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(54) **AUTOMATIC ICE MACHINERY**

AUTOMATISCHE EISMASCHINE

APPAREIL A GLACE AUTOMATIQUE

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Description

Field of the Invention

[0001] The present invention relates to an ice making mechanism of an automatic ice making machine, and more particularly to an improvement of a separator mounted to an opening portion of a housing of the ice making mechanism for discharge of ice cubes.

Discussion of the Prior Art

[0002] As disclosed in Japanese Patent Laid-open Publication No 60-89659, an ice making mechanism in an automatic ice making machine of this kind is provided on an upper portion of a housing body 8, wherein ice making water spouted from a sprinkler 16 is received by ice making cups 4 cooled by a cooling pipe 5 and frozen in the ice making cups during operation of the ice making machine. When the freeze of the ice making water is completed, the ice making machine is stopped, and the cooling pipe 5 is supplied with hot gas to drop ice cubes formed in the ice making cups 4 on an inclined slope 13 thereby to discharge the ice cubes into an ice storage cabinet 10 through an opening formed on the front of the ice making mechanism. In the ice making machine, a partition plate 21 of elastic sheet is suspended at the front of the ice making mechanism to permit drop of the ice cubes from the slope into the ice storage cabinet and to block the ice making water spouted from the sprinkler and entering into the ice storage cabinet. Accordingly, the partition plate 21 is useful to eliminate melting of the ice cubes in the ice storage cabinet and shortage of the ice making water during operation of the ice making machine.

[0003] Disclosed in Japanese Patent Laid-open Publication No. 60-86876 is a separator in the form of a plurality of stripped curtains 4 suspended from a support shaft 4a. As the partition plate 21 is integrally formed in entirety, a small amount of ice cubes will remain on the slope 13 if the partition plate 21 may not be opened by the weight of the ice cubes. In such a condition, the ice cubes remained on the slope are melted by ice making water spouted from the sprinkler and consumed uselessly. As the striped curtains 4 are separately suspended from the support shaft, ice cubes drop into the ice storage cabinet without remained on the slope when one of the curtains is opened by an ice cube. In the ice making machine, it is required to remove the partition plate or the separator for inspection and maintenance of the ice making mechanism. In such an instance, however, it takes plenty of time and works for inspection and maintenance of the ice making mechanism due to difficulty for removal of the partition or the separator.

[0004] JP 60-111863 A discloses an open cell-type ice making machine, which is provided with a plurality of paddles mounted on a horizontal axle, a water tank, a splash guide and ice making cells, wherein the rotation of the paddles splashes the water in the water tank towards said ice making cells and the direction of the water is guided by the splash guide to ensure that the ice making cells are efficiently sprayed with water.

Summary of the Invention

[0005] To solve the problems discussed above, the object of the present invention is to provide an ice making machine wherein the separator is in the form of a plurality of split separation plates capable of being mounted and removed in a simple manner without any error and opened by a small amount of ice cubes.

[0006] According to the present invention, the object is attained by providing an automatic ice making machine comprising a box-type ice making housing having a front wall plate formed at its lower portion with an opening, a sprinkler mounted within a lower portion of the ice making housing to spout ice making water upward, an ice making chamber formed in an upper portion of the ice making housing and provided therein with a plurality of ice making cell casings opened downward to be supplied with the ice making water spouted upward from the sprinkler and cooled by a cooling pipe mounted on the ice making chamber, an ice chute mounted within the ice making housing in a condition inclined to receive ice cubes dropping from the cell casings and to slide the ice cubes forward and discharge them through the opening of the ice making housing, and a separator suspended from the ice making housing to close the opening of the ice making housing, characterized in that the separator is composed of a plurality of split separation plates detachably engaged at their upper ends with the ice making housing.

Brief description of the drawings:

[0007]

Fig. 1 is a partly broken front view of an ice making mechanism of an automatic ice making machine in accordance with the present invention;
Fig. 2 is a vertical sectional view of the ice making mechanism in a condition where a right-hand sidewall panel was removed;
Fig. 3 is an enlarged front view of a separator shown in Fig. 1;
Fig. 4 is a sectional view taken along line 4-4 in Fig. 3;
Fig. 5 is a sectional view taken along line 5-5 in Fig. 3;
Fig. 6 is a left side view of the ice making mechanism shown in Fig. 1;
Fig. 7 is a vertical sectional view of the entirety of the ice making machine;
Fig. 8 is a sectional view illustrating an assembly process of the separator shown in Fig. 1;
Fig. 9 is a sectional view illustrating the separator retained in an open position;
Fig. 10 is a sectional view illustrating a condition where the separator is suspended in such a manner

that a lateral slit of the separator is faced inward; and Fig. 11 is a sectional view illustrating a condition where the separator was erroneously mounted to a lateral support rod.

Preferred embodiment:

[0008] Hereinafter, an embodiment of the present invention will be described with reference to Figs. 1-9. As illustrated in Fig. 7, an automatic ice making machine in this embodiment includes an ice making mechanism A provided within an upper portion of the interior of a housing assembly 70. The housing assembly 70 has a machine chamber 71 and an ice storage cabinet 72 mounted on the machine chamber 71. The machine chamber 71 is constructed with a front panel 71a, a rear panel 71b, a pair of side panels 71c and a bottom plate 71d. The ice storage cabinet 72 is constructed with a peripheral wall of heat insulation material opened at its upper portion and at its front upper half portion, a top panel 73 formed to cover the upper portion of the peripheral wall, a front lower panel 74 formed to cover the front surface of machine chamber 71 and a front lower portion of the peripheral wall, and a front upper panel 75 formed to cover a front upper portion of the peripheral wall. A door 76 of heat insulation material is hinged at its lower end to an upper end of the front lower panel 74 to open and close an opening formed between the front lower panel 74 and front upper panel 75. The door 76 is provided at its upper end with a grip 76b and at its inner peripheral surface with a packing 76c. The machine chamber 71 is formed to contain a freezing mechanism composed of a compressor, a condenser and a cooling fan for supply of cooled refrigerant to the ice making mechanism A. The ice storage cabinet 72 is formed at its bottom portion with a drain hole 72a for connection to a drain hose (not shown) extended to the exterior through the machine chamber 71.

[0009] As shown in Figs. 1, 2, 6 and 7, the ice making mechanism A has an ice making housing B formed between a pair of laterally spaced vertical side wall panels 10L and 10R bolted to the top panel 73 of ice storage cabinet 72. As shown in Figs. 1 and 7, a pair of horizontal channel portions 10a integrally formed with lower end portions of side wall panels 10L and 10R are extended rearward and carried by a support bracket 77 fixed to an internal surface of the rear wall of ice storage cabinet 72. As clearly seen in Fig. 7, an accumulator 78 and a water supply conduit (not shown) are provided in a space between a rear surface of the ice making mechanism A and the rear wall of ice storage cabinet 72.

[0010] As shown in Figs. 1 and 2, the ice making mechanism A includes an ice making water tank 30 and a sprinkler nozzle 40 assembled with a bottom portion of the ice making housing B, an ice making chamber 50 provided within an upper portion of the ice making housing B, and an ice chute 60 mounted within an intermediate portion of the ice making housing B. As shown in Fig. 2, the ice making housing B is in the form of a box-type housing formed with front and rear wall plates 17 and 20 assembled with the vertical side wall panels 10L and 10R. At the front of ice making housing B, a rectangular opening Ba is formed under the front wall plate 17 to be closed by a separator 25 as described later.

[0011] As show in Figs. 1 and 2, the vertical side wall panels 10L and 10R are formed at their upper ends with outward horizontal flange portions for attachment to the top panel 73 of ice storage cabinet 72 and at their outer surface with a plurality of spaced reinforcement ribs 14a, 14b and 14c. The horizontal channel portions 10a formed on the lower end portions of side wall panels 10L, 10R each are formed with vertically spaced horizontal flanges 13a and 13b which are extended rearward to form a horizontal groove 11 for support of the water tank 30. The upper flange 13b has an upper surface inclined upward at its rear portion to form a channel groove 12 with each inward flange 13c. As clearly shown in Fig. 2, the vertical side wall panels 10L, 10R each are integrally formed at their internal surfaces with front and rear cylindrical projections 14e located above the inward flange 13c. The front cylindrical projection 14e is located lower than the rear cylindrical projection 14e. As clearly shown in Fig. 1, the left-hand vertical side wall panel 10L has an extended portion 16 for attachment of a drain pan 37 and a sprinkler pump 45. As shown in Fig. 6, a through hole 15 is formed in the left-hand vertical side wall panel 10L at a portion between the reinforcement ribs 14a, and a water supply hose 47 is extended into the interior of ice making housing B through the through hole 15 for supply of ice making water into the sprinkler 40.

[0012] The front wall plate 17 is in the form of a rectangular plate of synthetic resin which is reinforced by lateral ribs 17a and 17b and is integrally formed with a lateral support rod 18 as clearly shown in Fig. 2. As shown in Figs. 3 and 4, the front wall plate 17 is formed at its lower end with a plurality of laterally spaced recesses 19 which correspond with separation plates 25a of the separator 25. These recesses 19 each are formed to contain each hook portion 25b of separation plates 25a and formed with a notch 19a for engagement with each semi-circular projection 26 formed on the hook portion 25b.

[0013] As shown in Fig. 2, a rectangular opening Ba is formed under the front wall plate 17 at the front of ice making housing B and is closed by the separator 25. As shown in Figs. 3 and 4, the separation plates 25a of separator 25 each are in the form of a rectangular plate integrally formed at its upper end with the hook portion 25b. The hook portion 25b is formed smaller in width than the separation plate 25a and slightly smaller than the recess 19 and is formed with a cylindrical internal surface for engagement with the lateral support rod 18. The hook portion 25b is formed at its bottom with a lateral slit 25c smaller than the diameter of lateral support rod 18. A semi-circular projection 26 is formed on the hook portion 25b at a position laterally displaced from the center of separation plate 25a.

[0014] In an assembly process of the separator 25, as shown in Fig. 8, the separation 25a is inserted into the interior of ice making housing B from the exterior and brought into engagement with the lateral support rod 18 at its hook portion 25b. In such a condition, the separation plate 25a is pulled in a direction shown by an arrow P so that the hook portion 25b is resiliently expanded at its lateral slit 25c and coupled within the recess 19 and that the semi-circular projection 26 of hook portion 25b is engaged with the notch 19a formed in the recess 19. Thus, as shown in Fig. 4, each separation plate 25a is suspended from the lateral support rod 18 to close the front opening Ba of ice making housing B. When it is desired to remove the separation plate 25a from the lateral support rod 18, the separation plate 25a is placed in a horizontal position and pushed backward. Thus, the separation plate 25a can be removed from the front wall plate 17.

[0015] The rear wall plate 20 is in the form of a rectangular plate of synthetic resin formed to close the backside of the ice making housing B. As shown in Fig. 2, the rear wall plate 20 is formed at its upper end with a lateral reinforcement rib 20a and at its lower end with a brim portion 21 located above the rear end portion of water tank 30. The brim portion 21 of rear wall plate 20 is formed with a recess (not shown) for inserting therethrough the water supply hose. In an assembly process of the ice making housing B, lateral support rods 24 are coupled at their opposite ends with the cylindrical projections 14e of side wall panels 10L, 10R. Thereafter, the front and rear wall plates 17 and 20 are inserted into corresponding vertical grooves formed in the front and rear end portions of side wall panels 10L, 10R and positioned in place.

[0016] As shown in Figs. 1 and 2, the water tank 30 is assembled with the bottom of the ice making housing B. The water tank 30 is formed with a pair of shallow portions 30a which are inserted from the front into the horizontal grooves 11 formed between the horizontal flanges 13a and 13b of respective side wall panels 10L, 10R and detachably supported in place. The water tank 30 has a deep portion located at the left side of ice making housing B. The deep portion of water tank 30 is formed with a water supply port 33 extended leftward, and the shallow portion of water tank 30 is formed at its bottom with an overflow port 34. The water tank 30 is formed at its front portion with an upright wall 30b and upright side walls 30c of the same height as the front upright wall 30b. (see Fig. 6)

[0017] As shown in Figs. 1, 2 and 6, the drain pan 37 is assembled under the extended portion 16 of left-hand side wall panel 10L and placed at the left side of the water supply port 33 of water tank 30. The drain pan 37 is attached to the bottom of the extended portion 16 of left-hand side wall panel 10L and fixed to a downward projection 16a formed on the bottom of extended portion 16. The drain pan 37 is formed at its bottom with a drain port 38 in connection to a drain pipe 39 extended to the drain port 72a formed in the bottom of ice storage cabinet 72.

[0018] As shown in Figs. 1 and 6, the sprinkler pump 45 is assembled with the bottom of the extended portion 16 of left-hand side wall panel 10L and placed at an inside of drain pan 37. A housing 45a of sprinkler pump 45 is formed with an inlet port 45b which is extended forward across the drain tank 37 and connected to a suction pipe 46.The suction pipe 46 is detachably connected to the water supply port 33 of water tank 30 by means of a pipe joint 46a. The water supply hose 47 connected at one end thereof to a discharge port 45c of the pump housing 45a is extended into the interior of ice making housing B thorugh the through hole 15 of left-hand side wall panel 10L and connected at the other end thereof to the sprinkler 40. The overflow port 34 of water tank 30 is located above a vertical partition passage 37a formed in the drain pan 37.

[0019] The sprinkler 40 is composed of a set of parallel flattened conduits communicated with each other by means of side conduits and provided thereon with spout nozzles 43. The sprinkle 40 is at one side thereof with two openings used for washing the parallel flattened conduits. The two openings of sprinkler 40 each are closed by a cap 42 of silicon rubber in a liquid-tight manner. In an assembly process, the opposite ends of sprinkler 40 are inserted into the support grooves 12 formed between the horizontal flanges 13b and 13c of respective side wall panels 10L, 10R, and the water supply hose 47 is connected to an inlet port formed on a central portion of sprinkler 40.

[0020] As shown in Fig. 2, an ice making chamber 50 is formed above an ice making base plate 51 supported at its opposite ends on upper portions of the side wall panels 10L, 10R. A plurality of ice making cell casings 52 are secured to the bottom surface of base plate 51 at positions aligned with the spout nozzles 43 of sprinkler 40. The ice making cell casings 52 are opened downward to be supplied with fresh water from the spout nozzles 43. The ice making base plate 51 and cell casings 52 are made of metal such as copper or aluminum superior in heat-conductivity. A cooling pipe 53 is meanderingly secured to the upper surface of ice making base plate 51 and placed at positions passing each center of the ice making cell casings 52. The cooling pipe 53 is supplied with refrigerant from the freezing mechanism (not shown) installed in the machine chamber 71 for cooling the ice making cell casings 52.

[0021] As shown in Figs. 1 and 2, the ice chute 60 is composed of a plurality of spaced slide members 61 arranged in the fore-and-aft direction of the ice making housing B and connected by means of spaced lateral members 62a, 62b and 62c in the form of a lattice. The ice chute 60 has a pair of spaced parallel support legs 63 provided at its front and rear portions for engagement with the tubular support rods 24. The support legs 63 of ice chute 60 each are formed with a pair of resilient leg segments spaced in width slightly smaller than the outer diameter of tubular support rod 24. The component parts of ice chute 60 are integrally made of synthetic resin in entirety. In an assembly process of the ice chute 60, the

support legs 63 of ice chute 60 are resiliently engaged with the tubular support rods 24 in such a manner that the ice chute 60 is inclined forward in the ice making housing B. In the ice chute 60, each space among the slide plates 61 is aligned with each spout nozzle 43 of sprinkler 40 to permit the fresh water supplied into each ice making cell casing 52 from the spout nozzles 43 of sprinkler 40.

[0022] In operation of the ice making machine, the ice making cell casings 52 are cooled by refrigerant supplied into the cooling pipe 53 from the freezing circuit in the freezing mechanism, and the ice making water is sucked from the water tank 30 by operation of the sprinkler pump45 and supplied into the sprinkler 40 through the water supply hose 47.

[0023] The ice making water is spouted upward from each nozzle 43 of sprinkler 40 through openings of the latticed ice chute 60 and brought into contact with the internal surface of each cell casing 52 cooled by the refrigerant. Thus, the ice making water is partly frozen in each cell casing 62, and a remainder of the water is returned into the water storage tank 30 and supplied again into the sprinkler 40. The ice cubes formed in the cell casings 52 are enlarged in the course of lapse of a time. When hot-gas is supplied into the cooling pipe 53 in a condition where the cell casings 52 have been filled with the ice cubes, the ice making chamber 50 is warmed by the hot-gas to release the ice cubes C from cell casings 52, and the ice cubes are received by the inclined ice chute 60 and slip downward on the ice chute 60 to open the separation plates 25a in a suspended condition. Thus, the ice cubes are delivered into the ice storage bin.

[0024] Subsequently, the water tank 30 is supplied with an amount of ice making water from a water supply hose (not shown), and the ice making chamber 50 is cooled by operation of the freezing mechanism. When the level of ice making water in tank 30 becomes higher than the overflow hole 34 during supply of the ice making water, an excessive amount of ice making water is discharged from the overflow hole 34 into the drain pan 37 and drained to the exterior through the drain pipe 39. During operation of the ice making machine, the opening Ba of ice making housing B is closed by the separator 25 in a suspended condition to prevent the ice cubes from splashing in the ice making housing B. Accordingly, the ice cubes C are stored in the ice storage bin 72 without melting and adherence caused by refreeze, and the ice making water is supplied without any shortage during operation of the ice making machine.

[0025] In this embodiment, each of the split separation plates 25a detachably engaged at its upper hook portion with the lateral support rod 18 can be removed from and mounted to the ice making housing B in a simple manner. Thus, the sprinkler 40 and ice chute 60 assembled in the ice making housing B can be inspected and maintained in a clean condition without removing all the separation plates 25a in such a manner as described below.

[0026] When one of the separation plates 25 is removed, the other separation plates can be displaced toward the removed separation plate in a lateral direction in a condition where the other shutter plates have been raised in such a manner that the semi-circular projections 26 each are disengaged from the notch 19a and that the lateral slits 25c of hook portions 25b are faced to the lower end of front wall plate 17 between the laterally spaced recesses 19. When displaced toward the removed separation plate, the separation plates 25a are retained in the raised position by engagement with the lower end of front panel 17 at the distal ends of their hook portions 25b to widely open the rectangular opening Ba of ice making housing B. Thus, the sprinkler 40, ice chute 60 and the interior of the ice making mechanism A can be inspected without removing the other separation plates 25a.

[0027] In this embodiment, the separation plates 25a are divided into six pieces to correspond with each raw of the cell casings 52 mounted to the ice making base plate 51 and suspended by engagement with the lateral support rod 18 at their hook portions 25b. Accordingly, each separation plate 25a is smoothly opened to permit drop of the ice cubes from the ice chute 60 and to eliminate the ice cubes remained on the ice chute 60 and melted by the ice making water spouted from the sprinkler 40.

[0028] As the lateral slit 25b of each hook portion 25b of the separation plates 25a is formed smaller in width than the diameter of lateral support rod 18, the hook portion 25b of separation plate 25a is engaged at its internal surface with the outer periphery of lateral support rod 28 for rotary movement when it is resiliently deformed and opened at its lateral slit 25c. Thus, the separation plates 25a are retained in position on the lateral support rod 18 in a suspended condition.

[0029] In case the separation plates 25a are mounted to the front wall plate 17 without provision of the laterally spaced recesses 19 for engagement with the semi-circular projections 26, a hook-portion 1a of a separation plate 1 is mounted to the lateral support rod 28 in a reverse direction as shown in Figs. 10 and 11 in a condition where a lateral slit 1b of hook portion 1a is faced to the inside of ice making housing B. In such a case, an impact force applied to the separation plate 1 from an ice cube C sliding down on the slide member 61 in an arrow direction E 1 acts to open the separation plate 1 in an arrow direction E2 and causes an impact force F3 acting on the hook portion 1a. The impact force F3 acts to disengage the hook portion 1a of separation plate 1 from the lateral support rod 18. If the separation plate 1a is removed from the lateral support rod 18 by abutment with an ice cube C sliding down on the chute 61, there is a possibility of the separation plate 1 being erroneously mounted as shown in Fig. 11. In such instance, the ice cube C sliding down on the slide member 61 does not drop into the ice storage cabinet 72 from the opening Ba of ice making housing B. It is, therefore, required to remove the separation plate 1 for replacement.

[0030] To avoid such problems as described above, the separation plates 25a in this embodiment are suspended from the lateral support rod 18 in such a manner that the lateral slit 25c of hook portion 25b is faced toward the exterior of ice making housing B as shown in Fig. 4. In such a condition, the impact force F 1 applied from ice cubes C sliding down on the slide member 61 in the arrow direction E1 acts to open the separation plate 25a in the arrow direction and acts as an impact force to thrust the hook portion 25b of separation plate 25a toward the lateral support rod 18 at the opposite side of its lateral slit 25c. Thus, the separation plate 25a is opened by the ice cubes without any possibility of being disengaged from the lateral support rod 18.

[0031] In the embodiment described above, the flat portions of separator plates 25a are spaced at their side edges 27 in narrow width as shown in Figs. 3 and 5. In such arrangement, there is a possibility of the separation plates 25a being adhered to each other due to ice making water trapped by surface tension between the side edges 27 thereof. If the separation plates 25 were adhered to each other, a small amount of ice cubes would be remained due to heavy movement of the separator 25.

[0032] To avoid such a problem as described above, it is preferable that the flat portions of separation plates 25a are formed at the side edges 27 thereof with vertically spaced projections 29a (two projections in the figure) and recesses 28a, 28b, 28c in predetermined width M as shown by two-dots and dash lines in Fig. 3. Alternatively, the side edges 27 of flat portions 25a may be chamfered at least at one side of the separation plates 25a as shown by two-dots and dash lines 27a in Fig. 5.

[0033] In the case that the vertically spaced projections 29a, 29b are formed on the side edges 27 of flat portions 25a, an amount of ice making water trapped by surface tension between the side edges 27 decreases at the vertically spaced projections 29a, 29b. As a result, an adhesive force of adjacent separation plates 25a caused by the trapped ice making water decreases to avoid heavy movement of the separator 25. Accordingly, each separation plate 25a is opened by an ice cube without remaining any ice cubes on the slide member 60. In a practical embodiment, it is desirable that the length N1, N2 of vertically spaced projections 29a, 29b and the length L1, L2, L3 and width M of vertical recesses 28a, 28b, 28c are determined taking into account the adhesive force of adjacent separation plates 25 caused by the trapped ice making water and an increase of leakage of the ice making water passing through the vertical recesses 28a, 28b, 28c.

[0034] In the case that the side edges 27 of flat portions 25a are chamfered at least at one side of the respective separation plates 25a, an amount of ice making water trapped by surface tension between the side edges 27 decreases at the chamfered portions. As a result, an adhesive force of adjacent separation plates 25a caused by the trapped ice making water decreases to avoid heavy movement of the separator plates 25. Accordingly, each separation plate 25a is opened by an ice cube without remaining any ice cubes on the slide member 60.

[0035] According to the present invention, the plurality of split separation plates detachably engaged at their upper ends with the ice making housing can be removed from and mounted to the ice making housing in a simple manner. Thus, the sprinkler and ice chute in the ice making housing can be inspected and maintained in a clean condition in a simple manner.

[0036] In the case that the front wall plate of the ice making housing is integrally provided at its lower end with the lateral support rod and is formed with laterally spaced recesses and that the plurality of separation plates are suspended from the lateral support rod at their hook portions, each separation plate can be provided in light weight to be smoothly opened by a small amount of ice cubes without causing any ice cubes remained on the ice chute.

[0037] As the hook portions of the separation plates are resiliently deformed and engaged with the lateral support rod for rotary movement, the separation plates are retained in place in a suspended condition to be moved in a reliable manner. As the separation plates are suspended from the lateral support rod in such a manner that each lateral slit of the hook portions are faced toward the exterior of the ice making housing, an impact force applied from ice cubes sliding down on the ice chute acts to thrust each hook portion of the separation plates toward the lateral support rod at the opposite side of its lateral slit. Thus, the separation plates are opened by the ice cubes without any possibility being disengaged from the lateral support rod.

[0038] In the case that the semi-circular projection is formed on the hook portion at a position displaced laterally from the center of the same and that the notch is formed in the recess for insertion of the hook portion at a position corresponding with the semi-circular projection, the separation plates may not be suspended from the lateral support rod in such a manner that the hook portion is erroneously faced toward the support rod in a reverse direction.

[0039] In the case that at least one projection is formed on each side edge of the flat portions of the separation plates placed adjacent to each other, an amount of ice making water trapped by surface tension between the side edges decreases at each projection of the flat portions. As a result, an adhesive force caused by the trapped ice making water decreases to avoid heavy movement of the separation plates 25a. Accordingly, each separation plate 25a is opened by an ice cube without causing any ice cubes remained on the ice chute.

[0040] In the case that each side edge of the flat portions of the separation plates placed adjacent to each other is chamfered, an amount of ice making water trapped by surface tension between the side edges decreases at the chamfered portions. As a result, an adhesive force caused by the trapped ice making water decreases to avoid heavy movement of the separation

plates 25a. Accordingly, each separation plate 25 is opened by an ice cube without any ice cubes remained on the ice chute.

Claims

1. An automatic ice making machine comprising a box-type ice making housing (B) having a front wall plate (17) formed at its lower portion with an opening (Ba) a sprinkler (40) mounted within a lower portion of the ice making housing (B) to spout ice making water upward, an ice making chamber (50) formed in an upper portion of the ice making housing (B) and provided therein with a plurality of ice making cell casings (52) opened downward to be supplied with the ice making water spouted upward from the sprinkler (40) and cooled by a cooling pipe (53) mounted on the ice making chamber (50), an ice chute (60) mounted within the ice making housing (B) in a condition inclined to receive ice cubes dropping from the cell casings (52) and to slide the ice cubes forward and discharge them through the opening (Ba) of the ice making housing (B), and a separator (25) suspended from the ice making housing (B) to close the opening (Ba) of the ice making housing (B), **characterized in that**
the separator (25) is composed of a plurality of split separation plates (25a) detachably engaged at their upper ends with the ice making housing (B).

2. The automatic ice making machine as claimed in claim 1, wherein a lateral support rod (18) is integrally provided on a lower end of said front wall plate (17), and wherein each of the separation plates (25a) has a flat portion (25a) and a hook portion (25b) integrally provided on an upper end of the flat portion (25a) and formed with an internal surface for rotary engagement with the lateral support rod (18), the separation plates (25a) being suspended from the lateral support rod (18) in such a manner that the hook portion (25) is engaged with the lateral support rod (18).

3. The automatic ice making machine as claimed in claim 2, wherein each hook portion (25b) of the separation plates (25a) is formed with a lateral slit (25c) smaller in width than the outer diameter of the lateral support rod (18), and wherein the separation plates (25a) are suspended from the lateral support rod (18) in such a manner that the hook portion (25b) is resiliently deformed and engaged with the lateral support rod (18).

4. The automatic ice making machine as claimed in claim 3, wherein the separation plates (25a) are suspended from the lateral support rod (18) in such a manner that the lateral slit (25c) of the hook portion (25b) is faced toward the exterior of the ice making housing (B).

5. The automatic ice making machine as claimed in claim 4, wherein the front wall plate (17) is formed at the lower end thereof with a plurality of laterally spaced recesses (19) to be engaged with the hook portions (25b) of the separation plates (25a), wherein the hook portions (25b) of the separation plates (25a) each are formed with a semi-circular projection (26) at a position laterally displaced from each center of the separation plates (25a), and wherein the recesses of the front wall plate (17) each are formed with a notch (19a) to be engaged with each semi-circular projection (26) of the hook portions (25b).

6. The automatic ice making machine as claimed in any one of claims 2 to 5, wherein at least one projection (29a, 29b) is formed on each side edge (27) of flat portions (25a) of the separation plates (25a) placed adjacent to each other.

7. The automatic ice making machine as claimed in any one of claims 2 to 6, wherein each side edge (27) of the flat portions (25a) of the separation plates (25a) placed adjacent to each other is chamfered.

Patentansprüche

1. Automatische Eisherstellungsmaschine, die ein Eisherstellungsgehäuse des kastenartigen Typs (B), das eine Vorderwandplatte (17) aufweist, die an ihrem unteren Abschnitt mit einer Öffnung (Ba) ausgebildet ist, eine Berieselungseinrichtung (40), die innerhalb eines unteren Abschnitts des Eisherstellungsgehäuses (B) montiert ist, so dass sie Eisherstellungswasser nach oben ausstößt, eine Eisherstellungskammer (50), die in einem oberen Abschnitt des Eisherstellungsgehäuses (B) ausgebildet ist und mit einer Mehrzahl von Eisherstellungszellengehäusen (52) ausgestattet ist, die nach unten geöffnet sind, so dass ihnen Eisherstellungswasser zugeführt wird, das von der Berieselungseinrichtung (40) nach oben ausgestoßen wird, und die durch ein Kühlrohr (53) gekühlt werden, das an der Eisherstellungskammer (50) montiert ist, eine Eisrutsche (60), die innerhalb des Eisherstellungsgehäuses (B) in einem geneigten Zustand montiert ist, so dass sie Eiswürfel aufnimmt, die von den Zellengehäusen (52) herabfallen, und die Eiswürfel vorwärts gleiten lässt und diese durch die Öffnung (Ba) des Eisherstellungsgehäuses (B) austrägt, und eine Trenneinrichtung (25), die an dem Eisherstellungsgehäuse (B) so aufgehängt ist, dass sie die Öffnung (Ba) des Eisherstellungsgehäuses (B) schließt, umfasst, **dadurch gekennzeichnet, dass**
die Trenneinrichtung (25) aus einer Mehrzahl von geteilten Trennplatten (25a) zusammengesetzt ist,

die an ihren oberen Enden mit dem Eisherstellungsgehäuse (B) in Eingriff sind.

2. Automatische Eisherstellungsmaschine nach Anspruch 1, bei der ein lateraler Haltestab (18) integriert an einem unteren Ende der Vorderwandplatte (17) bereitgestellt ist, und bei der jede der Trennplatten (25a) einen flachen Abschnitt (25a) und einen Hakenabschnitt (25b) aufweist, der integriert an einem oberen Ende des flachen Abschnitts (25a) bereitgestellt und mit einer Innenfläche zum drehenden Ineingriffnehmen des lateralen Haltestabs (18) ausgebildet ist, wobei die Trennplatten (25a) an dem lateralen Haltestab (18) derart aufgehängt sind, dass der Hakenabschnitt (25) mit dem lateralen Haltestab (18) in Eingriff ist.

3. Automatische Eisherstellungsmaschine nach Anspruch 2, bei der jeder Hakenabschnitt (25b) der Trennplatten (25a) mit einem lateralen Schlitz (25c) ausgebildet ist, der eine kleinere Breite als der Außendurchmesser des lateralen Haltestabs (18) aufweist, und bei der die Trennplatten (25a) derart an dem lateralen Haltestab (18) aufgehängt sind, dass der Hakenabschnitt (25b) elastisch verformt und mit dem lateralen Haltestab (18) in Eingriff gebracht wird.

4. Automatische Eisherstellungsmaschine nach Anspruch 3, bei der die Trennplatten (25a) derart an dem lateralen Haltestab (18) aufgehängt sind, dass der laterale Schlitz (25c) des Hakenabschnitts (25b) auf das Äußere des Eisherstellungsgehäuses (B) gerichtet ist.

5. Automatische Eisherstellungsmaschine nach Anspruch 4, bei der die Vorderwandplatte (17) an deren unterem Ende mit einer Mehrzahl von lateral beabstandeten Ausnehmungen (19) ausgebildet ist, die mit den Hakenabschnitten (25b) der Trennplatten (25a) in Eingriff kommen sollen, wobei die Hakenabschnitte (25b) der Trennplatten (25a) jeweils mit einer halbkreisförmigen Vorwölbung (26) an einer Position ausgebildet sind, die von jeder Mitte der Trennplatten (25a) lateral versetzt ist, und wobei die Ausnehmungen der Vorderwandplatte (17) jeweils mit einer Kerbe (19a) ausgebildet sind, die mit jeder halbkreisförmigen Vorwölbung (26) der Hakenabschnitte (25b) in Eingriff kommen soll.

6. Automatische Eisherstellungsmaschine nach einem der Ansprüche 2 bis 5, bei der mindestens eine Vorwölbung (29a, 29b) an jeder Seitenkante (27) von flachen Abschnitten (25a) der Trennplatten (25a), die aneinander angrenzend angeordnet sind, ausgebildet ist.

7. Automatische Eisherstellungsmaschine nach einem der Ansprüche 2 bis 6, bei der jede Seitenkante (27) der flachen Abschnitte (25a) der Trennplatten (25a), die aneinander angrenzend angeordnet sind, abgeschrägt ist.

Revendications

1. Machine automatique de fabrication de glace, comprenant un logement (B) de fabrication de glace du type boîte ayant une plaque (17) de paroi avant munie à sa partie inférieure d'une ouverture (Ba), un aspersoir (40) monté dans une partie inférieure du logement (B) de fabrication de glace pour faire jaillir vers le haut de l'eau pour fabriquer de la glace et une chambre (50) de fabrication de glace formée dans une partie supérieure du logement (B) de fabrication de glace et munie à l'intérieur d'une pluralité de casiers (52) de cellules de fabrication de glace ouverts vers le bas en vue d'être alimentés en l'eau de fabrication de glace jaillissant vers le haut de l'aspersoir (40) et refroidie par un conduit (53) de refroidissement monté sur la chambre (50) de fabrication de glace, une goulotte (60) pour de la glace montée dans le logement (B) de fabrication de glace à l'état incliné pour recevoir des cubes de glace tombant des casiers (52) de cellules et pour faire glisser les cubes de glace vers l'avant et les décharger par l'ouverture (Ba) du logement (B) de fabrication de glace, et un séparateur (25) suspendu du logement (B) de fabrication de glace pour fermer l'ouverture (Ba) du logement (B) de fabrication de glace, **caractérisée en ce que**
le séparateur (25) est composé d'une pluralité de plaques (25a) de séparation fendues, coopérant de manière détachable à leurs extrémités supérieures avec le logement (B) de fabrication de glace.

2. Machine automatique de fabrication de glace suivant la revendication 1, dans laquelle une tige (18) latérale de support est prévue d'un seul tenant sur une extrémité inférieure de la plaque (17) de paroi avant, et dans laquelle chacune des plaques (25a) de séparation a une partie (25a) plane et une partie (25b) en crochet prévues d'un seul tenant sur une extrémité supérieure de la partie (25a) plane et formée en ayant une surface inférieure destinée à coopérer en rotation avec la tige (18) latérale de support, les plaques (25a) de séparation étant suspendues à partir de la tige (18) latérale de support, de façon à ce que la partie (25) en crochet coopère avec la tige (18) latérale de support.

3. Machine automatique de fabrication de glace suivant la revendication 2, dans laquelle chaque partie (25b) en crochet des plaques (25a) de séparation est conformée en ayant une fente (25c) latérale de largeur plus petite que le diamètre extérieur de la tige (18)

latérale de support, et dans laquelle les plaques (25a) de séparation sont suspendues à partir de la tige (18) latérale de support, de façon à ce que la partie (25b) en crochet soit déformée élastiquement et coopère avec la tige (18) latérale de support.

4. Machine automatique de fabrication de glace suivant la revendication 3, dans laquelle les plaques (25a) de séparation sont suspendues à partir de la tige (18) latérale de support, de façon à ce que la fente (25c) latérale de la partie (25b) en crochet fasse face à l'extérieur du logement (B) de fabrication de glace.

5. Machine automatique de fabrication de glace suivant la revendication 4, dans laquelle la plaque (17) de paroi avant est conformée à son extrémité inférieure en ayant une pluralité de chambrages (19) espacés latéralement, destinés à coopérer avec les parties (25b) en crochet des plaques (25a) de séparation, les parties (25b) en crochets des plaques (25a) de séparation étant formées chacune en ayant une saillie (26a) hémicirculaire en une position décalée latéralement de chaque centre des plaques (25a) de séparation, et dans laquelle les chambrages de la plaque (17) de paroi avant sont conformés chacun en ayant une encoche (19a) destinée à coopérer avec chaque saillie (26) hémicirculaire des parties (25b) en crochet.

6. Machine automatique de fabrication de glace suivant l'une quelconque des revendications 2 à 5, dans laquelle au moins une saillie (29a, 29b) est formée sur chaque bord (27) latéral de parties (25a) planes des plaques (25a) de séparation disposées au voisinage l'une de l'autre.

7. Machine automatique de fabrication de glace suivant l'une quelconque des revendications 2 à 6, dans laquelle chaque bord (27) latéral des parties (25a) planes des plaques (25a) de séparation voisines l'une de l'autre est chanfreiné.

Fig. 1

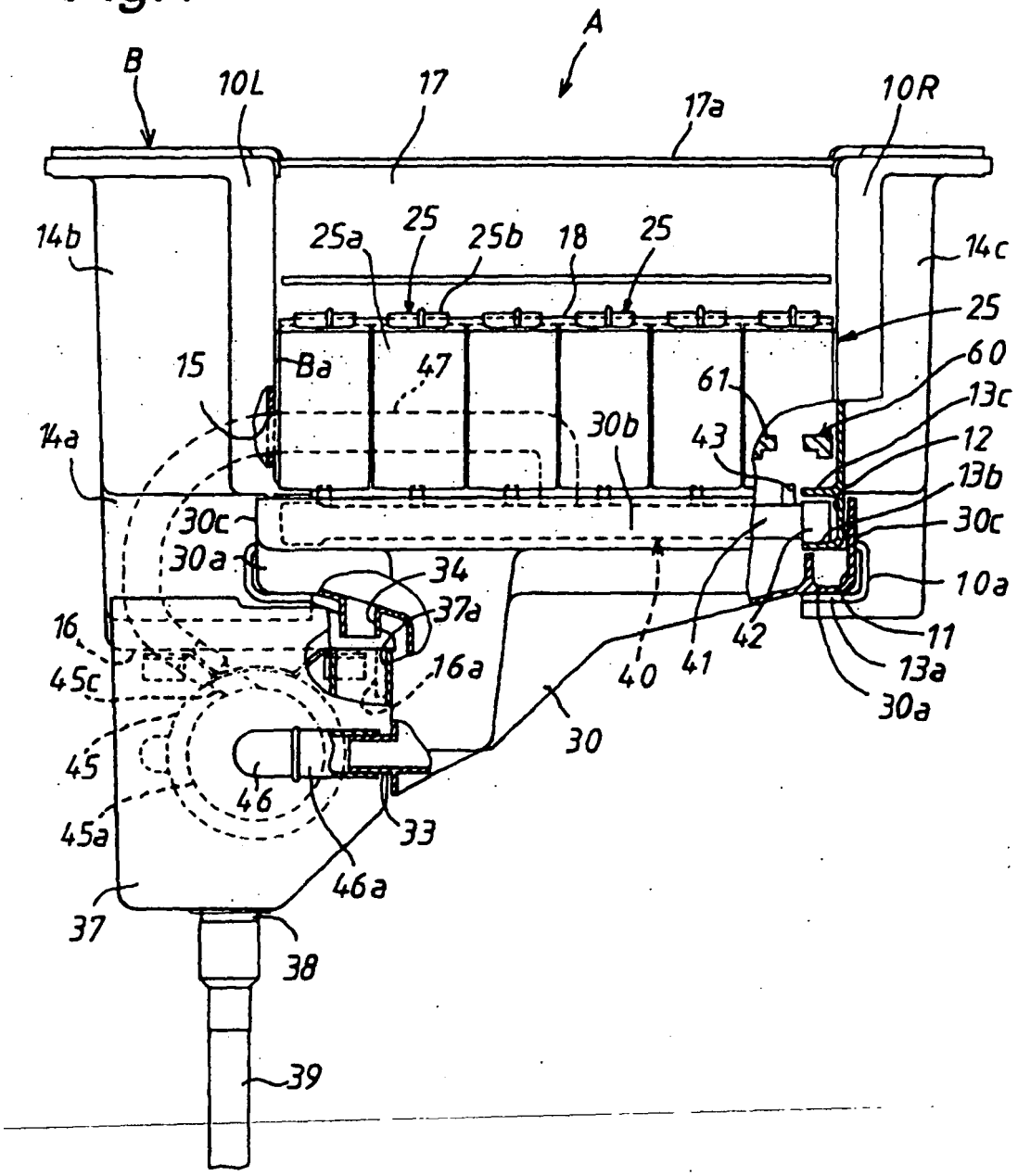

A
B
10L
17
17a
10R
14b
25a
25
25b
18
25
14c
25
60
13c
12
13b
30c
10a
11
13a
30a
15
8a
47
61
43
30b
14a
30c
30a
34
37a
16
16a
45c
45
45a
46
33
46a
37
38
39
40
41
42
30

Fig.2

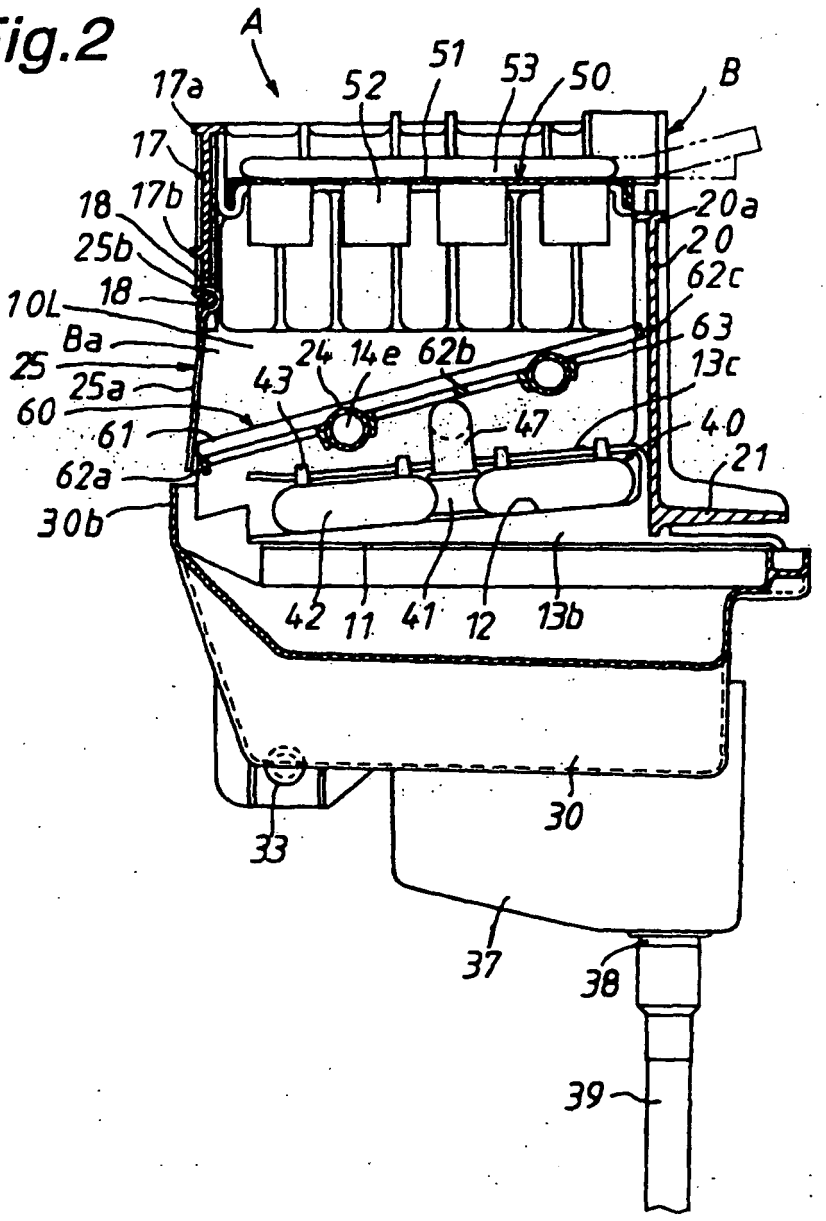

A
B
17a
17
17b
18
25b
18
10L
8a
25
25a
60
61
62a
30b
52
51
53
50
20a
20
62c
63
13c
40
21
24
14e
62b
43
47
42
11
41
12
13b
30
33
37
38
39

Fig.3

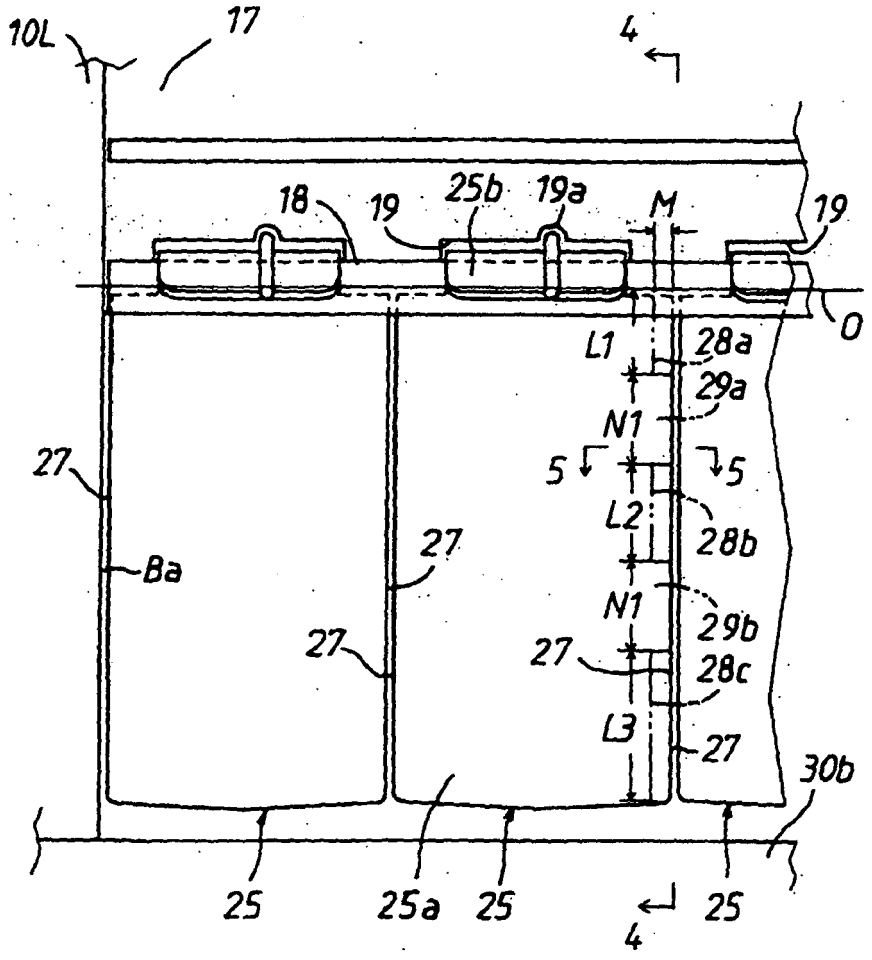

10L
17
4
18
19
25b
19a
M
19
O
L1
28a
29a
N1
5
5
27
Ba
27
L2
28b
N1
29b
27
27
28c
L3
27
30b
25
25a
25
4
25

Fig.4

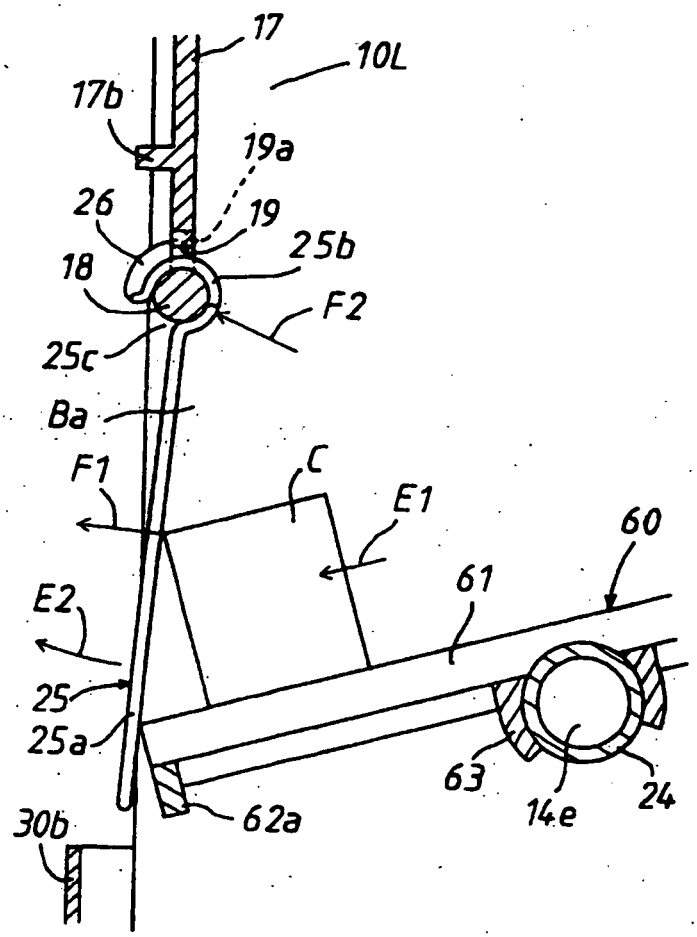

17
10L
17b
19a
26
19
25b
18
F2
25c
Ba
F1
C
E1
60
61
E2
25
25a
63
14e
24
62a
30b

Fig.5

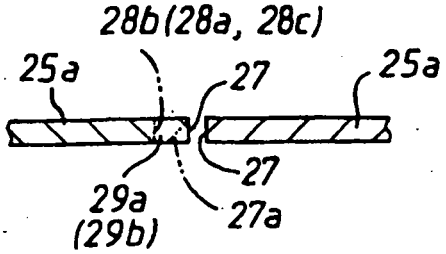

28b(28a, 28c)
25a
27
25a
27
29a
(29b)
27a

Fig.6

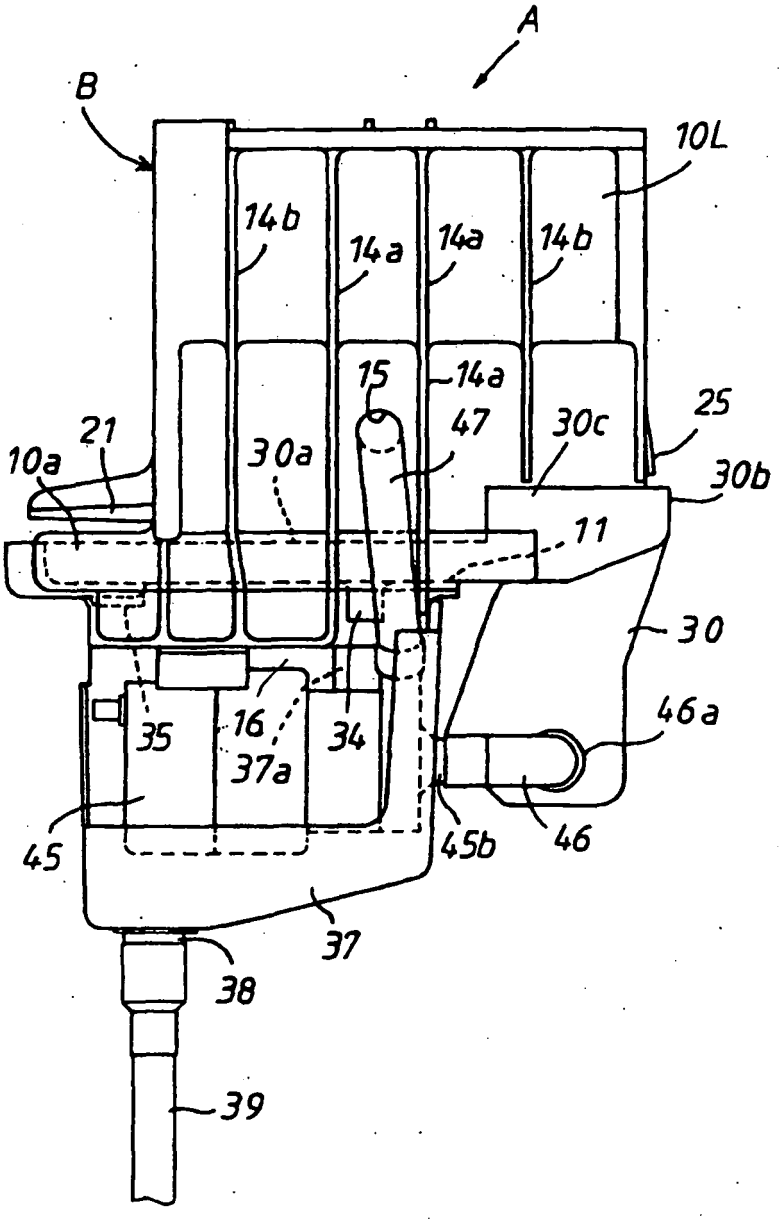

A
B
10L
14b
14a
14a
14b
15
14a
47
30c
25
21
10a
30a
30b
11
30
46a
35
16
37a
34
45
45b
46
37
38
39

Fig.7

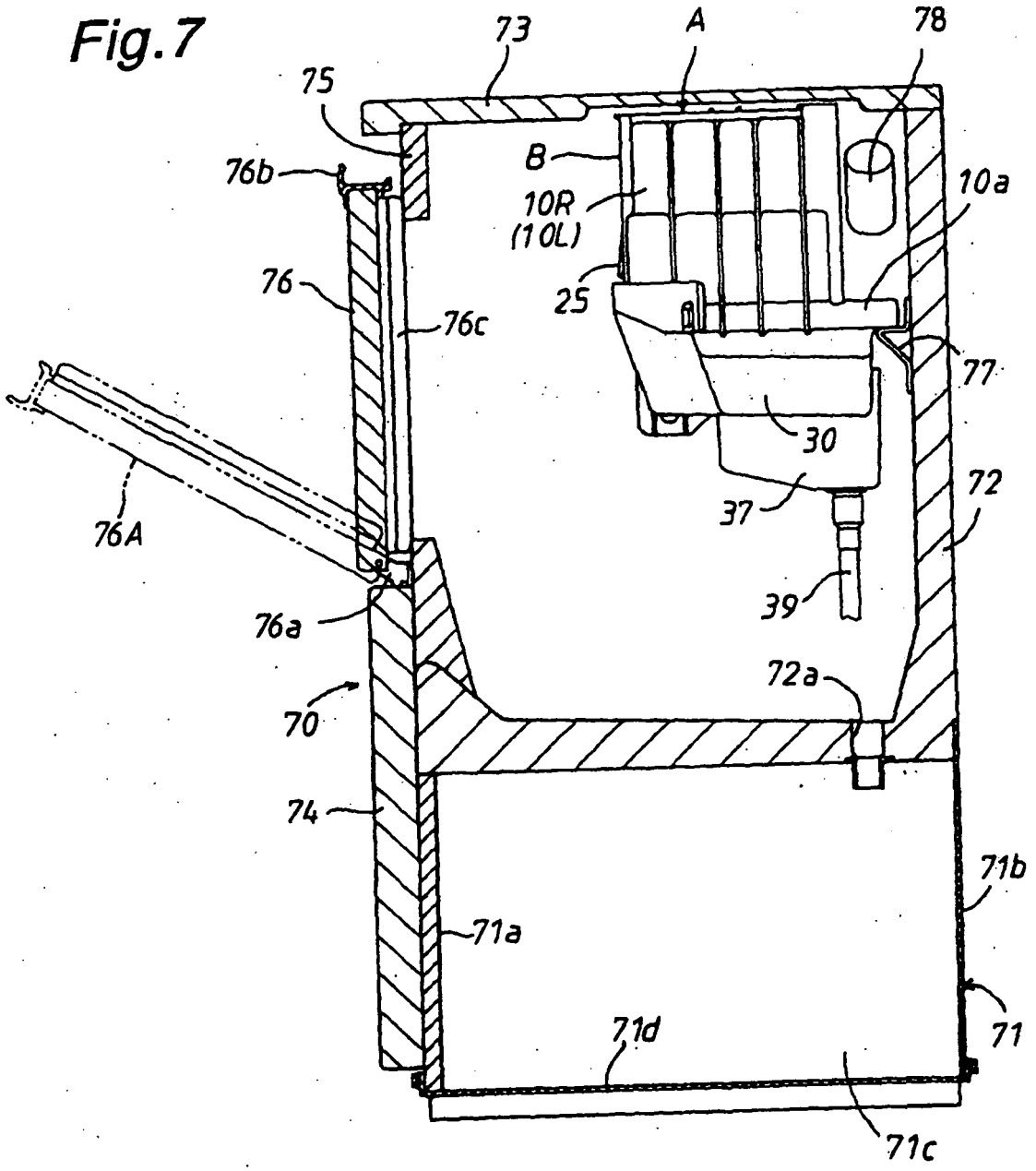
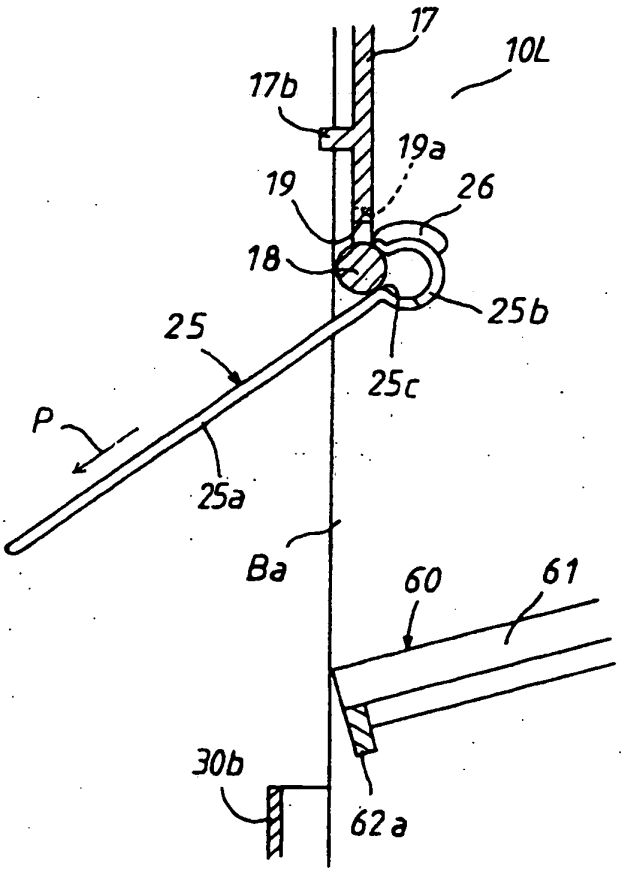

73
A
78
75
B
76b
10R
(10L)
10a
76
25
76c
77
30
72
37
76A
39
76a
72a
70
74
71b
71a
71
71d
71c

Fig.8


17
10L
17b
19a
19
26
18
25b
25
25c
P
25a
Ba
60
61
30b
62a

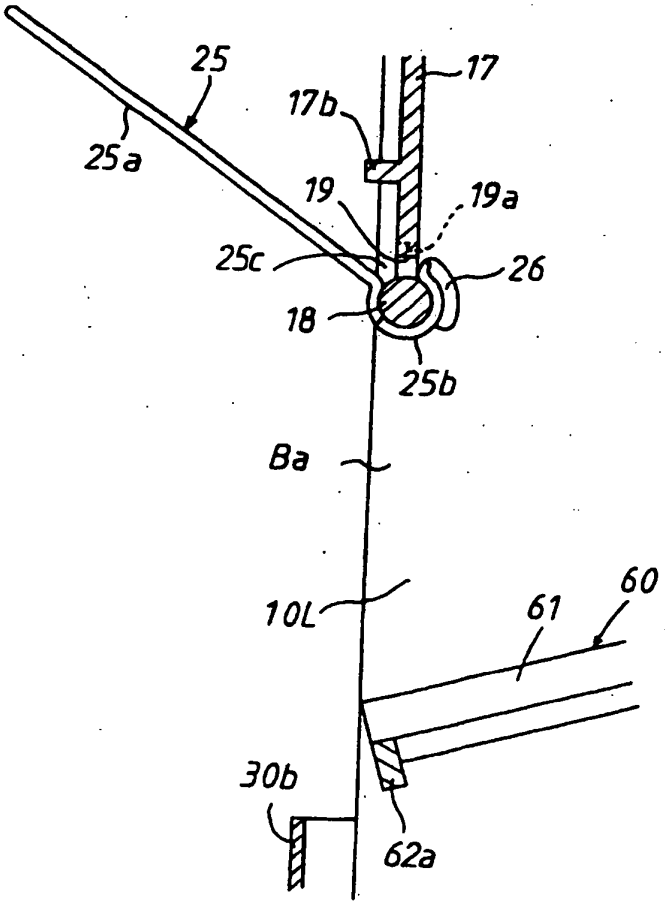
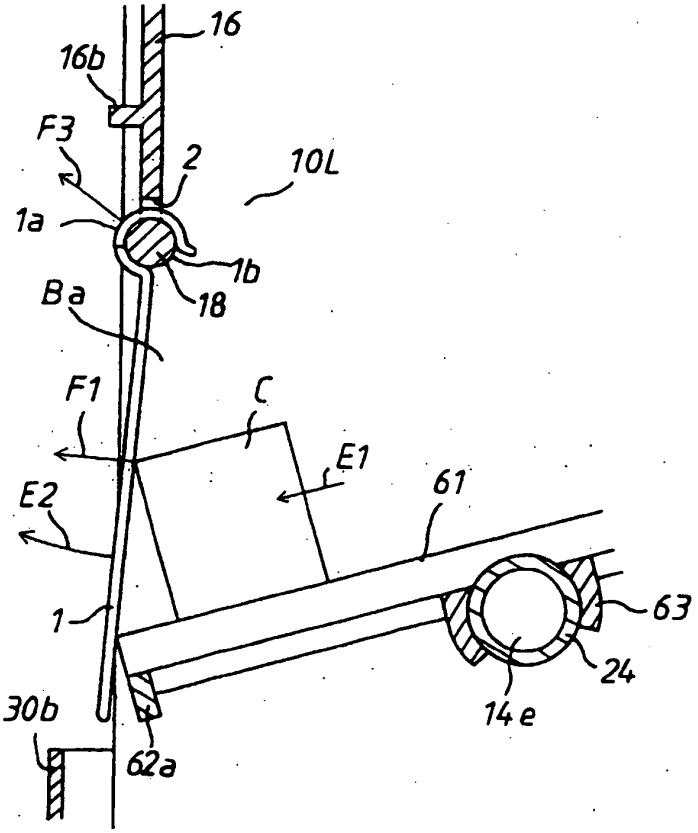

25
17
17b
25a
19
19a
25c
26
18
25b
Ba
10L
61
60
30b
62a

Fig.9

Fig.10


16
16b
F3
2
10L
1a
1b
18
Ba
F1
C
E1
E2
61
1
63
24
14e
30b
62a

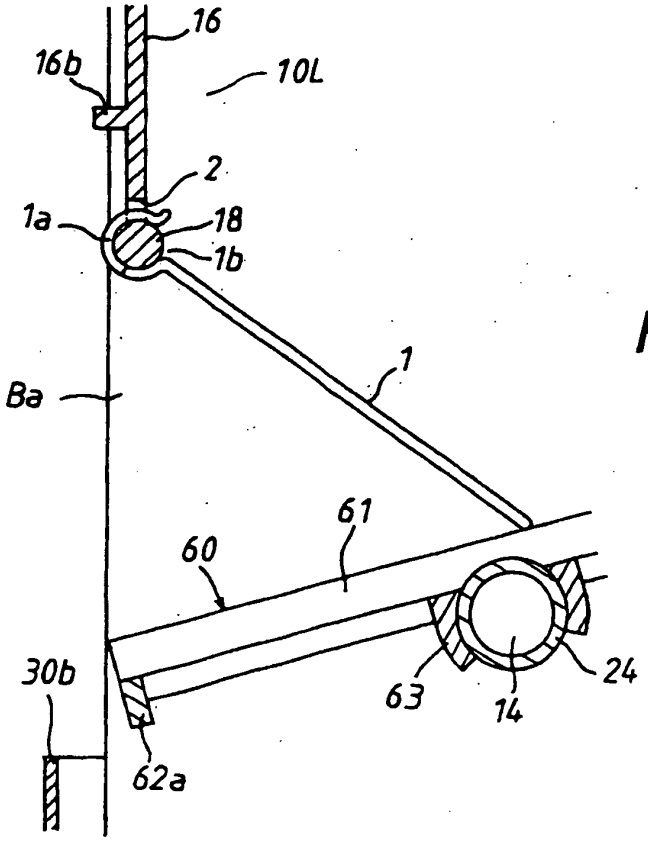

16
16b
10L
2
1a
18
1b
1
Ba
61
60
30b
63
14
24
62a

Fig.11

REFERENCES CITED IN THE DESCRIPTION

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- JP 60086876 A **[0003]**
- JP 60111863 A **[0004]**