Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2474209 A1 2003/08/07

(21) 2 474 209

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2003/01/29
(87) Date publication PCT/PCT Publication Date: 2003/08/07
(85) Entrée phase nationale/National Entry: 2004/07/28
(86) N° demande PCT/PCT Application No.: NL 2003/000064
(87) N° publication PCT/PCT Publication No.: 2003/063761
(30) Priorité/Priority: 2002/01/29 (02075308.3) EP

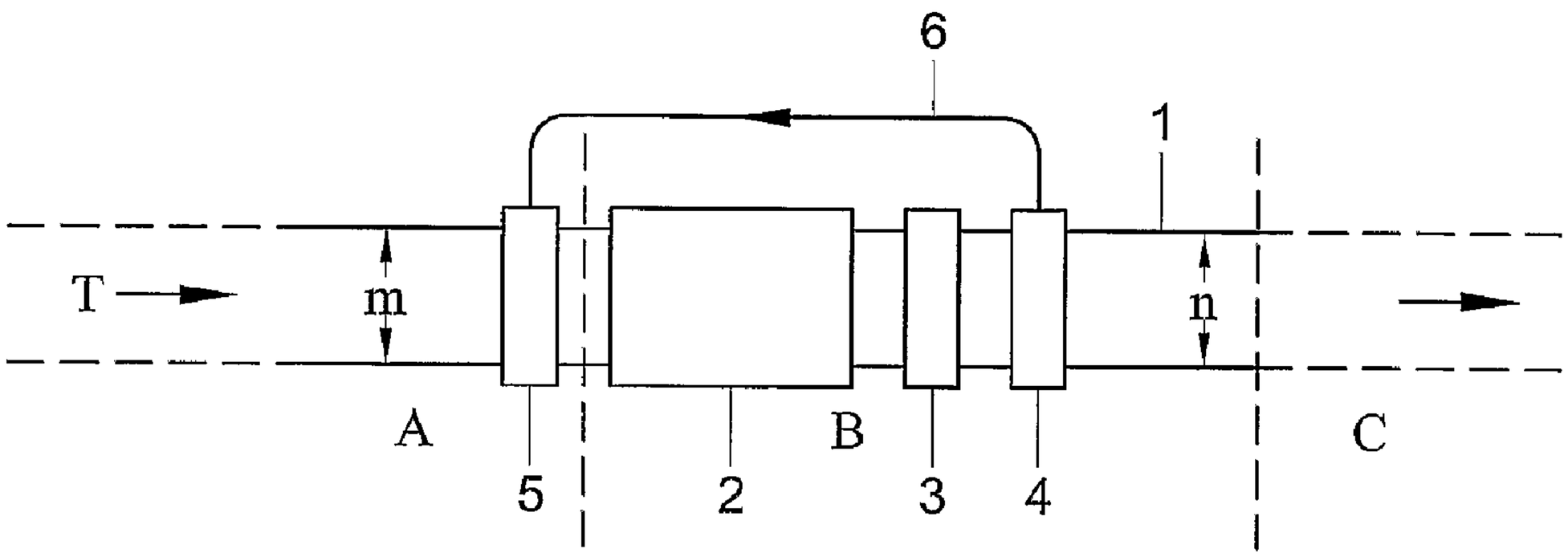
(51) Cl.Int.^{7}/Int.Cl.^{7} A01K 43/00

(71) Demandeur/Applicant:
FPS FOOD PROCESSING SYSTEMS B.V., NL

(72) Inventeurs/Inventors:
MOAYERI, HOSSEIN, NL;
VAN PINXTEREN, ADRIANUS, NL

(74) Agent: BORDEN LADNER GERVAIS LLP

(54) Titre : SYSTEME ET PROCEDE DE LAVAGE D'OEUFS
(54) Title: SYSTEM AND METHOD FOR WASHING EGGS



(57) Abrégé/Abstract:
A system for washing a stream of eggs which are uniformly distributed on m feed rows of a transport device and assume well-defined positions thereon, comprising - a feeding section, having, at least at the location of the washing of the eggs, m feed rows with the eggs on diabolos which are attached to cross axes whose ends are connected to endless chains, a washing device through which the eggs on the feed rows are passed and washed, - a dirt detection device for testing the washed eggs for residues of dirt, whereby, according to a well-determined procedure carried out by, for instance, a computer, each egg is assigned a dirt grade, while the washed eggs are passed on the feed rows along the detection device, a discharge device to which are allocated, in accordance with and following said procedure, those eggs whose dirt grade has exceeded a predetermined limit, and which discharges them as dirty eggs from the feed rows, while the other eggs proceed as clean eggs on a follow-on conveyor virtually from the discharge device, the follow-on conveyor being composed of n rows, and - a replacing device for replacing these discharged eggs into the feed section, wherein the discharge device discharges the dirty eggs immediately after the detection device and returns them along at least a single return row, parallel to and in upstream direction relative to the feed rows, and the replacing device replaces these discharged dirty eggs virtually immediately before the washing device. Such a system enables far-reaching optimization of the associated washing process.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 August 2003 (07.08.2003)

PCT

(10) International Publication Number
WO 2003/063761 A3

(51) International Patent Classification[7]: A01K 43/00

(21) International Application Number:
PCT/NL2003/000064

(22) International Filing Date: 29 January 2003 (29.01.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
02075308.3 29 January 2002 (29.01.2002) EP

(71) Applicant *(for all designated States except US)*: **FPS FOOD PROCESSING SYSTEMS B.V.** [NL/NL]; Burg. G.J.F. Tijdemanstraat 13, NL-2631 RE Nootdorp (NL).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **MOAYERI, Hossein** [NL/NL]; Stationsweg 117, NL-3771 VE Barneveld (NL). **VAN PINXTEREN, Adrianus** [NL/NL]; Rietgors 90, NL-3755 GE Eemnes (NL).

(74) Agent: **PRINS, A.W.**; Nieuwe Parklaan 97, NL-2587 BN Den Haag (NL).

(81) Designated States *(national)*: AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

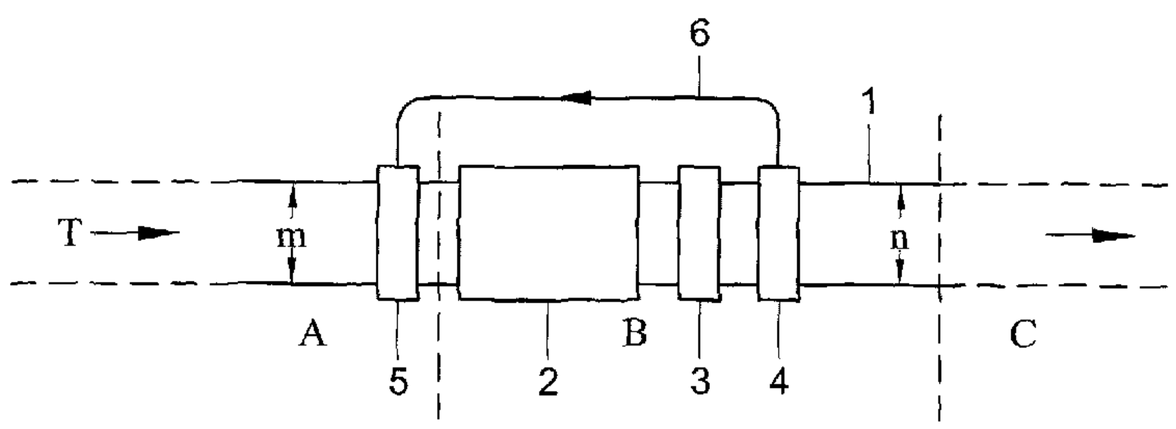
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(88) Date of publication of the international search report:
25 March 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM AND METHOD FOR WASHING EGGS



(57) Abstract: A system for washing a stream of eggs which are uniformly distributed on m feed rows of a transport device and assume well-defined positions thereon, comprising - a feeding section, having, at least at the location of the washing of the eggs, m feed rows with the eggs on diabolos which are attached to cross axes whose ends are connected to endless chains, a washing device through which the eggs on the feed rows are passed and washed, - a dirt detection device for testing the washed eggs for residues of dirt, whereby, according to a well-determined procedure carried out by, for instance, a computer, each egg is assigned a dirt grade, while the washed eggs are passed on the feed rows along the detection device, a discharge device to which are allocated, in accordance with and following said procedure, those eggs whose dirt grade has exceeded a predetermined limit, and which discharges them as dirty eggs from the feed rows, while the other eggs proceed as clean eggs on a follow-on conveyor virtually from the discharge device, the follow-on conveyor being composed of n rows, and - a replacing device for replacing these discharged eggs into the feed section, wherein the discharge device discharges the dirty eggs immediately after the detection device and returns them along at least a single return row, parallel to and in upstream direction relative to the feed rows, and the replacing device replaces these discharged dirty eggs virtually immediately before the washing device. Such a system enables far-reaching optimization of the associated washing process.

WO 2003/063761 A3

P63185

Title: System and method for washing eggs.

The present invention relates to a system and method according to the preamble of claims 1 and 14.

Such a method and system are generally known and are used, in particular, in packing stations for eggs. The eggs that are supplied there come, for instance, directly from laying batteries and are sorted and packaged in these packing stations. The type of sorting machine used in these stations has a capacity of about 1 million eggs a day. In the United States and Japan, the regulations for these sorting and packing operations require that prior to this sorting and packing, the eggs be washed. To that end, the sorting machines are equipped in-line at the in-feed side with washing apparatus. Consequently, such washing apparatus has a corresponding capacity. To obtain a good washing result, the control and use of such an apparatus must meet high standards.

Such a system is, for instance, shown in a brochure of Diamond Systems, "Egg Graders", July 1997. In a schematic overview in this brochure, a return line for dirty eggs is indicated. It runs from the beginning of the main chain or main conveyor back to a supply portion where the eggs coming from a laying battery are collected.

Over the last years, in this branch of industry, increasingly stringent requirements have been imposed on the conditions relating to hygiene and environment. As a consequence, the washing path is increased in length and/or in time. For the above-mentioned packing stations this not only requires a very efficient and effective management, but typically more floor space as well. With the above-mentioned apparatus, this is not possible.

To solve the above-mentioned problems, the present invention provides a system according to the opening paragraph, characterized in that immediately after the detection device, the discharge device discharges the dirty eggs and returns them along at least a single return row, parallel to and in upstream

direction relative to the feed rows, and that the replacing device replaces these discharged dirty eggs virtually immediately before the washing device.

This set-up has several considerable advantages.

For instance, the layout and size of the sorting machine itself will not have to be adapted because the stream of feed-through eggs is distributed over a number of rows customary for such a machine. Further, in a very suitable manner, for each packing station, more in particular for each apparatus, the optimal combination of length for the washing device, the level of the dirt grade and the number or rows for feedback, and thereupon for insertion, can be determined. It should be considered here that the length of the washing device is directly related to the washing program followed. In addition, it will be clear that by virtue of the present ostensibly small change with respect to the prior art, the construction of long feedback loops or return paths, for instance from a discharge belt at the end of the sorting path, a so-called off-grade belt, at a position downstream of the packing conveyors is thus avoided. As a result of these features, with great advantage, a clearly more economical management will be obtained.

More in particular, the system according to the invention is characterized in that the at least single return row is directed through the washing device.

A particular advantage of this addition is the possibility of thereby influencing the washing program in relation to the length of the washing device and the washing time to be selected. In particular, thus, washing devices of shorter length can be obtained.

A further exemplary embodiment of the system according to the present invention is characterized in that the system includes a feed-through control element between the feeding device and the follow-on conveyor.

What is to be regarded as a particular advantage thereof is that the supply of eggs to the washing device and feed-through of eggs found suitable can then be geared to each other in a very adequate manner.

More in particular, the system is then characterized in that the feed-through control element comprises

- an egg-transfer element with which the clean eggs are transferred from the feeding device to the follow-on conveyor having n rows, with n = m, and
- a velocity control element with which the velocity of the follow-on conveyor v_n is set so as to be less than that of the feeding device v_m. In that case, with advantage, for the egg-transfer element a dosing device is used.

In a suitable manner, this extension according to the invention offers the possibility, with different settings of the washing program for the washing device, to adapt the capacity of the entire system accordingly.

In yet another exemplary embodiment, the system according to the present invention is characterized in that

- in the above-mentioned procedure, further, all empty positions on the transport device, among which those of the discharged eggs, are registered in a zone directly downstream from said discharge of eggs by the discharge device, whereby a set of fill-in positions with corresponding fill-in position signals are obtained, and
- the system further comprises an inserting device by which, in response to the fill-in position signals, eggs coming from at least a single row from the feed rows mentioned, are inserted as insert eggs on pre-selected positions from the set of fill-in positions, while at the location of the inserting device, the number of rows of the follow-on conveyor is reduced from m to n,

with $1 \leq n < m$.

This handling procedure is very suitable specifically for the type of sorting machine where the eggs, from the very beginning, when being supplied, are assigned a fixed place in the machine. Although a number of dirty eggs are discharged, this handling operation is also mapped, preferably automatically with computer controlled tracking systems, so that in a highly advantageous manner, all positions of all eggs remain known. Through

insertion, the empty positions can then be used again so that the capacity of the following sorting section can be optimally adjusted.

Further elaborations according to the present invention will be elucidated hereinbelow in more detail with reference to a few drawings, wherein

Fig. 1 shows an outline of a first exemplary embodiment of the system according to the invention;

Fig. 2 shows an outline of a second exemplary embodiment;

Fig. 3 shows an outline of a third exemplary embodiment; and

Fig. 4 shows an outline of a fourth exemplary embodiment.

In these Figures, the same sections or parts have the same indication or reference number.

In Fig. 1, with transport device 1 for transport of products such as eggs in the transport direction T, the eggs are washed in a washing device 2. Generally, such a transport device is built up from cross axes with rollers with the ends of the axes connected to endless chains running over chain wheels, with typically one of the pairs of chain wheels, upstream or downstream, being driven by a motor. Mostly, the rollers are diabolos, with successive diabolos of successive axes forming a nest for an egg to be transported. Also, the diabolo construction can be designed such that each egg has its own two diabolos to thus prevent contamination through common use by the preceding and successive egg. The successive nests in transport direction which constitute a sequence of positions form rows. An example of this is described in WO0001229, also of applicant. Washing devices for eggs have long been known and are described, for instance, in US5460083 and US4985956.

In Fig. 1, with two broken lines transverse to the transport direction, the successive sections of the system are distinguished: A concerns the feeding section, B the washing section, and C the follow-on conveyor.

In the feeding section A, the eggs are placed on the diabolos, for instance by suction cups, after being picked up from trays, or from a feeding trough, with the eggs typically coming from laying batteries. Located on the rollers,

the eggs are passed through the washing device 2. This section comprises m rows, further called feed rows. After having been washed, the eggs are guided along a dirt detection device 3, as described in, for instance, WO 9927362 of applicant. In this device, in the manner described in that publication and indicated hereinabove, a selection based on dirt can be made.

With the aid of a discharge device 4, eggs assessed to be too dirty according to a procedure carried out by, for instance, a computer, are guided back as discharged eggs along at least a single return row 6 to the feed-in for the washing device. Such a discharge device can, for instance, be designed as described in WO 0001229, in particular with respect to Figure 8 thereof. The control of this discharge device takes place at the command of the above-mentioned procedure.

The clean eggs are led in the transport direction T via the next section of the transport device, follow-on conveyor C, to the further sorting and packing section of the machine. For these sections of the system, n rows are indicated. In general, the sections A, B and C will link up with each other having the same number of rows, so that m = n applies.

The eggs on the return row 6 are replaced into the feeding section A with the aid of a replacing device 5. According to the invention, this happens virtually immediately before the washing device 2, as is represented in the outline according to Fig. 1. It will be clear to any skilled person that this preferably involves replacement on rollers. However, if the rollers only start at that point, replacement can just yet take place between the eggs on a flat conveyor belt.

In the system according to the invention, the positions of discharge, of the return row and of replacement are selected such that as little time and distance as possible are lost. Generally, the return row runs directly next to and parallel to the rows in the washing device in upstream direction.

In Fig. 2 an outline similar to that according to Fig. 1 is shown. The at least single return row 6 is led through an added washing section, return

washing device 12. Preferably, washing device 2 and return washing device 12 will be accommodated in the same housing. By using this return washing device, an advantageous possibility of further shortening the washing device 2 is obtained.

In Fig. 3, a further embodiment of the system according to the invention is represented. At the location of the transition between the washing section B and the follow-on conveyor C, a feed-through control element 20 is provided. With this element 20, in a suitable manner, it is regulated that particularly the capacity of the sections following the washing section B remain at least equal. The fact is that the discharge of eggs yields empty positions which otherwise are no longer utilized in the further course of sorting.

In a special embodiment, this feed-through control element 20 comprises, according to the present invention

- an egg transfer element with which the clean eggs are transferred from the feeding device to the follow-on conveyor having n rows, with n = m, and

- a velocity control element with which the velocity of the follow-on conveyor v_n is set so as to be less than that of the feeding device v_m. Although this egg transfer element results in an interruption in the conveyor 1 as a whole, this is utilized in an advantageous manner to eliminate the empty positions on the follow-on transporter. To keep the capacity as constant as possible, also the velocity can be adapted by a velocity control element, in a manner such that it can be set, and possibly be further fine-adjusted, such that v_n is less than v_m. The control of this control element is coupled in a suitable manner to the computer which also effects the control of the washing, the dirt detection and the selection.

In particular, the egg transfer element comprises a dosing unit, which consists of a flat belt on which the eggs are all brought together and whence they are rearranged on the rollers of the follow-on conveyor.

In Fig. 4, in an outline, a still further exemplary embodiment of the system according to the invention is represented. In the washing section B,

now, an inserting device 21 is indicated and the area between the discharge device 4 and this inserting device 21 is hatched and is further indicated as zone 22. In this embodiment, the procedure carried out by the detection device also provides for registration of the positions which become vacant upon discharge by the discharge device 4 of eggs which are too dirty. This yields a set of fill-in positions corresponding to fill-in position signals which, as soon as the inserting device is to insert eggs on the positions fallen vacant earlier, controls the inserting device. The insertion takes place on pre-selected positions. As the eggs to be inserted come from a row intended for that purpose, the numbers of rows m and n will generally be different. For instance, (m – n) can equal 1, but larger differences are also possible. With great advantage, the labels of each egg can be maintained in this manner so that tracing an egg upstream or downstream relative to the washing section is possible in an unequivocal manner.

The row specially destined for insertion will generally be located at an outside of the transport device. However, also other manners of design are possible. A further possibility is that, conversely, the replacing device replaces the eggs coming from the return row into this row destined to be inserted. Also, a design may be chosen wherein, prior to insertion, the procedure provides for eggs from adjacent rows being fed into the insertion row mentioned to thus fill the empty positions as optimally as possible.

In this Figure, the inserting device is not indicated in detail. In particular, in addition to a feeding element for the rows (m = n), it comprises a distribution element which, in response to the fill-in position signals of the computer, distributes the insert eggs over, and inserts the eggs into, the pre-selected fill-in positions. More in particular, the distribution element comprises a buffer portion and an inserting mill or inserting belt.

As regards the discharge device, several designs can be used. For instance, the eggs can be taken from the stream of eggs with grippers or suction cups. A different possibility is for the eggs to be discharged

downwardly from the stream of eggs and to be guided further in a return row. More in particular, immediately before the discharge device, separate, tiltable transport units can be used.

From the above, it will be clear that the inserting device can also be deployed at other positions in such a system. Generally, the Figures, which represent such a system only in outline, can be modified on many points without thereby departing from the essence of the invention. In particular, the addition of the parallel washing devices 21 will contribute to a further optimization of the washing of eggs or similar products. Also encompassed by the invention are specifically the methods in accordance with the design of the system as described hereinabove.

Claims

1. A system for washing a stream of eggs which are uniformly distributed on m feed rows of a transport device and assume well-defined positions thereon, comprising

- a feeding section, having, at least at the location of the washing of the eggs, m feed rows with the eggs on diabolos which are attached to cross axes whose ends are connected to endless chains,
- a washing device through which the eggs on the feed rows are passed and washed,
- a dirt detection device for testing the washed eggs for residues of dirt, whereby, according to a well-determined procedure carried out by, for instance, a computer, each egg is assigned a dirt grade, while the washed eggs are passed on the feed rows along the detection device,
- a discharge device to which are allocated, in accordance with and following said procedure, those eggs whose dirt grade has exceeded a predetermined limit, and which discharges them as dirty eggs from the feed rows, while the other eggs proceed as clean eggs on a follow-on conveyor virtually from the discharge device, the follow-on conveyor being composed of n rows, and
- a replacing device for replacing these discharged eggs into the feed section, **characterized in that**

the discharge device discharges the dirty eggs immediately after the detection device and returns them along at least a single return row, parallel to and in upstream direction relative to the feed rows, and

the replacing device replaces these discharged dirty eggs virtually immediately before the washing device.

2. A system according to claim 1, **characterized in that** the at least single return row is directed through the washing device.

3. A system according to claim 1 or 2, **characterized in that** the feeding device and the follow-on conveyor form a continuous conveyor.

4. A system according to claim 1 or 2, **characterized in that** the system includes a feed-through control element between the feeding device and the follow-on conveyor..

5. A system according to claim 4, **characterized in that** the feed-through control element comprises

- an egg transfer element with which the clean eggs are transferred from the feeding device to the follow-on conveyor having n rows, with $n = m$, and
- a velocity control element with which the speed of the follow-on conveyor v_n is set so as to be less than that of the feeding device v_m.

6. A system according to claim 5, **characterized in that** the egg transfer element is a dosing device.

7. A system according to claim 1 or 2, **characterized in that**

- in the said procedure, further, all empty positions on the transport device, among which those of the discharged eggs, are registered in a zone immediately downstream from said discharge of eggs by the discharge device, whereby a set of fill-in positions with corresponding fill-in position signals are obtained, and
- in that the system further comprises an inserting device by which, in response to said fill-in position signals, eggs coming from at least a single row from said feed rows are inserted as insert eggs on pre-selected positions from the set of fill-in positions, while at the location of the inserting device the number of rows of the follow-on conveyor is reduced from m to n,

with $1 \leq n < m$.

8. A system according to any one of the preceding claims, **characterized in that** in the discharge device the eggs are taken from the stream of eggs with grippers or suction cups.

9. A system according to any one of the preceding claims, **characterized in that** in the discharge device the eggs are discharged downwards from the stream of eggs.

10. A system according to claim 9, **characterized in that** at least in the part of the transport device immediately before the discharge device, the eggs are located on separate tiltable transport units.

11. A system according to claim 7, **characterized in that** the inserting device comprises a distribution element for distributing the insert eggs over, and inserting the insert eggs into, pre-selected fill-in positions, in response to the fill-in position signals of the computer.

12. A system according to claim 11, **characterized in that** the distribution element comprises

- a buffer portion, and
- an inserting mill or inserting belt.

13. A method for washing a stream of eggs which are uniformly distributed on feed rows of a transport device and assume well-defined positions thereon, **characterized by** the use of the system according to any one of the preceding claims.

1/1

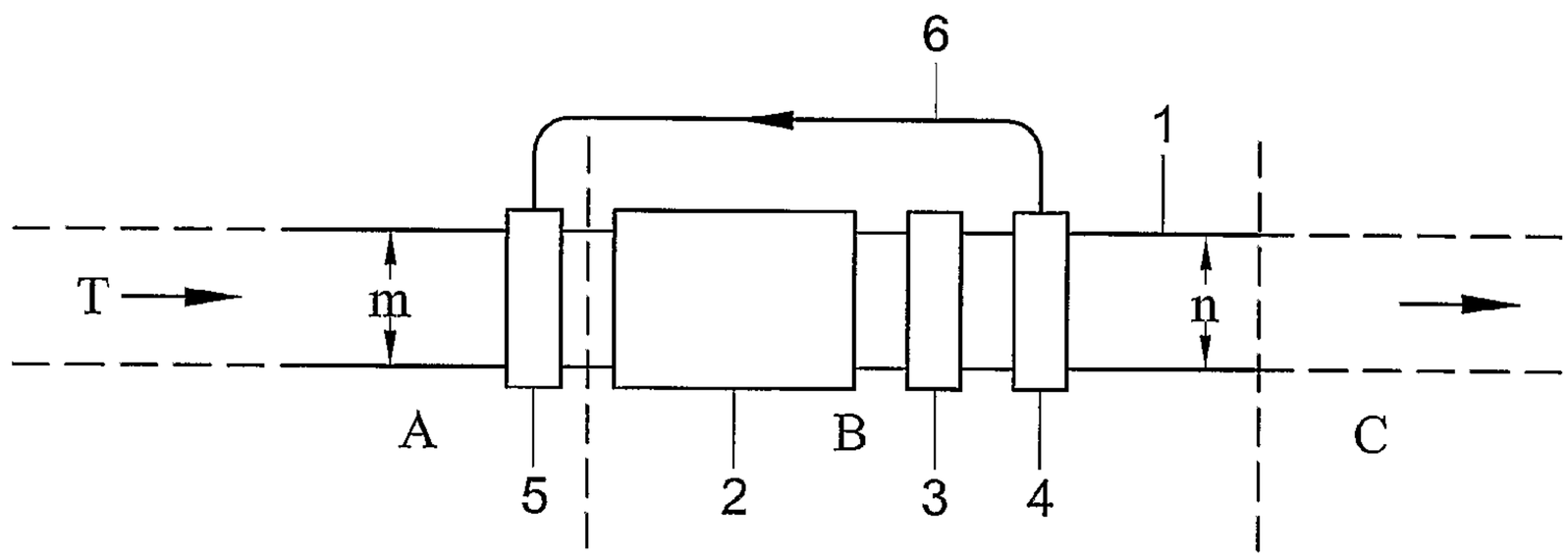


Fig. 1

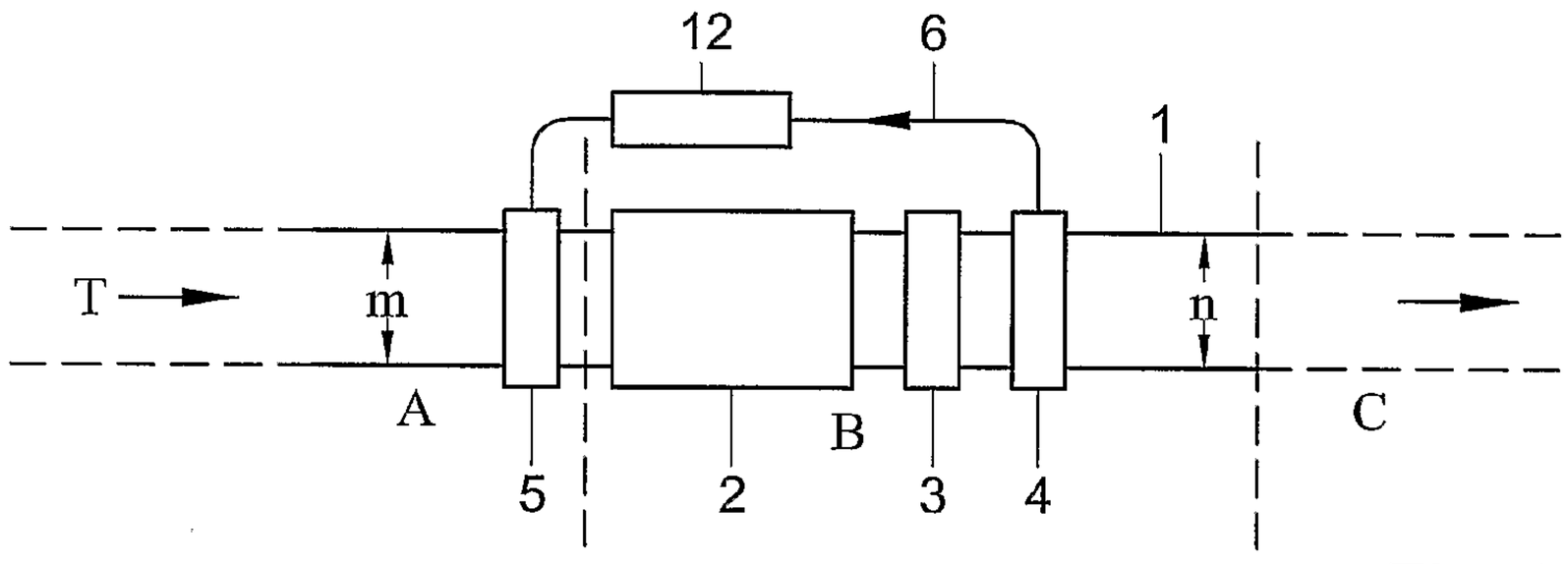


Fig. 2

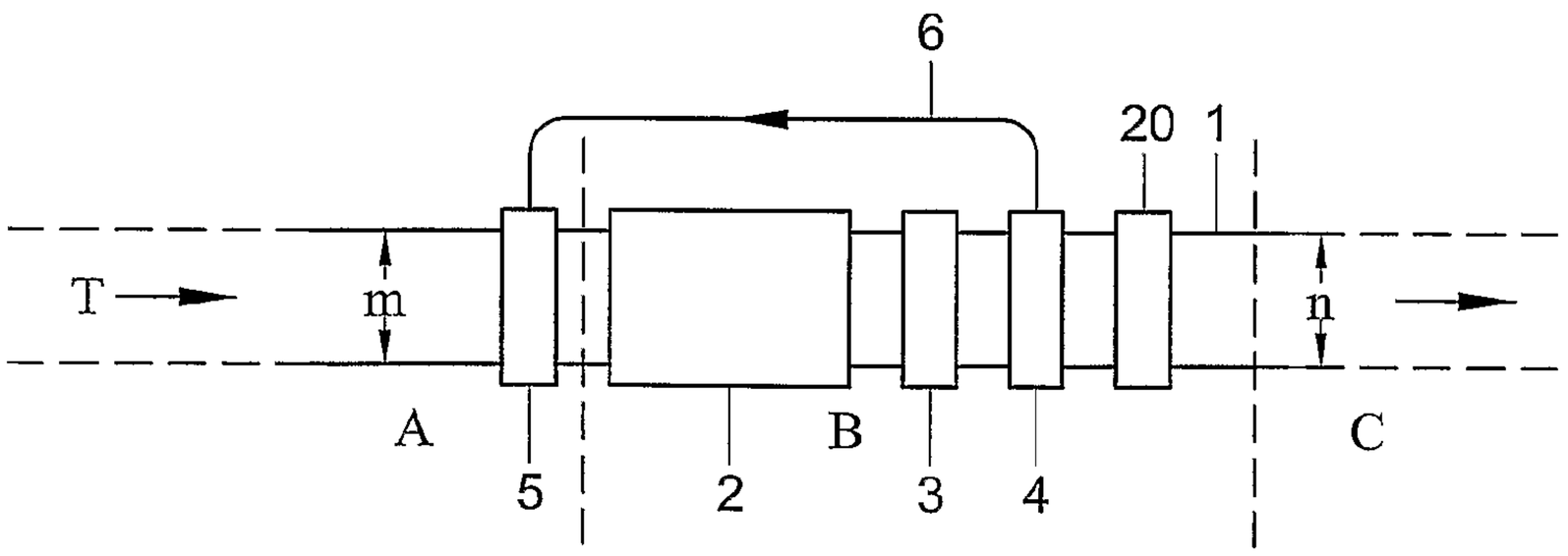


Fig. 3

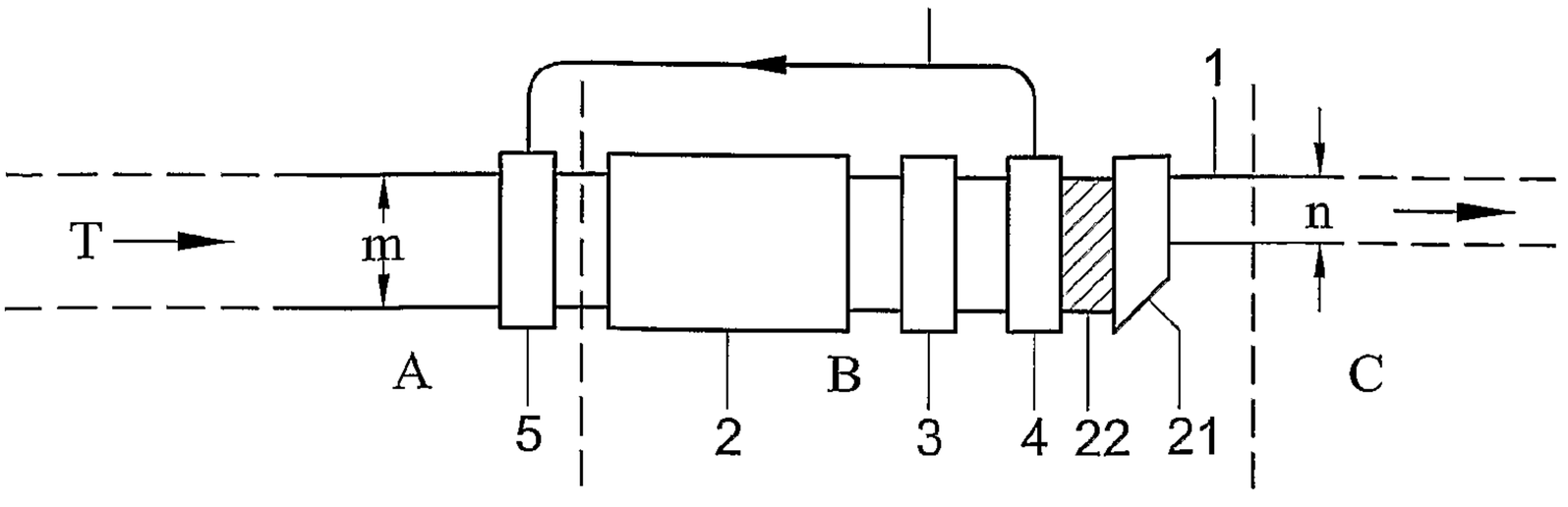
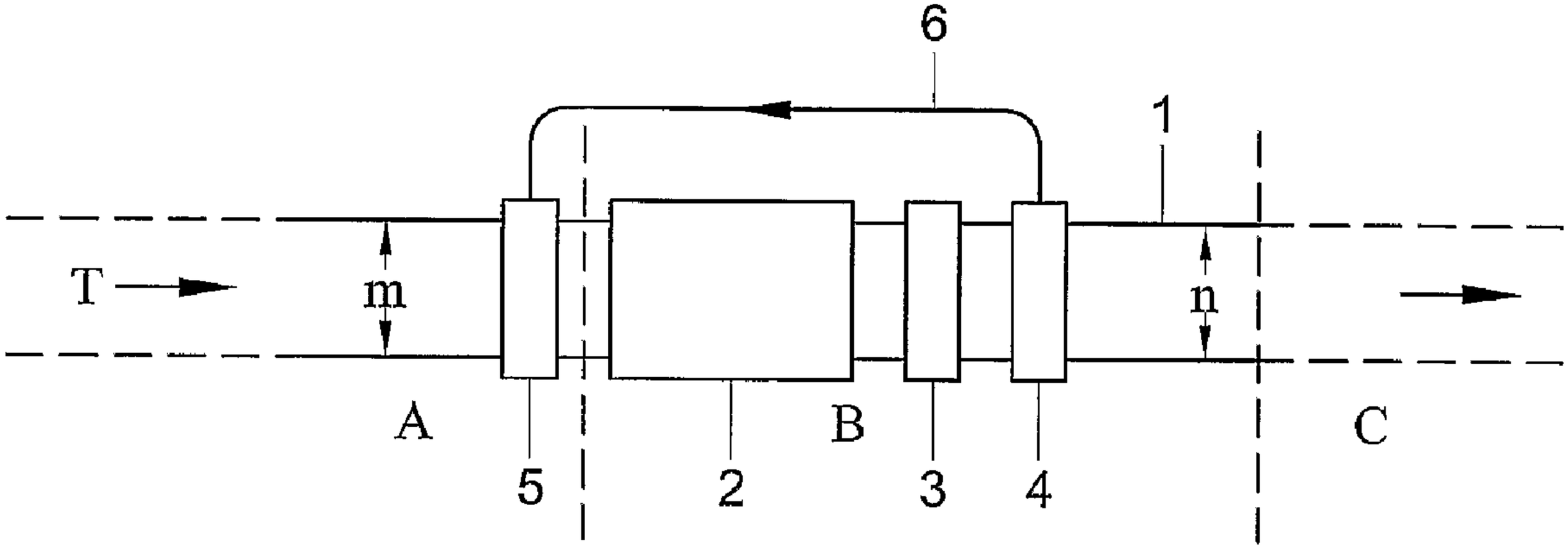


Fig. 4


6
1
T
m
n
A
B
C
5
2
3
4