

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 October 2011 (13.10.2011)

PCT

(10) International Publication Number
WO 2011/124548 A1

(51) International Patent Classification:
B65B 31/02 (2006.01)

(21) International Application Number:
PCT/EP2011/055200

(22) International Filing Date:
4 April 2011 (04.04.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
BO2010A000211 8 April 2010 (08.04.2010) IT

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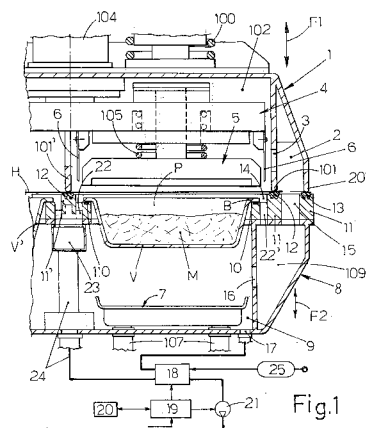
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: APPARATUS WITH OPPOSING HOUSINGS FOR MODIFIED ATMOSPHERE PACKAGING OF PRODUCTS PLACED IN TRAYS



(57) Abstract: When the opposing housings (1, 8) of the apparatus are closed, they form between them a small main chamber (P) delimited above by the film (H) for covering the tray and below by the tray (V) itself containing the product (M), and laterally by any suitable mechanical interface structure which surrounds the perimeter of said film and connects it to the perimeter of the upper edge (B) of the tray, this interface structure having holes (22) which are suitably distributed, are located outside the perimeter of the tray, and communicate with said main chamber (P). One or more of these holes (22) open(s) on at least one side of the tray and is/are connected to a first circuit (23, 24), while another one or more of said holes (22') open(s) on at least one opposing side of the tray and is/are connected to a second circuit (17) which in turn is connected to the inner chambers of the two housings (1, 8). Means (18, 19, 20) are provided to operate in such a way that, in the step of vacuum formation, both said first circuit (24) and said second circuit (17) are connected to vacuum forming means (21) which are kept active for a sufficient time to eliminate some of the air from the inside of the tray and to act in such a way that said first circuit (24) is connected in the next step or at the correct time to means (25) for supplying the process gases, while said second circuit (17) is closed or remains in communication with the vacuum means (21) to ensure that the process gas entering the tray from said first circuit (22, 24) causes the residual air in the tray to flow out from and/or towards said second circuit (22', 17), thus flushing and saturating the inner volume of the tray, which is subsequently sealed using known steps and means for welding and finally cutting the film (H).



WO 2011/124548 A1

TITLE:

APPARATUS WITH OPPOSING HOUSINGS FOR MODIFIED ATMOSPHERE PACKAGING OF PRODUCTS PLACED IN TRAYS

DESCRIPTION

- 5 The invention relates to a processing unit or apparatus which welds a sealing film in a gas-tight way onto at least one tray containing a product to be packaged. The apparatus in question is suitable for packaging machines known as "tray sealers", which weld a film on top of prefabricated trays filled with a product to be packaged, such as a food product. The apparatus according to the invention can be classified in
- 10 IPC B65B31/04 since it is of the type with opposing housings and can produce packages of the type known as MAP (Modified Atmosphere Packages), in which the product is enclosed in a sealed packaging which contains a modified atmosphere, to improve the preservation of the product without any substantial difference in pressure between the inside and the outside. In order to modify the atmosphere, in a step in
- 15 which the product placed in the tray is covered by the barrier film for subsequent sealing, which is kept suitably distant from the perimetric edge of the tray, air is initially removed from inside the tray and is then replaced with a modified atmosphere, such as an atmosphere based on nitrogen, carbon dioxide, oxygen and/or other gases.
- 20 For the implementation of this process in the prior art, the trays containing the products are housed in a lower housing which is open at the top, the edges of the trays bearing on the edge of the seat containing the trays. Means are provided for positioning the trays above the lower housing, for introducing them into this housing, and for extracting them at the end of the cycle, to enable them to be removed and
- 25 replaced with new trays to be sealed. An upper housing is located above, and aligned with, the lower housing, and the film from which portions are taken for sealing the trays placed beneath it passes under the upper housing. When the trays have been positioned above the lower housing, the two housings are made to close onto each other and onto the film, which divides the inner spaces of the two housings from
- 30 each other, and which is suitably raised above the edges of the trays, in such a way

that the inner space of the trays filled with products communicates with the inner space of the lower housing. In the packaging cycle, the inner spaces of the two housings are connected to a vacuum source, in order to remove air from inside the trays through the lower housing and balance the counter-pressure on the film through
5 the upper housing, in such a way that the film remains raised and separated from the trays. In the next step, the inner volume of the lower housing is separated from the suction circuit and is connected to a source for the progressive feed of the modified atmosphere, while the inner volume of the upper housing is connected to means for progressive pressurization, in such a way that the pressures acting above and below
10 the film are kept, for example, at equal levels. The modified atmosphere is usually introduced into the lower housing until the pressure reaches the level of atmospheric pressure, and the upper housing is connected to a circuit which gradually connects it to the atmosphere. When the process gases have been introduced into the lower housing and then passed through this into the trays, at least the lower circuit for
15 supplying the treatment gases is closed, and means located in the upper housing operate at the correct time by descending and interfering with the film in order to heat-weld it in a sealed way onto the edges of the trays and subsequently cut and separate the portion of film welded onto each tray from the remainder of the film which is connected to a reel for collecting the waste film. In the next step, the two
20 housings open by moving away from each other, the packaged trays are extracted from the lower housing and are removed and replaced with new trays, the film advances by one step to remove the waste film and position new intact film over the new trays, and the cycle which has been described is repeated.

In other cases, the inner spaces of the two housings are connected to separate
25 circuits, so that the film can be treated by the upper housing so as to give it an upwardly convex shape, which is particularly suitable for application to trays where there is an overflow of the product to be packaged. The vacuum is initially created by the circuit of the lower housing and the process gas for preserving the product is then injected. An example of this solution is described in US patent application
30 2005/0257501 published on 24-11-2005, entitled: "Method and packaging machine

for packaging a product arranged in a tray".

A similar method is described in Italian patent no. 1 244 845 of 22-11-1990, entitled: "Packaging machine for sealing containers".

The main problem encountered with prior art tray sealers is that a large quantity of process gas, which is cyclically injected into the trays through the inner volume of the lower housing, remains in this housing and is then dispersed into the surrounding air at the end of the cycle when the housings are opened. This has a significant effect on packaging costs, since the price of process gases is considerable, and it also complicates the design of the machine because the dispersion of process gases into the environment has to be prevented by the use of suction hoods. In the recent application PCT/EP/2011/050731 dated 20.01.2011, an attempt was made to overcome the aforesaid limitations of the prior art by constructing the means forming said opposing housings, between which the trays filled with product and the film above them are inserted, in such a way that, in a first step of closure of the housings, portions of film having a greater extension than the plan view of the edges of each tray are retained, and in such a way that the inner chambers of the upper and lower housings communicate with each other and with the inner space of the trays, enabling this whole circuit to be connected to the means for forming a vacuum in the trays. In the next step, said portions of film are brought towards the trays, but without sealing them, so as to form a main chamber of very small volume within each tray, which is separated from the inner chambers of the two housings and which is partly delimited by at least one component which has portions close to the edges of the tray and in which suitably distributed internal passages are formed, each of these passages having one end opening into said main chamber while its other end is connected to a process gas supply circuit. The process gases can then be injected directly through this circuit into said main chambers, and therefore directly into the trays, while the inner chambers of the two housings are gradually pressurized by a connection to the atmosphere, as is done in the prior art in the upper housing only. When the treatment of the trays is complete, the operating cycle continues in the conventional way, with the execution of the steps of heat-welding and cutting. When

the two housings are opened with both of their inner chambers at atmospheric pressure, the considerable dispersion of process gases which occurs in the prior art does not happen here, since the small quantity of process gas supplied to the trays has been trapped within the small internal spaces of the trays which are sealed by their covers. The circuits connected to said main chambers can be used to carry out selective and, if required, differentiated treatments of groups of trays which are placed between the pairs of opposing housings from time to time.

When the last-mentioned solution was observed in operation, it was found that, when the trays were large and only partially filled with product, and/or when the product required the forced elimination of the oxygen contained in the ambient air, the time taken for the whole packaging cycle was relatively long, since a considerable amount of time is required for the forced evacuation of the air from inside the trays and for the subsequent injection of gas into the inner volumes of the trays.

At this point, a new major technical problem arose. This was the problem of forming acceptable packages of the MAP type, of any size and for any product, in limited operating times and with the preliminary formation of lower vacuums in the housings than those required by the prior art. A subsidiary problem arising from this major problem was that of enabling the user of the packaging machine to select, from the control panel of the machine, the type of cycle to be carried out, according to the type and characteristics of the product to be packaged and of the packaging, so as to prepare the machine for the execution of variable operating cycles which are technically reliable in all cases, in limited time intervals. These problems have been resolved by the solution claimed in the appended Claim 1 and in the subsequent dependent claims, based on the following proposal for a solution.

During the packaging cycle, it is possible to form a main chamber which is delimited by the film covering the tray, by the upper edge of the tray, and by a suitable mechanical interface structure which surrounds the perimeter of said film and connects it to the perimeter of said upper edge of the tray, while holes opening on the perimeter of the tray can be formed in this interface structure. Of these holes, the ones that open on at least one side of the tray are connected to a first circuit, while all

the other said holes are connected to a second circuit which is connected to the inner volume of the lower housing and to that of the upper housing. In the step of vacuum formation, both said first and said second circuit are connected to the vacuum forming means which are kept active for a limited time, for example a time sufficient
5 for the elimination of 30-50% of the air from the inside of the tray. When the vacuum has been formed, said first circuit is connected to the process gas supply source, while said second circuit is closed or remains connected to the vacuum pump, in such a way that a gas-flush cycle follows or is superimposed on a vacuum-gas cycle. The gas entering the tray from said first circuit forces the residual air in the tray to
10 flow out through said second circuit, and simultaneously flushes and saturates the inner volume of the tray. Using this solution, it is possible to saturate the inside of the tray with process gases in a short time, after which the tray is finally sealed in the known steps of welding and final cutting of the film.

Further characteristics of the invention, and the advantages resulting therefrom, will
15 be made clearer by the following description of some preferred embodiments of the invention, illustrated purely by way of non-limiting example in the figures on the two attached sheets of drawings, in which:

- Fig. 1 is a cross-sectional view of the two opposing housings in the first step of closure onto the film, the housings containing a tray filled with product to be treated
20 and sealed;
- Fig. 2 shows schematically, in a plan view from above, a seat of the lower housing containing a tray to be treated and sealed;
- Fig. 3 shows a variant of the solution of Figure 2;
- Fig. 4 shows a significant part of the housing of Figure 1 in the known step in
25 which the film is welded onto the edge of the tray;
- Figs. 5, 6, 7 and 8 show some possible timing diagrams which relate the steps of vacuum, gas injection and welding of the tray to each other.

In Figure 1, the number 1 indicates the upper housing which is provided in its lower part with inner annular edges 101, 101' and an outer edge 201 which surrounds said
30 inner edges and which, together with the latter, delimits an annular chamber 2 which

communicates, through apertures 3 suitably distributed along the edge 101, with the inner volume 102 of the housing 1, which is connected to suitable vertical guiding and raising and lowering means which are indicated schematically by the double arrow F1 but are not illustrated in detail since they are already known. Within the housing 1 there is a plate 4 of a known type connected to special means 104 for selective raising and lowering, which, by means of respective interposed guide and spring means 105, support heat-welding units 5 beneath them and carry cutting units 6 which surround the outside of each welding unit 5 and are normally retracted from the latter. The housings shown in Figure 1 are such that they can operate simultaneously on two parallel lines of trays V and V', but only the part intended to operate on a line of trays V has been depicted in a substantially complete way, although it is to be understood that the part of the housing intended for operation on the other line of trays V' is a mirror image of that illustrated and is identical thereto in all respects. However, it is to be understood that the protective scope of the invention also includes housings which can operate on a single line of trays or on a single tray, for which the edge 101' will be placed adjacent to an outer edge 201. The number 100 indicates known means for damping the closure of the upper housing 1 onto the aforesaid lower housing. The heat-welding film H passes under the housing 1 and is used to seal the preformed trays V filled with the product M, the trays being placed by any suitable means under the housing 1 and accurately centred with respect to said means 5 and 6, while also bearing on extractors 7 of a known type associated with the lower housing 8 with corresponding guide and movement means 107. The lower housing 8 is connected to suitable known raising and lowering means indicated schematically by the double arrow F2, and has a chamber 9 whose shape and size are such that it can house the extractor 7 with the tray V when the housing is raised (see below), this chamber being provided at its top with a seat having an annular opening 10, usually with a non-stick gasket 110, on which the lower part of the edge B of the tray V is intended to bear in a sealed way. At a level above that of the annular seat 10, the lower housing 8 has flat surfaces 11, 11' with annularly continuous gaskets 12 and 13, aligned with and facing the edges 101, 101' and 201

of the upper housing 1.

Between the annular seat 10 and the flat surface 11 there is an annular recess 14 having suitable characteristics, while the portion of the flat surface 11 lying between said gaskets 12 and 13 has vertical apertures 15 in the form of holes or slots
5 communicating with the underlying gap 109 which is connected to the chamber 9 through lateral apertures 16 of the lower housing 8, and communicating with the inner chamber 2 of the upper housing 1 which lies above when the two housings are closed as shown in Figure 1 (see below). The chamber 9 has an opening with a conduit 17 which can be connected to or disconnected from a vacuum pump 21 by
10 means of a shut-off unit with valve means 18, controlled by a processor 19. The number 20 indicates a unit for programming, and if necessary for interrogating and controlling, the processor 19 and the unit 18 connected thereto.

It can be seen in Figures 1 and 2 that the recess 14 surrounding the annular seat 10 has holes and/or slots on its four sides, arranged in at least two opposing rows 22,
15 22' or preferably in four rows as also indicated by 22'', these last rows of holes being connected to the rows 22' and being connected, together with these, to the inner circuit 9, 109 of the housings 1, 8. The rows of holes 22 are connected to a manifold 23 of any suitable type, which is located inside the housing 8 and which is connected by means of one or more conduit(s) 24 to the shut-off unit 18 to which the means 25
20 for supplying the process gases to be injected into the trays are also connected.

The apparatus operates in the following way. In an intermediate step of the operating cycle, the apparatus is in the condition shown in Figure 1. The tray V with the product bears with its edge B on the gasket 110 of the annular seat 10, the housings 1 and 8 are closed onto each other, with the edges 101, 101' and 201 interacting with the
25 annular gaskets 12 and 13 and with a portion of film H clamped between the gasket 12 and said edges 101, 101' and suitably raised above the edge B of the tray. In a first operating step of the apparatus, the conduits 17 and 24 are connected through the unit 18 of Figure 1 to the pump 21 which thus draws air both from the inside of the tray, through all the holes 22, 22', 22'', and from the chambers 9, 109 of the lower
30 housing, as well as from the chambers 2, 102 of the upper housing, in such a way

that the pressures on the opposing faces of the film H are equal and the arrangement of the film in space is not substantially changed. When a sufficient vacuum has been formed in the tray, the conduit 17 is, for example, closed by the unit 18 in the connection to the pump 21, which, for example, is switched off (see below), and, at the correct time, the unit 18 connects the conduit 24 to the source 25 supplying the process gases which, as indicated by the arrows Z in Figure 2, enter the tray V through the row of holes 22 and create a saturation front which advances in a uniform laminar way, without any development of turbulence, thus forcing the residual air in the tray to flow out through the rows of holes 22" and 22' and to enter the chambers 9, 109, 2, 102 of the housings where there is a low vacuum. The amount of gas entering the tray is equal to the amount of air leaving it and entering the inner chambers of the housings, and therefore the pressure on the opposite faces of the film H is substantially balanced. When the inner space between the tray and its covering film has been saturated with the process gases, the welding means 5 are lowered as shown in Figure 4 to fasten the film in a gas-tight way, and at the correct time the unit 18 shuts off the connection of the conduit 24 to the process gas supply source 25. Thus the treatment gases rapidly saturate the inner space of the tray containing the product to be packaged, and remain trapped therein after said step of welding the film H onto the edge of the tray. This step is immediately followed by the step in which the film is cut, by the lowering of the means 6 which partially enter the annular recess 14, after which the inner chambers of the housings are brought to atmospheric pressure, the means 5 and 6 are raised, the housings are moved away from each other, the extractor 7 raises the packaged tray from the seat 10, and known means come into operation in order to remove the sealed trays, to replace them with new trays to be sealed, to advance the film H, to remove the waste part of the film and move it towards collection means, and to provide a new intact portion of the same film above the new trays to be sealed.

The three diagrams in Figure 5 show the interaction of the vacuum or suction step A, the gas injection step G and the welding step S in the prior art. The long amount of time elapsing in the step in which the suction A is active (position 1) is additional to

the subsequent time in which the gas injection step G is active, and therefore when the welding step S is activated the total time taken for treating the inner volume of the tray to be sealed is the sum of the two aforesaid time intervals, which is equal to T1. However, Figure 6 shows that the time T2 for treating the inner volume of the tray to be sealed can be reduced considerably with the apparatus according to the invention, since the active time of the vacuum step A is reduced and partially overlaps with the gas injection step G, as described above. The shorter vacuum formation time is obviously associated with a lower vacuum in the tray and in the housings, providing benefits in relation to the construction of the housings and of the various sealing gaskets. It is to be understood that what is described and illustrated in Figure 6 is a possible, but not unique, mode of operation of the apparatus according to the invention. The diagrams in Figure 7 show, for example, that the suction step A can also be maintained during the gas injection step G. On the other hand, the diagrams in Figure 8 show that the gas injection step G can start at the same time as the vacuum step A which may have a brief duration. Again, it is to be understood that these are only some possible alternative modes of operation of the apparatus and that others may be used, possibly in response to specific packaging requirements.

As stated with reference to Figure 2, the holes 22" in the shorter sides of the tray can be omitted or can be provided in a limited number and/or in an arrangement closer to the row of holes 22' than to the row 22, or can be provided with a different geometry and/or shape. The variant illustrated in Figure 3 shows that the rows of holes 22" can be connected to corresponding manifolds 23' to which their conduits 24' are connected. In the vacuum formation step, all the holes 22, 22' and 22" are in suction mode. However, when the gas injection step commences, the holes 22 are connected to the gas source, while the holes 22" can be closed or modified by, or in, connection with the outlet holes 22'. Simple means located behind the corresponding conduits 24' can be used to close or constrict said rows of holes 22" automatically, in such a way that the process gases flow from the holes 22 solely or predominantly towards the opposing holes 22' as indicated by the arrows Z in Figure 2, so as to

occupy in a uniform way, without any formation of vortices or reflux, the whole extension of the main chamber P containing the film, tray and product.

Using the means 20 of Figure 1, located on the control panel of the machine, the operator can select and set the operating cycle which is most suitable for the packaging of the products in the trays at any given time, given that, in addition to the indicated cycles, the machine can execute packaging cycles with a vacuum only or normal packaging cycles.

CLAIMS

1. Apparatus with opposing housings for the modified atmosphere packaging of products placed in trays, of the type comprising a downwardly open upper housing (1) containing the welding means (5) and preferably also containing the means (6) for cutting the barrier film (H) for sealing the trays, and an upwardly open lower housing (8) with a chamber (9) having at least one seat (10) for housing a tray (V) which can be moved into and out of this seat, and comprising means for positioning a stretched portion of film (H) between the two housings (1, 8) and above the trays (V), as well as means for bringing said housings towards each other to clamp between them the edges of the tray and said film above these edges, and also comprising means operating at the correct time to extract air from the tray and subsequently inject process gases into it to preserve the product placed in the tray, before the subsequent step of welding the film onto the edge of the tray and the subsequent cutting along the perimeter of the portion of film welded to the tray, characterized in that means are provided to operate in such a way that said housings (1, 8) form within them a main chamber (P) delimited above by the film (H) for covering the tray and below by the tray (V) containing the product (M), and laterally by any suitable mechanical interface structure which surrounds the perimeter of said film and connects it to the perimeter of the upper edge (B) of the tray, this interface structure being provided with holes and/or slots (22) which are suitably distributed and located outside the perimeter of the tray and which communicate with said main chamber (P), one or more of these holes (22) opening substantially in one portion or side of the tray and being connected to a first circuit (23, 24), while another one or more (22') of said holes open(s) in at least one opposing portion or side of the tray and is/are connected to a second circuit (17) which is connected to the inner chambers of the two housings (1, 8), means (18, 19, 20) being provided to operate in such a way that, in the vacuum formation step, both said first circuit (24) and said second circuit (17) are connected to vacuum forming means (21) which are kept active for a sufficient time to eliminate some of the air from the inside of the tray and to operate in such a way that, in the next step or at the correct time, said first circuit (24) is

connected to means (25) for supplying the process gases, while said second circuit (17) is closed or remains connected to the vacuum means (21) in such a way that the process gas flowing into one part of the tray through said first circuit (22, 24) forces the residual air in the tray to flow out from and/or towards at least one opposing part of the tray, through said second circuit (22', 17), the whole arrangement being such that the inner volume of the tray is simultaneously flushed and saturated, thus uniformly occupying, without the formation of vortices or reflux and therefore very rapidly and reliably, the whole extension of said main chamber (P) comprising the film, the tray and the product, which is subsequently sealed using known steps and means of welding and final cutting of the film (H).

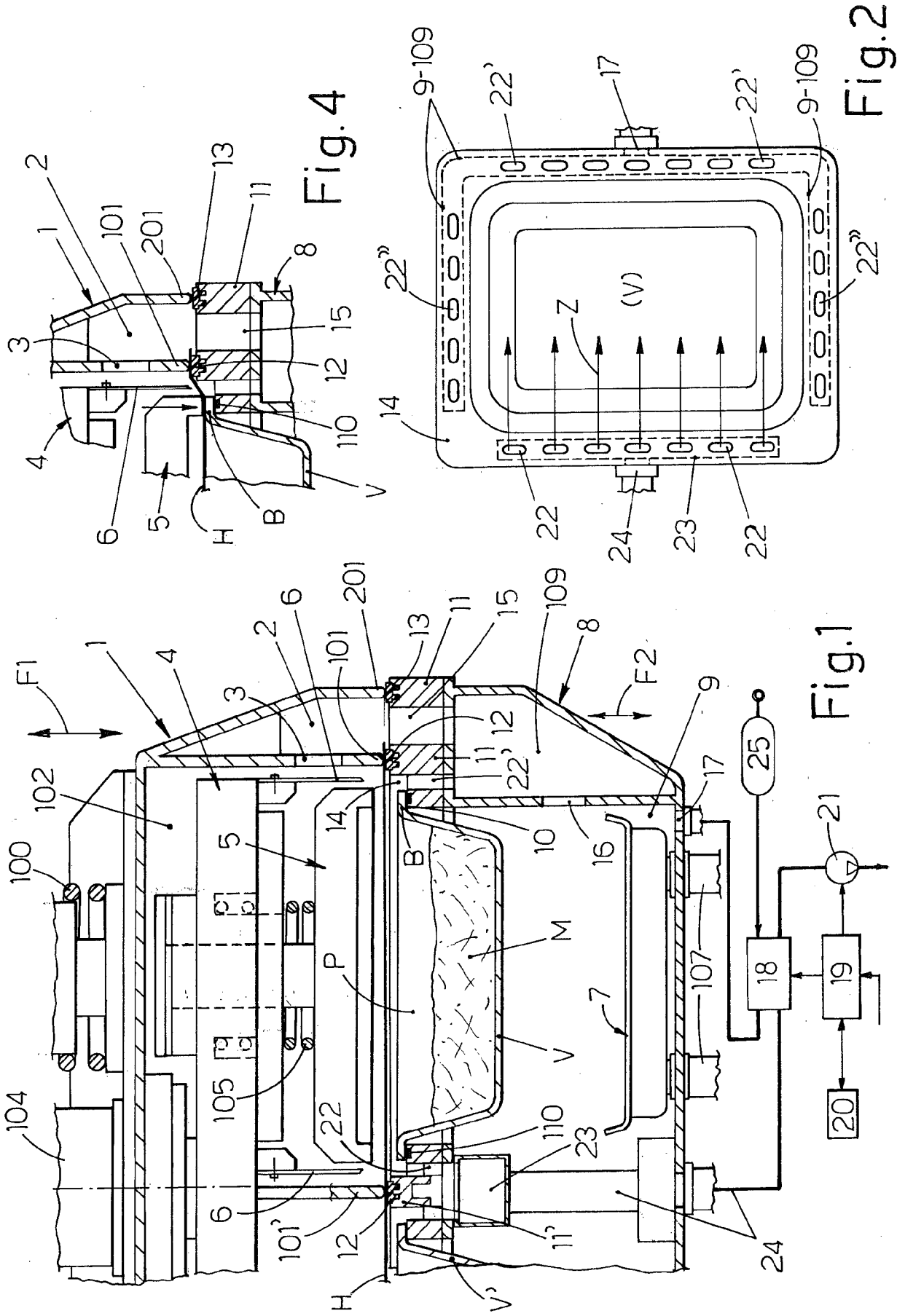
2. Apparatus according to Claim 1, in which said mechanical interface structure forms part of the lower housing (8) and comprises the annular seat (10, 110) adapted to contain the tray (V, M) and to support it by its edge (B) and comprises an annular flat surface (11, 11') which surrounds said seat (10) and whose upper face is at a higher level than this seat (10) and has annular gaskets (12, 13) on which the lower edges (101, 101', 201) of the upper housing (1) bear in a sealed way, when the upper housing is closed onto the lower housing (8), with the interposition of the film (H) which is thus suitably raised above the edge of the tray to form said main chamber (P), an annular recess (14) being provided between said seat (10, 110) and said annular flat surface (11, 11') and having said holes and/or slots (22, 22') opening into it, through which the main chamber (P) can be connected to said vacuum forming means (21) and/or to said process gas supply means (25).

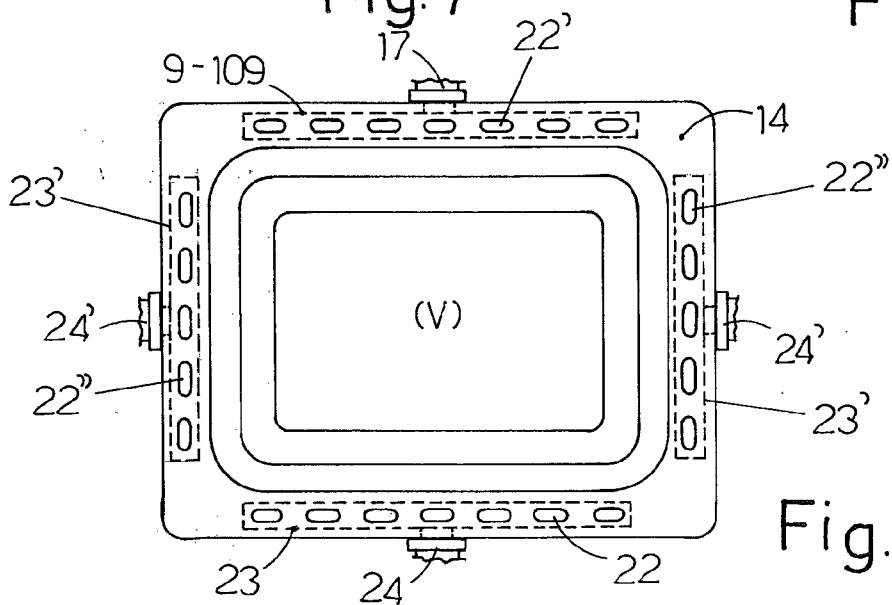
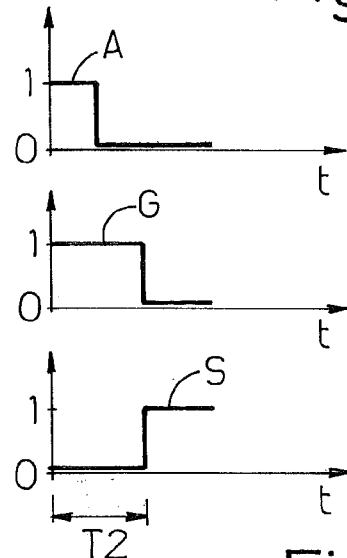
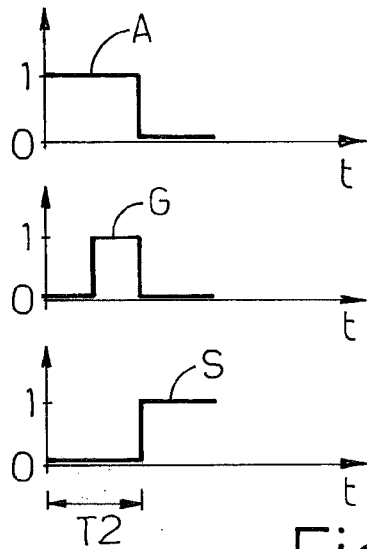
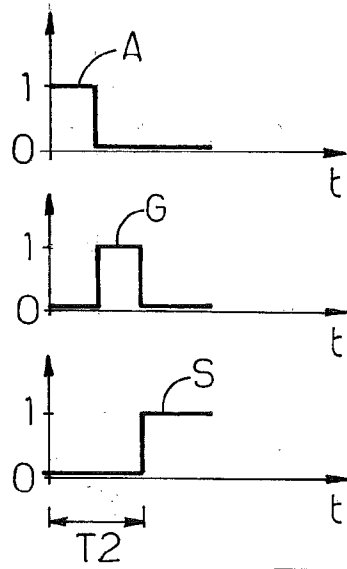
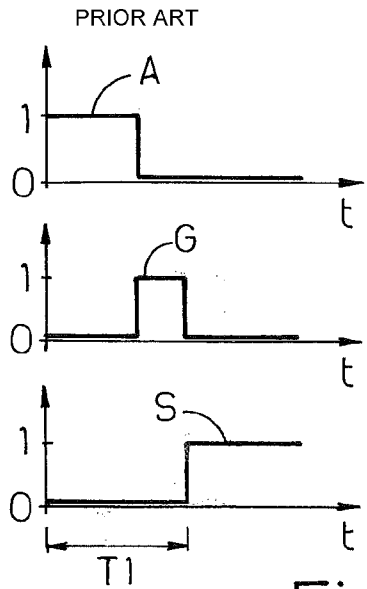
3. Apparatus according to Claim 1, in which said first circuit (24) is connected to a manifold (23) which is located inside the lower housing (8) and which is connected to said holes (22) opening on at least one side of the tray, while said second circuit (17) communicates with the inner chambers (9, 109) of the lower housing (8) which are directly connected to the holes (22') opening on at least one opposing side of the tray, said first and second circuits (24, 17) being connected to a shut-off unit with valves (18), controlled by a processor (19) with a programming terminal (20) and connected to said vacuum forming means (21) and to said process gas supply

means (25).

4. Apparatus according to Claim 1, in which said annular recess (14) also has supplementary holes and/or slots (22") opening on the other two sides of the tray, these supplementary holes communicating with the inner chamber (9, 109) of the
5 lower housing (8) directly or with the interposition of the controlled shut-off means, the whole arrangement being such that, in the vacuum step (A), said auxiliary holes (22") are also active, while in the gas injection step (G) the auxiliary holes (22") are closed or constricted, in such a way that the air flows out of the main chamber (P) including the tray solely or predominantly through the holes (22') opposite the holes
10 (22) for the inflow of the process gases.

5. Apparatus according to Claim1, characterized in that it comprises means for setting the apparatus, using the programming unit (20) of the processor (19), for the actuation of any one of a number of cycles specified for the production of packages of the MAP type or for the production of packages of any other suitable type,
15 including conventional packages.





INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/055200

A. CLASSIFICATION OF SUBJECT MATTER INV. B65B31/02 ADD.		
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) B65B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99/33703 A1 (SEALED AIR NEW ZEALAND LIMITED [NZ]; BOURKE BERNARD JOHN [NZ]) 8 July 1999 (1999-07-08) the whole document	1-4
X	----- EP 1 842 776 A2 (AWAX PROGETTAZIONE [IT] GRUPPO FABBRI S P A [IT]) 10 October 2007 (2007-10-10) the whole document	1-4
A	----- EP 1 908 689 A2 (MULTIVAC HAGGENMUELLER GMBH [DE]) 9 April 2008 (2008-04-09) the whole document	1-4
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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 "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "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 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family
Date of the actual completion of the international search 17 June 2011		Date of mailing of the international search report 01/07/2011
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Johne, Olaf

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2011/055200

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.: 5
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2011/055200

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9933703	A1	AU 1893399 A	19-07-1999

EP 1842776	A2	AT 440031 T	15-09-2009
		ES 2331210 T3	23-12-2009

EP 1908689	A2	AU 2007221858 A1	24-04-2008
		DE 102007047058 A1	10-04-2008
		JP 2008094498 A	24-04-2008
		NZ 562266 A	31-03-2009
		US 2008104930 A1	08-05-2008

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 5

Claim 5 seeks to define the invention by reference to a second entity. This reference leave the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claim unclear.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.