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

(11) Publication number: **0 492 738 A1**

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **91203389.1**

(51) Int. Cl.5: **B07B 13/04**

(22) Date of filing: **20.12.91**

(30) Priority: **21.12.90 NL 9002852**

(43) Date of publication of application:
01.07.92 Bulletin 92/27

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

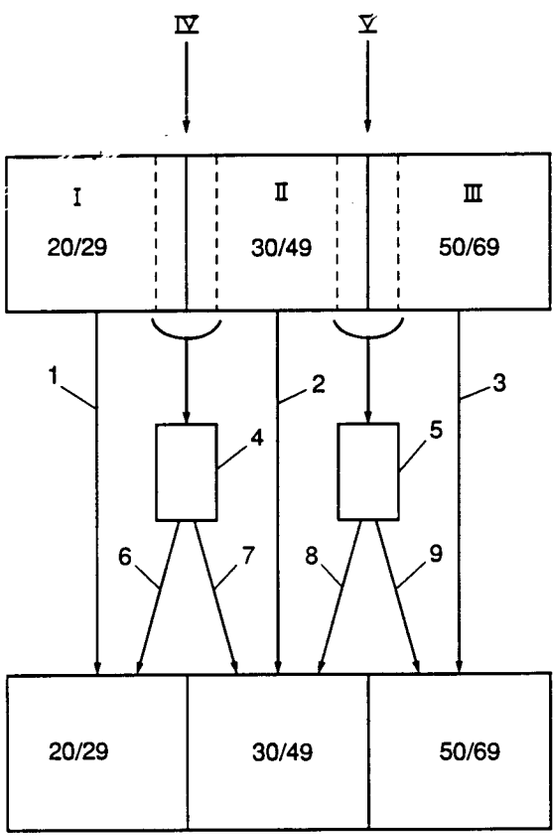
(71) Applicant: **Zijlstra & Bolhuis B.V.**
Beneden Dwarsdiep 25
NL-9645 LA Veendam(NL)

(72) Inventor: **Middel, Jan**
Paalslagen 5
NL-9468 HL Annen(NL)

(74) Representative: **Smulders, Theodorus A.H.J., Ir. et al**
Vereenigde Octrooibureaux Nieuwe Parklaan 97
NL-2587 BN 's-Gravenhage(NL)

(54) **A process for sorting bulbous and tuberous produce according to size, in particular suitable for potatoes.**

(57) A process for sorting bulbous and tuberous produce according to successive size classes, in particular suitable for sorting potatoes, whereby in the transitional range between at least two successive main classes at least one intermediate class is defined; a first sorting operation is carried out, in which produce is sorted according to sizes falling within the remaining range of the at least two main classes and the at least one intermediate class; the produce selected as falling within the remaining range of the main classes are passed to collections of produce belonging to those main classes; the produce falling within the at least one intermediate class is subjected to a second sorting operation (4,5), the produce falling into an intermediate class being separated into a first group belonging to the one main class pertaining to the relevant intermediate class and a second group belonging to the other main class pertaining to the relevant intermediate class; and the two groups are added to the collections belonging to the main classes.



EP 0 492 738 A1

This invention relates to a process for sorting bulbous and tuberous produce into successive size classes, in particular suitable for sorting potatoes.

In potato trade and processing industry potatoes are sorted into different size classes using internationally applied square size. The square size of a potato can be defined as the length of the side of the small square opening through which the potato can pass. The potatoes are sorted by means of riddles into a number of classes, e.g., a first class of potatoes having a square size below 35 mm, a next class of potatoes having a square size ranging from 35 to 45 mm, etc. Although acceptable accuracy is obtainable with such a sorting method, yet the number of potatoes that will find their way to a wrong class cannot be disregarded. These are for the major part potatoes having a square size near the boundary value of a class. When, e.g., potatoes are sorted into three size classes of, e.g., 20-30 mm, 30-50 mm and 50-70 mm, there is a great chance that a relatively large number of the produce that wrongly found its way to the class of 50-70 mm will have a square size ranging from 46 to 50 mm. Similarly, a relatively large number of produce having a square size ranging from 26 to 30 mm will generally be present in the class of 30-50 mm.

Since in potato trade and processing industry a more and more accurate sorting into a relatively large number of classes each comprising a relatively small size range is required, there is a need for an improved sorting method. The object of this invention is to meet the above need. For this purpose a process of the above type is characterized according to the invention in that in the transitional range between at least two successive main classes at least one intermediate class is defined; that a first sorting operation is carried out, in which produce is sorted according to sizes falling within the remaining range of the at least two main classes and the at least one intermediate class; that the produce selected as falling within the remaining range of the main classes are passed to collections of produce belonging to those main classes; that the produce falling within the at least one intermediate class is subjected to a second sorting operation, the produce falling into an intermediate class being separated into a first group belonging to the one main class pertaining to the relevant intermediate class and a second group belonging to the other main class pertaining to the relevant intermediate class; and that the two groups are added to the collections belonging to the main classes.

In the following the invention will be further described with reference to the accompanying Figure, which schematically illustrates the principle of the process according to the invention.

The Figure schematically shows, by way of example, three size classes, according to which bulbous and tuberous produce such as potatoes, but also, e.g., onions wit the stems cut off, apples etc. can be sorted. In this example the size classes I, II and III correspond to, e.g., sizes determined according to the square size principle of respectively 20 through 29 mm, 30 through 49 mm and 50 through 69 mm. As stated before, the sizes of the major part of the produce classified during the sorting process into a wrong class are just below the sizes belonging to the next class of larger produce.

According to the invention intermediate classes are introduced for produce having sizes that are near the boundary with the next class. The intermediate class may be completely within one of the original classes, but may also overlap the boundary between two original classes.

Thus, in the example shown, two intermediate classes IV and V are defined for produce having sizes of from, e.g., 26 and 24 mm and 46 and 54 mm, respectively. By now sorting not only according to the original main classes, but also according to the intermediate classes, the major part of the produce wrongly sorted at the original sorting machine will find its way to one of the intermediate classes. The other produce is directly classified into the right collections, as schematically indicated by arrows 1, 2 and 3. According to the invention the produce that found its way to the intermediate classes is subjected to a second sorting operation, as schematically indicated by blocks 4, 5. The second sorting operation need not be carried out similarly to the first sorting operation. For the second sorting operation a more accurate sorting method can be used advantageously. Although accurate sorting methods are generally also relatively time-consuming, this need not be a drawback, because relatively little produce is present in the intermediate classes.

For the second sorting operation the so-called channel sorting method could be used as described in applicants' simultaneously filed Dutch patent application, according to which method produce like potatoes can be sorted based on the square size by measuring the height of the potato located in a V-shaped channel.

In the second sorting operation the produce present in the intermediate class is accurately sorted into two groups, the separation between the two groups being formed by the boundary between the orginal classes. Thus the sorting operation indicated at 4 separates the produce into produce below 30 mm and produce above 29 mm, respectively. The first group is passed to the collection 20/29 and the second to the collection 30/49, as schematically indicated by arrows 6, 7. Similarly,

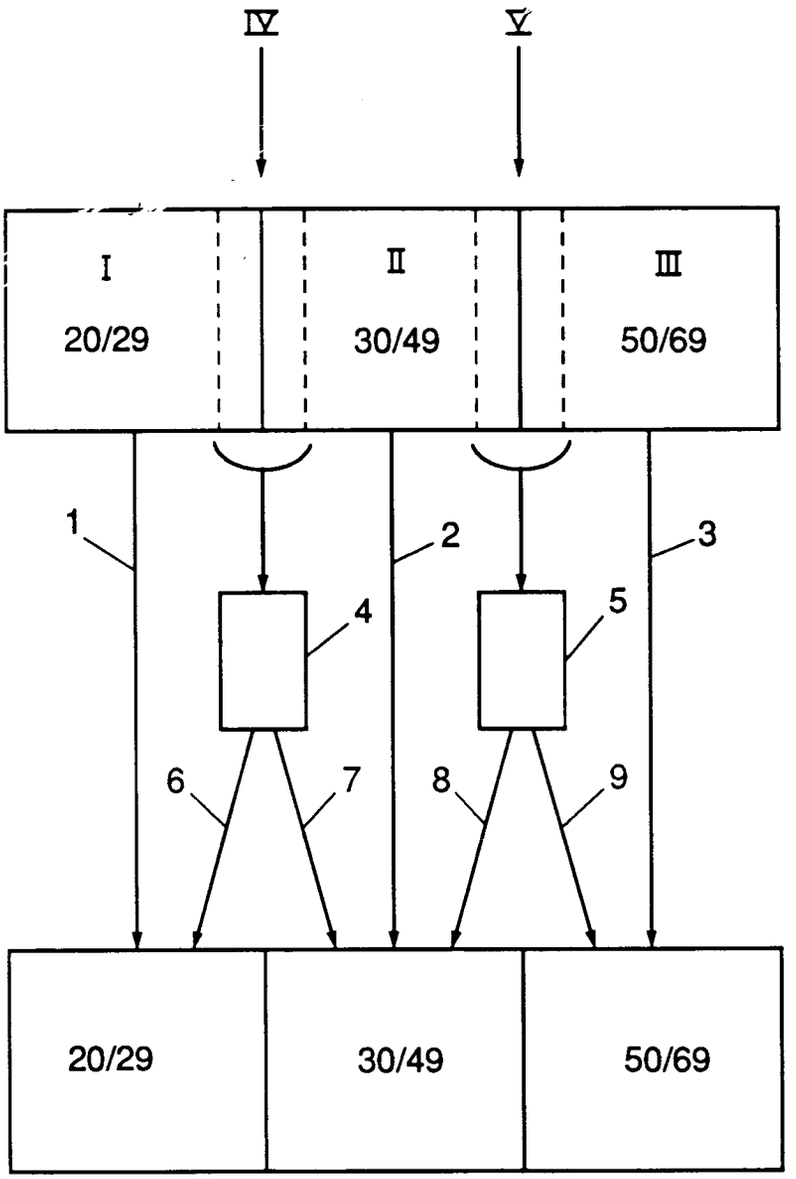
the produce is separated at 5 into a first group below 50 mm and a second group above 49 mm, as indicated by arrows 8, 9.

It has been found that when using a two-stage sorting method as described above a sorting accuracy of 97 to 98% is obtainable.

Claims

1. A process for sorting bulbous and tuberous produce according to successive size classes, in particular suitable for sorting potatoes, characterized in that in the transitional range between at least two successive main classes at least one intermediate class is defined; that a first sorting operation is carried out, in which produce is sorted according to sizes falling within the remaining range of the at least two main classes and the at least one intermediate class; that the produce selected as falling within the remaining range of the main classes are passed to collections of produce belonging to those main classes; that the produce falling within the at least one intermediate class is subjected to a second sorting operation, the produce falling into an intermediate class being separated into a first group belonging to the one main class pertaining to the relevant intermediate class and a second group belonging to the other main class pertaining to the relevant intermediate class; and that the two groups are added to the collections belonging to the main classes.

2. A process as claimed in claim 1, characterized in that the second sorting operation is carried out releatively more accurately than the first sorting operation.


IV
V
I
20/29
II
30/49
III
50/69
1
2
3
4
5
6
7
8
9
20/29
30/49
50/69

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 20 3389

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 763 794 (BILLINGTON, III ET AL) * abstract; figure 1 * ---	1	B07B13/04
A	FR-A-941 031 (TOUCHARD) * the whole document * ---	1	
A	US-A-4 225 422 (TREVOY ET AL) * column 3, line 21 - column 4, line 25; figure * ---	1,2	
A	US-A-3 438 491 (HALEY ET AL) * abstract; figure 1 * -----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B07B
B07C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 MARCH 1992	VAN DER ZEE W.T.

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 (P0401)