July 17, 1956 M. FROIDEVAUX 2,754,773

MACHINES FOR MOULDING A DOUGHY MASS

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Fig.1.

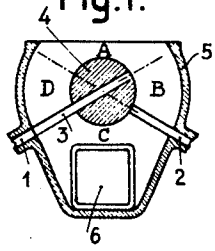


Fig.2.

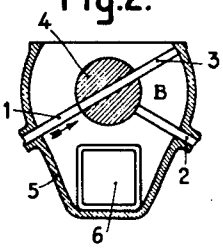


Fig.3.

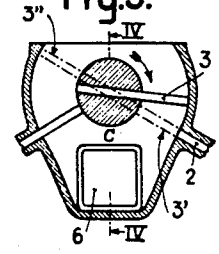


Fig.4.

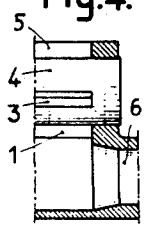
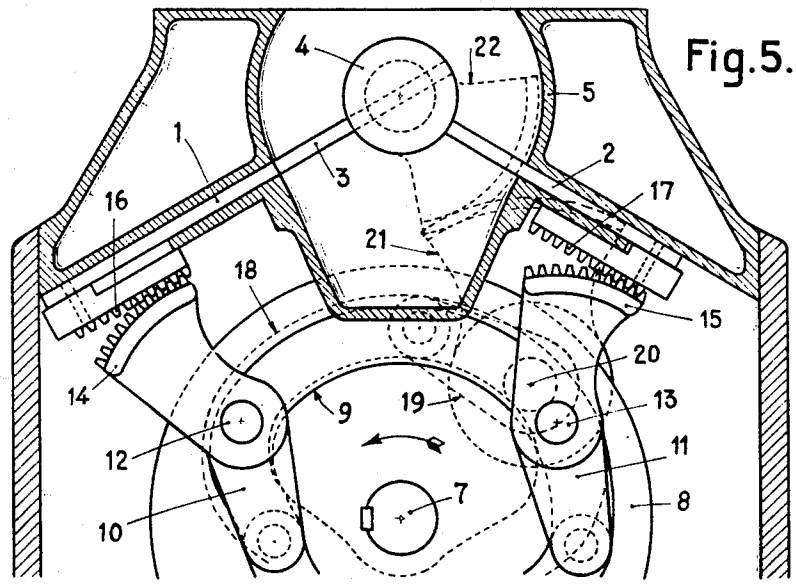


Fig.5.



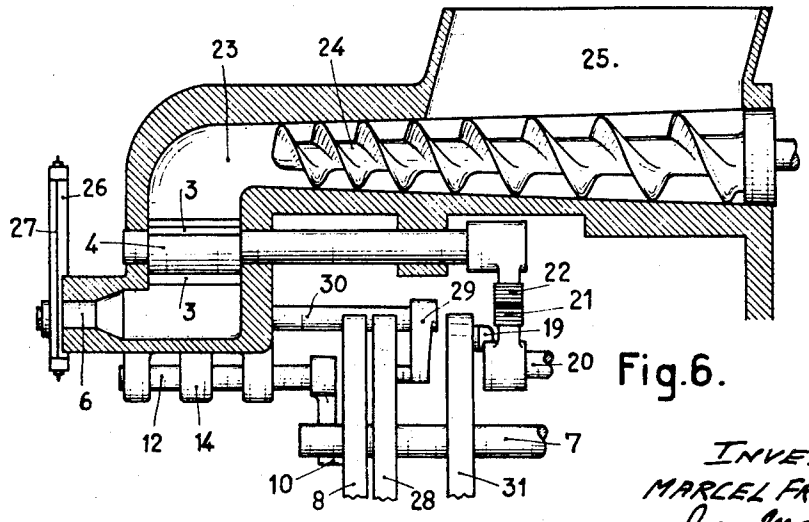


Fig.6.

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MACHINES FOR MOULDING A DOUGHY MASS

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7 Claims. (Cl. 107—14)

The present invention relates to a machine for treating doughy material, such as dough, butter or margarine, by forcing it through a die.

It is one of the important objects of the invention to provide means affording uniform kneading and extrusion of substantially equal masses of doughy material at high speed and in accordance with predetermined time sequence.

The aim of the invention is to force through a die at each cycle of operation, a given mass of material in order to produce moulded dough, of desired profile, length and, consequently, volume and weight.

The machine according to the invention is characterized by the fact that the line of intersection of two planes divides a chamber geometrically into four dihedrons and coincides with the axis of oscillation of a cylindrical member to which is imparted a swinging movement, the angle of oscillation of which corresponds to that of a pair of opposite lateral dihedrons, the said member or body carrying a blade directed along a diametral plane thus brought successively to coincide with one, then with the other of the two geometric planes. The aforesaid blade is dimensioned in such a way that, when one of its ends reaches the level of the outer surface of the cylindrical body, its other end issues therefrom to an extent bringing it into contact with a cylindrical portion of the wall of said chamber, said wall portion being cylindrical and coaxial with the axis of oscillation of said cylindrical member. Into said chamber may penetrate two reciprocable slides directed along said geometric planes, and defining a third dihedron remote from the two opposite dihedrons described by the plane of the blade, the die communicating with the interior of said third dihedron, while the mass treated is forced back into the space occupied by a fourth dihedron opposite to said third dihedron.

The described components of the device are so interrelated and actuated in such a manner that before each reversal of the direction of rotation of the cylindrical body, the slide in line with the blade pushes back the corresponding end of the latter to the level of the outer surface of said body, against which it remains pressed. The other slide, previously brought in the same manner to the level of the said surface, withdraws into the wall of the chamber as soon as the cylindrical body rotates, in order in its turn to push back the blade in the opposite direction preliminary to the next complete oscillation of he cylindrical body, and so on, the result being that at each cycle thus accomplished, one end of the blade forces back into the die a quantity of mass equivalent to the volume of the dihedron which it covers.

The accompanying drawings shows an embodiment of such a machine given by way of example.

Figs. 1 to 3 are three diagrammatic sections explaining how a moulding cycle takes place.

Fig. 4 is a partial section along IV—IV of Fig. 3.

Fig. 5 is a section on an enlarged scale and similar to that of Figs. 1 to 3, showing the kinematic connections

ensuring the development of the operations necessary for the repetition of the moulding cycles and thus constitutes a semi-diagrammatic representation of the machine.

Fig. 6 is a longitudinal section also semi-diagrammatic of the latter, on a smaller scale.

In Fig. 1, two slides 1 and 2 and a blade 3, in line with the slide 1, are distributed in two planes cutting each other and thus dividing the space geometrically into four dihedrons A, B, C, and D, which dot and dash lines render more clear.

In the center of the space, and having an axis coinciding with the line of intersection of said two planes, is a cylindrical body 4, slidably mounting the blade 3 along a diametral plane.

The assembly is enclosed in a chamber, the wall 5 of which has, in the space enclosed by the opposite dihedrons B and D, a cylindrical profile co-axial with the cylindrical body 4.

The two slides 1 and 2 are guided in corresponding openings in said wall 5, in which they may move in their plane, while the blade 3 may slide, in its own plane, with a tight fit in the body 4.

Its length is such that, when one of its ends is on a level with the outer surface of the cylindrical body, its other end abuts against the corresponding cylindrical part of the wall 5 of the chamber surrounding the whole.

In Fig. 1, it will be seen that it is the upper right hand end of the blade which is level with the cylindrical body and the lower left end which abuts against the wall, in this instance against the slide 1 which is on a level with the said wall.

While the chamber shown could actually be completely cylindrical, it will be seen that it has, in the position shown, the profile of an inverted pear. It is open at the top, opposite the dihedron A, and has at the bottom, in the dihedron C, an opening 6 which is the opening of the moulding die, as is shown in the section of Fig. 4.

A comparison between Figs. 1 and 2 shows that by pushing the slide 1 into the chamber, its position in alignment with the blade 3 allows it to push back the latter in the direction of the arrow (Fig. 2) and to bring it into the reverse position with respect to the preceding one, that is to say with its upper right end in contact with the wall of the chamber and the lower left end on a level with the outer surface of the cylindrical body 4. At that moment, the slide 1 is also on a level with said surface, the position also occupied by the slide 2 in the first two figures considered.

Supposing now that the whole chamber shown is filled with a mass of moldable material, for example either butter or margarine, it will be seen that the displacement of the blade 3, just described, has for its result to isolate in the dihedron B, included between the blade 3, the wall 5, the slide 2 and the cylindrical body 4, a predetermined volume of the said mass.

Fig. 3 shows how a molding cycle ends; what has just been described being the beginning.

A rotative movement is imparted to the cylindrical body 4 to sweep the blade 3 through the dihedron B (arrow of Fig. 3) whereas the slide 2 withdraws and disappears into the wall of the chamber. This movement continues until the taking up of the position 3', in line with the slide 2, in a position symmetrically opposite to that of Fig. 1.

The space previously occupied by the dihedrons B and C, which now communicate as a result of the withdrawal of the slide 2 is reduced to the volume of the dihedron C and the excess of mass (volume of the dihedron B) has been discharged by the die 6. It is sufficient to cut it at the level of the exit of the latter to produce a profiled block of equal volume for each similar cycle.

The following molding cycle will be identical but in the reverse direction.

In its forward movement, the slide 2 pushes back the blade into the position 3'' (see Fig. 3), after which the latter turns in a direction reverse to the preceding one, while the slide 1 withdraws and the position of Fig. 1 is restored. The discharged mass corresponds to the volume dihedron D, which is identical to that of the opposite dihedron B.

Thus carrying out a swinging movement which makes it turn alternately in one direction and the other, the cylindrical body, aided by the blade and the movements imparted thereto by the two slides, will discharge at each cycle the same quantity of profiled mass, allowing collection of molded dough pieces exactly of the same volume, i. e. weight.

The simplicity of the operations permits very great speed of operation, for example at a rhythm of more than a hundred moldings per minute.

To this end, the chamber in which operate the blade and the slides must obviously constantly be supplied, this being effected by pressing the mass, for example by means of the usual spiral screws.

It will be seen that since the discharge occurs through the dihedron C included between the two slides 1 and 2, the feed must occur through the opposite dihedron A.

It is known that with butter, for example, there is a risk that the union end to end of portions such as those compressed turn by turn by the blade 3 would not take place correctly. In the present case, the mixture of the portions compressed, now from one side, now from the other, taking place in C, produces a sort of kneading which eliminates any lack of continuity.

An explanation will now be given of how to actuate the described elements, in order automatically to produce the operative cycles which have just been explained in detail.

Fig. 5 shows, in a semi-diagrammatic manner, how this is accomplished.

There is to be seen the chamber defined by the wall 5, a part of the frame of the machine, as well as the cylindrical body 4, the slides 1 and 2 and the blade 3.

7 indicates a cam shaft carrying a cam 8, behind which is a second cam of the same diameter.

A groove 9 on the cam 8, of which an arrow shows the direction of rotation, imparts positively an alternating swinging movement to two levers 10 and 11, turning about spindles 12 and 13 and driving the toothed sectors 14 and 15.

The said sectors gear with racks 16 and 17, integral with the slides 1 and 2.

It is obvious that the swinging of the levers 10 and 11 will result in the alternate advance and withdrawal of the two slides.

A groove 18 on the cam 31 placed behind the cam 8, positively drives a lever 19, pivoted at 20, the swinging of which is transmitted to the toothed sector 21, gearing with a toothed sector 22, integral with the spindle of the cylindrical body 4. Thus is produced the swinging movement of said cylindrical body.

Upon examination of the drawing, it will be seen that the grooves of the two cams will guide the respective levers so that the operations constituting the successive molding cycles are developed.

In Fig. 5, the die is supposed to be placed in front of the drawing. This corresponds to the semi-diagrammatic longitudinal section of Fig. 6, in which only the necessary members for comprehension have been shown.

Above the cylindrical body 4 driving the blade 3, is a feed channel 23, in which spiral screws 24 (two side by side, one only of which is visible) push the mass charged into the hopper 25.

At the outlet of the die 6 is disposed a rotary bow 26, carrying a cutting wire 27, which the cam 28, acting positively on the lever 29 and the shaft 30 thrusts down

in the trajectory of the molded mass at each stop of the latter, that is to say, as a slide pushes back the blade 3.

31 shows the cam (not shown in Fig. 5) controlling the swinging of the cylindrical body 4 through the agency of the toothed sectors 21 and 22.

It is obvious that rotation of the blade must be such that the latter remains at least partially in the trajectory of the slides 1 and 2, with which it cooperates. This offers no difficulty in view of the fact that the correction to be made on the weight of the molded dough is of the order of a few grams and that an angle variation of at the most three degrees is sufficient.

As regards the spiral screws, an intermittent rotational movement is imparted thereto, said movement being produced by a suitable mechanism, connected to the same motive power as that driving the cam shaft 7.

In front of the outlet orifice of the die 6, a packing apparatus may be disposed, for obtaining molded and packed portions.

It is obvious that the mechanism shown is only by way of example and that other kinematic connections allow production of the desired operative cycles.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A device for feeding and extruding doughy material, comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, an oscillatable member disposed within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons and an upper and lower dihedron, a blade element slidably retained within the diametral slot of said oscillatable member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material upon successive oscillations of said oscillatable member.

2. A device for feeding and extruding doughy material, comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, a cylindrical member arranged for oscillation within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said cylindrical member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons and an upper and lower dihedron, a blade element slidably retained within the diametral slot of said cylindrical member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material upon successive oscillations of said cylindrical member.

3. A device for feeding and extruding doughy material, comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, a cylindrical member arranged for oscillation within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said cylindrical member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons bordering on respective lateral wall portions and an upper and lower dihedron, a blade element slid-

ably retained within the diametral slot of said cylindrical member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, said blade element being dimensioned so that when one of its opposite ends is level with the outer surface of said cylindrical member its other end is in contact with one of said lateral wall portions of the chamber, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material upon successive oscillations of said cylindrical member.

4. A device for feeding and extruding doughy material, comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, a cylindrical member arranged for oscillation within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said cylindrical member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons and an upper and lower dihedron, a blade element slidably retained within the diametral slot of said cylindrical member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, the opposite wall portions of said chamber subtended between said opposed lateral dihedrons being cylindrical and coaxial with the axis of oscillation of said cylindrical member, said blade element being dimensioned so that when one of its opposite ends is level with the outer surface of said cylindrical member its other end is in contact with one of said cylindrical wall portions of the chamber, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material corresponding to the volume of one of said lateral dihedrons upon successive oscillations of said cylindrical member.

5. A device for feeding and extruding doughy material, comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, a cylindrical member arranged for oscillation within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said cylindrical member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons and an upper and lower dihedron, the angle of oscillation of said cylindrical member corresponding to the dihedral angle of one of said opposed lateral dihedrons, a blade element slidably retained within the diametral slot of said cylindrical member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, the opposite wall portions of said chamber subtended between said opposed lateral dihedrons being cylindrical and coaxial with the axis of oscillation of said cylindrical member, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material corresponding to the volume of one of said lateral dihedrons upon successive oscillations of said cylindrical member.

6. A device for feeding and extruding doughy material, comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, a cylindrical member arranged for oscillation within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said cylindrical member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons bordering on respective lateral wall portions and an upper and lower dihedron, the angle of oscillation of said cylindrical member corresponding to the dihedral angle of one of said opposed lateral dihedrons, a blade element slidably retained within the diametral slot of said cylindrical member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, said blade element being dimensioned so that when one of its opposite ends is level with the outer surface of said cylindrical member its other end is in contact with one of said lateral wall portions of the chamber, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material corresponding to the volume of one of said lateral dihedrons upon successive oscillations of said cylindrical member.

7. A device for feeding and extruding doughy material comprising a chamber having an inlet end and an outlet end and defining a path of extrusion for the material through said chamber, a cylindrical member arranged for oscillation within said chamber and having a diametral slot extending through said member, a pair of reciprocable elements alternately projectable into said chamber and defining two geometric planes having a line of intersection coincident with the axis of oscillation of said cylindrical member, said geometric planes dividing the space within the chamber into a pair of opposed lateral dihedrons and an upper and lower dihedron, the angle of oscillation of said cylindrical member corresponding to the dihedral angle of one of said opposed lateral dihedrons, a blade element slidably retained within the diametral slot of said cylindrical member and arranged for successive alternate actuation at its opposite ends by said reciprocable elements, the opposite wall portions of said chamber subtended between said opposed lateral dihedrons being cylindrical and coaxial with the axis of oscillation of said cylindrical member, said blade element being dimensioned so that when one of its opposite ends is level with the outer surface of said cylindrical member its other end is in contact with one of said cylindrical wall portions of the chamber, and a die member communicating with said lower dihedron of said chamber, to thereby extrude through said die member equal masses of material corresponding to the volume of one of said lateral dihedrons upon successive oscillations of said cylindrical member.

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