

Method and apparatus for forming cakes

The present invention relates to a method of forming cakes from a sticky confectionary material.

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In high volume production of cakes from a sticky confectionary material such as a material based on sugar and cereals it is difficult to meet the requirements of high capacity and constant weight accuracy because of losses owing to the
10 tendency of the sticky material to adhere to the working parts of the machinery used.

Generally, in the production of confectionary products such as cakes or biscuits from sticky confectionary materials, the
15 material, for which means are provided to portion it to the appropriate weight, is received on a solid surface, pressed to form the required shape and size, and then removed from the solid surface and released to be transferred to the next stage of production. In such processes, it is often necessary
20 ry to have separate means for cutting and/or portioning the material before or after it is received on the solid surface, pistons or plungers for pressing the material between two surfaces, heat to prevent the material sticking to at least one of those surfaces, suction to hold the formed pieces
25 against one of the surfaces after separation of the surfaces, and plungers or pressure means for releasing the product. The solid surface on which the sticky material is received is often an endless conveyor.

30 French Patent No. 1,552,438 describes a method of forming dough pieces to cover filled pie shells. In this method, the dough is produced in predetermined portions, for example by means of a machine used to make biscuits, before being transported to the station where the pieces are formed. At
35 the station, a dough portion is placed on a solid surface

and is pressed by the descent of a piston which has air conduits in its body. The two surfaces are heated, the lower surface being heated to a higher temperature so that when the piston is raised the dough piece sticks to the colder surface of the piston, aided if necessary by suction applied to the air conduits. The pie shell is then positioned beneath the piston to which the dough piece adheres and the piston is lowered so that the dough piece is pressed against the rim of the pie shell and finally the piston raised again, accompanied by expulsion of air through the air conduits to ensure separation of the piston from the dough piece. The method described in this patent thus requires separate portioning means, piston, heat, suction and pressure.

15 United States Patent No. 3,722,398 describes an apparatus for producing cereal biscuits, which includes an endless conveyor comprised of a plurality of equal sized plates having openings extending from top to bottom thereof, which travel for a part of their path over a platform which causes the bottom openings to be closed and thus forms a number of open-top moulds. While travelling over the platform, the plates pass firstly underneath a filling apparatus where the moulds are filled with the product. They then pass underneath a set of plungers which compresses the product therein. The plates then move off the platform where the openings are returned to their original state i.e. not having bottoms, and a second set of plungers presses the product from the openings onto a conveyor where it is carried away. In the apparatus described in this patent the filling apparatus is quite specialised in that it is open at the top and bottom, and requires the presence of a plurality of tines rotated by a motor. In addition, the apparatus requires the aforementioned specialised belt, platform and two sets of plungers, one set for compressing the product and one set for releasing the product from the openings.

We have now devised an exceedingly simple method of forming cakes continuously from a sticky confectionary material whereby the sticky material is fed onto a conventional endless conveyor by conventional means and is cut, formed and released by a hollow cylinder inside which is a piston, and
5 whereby means for suction, heat and separate plungers for compressing and releasing the product are unnecessary.

Accordingly, the present invention provides a method of
10 forming a cake from a sticky confectionary material characterised in that the sticky confectionary material is transported on an endless conveyor adapted to run intermittently, to a position beneath at least one vertically disposed hollow cylinder whose wall is tapered at its lower end and inside
15 which is a piston, at which position the cylinder descends and cuts through the sticky material until its lower edge contacts the endless conveyor, then the piston descends to compress the sticky material to form the cake, after which the cylinder and piston ascend together carrying with them
20 the formed cake, and finally the piston redescends to press out and release the formed cake which is transported away from the endless conveyor.

The sticky confectionary material may conveniently be stored
25 in a hopper from which it is fed onto the endless conveyor. Before the sticky material is transported to the position beneath the hollow cylinder it advantageously passes under a levelling device, such as a scraper, by means of which it is disposed as a layer of uniform thickness.

30 The endless conveyor is adapted to run intermittently so that it may stop when the sticky material reaches the position beneath the hollow cylinder for the period of time required for the cylinder and piston to descend and press
35 the sticky material to form the cake and so that it may

restart when the cylinder and piston ascend together carrying with them the formed cake. Preferably, the sticky material is fed onto the conveyor only when the latter is stationary.

- 5 By "cylinder" in this invention we mean a hollow body of uniform internal cross-section throughout its length and whose wall is tapered at the outside of its lower end. The taper angle of the lower edge of the cylinder wall may suitably be from 10° to 20° and conveniently from 12.5° to 17.5°. Advanta-
10 geously, the lower edge of the tapered cylinder is sharp to facilitate cutting all the way through the sticky material.

- The piston has an external cross-section complementary to the internal cross-section of the cylinder and conveniently both
15 cross-sections may be circular. Both the cylinder and the piston may be made of plastics material. If desired, the face of the piston which compresses the sticky material may be formed with a pattern of any desired shape which is printed onto the sticky material when the piston compresses it.

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- We have found that a stable cake can be formed if the pressure applied by the piston is sufficient to reduce the thickness of the sticky confectionary material to from 40 % to 60 % and preferably from 45 % to 55 % of its original thick-
25 ness. The time of pressing may be from 0.5 to 5.0 seconds, preferably from 1.0 to 3.0 seconds and especially from 1.5 to 2.5 seconds. When the formed cake is released by the piston redescending and pressing it out of the cylinder, it is conveniently conveyed away by falling onto a shuttle table
30 which is inserted in the space between the cylinder and the endless conveyor when the cylinder is in its ascended position. The weight of the formed cake is thus easily determined by the diameter of the cylinder and the thickness of the sticky

material on the endless conveyor. Any surplus sticky material remaining on the endless conveyor may easily be recirculated by falling on to a transport system which reconveys it to the hopper.

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A programme unit may be fitted to the machine to coordinate all the movements.

The present invention also provides an apparatus for forming
10 cakes from a sticky confectionary material characterised in that it comprises an endless conveyor adapted to run intermittently above which is a vertically disposed hollow cylinder whose wall is tapered at its lower end and inside which is a piston, means for feeding a sticky confectionary material
15 onto the endless conveyor, means for lowering cylinder to cut through the sticky material until its lower edge contacts the endless conveyor, means for lowering the piston to compress the sticky material to form the cake, means for raising the cylinder and piston together carrying with them the
20 formed cake, means for lowering the piston to press out and release the formed cake and means for transporting the formed cake away from the endless conveyor.

The drive systems for the cylinder and piston are preferably
25 pneumatic.

The present invention is further illustrated by way of example with reference to the following drawings in which:

30 Figures 1 to 5 are diagrammatic sectional views showing the different stages in forming a stable cake from a sticky confectionary material on an endless conveyor by means of a hollow cylinder inside which is a piston.

35 Referring to the drawings, a hollow vertically disposed

cylinder 10 has a wall 11 of circular cross-section with a tapering portion 12 so that its lower end terminates in a sharp edge 13. Inside the cylinder is a piston 14 with piston rod 15. The cylinder and piston are fitted above a
5 horizontal endless conveyor 16 carrying a sticky confectionary material 17. A shuttle table 18 for receiving the formed stable cake 19 is inserted in the space between the cylinder 10 and the endless conveyor 16 when the cylinder is in its ascended position. The tapering portion angle 20 is 15°.

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In operation, six hollow vertical cylinders 10 are arranged close together in a row at right angles to the direction of travel of the horizontal endless conveyor 16. A layer of the sticky material 17 having the same length and width as is
15 covered by the cylinders is fed from a hopper (not shown) onto the upper surface of the conveyor while it is stationary. When the conveyor starts to move it transports the layer of sticky material firstly beneath a scraper (also not shown) which removes any excess material and levels out the layer
20 to a uniform thickness and then to a position beneath the hollow vertical cylinders whereupon it stops (Fig. 1). The cylinders 10 and the pistons 14 descend together and the cylinder walls 11 cut through the sticky material until their sharp edges 13 contact the conveyor (Fig. 2) and thus divide
25 the sticky material so that a portion lies within each cylinder. The pistons 14 then descend further and compress the portions of sticky material for two seconds to form the stable cakes having 50 % of their original thickness (Fig. 3) after which the cylinders and pistons ascend together carrying with
30 them the stable cakes (Fig. 4). The pistons then redescend and press out the stable cakes to release them so that they fall on to the shuttle table 18 (Fig 5) which carries them away. The pistons finally reascend within the cylinders to return to the position shown in Fig. 1 where the conveyor belt,
35 which was fed with a further layer of sticky material while

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it was stationary and which restarted when the cylinders and pistons ascended at the stage shown in Fig. 4, has transported the sticky material to a position beneath the cylinders, and the cycle is repeated.

Claims

1. A method of forming a cake from a sticky confectionary material characterised in that the sticky confectionary material is transported on an endless conveyor adapted to run intermittently, to a position beneath at least one vertically disposed hollow cylinder whose wall is tapered at its lower end and inside which is a piston, at which position the cylinder descends and cuts through the sticky material until its lower edge contacts the endless conveyor, then the piston descends to compress the sticky material to form the cake, after which the cylinder and piston ascend together carrying with them the formed cake, and finally the piston redescends to press out and release the formed cake which is transported away from the endless conveyor.
2. A method according to claim 1 characterised in that the sticky confectionary material passes under a levelling device before it is transported to the position beneath the hollow cylinder.
3. A method according to claim 1 characterised in that the endless conveyor stops when the sticky material reaches the position beneath the hollow cylinder and restarts when the hollow cylinder and piston ascend together carrying with them the formed cake.
4. A method according to claim 1 characterised in that the lower edge of the tapering portion of the cylinder wall is sharp.
5. A method according to claim 1 characterised in that the face of the piston which compresses the sticky material is formed with a pattern.



6. An apparatus for forming cakes from a sticky confectionary material characterised in that it comprises an endless conveyor adapted to run intermittently, above which is a vertically disposed hollow cylinder whose wall is tapered at its lower end and inside which is a piston, means for feeding a sticky confectionary material onto the endless conveyor, means for lowering the cylinder to cut through the sticky material until its lower edge contacts the endless conveyor, means for lowering the piston to compress the sticky material to form the cake, means for raising the cylinder and piston together carrying with them the formed cake, means for lowering the piston to press out and release the formed cake and means for transporting the formed cake away from the endless conveyor.

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7. An apparatus according to claim 6 characterised in that the drive systems for the cylinder and piston are pneumatic.

