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A method and an apparatus for erecting flat-laid packaging container blanks

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(56) Related Art
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ABSTRACT OF THE DISCLOSURE

The invention relates to a method and an apparatus (1) for erecting flat-laid packaging container blanks (3). The packaging container blanks (3) are fed one-by-one from a magazine (4) into the apparatus (1) where they are forced into a gap between an erector roller (14) and a counter pressure roller (22). On the axial surface (15) of the erector roller (14), there are disposed a number of suction cups (16) which are activated when the packaging container blank (3) reaches the erector roller (14) so that a panel (8) of the packaging container blank is fixedly retained against the surface (15) of the erector roller (14). When that panel (7) ahead of the fixedly retained panel (8) is free, a corner (10) of the packaging container blank (3) will be opened because of the bending against the erector roller (14). The opened corner (10) is further opened against a carrier (24) on a carrier chain (23) and the packaging container blank (3) is erected and enclosed in the carrier (24).

Publication figure: Fig. 1

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STANDARD PATENT

Application Number:

Lodged:

Invention Title: A METHOD AND AN APPARATUS FOR ERECTING FLAT-LAID PACKAGING CONTAINER BLANKS

The following statement is a full description of this invention, including the best method of performing it known to us :-

A METHOD AND AN APPARATUS FOR ERECTING FLAT-LAID PACKAGING CONTAINER BLANKS

TECHNICAL FIELD

The present invention relates to a method of erecting flat-laid packaging container blanks in that the flat-laid blanks are fed one-by-one into an apparatus which fixedly retains one of the panels of the packaging container blank, and in that the blank, after erection, is conveyed out of the apparatus by means of a carrier chain.

The present invention also relates to an apparatus for erecting flat-laid packaging container blanks, comprising a feeder device for the blanks, which feeds the blanks one-by-one into the apparatus, the apparatus fixedly retaining the blank, and also a carrier chain designed to convey the erected packaging container blanks out from the apparatus.

BACKGROUND ART

For packing liquid foods such as milk and juice, use is most generally made today of single-use disposable packages of the type which is manufactured from a packaging material which consists of a laminate with a core of paper or paperboard to which are laminated different thermoplastic layers, and possibly aluminium. One type of such single-use disposable packages is manufactured from packaging container blanks. The packaging container blanks consist of a sheet of suitable size for realising a package of a certain volume. The sheet has fold lines, so-called crease lines, in order to facilitate the reforming of the sheet into a finished packaging container. The sheet is further double-folded and glued, so that the packaging container blank constitutes a capsule which is open at both ends. The packaging container blanks are delivered flat-laid to a filling and packing machine and are erected in the filling machine.

The packaging container blanks are normally stacked in a magazine intended for this purpose in the filling machine and are fed therefrom, one-by-one, into an apparatus which erects the blanks to form open capsules. The open capsules are conveyed further, normally in a carrier chain, to a mandrel wheel. On the mandrel wheel, there are disposed a number of mandrels which are each intended to receive an erected packaging container blank which has been sealed for obtaining a package bottom. The bottom-sealed

packaging container blanks are conveyed further, filled and top-sealed to form a finished packaging container, either for a gable-top package or a parallelepipedic packaging container.

For erecting the flat-laid packaging container blanks, the commonest method is to employ two pivot arms with suction cups connected to a vacuum source, the pivot arms fixedly retaining two sides of the packaging container blank and, by a relative movement between the two pivot arms, the flat-laid packaging container blank is opened.

The drawback inherent in existing erector apparatuses for flat-laid packaging container blanks is that they include complex mechanical parts which require careful adjustment and which, on change of packaging volume, must be adapted to the new volume size. Erector apparatuses of this type are described in patent specifications EP 425,225 and SE 422,661.

OBJECTS OF THE INVENTION

One object of the present invention is to realise an apparatus for erecting flat-laid packaging container blanks which is mechanically simple and which requires no accurate adjustment in order to operate successfully. As a result of its simple mechanical make-up, the apparatus will be more economical and require fewer spare parts. The erector apparatus should also, in a simple manner, be adaptable to different packaging volumes.

A further object of the present invention is that the apparatus according to the invention is capable of operating more rapidly and thereby erecting more packaging container blank per unit of time than prior art apparatuses and methods.

SOLUTION

These and other objects have been attained according to the present invention in that the method of erecting flat-laid packaging container blanks of the type described by way of introduction has been given the characterizing features that the retainer device consists of an erector roller which fixedly retains the panel on its surface by means of suction cups, and that the packaging container blank is caused to follow the surface of the erector roller by being forced into a gap between the erector roller and a counter pressure roller, the bending of the panel along the surface of the erector roller causing a corner of the blank to open.

The objects of the present invention have further been attained in that the apparatus for erecting flat-laid packaging container blanks of the type described by way of introduction has been given the characterizing features that the apparatus consists of an erector roller with a number of suction cups along its surface, disposed to fixedly retain a panel of the packaging container blank, and further a counter pressure roller disposed such that the blank is forced into a gap between the erector roller and the counter pressure roller.

Preferred embodiments of the present invention have further been given the characterizing features as set forth in the appended subclaims.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

One preferred embodiment of the present invention will now be described in greater detail hereinbelow, with reference to the accompanying Drawings, in which:

Fig. 1 shows a first embodiment of the present invention;

Fig. 2 shows a second embodiment of the present invention;

Fig. 3 shows an erector roller according to the present invention;

Fig. 4 shows an air deflector for the erector roller according to the present invention; and

Fig. 5 shows a flat-laid packaging container blank for which the present invention is intended.

The accompanying Drawings show only those details and parts essential to an understanding of the present invention, and the placing of the erector apparatus in a filling machine, which is well-known to a person skilled in the art, has been omitted.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figs. 1 and 2 show an apparatus 1 according to the invention in two different embodiments. The apparatus 1 includes a feeder device 2 which is disposed to feed flat-laid packaging container blanks 3 to the apparatus 1 so that the packaging container blanks 3 enter the apparatus 1 one-by-one. The flat-laid packaging container blanks 3 come from a magazine 4 where a large number of blanks 3 are stored in order to be fed in sequence into the apparatus 1.

The flat-laid packaging container blanks 3 may have the appearance

as shown in Fig. 5 and consist of a flat-laid capsule with four sides or panels 5, 6, 7, 8 which are defined by fold lines or crease lines 9, the crease lines 9 facilitating forming of the packaging container blank 3 into a finished packaging container. The panels 5, 6, 7 and 8 constitute the side surfaces of the finished packaging container. The packaging container blank 3 is fed into the apparatus 1 with one of the corners 10 or 11 leading. The packaging container blank 3 constitutes a capsule which is open at both ends 12 and 13, and the distance between the ends 12 and 13 constitutes the height of the packaging container blank 3, which varies depending upon what packaging volume the finished packaging container is to have.

The apparatus 1 further includes an erector roller 14 which is shown as an individual part in Fig. 3. The erector roller 14 has, on its axial surface 15, a number of holes which constitute suction cups 16. The suction cups 16 are axially connected to holes 17 provided in the radial surface 18 of the erector roller 14. All suction cups 16 and radial holes 17 are connected to a vacuum source (not shown). The suction cups 16 on the axial surface 15 of the erector roller 14 are distributed in patterns on the surface so that they form groups. The number of suction cups 16 in the axial direction should cover the height, i.e. the distance between the ends 12 and 13, of the packaging container blank 3 of the largest packaging container blank 3 for which the apparatus 1 may be employed.

The number of suction cups 16 about the circumference of the erector roller 14 should cover the width of one panel 5, 6, 7, 8 of the packaging container blank 3. The number of suction cups 16 about the circumference has its correspondence in the same number of holes 17 on the radial surface of the erector roller 14.

In Fig. 3, the suction cups 16 have a pattern of three by four and this pattern group 19 is repeated three times along the axial surface 15 of the erector roller 14. The erector roller 14 in Fig. 1 has four such pattern groups 19 and, in Fig. 2, the groups are three in number. The number of pattern groups may vary between two and five, preferably three, and depends, among other things, on the thickness of the packaging material. A thinner packaging material may be subject to an undesirable residual bending if the erector roller 14 is of slight diameter and has few pattern groups 19. If the erector roller 14 is of large diameter and has a larger number of pattern groups 19, this will reduce the efficiency of the apparatus 1.

At the radial surface 18 of the erector roller 14, there is disposed an air deflector 20 which is shown in detail in Fig. 4. The air deflector 20 tightly surrounds the axial surface 18 of the erector roller 14. The air deflector 20 is stationary, while the erector roller 14 rotates. On the surface of the air deflector 20, there is provided a slot or groove 21 so that this constitutes the circumference of a segment of a circle and where the circumference coincides with the placement of the holes 17 on the radial surface 18 of the erector roller 14. The length of the groove 21 covers the greater part of the holes 17 in two pattern groups 19.

A counter pressure roller 22 is disposed against the surface 15 of the erector roller 14, the direction of movement of the counter pressure roller being opposed to that of the erector roller 14, while both of the rollers 14 and 22 operate at the same peripheral speed. The length of the counter pressure roller 22 must be at least the same as the length of the erector roller 14. Both the surface 15 of the erector roller 14 and the corresponding surface on the counter pressure roller 22 may be rubber-clad in order to afford a gentler treatment of the packaging container blanks 3.

The apparatus 1 further includes a carrier chain 23 for conveying the erect packaging container blanks 3 out from the apparatus 1. As in Figs. 1 and 2, the carrier chain may consist of an endless conveyor belt or chain on which are provided a number of carriers 24. The carriers 24 each accommodate one packaging container blank 3, are open towards the erector roller 14 and surround the erector packaging container blanks 3 on three sides. The carrier chain 23 is disposed to move tangentially in relation to the erector roller 14.

As shown in Fig. 1, a flat-laid packaging container blank 3 is fed out from the magazine 4 by means of the feeder device 2. The packaging container blank 3 is fed out such that the corner 10 first leaves the magazine 4. The blank 3 is fed straight into the space between the erector roller 14 and the counter pressure roller 22. The space between the rollers 14 and 22 is adjusted such that the packaging container blank 3 is held fast against the erector roller 14 without the blank 3 being deformed. By rubber-cladding one or both of the surfaces 15 on the rollers 14, 22, a gentler handling of the packaging container blanks 3 will be obtained. It must also be ensured that both of the rollers 14, 22 run at the same peripheral speed. Deviations in peripheral speed may give rise to scratch marks on the packaging container

blanks 3.

When the rear, subjacent panel 8 reaches the erector roller 14, the suction cup pattern 19 which is now located in register with the panel 8 is activated. All of the suction cups 16 in the pattern must be covered by the panel 8. The suction cup pattern 19 is activated in that the groove 21 of the air deflector 20 exposes the holes 17 in the relevant pattern group 19. In such instance, the panel 8 will be retained and bent towards the surface 15 of the erector roller 14.

The panel 7 lying ahead of the panel 8 is free and not retained against the surface 15 of the erector roller 14, so that, when the erector roller 14 moves towards the counter pressure roller 22, the corner 10 will be opened because of the bending around the erector roller 14. The smaller the diameter of the erector roller, the larger will be the opening given by the bending action, but the diameter should, however, not be so slight that there is residual bending of the erect packaging container blank 3. Correspondingly, an excessively large diameter of the erector roller 14 would give too little bending of the panel 8, for which reason the corner 10 will not open sufficiently to erect the packaging container blank 3. Experiments have shown that a diameter encompassing between two and five pattern groups 19 is appropriate.

With the movement of the erector roller 14, the opened corner 10 will strike against a side 25 of a carrier 24 in the carrier chain 23. At this juncture, the movement of the corner 10 is arrested and the packaging container blank 3 raises itself completely in its carrier 24. The groove 21 of the air deflector 20 is placed such that the holes 17 will once again be covered and deactivated when they are tangential to the direction of movement of the carrier chain 23. A completely erect packaging container blank 3 is now released from the surface of the erector roller 14 and is surrounded on three sides by a carrier 24. In that a panel 8 is held bent when the blank 3 is erected in the carrier 24, double folding of the packaging container blank 3 is prevented, i.e. that the blank 3 is folded over into a new flat-laid state.

Since the distance between each carrier 24 is less than the distance between two packaging container blanks 3 on the surface 15 of the erector roller 14 (in reality between 15 and 40 per cent less distance), the carrier chain must thus be advanced at a correspondingly lower speed (i.e. 15 to 40 per cent) than the peripheral speed of the erector roller 14).

On the erection of packaging container blanks 3 for different packaging volumes, the apparatus 1 is readily adjustable so that, for smaller volumes which have a lower blank height, one or more rows of suction cups 16 are closed along the circumference of the erector roller 14, so that all suction cups 16 in a pattern 19 are always completely covered by one panel 8.

As will have been apparent from the foregoing description, the present invention realises a method of erecting flat-laid packaging container blanks 3 and an apparatus 1 therefor, which displays a simple mechanical construction and which is readily adjustable for different packaging volumes. The apparatus 1 requires no adjustment and experiments have demonstrated that it is dependable and operationally reliable.

The present invention should not be considered as restricted to that described above and shown on the Drawings, many modifications being conceivable without departing from the spirit and scope of the appended Claims.

WHAT IS CLAIMED IS:xxx

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of erecting flat-laid packaging container blanks (3) in that the flat-laid blanks (3) are fed one-by-one into an apparatus (1) which fixedly retains one of the panels (8) of the packaging container blank (3), and in that the blank (3), after erection, is conveyed out of the apparatus (1) by means of a carrier chain (23), characterized in that the retainer apparatus (1) consists of an erector roller (14) which fixedly retains the panel (8) on its surface by means of suction cups (16); and that the packaging container blank (3) is caused to follow the surface (15) of the erector roller (14) by being forced into a gap between said erector roller (14) and a counter pressure roller (22), the bending of the panel (8) along the surface (15) of the erector roller (14) causing a corner (10) of the blank to open.

2. An apparatus (1) for erecting flat-laid packaging container blanks (3), comprising a feeder device (2) for the blanks (3), which feeds the blanks (3) one-by-one into the apparatus (1), said apparatus (1) fixedly retaining the blank (3), and a carrier chain (23) disposed to convey the erect packaging container blanks (3) out from the apparatus (1), characterized in that the apparatus (1) consists of an erector roller (14) with a number of suction cups (16) along its surface (15), disposed to retain one panel (8) of the packaging container blank (3), and also a counter pressure roller (22) disposed such that the blank (3) is forced into a gap between the erector roller (14) and the counter pressure roller (22).

3. The apparatus as claimed in Claim 2, characterized in that the suction cups (16) are arranged in a number of patterns (19) on the surface (15) of the erector roller (14), where each pattern (19) corresponds to the surface of one panel (8).

4. The apparatus as claimed in Claim 3, characterized in that the number of patterns (19) on the surface (15) of the erector roller (14) is between two and five.

5. The apparatus as claimed in Claim 2, characterized in that the erector roller (14) and the counter pressure roller (22) are disposed to move

at the same peripheral speed.

6. The apparatus as claimed in Claim 2, characterized in that the suction cups (16) are axially interconnected and, via a hole (17) on the one radial surface (18) of the erector roller (14), connected to a vacuum source.

7. The apparatus as claimed in Claim 6, characterized in that an axial row of suction cups (16) is activated by means of an air deflector disposed at the end of the erector roller (14) where the holes (17) are provided.

DATED this 29th day of July 1997.

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Fig.1

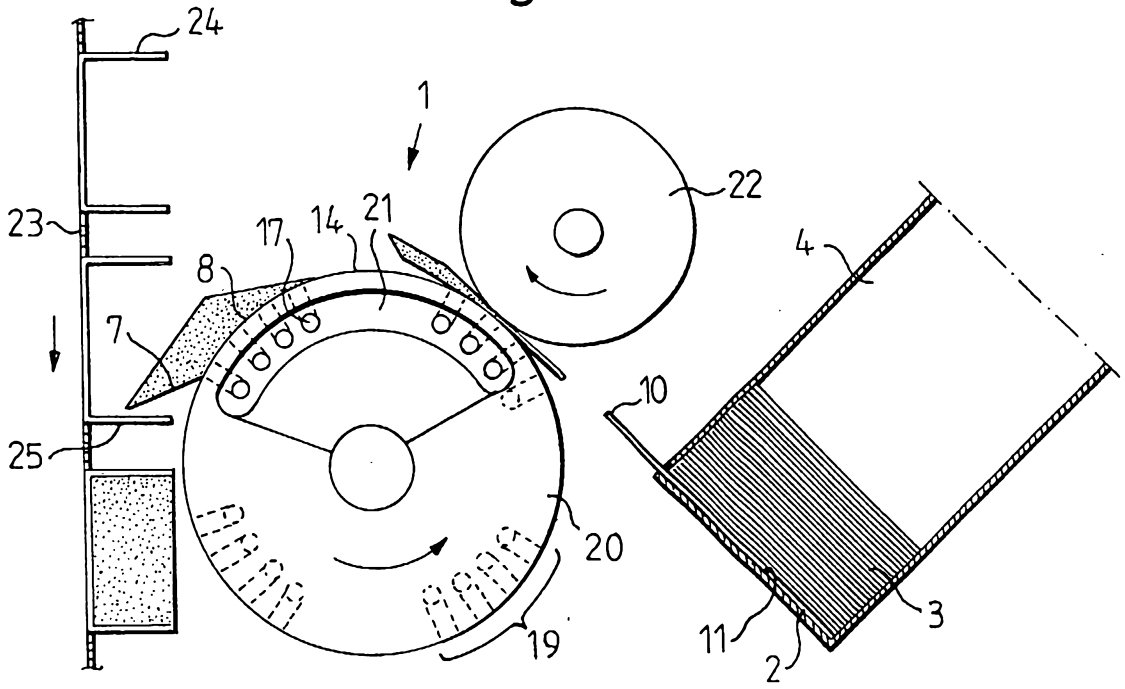


Fig.2

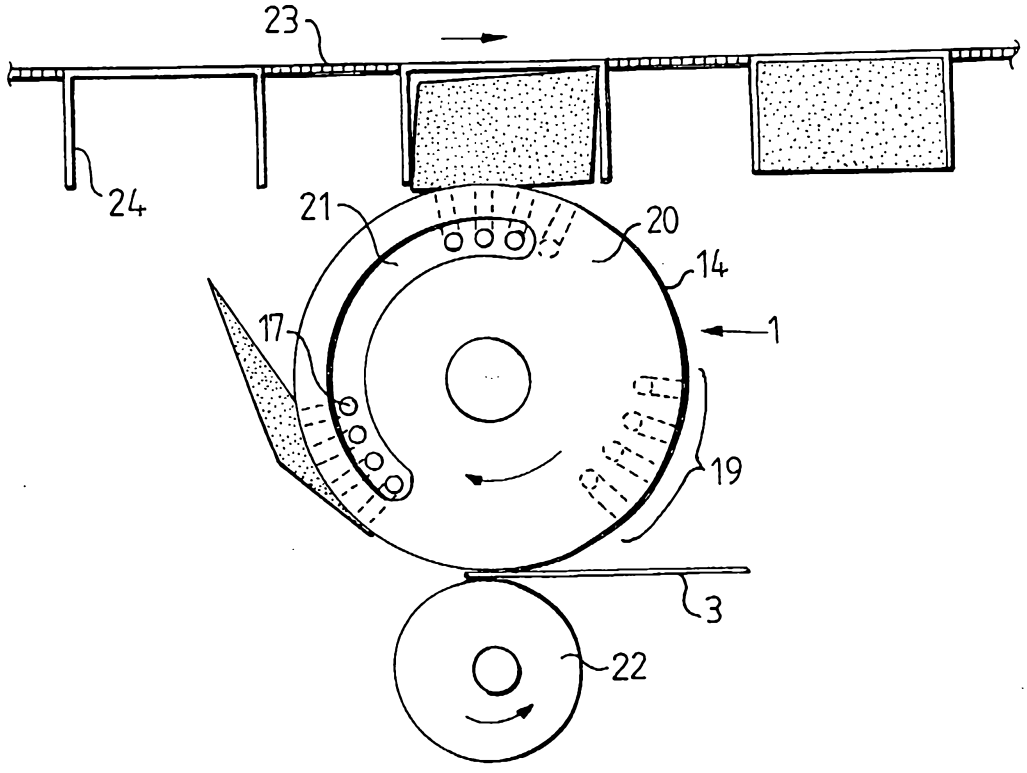


Fig. 3

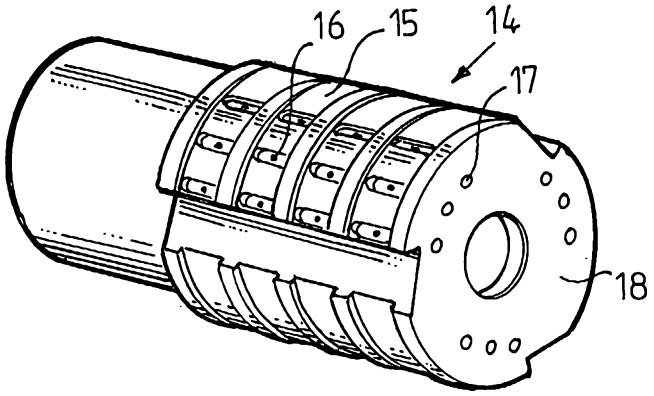


Fig. 4

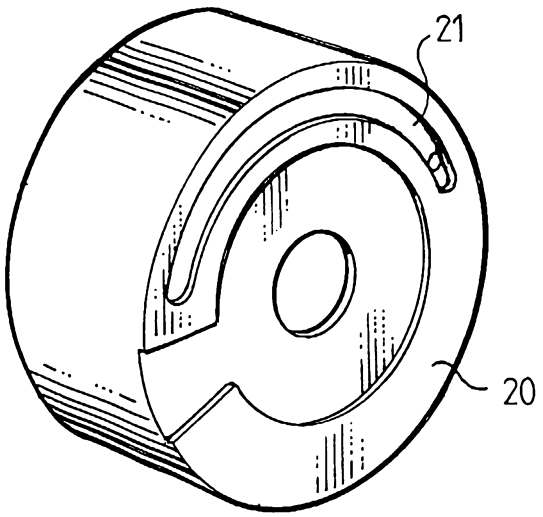


Fig. 5

