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

(11) Publication number: **0 015 461**
A1

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **80100894.7**

(22) Date of filing: **22.02.80**

(51) Int. Cl.³: **B 65 B 47/04**, B 65 B 25/22

(30) Priority: **02.03.79 IT 2068279**

(43) Date of publication of application: **17.09.80 Bulletin 80/19**

(84) Designated Contracting States: **AT BE CH DE FR GB IT LU NL SE**

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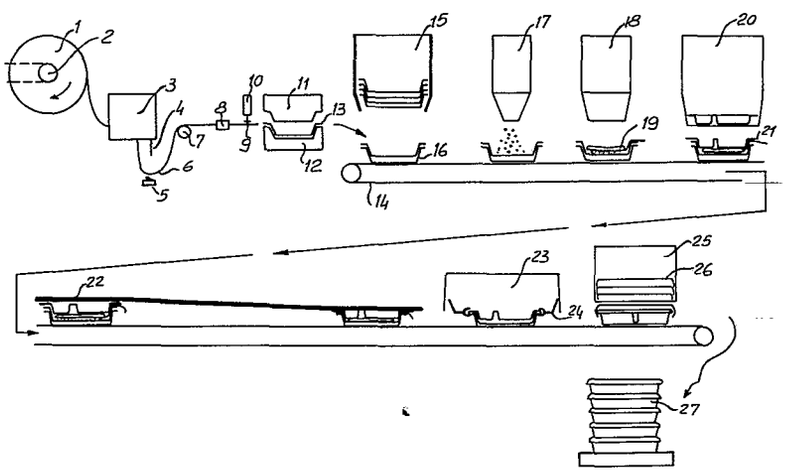
(54) Process and apparatus for making self-warming containers for precooked foods.

(57) The components of the container, fed by suitable devices, are assembled starting from the formation of a tray (13) adapted to contain calcium oxide granules and a hermetic envelope containing water, by means of a conveyor (14) and several automatic or manual devices allowing a high output and finished containers which are hightight and reliable in use.



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Process and apparatus for making self-warming containers for precooked foods

The present invention relates to a process as well as a corresponding apparatus for making self-warming containers for precooked foods, of the kind operating by means of an exothermic reaction between calcium oxide and water, said water being contained in a hermetically closed envelope, placed in a suitable tray containing also loose calcium oxide granules; opening of the water envelope is obtained at the moment of use by pulling a control strip projecting from the container and bearing at the other end a cutting member.

U.S. Patent Specification N° 3,871,357 discloses a self-warming container for precooked foods operating according to the above stated principle, but the manufacture of such a container was hitherto made with a semi-automatic process involving too many manual operations, which did not allow a mass production and did not guarantee a perfect product.

The apparatus according to the present invention substantially consists of the combination of means for supporting and automatically unwinding a roll of flexible but strong material such as aluminium foil, means for lubricating said material, means for delivering and positioning said material under a cutting and forming die, means for assembling the tray with the outer box, means for batching the calcium oxide granules, means for superposing the hermetic water envelope to the granules, the control strip with the cutting member being already affixed to the envelope, means for superposing the food-containing preformed aluminium plate, means for compacting the container, means for seam folding the edges of the container, means for coupling the cover and means for positioning and advancing the container during the entire operative cycle.

Other features, advantages and objects of the present invention will be apparent from the following detailed description of a preferred embodiment of the apparatus according to the present invention, said description pointing out also the features of the process, and being given merely as a non limiting example, with reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic showing of the apparatus emboding the process of the present invention and more particularly illustrating the several operative stages and steps in order to attain the self-warming container for precooked foods, starting from a roll of aluminum foil and other preformed elements.

With reference now to the single figure of the accompanying drawing, the preferred embodiment of the process and apparatus by which the self-warming container is made is being disclosed in detail.

It is important to point out, that some automatic devices being part of the apparatus may be steadily or temporarily replaced by manual operations: in the course of the description these apparatus will be indicated and the alternative manual procedures will also be pointed out.

The aluminum foil roll 1 (which may also be of other flexible but resistant material of a suitable kind) is arranged on a unwinding device 2 which is causing it to rotate step by step in synchronism with the subsequent stages. The aluminum web is then being sprayed with a suitable liquid in the lubricating device 3 so as to be ready for printing. Under the lubricating device there are an upper sensor 4 and a lower sensor 5, both provided with a proximity contact which, when the loop 6 of the aluminium foil is coming too close to the sensor 5 moving away from sensor 4, controls the unwinding device 2 so as to rotate for an amount sufficient to bring again the loop 6 to the predetermined position. This step makes available an amount of aluminium foil of sufficient length which, after being brought in line by idler roller 7, is drawn by jaws 8 of the automatic advancing device and subsequently is held in position by piston 9 of a pneumatic jack 10 while the drawing die 11 is lowered on the opposite mold 12 so as to shape the tray 13. Said tray 13 thus formed and at the same time severed from the aluminium feeding web by a cutter (not shown) is knocked out by suitable strippers and then is pushed to the

subsequent step by means of a compressed air blow.

At the beginning of the conveyor 14, in line with all the components of the apparatus, a preformed outer box 16 of cardboard or other suitable material is positioned by a feeding and stacking device 15. On such a box 16 the tray 13 will be automatically superposed, said tray 13 being of a height less than the box height so as to leave an air gap between tray and box bottom. The latter step of automatic superposition may be obviously replaced by a manual operation. The conveyor 14 then moves the tray and its supporting box under a batching device 17 pouring a predetermined and accurately metered amount of calcium oxide into said tray. A feeder 18 is then superposing to the calcium oxide granules, the hermetic water envelope 19 which is already finished with the control strip, which in its turn as the cutting element to tear the water envelope. Another feeding device 20 superposes the plate 21 made of aluminium or other good heat conductive material, said plate being formed by a separate machine and stacked in the feeding device 20. When the output of the plant is not very high or the labour costs make it advisable, the devices feeding and stacking the water envelope and the trays might be replaced by manual operation, without affecting however the precision and reliability characteristics of the finished product. The container is now comprised by all its elements and it is necessary to drive it under an inclined plane 22, forming together with the conveyor a sort of funnel or tapered path, in order to compact all the elements of the container and prepare it for the subsequent automatic seam folding step. The seam folding device 23 has arms 24 pressing on the container edges and folding the edge of both the tray and the plate on the

edge of the box, so as to obtain a perfect sealing. A final feeder then places the preformed cover 26, preferably made of transparent plastics. At last the self-warming containers 27 ready for use are stacked and collected for transportation to the food industry. Also the cover superposing and the final stacking operations might be carried out manually.

It is to be understood that several modifications, variations, additions, substitutions or simplifications of elements and components may be resorted to the above described apparatus, always embodying however the operative steps of the process of the present invention and therefore without departing from spirit and scope of the invention as defined in the appended claims.

Claims.

1. A process for the continuous production of self-warming containers for precooked foods, of the kind operating by means of an exothermic reaction between calcium oxide and water, said water being contained in a hermetically closed envelope, placed in a suitable tray and is opened by drawing an outer control strip, comprising the steps of unwinding a roll of flexible but strong material such as aluminium foil, feeding and positioning the web coming from said roll under a tray forming and drawing die, assembling the tray inside the outer box fed by a stacking and feeding device, batching the required amount of calcium oxide granules in said tray, superposing to the granules said water envelope provided with a control strip having a cutting member, superposing a plate for holding the precooked foods, compacting and seam folding the assembly and finally placing the cover so as to obtain the finished container.

2. The process of Claim 1, wherein the unwinding operation is effected step by step and is controlled by two proximity sensors, detacting the amount of unwound web and controlling the advancement of said web.

3. The process of Claim 1, wherein the compacting step is effected by automatically pressing the container between a conveyor on which the containers are placed during the assembling steps, and an inclined plane superposed thereto.

4. In an apparatus for continuously making self-warming containers for precooked foods, the combination comprising means for supporting and automatically unwinding a roll of flexible but strong web material such

as aluminium foil, means for lubricating said web material, means for conveying and positioning said web under a tray forming and cutting die, means for assembling the so formed tray with an outer box, means for batching calcium oxide granules into said tray, means for superposing to the granules a hermetic water envelope provided with a control strip having a cutting member, means for superposing a preformed plate for the precooked foods, means for compacting the container assembled elements, means for air tight seam folding of the container edges, means for coupling a cover to the container and means for positioning and advancing the container during the whole operative cycle.

5. The combination of Claim 4, wherein the means for assembling the tray on the outer box, the means for superposing the water envelope to the calcium oxide granules, the means for superposing the preformed food containing plate and the means for coupling the cover are consisting of automatic feeding and stacking devices.

6. The combination of Claim 5 wherein the automatic feeding and stacking devices may be replaced by manual operations during the manufacturing cycle.

7. The combination of Claim 4 wherein the means for positioning and advancing the container during the operative cycle are consisting of a conveyor running under the feeding and batching devices.

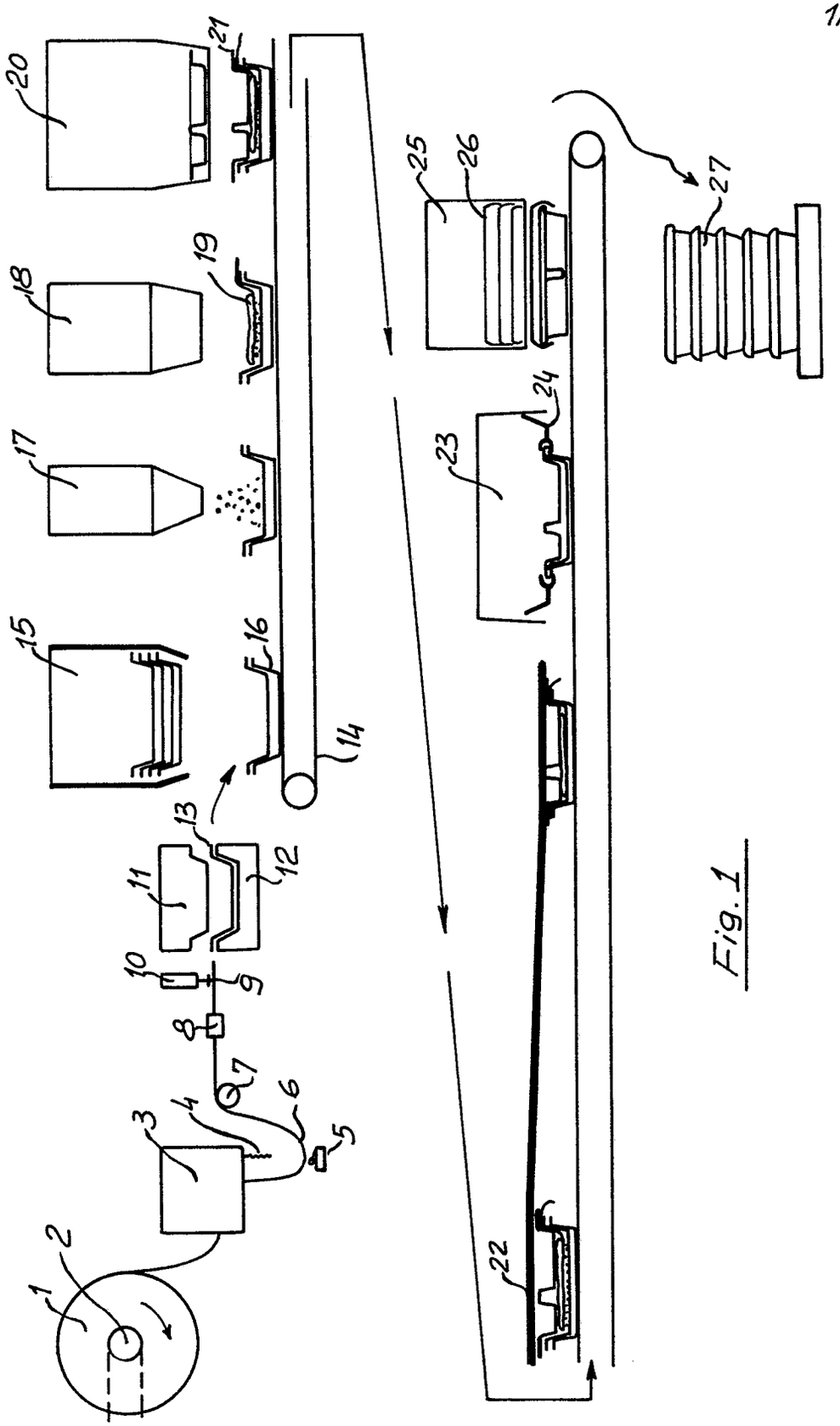

Fig. 1

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 80 10 0894

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	US - A - 3 892 060 (KAY) * Claim 1; figure 1 *	1,4
A	US - A - 3 244 082 (LEMELSON) * Column 2, line 61 to column 3, line 36; figures 1-3 *	1,4

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

B 65 B 47/04
25/22

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

B 65 B
B 65 D
A 47 J

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	02-06-1980	CLAEYS

EPO Form 1503.1 06.78