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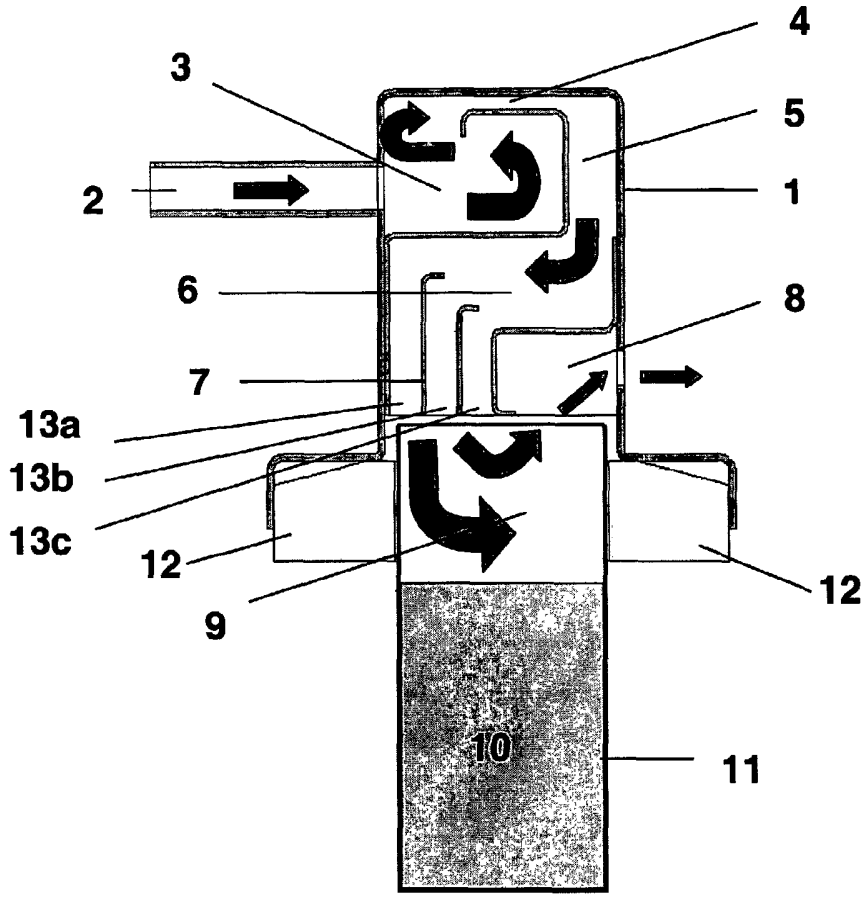
(54) Title: DEVICE FOR DISTRIBUTION OF A GASEOUS MEDIA



(57) Abstract: The invention concerns a device for distribution of a gaseous media. The device has a longitudinal, hollow body (1) comprising at least one inlet opening (2) for connection to supply mains, and at least one aperture (13a-c) forming an outlet for the injection of said media into a confined space such as a container (9). Said at least one outlet aperture (13a-c) is longitudinal and has a total cross section larger than the total cross section of said inlet opening (2) for the supply mains.

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DEVICE FOR DISTRIBUTION OF A GASEOUS MEDIA

FIELD OF THE INVENTION

The present invention relates to a device for distribution of a gaseous media in accordance with the preamble of claim 1.

BACKGROUND OF THE INVENTION

Traditionally, human food such as vegetables, fruits, and semi manufactured dishes and pet food such as meat stews are preserved and distributed in metal tins or cans having a cylindrical shape. Lately, a new concept has been developed where a parallelepipedic paperboard container is used instead of the cylindrical metal tins.

Irrespective of the concept used, the usual way of preserving the food in the container is accomplished by the following steps: a) provide a container with one open end, b) fill the container with the desired product, c) close the container, and d) retort the container and its content in an autoclave. There also exist systems where the product is retorted or otherwise sterilised and then filled into separately sterilised containers under sterile conditions.

In almost all long-term preservation of food products the amount of oxygen in the filled and sealed container is an issue to consider. Many food products are in some respect destroyed if there is too much oxygen in the container or if oxygen can enter the container during the storage.

In order to minimise the amount of oxygen in the closed containers it is common to try to replace the air in the so-called headspace before the containers are closed and sealed. The headspace is the volume in the container that has not been filled with product. It is e.g. common to replace the air in the headspace with nitrogen before the containers are sealed.

One example of a document addressing this issue is US-A-5,569,075. This document discloses a gas injection apparatus and process to form a controlled atmosphere in a confined space, comprising at least one assembly of ducts of

which a part of a duct comprises gas injection apertures. The assembly is supplied by at least one gas supply main. In order to achieve a laminar flow of the gas into the headspace of the container, the dimensions of the apparatus is chosen such that the total internal section of the supply mains is larger than the total section of the apertures. It has however been discovered that in some cases this apparatus does not give a satisfactory replacement of the air containing oxygen in favour of the nitrogen.

Thus, there is a need for an apparatus that can replace the air in favour of nitrogen to a greater extent.

SUMMARY OF THE INVENTION

A device of the kind defined in claim 1 offers a solution to the above-mentioned need.

The longitudinal shape of the outlet aperture(s) and the fact that the total area of the outlet(s) is larger than the total area of the supply mains give an advantageous distribution of the gaseous media, which in turn gives the desired high degree of replacement of the oxygen in the headspace of the containers.

Preferred embodiments of the invention are described in the dependent claims.

In accordance with a preferred embodiment, the hollow body further comprises a distribution slit, whereby the total cross section of the distribution slit is on one hand larger than the total cross section of the inlet opening for the supply mains and on the other hand smaller than the total cross section of said at least one outlet aperture. This distributes the gaseous media already inside the hollow body.

Preferably, the distribution slit extends along the longitudinal direction of said hollow body, whereby the gaseous media is evenly distributed along the whole length of the hollow body.

In accordance with another preferred embodiment, the main flow direction through the distribution slit is oriented in a first direction and the main flow direction

through said at least one outlet aperture is directed in a second direction different from said first direction. This help to ensure the even distribution of the gaseous media.

In accordance with yet another embodiment, said at least one outlet aperture forms a longitudinal outlet area extending along the longitudinal direction of said hollow body. By this configuration it is easy to replace the air in favour of another media in a number of containers simultaneously and/or in a container passing by relatively fast.

Preferably, said first flow direction is substantially perpendicular to said second flow direction, whereby this change in flow direction helps to get an even distribution of the gaseous media.

In accordance with a preferred embodiment, said at least one outlet aperture is formed by at least two longitudinal apertures separated by a baffle plate extending in the longitudinal direction of the hollow body. This shape and the baffle plate combines the features of providing an apparatus that can replace the air in many containers passing by relatively fast and the feature of giving an evenly distributed, controlled flow of the gaseous media.

Preferably, the baffle plate extends along the second flow direction, whereby the planar side surface of the baffle plate help to guide the flow of the gaseous media along the second flow direction.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail with reference to the appended schematic drawings, which shows an example of a presently preferred embodiment of the invention.

Fig 1 shows in perspective a queue of containers mowing from left to right underneath a hood for distribution of a gaseous media.

Fig 2 shows the gas flow in the apparatus as seen from above.

Fig 3 is a view similar to fig 1 showing the interior of the hood.

Fig 4 shows in a plane cross sectional side view the flow of the gas inside the hood.

Fig 5-8 shows how the hood can be used to replace air in the headspace of a container in favour of e.g. nitrogen.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As can be seen in fig 1 the containers 11 which have been filled with a product passes underneath a hood 1 for the replacement of the air in favour of nitrogen before they are sealed. Guide rails 12 guide the packages or containers 11 during the passage underneath the hood 1.

The gaseous media, such as e.g. nitrogen, is introduced via an inlet 2 connected to supply mains (not shown). The gas then enters a chamber 3 extending along the hood 1 and is thereafter distributed along the whole length of the hood via the longitudinal distribution slit 4 (see fig 2 and 4). With the exception of the inlet 2 and discharge openings 8, the hood 1 has the cross section shown in fig 4 along the whole length. The distribution slit 4 has a total cross sectional area larger than the inlet 2. From the slit 4, the gas is directed perpendicularly downwards in a channel 5 where the speed of the gas is slowed down and further redirected to a chamber 8 with a flow direction opposite the flow direction by the inlet opening 2. Thereafter the gas flow is once again redirected to the same direction as in the upper half of the channel 5, i.e. downwards, and divided into three separate flows by two baffle plates 7. The total area of the channel 5 is larger than the area of the inlet 2. It is also larger than the area of the distribution slit 4. The area of chamber 6 is in turn larger than the area of the channel 5.

The baffle plates 7 define a plane with one vector extending in the flow direction at the outlet apertures 13a-c and the other direction extending along the longitudinal direction of the hood 1. The longitudinal direction of the hood 1 coincides with the transport direction A of the

packages 11. The total area of the outlet apertures 13a-c is larger than the area of the inlet 2. Moreover, it is larger than the area of the chamber 6 and larger than the area of the channel 5 and thus also larger than the area of the distribution slit 4. This increasing flow area gives an even distribution of the gaseous media along the longitudinal direction A of the hood 1. Moreover, it gives a beneficial flow characteristic inside the container 11 resulting in a good replacement of air in favour of nitrogen.

As can be seen in fig 5 the container 11 is filled with a product 10 to a certain level, which results in a headspace 9 filled with air. When introduced underneath the hood 1 the nitrogen starts to flow into the headspace 9 and starts to push the air out of the headspace 9 via the discharge outlets 8 at the side of the container 11 being opposite the side receiving the nitrogen flow.

As can be seen in fig 6 and fig 7 the nitrogen pushes the air out of the headspace 9 until it as in fig 8 has replaced the air completely.

The device is adapted for a continuous of stepwise passage of containers 11, whereby the hood 1 has a length in the longitudinal direction A large enough to be able to replace the air in a satisfactory manner. Fig 5-8 can be seen as the state of the container 11 at different positions along the longitudinal direction A of the hood 1. If the containers are moved stepwise or the replacement process is completed before the next step fig 5-8 can be seen as different time frames.

The machine is intended for filling and closing parallelepipedic or brick-shaped containers, preferably made of cardboard material. The filled material may preferably be liquid or solid foodstuff.

It should be realised that a number of modification of the embodiments is possible within the scope of the invention as defined in the appended claims.

The packaging containers for food may be from a flexible type, i.e. wrapping films, pouches, sachets and the like, or from a more rigid type, i.e. boxes, cups, bottles,

jars or troughs, or from a combination of these. One preferred kind of packaging container is a paperboard container adapted for subsequent retorting in an autoclave.

Food is to be understood all kinds of food products, including liquid and high viscosity fluid food products and, thus, also beverages. Is should also be understood to include e.g. pet and human food like vegetables, fruits, pees and beans, products of meat, fish or poultry, and semi manufactured or finished dishes such as stew, soup or the like.

The hood has been described in the context of replacing air with nitrogen, but of course the device can be used for the controlled distribution of any gaseous media into any more or less confined space.

CLAIMS

1. A device for distribution of a gaseous media, having a longitudinal, hollow body (1) comprising at least one inlet opening (2) for connection to supply mains, and at least one aperture (13a-c) forming an outlet for the injection of said media into a confined space (9) such as a container, characterised in that said at least one outlet aperture (13a-c) is longitudinal and has a total cross section larger than the total cross section of said inlet opening (2) for the supply mains.

2. A device according to claim 1, wherein the hollow body (1) further comprises a distribution slit (4), whereby the total cross section of the distribution slit (4) is on one hand larger than the total cross section of the inlet opening (2) for the supply mains and on the other hand smaller than the total cross section of said at least one outlet aperture (13a-c).

3. A device according to claim 2, wherein the distribution slit (4) extends along the longitudinal direction (A) of said hollow body (1).

4. A device according to claim 2 or 3, wherein the main flow direction through the distribution slit (4) is oriented in a first direction and the main flow direction through said at least one outlet aperture (13a-c) is directed in a second direction different from said first direction.

5. A device according to one or more of claims 1-4, wherein said at least one outlet aperture (13a-c) forms a longitudinal outlet area extending along the longitudinal direction (A) of said hollow body (1).

6. A device according to one or more of claims 4-5, wherein said first flow direction is substantially perpendicular to said second flow direction.

7. A device according to one or more of claims 1-6, wherein said at least one outlet aperture (13a-c) is formed by at least two longitudinal apertures (13a, 13b, 13c) separated by a baffle plate (7) extending in the longitudinal direction (A) of the hollow body (1).

8. A device according to claim 7 and one or more of claims 4-6, wherein the baffle plate (7) extends along the second flow direction.

Fig 1

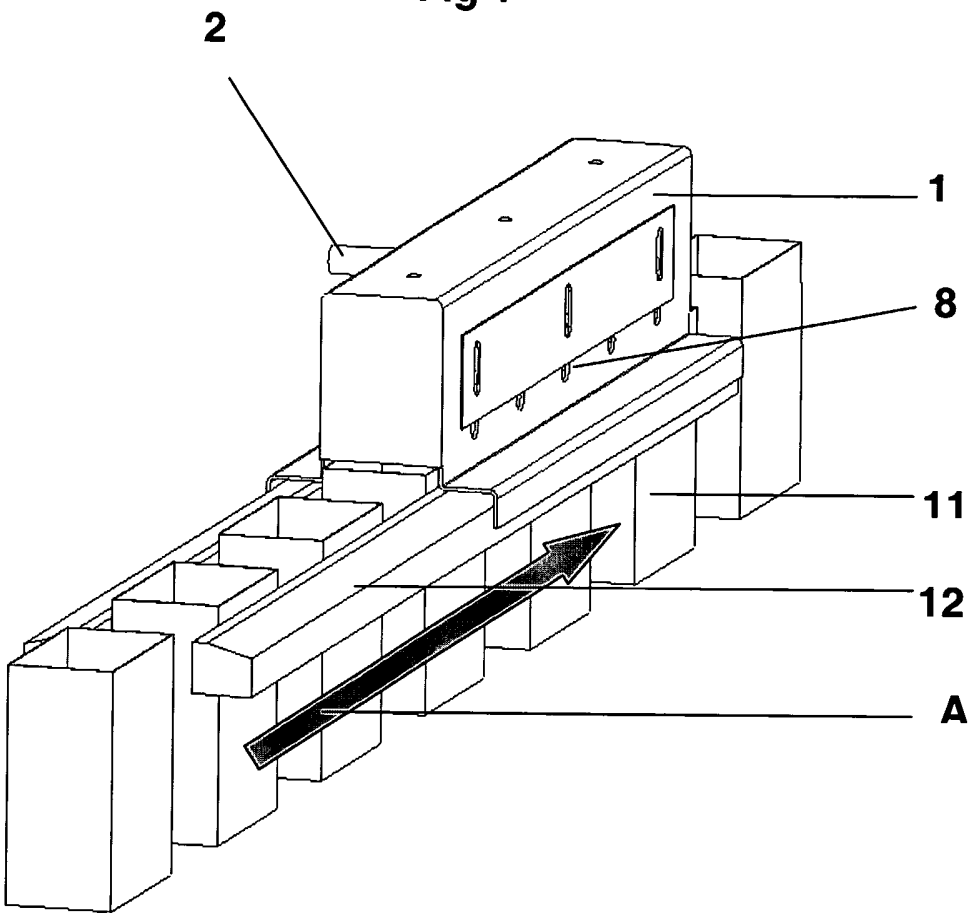
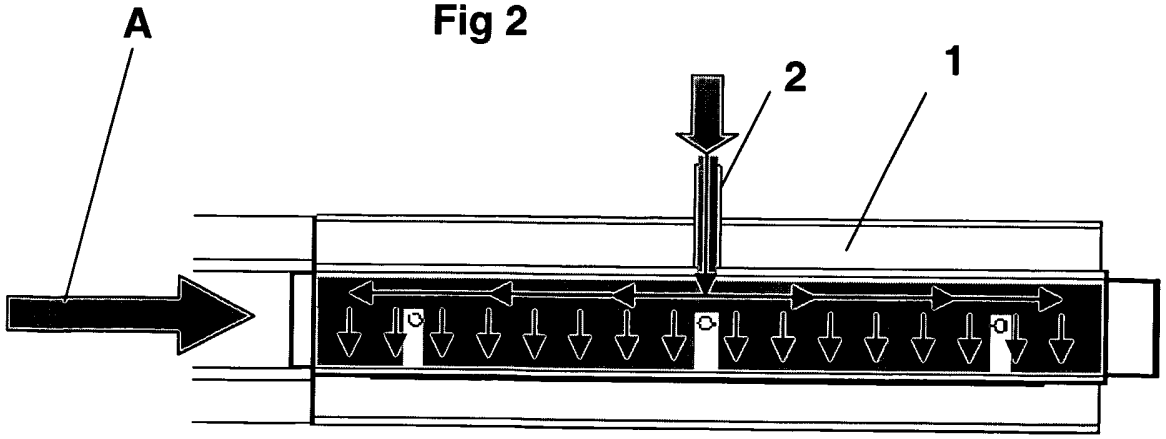


Fig 2



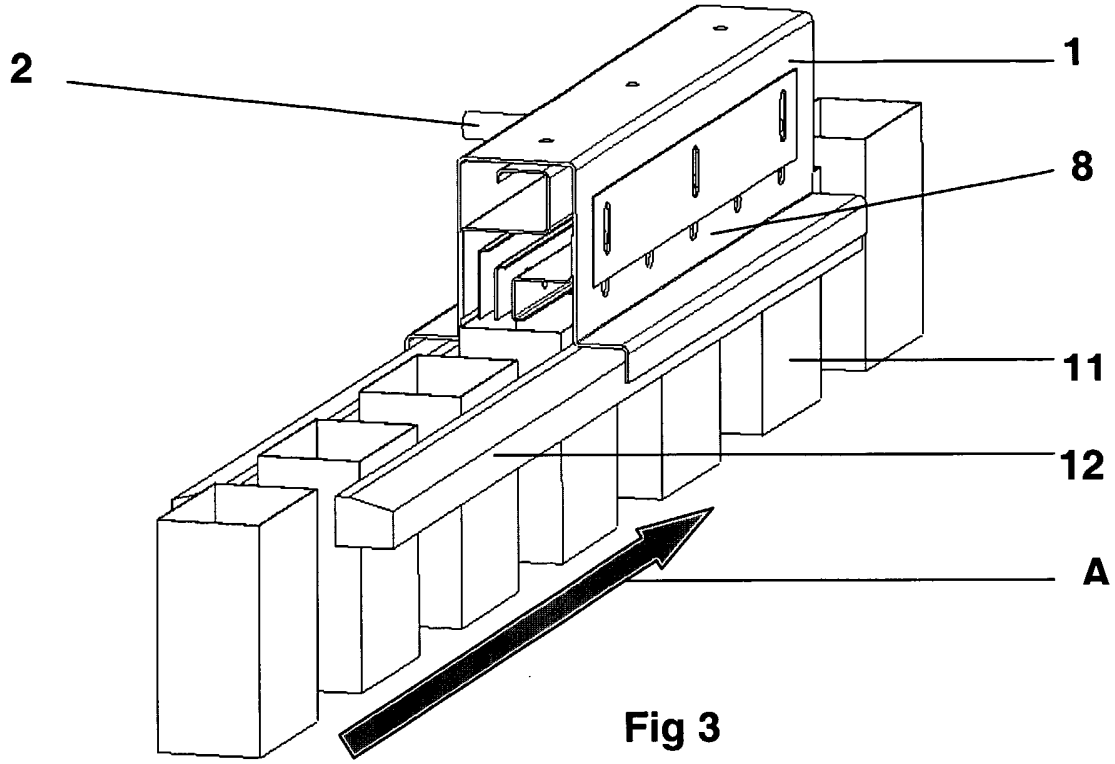


Fig 3

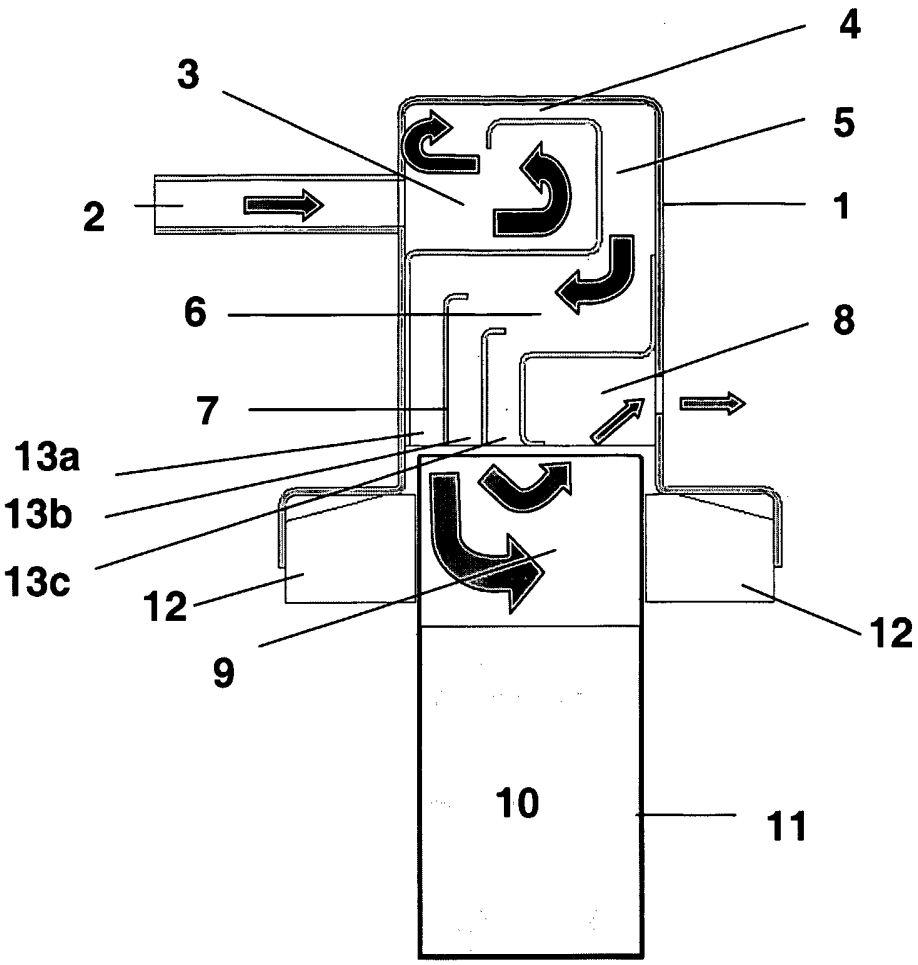


Fig 4

Fig 5

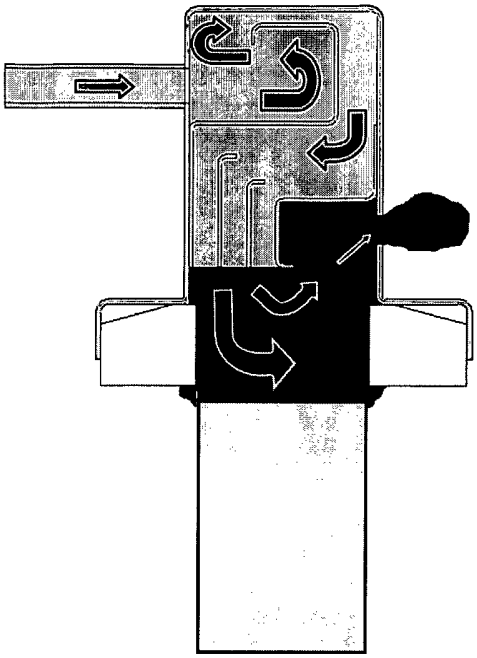


Fig 6

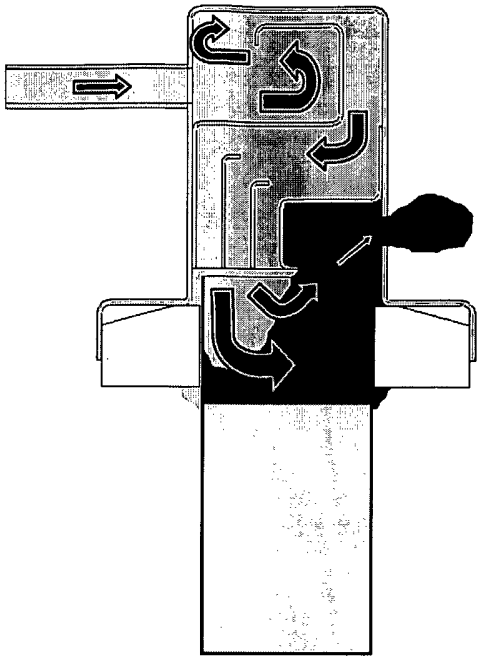


Fig 7

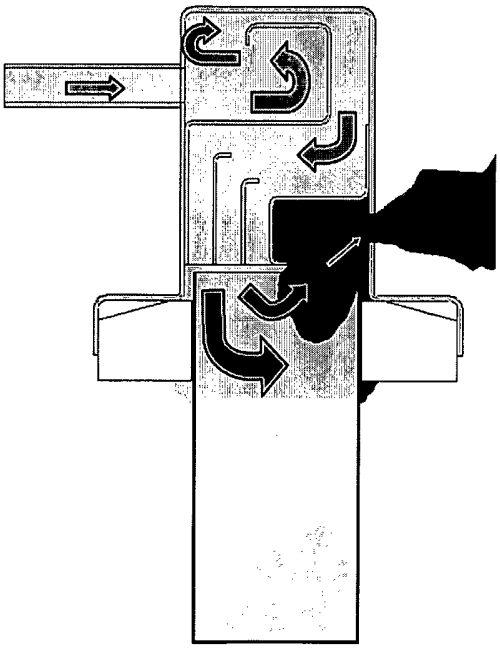
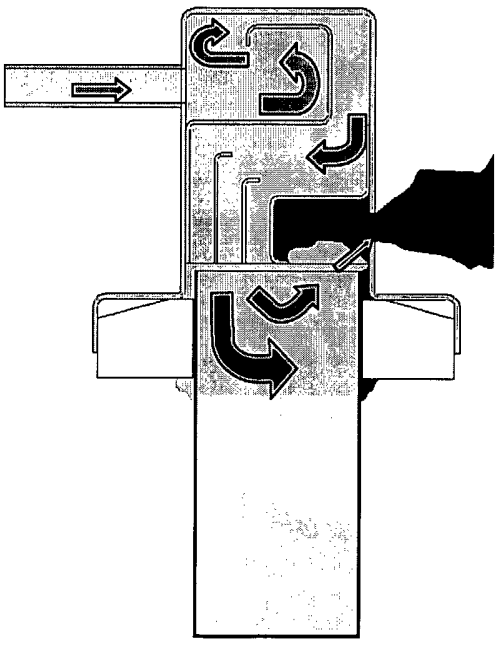


Fig 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2003/001607

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65B 31/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL,WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5961000 A (J.J.SANFILIPPO ET AL), 5 October 1999 (05.10.1999), column 4, line 51 - line 67; column 8, line 17 - line 22, figure 7	1-8
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X	US 5201165 A (G.MARANO ET AL), 13 April 1993 (13.04.1993), abstract	1
A		2-8
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"P" document published prior to the international filing date but later than the priority date claimed
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"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 January 2004	16 -02- 2004

Name and mailing address of the ISA/	Authorized officer
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US	5961000	A	05/10/1999	NONE		
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