

DESCRIPTION

CRUSTED FOOD MANUFACTURING APPARATUS

5 TECHNICAL FIELD

[0001]

The present invention relates to a crusted food manufacturing apparatus capable of continuously manufacturing crusted foodstuffs (products) in each of which a filling made of food such as bean paste or
10 jam is crusted with a crust material made of food dough such as bread dough.

BACKGROUND ART

[0002]

15 Conventionally, in the process of manufacturing crusted food, a crust material such as bread dough formed in a flat shape is placed on a placing member having an opening so as to cover the opening, and then a filling is supplied and placed onto a central part of the crust material from a nozzle member provided to be vertically movable while a peripheral
20 portion of the crust material is pressed against and held on the placing member by a pressing member. Thereafter, after the lifting up of the pressing member and the nozzle member, the peripheral portion of the crust material is gathered and sealed at the central portion by sealing means formed of an appropriate shutter mechanism. This technique has been
25 disclosed in Patent Document 1, for example.

[0003]

In the configuration disclosed in Patent Document 1, multiple supporting rods are provided vertically movably to a ring-like stay integrally attached to the nozzle member, and a ring-like pressing member is supported by lower ends of these supporting rods. A coil spring is elastically installed between the pressing member and the stay, and the pressing member is always biased downward to be located below a lower end of the nozzle member.

[0004]

Therefore, in the above-described configuration, after the pressing member presses the peripheral portion of the crust material, the lower end of the nozzle member presses and deforms the central part of the crust material downward so as to supply the filling. After the lower end is lifted up above the pressing member, the pressing member is lifted up following the lifting up of the nozzle member. Hence, the filling can be reliably supplied to the central part of the crust material.

[0005]

However, although the conventional configuration as described above is in the state in which the pressing member constantly presses the crust material by using a biasing force of the coil spring during a period from a time when the pressing member presses the crust material, until a time when the nozzle member is lifted up after being moved down, the biasing force of the coil spring fluctuates due to a change in a vertical position of the nozzle member. Accordingly, a pressing force of the pressing member always changes unstably. Because of this and also due to properties of the crust material and the like, it is difficult to always maintain a constant thickness for the peripheral portion of the crust material

pressed by the pressing member. This produces a problem that it is difficult to always hold sealed portions with a constant thickness, for example.

[0006]

5 Moreover, in the conventional configuration as described above, the nozzle member and the pressing member are configured to move vertically integrally while keeping a constant positional relationship. Therefore, there is a problem that neither the relative vertical-positional relationship between the nozzle member and the pressing member, nor
10 timings of vertical movements of the nozzle member and the pressing member can be adjusted based on conditions such as the properties or the thickness of the crust material.

PRIOR ART DOCUMENTS

15 Patent Documents

[0007]

Patent Document 1: Japanese Patent No. 4045319

DISCLOSURE OF THE INVENTION

20 Technical Problem

[0008]

 This invention has been made to solve the above-described problems. Therefore, an object thereof is to provide a crusted food manufacturing apparatus capable of individually adjusting vertical
25 movements and positions of a nozzle member and a dough pressing member, based on a thickness and properties of a crust material.

[0009]

Another object of the present invention is to provide a crusted food manufacturing apparatus which is capable of adjusting timings of vertical movement of a nozzle member and vertical movement of a dough pressing member.

Technical Solution

[0010]

In order to achieve the above object, a first aspect of the present invention provides a crusted food manufacturing apparatus for manufacturing crusted food in which a filling is crusted with a crust material, the apparatus comprising: crust material transferring means for transferring the flat-shaped crust material onto a placing member so as to cover an opening of the placing member, the placing member provided on a front face side of a main body frame of the crusted food manufacturing apparatus; a dough pressing member configured to be able to press an outer peripheral portion of the crust material placed on the placing member and to move vertically; a nozzle member configured to be able to eject the filling to a central part of the crust material on the placing member and to move vertically; lift supporting means configured to be able to support from below the crust material falling from the opening of the placing member and to move vertically; and sealing means for gathering a peripheral portion of the crust material to the central part and sealing the peripheral portion after the lifting up of the nozzle member and the dough pressing member, wherein the nozzle member and the dough pressing member are individually movable vertically and individually adjustable in

vertical movement and position.

[0011]

A second aspect of the present invention dependent on the first aspect provides the crusted food manufacturing apparatus, wherein the main body frame includes a nozzle vertical movement mechanism configured to vertically move the nozzle member, the nozzle member is attachable to and detachable from a nozzle lifting member from a front side thereof, the nozzle lifting member vertically movably provided on the nozzle vertical movement mechanism, the main body frame includes a pressing member vertical movement mechanism configured to vertically move the dough pressing member, and the pressing member is attachable to and detachable from a pressing member lifting member from a front side thereof, the pressing member lifting member vertically movably provided on the pressing member vertical movement mechanism.

[0012]

A third aspect of the present invention dependent on the first aspect or the second aspect provides the crusted food manufacturing apparatus, wherein the nozzle member is provided vertically movably inside an external cylinder attached to a front face of the main body frame in a manner integrally and immovably connectable to filling supplying means provided on the front face of the main body frame, and in a manner attachable to and detachable from the front face from a front side thereof, the dough pressing member is vertically movably provided outside the external cylinder, and the external cylinder, the nozzle member, and the dough pressing member collectively constitute a nozzle unit.

[0013]

A fourth aspect of the present invention dependent on any one of the first to third aspects provides the crusted food manufacturing apparatus, wherein the sealing means and the filling supplying means are attachable to and detachable from the main body frame from a front side thereof.

5

Advantageous Effects

[0014]

According to the present invention as disclosed in the first to fourth aspects, the nozzle member and the dough pressing member can achieve vertical movement individually and adjust vertical positions individually. Accordingly, the crusted food manufacturing apparatus of the present invention is capable of individually adjusting vertical positions of a nozzle member and a dough pressing member, based on a thickness and properties of a crust material. In addition, the crusted food manufacturing apparatus of the present invention is capable of adjusting timings of vertical movement of a nozzle member and vertical movement of a dough pressing member. Hence it is possible to solve the above-described problems of the related art.

20 BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

[Fig. 1] Fig. 1 is a perspective explanatory view showing an overall configuration of a crusted food manufacturing apparatus according to an embodiment of the present invention.

25 [Fig. 2] Fig. 2 is a front explanatory view showing an overall configuration of a crusted food manufacturing apparatus according to an

embodiment of the present invention.

[Fig. 3] Fig. 3 is a left side explanatory view showing an overall configuration of a crusted food manufacturing apparatus according to an embodiment of the present invention.

5 [Fig. 4] Fig. 4 is a plan explanatory view showing an overall configuration of a crusted food manufacturing apparatus according to an embodiment of the present invention.

[Fig. 5] Fig. 5 is a front sectional explanatory view showing part of a nozzle unit, sealing means, and a pump.

10 [Fig. 6] Fig. 6 is a rear explanatory view showing a configuration to individually move a nozzle member and a dough pressing member vertically.

BEST MODES FOR CARRYING OUT THE INVENTION

15 [0016]

Hereinbelow, an embodiment of the present invention will be described by using the drawings. Here, description will be made on assumptions that a side indicated by "F" in Fig. 1 is front side (a forward side) of a crusted food manufacturing apparatus 1 based on the present invention, that a side indicated by "B" is a back side, that a side indicated by "L" is a left side, and that a side indicated by "R" is a right side thereof. Reference codes "F", "B", "L", and "R" in Fig. 2 to Fig. 4 also indicate the same directions as those indicated in Fig. 1, respectively.

[0017]

25 First, referring to Fig. 1, a crusted food manufacturing apparatus 1 according an embodiment of the present invention includes a box-shaped

main body frame 5 provided with casters 3. The main body frame 5 is divided into a front main body frame 5A and a rear main body frame 5B, and the rear main body frame 5B is attached to the front main body frame 5A so as to be openable and closable in a rear direction by use of a hinge member (not shown). Accordingly, it is possible to easily perform maintenance and check of various mechanisms and devices embedded in the front main body frame 5A and the rear main body frame 5B. Note that the front main body frame 5A and the rear main body frame 5B will be collectively referred to as the main body frame 5 in the following description, and the front main body frame 5A and the rear main body frame 5B will be distinctively stated only when such distinction is necessary in particular.

[0018]

A placing member 9 including a circular opening 9A located at a central part thereof is attached to a front face 7 of the main body frame 5. Moreover, crust material transferring means 13 for transferring a crust material 11 formed into a flat shape onto the placing member 9 is provided so as to cover the opening 9A of the placing member 9. Although a configuration of the crust material transferring means 13 of this type has been publicly known, the configuration will be briefly described as follows. Specifically, the crust material transferring means 13 is formed of a belt conveyor and a tip end (a left end in Fig. 1) of a conveyor belt in the belt conveyor is movable above the placing member 9.

[0019]

The crust material transferring means 13 of this type performs an action to drop and supply the crust material 11 onto the placing member 9

so as to cover the opening 9A of the placing member 9 by transferring the crust material 11 placed thereon to a position above the placing member 9 and sending out the crust material 11 while causing the tip end of the conveyor belt to retreat from the left side to the right side in Fig. 1. Note
5 that the configuration of the crust material transferring means 13 is publicly known and description of more detailed configuration of the crust material transferring means 13 as well as description of actions thereof will be omitted.

[0020]

10 Meanwhile, a dough pressing member 15 having an annular shape and being capable of pressing an outer peripheral portion of the crust material 11 placed on the placing member 9 toward the placing member 9 is vertically movably provided on the front face 7 of the main body frame 5, and a nozzle member 17 capable of ejecting a filling (not shown) to the
15 central part of the crust material 11 on the placing member 9 is vertically movably provided thereon. Furthermore, lift supporting means 19 is vertically movably provided on the front face 7 of the main body frame 5, and is configured to support from below a lower side portion of the crust material 11 coming down from the opening 9A of the placing member 9
20 when the filling is ejected and supplied from the nozzle member 17 to the central part of the crust material 11.

[0021]

The lift supporting means 19 is formed of a belt conveyor in order to discharge crusted food formed by crusting the filling with the crust
25 material 11 out to a subsequent process. Note that the lift supporting means 19 of this type is publicly known and detailed description

concerning the configuration of the lift supporting means 19 will be omitted. Meanwhile, a discharge conveyor 21 is provided adjacent to the lift supporting means 19 on the front face 7 of the main body frame 5. This discharge conveyor 21 performs an action to discharge the crusted
5 food received from the lift supporting means 19 out to the subsequent process.

[0022]

The placing member 9 is detachably attached onto a base plate 25 (see Fig. 5) in sealing means 23 for gathering the peripheral portion of the
10 crust material 11 to the central part and sealing together after supplying the filling into the crust material 11 on the placing member 9, and an upper surface of the placing member 9 is fitted on the same level as an upper surface of the base plate 25. The base plate 25 of the sealing means 23 is detachably attached to the front face 7 of the main body frame 5 by using
15 an appropriate fixture tool 24 such as an attachment screw.

[0023]

The sealing means 23 is configured to interlock and connect multiple shutter pieces 27 (see Fig. 4) provided horizontally swingably on the base plate 25 in an interlocking manner via respective links 29, and to
20 perform opening and closing actions of a region surrounded with the respective shutter pieces 27 by reciprocating motions of an operating rod 31 to be moved in a reciprocating manner by an appropriate actuator. Note that the above-described shutter mechanism as an example of the sealing means 23 is publicly known as disclosed in Patent Document 1, for
25 example. Accordingly, more detailed description of the sealing means 23 will be omitted.

[0024]

The main body frame 5 is provided with filling supplying means 33 (see Fig. 5) in order to supply the filling to the crust material 11 placed on the placing member 9. To be more precise, a driving box 35 with a motor (not shown) embedded therein is provided above the main body frame 5 and a pair of support rods 37 horizontally protruding forward (in a surface direction which is perpendicular to a sheet surface in Fig. 5) are provided on a front face of this driving box 35. Moreover, a casing 41 in an appropriate pump 39 for sending out the filling is supported by these support rods 37 so as to be attachable to and detachable from a front side thereof. Here, a rotating shaft of the pump 39 is connected to a rotating shaft of the motor by using a dog clutch or the like, for example, and is therefore capable of easily attaching and detaching the pump 39 to and from the driving box 35.

15 [0025]

A hopper 43 is detachably attached to an upper part of the casing 41 of the pump 39. Specifically, an L-shaped locking member 45 is attached to the upper part of the casing 41 in an opposed manner, and is configured to lock and unlock an oval-shaped flange portion 47 provided below the hopper 43 on and off the locking part 45 by turning the hopper 43 by 90°. Note that the configuration for locking and unlocking the hopper 43 on and off the casing 41 is not limited only to the above-described configuration and other appropriate configurations are also applicable.

25 [0026]

An L-shaped connecting pipe 49 is detachably attached to a lower

part of the casing 41 of the pump 39, and a nozzle unit 51 is detachably attached to this connecting pipe 49. To be more precise, the nozzle unit 51 includes an external cylinder 57 which is integrally provided with a connecting pipe 55 which can establish connection and disconnection to and from the connecting pipe 49 easily via a joint pipe 53. Regarding connection and disconnection between both of the connecting pipes 49 and 55, if a connected state is as shown in Fig. 5, then it is possible to release connection between both of the connecting pipes 49 and 55 by moving the joint pipe 53 rightward in Fig. 5 and detaching the joint pipe 53 from the connecting pipe 55.

[0027]

Then, it is possible to integrally connect both of the connecting pipes 49 and 55 via the joint pipe 53 by performing the opposite action. In this case, both of the connecting pipes 49 and 55 are made of metal and are therefore immovably connected to each other. Moreover, even when pulsation tends to occur when the filling is sent out by the pump 39, it is possible to prevent vibration of both of the connecting pipes 49 and 55 and to send the filling smoothly to the nozzle unit 51.

[0028]

The nozzle unit 51 includes the nozzle member 17 vertically movably penetrating the external cylinder 57 and the dough pressing member 15 being vertically movably engaged with an outer periphery on a lower side of the external cylinder 57. The external cylinder 57 of this nozzle unit 51 is detachably attached to a nozzle unit support member 59 (see Figs. 1 to 3) which is provided above the front face of the main body frame 5 by using appropriate fixture tools 61 such as tightening screws.

Specifically, the external cylinder 57 is attached to the front face 7 of the main body frame 5 so as to be attachable to and detachable from a front side thereof.

[0029]

5 In the nozzle unit 51, in order to flow the filling supplied to the inside of the external cylinder 57 via the connecting pipes 49 and 55 further into the nozzle member 17, a long hole 63 elongated in the vertical direction is formed at a portion of the nozzle member 17 opposed to the connecting pipe 55. Moreover, a lifting rod 67 including an on-off valve
10 65, which is located at a lower end and capable of opening and closing an ejection port 17A that is provided at a lower end of the nozzle member 17, is provided inside the nozzle member 17 so as to be vertically movable and rotatable.

[0030]

15 To vertically move and rotate the lifting rod 67, a driving unit 71, which is detachably attached to a support block 69 integrally provided at an upper end of the nozzle member 17, includes a driving rod 73 that is connectably and disconnectably coupled with an upper end of the lifting rod 67 and that protrudes downward. The driving unit 71 includes a
20 rotary actuator 75 such as a motor for rotating the driving rod 73, and also includes a vertical motion actuator 77 such as an air cylinder for vertically moving the driving rod 73.

[0031]

 Moreover, the lifting rod 67 and the driving rod 73 are joined
25 together so as to integrally move vertically and to rotate integrally. To be more precise, coupling blocks 79A and 79B being easily connectable and

disconnectable outside the nozzle member 17 but at the same time appropriately engaged and coupled with each other so as not to be disconnected in a diametric direction or an axial direction inside the nozzle member 17 by restriction of the nozzle member 17 are integrally provided
5 at an upper end of the lifting rod 67 and at a lower end of the driving rod 73, respectively. Note that the configuration to engage and connect the coupling blocks 79A and 79B with each other is not limited only to the configuration as shown in Fig. 5. For example, it is possible to apply engagement between a concave portion such as a dovetail groove and a
10 convex portion such as a dovetail tenon. Other various structures are also applicable.

[0032]

In order to vertically move the nozzle member 17 and the dough pressing member 15 in the nozzle unit 51, lifting rods 81 and 83 (see Fig.
15 3) which horizontally protrude forward from the front face 7 are respectively provided on the main body frame 5 so as to be vertically movable, and U-shaped folk members 85 and 87 are integrally attached to front ends of the lifting rods 81 and 83, respectively. Moreover, one of the folk members 85 is engaged with an engagement groove 89 (see Fig. 5)
20 formed on the support block 69, which is integrally provided on the upper end of the nozzle member 17, so as to be engageable and disengageable relatively in a front-rear direction. Meanwhile, the other folk member 87 is engaged with an engagement groove 91 in the front-rear direction, which is formed on an upper part of the dough pressing member 15, so as to be
25 engageable and disengageable relatively in the front-rear direction.

[0033]

Therefore, by individually moving the lifting rods 81 and 83 vertically, it is possible to individually move the nozzle member 17 and the dough pressing member 15 vertically.

[0034]

5 In order to vertically move the lifting rods 81 and 83, a lifting slider 93 (see Fig. 6) configured to fix a base end side of the lifting rod 81 and a lifting slider 95 configured to fix a base end side of the lifting rod 83 are guided and supported vertically movably by a guiding member 97 which is perpendicularly provided in the main body frame 5. Here, the
10 lifting rods 81 and 83 protrude from long holes 96 elongated in the vertical direction and formed in the main body frame 5 toward the front face 7. Moreover, in order to move the lifting slider 93 vertically, an appropriate rotary actuator 101 such as a motor having an output shaft provided with a pinion (not shown) engaged with a rack 99 extending in the vertical
15 direction is fitted to the lifting slider 93. Meanwhile, a rotary actuator 105 provided with a pinion (not shown) engaged with a rack 103 extending in the vertical direction is fitted to the lifting slider 95.

[0035]

20 Therefore, by individually operating the rotary actuators 101 and 105, it is possible to individually move the lifting sliders 93 and 95 vertically and thereby to individually move the nozzle member 17 and the dough pressing member 15 vertically. Moreover, by operating the rotary actuators 101 and 105 synchronously at the same time, it is possible to synchronously move the nozzle member 17 and the dough pressing
25 member 15 vertically. Further, by individually controlling the rotary actuators 101 and 105, it is possible to adjust a positional relationship in the

vertically direction between the nozzle member 17 and the dough pressing member 15 to a desired positional relationship.

[0036]

If both of the rotary actuators 101 and 105 are configured to rotate reciprocally within a certain angular range, i.e., if rotating angles of the rotary actuators 101 and 105 cannot be adjusted to desired angles, then it is possible to adjust the vertical positional relationship between the nozzle member 17 and the dough pressing member 15 by applying the following configuration.

10 [0037]

Specifically, the racks 99 and 103 are capable of adjusting vertical positions by vertically movably supporting the racks 99 and 103 with use of a support block 107 embedded in the main body frame 5. Hence it is possible to apply a configuration in which: the pinions provided on the rotary actuators 101 and 105 are retained in a locked state when the racks 99 and 103 are adjusted vertically; the lifting slider 93 and the rotary actuator 101 vertically move integrally with the rack 99 when the racks 99 and 103 move vertically; and the lifting slider 95 and the rotary actuator 105 vertically move integrally with the rack 103. Meanwhile, as for the configuration to individually adjust the vertical positions of the racks 99 and 103, it is possible to apply a configuration to threadably engage adjusting screws 109 and 111, which are rotatably supported on an upper part of the main body frame 5, with screw nuts (not shown) provided on the racks 99 and 103.

25 [0038]

According to the configuration described above, it is possible to

individually adjust the respective racks 99 and 103 vertically by individually rotating the adjusting screws 109 and 111. Therefore, it is possible to vertically adjust a work area where the nozzle member 17 moves vertically and to vertically adjust a work area where the dough pressing member 15 moves vertically.

[0039]

By the way, the rotary actuator 101 or 105 may apply a servo motor or the like which can control a rotating position and a rotating speed as needed. In this case, it is possible to control vertical moving speeds, vertical positions, timings of vertical motion, and the like of the lifting sliders 93 and 95 as needed by controlling rotations of the rotary actuators 101 and 105 and the like instead of vertically moving the racks 99 and 103.

[0040]

According to the above-described configuration, when the crust material 11 formed into a flat shape (a disc shape) is placed on the crust material transferring means 13, the crust material 11 is transferred in the left direction in Fig. 1. Then, when an optical sensor 113 provided in a predetermined position detects the crust material 11 on the crust material transferring means 13, the crust material 11 is placed on the placing member 9 so as to cover the opening 9A provided on the placing member 9 under the control of a control device 115. When the crust material 11 is placed on the placing member 9 as described above, the operating rod 31 configured to operate the sealing means 23 is slightly reciprocated, whereby the multiple shutter pieces 27 are slightly opened and closed and the periphery of the crust material 11 is pressed toward the central part. Specifically, a centering action is performed so as to align the center of the

crust material 11 with the center of the opening 9A.

[0041]

After centering the crust material 11 as described above, the rotary actuator 105 is operated so as to move the dough pressing member 15 downward and to press and fix the outer periphery of the crust material 11 onto the placing member 9. In this case, a falling position of the dough pressing member 15 is always maintained in a constant position because the rotating angle of the rotary actuator 105 is always maintained at a constant angle. Hence the thickness of the outer peripheral portion of the crust material 11 is always maintained at a constant value.

[0042]

Here, it is possible to adjust a position to stop falling of the dough pressing member 15 by rotating the adjusting screw 111, and thereby to adjust the position to stop falling of the dough pressing member 15 so as to correspond to the thickness of the crust material 11. Hence it is possible to always maintain the thickness of the peripheral portion of the crust material 11 at a desired thickness.

[0043]

When the outer periphery of the crust material 11 is pressed and fixed by the dough pressing member 15 as described above, it is possible to eject and supply the filling to be sent and supplied from the pump 39 out of the ejection port 17A onto the crust material 11 by operating the rotary actuator 101 to move the nozzle member 17 downward and then operating the vertical motion actuator 77 to lift up the on-off valve 65. Thereafter, at the time of finishing the ejection and supply of the filling, the ejection port 17A is closed by use of the on-off valve 65 and the on-off valve 65 is

rotated by use of the rotary actuator 75 while retaining this closed state, and then the nozzle member 17 is lifted up so as to prevent the filling from adhering to a lower surface of the on-off valve 65. Hence it is possible to prevent the adhesion and the lifting up of the filling in association with the
5 lifting up of the nozzle member 17.

[0044]

Incidentally, when the nozzle member 17 is moved downward as described above, such movement is performed separately from falling of the dough pressing member 15. Accordingly, it is possible to adjust a
10 falling timing and a falling speed of the nozzle member 17 so as to eject and supply the filling almost simultaneously with the dough pressing member 15 pressing the crust material 11. Moreover, it is possible to start the lifting up of the dough pressing member 15 almost simultaneously with the nozzle member 17 starting the lifting up after the termination of the
15 ejection and supply of the filling. Hence it is possible to improve productivity.

[0045]

As described previously, when the filling is ejected and supplied from the nozzle member 17 onto the crust material 11, the central part of the
20 crust material 11 gradually moves downward from the opening 9A of the placing member 9. Here, the crust material 11 is supported from below by the lift supporting means 19 vertically movable. Accordingly, the crust material 11 is prevented from being partially stretched and locally thinned.

[0046]

25 As described previously, the crust material 11 is supported from below by the lift supporting means 19. When the nozzle member 17 and

the dough pressing means 15 are lifted up after the termination of the ejection and supply of the filling, the peripheral portion of the crust material 11 is gathered to the central part and sealed together by the sealing means 23 formed of the shutter mechanism. In this case, the thickness of the peripheral portion of the crust material 11 is always maintained at the same level. Accordingly, the thickness (amount) of the crust material 11 gathered to a sealing part is always retained substantially constant. Hence it is possible to seal the crust material 11 stably and reliably. That is to say, it is possible to manufacture crusted food by crusting the filling with the crust material 11.

[0047]

The crusted food thus manufactured is transferred from the lift supporting means 19 onto the discharge conveyor 21 and then conveyed to a subsequent process.

[0048]

As it is understood from the description made above, the nozzle member 17 and the dough pressing member 15 are configured to individually move vertically and the positions to stop falling of the respective members can be set (controlled) individually. Hence it is possible to adjust (control) the positions to stop falling of the respective members so as to correspond to the properties of the crust material 11 and thereby to solve the above-described problems of the related art.

[0049]

Moreover, the nozzle member 17 and the dough pressing member 15 move vertically by using the separate actuators 101 and 105. Therefore, it is possible not only to adjust the relationship of the relative

vertical positions between the nozzle member 17 and the dough pressing member 15 so as to correspond to the properties of crust material 11 but also to adjust (control) start timings and speeds of vertical movement of the nozzle member 17 and the dough pressing member 15. Hence it is possible to improve productivity while minimizing wasted time.

[0050]

Meanwhile, according to the above-described configuration, it is possible to attach and detach the constituents such as the sealing means 23, the nozzle unit 51, and the pump 39 to and from the main body frame 5 at the front side of the main body frame 5. Hence it is possible to perform cleaning as well as maintenance and check of the constituents easily.

[0051]

The present invention is not limited only to the above-described embodiment but can be embodied in various other aspects by making appropriate modifications. Specifically, in order to simplify the configuration, it is also possible to apply a configuration omitting the on-off valve 65 provided inside the nozzle member 17 of the nozzle unit 51, the vertical motion actuator 77 and the rotary actuator 75 for vertically moving and rotating the on-off valve 65, and so forth.

[0052]

In this case, at the time of the termination of the ejection and supply of the filling from the nozzle member 17 onto the crust material 11, the filling inside the nozzle member 17 flows slightly backward because the pump 39 stops normal rotation and starts inverse rotation as appropriate at the same time as the start of the lifting up of the nozzle member 17. Accordingly, it is possible to suction the excessive filling which tends to be

ejected out of the ejection port 17A of the nozzle member 17. Note that at the time of the termination of the ejection and supply of the filling, the inverse rotation of the pump 39 as mentioned above can also be carried out in the case of the above-described configuration provided with the on-off
5 valve 65.

[0053]

As described above, by inversely rotating the pump 39 at the time of the termination of the ejection and supply of the filling and thereby suctioning the filling, it is possible to effectively prevent the excessive
10 filling from coming out of the ejection port 17A of the nozzle member 17.

[0054]

Meanwhile, in the above-described configuration, it is also possible to lift up the coupling blocks 79A and 79B in the nozzle member 17 to suction the filling inside the nozzle member 17 when the pump 39
15 stops the normal rotation to stop supply of the filling. In this case, the entire filling inside the nozzle member 17 is suctioned upward by the lifting up of the coupling blocks 79A and 79B and a negative pressure is generated on the lower surface side of the on-off valve 65. Hence it is possible to suction the filling in the vicinity of the ejection port 17A, and
20 thereby to effectively prevent the filling from coming out of the ejection port 17A.

[0055]

It is to be noted that the entire contents of Japanese Patent Application No. 2008-135732 (filed on May 23, 2008) are incorporated in
25 this specification by reference.

[0056]

The present invention is not limited only to the above-described embodiment of the invention and can be embodied in various other aspects by making appropriate modifications.

CLAIMS

1. A crusted food manufacturing apparatus for manufacturing crusted food in which a filling is crusted with a crust material, the apparatus comprising:

5 crust material transferring means for transferring the flat-shaped crust material onto a placing member so as to cover an opening of the placing member, the placing member provided on a front face side of a main body frame of the crusted food manufacturing apparatus;

 a dough pressing member configured to be able to press an outer
10 peripheral portion of the crust material placed on the placing member and to move vertically;

 a nozzle member configured to be able to eject the filling to a central part of the crust material on the placing member and to move vertically;

15 lift supporting means configured to be able to support from below the crust material falling from the opening of the placing member and to move vertically; and

 sealing means for gathering a peripheral portion of the crust material to the central part and sealing the peripheral portion after the
20 lifting up of the nozzle member and the dough pressing member, wherein

 the nozzle member and the dough pressing member are individually movable vertically and individually adjustable in vertical movement and position.

25 2. The crusted food manufacturing apparatus according to claim 1, wherein the main body frame includes a nozzle vertical movement

mechanism configured to vertically move the nozzle member,

the nozzle member is attachable to and detachable from a nozzle lifting member from a front side thereof, the nozzle lifting member vertically movably provided on the nozzle vertical movement mechanism,

5 the main body frame includes a pressing member vertical movement mechanism configured to vertically move the dough pressing member, and

the pressing member is attachable to and detachable from a pressing member lifting member from a front side thereof, the pressing member lifting member vertically movably provided on the pressing member vertical movement mechanism.

3. The crusted food manufacturing apparatus according to claim 1, wherein

15 the nozzle member is provided vertically movably inside an external cylinder attached to a front face of the main body frame in a manner integrally and immovably connectable to filling supplying means provided on the front face of the main body frame, and in a manner attachable to and detachable from the front face from a front side thereof,

the dough pressing member is vertically movably provided outside the external cylinder, and

20 the external cylinder, the nozzle member, and the dough pressing member collectively constitute a nozzle unit.

4. The crusted food manufacturing apparatus according to claim 1, wherein

25 the sealing means and the filling supplying means are attachable to and detachable from the main body frame from a front side thereof.