

[0074] In addition, as shown in Fig. 7, the accommodating seat member rows 31, 35, 32, and 36 may be constructed by providing a fixed sliding plate 91 common to the accommodating seat member row 31 of the accommodating and delivering means 5 and the accommodating seat member row 35 of the accommodating and delivering means 7 and a fixed sliding plate 92 common to the accommodating seat member row 32 of the accommodating and delivering means 5 and the accommodating seat member row 36 of the accommodating and delivering means 7 and by making the respective accommodating seat member of accommodating seat member rows 31, 35, 32, and 36 openable on one side. In this case, as shown in Fig. 7, the accommodating seat member row 41 consisting of the accommodating seat members 41a to 41e may be fixed.

[0075] With the packaging means 11 provided with the fixed accommodating seat member row 41 as shown in Fig. 7, the reciprocating means 51 can be omitted, and such a fixed accommodating seat member row 41 is adapted to collectively accommodate the five eggs 2 selectively delivered from the accommodating and delivering means 7 and collectively deliver these accommodated five eggs 2 to the accommodating seat member row 43 in the same way as described above. Accordingly, with the packaging means 11 of the sorting and packaging apparatus 1 shown in Fig. 7, the accommodating and filling means 44 is comprised of the accommodating seat member row 41, the accommodating seat member row 43, the vertically moving means 56 for vertically moving the accommodating seat member row 43, and the interval changing means 55 for changing the interval L1 between adjacent ones of the accommodating seat members 43a to 43e of the accommodating seat member row 43 on the vertical movement of the accommodating seat member row 43 by the vertically moving means 56. In addition, with the packaging means 11 of the sorting and packaging apparatus 1 shown in Fig. 7, the accommodating seat member row 41 may be omitted, and the accommodating and filling means 44 may be arranged to allow the five eggs 2 se-

lectively delivered from the accommodating and delivering means 7 to be collectively accommodated directly by the accommodating seat member row 43.

[0076] It should be noted that although the above-described example is the case of the sorting and packaging apparatus 1 concerning the weight as an attribute of the eggs 2, to produce eye-catching eggs-packaged products in which white eggs and brown eggs are arranged in a zigzag manner in the container 9, a sorting and packaging apparatus concerning the white eggs and brown eggs, i.e., concerning the color as an attribute of the eggs 2, may be constructed in the same way as described above. Still further, a sorting and packaging apparatus concerning the size, color, and the like of such as fruits, other than the eggs 2, may be constructed in the same way as described above.

Claims

1. An apparatus for sorting and packaging articles, comprising:

a plurality of sorting and distributing means for respectively conveying articles, and sorting and distributing the articles on the basis of their attribute, said plurality of sorting and distributing means being adapted to be translated with respect to each other;

first accommodating and delivering means for accommodating the articles distributed from each of said sorting and distributing means in correspondence with each of said sorting and distributing means and for delivering the accommodated articles therein;

second accommodating and delivering means for accommodating the articles delivered from said first accommodating and delivering means in correspondence with each of said sorting and distributing means and for delivering the accommodated articles therein; and

common packaging means for accommodating the articles delivered from said second accommodating and delivering means, and for filling and packaging the accommodated articles therein in a predetermined container, in common to the articles from each of said sorting and distributing means,

wherein said common packaging means has accommodating and filling means for filling the accommodated articles therein in the container in conformity with a filling form determined on the basis of an attribute of the articles.

2. The apparatus for sorting and packaging articles according to claim 1, wherein said common packaging means further has selectively collecting and

delivering means for selectively collecting and accommodating with respect to each of said sorting and distributing means the articles delivered from said second accommodating and delivering means and for delivering the accommodated articles therein, and said accommodating and filling means is adapted to accommodate the articles delivered from said selectively collecting and delivering means.

3. The apparatus for sorting and packaging articles according to claim 2, wherein said second accommodating and delivering means is adapted to selectively deliver the accommodated articles therein with respect to the articles from each of said sorting and distributing means, and said selectively collecting and delivering means is adapted to selectively collect and accommodate with respect to each of said sorting and distributing means the articles delivered from said second accommodating and delivering means in synchronism with the selective delivery of the articles by said second accommodating and delivering means.

4. The apparatus for sorting and packaging articles according to claim 2 or 3, wherein said first accommodating and delivering means is adapted to collectively deliver an accommodated group of articles therein, said second accommodating and delivering means is adapted to accommodate in correspondence with each of said sorting and distributing means the group of articles collectively delivered from said first accommodating and delivering means and to collectively deliver the accommodated group of articles therein, said common packaging means is adapted to accommodate the group of articles delivered from said second accommodating and delivering means and to fill and package the accommodated group of articles therein in the predetermined container, said selectively collecting and delivering means is adapted to selectively collect and collectively accommodate with respect to each of said sorting and distributing means the group of articles from said second accommodating and delivering means and deliver the accommodated group of articles therein, and said accommodating and filling means is adapted to accommodate the group of articles delivered from said selectively collecting and delivering means and fill the accommodated group of articles therein in the container in conformity with the filling form determined on the basis of the attribute of the articles.

5. The apparatus for sorting and packaging articles according to any one of claims 2 to 4, wherein said selectively collecting and delivering means includes a group of accommodating seat members for accommodating the articles delivered from said sec-

ond accommodating and delivering means and reciprocating means for reciprocating said group of accommodating seat members to allow said group of accommodating seat members to selectively collect with respect to each of said sorting and distributing means the articles delivered from said second accommodating and delivering means.

6. The apparatus for sorting and packaging articles according to claim 5, wherein said reciprocating means is adapted to reciprocate said group of accommodating seat members so that a reciprocating speed after the collection of the articles becomes slower than a reciprocating speed of said group of accommodating seat members for the collection of the articles.
7. The apparatus for sorting and packaging articles according to any one of claims 2 to 6, wherein said accommodating and filling means has a group of accommodating seat members for accommodating the articles delivered from said selectively collecting and delivering means or the articles delivered from said second accommodating and delivering means, as well as vertically moving means for vertically moving said group of accommodating seat members.
8. The apparatus for sorting and packaging articles according to claim 7, wherein said accommodating seat members of said group of accommodating seat members for accommodating the articles delivered from said selectively collecting and delivering means or the articles delivered from said second accommodating and delivering means are provided such that an interval between adjacent ones of said accommodating seat members is variable, and said accommodating and filling means has interval changing means for changing the interval between adjacent ones of said accommodating seat members of said group of accommodating seat members on the vertical movement of said group of accommodating seat members by said vertically moving means.
9. The apparatus for sorting and packaging articles according to claim 8, wherein the filling form includes an interval between adjacent ones of accommodating seats of the container, and said interval changing means is adapted to change the interval between adjacent ones of said accommodating seat members of said group of accommodating seat members such that the interval between adjacent ones of said accommodating seat members of said group of accommodating seat members is made to conform to an interval between adjacent ones of the articles delivered from said selectively collecting and delivering means or the articles delivered from

said second accommodating and delivering means and to the interval between adjacent ones of the accommodating seats of the container on the vertical movement of said group of accommodating seat members by said vertically moving means.

10. The apparatus for sorting and packaging articles according to claim 8 or 9, wherein said accommodating seat members of said group of accommodating seat members for accommodating the articles delivered from said selectively collecting and delivering means or the articles delivered from said second accommodating and delivering means are arranged in a row and are formed as an accommodating seat member row, said interval changing means includes resilient members disposed between adjacent ones of said accommodating seat members of said accommodating seat member row which are movable with respect to each other, as well as one-end-side moving means for moving said accommodating seat member on one end side of said accommodating seat member row toward said accommodating seat member on another end side thereof in response to a movement of said accommodating seat member row by said vertically moving means, and said one-end-side moving means includes a pressing member for pressing said accommodating seat member on the one end side of said accommodating seat member row and an arm member which, at one end portion thereof, is rotatably connected to said pressing member and which, at another end portion thereof, is positionally adjustable and is supported rotatably.
11. The apparatus for sorting and packaging articles according to claim 10, wherein said interval changing means further includes other-end-side moving means for moving said accommodating seat member on the other end side of said accommodating seat member row toward said accommodating seat member on the one end side thereof in response to the movement of said accommodating seat member row by said vertically moving means, and said other-end-side moving means includes another pressing member for pressing said accommodating seat member on the other end side of said accommodating seat member row and another arm member which, at one end portion thereof, is rotatably connected to said other pressing member and which, at another end portion thereof, is positionally adjustable and is supported rotatably.
12. The apparatus for sorting and packaging articles according to claim 10, wherein said interval changing means further includes a fixing member for fixing said accommodating seat member on the other end side of said accommodating seat member row.

13. The apparatus for sorting and packaging articles according to any one of claims 1 to 12, wherein the articles are eggs, the attribute is the weight of the eggs, said sorting and distributing means is adapted to downwardly release the eggs with their long axes set substantially vertically to distribute the eggs, and said first and said second accommodating and delivering means are adapted to accommodate the eggs from above and collectively release from below to deliver the accommodated eggs therein.

15

20

25

30

35

40

45

50

55

FIG. 1

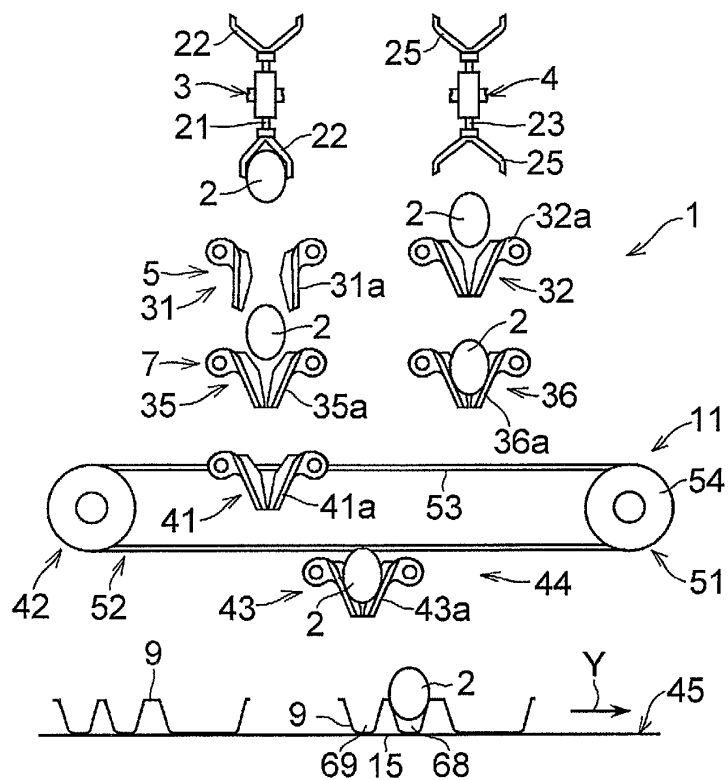


FIG. 2

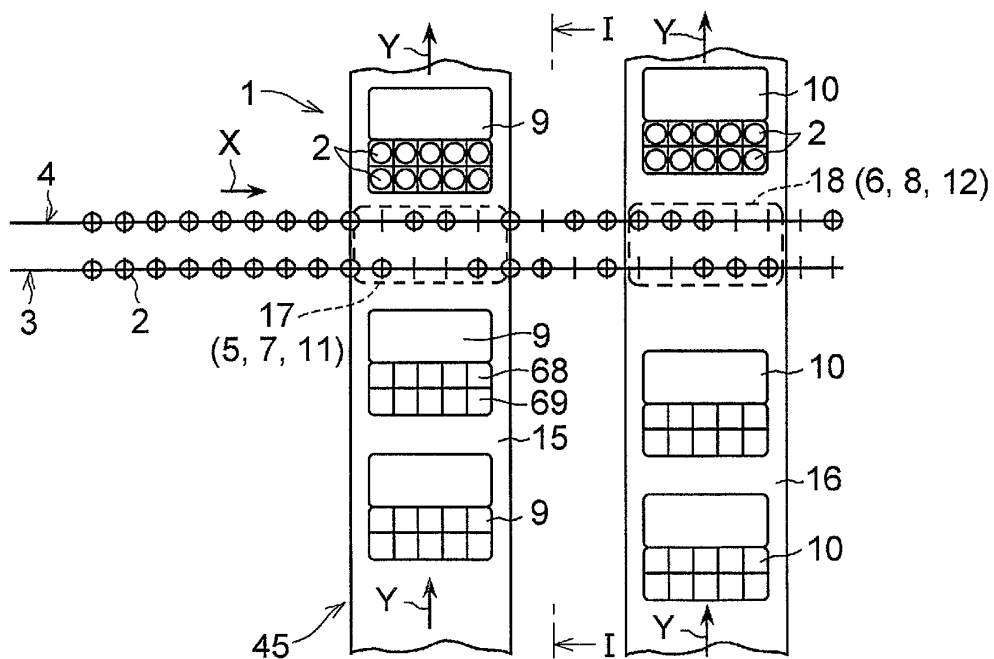


FIG. 3

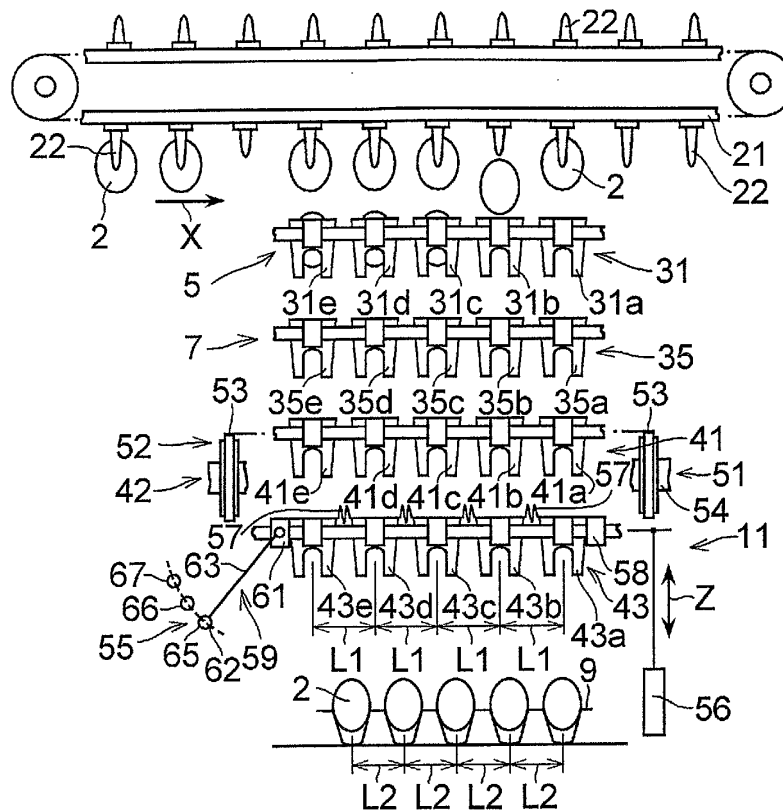


FIG. 4

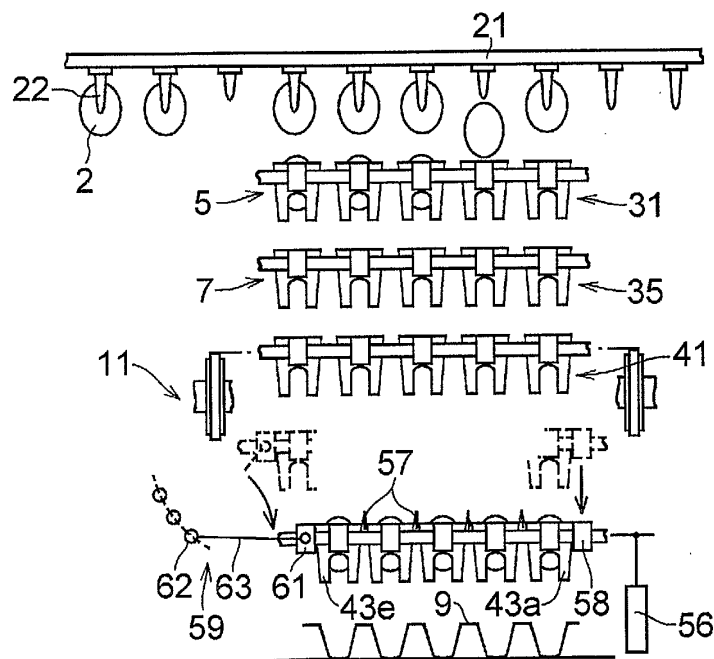


FIG. 5

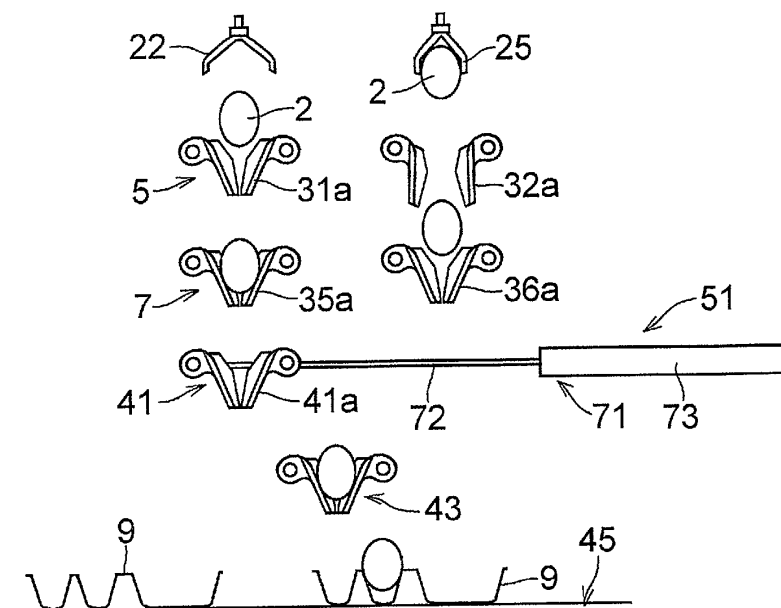


FIG. 6

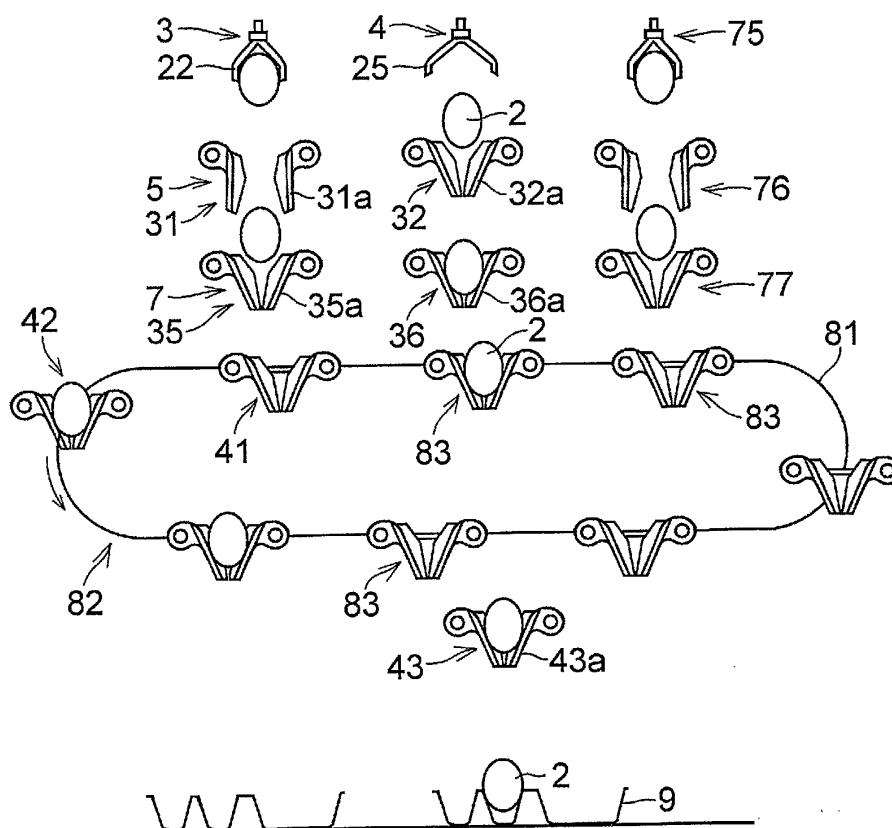
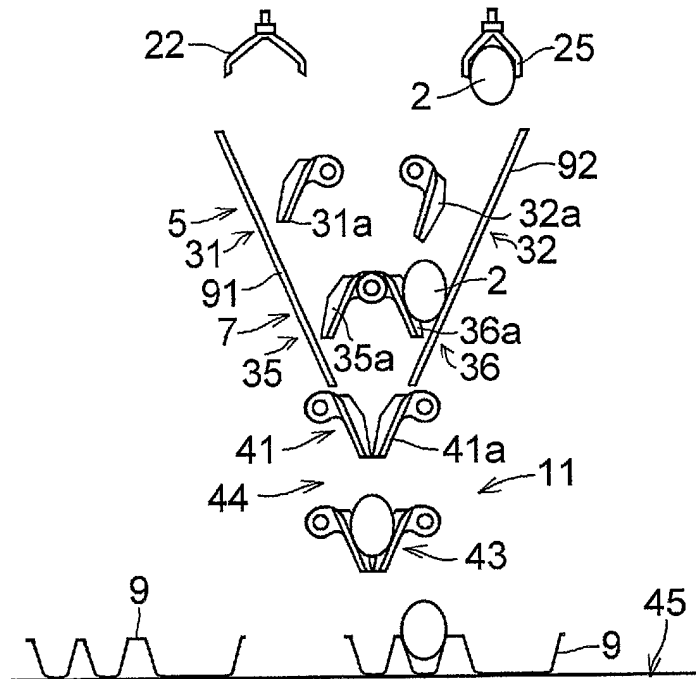


FIG. 7





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 25 7339

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.CI.7)
X	EP 1 057 728 A (NAMBU DENKI SEISAKUSHO KK) 6 December 2000 (2000-12-06) * column 13, line 5 - column 17, line 51; figures 2,6,7 *	1-6,13	B65B23/06
X	EP 0 560 458 A (FOOD PROCESSING SYSTEMS) 15 September 1993 (1993-09-15) * column 6, line 36 - column 14, line 6; figures *	1-4,7,13	
A	EP 0 390 241 A (TERPA POULTRY BV) 3 October 1990 (1990-10-03)	8	
A	NL 6 717 724 A (AVIOLANDA) 1 July 1969 (1969-07-01)		
			TECHNICAL FIELDS SEARCHED (Int.CI.7)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 17 March 2003	Examiner Jagusiak, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 25 7339

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.

17-03-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 1057728	A	06-12-2000	JP	2001039410 A	13-02-2001
			EP	1057728 A1	06-12-2000
EP 0560458	A	15-09-1993	US	5232080 A	03-08-1993
			EP	0560458 A1	15-09-1993
			JP	6211213 A	02-08-1994
EP 0390241	A	03-10-1990	NL	8900584 A	01-10-1990
			EP	0390241 A2	03-10-1990
			JP	2296617 A	07-12-1990
			US	5096041 A	17-03-1992
			US	5232080 A	03-08-1993
NL 6717724	A	01-07-1969	NONE		