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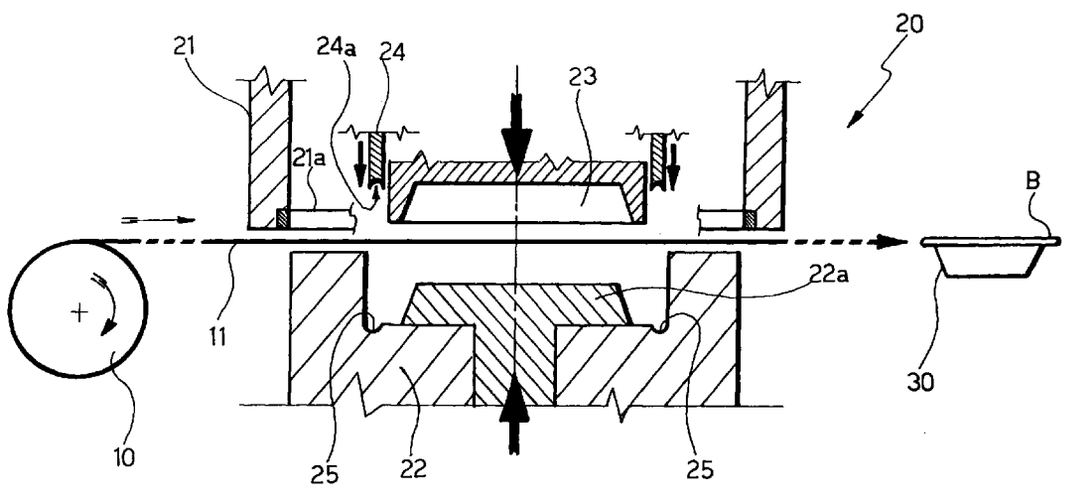
## (54) Method for manufacturing self supporting containers made of paper like material

(57) The method comprises in succession the following operating steps:

-- the cutting, by means of a die-cutter (21), of a disk (D) from a ribbon (11) of paperlike material which is fed continuously from a storage reel (10);
-- the drawing of said disk by means of complementarily shaped mold parts (22-23) and the forming of the bottom and of the lateral wall or walls of the container, the lateral wall or walls having a perimetric flap which is in excess with respect to the depth of the finished container (30);

-- the swaging, by means of a beading ring (24), of the excess perimetric flap and the forming of a compacted circular rim (B) which is adapted to give the container (30) self-standing characteristics.

FIG. 1




EP 0 951 990 A2

## Description

**[0001]** The present invention relates to a method for manufacturing self-standing containers made of paper-like material for oven baking, displaying and selling foodstuffs, especially confectionery products, to the apparatus for carrying out the method and to the containers obtained with said method.

**[0002]** It is known that in order to bake, display and sell bakery products, such as the Italian specialty known as "focaccia", unleavened cakes, sweet or savory pies and the like, containers of the following types are used: metal baking pans, either plain or with optional containers of pleated paper, known as dessert coasters, inserted in them; self-standing containers of corrugated paper, known as baking molds; and aluminum containers.

**[0003]** These conventional containers respectively suffer the following drawbacks: dessert coasters require baking pans for accommodating and handling them, because they are not self-standing; corrugated-paper baking molds have a manufacturing process which is complicated and expensive because they entail the assembly of two or more components which are typically constituted by a bottom and by a lateral band plus an optional upper compacted reinforcement portion; aluminum containers are excessively expensive and cause considerable environmental pollution.

**[0004]** The aim of the present invention is substantially to eliminate these and other drawbacks, and within the scope of this general aim the invention has the following particular objects:

-- to provide a manufacturing method which is extremely simple, inexpensive and adapted to obtain, in a single die-cutting action and by means of a composite tool, paper containers which are similar to dessert coasters but have self-standing characteristics which allow to use them directly without the aid of containment and handling pans;
-- to provide a manufacturing method which allows to obtain a container which is economically advantageous, particularly obtained monolithically by die-cutting, so that said method does not require steps for assembling and/or gluing semifinished components obtained individually, such as the rim, the lateral band and the optional reinforcement ring;
-- to provide a manufacturing method and a container which are fully free from polluting factors, in order to protect the working environment in which said manufacturing process takes place and the consumer of the foodstuffs baked and packaged in said containers.

**[0005]** According to the present invention, this aim, these important objects and others which will become apparent from the detailed description that follows are achieved with a method and an apparatus for manufacturing baking containers, and with the containers produced with said method, having the respective specific characteristics stated in the appended claims.

**[0006]** Substantially, the invention is based on the concept of providing in succession, by acting with a single die-cutting action and by means of a composite tool, the following operating steps:

-- cutting of a disk from a ribbon of paperlike material which is fed continuously from a storage reel;
-- drawing of said disk and formation of the bottom and of the lateral wall or walls of the container, said lateral wall or walls having a perimetric flap which is in excess with respect to the depth of the finished container;
-- swaging of said excess perimetric flap and formation of a rolled and compacted circular rim which is adapted to give the container self-standing characteristics.

**[0007]** For this purpose, the composite die-cutting tool comprises the following coaxially arranged components: a circular die-cutter, with a cutting edge made of inserted hard metal, in order to cut said disk of paper-like material; a female mold part which can move axially and cooperates with the circular plate of a complementarily shaped male mold part, for drawing the disk of paper-like material produced by die-cutting; a beading ring, which is arranged outside the female mold part and can move axially in an annular gap that lies between the male and female mold parts when they are mutually adjacent and is adapted to engage the excess perimetric flap that surrounds the drawn disk in order to push said flap, for rolling up, swaging and compacting, into a corresponding annular cavity which is provided in said male mold part and surrounds said circular plate.

**[0008]** The container produced with the manufacturing method according to the invention is therefore characterized by a monolithic drawn paper-like structure having a reinforced rim which has a self-standing function and is produced by rolling, swaging and compacting a perimetric flap of the side wall or walls, provided in excess with respect to the depth of the finished container.

**[0009]** The characteristics, purposes and advantages of the method, of the corresponding manufacturing apparatus and of the container according to the present invention will become apparent from the detailed description that follows and with reference to the accompanying drawings, given by way of non-limitative example and wherein:

Figure 1 is a schematic sectional view of the apparatus for carrying out the method according to the invention;
Figures 2, 3, 4 and 5 are partial views, similar to Figure 1, illustrating in sequence the operating steps of said method;

Figure 6 is a perspective view of the finished container which is the result of the steps of the method shown in Figures 2 to 5;

Figure 7 is a schematic enlarged-scale sectional view, taken along the plane VII-VII of Figure 6.

**[0010]** With reference to Figure 1, the reference numeral 10 designates the reel for storing a ribbon 11 of paper-like material, typically vegetable parchment, preferably composed of two bonded sheets which have respective basic weight of substance of 60 and 95 g/m$^2$, or other equivalent or similar material.

**[0011]** The ribbon 11 is fed continuously to an apparatus 20 which provides in succession by means of a single die-cutting action: cutting of a disk D of paper-like material from the ribbon 11; drawing of said ribbon and swaging of the free edge B of the drawn disk. For this purpose, the apparatus 20 is composed of a plurality of elements which are arranged coaxially and are substantially constituted by:

-- a circular die-cutter 21, with a cutting edge 21a made of inserted hard metal, which is moved vertically, by way of conventional means which are not shown, with respect to a fixed mold part 22 in order to cut the disk D from the ribbon 11;

-- a female mold part 23, which is movable axially and cooperates, in order to draw the disk D, with a male circular plate 22a of the fixed mold part 22;

-- a beading ring 24, which is arranged outside the female mold part 23 and is movable axially in an annular gap LA (Figure 3) which lies between the two mold parts 22-23 when they are mutually adjacent in the closed configuration and is adapted to cooperate with an annular cavity 25 provided in the fixed mold part and which surrounds the circular plate 22a in order to form the swaged rim B of the drawn disk, as described in detail hereinafter.

**[0012]** In the illustrated example, the complementary walls of the female mold part 23 and of the circular plate 22a are smooth, but this is a non-limitative configuration, since said walls can be provided with ridges or dentellations parallel to their generatrices in order to produce containers having correspondingly ribbed or pleated walls.

**[0013]** Conventional means, which are not shown and preferably comprise double-acting fluid-actuated actuators, are provided in order to vertically move the female mold part 23 from an open position (Figures 1 and 2), in which said mold part is spaced from the circular plate 22a, to a closed position, in which it is lowered onto said circular plate (Figures 3 and 4). Further conventional actuation means are provided in order to move the beading ring 24 vertically, so as to form said rim B and move the circular plate 22a with respect to the fixed mold part 22 in order to extract the finished container 30 (Figure 5).

**[0014]** With reference to Figures 2 to 5, the steps of performing the manufacturing method according to the present invention are described in succession.

Step I (Figure 2): consists in cutting the disk D of paper-like material by lowering the die-cutter 21 with respect to the mold part 22. During this step, the circular plate 22a is kept in a raised position with respect to the mold part 22 and acts as supporting element for the disk D that has just been diecut.

Step II (Figure 3): consists in drawing the disk D by lowering the female mold part 23 onto the circular plate 22a, which is in turn returned to a lowered position with respect to the fixed mold part 22. As clearly shown in the Figure, the diameter of the disk D is such that the side wall of the drawn disk D' has a perimetric flap LP which is in excess with respect to the depth P of the finished container 30 (Figure 6).

Step III (Figure 4): consists in swaging the excess perimetric flap LP and in consequently forming a compacted rim B, obtained by lowering the beading ring 24 into the annular gap LA which lies between the two mold parts 22 and 23 and in which said perimetric flap is arranged. The action of the beading ring 24 is substantially to roll up the flap LP (Figure 7) and to press the roll thus formed, compacting it; for this purpose, the beading ring 24 is provided with a semicircular active surface 24a which is adapted to cooperate with the annular cavity 25, which also has a semicircular profile, provided on the fixed mold part 22.

Step IV (Figure 5): consists in opening the mold by lifting the female mold half 23 and in expelling the finished container 30 by lifting the circular plate 22a with respect to the mold part 22.

**[0015]** As clearly shown in Figures 6 and 7, the container 30 produced with the above described manufacturing method is accordingly characterized by a monolithic paper-like drawn structure which has a reinforced rim B which gives said container mechanical self-standing characteristics, said rim being the result of the rolling and swaging of a perimetric flap LP of the lateral wall of the container, which is provided in excess with respect to the depth P thereof.

**[0016]** Without altering the concept of the invention, the details of execution of the method and the embodiments of the apparatus and of the finished containers may of course vary extensively with respect to what has been described and illustrated by way of non-limitative example without thereby abandoning the scope of the invention.

**[0017]** The disclosures in Italian Patent Application No. TO98A000346 from which this application claims priority are incorporated herein by reference.

**[0018]** Where technical features mentioned in any

claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. A method for manufacturing self-standing containers (30) made of paper-like material for oven baking, displaying, and selling foodstuffs, characterized in that it comprises in succession the following operating steps:

   -- cutting of a disk (D) from a ribbon (11) of paper-like material which is fed continuously from a storage reel (10);
   -- drawing of said disk (D) and formation of the bottom and of the lateral wall or walls of the container, said lateral wall or walls having a perimetric flap (LP) which is in excess with respect to the depth (P) of the finished container (30);
   -- swaging of said excess perimetric flap (LP) and formation of a compacted circular rim (B) which is adapted to give the container (30) self-standing characteristics.

2. A method according to claim 1, characterized in that the paper-like material of said ribbon (11) is constituted by vegetable parchment.

3. A method according to claims 1 and 2, characterized in that said ribbon (11) is constituted by two sheets of vegetable parchment, which are superimposed and bonded, with substance of 60 and 95 $gr/m^2$ respectively.

4. A method according to the preceding claims, wherein the succession of said operating steps is performed by simultaneously activating the various coaxial elements of a single composite apparatus (20) which acts with a single die-cutting action.

5. A method according to the preceding claims, characterized in that the swaging of the excess perimetric flap (LP), in order to form said circular rim (B), occurs by rolling up said flap (LP).

6. A method for manufacturing self-standing containers (30) made of paper-like material for oven baking, displaying and selling foodstuffs, according to the preceding claims and substantially as described and illustrated.

7. An apparatus (20) for carrying out the method according to claims 1 to 6, characterized in that it is composed of a single die-cutting tool which comprises the following coaxially arranged parts: a circular die-cutter (21) with a cutting edge (21a) made of inserted hard metal, in order to cut the disk (D) made of paper-like material; a female mold part (23), which can move axially and cooperates with the circular plate (22a) of a complementary male mold part, in order to draw the disk (D) produced by die-cutting; a beading ring (24), which is arranged outside the female mold part (23) and can move axially in an annular gap (LA) that lies between the two mold parts when they are mutually adjacent and is adapted to engage said excess perimetric flap (LP) in order to push it, for rolling, swaging and compaction, into a corresponding annular cavity (25) provided in the male mold part (22) so as to surround said circular plate (22a).

8. An apparatus (20) according to claim 7, characterized in that it comprises fluid-actuated actuation means for individually and axially moving said coaxial elements (21, 23, 22a, 24) of the die-cutting tool.

9. An apparatus according to claim 7 and 8, characterized in that the beading ring (24) is provided with a semicircular active surface (24a) which is adapted to cooperate with said annular cavity (25) provided in the male mold part (22), which also has a semicircular profile, in order to produce the rolling and compaction of said excess perimetric flap (LP).

10. An apparatus according to claims 7 to 9 and substantially as described and illustrated.

11. A self-standing container (30) made of paper-like material for oven baking, displaying and selling foodstuffs, obtained with the manufacturing process according to claims 1 to 6, characterized in that it has a monolithic paperlike drawn structure which has a reinforced rim (B) which is adapted to give self-standing mechanical characteristics to said container; said rim (B) being produced by rolling and swaging a perimetric flap (LP) of the side wall or walls of the container; said flap being provided in excess with respect to the depth (P) of said container.

12. A container according to claim 11, characterized in that it has smooth side walls.

13. A container according to claim 11, characterized in that has pleated side walls.

FIG. 1

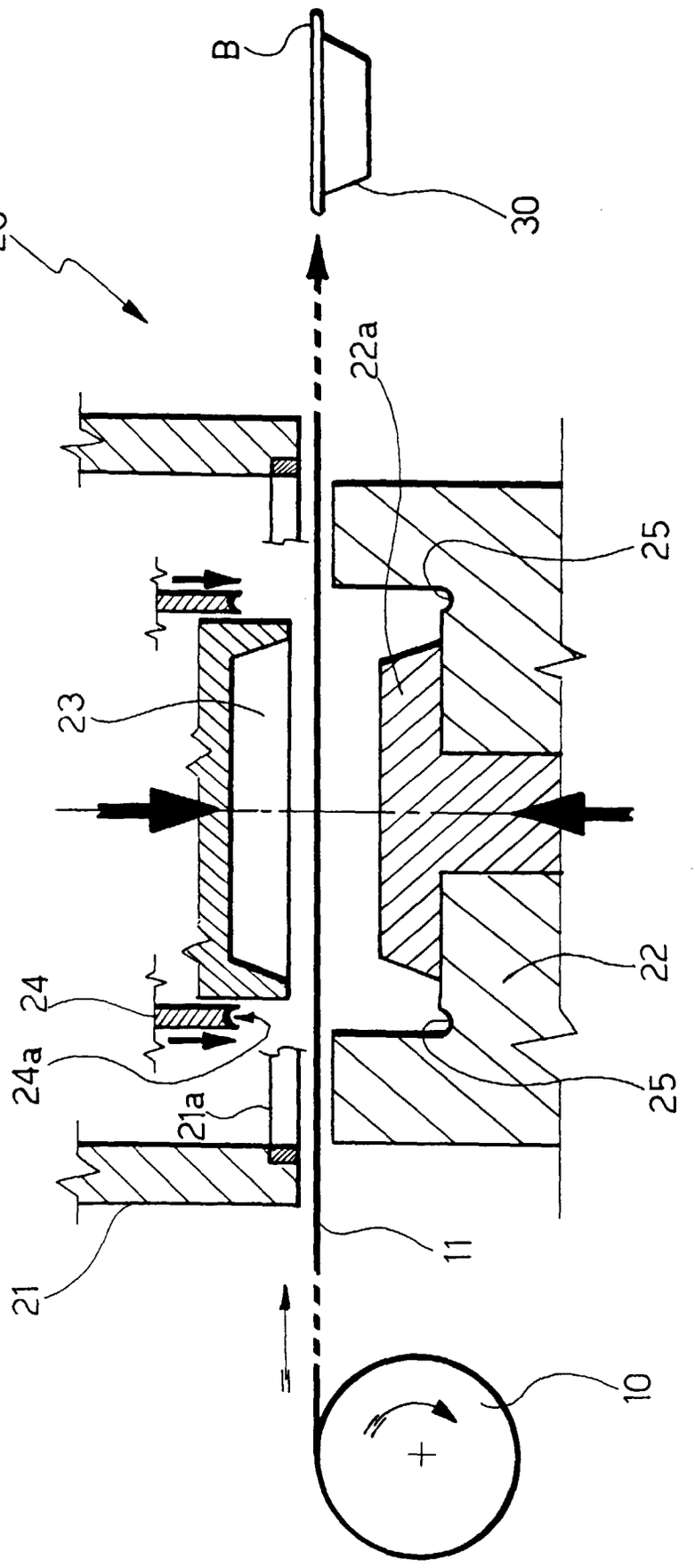


FIG. 2

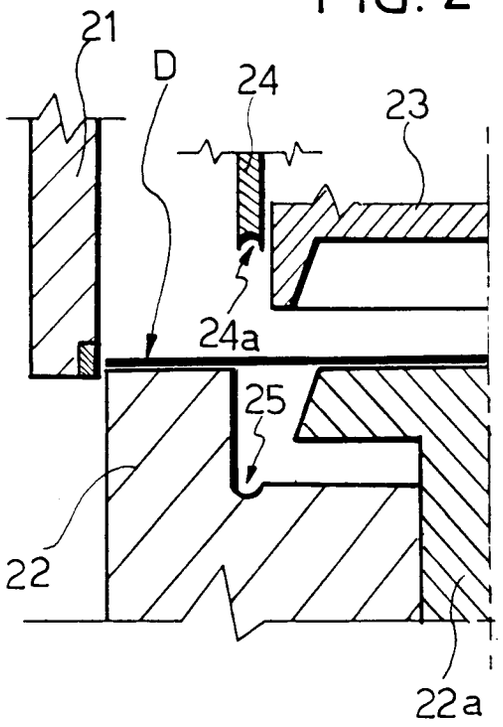



FIG. 3

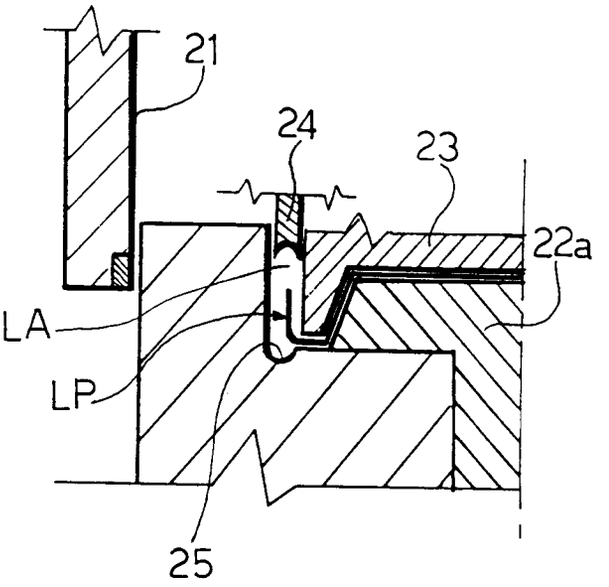



FIG. 4

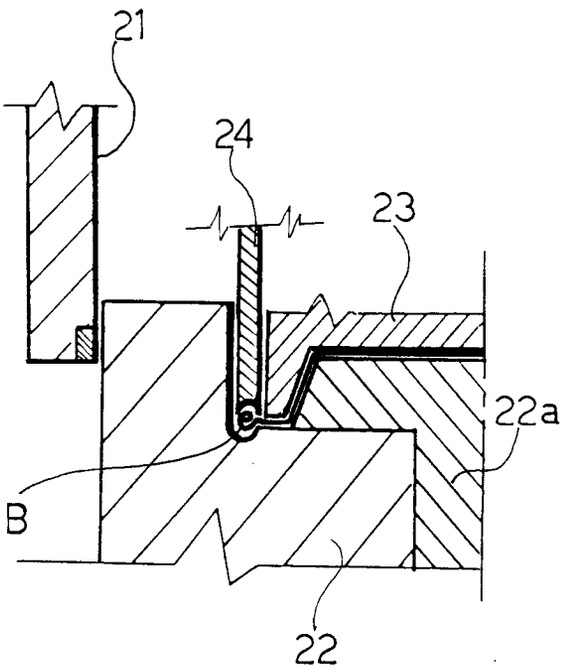



FIG. 5

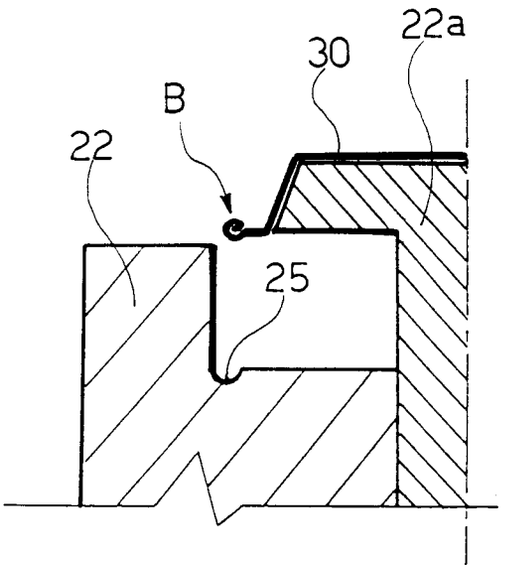


FIG. 6

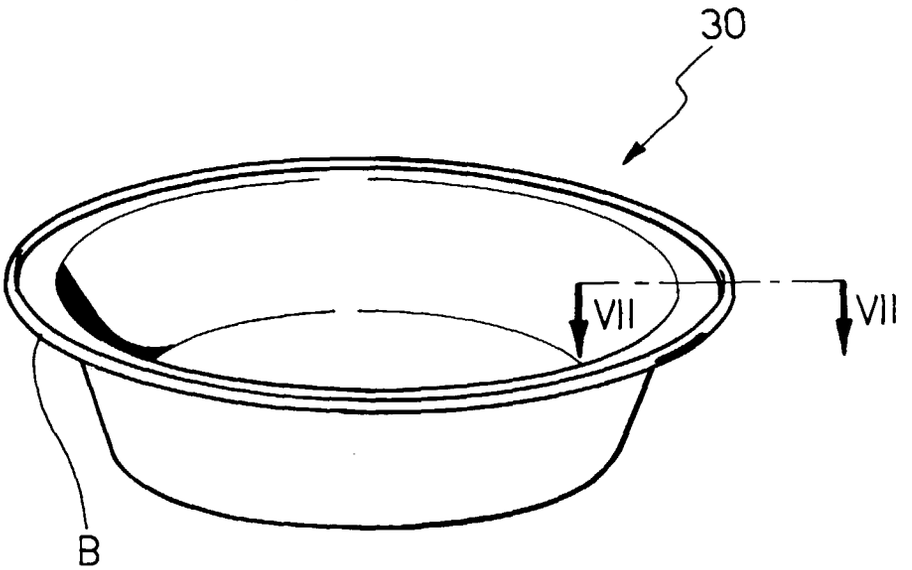



FIG. 7