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(54) IMPROVEMENTS IN AND RELATING TO MACHINES FOR ASSEMBLING CONTAINERS IN CARRIERS

(71) We, MEAD - EMBALLAGE, SOCIETE ANONYME, a French Corporate Body, of Boulevard d'Anvaux 36—Chateauroux (Indre) France, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to a machine for automatically producing assemblies of container cups, such as for yoghurt, in carriers.

15 According to the invention, in a machine for automatically producing assemblies each consisting of at least two container cups suspended from a carrier, of foldable cardboard or like stiffly-foldable sheet material, by the rim of each cup being retained in a respective hole in the carrier; the machine comprises:—

20 a conveyor with apertured supports, means to deliver to the conveyor supports, unfolded carrier blanks so that the cup-retaining holes in the blanks register with the support apertures,
 25 means for delivering and loading into successively conveyed carrier blanks, cups to rest each by its rim in a carrier blank hole, means to engage opposite margins of the carrier blanks and fold them towards one another over the tops of the respective cups, and

30 means to join the meeting margins of each folded carrier blank so that the tops of the cups are covered and retained against upward withdrawal from their carrier holes. The invention is illustrated, by way of example, on the accompanying drawings, in which:—

40 Fig. 1 is a schematic view in perspective of a machine according to the invention, Fig. 2 is a side elevation view of the machine shown in Fig. 1,

Fig. 3 is a top plan of the machine shown in Fig. 1,

Fig. 4 is a schematic top plan of part of an endless belt forming part of the machine shown in Fig. 1,

Fig. 5 is a top plan of a container support forming part of the machine shown in Fig. 1,

Fig. 6 is a section of the container support taken along the line 6—6 in Fig. 5,

Fig. 7 is a plan of a carrier blank adapted to be used in the machine shown in Fig. 1,

Fig. 7a is a schematic view in perspective of a pair of container cups in a carrier as assembled by the machine shown in Fig. 1,

Fig. 8 is a top plan of a folding device forming part of the machine shown in Fig. 1,

Fig. 9 is a side elevation of another embodiment of a machine according to the invention, and

Fig. 10 is an end elevation of the machine shown in Fig. 9.

Reference will first be made to the embodiment of Figs. 1—8. The machine for automatic assembly of yoghurt containers, or like frusto-conical container cups P, comprises a frame 10 on which is secured a working table 11 which carries, with the interpositioning of a plate of plastics material (not shown), an endless conveyor belt 12 guided by wheels 13 and 14 beneath the table 11.

The conveyor belt 12 preferably comprises small plates 15 (Fig. 4) hinged to one another and is continuously driven by a motor 16 and a transmission belt 17 acting on wheel 14. Such a conveyor belt is, for example, of the type which is known under the name "Brampton conveyor belt".

Some of the plates 15 of the belt 12, for example one out of every two plates, carries a support 18 which is preferably C-shaped (Figs. 5 and 6) having a lower leg 19 fixed to the plate 15, by riveting for example, and

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an upper leg 20, parallel to the leg 19, with an aperture 21 formed to matingly receive the adjacent lateral surfaces of a pair of cups P to be assembled into a carrier.

5 The belt 12 carrying the supports 18 is intended to carry cups to be assembled from one end of the table 11 to the other and is fed with cups by a device 22 comprising a guide 23 in which the cups are aligned one
10 behind the other on an endless chain conveyor 28 for moving the cups in succession from an input, connected to another machine for filling the cups (not shown) to an output of the guide 23 where the cups are taken one
15 after another between the teeth 24 of a toothed wheel 25 (Fig. 3) which transfers them after guiding by means of a pivot 26 and an angled plate 27 above the supports 18 provided, by a mechanism which will be
20 described more in detail hereinbelow, for assembly with a carrier blank formed of cardboard and of the type shown in Fig. 7.

In one of the panels of such a blank F two or more holes O are provided for mating
25 engagement with the rims of the cups, the different panels being adapted to form after folding a tubular member with a rectangular cross-section with a non-perforate upper panel to prevent withdrawal of a cup from
30 an assembled carrier (Fig. 7a).

In the vicinity of the input end of the belt 12 there is a device 30, for feeding the cardboard blanks F, comprising a rack 31
35 for the blanks, which are initially piled flat, and a feeding device 32 with pivotable arms operated by a cam 33. The end of one of the arms carries suction means for lifting and leading the blanks one by one between rubber
40 rollers 34, 35 which position the blanks on the upper face of leg 20 of each support 18 on the belt 12. The supports 18 are provided with lugs (not shown) which ensure the positioning of the blank so that the holes
45 O of the blank coincide with the apertures 21 in the upper legs 20 of the supports 18.

Immediately downstream of the rubber rollers 34, 35 a marking device 36 is provided which includes a rotatably driven segment on which is engraved a date intended
50 to be printed on the carrier, for example the date before which the products contained therein should be consumed.

An inclined plate 40 is provided at the input end of, and above, the belt 12 against
55 the underside of which the cups impinge as they leave the wheel 25. As the cups are carried by the belt 12 in the direction of arrow f (Fig. 1) they are consequently forced through the holes O in the carrier blanks
60 into the apertures 21 of the supports 18 by reaction against the plate 40. The blanks F may be provided with tongues L projecting across the holes O, as shown by the chain-dotted lines in Fig. 7, the tongues being torn
65 away to project downwardly by the insertion

of the cups. The tongues L may have advertising matter printed on them. A microswitch (not shown) cooperates with the inclined plate 40, formed of relatively flexible metal, to stop the machine if a cup is not correctly
70 placed in a support.

There is also provided at a small distance from the end of the inclined plate 40, above the supports 18 and fixed to the table 11 by angle-irons 42, a device 43 (Figs. 1 and 8)
75 for folding the cardboard blanks. The device 43 comprises angled folding arms or deflectors such as at 44 constructed and arranged to engage opposite margins of, and effect the folding over of, panels G, H and I (Fig. 7)
80 of the blank during its movement in the direction of the arrow f and a slide groove 45 to bring together the meeting margins comprising a folded-over portion on an end panel K and a tongue M of blank F, previously
85 coated with a quick drying glue or adhesive by a device 46, (Figs. 1—3), preferably a Bostick type C2W gluing device, known per se.

Towards the end of the belt 12, an inclined
90 plate 47 causes upward movement of the assembled cups and carriers, their removal out of the apertures 21 being aided by a toothed wheel 48 secured to the frame of the machine in such a manner that the periphery
95 of the wheel is substantially tangential to the top 49 of a receiving table for the assemblies.

The operation of the machine is as follows:—

The motor 16 drives the wheel 14 by means of the transmission belt 17 to control the movement of the endless belt 12 which transmits movement to the wheel 13. A shaft
100 50 carrying the wheel 13 also carries a gear wheel 51 driving a gear wheel 53, keyed to a shaft 54, via an intermediary gear 52. Two pinions 55 and 56 are keyed directly to the shaft 54 and are connected, by the intermediary of driving transmissions 57 and 58,
105 to shafts 59 and 61 respectively. The shaft 59 carries the control cam 33 of the cardboard blank feeding device 32 and a wheel 60 is keyed to the shaft 61 which also carries a pinion 62 for driving the rollers 34 and 35, the marking section 36, and for controlling the forward movement of the endless chain conveyor 28 carrying the cups in the device 22. The shaft 61 also controls the
110 movement of the toothed wheel 25 by means of bevel gears.

A cam (not shown) is fixed to the shaft 54 for controlling the suction means for discharging the cardboard blanks onto the belt
125 12.

Beneath the table 11 are housed various auxiliary members of the machine such as a vacuum pump, switches and means for controlling and for heating the gluing device 46.

Reference is now made to Figs. 9 and 10

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which show an alternative embodiment of a machine. In this embodiment, the cups to be assembled are fed by gravity from a feeding device 102 which faces a rack 103 for the carrier blanks. A longitudinal belt 104, on which are mounted supports for the cups, is displaced with a step-wise translatory movement through the intermediary of a gear motor unit 109 which drives a camshaft 110 controlling in turn through the intermediary of levers and rollers the positioning of the cardboard blanks and an arm 112 which lifts the containers and drops them onto the belt 104 in time with the translatory movement thereof.

From the step displacement of the belt 104, angled folding arms or deflectors (not shown), similar to those of the preceding embodiment, ensure the folding of the cardboard blank and a glue applying device 108, similar to that of the previous embodiment, disposes along the meeting margins of the cardboard blanks a film of adhesive which assures the closing of the carrier in a manner described hereinabove.

WHAT WE CLAIM IS:—

1. A machine for automatically producing assemblies each consisting of at least two container cups suspended from a carrier, of foldable cardboard or like stiffly-foldable sheet material, by the rim of each cup being retained in a respective hole in the carrier; the machine comprising:—

a conveyor with apertured supports,
means to deliver to the conveyor supports, unfolded carrier blanks so that the cup-retaining holes in the blanks register with the support apertures,
means for delivering and loading into successively conveyed carrier blanks, cups to rest each by its rim in a carrier blank hole,
means to engage opposite margins of the carrier blanks and fold them towards one another over the tops of the respective cups, and
means to join the meeting margins of each folded carrier blank so that the tops of the cups are covered and retained against upward withdrawal from the carrier holes.

2. A machine as claimed in claim 1, in which the conveyor is a continuously moving belt.

3. A machine as claimed in claim 1, in which the conveyor is an intermittently moving belt. 55

4. A machine as claimed in claim 1, 2 or 3, in which each support is C-shaped, is attached by its lower leg to the conveyor and has a single aperture in its upper leg. 60

5. A machine as claimed in claim 1, in which the means for delivering unfolded carrier blanks comprise cam-operated pivotal arms, with suction means at the ends thereof, oscillating between a rack and opposed pairs of driven rollers. 65

6. A machine as claimed in claim 5, in which a rotary device for marking container blanks is interposed between the rollers and the conveyor. 70

7. A machine as claimed in claim 1, in which the means for delivering and loading cups comprises means for delivering cups between the teeth of a rotating wheel and means to guide the cups from the wheel and under an inclined plate to the supports. 75

8. A machine as claimed in claim 1, in which the folding means comprise shaped deflectors stationary with respect to the conveyor. 80

9. A machine as claimed in claim 1, in which the joining means comprise an adhesive applying device stationary with respect to the conveyor.

10. A machine as claimed in any of the preceding claims, in which means are provided to remove assembled cups and carriers from the supports. 85

11. A machine for automatically producing assemblies substantially as described with reference to and as shown by Figs. 1 to 8 or Figs. 9 and 10 of the accompanying drawings. 90

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10. A machine as claimed in any of the preceding claims, in which means are provided to remove assembled cups and carriers from the supports.

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