(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 825 744 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
21.10.2026 Bulletin 2026/43

(21) Application number: **25752382.9**

(22) Date of filing: **10.02.2025**

(51) International Patent Classification (IPC):
B65B 7/28 *(2006.01)* ***B65B 7/16*** *(2006.01)*
B65B 51/10 *(2006.01)* ***B65B 51/14*** *(2006.01)*
B65B 57/00 *(2006.01)* ***B65C 9/46*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B65B 7/16; B65B 7/28; B65B 51/10; B65B 51/14; B65B 57/00; B65C 9/46

(86) International application number:
PCT/JP2025/004277

(87) International publication number:
WO 2025/170078 (14.08.2025 Gazette 2025/33)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(30) Priority: **09.02.2024 JP 2024018817**
02.12.2024 JP 2024209375

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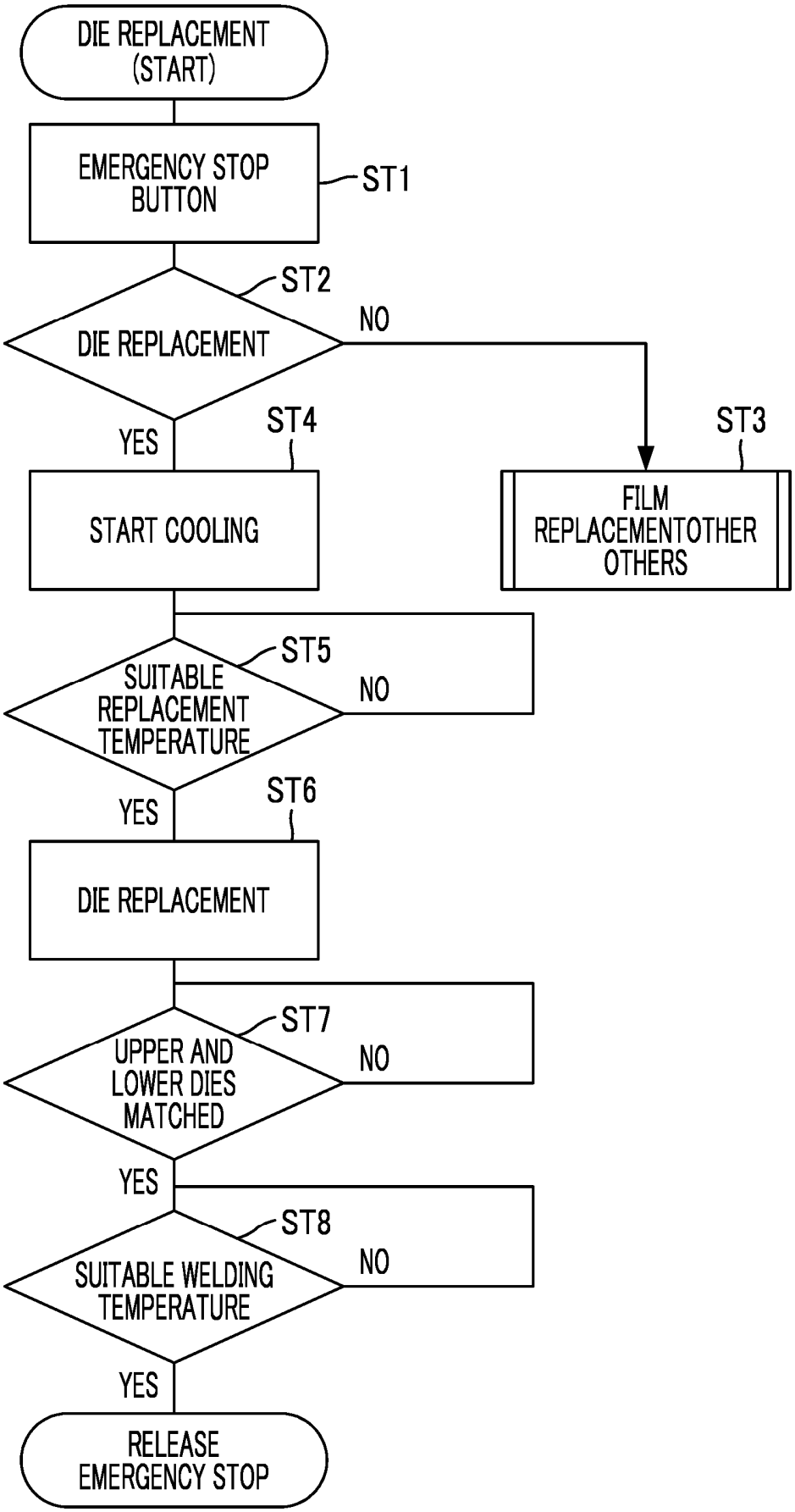
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(54) **PACKAGING DEVICE**

(57) An object of the present invention is to address various points to be improved in order to enhance the effectiveness in a case of implementing a packaging apparatus that processes the entire welding portion at once by bringing the entire welding portion into contact with a heating element. The object is achieved by a packaging apparatus that performs heat-seal packaging of an object to be packaged using a pair of dies, the apparatus including: temperature measuring means for measuring a temperature of a heated die; determination means configured to determine whether or not the temperature measured by the temperature measuring means is a suitable welding temperature for packaging; and control means for restricting packaging control by packaging means in a case where the determination means determines that the measured temperature is not within a suitable welding temperature range.

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FIG. 17


DIE REPLACEMENT (START)
EMERGENCY STOP BUTTON
ST1
ST2
DIE REPLACEMENT
NO
YES
ST4
START COOLING
ST3
FILM REPLACEMENTOTHER OTHERS
ST5
SUITABLE REPLACEMENT TEMPERATURE
NO
YES
ST6
DIE REPLACEMENT
ST7
UPPER AND LOWER DIES MATCHED
NO
YES
ST8
SUITABLE WELDING TEMPERATURE
NO
YES
RELEASE EMERGENCY STOP

Description

TECHNICAL FIELD

[0001] The present invention relates to a packaging apparatus that covers a tray on which an object to be packaged is placed with a film and heat-seals the film to an edge portion of the tray.

BACKGROUND ART

[0002] As a packaging apparatus in the related art, there is a packaging apparatus in which an object to be packaged is placed on a placement table and pushed into a body, and the placement table is automatically pushed out of the body by an unloading mechanism after heat-sealing, thereby improving convenience (for example, refer to Patent Document 1).

Citation List

Patent Document

[0003] Patent Document 1: JP-2003-261102-A

SUMMARY OF INVENTION

Technical Problem

[0004] The packaging apparatus disclosed in Patent Document 1 has a disadvantage in that it takes time to perform one process because the heat-sealing is performed by rotating a heating roller. It is also conceivable to exclude the heating roller and to bring the entire welding portion into contact with a die as a heating portion at once to perform processing at once, but in a case where the packaging apparatus is implemented in such a direction, there are various points to be improved in order to improve the effectiveness.

[0005] An object of the present invention is to address such a problem, and in a case where a packaging apparatus that brings the entire welding portion into contact with a heating portion to perform processing at once is implemented, it is an object of the present invention to address various points to be improved in order to improve the effectiveness.

Solution to Problem

[0006] The packaging apparatus according to the embodiment of the present invention includes at least the following configuration.

[0007] A packaging apparatus performs heat-seal packaging of an object to be packaged using a pair of dies, and the packaging apparatus includes temperature measuring means for measuring a temperature of a heated die, determination means configured to determine whether or not the temperature measured by the temperature measuring means is a suitable welding temperature for packaging, and control means for restricting packaging control by packaging means in a case where the determination means determines that the measured temperature is not within a suitable welding temperature range.

[0008] Here, the temperature measuring means includes both aspects of directly or indirectly calculating the temperature of the upper die.

Advantageous Effects of Invention

[0009] According to the present invention, it is possible to provide a packaging apparatus capable of effectively preventing packaging defects.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

[FIG. 1] A right perspective view showing an appearance of a packaging apparatus according to an embodiment of the present invention.

[FIG. 2] A left perspective view showing an appearance of the packaging apparatus according to the embodiment of the present invention.

[FIG. 3] A top view showing an appearance of the packaging apparatus according to the embodiment of the present invention.

[FIG. 4] A right side view of the packaging apparatus according to the embodiment of the present invention.

[FIG. 5] A right side view of weighing means and packaging means (in which a part of a frame is removed).

[FIG. 6] A right perspective view of weighing means and packaging means (in which a part of a frame is removed).

[FIG. 7] A front sectional view showing an upper die and an upper die holder, in which FIG. 7(a) shows an upper die holder in a case where the upper die is not loaded, FIG. 7(b) shows an upper die alone, and FIG. 7(c) shows a state where the upper die is loaded in the upper die holder.

[FIG. 8] A view showing the upper die, in which FIG. 8(a) is a top view, FIG. 8(b) is a front view, FIG. 8(c) is a bottom view, FIG. 8(d) is an upper perspective view, and FIG. 8(e) is a lower perspective view.

[FIG. 9] A view showing a state where the upper die is loaded in the upper die holder, in which FIG. 9(a) is a top view, FIG. 9(b) is a front view, FIG. 9(c) is a bottom view, FIG. 9(d) is an upper perspective view, FIG. 9(e) is a right side view, and FIG. 9(f) is a conceptual view showing a heat transfer member.

[FIG. 10] A view showing a state where the upper die is not loaded in the upper die holder, in which

FIG. 10(a) is a top view, FIG. 10(b) is a front view, FIG. 10(c) is a bottom view, FIG. 10(d) is an upper perspective view, FIG. 10(e) is a right side view, and FIG. 10(f) is an enlarged view of a portion D of FIG. 10(d).

[FIG. 11] A view showing the lower die, in which FIG. 11(a) is a top view, and FIG. 11(b) is a side cross-sectional view.

[FIG. 12] A perspective view showing a state where the lower die is attached to and detached from a lower die holder.

[FIG. 13] A partially enlarged view of a side cross-sectional view of the lower die.

[FIG. 14] A side cross-sectional view showing a change in state in a case where the lower die pushes up the upper die.

[FIG. 15] A view showing another example of the upper die and the lower die.

[FIG. 16] A view showing an operation mechanism of the determination of the loading state.

[FIG. 17] A flowchart showing a flow of various types of processing on the die.

[FIG. 18] A view showing a layout example of a display screen.

[FIG. 19] A view showing a layout example of a display screen.

[FIG. 20] A view showing a layout example of a display screen.

[FIG. 21] A view showing a layout example of a display screen.

[FIG. 22] A view showing a layout example of a display screen.

[FIG. 23] A view (table) showing setting items used for determining a packaging state or an attachment condition.

[FIG. 24] A view (table) showing priorities for PLU setting information, tray setting information, and die setting information.

[FIG. 25] A view showing a layout example of a main menu.

[FIG. 26] A view showing a layout example of a packaging mode screen.

[FIG. 27] A view showing an example of a popup menu displayed in response to a packaging start command.

[FIG. 28] A view showing a layout example of a setting screen of a product master.

[FIG. 29] A view showing a layout example of a PLU setting screen.

[FIG. 30] A view showing a layout example of a tray selection screen.

[FIG. 31] A view showing a layout example of a setting screen for each tray.

[FIG. 32] A view showing a layout example of a setting screen for each die.

[FIG. 33] A view showing a layout example of a setting screen for each die.

[FIG. 34] A perspective view showing a state in which the upper die and the lower die are accommodated in die accommodating means.

[FIG. 35] A right side view showing a state in which the upper die and the lower die are accommodated in the die accommodating means.

[FIG. 36] A view for describing an example of an electrical configuration of the packaging apparatus 100.

[FIG. 37] A flowchart showing a flow of processing during normal operation of the packaging apparatus.

[FIG. 38] A view showing a layout example of an error display screen.

[FIG. 39] A flowchart showing a flow of processing during normal operation of the packaging apparatus.

[FIG. 40] A view showing a layout example of an error display screen.

[FIG. 41] A flowchart showing a flow of processing during normal operation of the packaging apparatus.

[FIG. 42] A flowchart showing a flow of processing in another example regarding the die replacement.

[FIG. 43] A view showing a layout example of an error display screen.

[FIG. 44] A flowchart showing a flow of processing in a case where the emergency stop button is pressed during the packaging.

DESCRIPTION OF EMBODIMENTS

[0011] Hereinafter, an example of an embodiment of a packaging apparatus according to the present invention will be described with reference to the drawings. However, the following drawings are created for the purpose of description, and members unnecessary for the description may be intentionally omitted for the sake of clarity. In addition, for the sake of description, some members may be intentionally shown larger or smaller, and the drawings do not show an accurate scale. In the following description, the same reference numerals in different drawings indicate portions having the same functions, and duplicate descriptions in each drawing will be omitted as appropriate.

(Overall Configuration)

[0012] FIGS. 1 to 4 are views showing an appearance of a packaging apparatus according to an embodiment of the present invention, in which FIG. 1 is a right perspective view, FIG. 2 is a left perspective view, FIG. 3 is a top view, and FIG. 4 is a right side view. FIGS. 5 and 6 particularly show a weighing means and a packaging means, in which FIG. 5 is a right side view (in which a part of a machine frame is removed), and FIG. 6 is a right perspective view (in which a part of the machine frame is removed).

[0013] A packaging apparatus 100 according to the

embodiment of the present invention shown in FIGS. 1 to 3 automatically performs a series of operations from weighing an object to be packaged (contents) placed on a tray T by tare deduction, performing a top seal process accompanied by a gas replacement process for extending a best-before date of the object to be packaged (processing the entire welding portion at once), and label attachment while carrying the tray T on which the object to be packaged is placed into a machine, to carrying out after the top seal process and the label attachment. In other words, it can be said that the packaging apparatus is an apparatus in which a packaging process is present between a weighing process of the object to be packaged and a label attachment process. More specifically, as shown by arrows in FIG. 3, the packaging apparatus 100 is configured as follows. In a case where the tray T on which the object to be packaged is placed is placed on a weighing means 1, a weight of the object to be packaged is weighed. The tray T is carried in by an infeed bar IB (see FIGS. 5 and 6) such that the tray T advances into a machine frame having a packaging means 2. In the machine frame, a lower die 25 (see FIG. 1) pushes the tray T upward, and first, air present in a space formed between a film and the tray T is replaced with an inert gas, the film being always stretched by being held at both ends by a film holding means 211 and an excess film winding means 212 (see FIG. 1). Next, the film is heat-sealed by being heat-welded at a predetermined heat seal temperature for a predetermined tray seal time period while the edge portion of the tray T is brought into contact with the film and the film is sandwiched between the lower die 25 and an upper die 24 (see FIG. 1), and the film is cut. Then, the lower die 25 and the tray T are lowered to return to a predetermined height (a fixed position), and the tray T is caused to advance again in a carrying-in direction by the infeed bar IB (see FIGS. 5 and 6) and is transferred to a downstream region 3. The tray T is moved in a carrying-out direction orthogonal to the carrying-in direction, and a label is attached by a label attaching means 7. Then, the tray T is discharged to a first discharge table 4, and the tray T is further moved in a direction opposite to the carrying-in direction to be fed to a second discharge table 5.

[0014] As shown in FIG. 5, the infeed bar IB, which is a transport mechanism of the tray T, is configured to be able to transfer the tray T from the weighing means 1 to the packaging means 2 and then from the packaging means 2 to the downstream region 3 by being bridged over two left and right chains that are able to circulate over the entire front and rear circumference from the front side of the weighing means 1 to the rear side of the packaging means 2 at positions of four locations in a circumferential direction, and the chains circulate.

[0015] In the embodiment of the present invention, three types of upper dies and lower dies are prepared and configured to be interchangeable so as to be able to correspond to three types of trays T having different sizes, that is, a large size, a medium size, and a small size. In addition, in a case where the die is replaced, different packaging operation controls are executed, such as performing packaging by varying the heat seal temperature, the tray seal time, and the gas filling time. Specifically, in a case where an emergency stop button 8 is pressed to replace the die, the die temperature is lowered by a cooling means (including reduction of an output of a heater means, natural cooling, and active cooling by a fan or the like) until a replaceable temperature (for example, 35°C) is reached, and after the die is replaced, the die temperature is raised by the heater means until a temperature suitable for the replaced die is reached. However, such an aspect is merely an example, and the types of sizes may be two types of a large size and a small size, or four or more types of sizes may be prepared, or further, the size of the tray may be only one type, and an aspect in which the replacement is not assumed may be adopted. On the other hand, even in a case where the trays have the same size, it may be preferable to vary the packaging operation for trays having different types, specifically, different materials. For example, a temperature suitable for a foamed tray is 110°C, whereas a temperature suitable for a resin tray is 180°C. In the embodiment of the present invention, the heat seal temperature is actually varied depending on the type of the tray, and the packaging operation is executed. That is, in a case where the tray is replaced with a tray having a different set temperature, the die temperature is raised by the heater means or the die temperature is lowered by the cooling means (including reduction of an output of a heater means, natural cooling, and active cooling by a fan or the like).

[0016] The weighing means 1, the packaging means 2, and the downstream region 3 are vertically arranged from the front side to the back side of the apparatus. In addition, as shown in FIG. 1, a console 6 is disposed above the weighing means 1 and on the upstream side of the weighing means 1 in the transport direction, the console 6 having an operation unit such as a display unit, a numeric keypad, a touch panel, and an emergency stop button 8 pressed in a case of replacing the die on the front side, and a speaker or a control unit that emits a buzzer sound, various voice messages, and the like is disposed inside the console 6. In more detail, the lower end portion of the case of the console 6 is located on the upstream side of the weighing means 1, the center of the console 6 and the center of the display unit are also located in the region of the weighing means 1, and the console 6 is disposed to be inclined, but the upper end portion of the case of the console 6 is also located on the upstream side of the weighing means 1. In addition, an upper portion of the downstream region 3 is a label attaching means 7 that prints and attaches a product label having information such as a measured weight, a unit price, and a price.

Further, a mechanism for gas replacement, which is not shown in FIGS. 1 to 3, is provided in the lower die 25. In the present specification, the term "gas replacement" refers to a "gas replacement" used in a broad sense (regardless of specific steps) as a process of replacing air in an object to be packaged with an inert gas for extending a best-before date, and includes both an aspect of "gas replacement" used in a narrow sense of completely removing air and then introducing gas and an aspect of "gas flush" of blowing gas to push out air. Such gas replacement packaging in a broad sense may be referred to as MAP packaging.

[0017] In the embodiment of the present invention having such a configuration, the top seal is performed while performing the gas replacement from between the object to be packaged and the film, and thus the gas replacement processing for extending the best-before date of the object to be packaged and the packaging processing by the top seal are performed substantially at the same time, so that the efficiency of the work can be improved.

[0018] In addition, in the embodiment of the present invention, the tray T inserted from the front side is packaged and then returned to the front side again, so that the configuration greatly contributes to the improvement of workability in the back yard, and the configuration is realized in a compact manner. However, from the viewpoint of performing the gas replacement processing for extending the best-before date of the object to be packaged and the packaging processing by the top seal substantially at the same time, the configuration in which the tray is inserted from the front side and then returned to the front side is not an essential configuration, and the configuration can be realized in a form in which the tray is simply transported in one direction from the front side to the back side, or can be realized in a form in which the packaging processing is performed first and then the weighing processing is performed. Further, it is also possible to eliminate the weighing processing and the label attaching processing and to configure the apparatus to be specialized in the packaging processing, and in the packaging processing, it is not always necessary to perform the gas replacement from the viewpoint of the packaging operation in consideration of the suitable welding temperature. That is, the present invention includes a case in which the gas replacement processing is not performed.

[0019] The machine frame shown in FIG. 1, particularly the machine frame of the upper portion, has a great meaning not only in terms of arranging the packaging means 2 and other components inside but also in terms of blocking the inside from the outside. In addition, buffer tanks (BT1 and BT2) are arranged in the machine frame of the lower portion for gas replacement (see FIG. 6). In addition, after the weighing by the weighing means 1, the tray T is transported, and the upper and lower dies are closed to perform the top seal, and in order to prevent an operator or the like from accidentally inserting a hand and causing an unexpected accident, a shutter 11 is provided in a portion between the weighing means 1 and the packaging means 2, which includes a region slightly closer to the weighing means 1 (see FIG. 6). At a point in time when the tray T is transported to the packaging means 2 by the infeed bar IB (see FIGS. 5 and 6), the inside and outside of the housing are blocked by the shutter 11. The transport means of the embodiment of the present invention is not a belt conveyor or the like but the infeed bar IB (see FIGS. 5 and 6), and thus the shutter is configured to be raised and closed from the bottom to the top to avoid the chain portion. However, the shutter may be configured to be lowered and closed from the top to the bottom, or the safety may be ensured by stopping the apparatus in a case where the sensor detects the intrusion of the hand without providing the shutter.

[0020] In order to improve the convenience during the transport, the first discharge table 4 and the second discharge table 5 are configured to be attachable and detachable. In addition, after the discharge tables are removed, the label attaching means 7 is configured to be slid to the leftmost side of FIG. 3 to be within the range of the left and right sides of the machine frame so as not to interfere with the transport. On the contrary, in a case of a "pricing mode" in which only a pricing label is issued without packaging, the operator manually attaches the pricing label to the product, and thus the label attaching means 7 is slid to the rightmost side of FIG. 3. As a means for realizing this, the packaging apparatus 100 according to the embodiment of the present invention includes a label attaching means slide rail 71 and an anti-tumble leg 72. The anti-tumble leg 72 serves to support the entire apparatus so that the packaging apparatus 100 does not fall due to imbalance when the label attaching means 7 is moved to the rightmost side.

[0021] The weighing means 1 is configured to weigh the weight of the placed object to be packaged and the tray T, and transmits information on the weighed weight to the control unit of the console 6. In addition, as shown in FIG. 5, the infeed bar IB, which is a rod shape, is bridged over two left and right chains that can circulate over the entire front and rear circumference from the front side of the weighing means 1 to the rear side of the packaging means 2 at four positions in the circumferential direction, and the placed tray T can be carried in toward the machine frame including the packaging means 2, and can be transferred to the downstream region 3 as it is. More specifically, as shown in FIG. 5, a total of eight infeed bar support members IB1 for bridging the infeed bars IB are provided at four positions in the circumferential direction of the two left and right chains, and four antibacterial-treated metal rod-shaped infeed bars IB are connected (see also FIG. 6). The interval of the infeed bars IB in

the circumferential direction is an interval at which the infeed bars IB do not interfere with the next object to be packaged placed on the weighing means 1 in a case where the infeed bar IB performs an operation of temporarily retreating to prevent the infeed bar IB from coming into contact with the lower die 25 that is in the ascending operation. The height of the infeed bars IB with respect to the placement surface of the tray T is configured to be positioned at the center of the height of the bottom surface and the height of the upper surface of the tray T, but the height may be appropriately changed as long as the tray T can be stably transported.

[0022] As the tray T, as described above, three types of "large", "medium", and "small" are set, and the upper die 24 and the lower die 25 for performing the packaging process corresponding to each size are prepared and are replaceable. Specifically, in the present embodiment, the upper die for a large tray having a tray size of a width of 150 mm and a depth of 150 mm, the upper die for a medium tray having a tray size of a width of 150 mm and a depth of 120 mm, and the upper die for a small tray having a tray size of a width of 120 mm and a depth of 120 mm are prepared. However, the outer shapes of the dies are all the same size regardless of the tray size. For the infeed bar IB, the placement table of the weighing means 1 is provided with recesses that slightly differ in depth to correspond to the tray sizes of "large", "medium", and "small" so that the three types of trays T of "large", "medium", and "small" are appropriately centered. That is, a deep recess of a medium size is disposed inside the recess of a large size, and a deeper recess of a small size is disposed inside the recess of a medium size. The step difference due to the recess is kept to a slight difference so as not to cause resistance during the transfer of the tray T by the infeed bar IB. In addition, as a centering means, the guide 12 having a shape that narrows toward the center on both left and right sides is provided (see the partially enlarged view of FIG. 2). Further, the centering means may be a display that can be visually confirmed, instead of a recess or a guide. Even in a case where a slight left-right deviation occurs, since the side surface of the tray T is inclined, the tray T is naturally guided to an appropriate position when being pushed up by the lower die 25. Although the detailed description will be omitted, the packaging apparatus 100 according to the embodiment of the present invention is provided with a detection determination means capable of performing the fit detection or the non-loading detection of the upper and lower dies.

[0023] As shown in FIG. 5, the tray T that has been subjected to the packaging process by heat sealing is transferred from the packaging means 2 to the rear stage region 3. As shown in FIG. 6, the rear stage region 3 is configured with a conveyor belt and functions as a discharge means for moving the tray T to the outside of the machine frame, but a label attaching means 7 for printing and attaching a product label is provided above the rear stage region 3. Therefore, the rear stage region 3 can also be regarded as the label attaching means 7. In this way, the tray T is transferred in the discharge direction orthogonal to the carry-in direction by the rear stage region 3 and is discharged toward the first discharge table 4. The first discharge table 4 shown in FIGS. 1 and 3 is provided with drive rollers, and moves the tray T in the direction opposite to the carry-in direction to send the tray T to the second discharge table 5. The second discharge table 5 is inclined, and the tray T moves by its own weight, so that the rollers of the second discharge table 5 are merely rollers without a driving force.

[0024] Regarding the upper die 24 and the lower die 25, the packaging apparatus 100 according to the embodiment of the present invention includes an upper die accommodating means 24H and a lower die accommodating means 25H as accommodating means capable of accommodating all types of dies that are not loaded. In this manner, it is not necessary to store the dies that are not used due to replacement at a place different from the packaging apparatus main body, and it is possible to achieve space saving. The upper die accommodating means 24H and the lower die accommodating means 25H are disposed in a vicinity region in which the film holding means 211 and the excess film winding means 212 are installed. More specifically, in the packaging apparatus 100 according to the embodiment of the present invention, the upper die accommodating means 24H and the lower die accommodating means 25H are disposed above both the weighing means 1 and the packaging means 2 in a form corresponding to the disposition of the weighing means 1 and the packaging means 2. In addition, the lower die accommodating means 25H is disposed above the weighing means 1 and is disposed on the downstream side of the console 6 in the vicinity of the console 6 having the display unit. Of course, this aspect is merely an example, and the disposition positions of the upper die accommodating means 24H and the lower die accommodating means 25H may be reversed, or the upper die accommodating means 24H and the lower die accommodating means 25H may be disposed in a divided manner in an accommodation place for the upper and lower dies of one size and an accommodation place for the upper and lower dies of another size.

[0025] In general, regarding the machine frame having the packaging means 2, in FIG. 4, in a form corresponding to the front and rear disposition of the weighing means 1 and the packaging means 2 shown by the broken line regions, the film holding means 211 that holds the film for packaging the container and the excess film winding means 212 that winds the excess film in a case of sealing the container are disposed above the machine frame, and the film suspending means 21 is configured as a whole. The film holding means 211 is provided with a film set shaft lever 211L that can be

erected or tilted, and the excess film winding means 212 is provided with a winding shaft lever 212L that can be erected or tilted. In FIG. 6, the film set shaft lever 211L is tilted to be substantially perpendicular to the axial direction, whereas the winding shaft lever 212L of the roll that is not loaded is erected to extend in the axial direction. As understood from FIG. 6, the roll film R cannot be inserted unless the lever is erected, but in a case where the lever is tilted after the roll film R is inserted, the roll film R is not detached by the lever. In addition, since the set shaft is expanded to push the shaft center of the film from the inside in conjunction with the tilting operation of the lever, the roll film R is stably fixed to the set shaft. In addition, the side panel SP is dimensionally set to be unable to be closed unless the lever is tilted, and the safety of the apparatus is ensured.

[0026] In FIG. 4, the first imaging means is provided at a position A marked with a circle, and the second imaging means is provided at a position B marked with a circle. The first imaging means images the state of the tray T carried into the machine frame from above by the infeed bar IB (see FIGS. 5 and 6). The control unit of the packaging apparatus 100 determines the tray size or the filling state of the article to be packaged by using the imaged information. The second imaging means images the state of the tray T from the side surface in the machine frame, and the control unit of the packaging apparatus 100 determines whether the tray T is reliably fitted into the lower die 25 in a case where the tray T is pushed upward by using the imaged information. In addition, the imaging means may be configured to be used for determining the suitability of the die or determining the tray type. In a case of determining the tray type, the tray may be classified by color or appropriately attached with identification information, and the type may be determined by the identification information.

[0027] As shown in FIGS. 1 and 4, the film suspending means 21 is disposed to be accommodated in the upper portion of the machine frame in which the weighing means 1 and the packaging means 2 are disposed. The film is suspended in the same direction as the weighing means 1, the packaging means 2, and the downstream region 3 are vertically arranged from the front side to the apparatus back side. That is, the suspension direction of the film is the same as the transport direction of the tray T. In the related-art packaging apparatus, the film suspending means is usually disposed to largely protrude to a region outside the apparatus machine frame in which the packaging means and the like are disposed. However, in the present embodiment, the film holding means 211 and the excess film winding means 212 are disposed above and in the vicinity of the mounting means that can mount a plurality of dies, and the film is suspended below and in the vicinity of the mounting means, which greatly contributes to space saving. More specifically, as shown in FIG. 5, the present embodiment is provided with the mounting means (as the upper die holder 240 into which the upper die 24 is loaded) between the film suspending means 21 (including the film holding means 211 and the excess film winding means 212) and the transport space of the tray T (by the infeed bar IB). In addition, as shown in FIG. 5, the present embodiment adopts a disposition configuration in which the film fed from the film holding means 211 is given a constant tension by the dancer rollers DR to stabilize the tension, and then is wound around the two film feed shafts FS and FS to pass through the vicinity of the lower side of the mounting means, and is wound by the excess film winding means 212.

[0028] The film suspending means 21 including the film holding means 211 and the excess film winding means 212 is accommodated in the upper region of the weighing means 1 and the packaging means 2, but a configuration may be adopted in which the excess film winding means 212 is set to extend to the downstream region 3, or the console 6 is disposed at another position to allow the film holding means 211 to protrude further forward. Even with such a configuration, it can be said to be a technical idea for space saving that can be distinguished from the related art, which is the film suspending means disposed to largely protrude to the region outside the apparatus machine frame. In addition, even in a disposition in which the front and rear directions of the film holding means 211 and the excess film winding means 212 are reversed, the space saving is not impaired, and the film holding means 211 may be disposed rearward and the excess film winding means 212 may be disposed forward.

[0029] In FIG. 1, the side panel SP is configured to be pivotally supported by a right long side portion and to be rotatable rearward. With the configuration, the roll film R can be replaced from the right side surface, and the upper die 24 and the lower die 25 can also be replaced from the right side. As described above, the upper die 24, the film holding means 211, and the excess film winding means 212 are attachable and detachable from the same direction in the direction along the winding shaft during replacement. In addition, the lower die 25 is also attachable and detachable from the same direction in the direction along the winding shaft. However, for the lower die 25, replacement work of inserting the lower die 25 from the right side surface and then dropping the lower die 25 slightly downward is added. The label attaching means 7 is configured to be able to be tilted (rotated) rearward, and is configured to facilitate replacement of the roll film R and replacement of the upper die 24 and the lower die 25. In addition, with the rotatable configuration, the label replacement itself is also facilitated. The rotatable side panel SP may be on the left side instead of the right side. That is, the rotatable side panel SP may not be provided on the same side as the side on which the first discharge table 4 and the like are disposed. However, it is advan-

tageous in terms of space saving to configure the side panel SP on the same side as the side on which the first discharge table 4 and the like are disposed to be rotatable.

[0030] The top panel UP, the front panel FP, and the side panel SP of the machine frame are formed of a transparent material or are fitted with a transparent plate, so that the state of the film suspended by the film suspending means 21 can be confirmed. In addition, the top panel UP is configured to be slidable rearward to a position where the top panel UP does not come into contact with the label attaching means 7, so that the top panel UP can be handled in case of a trouble or the like in addition to visual confirmation, and the front panel FP is also configured to be pivotally supported at an upper side and to be rotatable. The front panel FP may be configured to be rotatable by being pivotally supported at a lower side or may be configured to be slidable.

[0031] As shown in FIGS. 5 and 6, a upper die holder 240 into which the upper die 24 is loaded is provided between the film suspending means 21 and the transport space of the tray T (by the infeed bar IB), and functions as a mounting means capable of replacing a plurality of dies. The upper die holder 240 is provided with a locking means for preventing the upper die 24 from being removed after the upper die 24 is loaded by being inserted to the rear. In order to remove the upper die 24, it is necessary to operate a lock release lever 24L (see FIG. 9). The lock release lever 24L is configured to be unable to perform a lock release operation in a case where it is not appropriate to remove the upper die, such as when the temperature is high, in cooperation with the die replacement processing. The locking means may be configured as automatic locking means, and in a case where the locking means is configured as automatic locking means, the locking means may be configured to cooperate with the temperature of the upper die 24 in the locking operation or the release prohibition operation in the die replacement processing.

[0032] A heater means 241 (see FIG. 7(a)) for supplying heat for film welding is provided in the upper die holder 240. The upper die 24 is provided with a metal plate 242 (see FIG. 7(b)) that transmits the heat supplied from the heater means 241 (as the top seal portion 242) and a film cutting means 244 (see FIGS. 7(b) and 8) for cutting the film. The heater means 241 is in contact with the metal plate 242 of the upper die 24 loaded in the upper die holder 240. The metal plate 242 has a protruding portion 242a having a size corresponding to an edge portion of the tray T and a central portion 242b surrounded by the protruding portion 242a (see also FIG. 9(c)), and transmits the heat supplied from the heater means 241 to the protruding portion 242a to heat-seal the film in contact with the edge portion of the tray T at a predetermined heat seal temperature for a predetermined tray seal time.

[0033] In the embodiment of the present invention, aluminum having a high thermal conductivity is adopted as a material of the metal plate 242, but there is no prohibition against adopting silver, copper, gold, or the like having a higher thermal conductivity, and even in a case of a material having a lower thermal conductivity than aluminum, there is no prohibition against adopting the material as long as there is no practical problem.

[0034] In the embodiment of the present invention, the structure of the metal plate 242 includes the protruding portion 242a corresponding to the edge portion of the tray T and has an uneven shape, but the protruding portion 242a and the central portion 242b are basically one-plate structures composed of one member. However, the metal plate may be configured to have a structure in which two plates are bonded to each other and a heat pipe is stretched between the two plates to conduct heat from the heater more quickly and more widely and evenly. In addition, since the metal plate 242 welds the film and the container with the protruding portion 242a functioning as the top seal portion, the central portion 242b, which is a place other than the protruding portion 242a, does not need to have a high temperature. In consideration of the possibility that heat may be dissipated from the central portion 242b, it is suitable to configure the central portion 242b to fix a member serving as a heat insulating material, and the central portion 242b may be configured in this manner.

[0035] A temperature sensor (not shown) is provided in the vicinity of the upper die fhlder 240. The temperature sensor is responsible for a part of the configuration of the die temperature calculation means. The temperature sensor may be provided in the vicinity of the heater means 241 or in a heat transfer member described later, and in short, the die temperature calculation means that obtains the detection information from the temperature sensor may directly obtain the temperature of the metal plate 242 of the upper die 24, or may indirectly obtain the temperature by measuring a current value, a voltage value, a thermography, or the like and performing an appropriate operation on the measurement value. Specifically, in addition to directly detecting the temperature of the upper die by the temperature sensor, the temperature of the heater means or the heat transfer member is detected by the temperature sensor, and then the temperature of the metal plate 242 of the upper die in contact with the edge portion of the tray T is calculated from the temperature information, the thermal resistance and the heat capacity of the heater means or the heat transfer member by a prediction operation of a computer. The calculated temperature information of the upper die 24 (the metal plate 242) is used to execute various processing controls for the die described later or packaging operation controls in consideration of a suitable welding temperature. Therefore, the control unit of the packaging apparatus 100 includes means for determining whether or not the temperature measured by the temperature sensor is a suitable welding temperature for packaging.

[0036] A lower die 25 is provided below the upper die holder 240 with a transport space of the tray T interposed therebetween. The lower die 25 pushes up the tray T, and the film sequentially fed from the roll film R loaded in the film suspending means 21 is sandwiched between the metal plate 242 of the upper die 24 and the lower die 25 to perform a packaging process (top seal process) at a predetermined heat seal temperature for a predetermined tray seal time. In this way, the film suspending means 21, the upper die 24, and the lower die 25 constitute the packaging means 2, and the packaging means 2 is disposed continuously on the downstream side of the weighing means 1 in the transport direction.

[0037] In the present embodiment, the roll film R is supported through a central hole thereof by a shaft of the film holding means 211. In a case where the fed film is sealed by the metal plate 242 and cut into a size of the tray T by the film cutting means 244, the film is in a waste state in which only a portion around the cut remains, that is, the film is in a state in which the inside is hollowed out. The film in the waste state is sequentially wound by the excess film winding means 212.

[0038] As shown in FIG. 7(b), the metal plate 242 that functions as a top seal is disposed to face the fed film (see also FIG. 8). In a case where the tray T is moved upward by the lower die 25, the film is heat-welded at a predetermined heat seal temperature for a predetermined tray seal time along the edge portion of the tray T in a state in which the edge portion of the tray T and the film are sandwiched between the lower die 25 and the metal plate 242 of the upper die 24. Before the heat welding, a gas replacement process of injecting an inert gas for extending the best-before date of the object to be packaged into a space formed between the film and the tray T to replace the air with the inert gas is performed.

(Transport Operation by Infeed Bar)

[0039] As shown in FIG. 5, each of the infeed bars IB, which is a transport mechanism of the tray T, is configured to be able to transfer the tray T from the weighing means 1 to the packaging means 2 and then from the packaging means 2 to the downstream region 3 by being bridged over two left and right chains that are able to circulate over the entire front and rear circumference from the front side of the weighing means 1 to the rear side of the packaging means 2 at positions of four locations in a circumferential direction, and the chains circulate. The roller 31 is disposed in a space generated between the packaging means 2 and the downstream region 3, and the tray T can be smoothly moved from the packaging means 2 to the downstream region 3. Since most of the packaging target can be said to be food, the metal infeed bars IB are subjected to an antibacterial treatment and a rust prevention treatment. Each of the infeed bars IB is connected to the chains via infeed bar support members IB1 provided at a total of eight positions at four positions in the circumferential direction of the two left and right chains.

[0040] In this way, the transport operation of the infeed bars IB that are connected to the chains, which are drive units, and that are transported around will be described. First, the tray T placed on the weighing means 1 is pushed by one of the infeed bars IB and transferred to the packaging means 2, and the infeed bar IB is stopped. In this state, in a case where the lower die 25, which will be described later, is moved upward, the infeed bar IB interferes with the lower die 25, and thus the infeed bar IB is temporarily moved rearward to a region where the weighing means 1 is positioned. As described above, the disposition interval of the infeed bars IB in the circumferential direction is an interval at which the infeed bars IB do not interfere with the next object to be packaged placed on the weighing means 1 in a case where the infeed bar IB each performs an operation of being temporarily moved rearward. At a point in time when the infeed bar IB is temporarily moved rearward, the shutter is lowered from above the front side portion of the machine frame to block the outside and the inside, and safety is ensured. The infeed bar IB at this time is positioned in the shutter. That is, the disposition position of the shutter is not at a strict boundary portion between the weighing means 1 and the packaging means 2, but is slightly present in the region of the weighing means 1. Since the infeed bars IB are intermittently disposed in the circumferential direction, a shutter configuration that is moved upward from below can also be adopted as long as the chain portion that is continuously disposed in the circumferential direction is avoided. After the top seal of the tray T is performed by the packaging means 2, the infeed bar IB moves forward again and transfers the tray T to the downstream region 3. In this case, since the roller 31 is present, the tray T is smoothly transferred without falling between the packaging means 2 and the downstream region 3. The height of the infeed bar IB with respect to the placement surface of the tray T is configured to be positioned at the center of the height of the bottom surface and the height of the upper surface of the tray T, but the height may be appropriately changed as long as the tray T can be stably transported. In the present embodiment having such a configuration, the object to be packaged can be transported from the weighing means to the downstream region through the packaging means by a single transport means, which greatly contributes to space saving and cost reduction.

(Gas Replacement and Packaging Operation by Upper Die and Lower Die)

[0041] FIG. 7 is a front sectional view showing an upper die and an upper die holder, in which FIG. 7(a) shows an upper die holder in a case where the upper

die is not loaded, FIG. 7(b) shows an upper die alone, and FIG. 7(c) shows a state where the upper die is loaded in the upper die holder. FIG. 8 is a view showing the upper die, in which FIG. 8(a) is a top view, FIG. 8(b) is a front view, FIG. 8(c) is a bottom view, FIG. 8(d) is an upper perspective view, and FIG. 8(e) is a lower perspective view. FIG. 11 is a view showing the lower die, in which FIG. 11(a) is a top view and FIG. 11(b) is a side sectional view. FIG. 13 is an enlarged view of a portion A in FIG. 11(b), and shows a state where the lower die is rotated by 90 degrees and is horizontally disposed. FIG. 14 is a side sectional view showing a change in state when the lower die is pushed up with respect to the upper die.

[0042] As can be understood from the comparison between FIGS. 7(a) and 7(c), which are front sectional views, the upper die 24 is loaded into the upper die holder 240 in a manner of entering from the right side. That is, as described above, the upper die 24 is attachable and detachable from the right side in FIG. 1, which is the same direction as the film holding means 211 and the excess film winding means 212 in the direction along the winding shaft. In addition, as shown in FIG. 7(b), the upper die includes a metal plate 242 that functions as a top seal by receiving heat supplied from the heater means 241, and a film cutting means 244 for cutting the film. As shown in FIG. 8, the metal plate 242 has a rectangular shape with chamfered corners to correspond to an edge portion of the tray T, and the film cutting means 244 is disposed on an outer periphery of the metal plate 242. In addition, the metal plate 242 is composed of a protruding portion 242a having a size corresponding to the edge portion of the tray T and a central portion 242b surrounded by the protruding portion 242a (see also FIG. 9(c)). The film cutting means 244 can cut the welded film to a size of the tray T. The heat from the heater means 241 is transmitted only to the metal plate 242, but a structure in which the heat is transmitted to other metal portions is not excluded.

[0043] As shown in FIG. 7(a), the heater means 241 for supplying heat for film welding is positioned above the upper die 24 by biasing means (not shown) in a case where the upper die 24 is not loaded (see also FIGS. 10(b) and 10(d)). Here, in a case where the upper die 24 shown in FIG. 7(b) is caused to enter from the right direction in the drawing, a contact portion at a distal end of the upper die 24 comes into contact with a roller 2431 at a distal end of a heater link 243, and the heater link 243 presses the heater means 241 downward as shown in FIG. 7(c) (see also FIGS. 9(b) and 9(d)). Then, the heater means 241 comes into contact with the metal plate 242 of the upper die 24, and can transmit heat for welding to the metal plate 242.

[0044] In the embodiment of the present invention, the heater means 241 is formed by drilling a hole in an aluminum material and inserting a cartridge heater into the hole (see also FIG. 10(d)). However, it is also possible to adopt a silicone rubber heater, a plate heater, a plug-type heater, a sheath heater, or the like. Furthermore, the heater type is not limited to a heat conduction type heater, and may be an aspect of a convection type heater, a radiation type heater, or the like.

[0045] In addition, the heater means may be configured to come into direct contact with the metal plate 242 of the upper die 24, or may be configured to come into indirect contact with the metal plate 242 by adding a member having a high thermal conductivity, for example, a heat transfer member such as gold, silver, copper, or aluminum, to the metal plate 242. For example, in a case where the spread of the heater means is smaller than the size of a rectangular portion as the spread of the metal plate 242, a region to which heat is transferred is only near the center, and the efficiency is not good. Therefore, as shown in FIG. 9(f), a heat transfer member HTM having a high thermal conductivity and a size not inferior to the spread of the metal plate 242 is interposed between the heater means 241 and the metal plate 242, so that an area to which heat is transferred can be effectively increased. In a case where the heat transfer member HTM is provided, a thermal resistance and a heat capacity of the heat transfer member HTM are taken into consideration in a case of calculation of the upper die temperature calculation means.

[0046] In a case where the tray T is to be adapted by selecting and mounting one die among dies having a plurality of types of sizes in order to perform packaging processing according to different sizes of, for example, three types of sizes of "large", "medium", and "small", it is generally considered to provide the heater means in each die. However, in this case, since work of inserting and removing a heat source connector is required each time the die is replaced, it is troublesome. However, in the packaging apparatus 100 according to the embodiment of the present invention, there is an advantage that the replacement work is simple and efficient because it is not necessary to reconnect the line of the heater and additional work of establishing an electrical connection in the work of replacing the upper die is not required.

[0047] As described above, the upper die 24 is provided with the chamfered rectangular metal plate 242 having a size and a shape corresponding to the edge portion of the tray T, and the metal plate 242 is composed of a protruding portion 242a having a size corresponding to the edge portion of the tray T and a central portion 242b surrounded by the protruding portion 242a. In the present embodiment, an upper die for a large tray having a tray size of a width of 150 mm and a depth of 150 mm, an upper die for a medium tray having a tray size of a width of 150 mm and a depth of 120 mm, and an upper die for a small tray having a tray size of a width of 120 mm and a depth of 120 mm are prepared. FIG. 8 shows an upper die corresponding to a "medium" size tray. On the other hand, FIG. 9 shows

an upper die corresponding to a "large" size tray.

[0048] The metal plate 242 transfers heat supplied from the heater means 241 disposed in the upper die holder 240 to the film to perform the top sealing. A cutting blade as a film cutting means 244 for cutting the film is provided on an outer periphery of the chamfered rectangular metal plate 242. As shown in FIGS. 8 to 10, the film cutting means 244 is fixed to the upper die 24 body. In addition, the metal plate 242 and the surrounding bottom plate 247 are connected to the upper die 24 body via a biasing means, and a biasing force of the former is set to be stronger than a biasing force of the latter. Therefore, in a case where the lower die 25 is pushed upward while the edge portion of the tray T is brought into contact with the tray edge support portion 254 of the lower die 25 shown in FIG. 11, first, the lower die 25 comes into contact with the surrounding bottom plate 247 of the upper die 24, then, the edge of the tray T comes into contact with the metal plate 242, and finally, the film pushed upward by the tray T comes into contact with the film cutting means 244.

[0049] The upper die 24 is provided with three upper die holes 245 for detecting the size of the die, and one of the holes is filled according to the size. The unfilled hole functions as a light-transmitting portion, and the filled hole functions as a light-shielding portion or a reflective portion.

[0050] In a case where the upper die 24 is removed from the upper die holder 240, in a case where a side portion of the upper die 24 is gripped, the film cutting means 244 may protrude from a bottom surface of the upper die 24, which is dangerous. Therefore, as shown in FIG. 8, the upper die 24 is provided with a transport grip portion 246. In a case where the transport grip portion 246 is present, in a case of pressing to perform the heat sealing, that is, in a case where the lower die 25 is pushed upward, the film cutting means 244 protrudes relatively downward. However, in a case where the upper die 24 is removed and held by a hand, the film cutting means 244 can be prevented from protruding relatively. In addition, the transport grip portion 246 also contributes to preventing burns or the like in a case where the upper die 24 is held in a state where cooling has not yet been sufficiently completed.

[0051] In a case where the upper die 24 is attached to the upper die holder 240, the notch portion 248 (see FIG. 8(d)) provided at a left and right lower end of the upper die 24 is temporarily placed on a rail 2401 of a left and right inner surface of the upper die holder 240, and then a slide operation is performed, so that the upper die 24 can be easily loaded (see also FIGS. 10(d) and 10(f)). In addition, in a case where the upper die 24 is removed from the upper die holder 240, the lock release lever 24L shown in FIG. 9 is pushed downward to unlock the upper die 24, and then the extraction grip portion 24G is gripped and a slide operation is performed. At a point in time when most of the upper die 24 protrudes, the transport grip portion 246 is gripped again and pulled out, so that the upper die 24 can be easily removed.

[0052] FIGS. 9 and 10 show a state where the upper die is loaded in the upper die holder and a state where the upper die is not loaded in the upper die holder. FIG. 9 is a view showing a state where the upper die is loaded in the upper die holder, in which FIG. 9(a) is a top view, FIG. 9(b) is a front view, FIG. 9(c) is a bottom view, FIG. 9(d) is an upper perspective view, FIG. 9(e) is a right side view, and FIG. 9(f) is a conceptual view showing a heat transfer member. FIG. 10 is a view showing a state where the upper die is not loaded in the upper die holder, in which FIG. 10(a) is a top view, FIG. 10(b) is a front view, FIG. 10(c) is a bottom view, FIG. 10(d) is an upper perspective view, FIG. 10(e) is a right side view, and FIG. 10(f) is an enlarged view of a portion D of FIG. 10(d). Unlike FIG. 8, FIG. 9 shows a state where the upper die corresponding to the tray having the "large" size is loaded.

[0053] As can be seen by comparing FIGS. 9(b) and 10(b) or as can be seen by comparing FIGS. 9(d) and 10(d), in a state where the upper die 24 is loaded, as shown in FIGS. 9(b) and 9(d), the heater link 243 pushes the heater means 241 downward, whereas in a state where the upper die 24 is not loaded, as shown in FIGS. 10(b) and 10(d), the heater means 241 is positioned upward by the biasing means (not shown), so that the heater link 243 also bounces upward along with the heater means 241.

[0054] FIG. 9(c) shows a state where the metal plate 242 is composed of a protruding portion 242a having a size corresponding to an edge portion of the tray T and a central portion 242b surrounded by the protruding portion 242a. In addition, in FIG. 10(d), a state where the heater means 241 is positioned upward by the biasing means (not shown) is shown, and a hole for inserting the cartridge heater can be seen.

[0055] As can be seen by comparing FIGS. 9(c) and 10(c), the spread of the heater means 241 is smaller than the size of the rectangular shape portion as the spread of the metal plate 242. Therefore, as shown in FIG. 9(f), a heat transfer member HTM having a thermal conductivity and a size that is not inferior to the spread of the metal plate 242 is interposed between the heater means 241 and the metal plate 242, so that the area for heat transfer is effectively increased.

[0056] As shown in FIGS. 11(a) and 11(b), the lower die 25 includes a gas inlet 251 for performing a gas replacement process (gas flush), a gas diffusion stage section 2510 connected to the gas inlet 251, and an air discharge port 252. Since a region including the gas inlet 251 and the gas diffusion stage section 2510 is covered with a cover, the gas inlet 251 and the gas diffusion stage section 2510 are drawn by broken lines in FIG. 11(a). Since the gas diffusion stage section 2510 has a triangular shape in a top view, the gas is imparted with diffusivity that easily spreads in a lateral direction of the tray as indicated by a white arrow in the

drawing. In FIG. 13, F indicated by a broken line is a film and simultaneously indicates a film carrying surface. However, since a cover that covers the gas diffusion stage section 2510 and the like is positioned at a left end of the broken line, only that portion is drawn by a solid line. In addition, in FIG. 13, as indicated by white arrows, the gas is diffused by the gas diffusion stage section 2510, enters the inside of the tray T, is sent rearward, and finally changes direction downward and is discharged from the plurality of air discharge ports 252. The gas inlet 251 is disposed in front (corresponding to the long side of the tray), whereas the air discharge ports 252 are disposed in rear (corresponding to the long side of the tray facing the front), but the air discharge ports 252 may be disposed on a side (on both left and right sides or on one side) corresponding to a short side of the tray. In addition, the air discharge ports 252 communicate downward, but may be configured to communicate rearward.

[0057] As shown in FIG. 11(a), the lower die 25 is provided with three lower die holes 253 for detecting the size of the die, and one of the holes is filled according to the size. The unfilled hole functions as a light-transmitting portion, and the filled hole functions as a light-shielding portion or a reflective portion. The tray T is raised by being supported by a tray edge support portion 254 provided inside the lower die 25 at an edge portion thereof. The center of the lower die 25 is vertically penetrated, and a tray bottom surface support means 26 is fixedly provided in a housing at this position (see FIG. 14). The tray bottom surface support means is configured to be able to correspond to the size of the tray to be used. For example, a replaceable configuration or a slide variable configuration in which a depth is extended and contracted according to the tray size can be adopted.

[0058] A method of attaching and detaching the lower die will be described with reference to FIG. 12. FIG. 12 is a perspective view showing a state in which the lower die is attached to and detached from the lower die holder. As shown in the drawing, in a state in which the lower die 25 is loaded in the lower die holder 250, the lower die 25 can be easily attached to and detached from the lower die holder 250 by gripping a hole in which the tray inside the tray edge support portion 254 of the lower die 25 falls, that is, by gripping a gripping portion using an upper surface, a lower surface, and an inner surface, which are peripheral portions, as the gripping portion.

[0059] The upper die 24, the upper die holder 240, and the lower die 25 cooperate with each other to push up the tray T, and a gas replacement process for extending a best-before date of an object to be packaged is performed, and then a packaging process is performed. This operation will be described. FIG. 14 is a side cross-sectional view showing a change in a state in a case in which the lower die is pushed up with respect to the upper die, in which FIG. 14(a) shows a state in which the lower die 25 is slightly raised from a lowermost stage position, FIG. 14(b) shows a state in which the lower die 25 is largely raised and is in contact with the film F to form a closed space, and FIG. 14(c) shows a state in which the lower die 25 has continued to be raised, is in contact with the metal plate 242, and is further raised to cut (punch out) the film F by the film cutting means 244. In addition, in each of FIG. 14(b) and FIG. 14(c), a partially enlarged view of a portion B and a portion C is also shown.

[0060] The tray T transported from the weighing means 1 by the infeed bar IB is initially supported by the tray bottom surface support means 26 on a bottom surface thereof. Thereafter, in a case in which the lower die 25 is raised, the support of the bottom surface of the tray T by the tray bottom surface support means 26 is taken over by the support of an edge portion of the tray T by the tray edge support portion 254 of the lower die 25 as shown in FIG. 14(a). Thereafter, in a case in which the lower die 25 is raised to a position shown in FIG. 14(b), a closed space is formed by the lower die 25 and the film F, an inert gas for replacing air present in a space formed between the film F and the tray T is transmitted and injected through the gas inlet 251 and the gas diffusion stage section 2510, and instead, the air is discharged from the air discharge port 252. As a result, the gas replacement process (gas flush) for extending the best-before date of the object to be packaged is executed. Thereafter, the lower die 25 continues to be raised, and the edge portion of the tray T comes into contact with the metal plate 242 of the upper die 24 (this state is not shown, and the lower die 25 is located at a height position between FIG. 14(b) and FIG. 14(c)). In this state, the top sealing is started, and after the heat welding process is performed at a predetermined heat sealing temperature for a predetermined tray sealing time, the lower die 25 is further raised, and the extra length portion around the top-sealed film is cut by the film cutting means 244. The heat sealing temperature and the tray sealing time are basically associated with the PLU as will be described later. From FIG. 14(c), a state in which the blade edge of the film cutting means 244 is located below the film F and the edge portion of the tray T such that the metal plate 242 of the upper die 24 and the tray edge support portion 254 of the lower die 25 sandwich the film F and the edge portion of the tray T can be seen. The action mechanism in which the edge portion of the tray T first comes into contact with the metal plate 242 and then comes into contact with the film cutting means 244 is achieved by setting a biasing force of the metal plate 242 in a downward direction to be weaker than a biasing force of the film cutting means 244 and configuring the metal plate 242 to retreat upward with respect to the film cutting means 244. Although not shown, in a case in which the lower die 25 is lowered, the support of the edge portion of the tray T by the tray edge support portion 254 of the lower die 25 is taken over by the

support of the bottom surface of the tray T by the tray bottom surface support means 26, and thereafter, the tray T is transported to the downstream region 3 by the infeed bar IB.

(Fit Detection of Upper and Lower Dies)

[0061] As described so far, in the embodiment of the present invention, three types of upper dies and three types of lower dies are prepared to correspond to three types of trays T of "large", "medium", and "small" having different sizes. The upper die 24 can be replaced by being inserted from the right side of the side panel SP as it is, and the lower die 25 can be replaced by being inserted from the right side of the side panel SP and then being dropped downward. Here, a problem arises as to whether or not the correct size die is loaded. Therefore, in the embodiment of the present invention, a measure is taken to detect whether or not the correct upper die 24 and the correct lower die 25 are loaded. That is, as shown in FIG. 8, the upper die 24 is provided with three upper die holes 245, and as shown in FIG. 11, the lower die 25 is provided with three lower die holes 253. One hole in each of the upper die holes 245 and the lower die holes 253 is filled according to the size. A light-emitting element is provided below the lower die 25 and a light-receiving element is provided above the upper die 24 in portions corresponding to both ends of the three holes. A light-emitting element is provided above the upper die 24 and a light-receiving element is provided below the lower die 25 in a portion corresponding to the center. Originally, two light beams should be received, but in a case in which the upper die 24 and the lower die 25 do not correspond to each other, one of the light beams is blocked, so that the upper and lower dies do not fit, and this can be detected. Based on this premise, the size of the die loaded in a vertically aligned manner can also be detected and determined according to the position of the hole, and a notification means such as a display means, a voice guidance, or communication with an external separate device is configured to perform a notification as necessary.

[0062] In the present embodiment, the reason why the traveling directions of the light beams are reversed between the portions corresponding to both ends and the portion corresponding to the center is to suppress the interference of the adjacent light beams. However, in a case in which there is no concern about the interference of the light beams, the directions of the three light beams may be aligned. In addition, the hole filled according to the size is one of the three holes, but two holes may be filled. However, it is desirable to fill one hole and detect the other two holes because the possibility of determining various different situations is increased. Further, the light-emitting element and the light-receiving element may be a reflective sensor instead of a combination thereof, and in this case, the hole to be filled is a reflective portion instead of a light-shielding portion. In addition, the upper and lower dies may be configured to be determined by capturing the features of the upper and lower dies with another optical means, for example, an imaging element, and performing image analysis, instead of an optical sensor, and in this case, even in a case in which the upper and lower dies are not aligned and are in a mismatched state, each of the upper and lower dies can be determined separately. According to the present embodiment with such a configuration, it is possible to provide a packaging apparatus with high effectiveness without stopping the line due to the mismatch of the upper and lower dies.

[0063] As an aspect of the problem occurrence, other errors may occur in addition to the mismatch of the upper and lower dies. In a busy period at a site, other work may be interrupted and performed in addition to the packaging work, and the operator may be forced to perform other work or an unfamiliar operator may perform the operation, which may result in a mistake of forgetting to load the die itself. Then, despite the fact that the die is not loaded, the operator may mistakenly think that the die has been replaced and may attempt to resume the work. However, in the embodiment of the present invention, in a case in which neither the upper nor lower dies are loaded, the light is not blocked for all of the three holes, and thus the light emitted from the three light-emitting elements is detected by all of the three light-receiving elements. By determining a state in which the three sensors are turned on as a loading omission and notifying the operator of the state, it is possible to prevent further work errors due to the loading omission of the upper and lower dies.

[0064] As described above, the mismatch of the upper and lower dies and the loading omission of the upper and lower dies can be detected by the three holes, but in some cases, another type of mistake may occur. In a case in which interrupted work occurs during the replacement work, it is also conceivable that a situation occurs in which the upper die is replaced but the lower die is not replaced and is not loaded, or vice versa. Another example of the fit detection of the upper and lower dies will be described, assuming such a mistake.

[0065] FIG. 15 is an example in which holes are provided at five different positions in the upper die holes 245 and the lower die holes 253 (in the drawing, one hole is filled, so the holes appear to be four). The configuration of the three holes of the matching determination upper die holes 2451 and the matching determination lower die holes 2531 and the action mechanism such as determining the match by turning on the two sensors are the same as those in the example described above. In addition to this, in another example, as shown in FIG. 15, the upper die 24 is provided with a lower die non-loading determination hole 2452, and the lower die 25 is provided with an upper die non-loading

determination hole 2532. In another example of the fit detection of the upper and lower dies, the lower die non-loading determination hole 2452 and the upper die non-loading determination hole 2532 are provided, and thus the control means of the packaging apparatus is configured to determine a state in which the lower die is not loaded or a state in which the upper die is not loaded. Of course, it is also possible to determine a state in which neither the upper nor lower dies are loaded.

[0066] The action mechanism of the determination will be described with reference to FIG. 16. Here, the numbers 2 to 4 with circles (hereinafter, referred to as (2) to (4)) are the matching determination upper die hole 2451 or the matching determination lower die hole 2531. In addition, (1) is the lower die non-loading determination hole 2452, and (5) is the upper die non-loading determination hole 2532. The hole of the lower die at a position facing the lower die non-loading determination hole 2452 of the upper die 24 is filled, but the hole may be configured not to be formed in the first place. The same applies to the hole of the upper die at a position facing the upper die non-loading determination hole 2532 of the lower die 25.

[0067] As shown in FIG. 16(a), in a case where the sensor outputs at the corresponding positions of (2) and (3) are turned on, it is determined that the large-sized die is loaded. In addition, as shown in FIG. 16(b), in a case where the sensor outputs at the corresponding positions of (2) and (4) are turned on, it is determined that the medium-sized die is loaded. In addition, as shown in FIG. 16(c), in a case where the sensor outputs at the corresponding positions of (3) and (4) are turned on, it is determined that the small-sized die is loaded. In addition, although not shown, in a case where only one sensor output is turned on, the sizes of the upper and lower dies do not match. On the other hand, in a case where three sensor outputs are turned on, neither the upper nor lower dies are loaded. The determination method of the other example described above has the same action mechanism even in the example in which only three holes described above are provided.

[0068] In a case where only one of the upper and lower dies is forgotten to be loaded, the fact cannot be detected by only three sensors. However, in a case where five sensors are used, the fact can be detected appropriately. That is, as can be understood from FIG. 16(d), in a case where the sensor output of (1) is turned on, the upper die is loaded, but the lower die is not loaded. On the other hand, as can be understood from FIG. 16(e), in a case where the sensor output of (5) is turned on, the lower die is loaded, but the upper die is not loaded. In a case where nither the upper nor lower dies are loaded, as described above, the sensor outputs of (2) to (4) are turned on, but in addition to this, the sensor outputs of (1) and (5) are also turned on, and all five sensor outputs are turned on. In addition, the determination may be made by a method other than the above method. For example, the upper die is configured such that the tray size is determined by the sensors of (2) to (4), but the determination of whether the upper die is loaded or not is performed by inserting the upper die 24 shown in FIG. 9 into the upper die holder 240 by providing a physical sensor or the like, and the lower die is configured such that the tray size is determined by the sensors of (2) to (4), and the determination of whether the lower die is loaded or not is performed by the sensor of (1). According to this configuration, the sensor of (5) can be omitted.

[0069] In addition, in the example in which three holes are provided and the other example in which five holes are provided, the size information of the container associated with the product information is stored in an appropriate storage means, and it is possible to detect that the size of the determined upper and lower dies and the size of the container associated with the called product information are different, and the notification means is configured to perform the notification as necessary. On the contrary, as a control of not calling a product that does not correspond to the set die, the product may not be called to make the user notice that the die is not suitable.

[0070] The means for determining the suitability of the die may be another detection means without using the holes. For example, a more intelligent method using the first imaging means C1 and the second imaging means C2 that image the state of the tray T may be used, or conversely, a primitive method may be used. For example, a configuration can be adopted in which the weight of the die is measured to determine the die, or a mark or a number is written on the die so that the number of the die can be visually confirmed. In addition, even in a case where an imaging element is used, the determination may be made by reading a barcode displayed on the die, rather than the physical feature of the die itself.

[0071] However, in a case where an optical means or another physical quantity is used, if a sensor that can identify which upper and lower die is loaded is provided, it is possible to determine which size of die is loaded in each of the upper and lower die holders, and the guidance on the display screen described later is advantageous. As a specific example of the sensor, the first imaging means C1 and the second imaging means C2 described above can be used. That is, the upper die 24 need only be configured to be captured by configuring the first imaging means C1 to be able to image the upper die 24 at the same time as the tray T carried into the machine frame as a wide-angle camera, or by configuring the camera to be able to pan. Of course, a dedicated imaging means for the upper die 24 may be prepared. In addition, a physical sensor or the like corresponding to the size of each die can be appropriately adopted.

(Various Processes on Dies)

[0072] In the present embodiment, the effective process on the upper and lower dies is devised while considering the device characteristics of the packaging apparatus. Specifically, the process that contributes to the appropriate packaging work can be executed by using the temperature information obtained from the die temperature measuring means and using the fit detection information of the upper and lower dies according to the situation. This will be described with reference to FIGS. 17 to 22.

[0073] FIG. 17 is a flowchart showing a flow of various types of processing on the die, and FIGS. 18 to 22 are examples of screen layouts displayed on the display unit of the console 6. The process performed on the die will be described along the flowchart of FIG. 17.

[0074] In a case where the upper and lower dies are changed, the packaging machine is stopped by pressing the "emergency stop" button once, and then the die is replaced or the film is replaced. In step 1, first, the "emergency stop" button 8 is pressed (ST1). The "emergency stop" button 8 is a mechanical button (see FIGS. 1 and 5) disposed on the machine frame, but need not necessarily be a mechanical button. FIG. 18(a) is a screen layout showing a state immediately after the "emergency stop" button 8 is pressed. The type of the die currently set is determined, and the type of the die currently set is displayed. In FIG. 18(a), the upper die 24A and the lower die 25A for the large tray are set, and this is displayed together with the size information of the width of 150 mm and the depth of 150 mm.

[0075] In step 2, it is determined whether or not the die is replaced (ST2). That is, in a case where the "film replacement" button is pressed on the screen of FIG. 18(a), the operator's intention to replace the film instead of replacing the die is input, the determination in step 2 is NO, and in step 3, the film replacement or other work is executed (ST3). Examples of the other work include work in a "pricing mode" in which only a label for pricing is issued without packaging. In order to transition to the pricing mode, the "manual pricing" button is pressed, and then the display screen transitions to the weighing screen (packaging and pricing screen). In addition, the packaging machine cleaning is also an example of the other work.

[0076] On the other hand, in a case where the "die replacement" button is pressed on the screen of FIG. 18(a) in order to replace the die, a button prompting "cooling start" is displayed as shown in the screen layout of FIG. 18(b). The "cooling start" in the present embodiment means that the heat supply of the heater means 241 is stopped and natural cooling is performed. Of course, in a case where the entire apparatus is heated, in a case where the cooling means for protecting the apparatus main body is provided, the cooling means may be configured to perform active cooling by using the cooling means, or special cooling means dedicated to the die may be provided. In addition, in the operation aspect, for example, in a case where the "die replacement" button is pressed, the pressing operation of the "cooling start" button may be skipped so that the cooling (natural cooling) is started immediately. The display of the operation screen is merely an example.

[0077] Returning to the flowchart, in step 4, in a case where the "cooling start" button is pressed, a state of natural cooling is achieved (ST4), and a screen layout shown in FIG. 19(a) is displayed on the display unit. As shown in FIG. 19(a), first, "cooling" is displayed as information. In addition to the current die corresponding to the tray size information, the current temperature calculated by the die temperature calculation means is "90°C", the proper exchange temperature is "35°C", and an estimated time until the proper temperature is also displayed. The estimated time may be set in advance from the current temperature to the proper exchange temperature, or the required time calculated by a predetermined algorithm from the current temperature, the outside air temperature (indoor temperature), and the like may be displayed, and the estimated time is merely an indication.

[0078] In a case where the "emergency stop" button 8 is released during the cooling, it is possible to notify that "the exchange has not been performed yet", to display a message inquiring whether the necessity of restarting the packaging with the loaded die without performing the exchange has occurred, to confirm the necessity of reheating, or to display a confirmation screen for heating to the suitable welding temperature, and to perform reheating.

[0079] Thereafter, the monitoring is continued until the current temperature calculated by the die temperature calculation means reaches 35°C, which is the proper exchange temperature (ST5), and in a case where the current temperature reaches the proper exchange temperature, the screen layout shown in FIG. 19(b) is displayed. The operator who has checked the messages "cooling completed" and "the exchange can be performed" presses the "die replacement" button in step 6 to change the upper die and the lower die to those corresponding to the desired tray size (ST6). In a case where the "die replacement" button is pressed, the packaging apparatus 100 according to the embodiment of the present invention executes control of loosening the film by rotating the film support shaft in a direction of loosening or rotating the winding side in a direction of loosening, thereby making it easier to replace the die. The film and the upper die 24 are very close to each other, and there is a concern that the film may be caught on the upper die 24 during the insertion and removal of the upper die 24 (see FIG. 4). Thereafter, the operator performs the die replacement work, and in a case where the operator presses the "exchange completed" button (not shown) after the work

is completed, the loaded state of the upper and lower dies is determined in step 7 (ST7).

[0080] As a result of the determination, in a case where there is a problem with the loaded state of the die, an error is displayed in a conspicuous manner, and the content of the error is displayed. For example, as shown in FIG. 20(a), the upper die is displayed as not loaded together with the emphasized display of the "die mismatch error". Then, the "start heating" button is not activated and is in a state where it cannot be pressed. After the operator who has viewed the screen of FIG. 20(a) loads the not loaded upper die and presses the "die replacement completed" button, the die loaded in each of the upper die and the lower die is displayed. As a result, in a case where the size of the upper die is erroneously loaded, for example, the upper die is displayed as having a large size, but the lower die is displayed as having a medium size, and the state of the size mismatch is displayed together with the emphasized display of the "die mismatch error", and the "start heating" button is not activated and is in a state where it cannot be pressed. However, this display mode is a case where the sensors capable of individually determining the upper and lower dies are provided, and in a case where the sensors are not provided, only the fact that the upper and lower dies do not match is simply notified.

[0081] On the other hand, as a result of the determination, in a case where the sizes of the upper and lower dies match, for example, as shown in FIG. 20(b), on the guide screen, it is displayed that both the upper die and the lower die have a medium size, and the "start heating" button is displayed as being activated and in a state where it can be pressed. Thereafter, the size information display of the upper and lower dies may be configured to transition to a single size information display such as "medium size (2) tray 150W × 120D" as shown in FIG. 20. In addition, the heating may be started together with the display of the start of heating without requiring a pressing operation.

[0082] In addition, as the button display, the display of the start of heating may not be performed, and the start of heating may be controlled to be performed only when the upper die and the lower die match, and the start of heating may be controlled not to be performed when the upper die and the lower die do not match. However, it is desirable to configure the heating itself to be recognizable by screen display, voice notification, sign pole, or the like. Furthermore, in a case where it is detected that the upper die is reloaded during the replacement, the heating may be restarted by executing the restart control of the heating, or the heating may be restarted with a condition such as a gentle restart. By executing these controls, the time required to reach the suitable welding temperature can be shortened.

[0083] Thereafter, the monitoring is continued until the current temperature calculated by the die temperature calculation means reaches 160°C, which is the suitable welding temperature (ST8). In this case, on the guide screen of the display unit, as shown in FIG. 21(a), it is displayed that both the upper die and the lower die have a medium size, and it is displayed that the heating is in progress. The fact that the heating is in progress may be notified by blinking a pilot lamp provided in the device housing, a sign pole disposed outside the housing, or the like. The current temperature calculated by the die temperature calculation means is also displayed as "38°C", and the welding temperature is also displayed as "160°C". In addition, an estimated time until the welding temperature is reached may be displayed.

[0084] In a case where the "emergency stop" button 8 is pressed to release the emergency stop state during the heating, a warning notification such as "there is a risk of packaging defect" is performed, and the transition to the "packaging mode" and the "packaging and pricing mode" among the plurality of prepared processing modes as various types of work performed by the packaging apparatus 100 until the heating temperature reaches the suitable temperature is configured to be unavailable. On the other hand, since the work in the "pricing mode" in which the weighing and pricing is performed without packaging or only the label for pricing is issued can be executed even during the heating, the "manual pricing" button can be pressed on the screen of FIG. 21(a). As described above, the packaging apparatus 100 according to the embodiment of the present invention includes the mode switching means that is capable of switching between the first processing mode in which both the packaging means and the pricing means execute the processing and the second processing mode in which only the pricing means executes the processing, and the mode switching means is configured to restrict the mode switching to a mode other than the second processing mode in a case where the upper die is not in the suitable temperature range for welding. In addition, on the operation screen of the "pricing mode", the change of the processing mode in a state where the temperature is not the suitable welding temperature may be configured to be prohibited, or the change may be configured to be allowed but only the notification that the temperature is not the suitable temperature is performed.

[0085] In addition, it is also possible to adopt a configuration in which the weighing work related to the packaging is started in advance to some extent, in addition to the manual pricing of the work completely independent of the packaging. That is, although the packaging is not yet in a stage where the packaging can be appropriately performed, the weighing work, which is the pre-stage processing, can be performed, and the temperature at which the switching to the weighing screen is permitted can be set, and for example, in a case where the welding temperature is 160°C, the switching to the weighing screen may be configured to be permitted at a point in time when the temperature

reaches 120°C.

[0086] In step S8, in a case where it is determined that the welding temperature is reached, that is, the heating is completed (ST8), the screen layout shown in FIG. 21(b) is displayed. The operator who has checked the message "heating completed" and "please release the [emergency stop] button" can press the "heating completed" button for confirmation and further release the "emergency stop" button 8 to start the packaging and pricing work. The "heating completed" button may be configured to be omitted, and the operation mode may be configured to directly release the "emergency stop" button 8.

[0087] Additional configurations and modification examples related to various types of processing on the die will be described. Since the range setting of the welding temperature may change depending on the material and compatibility of the tray, the film, and the like, the range setting is configured to be changeable and storable and acquirable. In this case, the welding temperature may be configured to be changed by changing the setting of the "tray" or the "film" on the weighing screen. In addition, a master in which the types of the tray and the film are combined may be set, and the master may be designated to be changed. In addition, in a case where the combination of the tray and the film is not appropriate, the notification may be appropriately performed by a warning display, a warning sound such as a buzzer sound, or an alert sound.

[0088] In addition, in addition to the screen display on the display unit, a sign pole may be provided for the notification during cooling or heating, and the sign pole may be configured to be turned on in blue during cooling and to blink in blue when the temperature reaches the proper exchange temperature, and to be turned on in red during heating and to blink in red when the temperature reaches the proper welding temperature. The notification mode can be changed to grasp the degree of reaching the proper welding temperature during heating and the degree of reaching the proper exchange temperature during cooling, and there is an advantage that the state of the temperature can be grasped while performing other work even in a case where the waiting time is relatively long, or the situation can be grasped from a place away from the packaging apparatus. The notification regarding the proper welding temperature and the proper exchange temperature may be performed in multiple stages by, for example, turning on the notification in a blinking state until the temperature reaches the proper welding temperature or the proper exchange temperature, turning on the notification in a turned-on state when the temperature reaches the proper welding temperature or the proper exchange temperature, and gradually changing the blinking cycle until the temperature reaches the proper welding temperature or the proper exchange temperature.

[0089] In a case where the die is exchanged in a state where the temperature is not the proper exchange temperature, the notification may be performed by a message or a voice to exchange the die using the heat-insulating gloves. In addition, in a case where a sensor that detects the loading state of the die is provided, in a case where the die is exchanged in a state where the temperature is not the proper exchange temperature, the notification that the temperature is not the proper exchange temperature can be performed. Further, in a case where a lock mechanism is provided during the loading of the die, the lock release may be prohibited until the temperature reaches the proper exchange temperature, or the lock release may be controlled to be released by setting a special authority for the lock release and by a special operation such as a password.

(Display Example of Determination Result on Weighing Screen)

[0090] FIG. 22 is a diagram showing a display example of a determination result on a weighing screen. For a product name of "Gauda Cheese", "Large (1)" is displayed in an item of "Tray type selection", and "Width 150 × Depth 150" is displayed in an item of tray dimensions. "Width 150 × Depth 150" is set in the item of the tray dimensions of "Gauda Cheese", and here, since the die is "Large (1)", the combination is correct. In a case where "Medium (2)" or "Small (3)" is loaded as the die, the target tray dimensions are "Width 150 × Depth 120" or "Width 120 × Depth 120", and the combination is a size error for "Gauda Cheese". Therefore, in a case where the determination result of the loading state of the upper and lower dies is medium or small, the notification that the size is an error is performed. For example, the display mode may be changed from the normal display mode to be conspicuous so that the size error can be easily recognized, or a message such as "size error" may be displayed more directly. Further, the error may be notified by a voice.

[0091] In addition, in a case of the correct combination, the tray dimensions may not be changed. However, the tray dimensions may be changed for the die, and the tray dimensions of "Width 150 × Depth 150" of "Gauda Cheese" may be changed to "Width 150 × Depth 120" or "Width 120 × Depth 120" which are the tray dimensions that match the die, depending on the operation at the site, and in this case, the tray dimensions may be configured to be changeable as an exception processing. In other words, in a case where there is no corresponding tray, the packaging can be performed with another tray as a site response.

[0092] In a case where the storage of the product number is ambiguous and the user wants to input the product number several times, the notification of the size error is slightly annoying, and thus the notification timing may be slightly delayed, for example, the notification may be performed at a timing at which the op-

erator performs the weighing without noticing the size error.

[0093] In addition, the current processing mode is "packaging and pricing mode", and the heat seal temperature is "160°C". For the temperature display, the display mode may be changed to be conspicuous as long as the temperature is not the appropriate temperature. For example, it is considered that the display is performed in red while waiting for heating, and the display is changed to green when the temperature is the appropriate temperature.

[0094] In a case where the "pricing mode" is selected as the "packaging mode", the packaging work is not executed, and thus the determination of the match or mismatch between the die size associated with the called product and the loaded die size and the notification are not performed. Of course, the determination and the notification may be performed for the packaging work to be performed later.

(Packaging Operation Control Considering Suitable Welding Temperature)

[0095] The packaging apparatus 100 according to the embodiment of the present invention is devised to execute the optimal packaging operation control considering the suitable welding temperature by using the PLU setting information, the tray setting information, and the die setting information. In general, the suitable temperature for welding is set for each die, and in some cases, for each tray, and the packaging operation is executed at the suitable temperature. Therefore, in a case where the temperature of the die is not the appropriate set temperature, the control is performed not to start the packaging operation, such as prohibiting the packaging or waiting for the packaging until the temperature of the die reaches the appropriate set temperature. In addition, the control is performed to execute the notification that the temperature is not appropriate and the notification of the time until the temperature reaches the appropriate temperature. As shown in FIG. 23, these controls are executed according to the setting items used for the PLU setting, the tray setting, and the die setting.

[0096] The PLU setting information is originally a series of setting information stored in the product information storage means, the series of setting information including a product name, a price look up (PLU) code that is an identifier of the product, a thumbnail image showing a design of the product, a fixed weight or a variable weight of the product, and a price of a corresponding product (represented by (unit price × quantity) or (unit price × weight)). In addition to this, in the packaging apparatus 100 according to the embodiment of the present invention, specifications related to the packaging operation control are also stored in association with the PLU code. Specifically, the type of the tray, the type of the gas, the gas filling time, and the gas injection speed are set for each PLU. The product information storage means may be configured to be provided in the packaging apparatus 100 or may be configured to be provided in an external device. In any configuration, the control unit of the packaging apparatus 100 executes a control process of storing the information to be set and stored in association with the product in the product information storage means.

[0097] The tray setting information is information in which the heat seal temperature, the tray seal time, the gas filling time, and the gas injection speed are set for each tray. The reason why the setting of the heat seal temperature is provided in the tray setting is that, even in a case where the same die is used, the type of the tray to be used, specifically, the material is different, and thus the temperature suitable for the heat sealing is different. For example, a temperature suitable for a foamed tray is 110°C, whereas a temperature suitable for a resin tray is 180°C.

[0098] The die setting information is information in which the heat seal temperature, the tray seal time, and the gas filling time are set for each die. The reason why the setting of the heat seal temperature is provided in the die setting is that the temperature suitable for the heat sealing is different due to a difference in heat capacity depending on the size.

[0099] The PLU setting information, the tray setting information, and the die setting information are provided with a priority. That is, as shown in ascending order in the table shown in FIG. 24, the packaging operation control is preferentially determined in the order of the PLU setting information, the tray setting information, and the die setting information.

[0100] For example, in a case where the product number in the PLU is "0001", the gas filling time of 300 msec and the used tray of "000001" are set, and thus the gas filling time and the used tray are determined as the control contents. However, in a case where the product number in the PLU is "0002", the used tray of "000002" is set, but the gas filling time is automatically set and a specific value is not set, and thus the tray setting of the next priority is referred to. In addition, in a case where the tray number is "000002", the gas filling time of 250 msec is set, and thus the gas filling time is determined as the control content.

[0101] In a case where the product number in the PLU is "0003", the gas filling time is automatically set and a specific value is not set in the PLU setting information. In addition, the gas filling time is automatically set and a specific value is not set in the tray setting even for the used tray of "000003" set in a case where the product number in the PLU is "0003". Therefore, the die setting of the last priority is referred to. In addition, the "tray type 3" is set for the used tray of "000003", and the gas filling time of 1800 msec is set for the "tray type 3", and thus the gas filling time is determined as the control content.

[0102] The PLU setting information is not involved in

the determination of the heat seal temperature, and the packaging operation control is preferentially determined in the order of the tray setting information and the die setting information. In the example shown in FIG. 24, the specific temperature is set such that the heat seal temperature is 160°C for the used tray of "000001" and the heat seal temperature is 157°C for the used tray of "000002", while the heat seal temperature is automatically set for the used tray of "000003". In this way, in a case where the specific value is not set and the automatic setting is performed, the die setting is referred to. In addition, the "tray type 3" is set for the used tray of "000003", and the heat seal temperature of 180°C is set for the "tray type 3", and thus the heat seal temperature is determined as the control content.

[0103] As described above, the packaging operation control is various types of control for executing the packaging operation at an appropriate temperature. More specifically, the scope of the packaging operation control may include prohibiting the packaging operation, delaying the start of packaging, cooling the die as the heat-generating member (basically, natural cooling, but may be an aspect of cooling by providing a cooling fan or a peltier element), heating the die as the heat-generating member, making a notification regarding the suitable welding temperature, performing an appropriate packaging operation, or restricting or prohibiting an inappropriate packaging operation. The description will be made with reference to FIGS. 25 to 33.

[0104] FIG. 25 is a diagram showing a layout example of a main menu displayed after the power of the packaging apparatus 100 according to the embodiment of the present invention is turned on and the initialization process is performed or in response to a call operation. The example of the screen layout shown here is set at the time of product shipment, but the assignment position, size, and the like of the button can also be changed by the person in charge of the technology or the salesperson in charge customizing the setting.

[0105] In the screen layout shown in FIG. 25, the A1 button is a button operated to execute a "packaging mode" for performing the top seal processing and the labeling process. The A2 button is a button operated to execute a "pricing mode" in which only the pricing label is issued without packaging on the premise that the operator manually attaches the pricing label to the product.

[0106] In the screen layout shown in FIG. 25, the A3 button is a button operated to call a "setting mode" screen for selecting and determining each item of the PLU setting, the tray setting, and the die setting. The A4 button is a "training mode" button operated to call a training menu for the operator to master the operation of the packaging apparatus. In addition, the screen layout shown in FIG. 25 is also provided with a "set up" button for setting the entire packaging apparatus.

[0107] In the main menu shown in FIG. 25, the state of the temperature of the die, specifically, whether the temperature of the die is an appropriate temperature, or whether the die is being cooled or heated in a case where the temperature of the die is not an appropriate temperature may be displayed, and a rough time guide until the temperature of the die reaches an appropriate temperature may be further displayed. In addition, instead of the display means or in addition to the display means, a voice output means for making a notification by voice guidance can also be adopted. In addition, in addition to the screen display on the display unit, a sign pole may be provided for the notification during cooling or heating, and the sign pole may be configured to be turned on in blue during cooling and to blink in blue when the temperature reaches the proper exchange temperature, and to be turned on in red during heating and to blink in red when the temperature reaches the proper welding temperature. The state of reaching the appropriate welding temperature and the state of reaching the appropriate exchange temperature during cooling can be ascertained by changing the notification mode, and there is an advantage that the state of the temperature can be ascertained while performing other work even in a case where the waiting time is relatively long, or the situation can be ascertained from a place away from the packaging apparatus. The notification regarding the proper welding temperature and the proper exchange temperature may be performed in multiple stages by, for example, turning on the notification in a blinking state until the temperature reaches the proper welding temperature or the proper exchange temperature, turning on the notification in a turned-on state when the temperature reaches the proper welding temperature or the proper exchange temperature, and gradually changing the blinking cycle until the temperature reaches the proper welding temperature or the proper exchange temperature. According to such a configuration, it is possible to issue a warning to the operator, and the operator can make a work outlook for the future.

[0108] In the screen shown in FIG. 25, in a case where the "packaging mode" of A1 is touched, the mode is shifted to the packaging mode, and the screen is transitioned to the screen shown in FIG. 26. FIG. 26 is a diagram showing a layout example of a packaging mode screen. The example of the screen layout shown here is set at the time of product shipment, but the button assignment position, size, and the like can be optionally changed by customizing the setting.

[0109] In the screen layout shown in FIG. 26, B1 is a display region indicating the temperature status of the die. Specifically, it is displayed whether the temperature of the die is an appropriate temperature, or whether the die is being cooled or heated in a case where the temperature of the die is not an appropriate temperature. As described above, the welding temperature suitable for heat sealing varies depending on the type of tray and the type of die to be used, and it is not sufficient to simply heat the die. Therefore, the die is cooled or

heated such that the temperature of the die is an appropriate temperature. In the present embodiment, the cooling is performed by natural cooling, but in a case where the apparatus includes a cooling means for protecting the apparatus main body in a case where the entire apparatus is heated, the cooling means may be used to perform active cooling, or a special cooling means dedicated to the die, for example, a special cooling means such as a fan or a peltier element may be provided.

[0110] In the screen layout shown in FIG. 26, B2 is a button operated to call a menu screen for setting the packaging machine PLU data. B3 is a button operated to call a menu screen for performing tray setting. B4 is a display region indicating the current temperature of the die and the set temperature set as appropriate at present. In the example shown in FIG. 26, it is displayed that the current temperature of the die is 142°C and the set temperature is 157°C. Therefore, it is displayed in the display region of B1 that the die is being heated.

[0111] In the screen layout shown in FIG. 26, B5 is a display region indicating the type of die currently loaded. B6 is a display region indicating the current tray seal time set. The tray seal time is changed according to the type of die and the type of tray loaded.

[0112] In the screen layout shown in FIG. 26, B7 is a display region indicating whether or not the target corresponding to the current PLU is a product to be gas-filled. B8 is a display region indicating the type of gas to be used. That is, when the PLU is changed, the display of B8 is changed.

[0113] In a case where the display of "appropriate temperature" is made in the display region indicating the heater status of B1 on the screen shown in FIG. 26, when an operation for starting the top sealing is performed, the packaging operation is started. That is, the packaging apparatus 100 includes start means for starting the top sealing, and in the embodiment of the present invention, when the object to be packaged is placed on the weighing unit, the weighing operation and the packaging operation are automatically started. That is, the weighing unit also serves as the start means. In addition, the packaging operation may be configured to be started by pressing a start button provided separately, without starting the packaging operation by simply placing the object to be packaged on the weighing unit. In this case, the start means is a start button. In any aspect of the start means, in a case where the start means is activated, the operator can be made aware that the packaging is started by performing notification by voice guidance or screen display. On the other hand, even in a case where the start means is not activated, the notification is performed. It is preferable that the notification is made in a conspicuous manner, for example, by using a popup menu. Hereinafter, an example of the popup menu displayed in response to the packaging start command will be described with reference to FIG. 27.

[0114] In practice, since the display of "heating" is made in the display region indicating the heater status of B1 on the screen shown in FIG. 26, the packaging operation is not started even in a case where an operation for starting the top sealing is performed. In the embodiment of the present invention, when the object to be packaged is placed on the weighing unit, as shown in FIG. 27, a notification "Packaging is possible when the heater reaches the usable temperature. Please wait while taking the product." is displayed by a popup menu C1. In this case, the notification may be supplemented with a display indicating an approximate time until the temperature of the die becomes appropriate. As described above, the packaging operation control in the present embodiment is control of not starting the packaging operation by prohibiting the packaging operation in a case where the temperature of the die is not the appropriate set temperature. After the prohibition of the packaging operation is released, the operator places the object to be packaged taken according to the notification on the weighing unit again, that is, performs an operation for starting the top sealing again. According to this configuration, it is possible to prevent the occurrence of a situation in which the heat sealing is not appropriately performed.

[0115] As a modification example, a notification "Packaging is started when the heater reaches the usable temperature. Please wait as it is." may be displayed on the popup menu, and the content of the packaging operation control may be set to standby control. In this case, the notification may be supplemented with a display indicating an approximate time until the temperature of the die becomes appropriate. As described above, the packaging operation control in the modification example is control of not starting the packaging operation by causing the packaging operation to stand by until the temperature of the die reaches the appropriate set temperature in a case where the temperature of the die is not the appropriate set temperature. In a case where the prohibition of the packaging operation is released, the packaging operation is automatically started. According to this configuration, it is also possible to prevent the occurrence of a situation in which the heat sealing is not appropriately performed.

(Specifications of Packaging Operation in PLU Setting, Tray Setting, and Die Setting)

[0116] As described so far, the packaging apparatus 100 according to the embodiment of the present invention performs control of not starting the packaging operation by prohibiting the packaging, causing the packaging operation to stand by until the temperature of the die reaches the appropriate set temperature, or the like in a case where the temperature of the die is not the appropriate set temperature, and performs noti-

fication control indicating that the temperature is not appropriate or notification control of a time until the temperature reaches the appropriate temperature, but this is based on the premise that the specifications of the packaging operation are also set in the PLU setting, the tray setting, and the die setting. Hereinafter, the description will be made.

[0117] FIG. 28 is a diagram showing a layout example of a product master setting screen, FIG. 29 is a diagram showing a layout example of a PLU setting screen, FIG. 30 is a diagram showing a layout example of a tray setting screen, FIG. 31 is a diagram showing a layout example of a setting screen for each tray, FIG. 32 is a diagram showing a layout example of a setting screen for each die, and FIG. 33 is a diagram showing a layout example of a setting screen for each die.

[0118] Examples of items of information stored in the product information storage means, that is, information called a so-called product master include a product name, a price, a multi-image showing a design of the product, a place of origin name, and the like for each price look up (PLU) code, which is an identifier of the product, and examples of characteristic items of the present invention include specifications of the packaging operation. In the product master setting screen shown in FIG. 28, in a case where a button of "packaging machine PLU data of D1" is touched, the screen transitions to the screen shown in FIG. 29.

[0119] In the PLU setting screen shown in FIG. 29, the specifications for the label attachment control can be set in association with the PLU, and the specifications of the packaging operation can also be set as a characteristic configuration of the present invention. Specifically, in a case where a button of a gas filling time of E1 shown in FIG. 29 is touched, a selection item as the filling time is displayed in a pull-down menu, and the filling time can be set by touching a confirmation button. In the example shown in FIG. 29, "automatic" is designated as the filling time. The designation of "automatic" means that the control is performed according to the filling time designated in the tray setting, which is the next priority, as described above, and in a case where "automatic" is also designated in the tray setting, the control is further performed according to the filling time designated in the die setting, which is the next priority.

[0120] In addition, in a case where a button of a gas-in-use selection of E2 shown in FIG. 29 is touched, a type of gas to be used is displayed in a pull-down menu, and the use gas can be set by touching a confirmation button. In the example shown in FIG. 29, "gas 1" is designated as the gas in use. In this way, the type of gas used for packaging is configured to be stored in association with the PLU. In the packaging apparatus 100 according to the embodiment of the present invention, the air is replaced with the inert gas in order to extend the best-before date of the object to be packaged, but it is desirable that the gas varies depending on the type of the object to be packaged. For example, since beef turns black in a case where oxygen is not contained in an amount of about 30%, an inert gas obtained by mixing three types of gases of nitrogen, carbon dioxide, and oxygen is used, but since chicken meat and pork meat do not turn black, an inert gas obtained by mixing two types of gases of nitrogen and carbon dioxide is used.

[0121] In the product master setting screen shown in FIG. 28, in a case where a button of "tray of D2" is touched, the screen transitions to the tray selection screen shown in FIG. 30. The tray selection screen shown in FIG. 30 is a screen for selecting a tray to be set from among the tray 1 to the tray 5 shown in F1 and confirming the tray for which the information is to be set by a confirmation button of F2 in order to set the heat seal temperature, the tray seal time, and the gas filling time for each type of tray. Here, in a case where the tray 1 to which an identification number "000001" is assigned is selected and the confirmation button is operated, the screen transitions to the setting screen for each tray shown in FIG. 31. Unlike the display in FIG. 28, in a case where the tray is already set in the product master, the tray number is displayed, and in this case, the tray setting information is referred to.

[0122] FIG. 31 is a diagram showing a layout example of the setting screen for each tray, and here, the setting screen of the tray of "000001" is displayed as shown in a display area of the tray identification number of G1. As shown in a display area of G2, 160°C is set as the heat seal temperature, as shown in a display area of G3, 500 msec is set as the tray seal time, and as shown in a display area of G4, 300 msec is set as the gas filling time. In a case where these display areas are touched, a predetermined change menu is pulled down and displayed, and a numerical value can be changed.

[0123] FIG. 32 is a diagram showing a layout example of the setting screen for each die, and here, the setting screen of the "die 1" is displayed. However, on the screen, the "die 1" is displayed as a "tray die 1" like the tab of H1. As shown in a display area of H2, 160°C is set as the heat seal temperature, as shown in a display area of H3, 1000 msec is set as the tray seal time, and as shown in a display area of H4, 300 msec is set as the gas filling time. In any display area, in a case where the display area is touched, a predetermined change menu is pulled down and displayed, and a numerical value can be changed.

[0124] FIG. 33 is a diagram showing another display screen of the example of the layout of the setting screen for each die, and here, the setting screen of the "die 2" is displayed. However, on the screen, the "die 2" is displayed as a "tray die 2" like the tab of I1. As shown in a display area of I2, 157°C is set as the heat seal temperature, as shown in a display area of I3, 500 msec is set as the tray seal time, and as shown in a display area of I4, 250 msec is set as the gas filling

time. In any display area, in a case where the display area is touched, a predetermined change menu is pulled down and displayed, and a numerical value can be changed.

(Gas Replacement Processing)

[0125] Gas replacement process for extending the best-before date of the product to be packaged is performed by replacing the air with the inert gas. The inert gas is used for extending the best-before date of the food by adjusting three types of gas ratios of nitrogen, carbon dioxide, and oxygen. Oxygen may not be necessary, but in fact, oxygen is necessary for maintaining the redness of the meat. As described above, in a state where the upper and lower dies are closed, the gas can be efficiently fed by a structure in which the gas is injected from between the film and the container. That is, it is possible to shorten the gas injection time by removing the air in the die from the air discharge port 252 while injecting the gas from the gas inlet 251. In addition, since the gas inlet 251 is disposed on the weighing means 1 side, the gas can be injected from the same position even in the dies having different sizes. Further, since the gas inlet 251 and the air discharge port 252 are provided in the transport direction of the film, the film can be reliably covered with the film without being deviated to the left and right. Here, the film is set to be prepared in only one type such that it is not necessary to replace the film for each tray size. The same applies to the tray T, and since the lateral widths are all the same and only the depth sizes are different (however, a plurality of types of heights may be prepared, and the material may also be different as described above), the film can be used without waste.

[0126] In the related art, gas replacement packaging is mostly of a type in which gas is injected into a bag during bag making. The present embodiment has a great significance in that the gas replacement processing is efficiently realized in the top seal by injecting the gas in a state where the film is sandwiched.

[0127] The gas replacement time is configured to be automatically or manually changed according to the three types of sizes of the trays T, that is, "large", "medium", and "small". In addition, the gas replacement time may be configured to be changed according to the best-before date. The console 6 may be configured to directly select the best-before date or to associate the best-before date recommended in the product information and automatically change the gas replacement time by selecting the product. Further, a plurality of gas inlets, for example, three gas inlets each dedicated to nitrogen, carbon dioxide, and oxygen, may be provided, and the optimal gas ratio may be adjusted by setting or automatic control.

(Gas Switching Processing corresponding to Product Information)

[0128] As described above, the packaging apparatus 100 according to the embodiment of the present invention is configured to switch the type of gas according to the product. For example, in a case of packaging beef, an inert gas obtained by mixing three types of gases, that is, nitrogen, carbon dioxide, and oxygen, is used, and in a case of packaging chicken meat or pork, an inert gas obtained by mixing two types of gases, that is, nitrogen and carbon dioxide, is used. However, in a case where the operation is performed only by a simple switching operation by the operator, in a case where the gas to be used is erroneously selected and packaged, there is a concern that appropriate packaging may not be performed, such as that the desired expiration date extension is not performed or the discoloration of the product occurs. Therefore, in the packaging apparatus 100 according to the embodiment of the present invention, a device is provided to reliably use the optimal type of gas for each food to be packaged.

[0129] The packaging apparatus 100 according to the embodiment of the present invention is configured to store the type of gas used for packaging for each product in the product information storage means in association with each other. In the packaging apparatus 100 according to the embodiment of the present invention, the type of gas used for packaging is set and stored, and the gas to be enclosed is automatically changed at a predetermined timing, for example, when the product is called. The product information storage means may be configured to be provided in the packaging apparatus 100 or may be configured to be provided in an external device. In any configuration, the control unit of the packaging apparatus 100 executes the storage control processing of setting and storing the type of gas used for packaging in association with the product in the product information storage means.

[0130] In addition, in the packaging apparatus 100 according to the embodiment of the present invention, not only the type of the gas in use but also the injection rate (momentum) of the gas can be set and stored for the product. For example, in a case of food in which a large number of small contents such as shirasu are collected, instead of a large solid such as meat or fish, the contents are scattered by the injection of the gas, and a situation in which the contents enter a gap between the film before sealing and the edge of the tray occurs. For such a product, it is suitable to perform gas replacement by reducing the injection rate of the gas.

(Regarding Die Accommodating Means)

[0131] As described above, the packaging device 100 according to the embodiment of the present invention comprises the upper die accommodating means 24H and the lower die accommodating means 25H as

the accommodating means that can accommodate all types of dies that are not loaded, and it is not necessary to store the die that is not used by exchange at a place different from the packaging device body. In the embodiment, the configuration is adopted in which two types of dies that are not used among the three types of dies can be housed, but in a case where the size of the apparatus is allowed to be increased in order to enable all three types of dies to be stored without being loaded in a case where the packaging apparatus is not used, the housing means can also be configured to be large enough to house all the dies. In a case where there is a high possibility that the work is started from a die of any size at the start of use of the apparatus, this configuration is more efficient.

[0132] FIG. 34 is a perspective view showing a state in which the upper die and the lower die are housed in the die accommodating means, and FIG. 35 is a right side view showing a state in which the upper die and the lower die are housed in the die accommodating means. FIGS. 34(a) and 35(a) show a state in which the upper and lower dies are housed, and FIGS. 34(b) and 35(b) show a state in which the upper and lower dies are not housed. In addition, FIG. 35(c) is an enlarged view of a lower end right corner of the upper die housing means 24H in FIG. 35(a).

[0133] In FIGS. 34 and 35, the upper die 24B for a medium tray and the lower die 25B for a medium tray are loaded in the holder and are in use (not shown), the upper die 24A for a large tray and the upper die 24C for a small tray, which are not loaded in the holder, are housed in the upper die housing means 24H, and the lower die 25A for a large tray and the lower die 25C for a small tray, which are not loaded in the holder, are housed in the lower die housing means 25H.

[0134] Since the upper die housing means 24H and the lower die housing means 25H are disposed in the vicinity of the film, the upper die housing means 24H and the lower die housing means 25H are covered with a protective member in order to prevent the influence of heat on the film. That is, the upper die accommodating means 24H and the lower die accommodating means 25H are covered with a cover so that heat is not unintentionally transferred to the film. As the protective member, a heat insulating material or a cooling material can be appropriately adopted in order to reduce the influence of heat. In addition, in order to more actively cool the upper die accommodating means 24H and the lower die accommodating means 25H, a cooling fan may be provided in addition to the protective member.

[0135] The upper die housing means 24H is configured to be able to attach and detach the upper die in a slide type in order to house two upper dies in a state of being separated from each other in an up-down direction. As shown in FIG. 35(c), a right end and a left end of a lower portion of the upper die 24 have an L shape or a left-right inverted shape of L, the upper die housing means 24H has a rail shape that rises in an up-down inverted shape of the L shape or the left-right inverted shape of L, and the lower portion of the upper die 24 is slidable by being fitted to the rail shape. Since the relationship of the rail shape is the same for the upper die 24 and the upper die holder 240, it is possible to perform an operation for loading the upper die 24 in the holder and housing the upper die 24 in the upper die housing means by the same sliding operation.

[0136] The lower die housing means 25H is configured to be able to attach and detach the lower die in a slide type in order to house two lower dies in a state of being separated from each other in a left-right direction. The relationship between the end portion of the lower die and the rail shape of the lower die accommodating means is substantially the same as that for the upper die. In addition, in order to easily take out the two lower dies arranged in the left-right direction, any one of the left and right sides of the housing of the lower die accommodating means is shorter than the other.

(Electrical Configuration of Packaging Apparatus)

[0137] An electrical configuration of the packaging apparatus 100 that controls the mechanism portion and various types of processing described so far will be described. FIG. 36 is a diagram showing an example of the electrical configuration of the packaging apparatus 100 according to the embodiment of the present invention.

[0138] As shown in FIG. 36, the packaging apparatus 100 includes a control unit CU that executes various types of control such as performing monitoring control by obtaining information from each component, performing drive control of a mechanism portion of each component, and performing control of an electric circuit of each component. Examples of each component that is a target of control or the like performed by the control unit CU include the weighing means 1, the infeed bars IB as the conveying means, the console 6 as the input/output means or the operating means, the label attaching means 7, the label issuing means 73 provided in association with the label attaching means, the shutter 11, the film suspending means 21 that conveys the film, the upper and lower dies 24 and 25, the top seal portion 242, the conveyor belt 31 as the discharge means, and the buffer tank BT for gas replacement. The control unit CU and each component are electrically connected to each other by an interface circuit for communication, signal lines, and the like.

[0139] The control unit CU comprehensively controls each component of the packaging apparatus 100. The control unit CU causes a computer to execute a function according to the present embodiment of the invention by executing, for example, a control program. The control unit CU includes a storage device such as a CPU as an arithmetic control circuit, a RAM or a ROM as a storage unit, and other storage devices. The storage unit stores the control program and the like, and

also stores characteristics of the tray, the gas, and the like.

[0140] The weighing means 1 measures the weight of the object to be packaged in a case where the tray T on which the object to be packaged is placed is placed, and transmits weight information to the control unit CU in a case where the minimum weighing value is stable. The control unit CU receives a signal from the weighing means 1 and starts the packaging process. For this reason, the weighing means 1 also serves as activation means of the packaging apparatus.

[0141] The infeed bar IB starts to operate in response to a drive command from the control unit CU after the control unit CU receives the weight information, operates to move the tray T to a position at which the top sealing process is performed in the machine frame, and then temporarily stops. The infeed bar IB resumes the operation in response to the drive command from the control unit CU after the control unit CU receives information indicating that the top sealing process is completed, and the tray T is conveyed to the downstream region 3. In this way, the infeed bar IB functions as the conveying means in the packaging apparatus 100.

[0142] The console 6 includes a display unit, a speaker, a numeric keypad, and a touch panel, and functions as input/output means or operation means operated by the operator. The label attaching means 7 attaches a product label to the tray T on which the weighing and the packaging process are performed, and the label issuing means 73 that prints and issues the product label having information such as the measured weight, the unit price, and the price is provided in association with the label attaching means 7. The control unit CU also performs command control of the operation timing of the label attaching means 7 and the label issuing means 73.

[0143] The shutter 11 receives an operation command from the control unit CU and functions to block the inside and the outside of the housing, thereby ensuring safety. The film suspending means 21 conveys the film by the film holding means 211 and the excess film winding means 212. The upper and lower dies 24 and 25 sandwich the film therebetween, specifically, the lower die 25 pushes up the tray T, and thus, the packaging process is performed. The top seal portion 242 is provided in association with the upper die 24. The control unit CU performs command control or monitoring control of the operation timing of these components.

[0144] The conveyor belt 31 starts the operation in response to the drive command from the control unit CU, and functions as the discharge means that conveys the tray T conveyed to the downstream region 3 in the lateral direction to discharge the tray T to the outside of the apparatus. The buffer tank BT is connected to a gas cylinder or the like installed outside the packaging apparatus 100, and temporarily stores the gas for gas replacement. The gas storage amount remaining in the buffer tank BT is monitored by the control unit CU.

(Processing Flow in Normal Operation of Packaging Apparatus)

[0145] An example of a processing flow in a case where the packaging apparatus 100 is activated (power is turned on) and then the operation is started to perform the packaging process and the label attaching process will be described with reference to FIGS. 37 to 41.

[0146] In the start shown in FIG. 37, the operation of the packaging apparatus 100 is started in a case where the power is turned on.

[0147] In step S101, the fit detection of the upper and lower dies is performed. In a case where it is determined that the upper and lower dies do not match, in a case where it is determined that the dies are not loaded, or the like, in step S102, the heating of the dies is stopped. At this stage, since the initial screen is not yet displayed, the display indicating that there is an error is not performed. However, a special screen display may be activated to display an error or to notify the user by voice (buzzer or the like).

[0148] In step S103, the heating of the dies is started, and then in step S104, the standby screen is displayed until the apparatus is started up. The standby screen is a screen for checking the date, but the information may be replaced with other information or other information may be displayed, or the information may not be displayed.

[0149] A screen prompting the operator to press the reset button is displayed at the end of the standby screen, and in step S105, the operator presses the reset button. Of course, the screen may be configured not to be displayed on the premise that the operator is familiar with the operation method. In a case where the reset button is pressed, in step S106, the packaging apparatus 100 starts the idle operation for checking whether or not a plurality of components as the operating units can appropriately execute the operation. Specifically, the components that perform the idle operation are the infeed bars IB as the conveying means, the conveyor belt 31 as the discharge means, and the lower die 25 that performs the up and down operation. The operation order of the idle operation may be appropriately set, and the components may be operated substantially simultaneously. In addition, the idle operation of the other operating units (for example, the label attaching means 7) may also be performed. Although not shown, in a case where there is a component that has not performed the idle operation due to some unexpected situation, the control unit CU that monitors the situation executes the error notification.

[0150] In step S107, since the reset button is pressed, the fit detection of the upper and lower dies is performed again. In a case where it is determined that

the upper and lower dies do not match, the heating of the dies is stopped in step S108. At this stage, since the menu screen is already displayed on the display unit of the console 6, the error display such as the mismatch of the upper and lower dies is performed.

[0151] On the other hand, in a case where it is determined that the upper and lower dies are matched, the heating of the dies is continued (step S109).

[0152] In step S110, it is determined whether or not the film remains in the film holding means 211. As a specific method of the determination, the film holding means 21 may be slightly operated, and in a case where the dancer rollers DR move up and down and the sensor reacts, it is determined that the film is present, and in a case where the dancer rollers DR do not move up and down and the sensor does not react, it is determined that the film is not present. In a case where it is determined that the film is not present, the error display is performed in step S111. However, since the work of replenishing or replacing the film can be performed at a location different from the location where the dies are disposed, the heating of the dies is continued without being stopped. FIG. 38 shows an example of the error display screen, in which FIG. 38(a) shows an error screen in step S108, and FIG. 38(b) shows an error screen in step S111. In the screen of FIG. 38(a), a message "The tray die and the setting information do not match. Please check the setting and the tray die." is shown in the pop-up window PW1. In the screen of FIG. 38(b), a message "The film is not present. Please replace the film with a new film." is shown in the pop-up window PW2.

[0153] The processing order from step S106 to step S110 described above is merely an example, and the order can be rearranged. For example, after determining whether or not the film is present, the matching of the upper and lower dies may be checked, and finally, an idle operation for checking whether or not the operation can be executed may be executed. Further, other checking processing or the like may be added. In a case where steps S106 to S110 are normally executed, the weighing screen is displayed (step S112).

[0154] With reference to FIG. 39, in a state where the weighing screen is displayed in step S112, the operator operates the display unit (touch panel) of the console 6 to perform the product selection operation by the PLU code (step S113). Next, the operator places the product on the weighing means 1 (step S114). In step S115, in a case where the weighing value of the weighing means 1 is stable, the weight information is transmitted from the weighing means 1 to the control unit CU.

[0155] The control unit CU performs the checking processing shown in step S116 to step S126 before starting the packaging processing.

[0156] In step S116, it is determined whether or not the temperature of the die is the seal proper temperature. In a case where the temperature is not the proper temperature, an error is displayed in step S117.

[0157] In step S118, it is determined whether or not the inserted die matches the die associated with the product. In a case where the dies do not match, an error is displayed in step S119, and the operator performs the corresponding processing.

[0158] In step S120, it is determined whether or not the gas associated with the product matches the gas connected to the packaging machine. Examples of this type include a case where the gas 1 is selected even though the gas is associated with the product as the gas not used, and a case where the gas 1 is selected even though the gas 2 is associated with the product. In a case where the gases do not match, an error is displayed in step S121, and the operator performs the corresponding processing.

[0159] In step S122, it is determined whether or not the remaining amount of the gas is equal to or greater than a specified value. In a case where the remaining amount of the gas is not equal to or greater than the specified value, an error is displayed in step S123, and the operator performs the corresponding processing.

[0160] In step S124, it is determined whether or not the upper and lower dies match. In a case where the dies do not match, an error is displayed in step S125, and the operator performs the corresponding processing.

[0161] In step S126, it is determined whether or not the remaining amount of the label is sufficient. In a case where the remaining amount of the label is not sufficient, an error is displayed in step S127, and the operator performs the corresponding processing.

[0162] FIG. 40 shows an example of an error display screen, in which FIG. 40(a) shows an error screen in step S117, and FIG. 40(b) shows an error screen in step S119. On the screen of FIG. 40(a), the popup window PW3 shows a message for transmitting an error, "The packaging can be performed when the temperature of the heater becomes usable. Please wait while taking the product." On the screen of FIG. 40(b), the popup window PW4 shows a message for transmitting an error, "The tray die and the setting information do not match.", and a message for transmitting the content to be performed by the operator, "Please check the setting and the tray die." The operator who has seen this performs the corresponding processing of checking the setting and the tray die.

[0163] The processing order from step S116 to step S126 described above is merely an example, and the order can be rearranged. In addition, other confirmation processing or the like may be added. In a case where steps S116 to S126 are normally executed, the shutter is opened in response to a command from the control unit CU (step S128).

[0164] With reference to FIG. 41, in a case where the shutter is opened in step S128, in the next step S129, the tray T (which is a container on which the product is placed) is carried into the apparatus by the infeed bars IB. Here, although not shown, in a case where the in-

feed bars IB do not operate due to some unexpected situation, the control unit CU that monitors the situation executes an error notification.

[0165] In step S130, the film suspending means 21 performs the film feed. Although not shown, in a case where the film feed is not performed due to some unexpected situation, the control unit CU that monitors the situation executes an error notification, as in the case of step S129.

[0166] In step S131, the label issuing unit 73 issues a label in preparation for the completion of the packaging process. The error notification in a case where an unexpected situation occurs is the same as described above.

[0167] In step S132, the lower die 25 pushes the tray T upward. The error notification in a case where an unexpected situation occurs is the same as described above.

[0168] In step S133, the air present in the space formed between the film held by the film holding means 211 and the surplus film winding means 212 and the tray T is replaced with the inert gas. The error notification in a case where an unexpected situation occurs is the same as described above.

[0169] In step S134, the top sealing process is executed until the film is heat-sealed and cut by performing heat welding at a predetermined heat sealing temperature for a predetermined tray seal time. The error notification in a case where an unexpected situation occurs is the same as described above.

[0170] In step S135, the infeed bar IB causes the tray T to advance again and transfers the tray T to the downstream region 3. The error notification in a case where an unexpected situation occurs is the same as described above.

[0171] In step S136, the conveyor belt 31 transports the tray T to a position where the label can be attached. The error notification in a case where an unexpected situation occurs is the same as described above.

[0172] In step S137, the label is attached to the tray T by the label attaching means 7. The error notification in a case where an unexpected situation occurs is the same as described above.

(Processing Flow for Another Example of Die Replacement Process)

[0173] The die replacement process that is not the process during the normal operation of the packaging apparatus has already been described with reference to FIG. 17, but another example can also be assumed, and thus will be described. In the processing flow shown in FIG. 17, after the emergency stop button 8 is pressed, a declaration that the "die replacement" is to be performed, that is, the button for the "die replacement" is pressed, and then the replacement process is performed. The "film replacement" is also performed by making a similar declaration. However, the die or the film can be replaced without any special operation of such a declaration, and thus, in another example, the die is replaced without any declaration.

[0174] FIG. 42 is a flowchart showing a flow of processing in another example regarding the die replacement. In step S201, the emergency stop button 8 is pressed. The emergency stop button 8 is not a dedicated button for performing the die replacement, but is a button that is widely used for safely maintaining the packaging apparatus 100. Therefore, step S202 does not indicate a special process as the apparatus, but indicates that the operator intends to start the die replacement.

[0175] In a case where the reset button is pressed in step S203, it is determined in step S204 whether or not the upper and lower dies match. In a case where the upper and lower dies do not match, in step S205, an error is displayed, the heating of the die is stopped, and natural cooling is performed such that the die can be replaced. In addition, a configuration in which the die is actively cooled may be adopted. FIG. 43 shows an error screen in step S205. On the screen of FIG. 43, a message indicating a response that the operator should perform, "Please press the [emergency stop] button and replace the die with the upper and lower dies that match", is displayed together with information for transmitting an error indicating that the mismatch between the upper and lower dies is detected. On the other hand, in a case where it is determined in step S204 that the upper and lower dies match, the heating of the die is continued (step S206).

(Processing Flow in case where Emergency Stop Button is Pressed during Packaging)

[0176] The processing flow shown in FIG. 42 shows a case where the emergency stop button is pressed when the packaging process is not performed, for example, in a case of the price labeling mode, but it is also assumed that the emergency stop button is pressed during the packaging, and thus, the processing in this case will be described. FIG. 44 is a flowchart showing a flow of processing in a case where the emergency stop button is pressed during the packaging.

[0177] In step S301, the emergency stop button 8 is pressed, and in this case, the control unit CU determines that the packaging mode is actually in use and the tray T is in a state of being carried into the packaging apparatus 100. In step S302, it is determined whether or not the product is present in the packaging area. This determination can be configured to be performed using a pair of optical sensors or imaging means that are obliquely disposed with respect to the packaging area. In a case where it is determined that the product is not present in the packaging area, the packaging apparatus continues the heating, but the operation mechanism unit remains stopped (step S303).

[0178] On the other hand, in a case where it is deter-

mined that the product is present in the packaging area, in step S304, a predetermined time (for example, 30 seconds) is waited. Until the predetermined time elapses, the packaging apparatus continues the heating, but the operation mechanism unit remains stopped (step S305). However, in a case where the predetermined time elapses, the heating of the die is stopped (step S306). By performing such processing, even in a case where the emergency stop button 8 is pressed due to an erroneous operation during the packaging, the die heating is continued within 30 seconds, and thus, it is possible to smoothly return to the packaging process. On the contrary, in a case where 30 seconds elapses, it is assumed that the confirmation of the intention to replace the die is obtained, and thus, the heating is stopped in order to perform natural cooling in preparation for the replacement.

(Regarding Other Embodiments)

[0179] The embodiment described above is configured to perform the weighing, the packaging, and the labeling process, but may be configured to provide a packaging-only mode that performs only the packaging process. The packaging-only mode is suitable for a fixed-price product that does not need to be weighed. Since it is not necessary to transfer the product to the downstream region in order to perform the labeling, in the packaging-only mode, the infeed bar IB may be configured to rotate in reverse to discharge the tray to the front side after the packaging process. Alternatively, the apparatus may be configured as a dedicated apparatus that performs only the packaging. Even in that case, the technology idea of performing the gas replacement processing for extending the best-before date of the object to be packaged and the packaging process by the top seal substantially at the same time is included in the scope.

[0180] In addition, the present invention includes not only a case of responding to the mode switching called the packaging-only mode but also a case of configuring the apparatus itself to be an apparatus specialized for packaging. That is, the apparatus may be configured as a dedicated apparatus that performs only the packaging process by configuring the apparatus to be a separate apparatus from the weighing means, the console for the weighing means, the labeling means, and the like without having the configurations thereof, and communicating with the separate apparatus.

[0181] In the described embodiment, the weighing means 1 is provided in the preceding stage of the packaging means 2, but the weighing function may be configured to be provided at the position of the tray bottom surface support means 26 (see FIG. 14) or in the downstream region 3 (see FIG. 5). In a case where the weighing function is provided in the downstream region 3, the weighing and the labeling are performed after the packaging, and the weighing target in this case is the weight including the tray weight, the film weight, and the gas weight. Therefore, the weight including the tray weight, the film weight, and the gas weight may be tared and printed. In a case where the weighing function is assigned to the tray bottom surface support means 26 or the downstream region 3, the region of the broken line "1" shown in FIG. 4 is simply a placement area for carrying the object to be packaged into the apparatus.

[0182] The packaging means can also be provided in the foremost stage. That is, the upper and lower dies may be disposed in the region of the broken line "1" shown in FIG. 4, the tray may be directly placed on the lower die, and then the weighing or the labeling may be performed. The weighing function in this case is disposed in the tray bottom surface support means 26 or the downstream region 3 described above. In a case where this configuration is adopted, it is suitable to provide a shutter in the front side portion of the foremost stage and close the shutter as soon as the tray is placed to ensure safety.

[0183] The described embodiment is an aspect in which the inert gas is filled by the gas flush in which the gas is blown to push out the air, but an aspect of gas replacement (in a narrow sense) in which the air is removed and then the gas is put in may be adopted. Although the injection time is longer than the gas flush, the gas replacement is advantageous in terms of the diffusivity of the gas and the gas being distributed to every corner. In this case, the air discharge port is configured as a suction port for removing the air first.

[0184] In addition, in the described embodiment, the film is configured to be suspended in the same direction as the weighing means 1, the packaging means 2, and the downstream region 3 are vertically arranged from the front side to the apparatus back side, and the lateral width size of the tray is set to a single size, but the film may be configured to be suspended in a direction orthogonal to the weighing means 1 and the packaging means 2, and the lateral width direction of the tray may be changed for each tray size.

(Supplementary Notes)

[0185] For the embodiment described in the present specification, even in a case where an inappropriate state such as failure to load the die occurs, the time for stopping the line can be suppressed, and the packaging apparatus can be conceived from the viewpoint of being highly effective. In addition, the invention of the packaging apparatus will be described below.

<Supplementary Note 1>

[0186] A packaging apparatus A is a packaging apparatus in which a plurality of dies are interchangeable in order to seal a film to a plurality of sizes of containers, the packaging apparatus A including: upper and

lower dies corresponding to the plurality of sizes of containers; and determination means provided in an apparatus main body and determining a loading state of the die.

<Supplementary Note 2>

[0187] In the packaging apparatus A, the determination means determines sizes of the upper and lower dies and matching between the upper and lower dies.

<Supplementary Note 3>

[0188] In the packaging apparatus A, the upper and lower dies each include a plurality of light-transmitting portions and/or a plurality of reflective portions disposed in different aspects according to a type, the apparatus main body includes a plurality of optical sensors, and the determination means determines the matching between the upper and lower dies according to a light detection status by the plurality of optical sensors.

<Supplementary Note 4>

[0189] In the packaging apparatus A, the determination means determines the loading state of the upper and lower dies during a period from power-on of the apparatus to display of a product call screen, and the apparatus includes a notification means that performs a notification according to a determination result of the determination means.

<Supplementary Note 5>

[0190] In the packaging apparatus A, the determination means determines the loading state of the upper and lower dies during a period from power-on of the apparatus to display of a product call screen, the apparatus includes a notification means that performs a notification according to a determination result of the determination means, and a storage means that stores size information of a container associated with product information, and in a case where a size of the die determined by the determination means and a size of the container associated with the called-up product information are different from each other, the notification means performs a notification.

[0191] In addition, in the embodiment described in the present specification, there is a situation in which heat sealing is not appropriately performed in a case where a temperature setting suitable for a welding target to be brought into contact with the die is not made, and there are various problems in order to enhance the effectiveness of the packaging apparatus, and thus the embodiment can be conceived from the viewpoint of a packaging apparatus capable of executing an optimal packaging operation. The following will be described.

<Supplementary Note 6>

[0192] A packaging apparatus B that performs top sealing on an object to be packaged by a die, the packaging apparatus B comprising: heating means for heating the die; temperature measuring means for measuring a temperature of the die; determination means capable of determining whether or not the temperature measured by the temperature measuring means is a suitable welding temperature for packaging; packaging means for performing heat-seal packaging on the object to be packaged by the die; and packaging operation control means for performing control related to a packaging operation according to a result determined by the determination means.

[0193] According to the above-described configuration, it is possible to provide a packaging apparatus capable of performing a packaging operation in consideration of a suitable welding temperature.

<Supplementary Note 7>

[0194] In the packaging apparatus B, the packaging operation control means does not start the packaging until the temperature reaches the suitable welding temperature.

[0195] According to the above-described configuration, it is possible to prevent a situation in which heat sealing is not appropriately performed.

[0196] A packaging apparatus C that is the packaging apparatus B, further comprising: notification means, in which the packaging operation control means causes the notification means to notify whether or not the measured temperature is the suitable welding temperature for packaging.

[0197] According to the above-described configuration, it is possible to provide a packaging apparatus capable of issuing a warning to an operator.

[0198] In the packaging apparatus C, start means for starting the top sealing is further provided, and the notification means performs the notification in a case where the start means is activated.

[0199] According to the above-described configuration, it is possible to provide a packaging apparatus capable of making an operator aware that packaging is started.

[0200] In the packaging apparatus C, the notification means notifies a time until the measured temperature reaches the suitable welding temperature for packaging.

[0201] According to the above-described configuration, it is possible to provide a packaging apparatus capable of allowing an operator to make a work outlook for the future.

[0202] A packaging apparatus D that is the packaging apparatus B, in which a heat seal temperature stored in tray setting information in which specifications of the packaging operation control are set for each tray

is referred to as the suitable welding temperature.

[0203] According to the above-described configuration, it is possible to appropriately deal with a situation in which the temperature suitable for heat sealing is different depending on the type of the tray to be used, for example, a difference in tray size or a difference in material of the tray even in a case where the tray sizes are the same.

[0204] A packaging apparatus E that is the packaging apparatus B, in which a heat seal temperature stored in die setting information in which specifications of the packaging operation control are set for each die is referred to as the suitable welding temperature.

[0205] According to the above-described configuration, it is possible to appropriately deal with a situation in which the temperature suitable for heat sealing is different depending on a difference in heat capacity due to the size of the die.

[0206] In the packaging apparatus D or the packaging apparatus E, a priority is provided in an order of the tray setting information and the die setting information for the appropriate heat seal temperature to be referred to.

[0207] According to the above-described configuration, the suitable welding temperature can be set in more detail. For example, even in a case where the setting of the appropriate temperature according to the tray size is performed at a minimum, it is possible to set a fine control according to the tray type.

<Summary of Embodiment>

[TECHNICAL FIELD]

[0208] The present invention relates to a packaging apparatus that covers a tray on which an object to be packaged is placed with a film and heat-seals the film to an edge portion of the tray.

[BACKGROUND ART]

[0209] As a packaging apparatus in the related art, there is a packaging apparatus in which an object to be packaged is placed on a placement table and pushed into a body, and the placement table is automatically pushed out of the body by an unloading mechanism after heat-sealing, thereby improving convenience (for example, see Patent Document 1).

[Citation List] [Patent Document] [Patent Document 1] JP-A-2003-261102

[SUMMARY OF INVENTION]

[0210] [Problems to be Solved by the Invention] The packaging apparatus disclosed in Patent Document 1 has a disadvantage in that it takes time to perform one process because the heat-sealing is performed by rotating a heating roller. It is also conceivable to exclude the heating roller and bring the entire welding portion into contact with the heating unit to perform the process at once, but in a case of implementing the packaging apparatus in such a direction, there are various points to be improved in order to enhance the effectiveness.

[Technical Problem]

[0211]

(1) As described above, according to an aspect of the present embodiment, there is provided a packaging apparatus (100) including: an upper die (24); a lower die (25); heating means that heats the upper die; temperature measuring means that measures a temperature of the upper die; determination means that is capable of determining whether or not the temperature measured by the temperature measuring means is a suitable welding temperature for packaging; and packaging means (2) that performs heat-seal packaging on an object to be packaged by the upper die and the lower die, in which the determination means restricts packaging control by the packaging means in a case where it is determined that the measured temperature is not within a suitable welding temperature range.

[0212] According to the above-described configuration, it is possible to provide a packaging apparatus capable of effectively preventing a packaging defect.

[0213] (2) According to an aspect of the present embodiment, the packaging apparatus (100) according to (1) includes matching determination means that determines that the upper die and the lower die have the same size, in which the heating means controls heating in a case where the matching determination means determines that the upper die and the lower die do not match.

[0214] According to the above-described configuration, a time required to reach the suitable welding temperature can be shortened.

[0215] (3) According to an aspect of the present embodiment, the packaging apparatus (100) according to (1) includes heating state notification means that performs notification in a different aspect before a heat source of the upper die reaches the suitable welding temperature and after the heat source reaches the suitable welding temperature by the heating means, after the matching determination means determines that the upper die and the lower die match.

[0216] According to the above-described configuration, even in a case where a waiting time is relatively long, it is possible to understand a state of the temperature while performing other work.

[0217] (4) According to an aspect of the present embodiment, the packaging apparatus (100) according to

(1) includes packaging control stopping means (8) that stops the packaging control; and acceptance means that accepts die replacement work that is enabled by execution of the packaging control stopping means, in which the determination means is capable of determining whether or not the temperature measured by the temperature measuring means is a proper exchange temperature of the upper die, and determines whether or not the measured temperature is the proper exchange temperature of the upper die by the acceptance of the acceptance means, and outputs a result of the determination that the temperature is the proper exchange temperature or is not the proper exchange temperature.

[0218] According to the above-described configuration, since it is possible to appropriately understand whether or not the temperature is the proper exchange temperature, it is possible to safely replace the die.

[0219] (5) According to an aspect of the present embodiment, the packaging apparatus (100) according to (1) includes the packaging means (2); price labeling means (7) that performs price labeling based on printed information of the object to be packaged; and mode switching means that is capable of switching between a first processing mode in which processing by at least the packaging means and the price labeling means is executed and a second processing mode in which processing by only the price labeling means is executed, in which the mode switching means restricts mode switching to a mode other than the second processing mode in a case where the upper die is not within the suitable welding temperature range.

[0220] According to the above-described configuration, it is possible to provide a packaging apparatus capable of executing work in a "price labeling mode" in which only a label for price labeling is issued without performing packaging while effectively preventing a packaging defect.

[0221] (6) According to an aspect of the present embodiment, there is provided a packaging apparatus including: heating means that heats a die; temperature measuring means that measures a temperature of the die; packaging control stopping means that stops packaging control; determination means that is capable of determining whether or not the temperature measured by the temperature measuring means is a proper exchange temperature of the die; acceptance means that accepts die replacement work that is enabled by execution of the packaging control stopping means; and output means that outputs a result of the determination that the temperature is the proper exchange temperature or is not the proper exchange temperature according to a determination result of the determination means by the acceptance of the acceptance means.

[0222] According to the above-described configuration, since it is possible to appropriately understand whether or not the temperature is the proper exchange temperature, it is possible to safely replace the die.

[0223] (7) According to an aspect of the present embodiment, there is provided a packaging apparatus that packages an object to be packaged by heat sealing using a pair of dies, the packaging apparatus including: temperature measuring means that measures temperatures of the pair of dies; determination means that determines whether or not the pair of dies are at a temperature suitable for the heat sealing by the temperature measuring means; and control means that controls packaging of the object to be packaged according to a determination result of the determination means.

[0224] According to the above-described configuration, it is possible to provide a packaging apparatus capable of effectively preventing a packaging defect.

[0225] Although the packaging apparatus 100 according to the embodiment of the present invention has been described in detail with reference to the drawings, a specific configuration is not limited to the embodiment, and the packaging apparatus 100 is included in the present invention even in a case where a design is changed within a range not departing from the gist of the present invention. For example, in the embodiment, the gas system is configured to have two gas systems, but the gas system can also be configured to have three or more gas systems. Further, instead of preparing a gas for each food type, for example, three gas cylinders of nitrogen, carbon dioxide, and oxygen may be prepared, and a gas supply system may be provided such that mixing ratios of the gas cylinders are different from each other. In addition, for example, in the embodiment, it has been described that the natural cooling is started after the "cooling start" button is pressed, but in a case where cooling means for protecting the apparatus main body is provided, it is also possible to consider that the cooling is started at a point in time when the cooling means starts to operate, but this aspect is also included in the present invention. The same applies to the heating, and after the die replacement is completed, in a case where the heat in the packaging work before the die replacement is higher than the room temperature even in a case where the heat is cooled before the heater means starts the reheating, the metal plate is heated at a point in time when the metal plate comes into contact with the heater means before the "heating start" button is pressed, but this aspect is also included in the present invention. In addition, as an add-on configuration, an automatic locking means that fixes the die in a mounted state can be provided, and the locking means can be configured not to be released until the die is cooled to the proper exchange temperature. The configuration improves the safety of the packaging apparatus, but does not form a different invention concept, and is still included in the present invention.

[0226] In addition, the invention disclosed in the present specification is not limited to the overall configuration of the packaging apparatus 100 according to the embodiment. That is, the invention is not limited to the

flow of the transport shown in FIG. 3 or the aspect of the sealing shown in FIG. 14, and should be considered as an invention of a higher-level concept of performing effective control after measuring the temperature of the die. In addition, a target to be heated and a target to be measured in terms of temperature can be a lower die instead of or in addition to the upper die. In a case where the lower die is heated, for example, a tray in which a welding layer is provided on a surface of a tray edge portion may be used, and the welding layer on the surface of the tray edge portion heated by the lower die from a back side of the tray edge portion may be melted to perform the top sealing by welding the film pressed against the surface of the tray edge portion, or another configuration may be adopted.

[0227] In addition, in the embodiment, it has been described that the heat seal temperature is stored in the tray setting information on the premise that the temperature suitable for the heat sealing is different depending on the type of the tray to be used or the material of the tray even in a case where the same die is used, and the priority is provided in the order of the PLU setting information, the tray setting information, and the die setting information. However, under a requirement specification in which only a single type of tray is used, the heat seal temperature may not be stored in the tray setting information, and the automatic setting, that is, the reference to other setting information may be configured, or the priority may be configured to be set in a different order depending on the situation.

[0228] Further, as the embodiment, the packaging apparatus that performs the gas replacement processing for extending the best-before date of the object to be packaged has been described, but the fact that the suitable welding temperature is different depending on the die size or the tray type does not change even in a case of a packaging apparatus that does not involve the gas replacement processing. In the embodiment, in a case where the die is exchanged, the packaging operation control in which the heat seal temperature, the tray seal time, and the gas filling time are different is executed, but in a case of a packaging apparatus that does not involve the gas replacement processing, the specifications for the packaging operation control are only those related to the heat welding, such as the heat seal temperature or the tray seal time. As described above, the object of the present invention of providing the packaging apparatus that can execute the optimal packaging operation should be understood as being construed in a broad sense, and at the same time, it is understood that the present specification also shows an object in a narrow sense.

REFERENCE SIGN LIST

[0229]

100: Packaging apparatus
1: Weighing means
2: Packaging means
21: Film suspending means
211: Film holding means
211L: Film set shaft lever
212: Excess film winding means
212L: Winding shaft lever
24: Upper die
24G: Extraction grip portion
24H: Upper die accommodating means
24L: Lock release lever
240: Upper die holder (mounting means)
2401: Rail
241: Heater means (heating means)
242: Metal plate (top seal portion)
242a: Protruding portion
242b: Central portion
243: Heater link
244: Film cutting means
245: Upper die hole
246: Transport grip portion
248: Notch portion
25: Lower die (gas replacement means)
25H: Lower die accommodating means
251: Gas inlet
2510: Gas diffusion stage section
252: Air discharge port
253: Lower die hole
26: Tray bottom surface support means
3: Downstream region
4: First discharge table
5: Second discharge table
6: Console
7: Label attaching means
71: Label attaching means slide rail
72 :Anti-tumble leg
8: Emergency stop button
IB: Infeed bar
HTM: Heat transfer member
BT1: Buffer tank 1
BT2: Buffer tank 2
T: Tray
R: Roll film
FS: Film feed shaft
DR: Dancer roller
A1: Packaging mode button
A2: Price labeling mode button
A3: Setting mode button
A4: Training mode button
B1: Die temperature display area
B2: PLU setting menu call button
B3: Tray setting menu call button
B4: Heat seal temperature display area
B5: Die type display area
B6: Tray seal time display area
B7: Gas filling presence/absence display area
B8: Gas-in-use display area

C1: Popup menu
D1: Packaging machine PLU data setting button
D2: Tray setting button
E1: Gas filling time setting button
E2: Gas-in-use selection button
F1: Tray type selection setting button
F2: Confirm button
G1: Tray identification number display area
G2: Heat seal temperature display area
G3: Tray seal time display area
G4: Gas filling time display area
H1: Tab of Die 1
H2: Heat seal temperature display area
H3: Tray seal time display area
H4: Gas filling time display area
I1: Tab of Die 2
I2: Heat seal temperature display area
I3: Tray seal time display area
I4: Gas filling time display area

Claims

1. A packaging apparatus that performs heat-seal packaging of an object to be packaged using a pair of dies, the apparatus comprising:

temperature measuring means for measuring a temperature of a heated die;
determination means configured to determine whether or not the temperature measured by the temperature measuring means is a suitable welding temperature for packaging; and
control means for restricting packaging control by packaging means in a case where the determination means determines that the measured temperature is not within a suitable welding temperature range.

2. The packaging apparatus according to Claim 1, comprising:

matching determination means for determining that the pair of dies is composed of an upper die and a lower die, and the upper die and the lower die have the same size, wherein
the control means controls heating in a case where the matching determination means determines that the sizes of the upper die and the lower die do not match.

3. The packaging apparatus according to Claim 2, comprising:
heating state notification means for performing notification in a changed aspect before a temperature of the heated die reaches the suitable welding temperature and after the temperature of the heated die reaches the suitable welding temperature, after the matching determination means determines that the upper die and the lower die match.

4. The packaging apparatus according to Claim 2 or 3, wherein

the matching determination means determines a loading state of the upper die and the lower die between power-on of the packaging apparatus and display of a product call screen, and
the apparatus comprises notification means for performing notification according to a determination result of the matching determination means.

5. The packaging apparatus according to Claim 1, comprising:

price labeling means for performing price labeling based on printed information of the object to be packaged; and
mode switching means for switching between a first processing mode in which at least processing of performing heat-seal packaging of the object to be packaged and processing by the price labeling means are executed and a second processing mode in which processing by only the price labeling means is executed, wherein
in a case where the upper die is not within the suitable welding temperature range, the mode switching means restricts mode switching to a mode other than the second processing mode.

FIG. 1

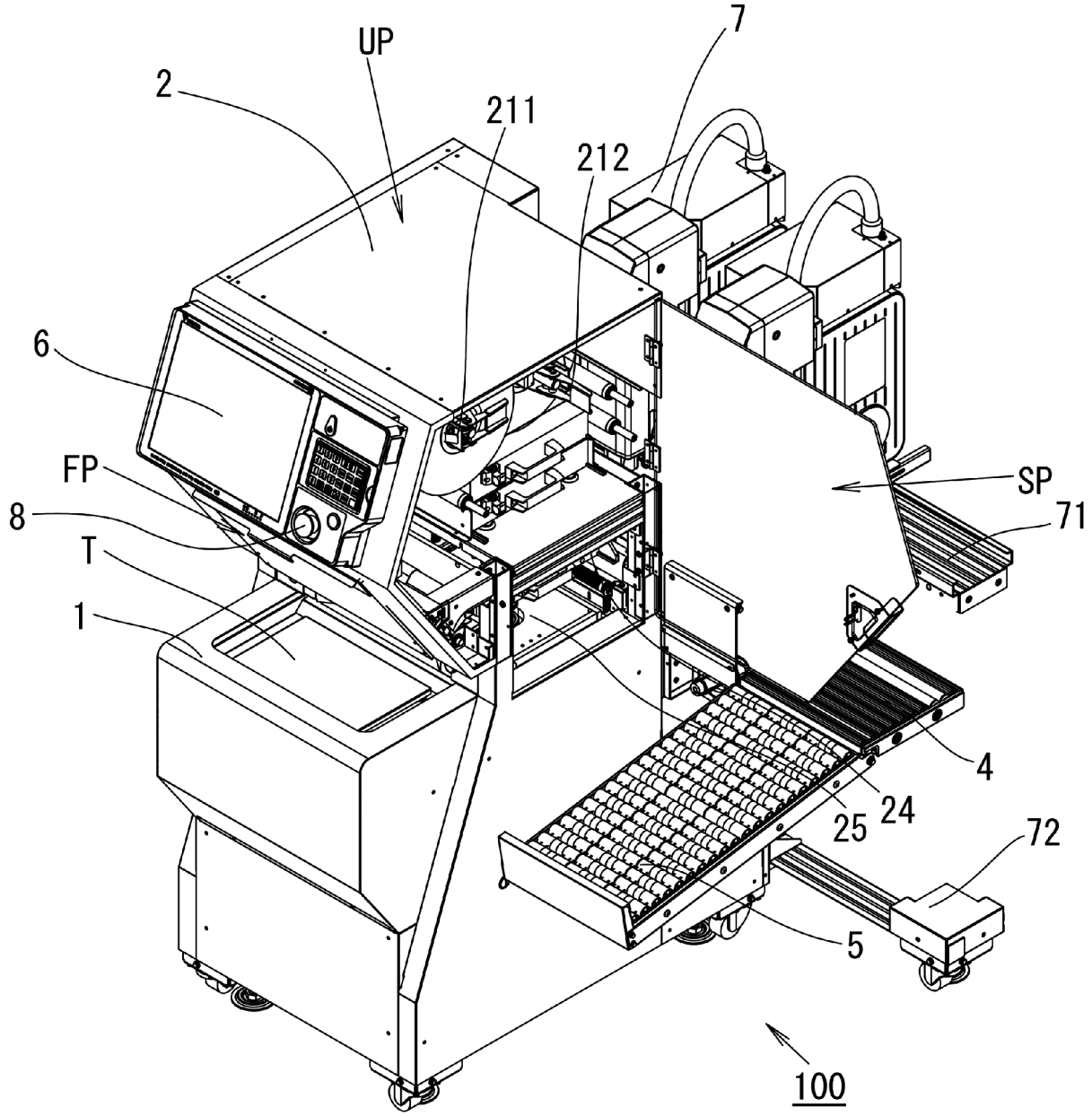


FIG. 2

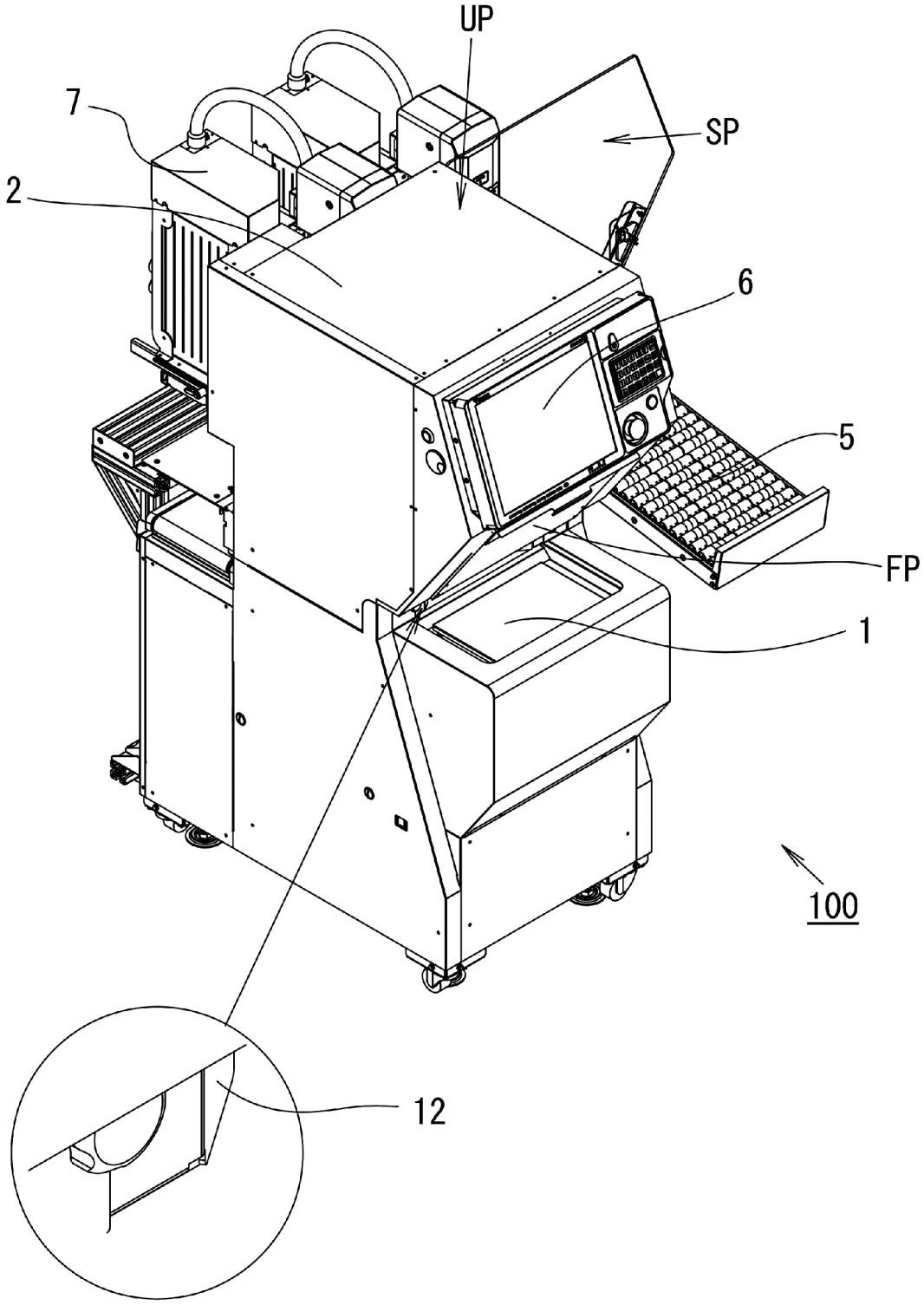


FIG. 3

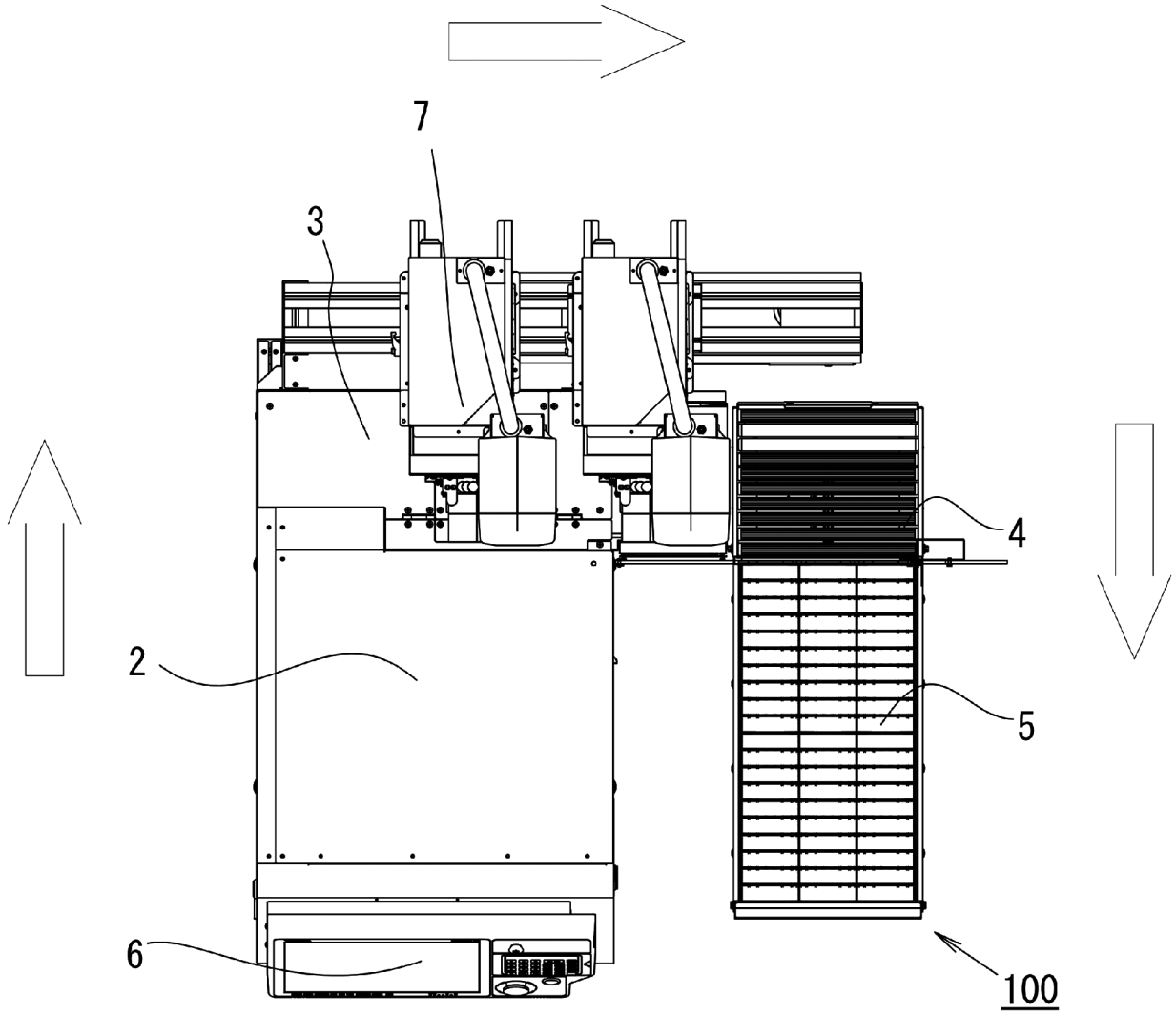


FIG. 4

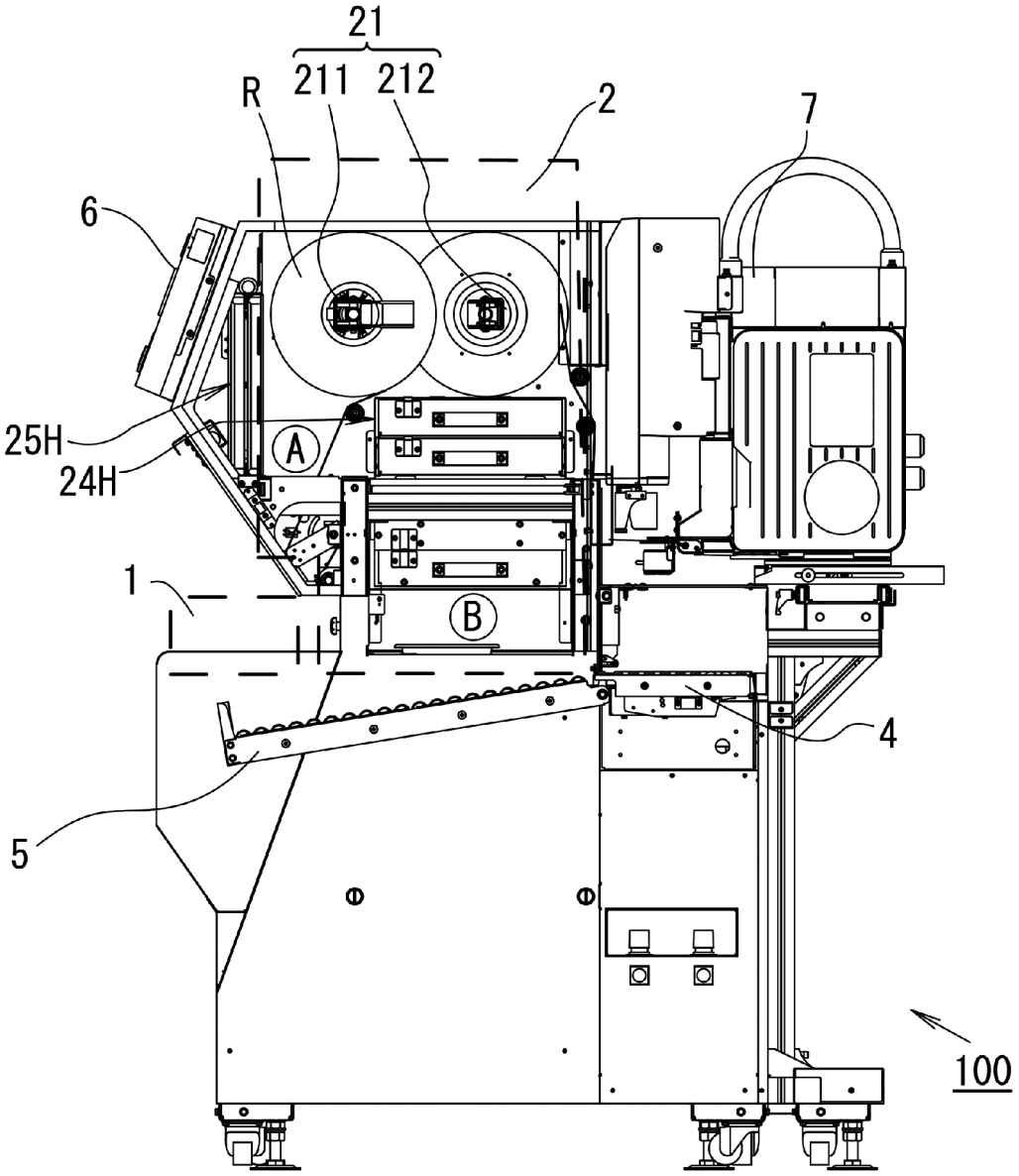


FIG. 5

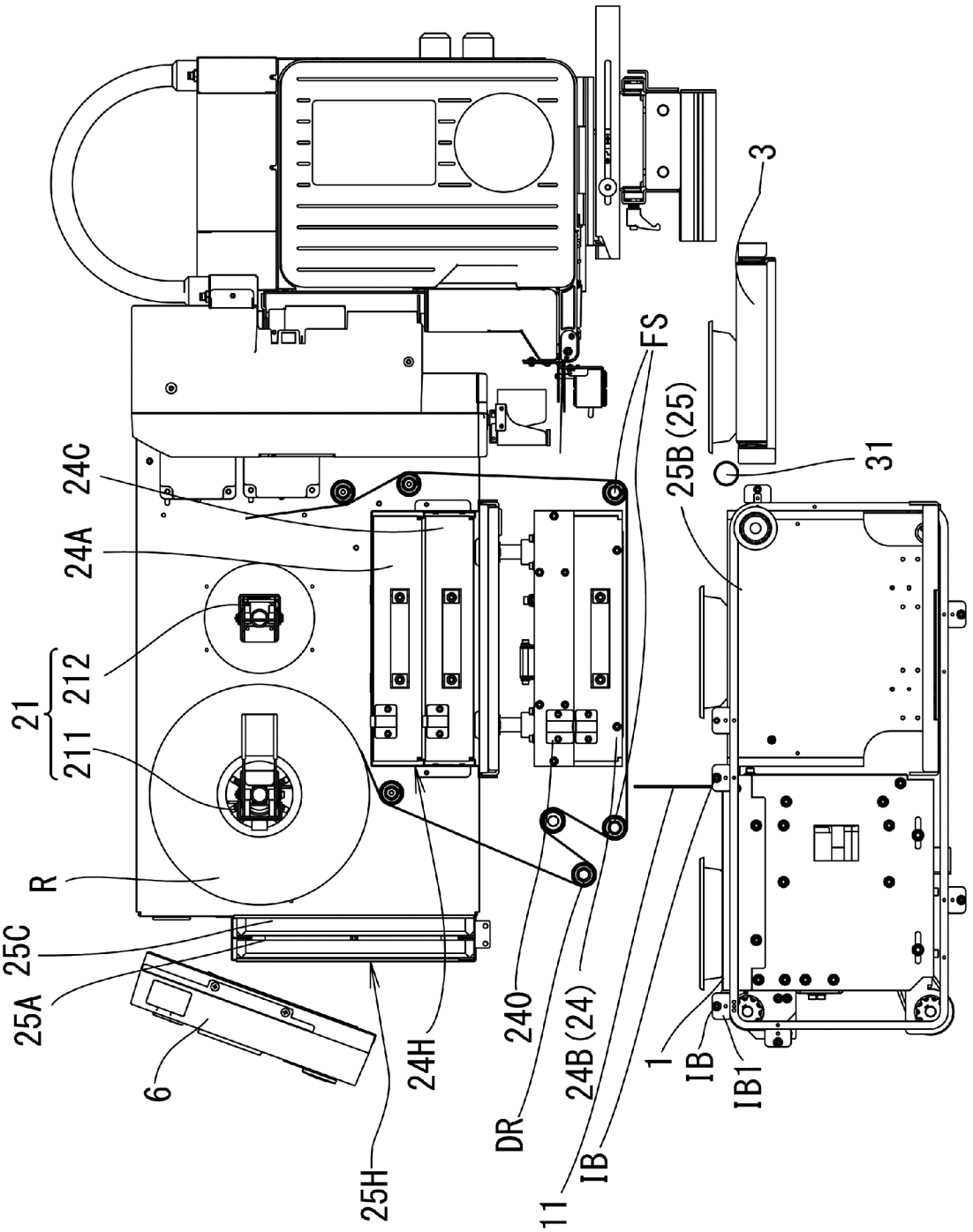

3
FS
25B (25)
31
24C
24A
21
211
212
R
25C
25A
6
24H
25H
240
DR
24B (24)
11
IB
1
IB
IB1

FIG. 6

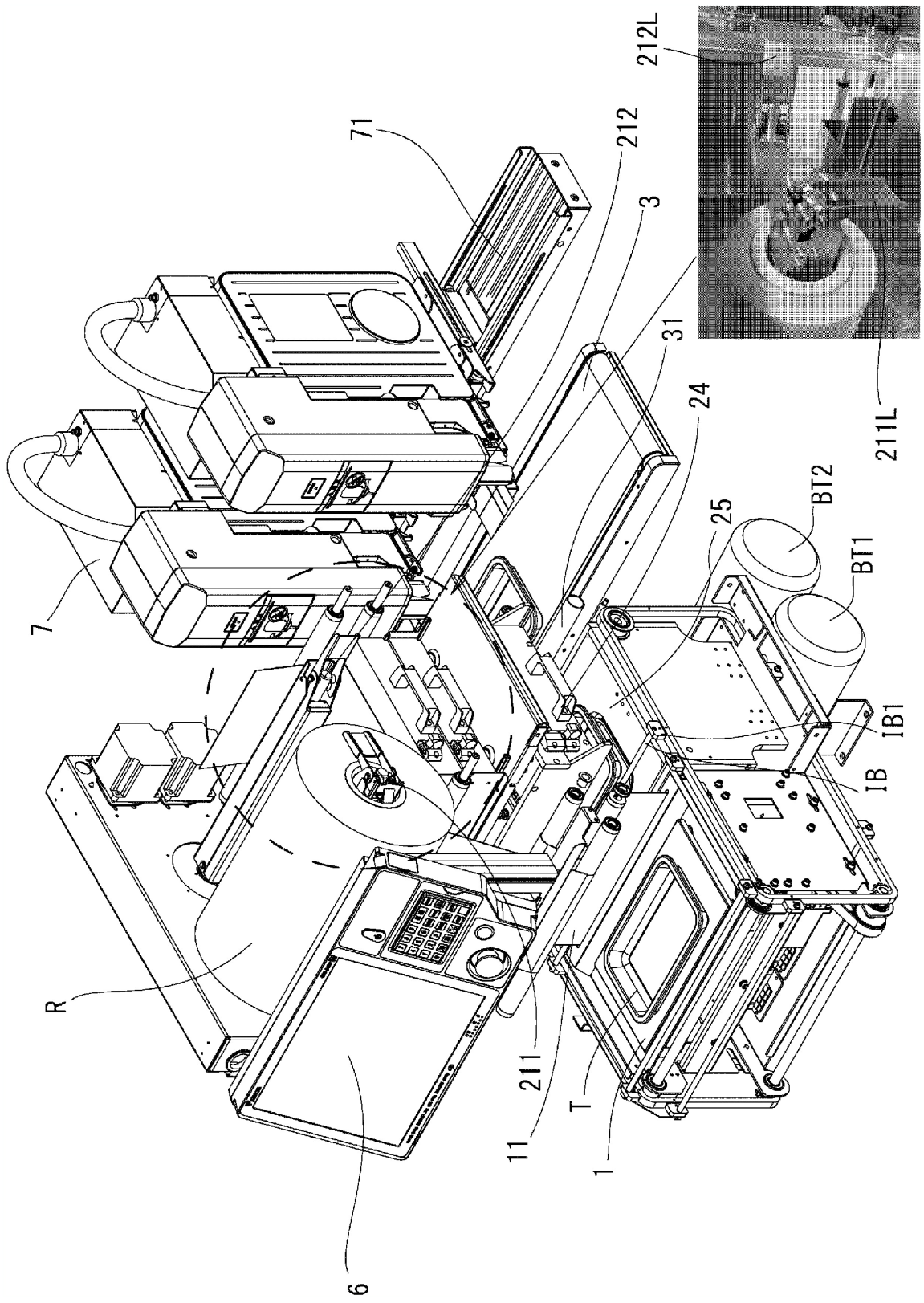
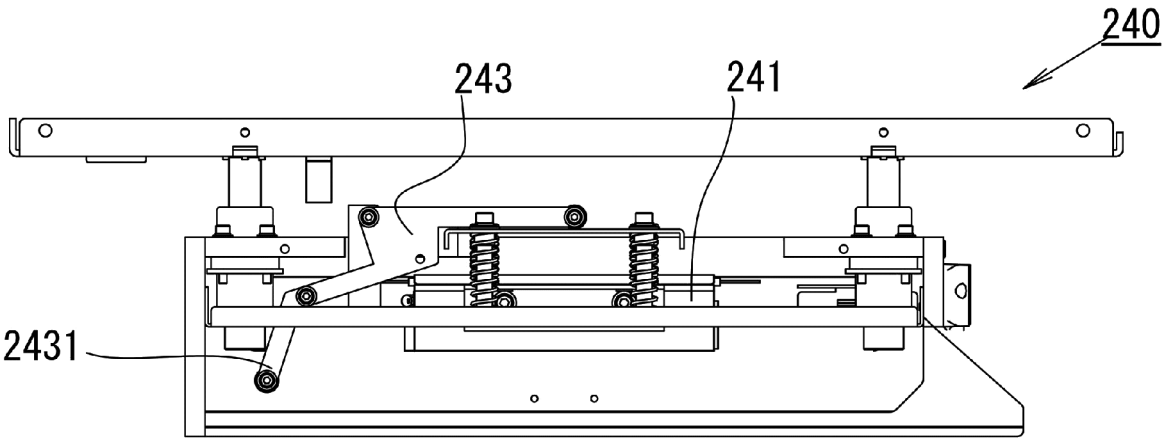
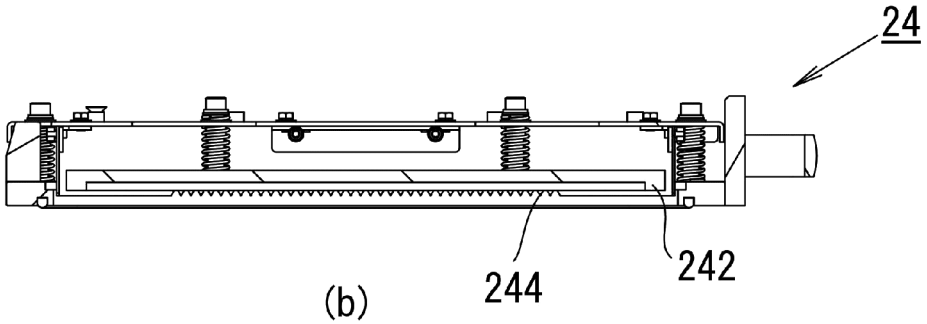


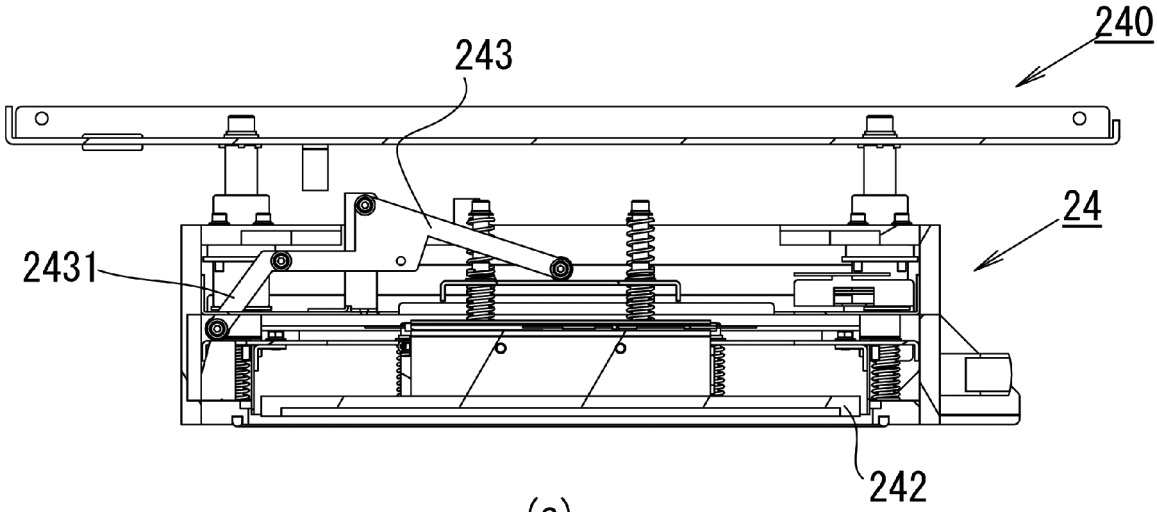
FIG. 7



(a)

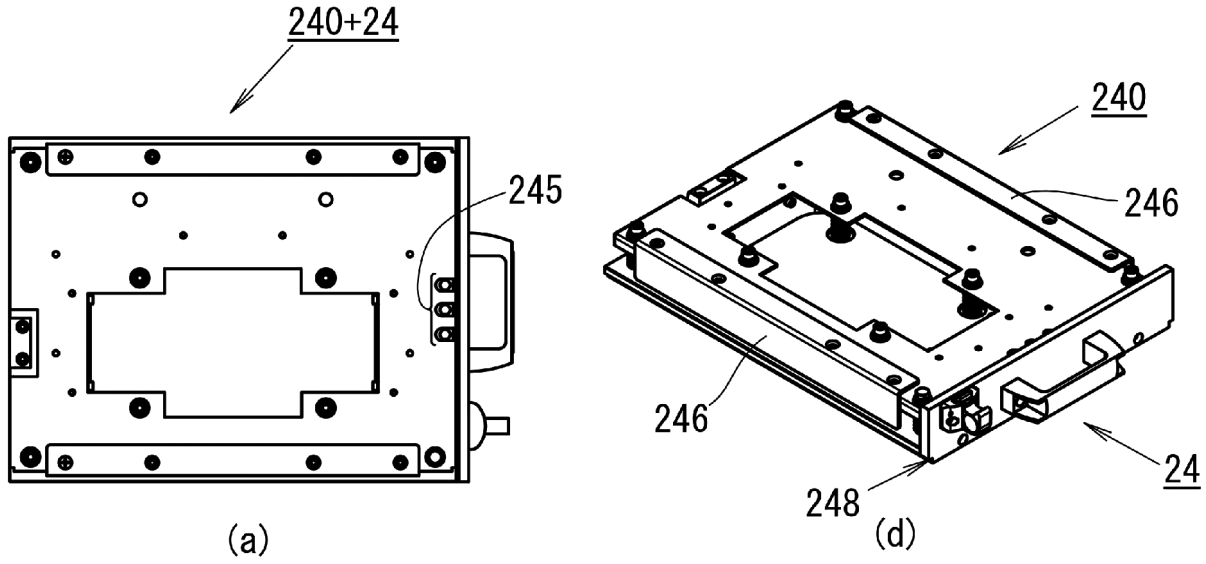


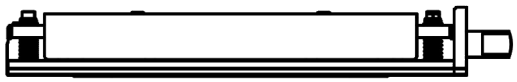
(b)



(c)

FIG. 8


240+24
245
(a)
240
246
246
24
248
(d)


(b)

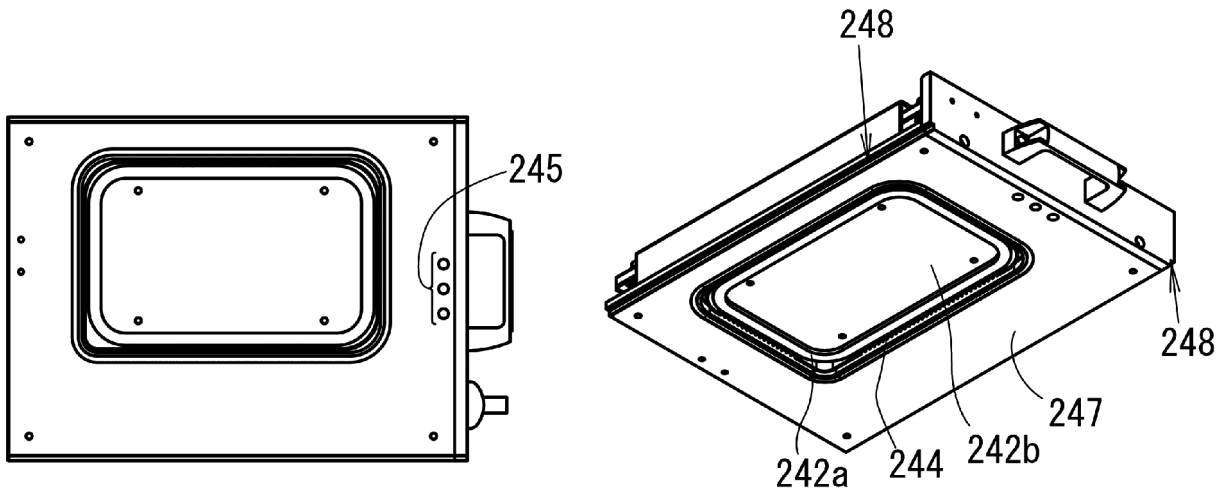
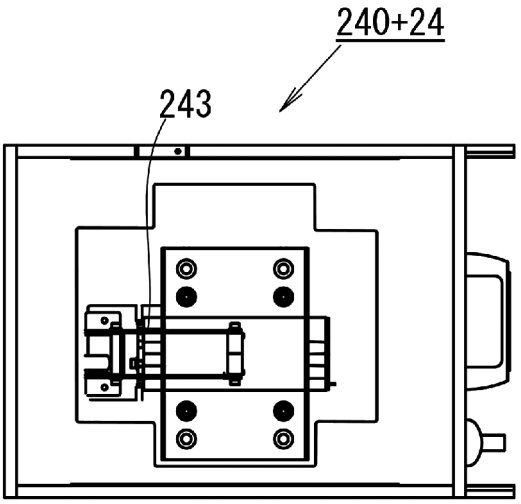
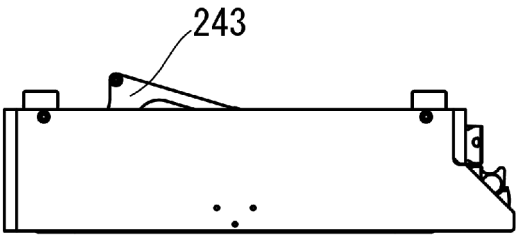

245
(c)
248
248
247
242a
244
242b
(e)

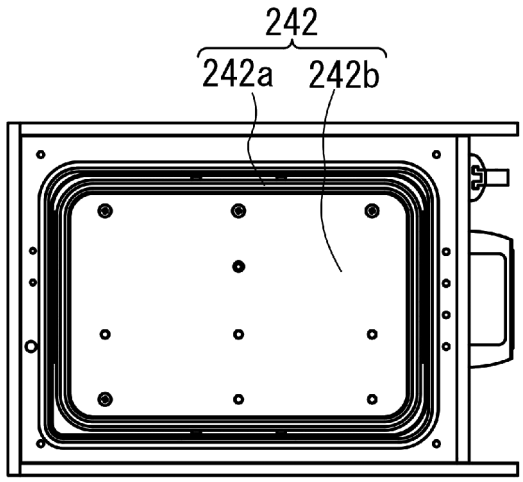
FIG. 9


240+24
243

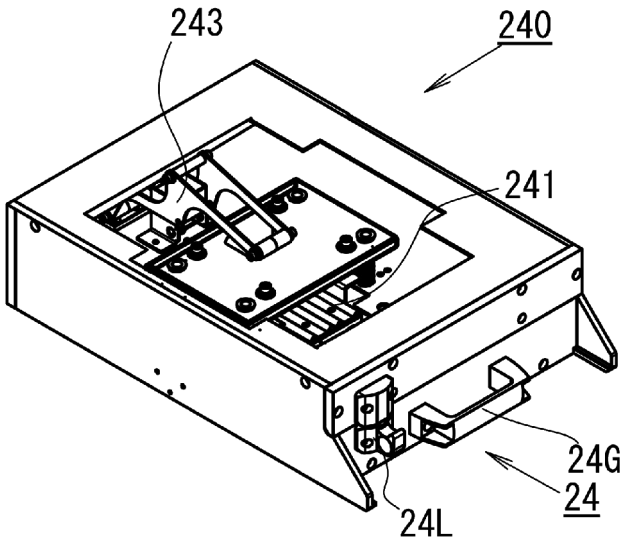
(a)


243

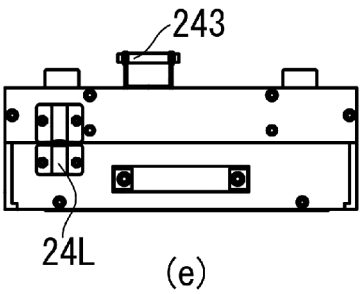
(b)


242
242a
242b

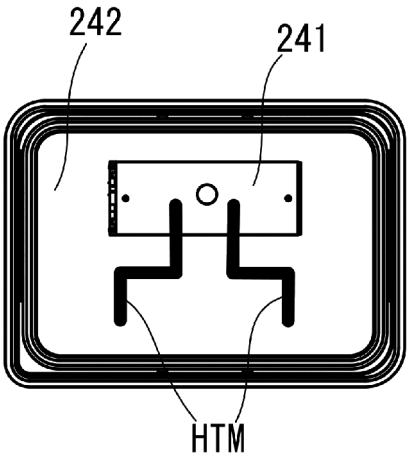
(c)


243
240
241
24G
24
24L

(d)

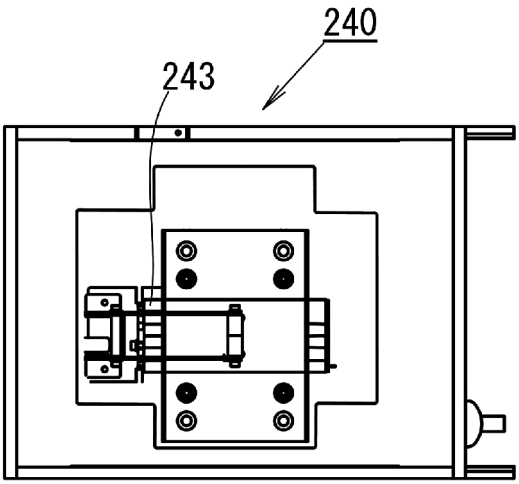

243
24L

(e)

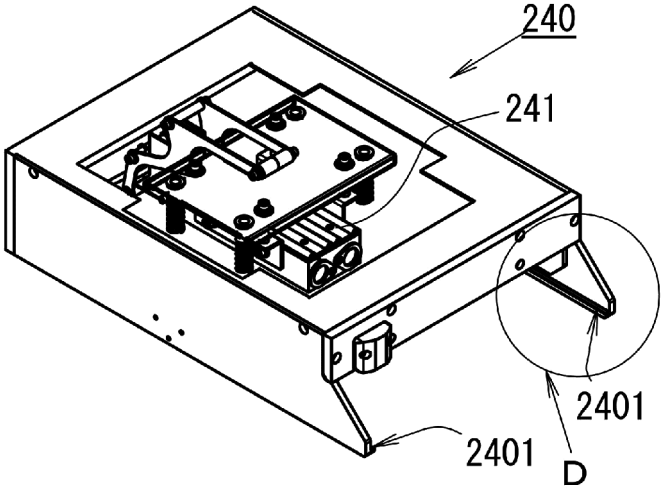

242
241
HTM

(f)

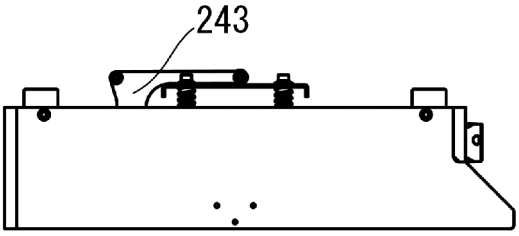
FIG. 10



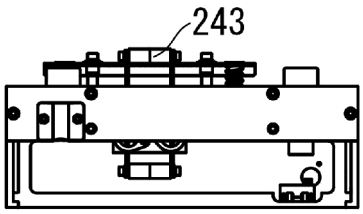
(a)



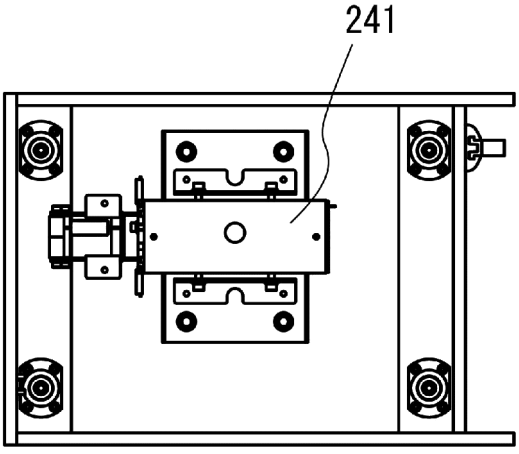
(d)



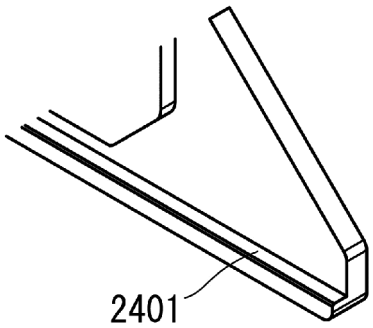
(b)



(e)

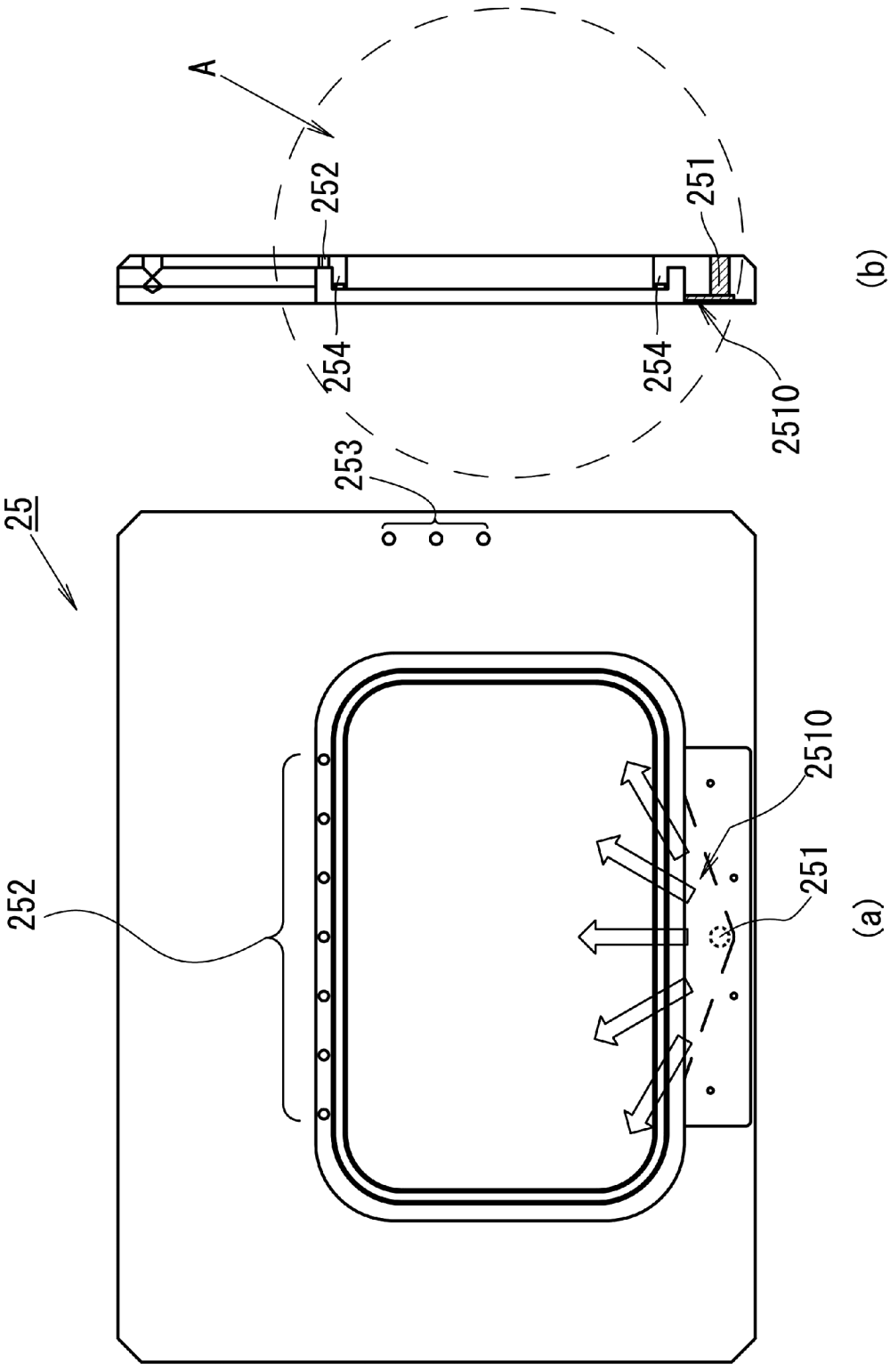


(c)



(f)

FIG. 11



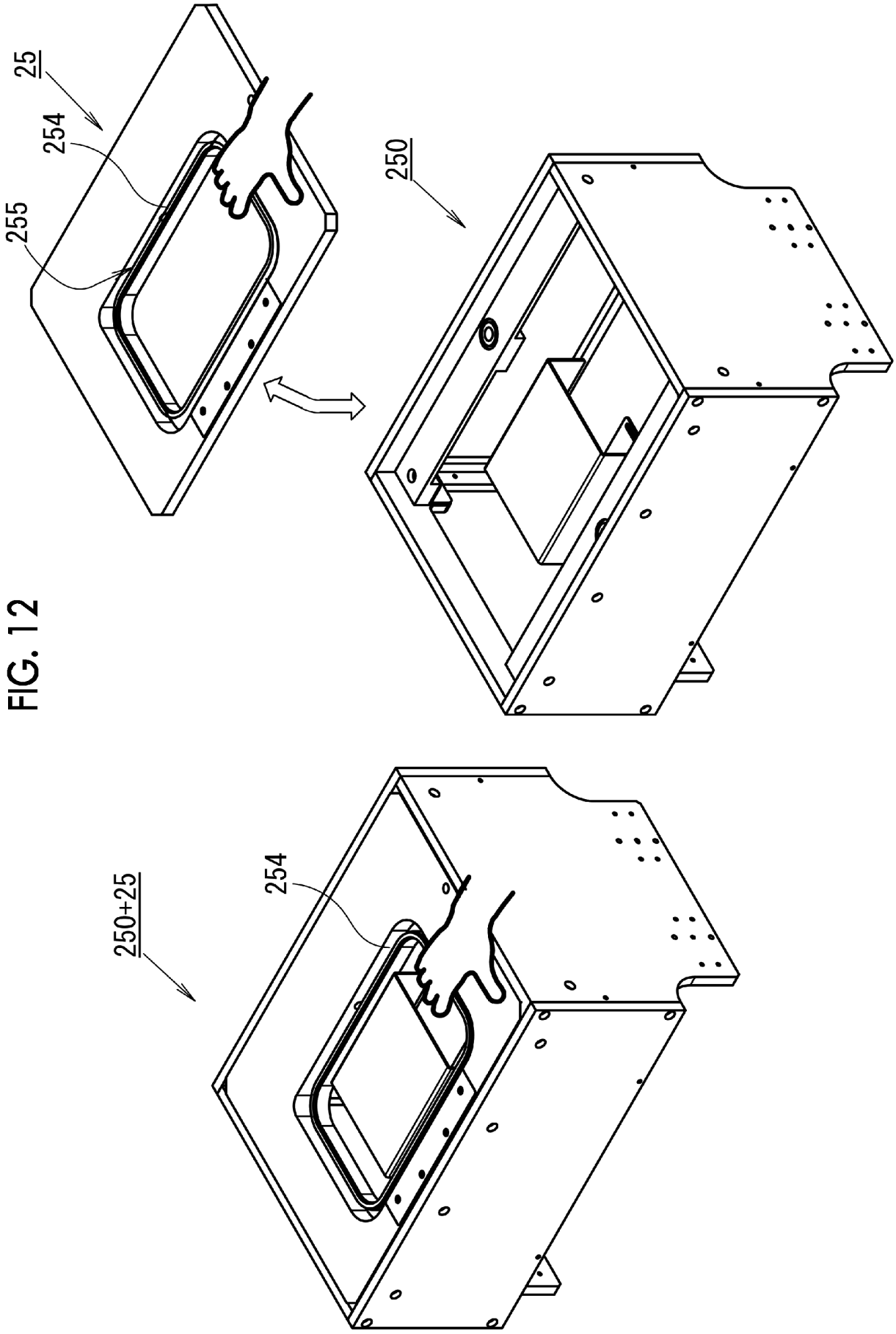
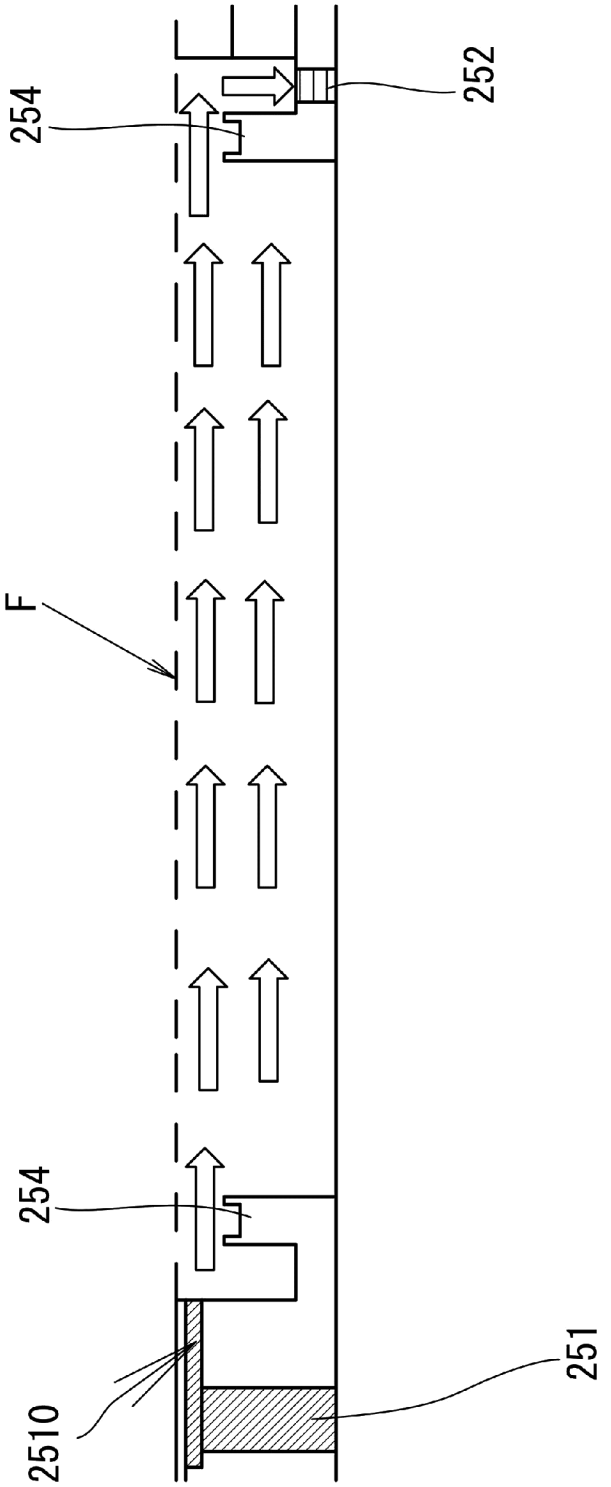


FIG. 12

FIG. 13



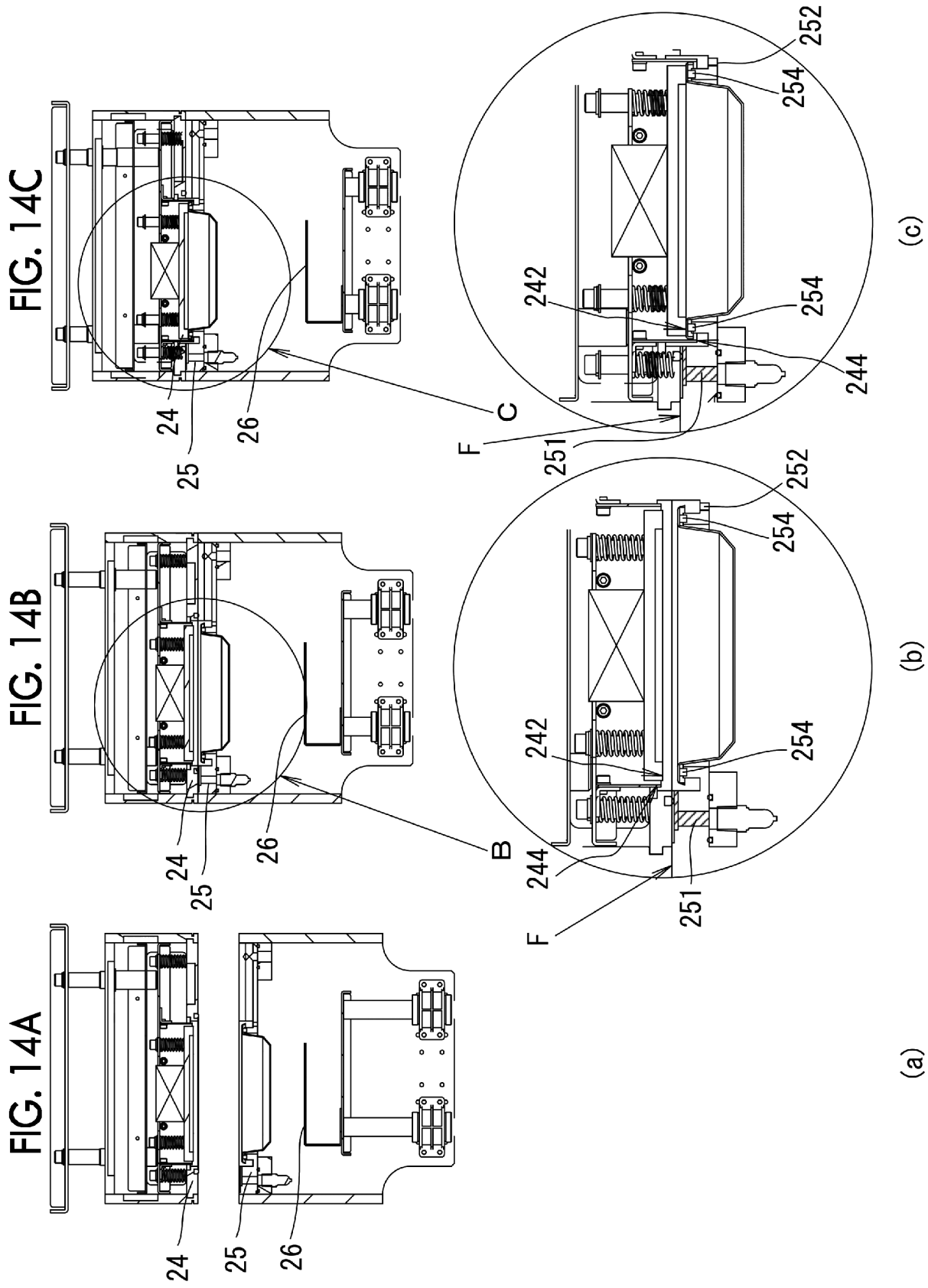
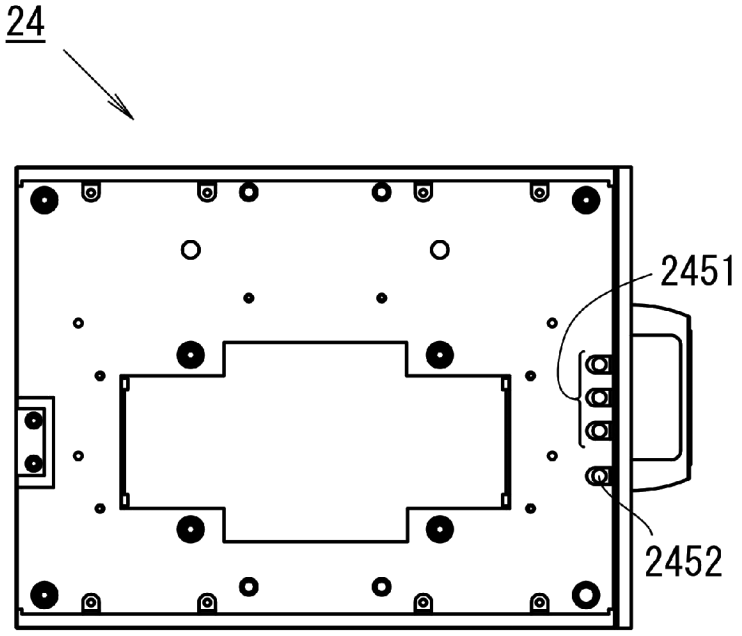
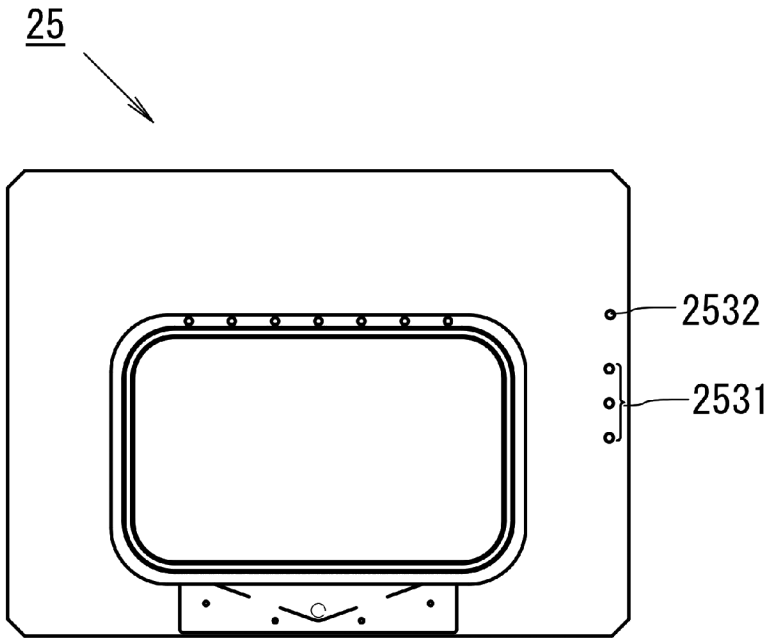

FIG. 14A
24
25
26
(a)
FIG. 14B
24
25
26
B
242
244
251
252
254
F
(b)
FIG. 14C
24
25
26
C
242
244
251
252
254
F
(c)

FIG. 15



(a)



(b)

FIG. 16

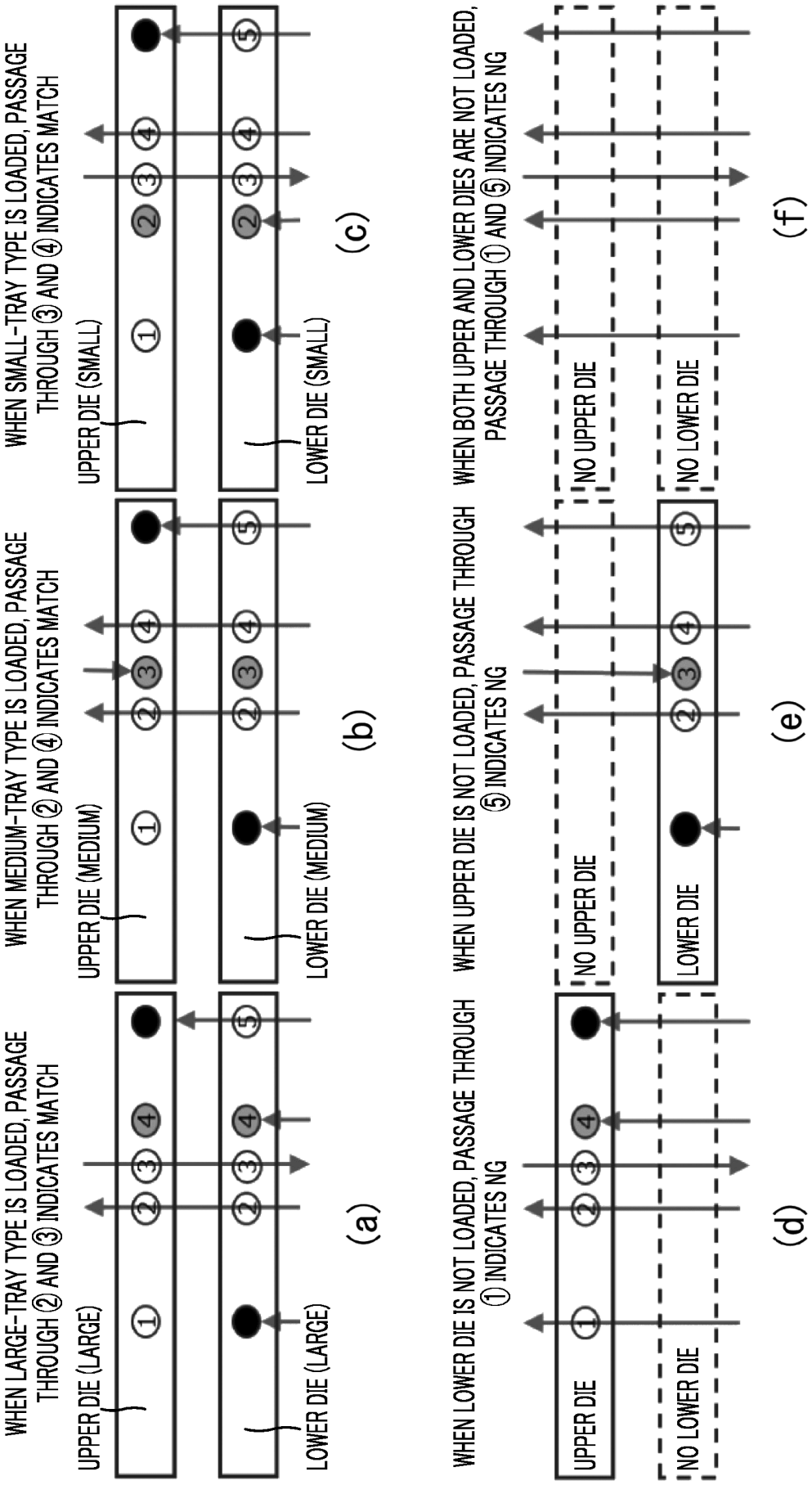

WHEN LARGE-TRAY TYPE IS LOADED, PASSAGE THROUGH ② AND ③ INDICATES MATCH
UPPER DIE (LARGE)
LOWER DIE (LARGE)
(a)
WHEN MEDIUM-TRAY TYPE IS LOADED, PASSAGE THROUGH ② AND ④ INDICATES MATCH
UPPER DIE (MEDIUM)
LOWER DIE (MEDIUM)
(b)
WHEN SMALL-TRAY TYPE IS LOADED, PASSAGE THROUGH ③ AND ④ INDICATES MATCH
UPPER DIE (SMALL)
LOWER DIE (SMALL)
(c)
WHEN LOWER DIE IS NOT LOADED, PASSAGE THROUGH ① INDICATES NG
UPPER DIE
NO LOWER DIE
(d)
WHEN UPPER DIE IS NOT LOADED, PASSAGE THROUGH ⑤ INDICATES NG
NO UPPER DIE
LOWER DIE
(e)
WHEN BOTH UPPER AND LOWER DIES ARE NOT LOADED, PASSAGE THROUGH ① AND ⑤ INDICATES NG
NO UPPER DIE
NO LOWER DIE
(f)

FIG. 17

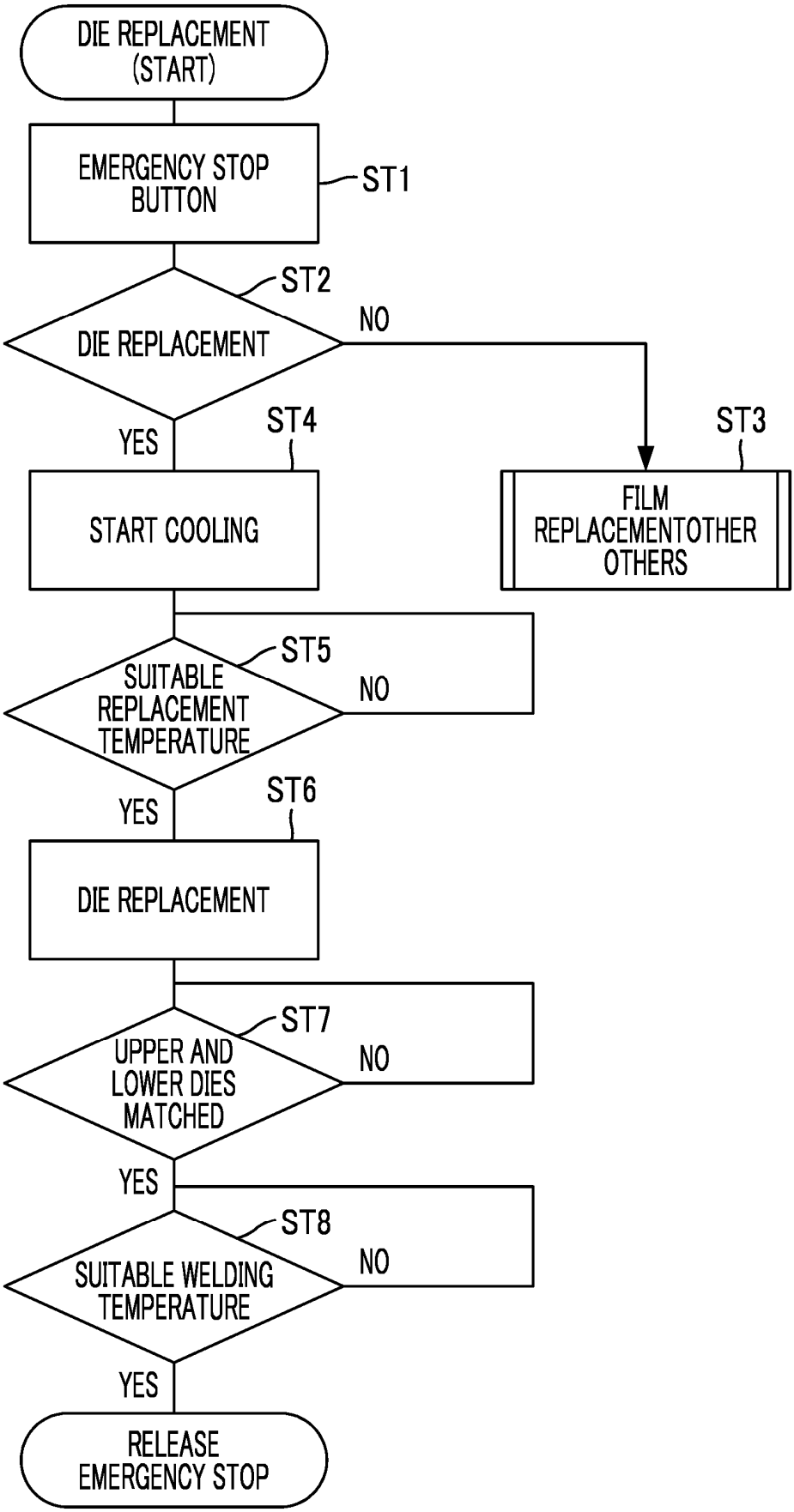
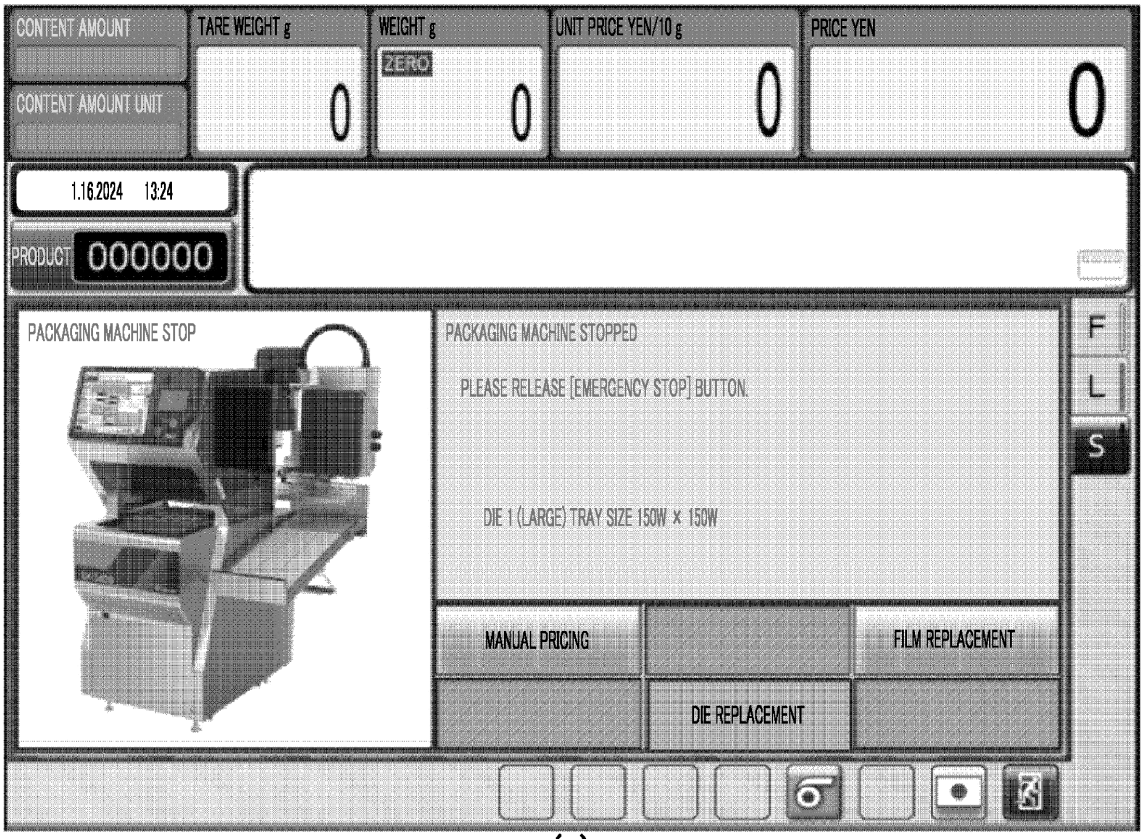
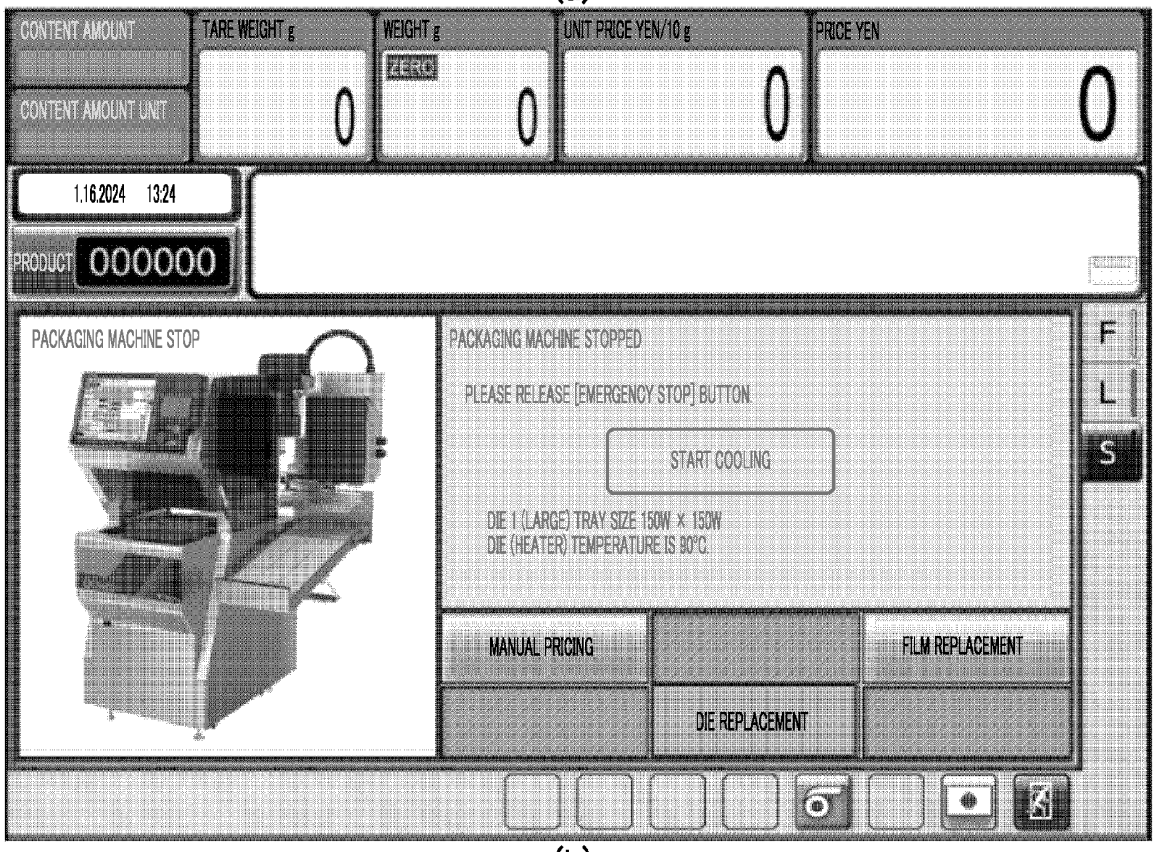

DIE REPLACEMENT (START)
EMERGENCY STOP BUTTON
ST1
ST2
DIE REPLACEMENT
NO
YES
ST4
START COOLING
ST3
FILM REPLACEMENTOTHER OTHERS
ST5
SUITABLE REPLACEMENT TEMPERATURE
NO
YES
ST6
DIE REPLACEMENT
ST7
UPPER AND LOWER DIES MATCHED
NO
YES
ST8
SUITABLE WELDING TEMPERATURE
NO
YES
RELEASE EMERGENCY STOP

FIG. 18

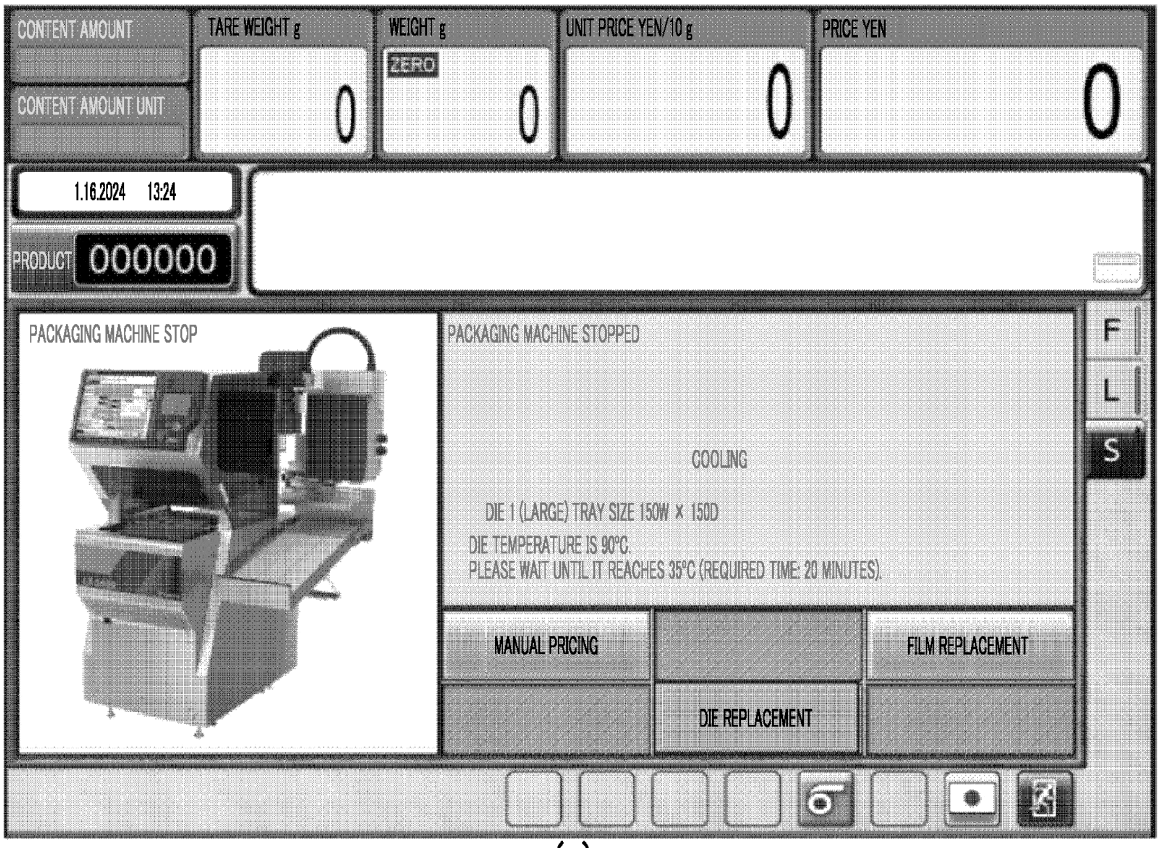

CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
PLEASE RELEASE [EMERGENCY STOP] BUTTON.
DIE 1 (LARGE) TRAY SIZE 150W × 150W
MANUAL PRICING
FILM REPLACEMENT
DIE REPLACEMENT
F
L
S

(a)

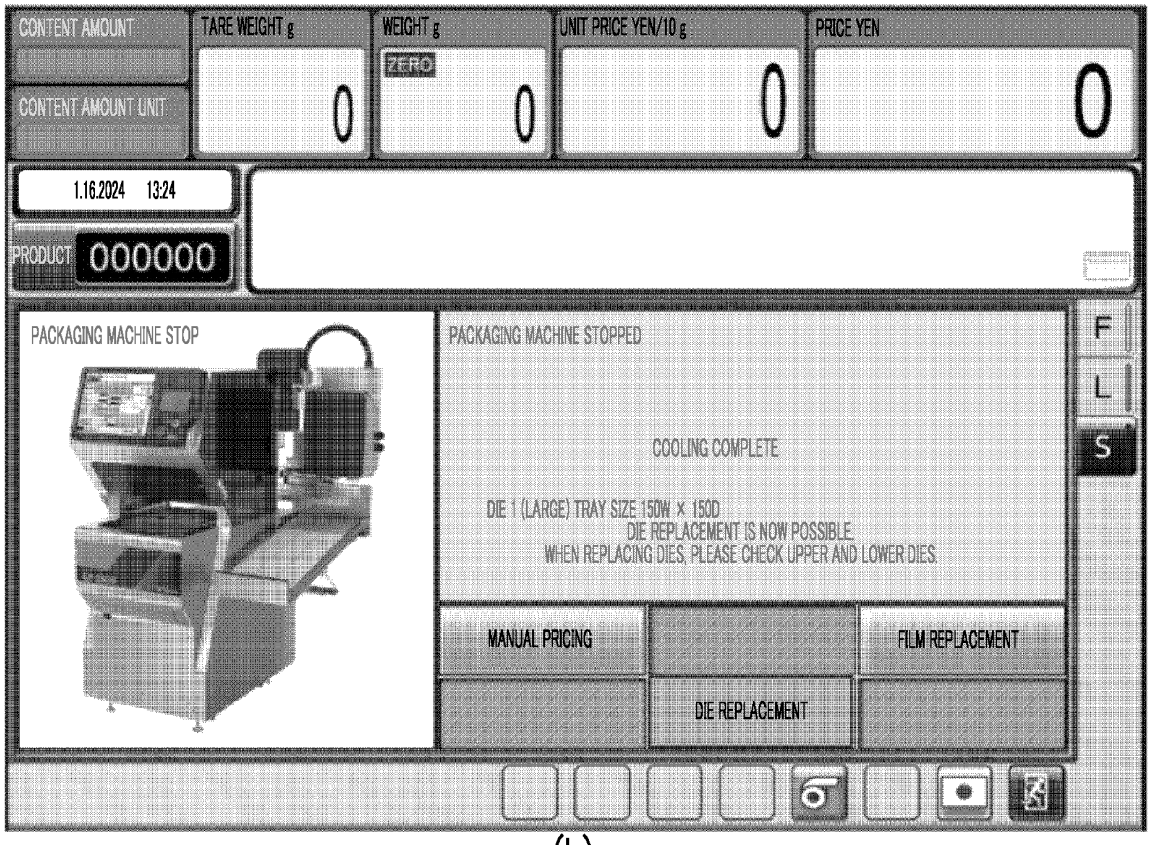

CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
PLEASE RELEASE [EMERGENCY STOP] BUTTON.
START COOLING
DIE 1 (LARGE) TRAY SIZE 150W × 150W
DIE (HEATER) TEMPERATURE IS 90°C.
MANUAL PRICING
FILM REPLACEMENT
DIE REPLACEMENT
F
L
S

(b)

FIG. 19

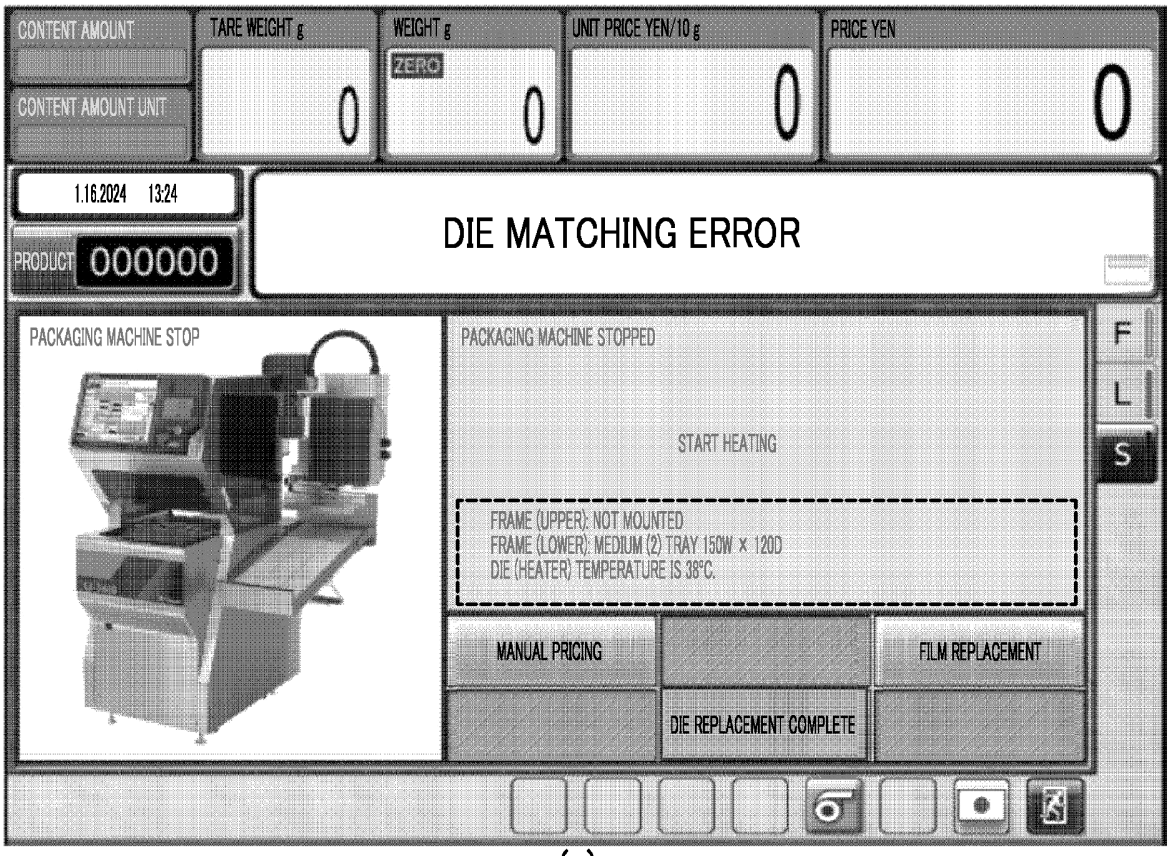

CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
COOLING
DIE 1 (LARGE) TRAY SIZE 150W × 150D
DIE TEMPERATURE IS 90°C.
PLEASE WAIT UNTIL IT REACHES 35°C (REQUIRED TIME: 20 MINUTES).
MANUAL PRICING
FILM REPLACEMENT
DIE REPLACEMENT
F
L
S

(a)

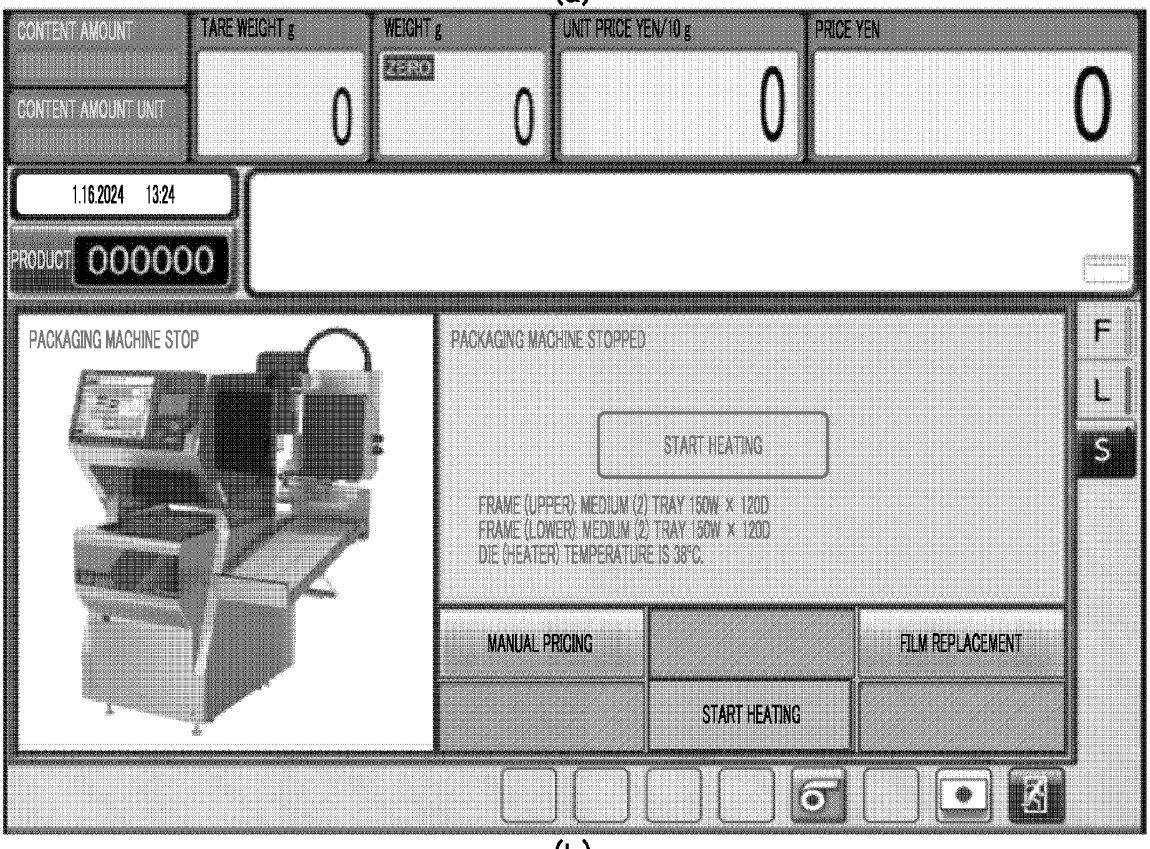

CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
COOLING COMPLETE
DIE 1 (LARGE) TRAY SIZE 150W × 150D
DIE REPLACEMENT IS NOW POSSIBLE.
WHEN REPLACING DIES, PLEASE CHECK UPPER AND LOWER DIES.
MANUAL PRICING
FILM REPLACEMENT
DIE REPLACEMENT
F
L
S

(b)

FIG. 20

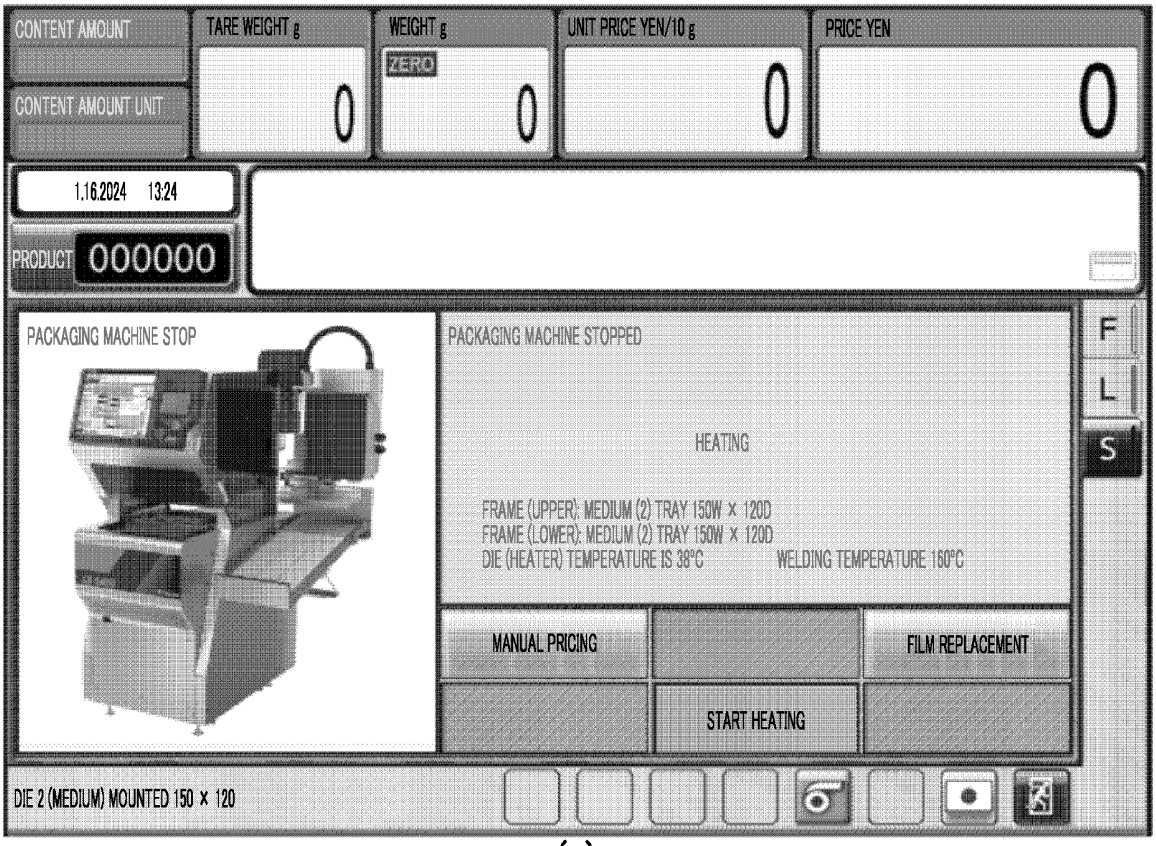

CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
DIE MATCHING ERROR
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
START HEATING
FRAME (UPPER): NOT MOUNTED
FRAME (LOWER): MEDIUM (2) TRAY 150W × 120D
DIE (HEATER) TEMPERATURE IS 38°C.
MANUAL PRICING
FILM REPLACEMENT
DIE REPLACEMENT COMPLETE
F
L
S

(a)

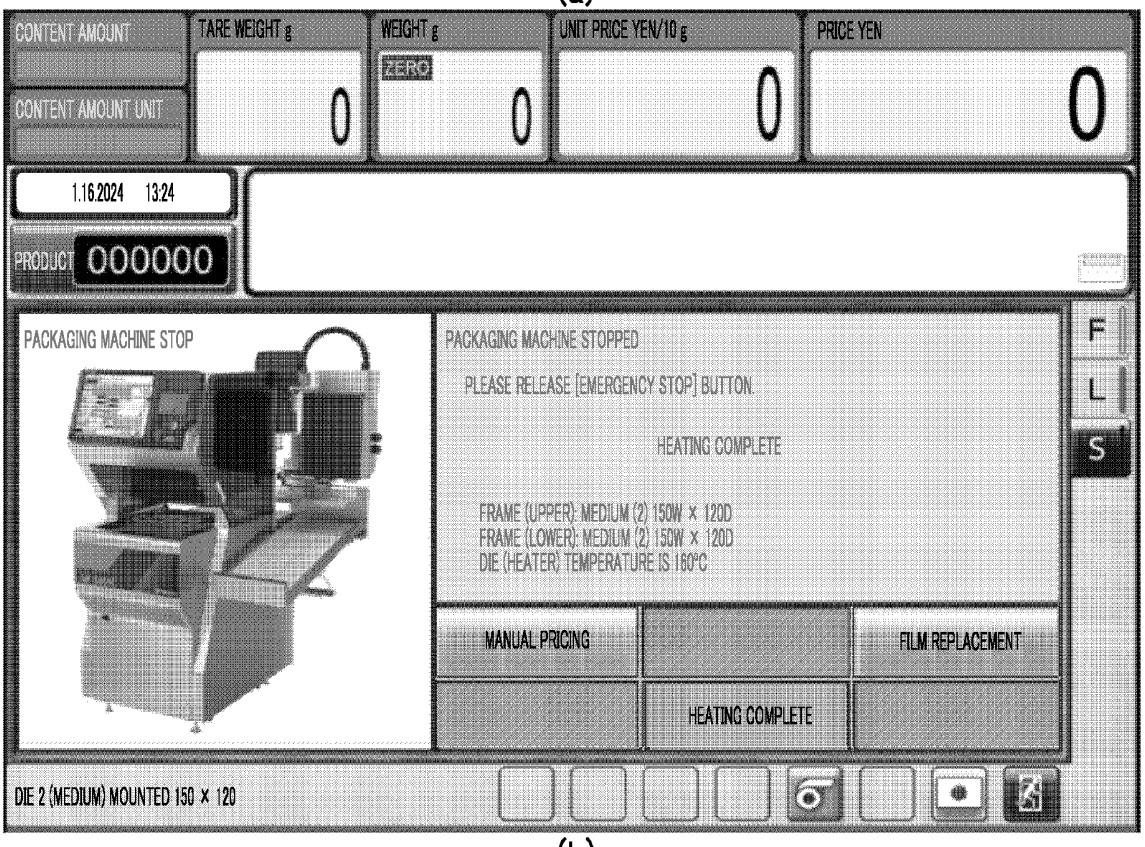

CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
START HEATING
FRAME (UPPER): MEDIUM (2) TRAY 150W × 120D
FRAME (LOWER): MEDIUM (2) TRAY 150W × 120D
DIE (HEATER) TEMPERATURE IS 38°C.
MANUAL PRICING
FILM REPLACEMENT
START HEATING
F
L
S

(b)

FIG. 21


CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
HEATING
FRAME (UPPER): MEDIUM (2) TRAY 150W × 120D
FRAME (LOWER): MEDIUM (2) TRAY 150W × 120D
DIE (HEATER) TEMPERATURE IS 38°C
WELDING TEMPERATURE 160°C
MANUAL PRICING
FILM REPLACEMENT
START HEATING
F
L
S
DIE 2 (MEDIUM) MOUNTED 150 × 120

(a)


CONTENT AMOUNT
CONTENT AMOUNT UNIT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
UNIT PRICE YEN/10 g
0
PRICE YEN
0
1.16.2024 13:24
PRODUCT 000000
PACKAGING MACHINE STOP
PACKAGING MACHINE STOPPED
PLEASE RELEASE [EMERGENCY STOP] BUTTON
HEATING COMPLETE
FRAME (UPPER): MEDIUM (2) 150W × 120D
FRAME (LOWER): MEDIUM (2) 150W × 120D
DIE (HEATER) TEMPERATURE IS 160°C
MANUAL PRICING
FILM REPLACEMENT
HEATING COMPLETE
F
L
S
DIE 2 (MEDIUM) MOUNTED 150 × 120

(b)

FIG. 22

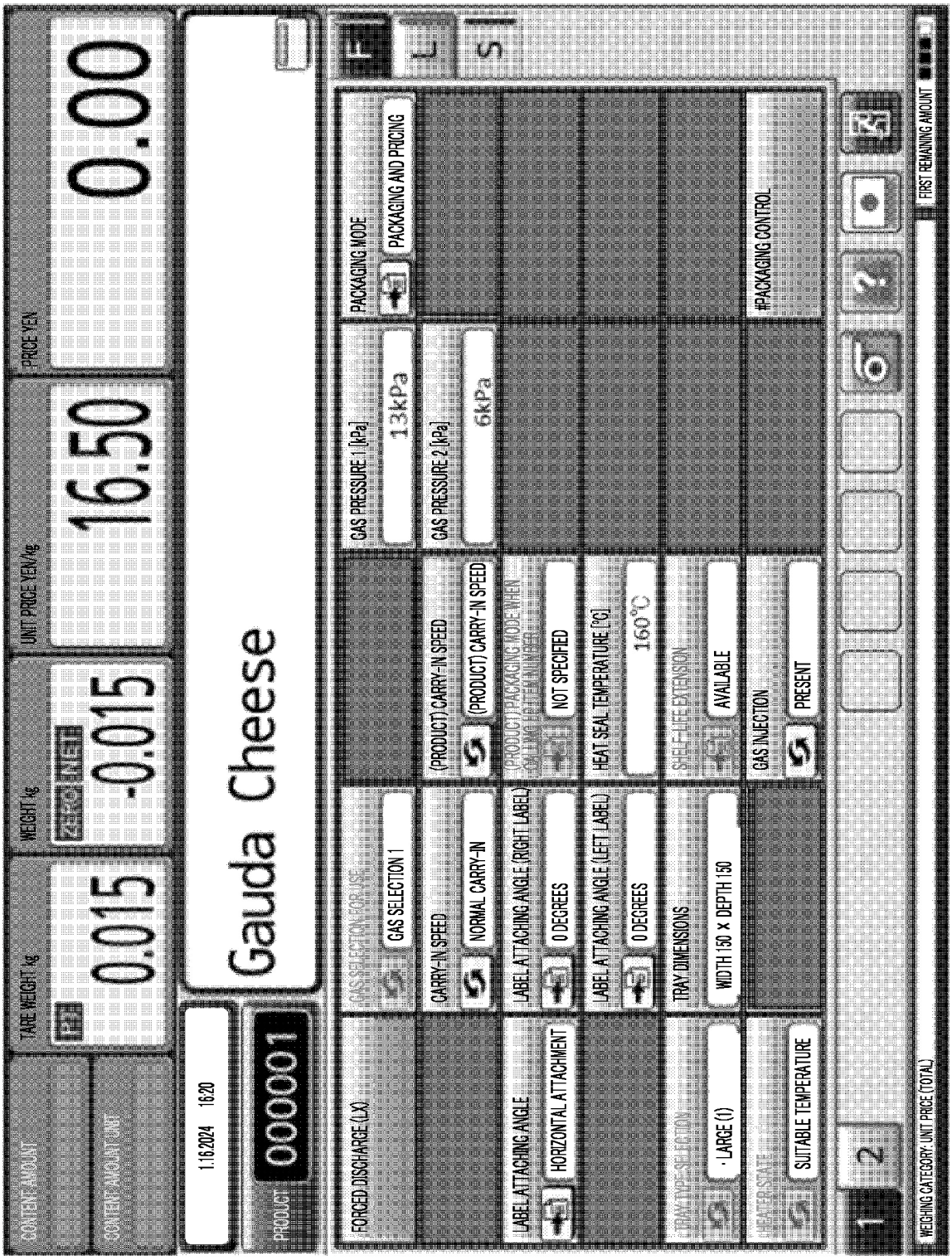

CONTENT AMOUNT
TARE WEIGHT kg
0.015
WEIGHT kg
ZERO NET
-0.015
UNIT PRICE YEN/kg
16.50
PRICE YEN
0.00
CONTENT AMOUNT UNIT
1.16.2024 16:20
PRODUCT 000001
Gauda Cheese
FORCED DISCHARGE (LX)
GAS SELECTION FOR USE
GAS SELECTION 1
GAS PRESSURE 1 [kPa]
13kPa
PACKAGING MODE
PACKAGING AND PRICING
CARRY-IN SPEED
(PRODUCT) CARRY-IN SPEED
NORMAL CARRY-IN
(PRODUCT) CARRY-IN SPEED
GAS PRESSURE 2 [kPa]
6kPa
LABEL ATTACHING ANGLE
HORIZONTAL ATTACHMENT
LABEL ATTACHING ANGLE (RIGHT LABEL)
0 DEGREES
(PRODUCT) PACKAGING MODE WHEN SPLITTING IS SET TO 2 NUMBERS
NOT SPECIFIED
LABEL ATTACHING ANGLE (LEFT LABEL)
0 DEGREES
HEAT SEAL TEMPERATURE [°C]
160°C
TRAY TYPE SELECTION
· LARGE (1)
TRAY DIMENSIONS
WIDTH 150 × DEPTH 150
SHELF-LIFE EXTENSION
AVAILABLE
HEATER STATE
SUITABLE TEMPERATURE
GAS INJECTION
PRESENT
#PACKAGING CONTROL
1
2
WEIGHING CATEGORY: UNIT PRICE (TOTAL)
FIRST REMAINING AMOUNT

FIG. 23

PLU SETTING	TRAY SETTING	DIE SETTING	PACKAGING APPARATUS SPECIFICATIONS
GAS SELECTION			
CARRY-IN SPEED	CARRY-IN SPEED	CARRY-IN SPEED	
	HEAT SEAL TEMPERATURE	HEAT SEAL TEMPERATURE	
	TRAY SEAL TIME	TRAY SEAL TIME	
GAS FILLING TIME	GAS FILLING TIME	GAS FILLING TIME	
	TRAY DEPTH (UPPER OPENING)		TRAY DEPTH (UPPER OPENING)
	TRAY DEPTH (BOTTOM SURFACE)		TRAY DEPTH (BOTTOM SURFACE)
	TRAY HEIGHT		TRAY HEIGHT

FIG. 24

● PLU SETTING

ITEM NUMBER	PRODUCT NAME	UNIT PRICE	···	TYPE OF GAS	GAS FILLING TIME (msec)	TRAY USED
0001	FOR BEEF SHOULDER LOIN STEAK	398/g	···	GAS 1	300	000001
0002	FOR GINGER-FRIED PORK LOIN	198/g	···	GAS 2	AUTOMATIC	000002
0003	CHICKEN THIGH BLOCK	108/g	···	GAS 2	AUTOMATIC	000003
0004	WHITEBAIT	298	···	GAS 2	300	000004

● TRAY SETTING

TRAY NUMBER	TRAY NAME	HEAT SEAL TEMPERATURE	SEAL TIME (msec)	···	GAS FILLING TIME (msec)	USED DIE
000001	B01 BLACK TRAY	160	1000	···	300	TRAY TYPE 1
000002	B02 BLACK TRAY	157	500	···	250	TRAY TYPE 2
000003	H01 TRANSPARENT TRAY	AUTOMATIC	1200	···	AUTOMATIC	TRAY TYPE 3
000004	H02 TRANSPARENT TRAY	100	AUTOMATIC	···	400	TRAY TYPE 1

● DIE SETTING (ITEM IN PACKAGING MACHINE SETUP MATERIALS)

DIE NUMBER	DIE	HEAT SEAL TEMPERATURE	SEAL TIME (msec)	···	GAS FILLING TIME (msec)	···
1	TRAY TYPE 1	160	1000		300	···
2	TRAY TYPE 2	157	500		250	···
3	TRAY TYPE 3	180	1200		1800	···

EP 4 825 744 A1

FIG. 25

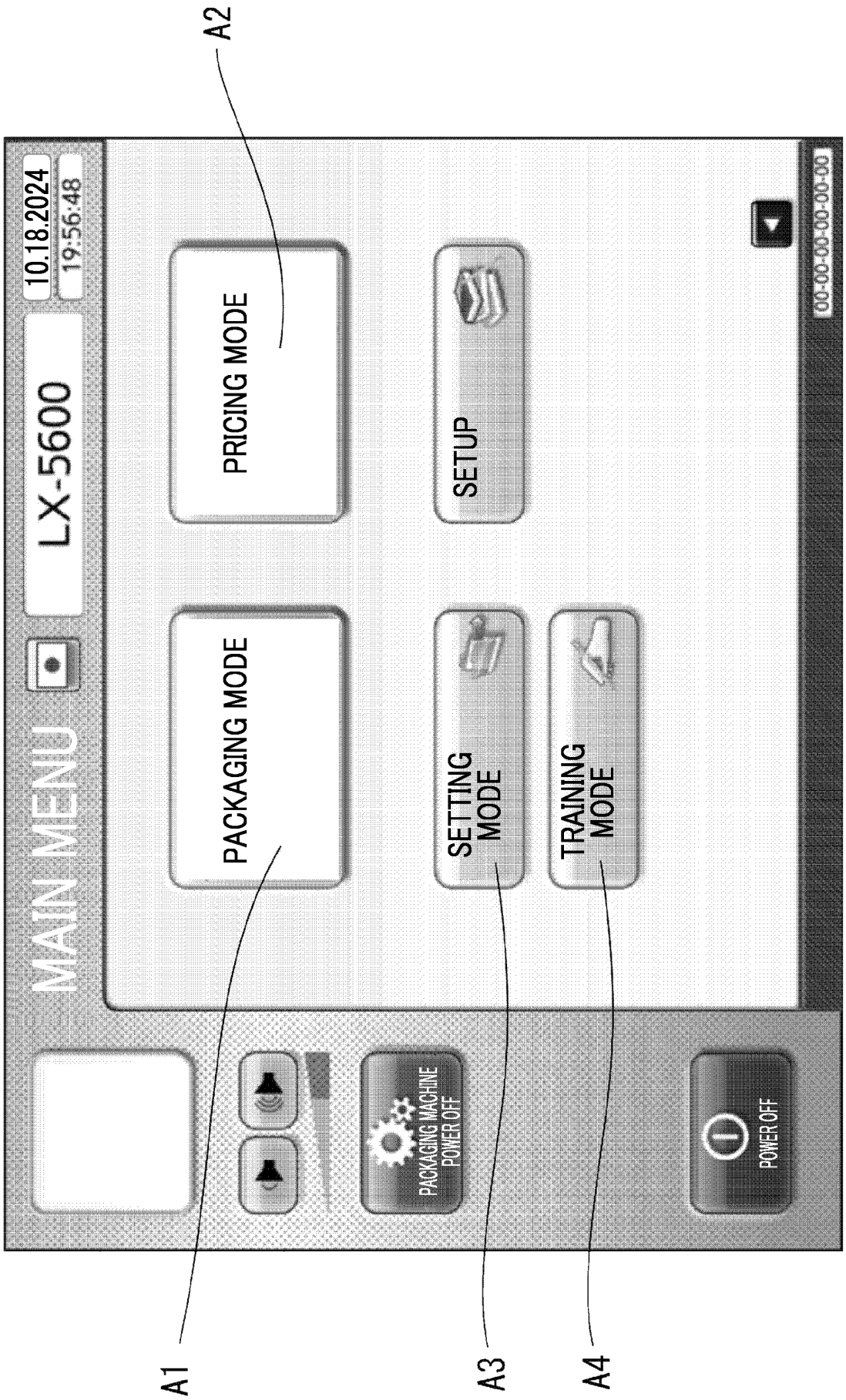

A2
MAIN MENU
LX-5600
10.18.2024
19:56:48
PRICING MODE
SETUP
PACKAGING MODE
SETTING MODE
TRAINING MODE
PACKAGING MACHINE POWER OFF
POWER OFF
A1
A3
A4

FIG. 26

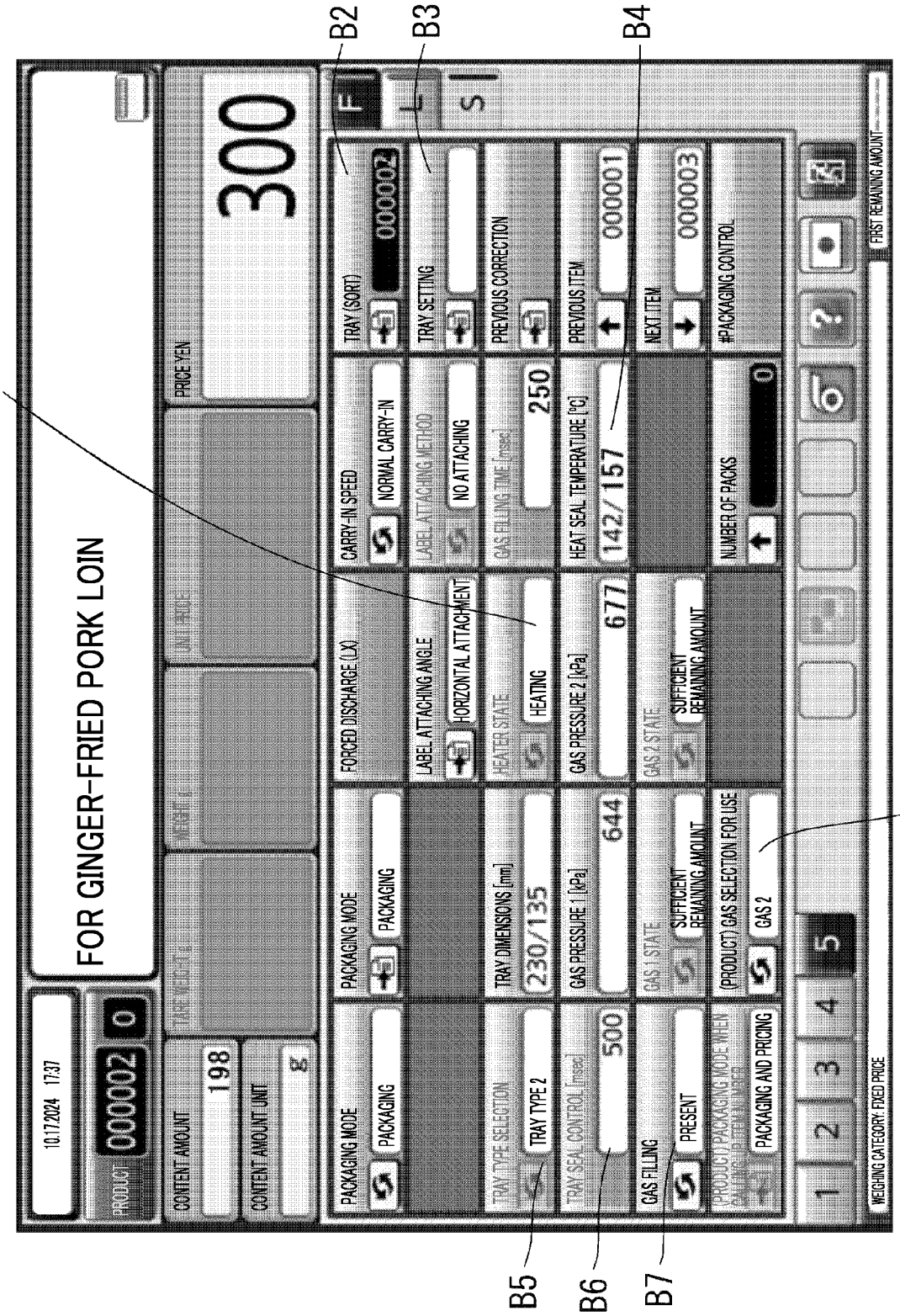

B1
B2
B3
B4
B5
B6
B7
B8
10.17.2024 17:37
FOR GINGER-FRIED PORK LOIN
PRODUCT 000002 0
CONTENT AMOUNT 198
CONTENT AMOUNT UNIT g
TARE WEIGHT
WEIGHT
UNIT PRICE
PRICE YEN 300
PACKAGING MODE
PACKAGING
PACKAGING MODE
PACKAGING
TRAY TYPE SELECTION
TRAY TYPE 2
TRAY SEAL CONTROL [msec]
500
GAS FILLING
PRESENT
(PRODUCT) PACKAGING MODE WHEN BATTING PATTERN NUMBER
PACKAGING AND PRICING
FORCED DISCHARGE (LX)
LABEL ATTACHING ANGLE
HORIZONTAL ATTACHMENT
TRAY DIMENSIONS [mm]
230/135
GAS PRESSURE 1 [kPa]
644
GAS 1 STATE
SUFFICIENT REMAINING AMOUNT
(PRODUCT) GAS SELECTION FOR USE
GAS 2
CARRY-IN SPEED
NORMAL CARRY-IN
LABEL ATTACHING METHOD
NO ATTACHING
HEATER STATE
HEATING
GAS PRESSURE 2 [kPa]
677
GAS 2 STATE
SUFFICIENT REMAINING AMOUNT
NUMBER OF PACKS
0
TRAY (SORT)
000002
TRAY SETTING
PREVIOUS CORRECTION
250
HEAT SEAL TEMPERATURE [°C]
142/157
PREVIOUS ITEM
000001
NEXT ITEM
000003
#PACKAGING CONTROL
F
L
S
1 2 3 4 5 6 7 8 9
WEIGHING CATEGORY: FIXED PRICE
FIRST REMAINING AMOUNT

FIG. 27

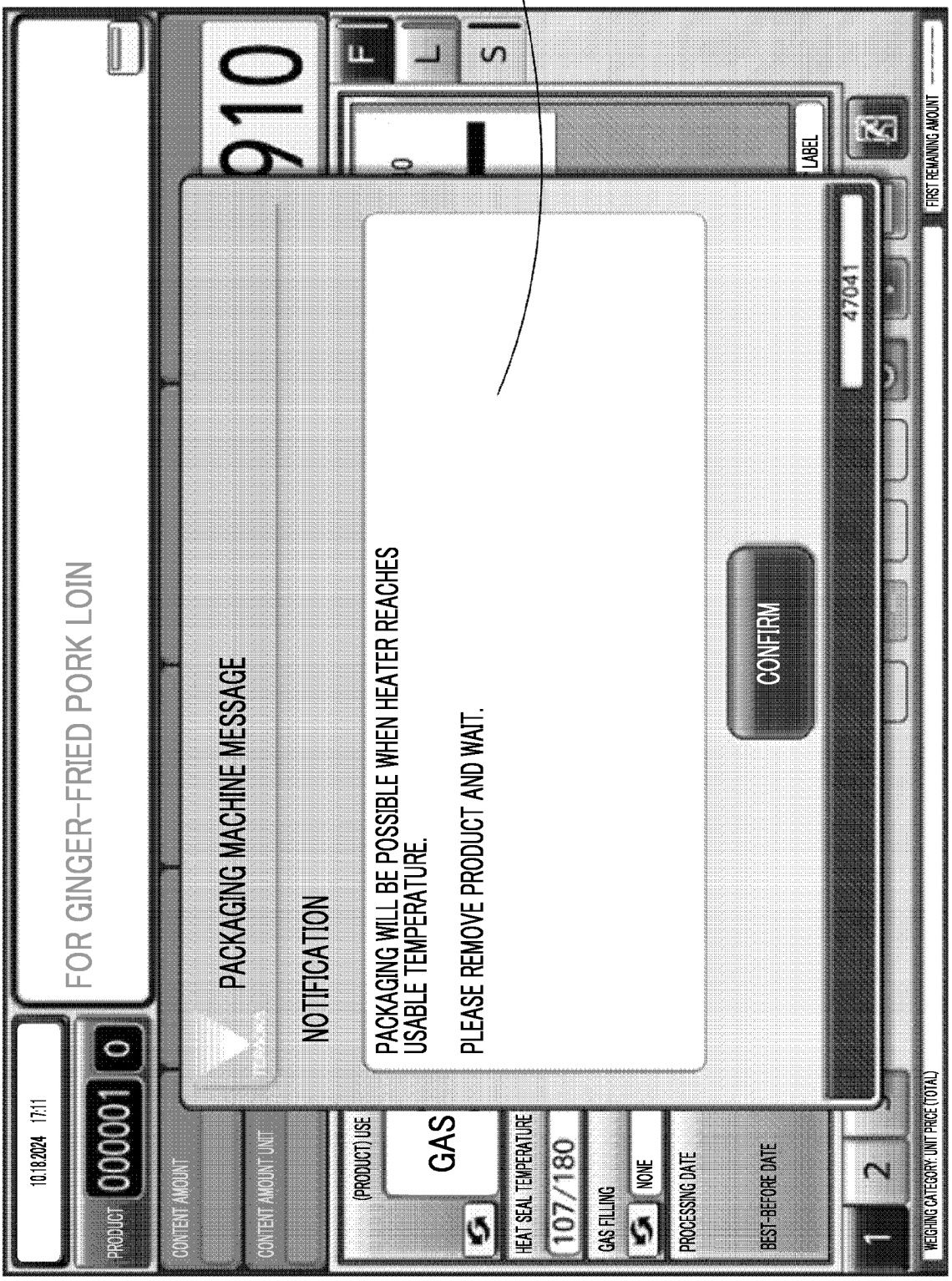

C1
10.18.2024 17:11
PRODUCT 000001 0
FOR GINGER-FRIED PORK LOIN
910
F
L
SI
CONTENT AMOUNT
CONTENT AMOUNT UNIT
PACKAGING MACHINE MESSAGE
NOTIFICATION
PACKAGING WILL BE POSSIBLE WHEN HEATER REACHES USABLE TEMPERATURE.
PLEASE REMOVE PRODUCT AND WAIT.
CONFIRM
LABEL
47041
(PRODUCT) USE
GAS
HEAT SEAL TEMPERATURE
107/180
GAS FILLING
NONE
PROCESSING DATE
BEST-BEFORE DATE
1
2
WEIGHING CATEGORY UNIT PRICE (TOTAL)
FIRST REMAINING AMOUNT

FIG. 28

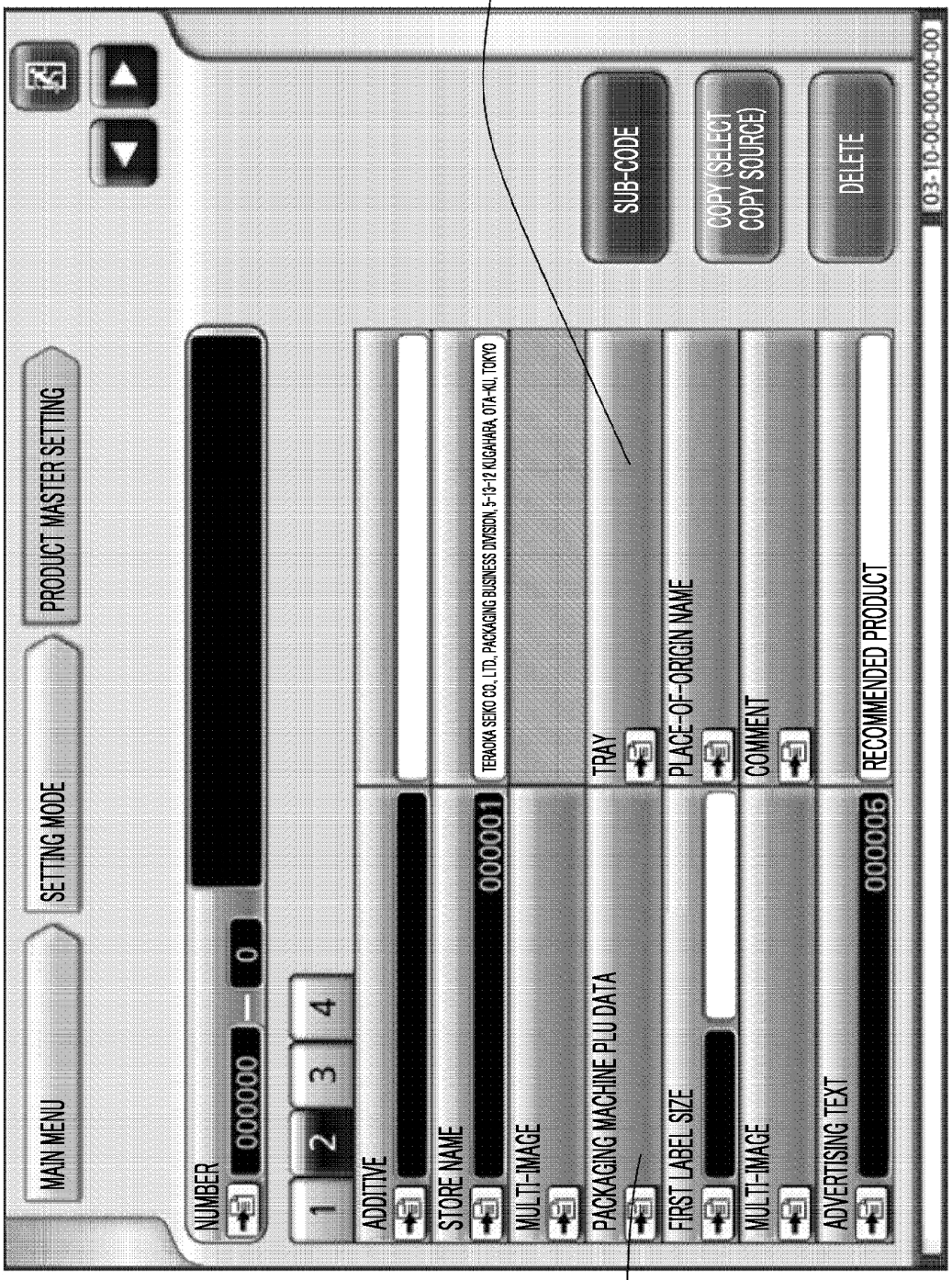

MAIN MENU
SETTING MODE
PRODUCT MASTER SETTING
NUMBER
000000
0
1
2
3
4
ADDITIVE
STORE NAME
TERAOKA SEIKO CO., LTD. PACKAGING BUSINESS DIVISION, 5-13-12 KUGAHARA, OTA-KU, TOKYO
000001
MULTI-IMAGE
PACKAGING MACHINE PLU DATA
TRAY
FIRST LABEL SIZE
PLACE-OF-ORIGIN NAME
MULTI-IMAGE
COMMENT
ADVERTISING TEXT
000006
RECOMMENDED PRODUCT
SUB-CODE
COPY (SELECT COPY SOURCE)
DELETE
03-10-00-00-00-00
D1
D2

FIG. 29

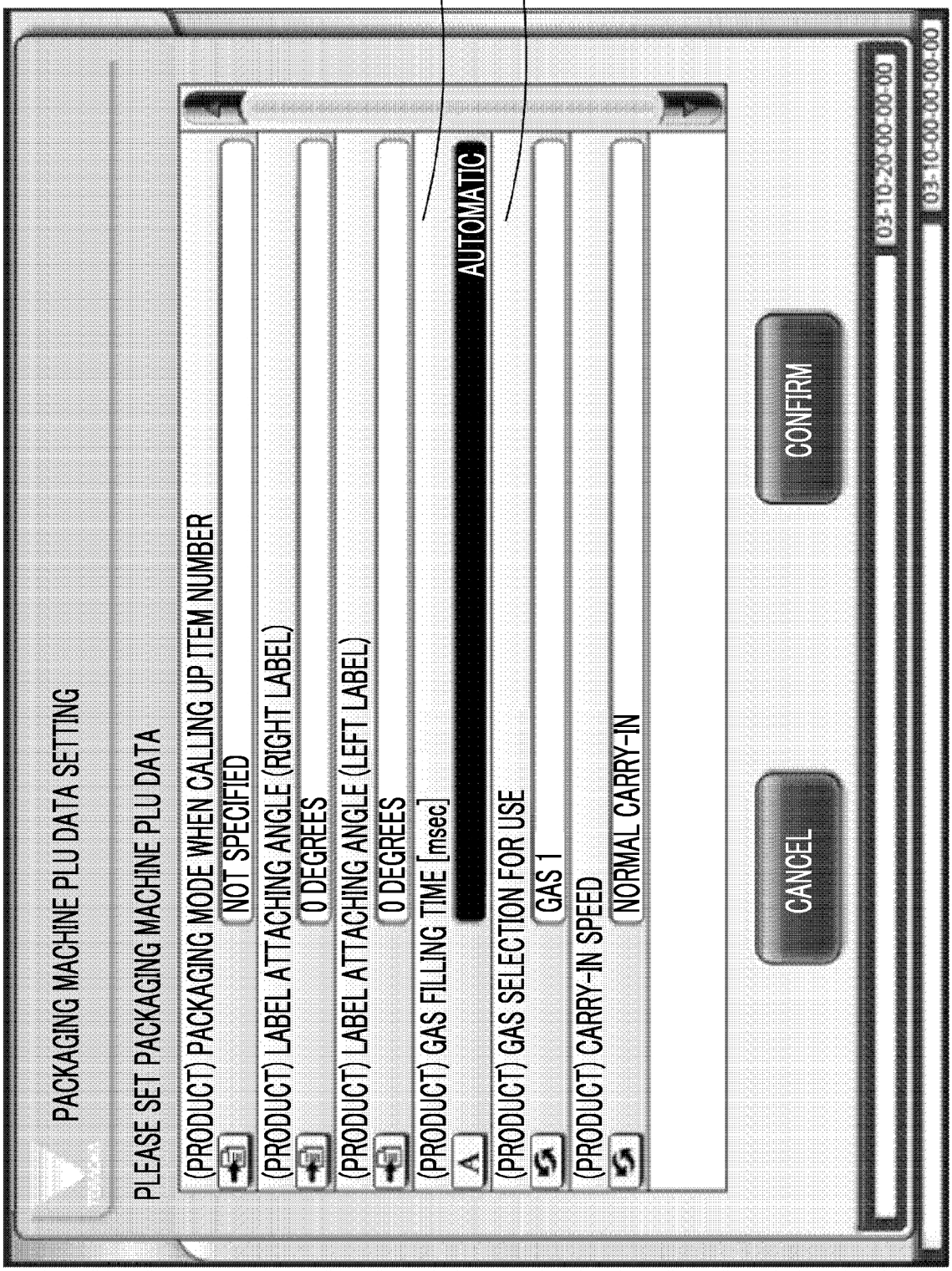

E1
E2
PACKAGING MACHINE PLU DATA SETTING
PLEASE SET PACKAGING MACHINE PLU DATA
(PRODUCT) PACKAGING MODE WHEN CALLING UP ITEM NUMBER
NOT SPECIFIED
(PRODUCT) LABEL ATTACHING ANGLE (RIGHT LABEL)
0 DEGREES
(PRODUCT) LABEL ATTACHING ANGLE (LEFT LABEL)
0 DEGREES
(PRODUCT) GAS FILLING TIME [msec]
A
AUTOMATIC
(PRODUCT) GAS SELECTION FOR USE
GAS 1
(PRODUCT) CARRY-IN SPEED
NORMAL CARRY-IN
CANCEL
CONFIRM
03-10-20-00-00-00
03-10-00-00-00-00

FIG. 30

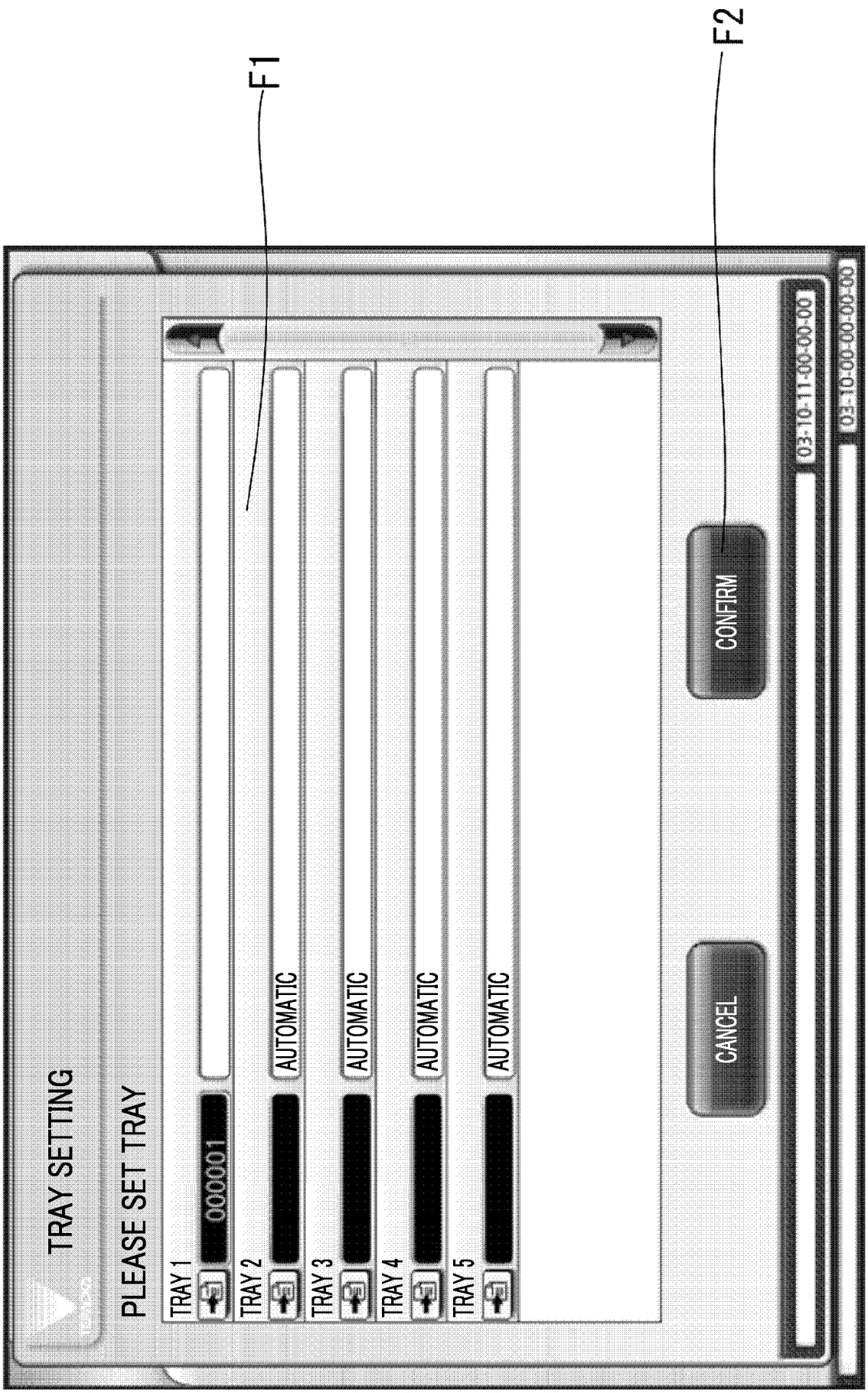

F1
F2
TRAY SETTING
PLEASE SET TRAY
TRAY 1
000001
TRAY 2
AUTOMATIC
TRAY 3
AUTOMATIC
TRAY 4
AUTOMATIC
TRAY 5
AUTOMATIC
CANCEL
CONFIRM
03-10-11-00-00-00
03-10-00-00-00-00

FIG. 31

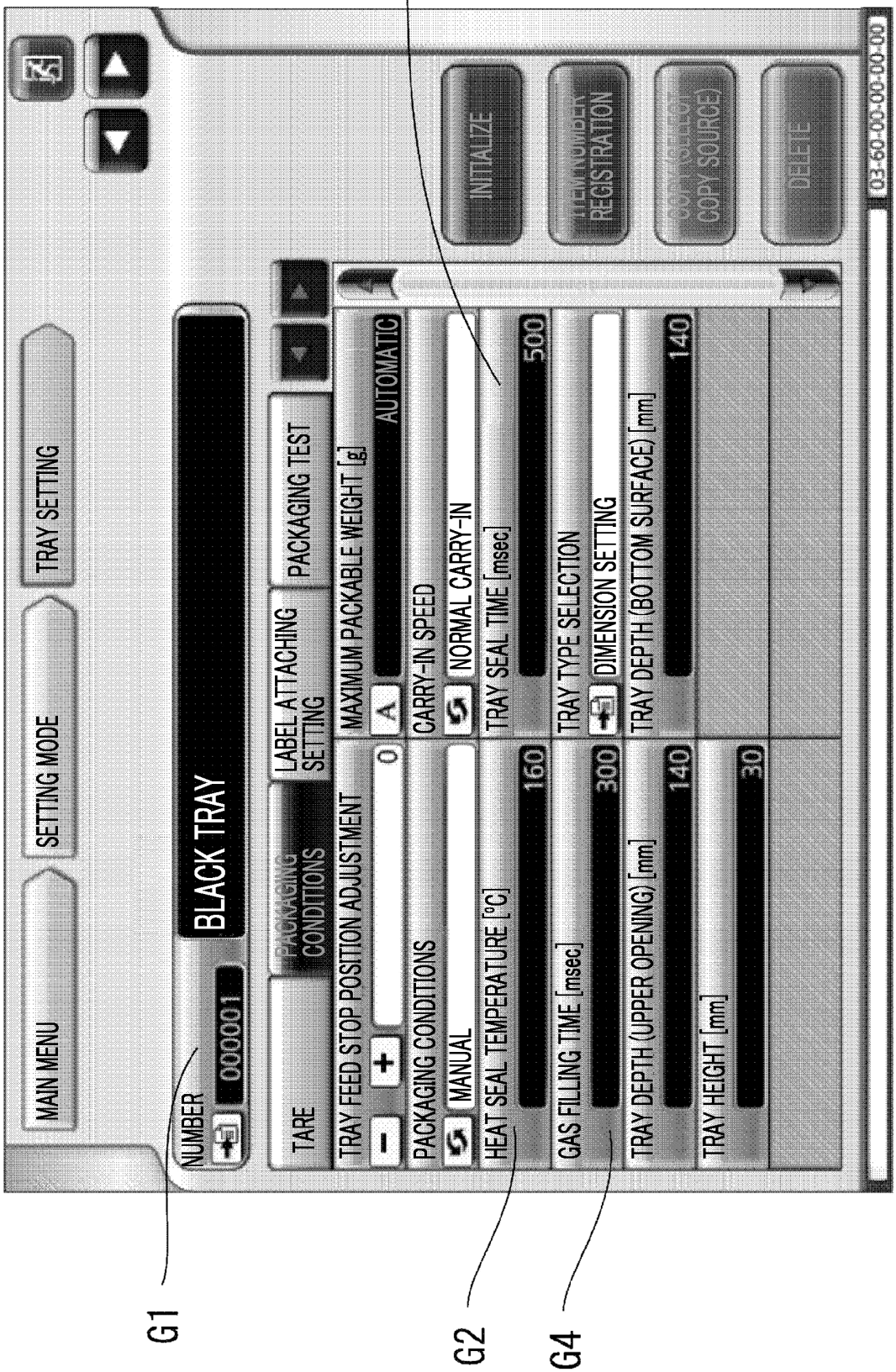

MAIN MENU
SETTING MODE
TRAY SETTING
NUMBER
000001
BLACK TRAY
TARE
PACKAGING CONDITIONS
LABEL ATTACHING SETTING
PACKAGING TEST
TRAY FEED STOP POSITION ADJUSTMENT
0
PACKAGING CONDITIONS
MANUAL
HEAT SEAL TEMPERATURE [°C]
160
GAS FILLING TIME [msec]
300
TRAY DEPTH (UPPER OPENING) [mm]
140
TRAY HEIGHT [mm]
30
MAXIMUM PACKABLE WEIGHT [g]
A
AUTOMATIC
CARRY-IN SPEED
NORMAL CARRY-IN
TRAY SEAL TIME [msec]
500
TRAY TYPE SELECTION
DIMENSION SETTING
TRAY DEPTH (BOTTOM SURFACE) [mm]
140
INITIALIZE
REGISTRATION
COPY SOURCE
DELETE
03-60-00-00-00-00
G1
G2
G3
G4

FIG. 32

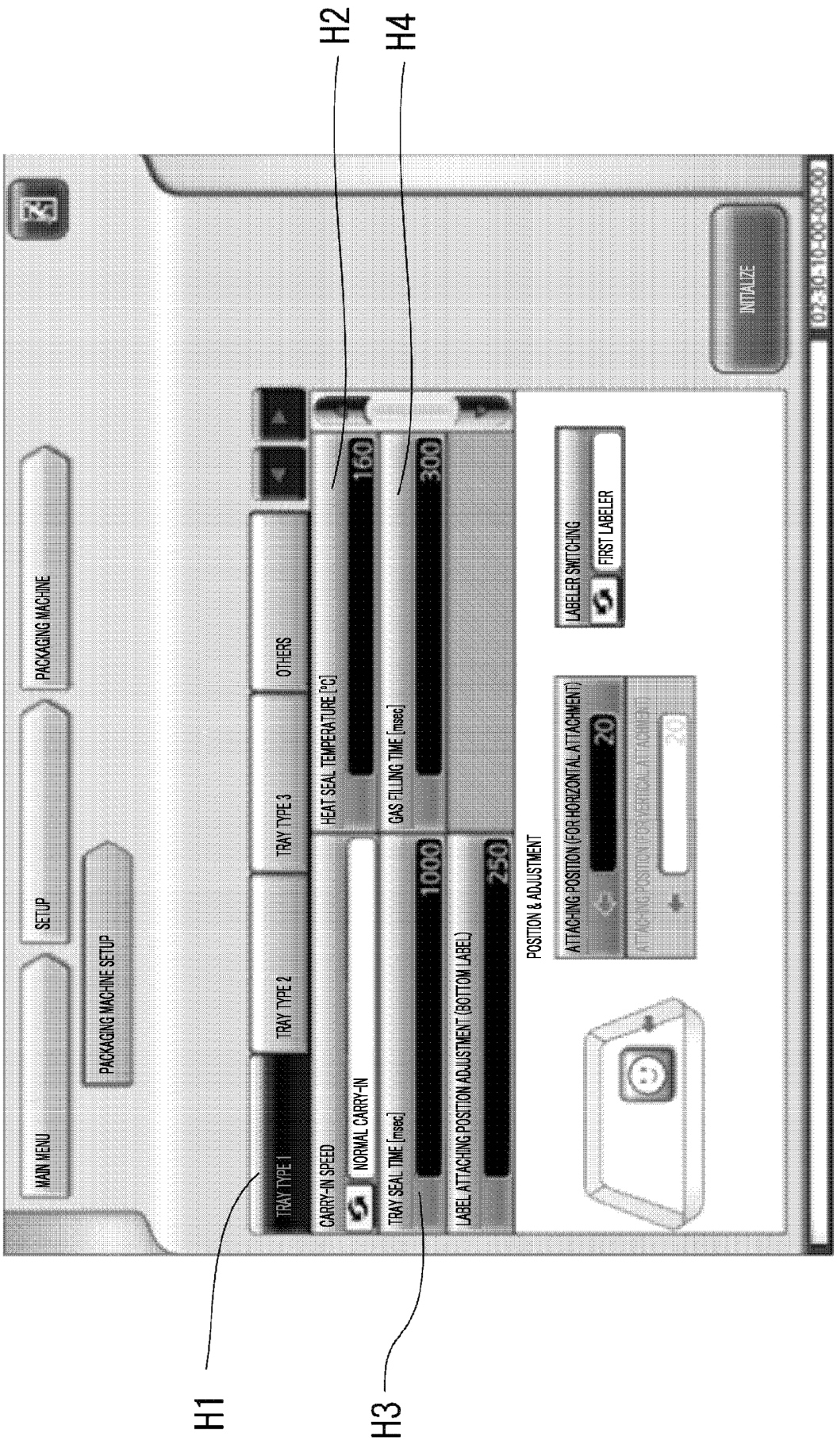

H1
H2
H3
H4
MAIN MENU
SETUP
PACKAGING MACHINE
PACKAGING MACHINE SETUP
TRAY TYPE 1
TRAY TYPE 2
TRAY TYPE 3
OTHERS
CARRY-IN SPEED
NORMAL CARRY-IN
TRAY SEAL TIME [msec]
1000
LABEL ATTACHING POSITION ADJUSTMENT (BOTTOM LABEL)
250
HEAT SEAL TEMPERATURE [°C]
160
GAS FILLING TIME [msec]
300
POSITION & ADJUSTMENT
ATTACHING POSITION (FOR HORIZONTAL ATTACHMENT)
20
LABELER SWITCHING
FIRST LABELER
INITIALIZE

FIG. 33

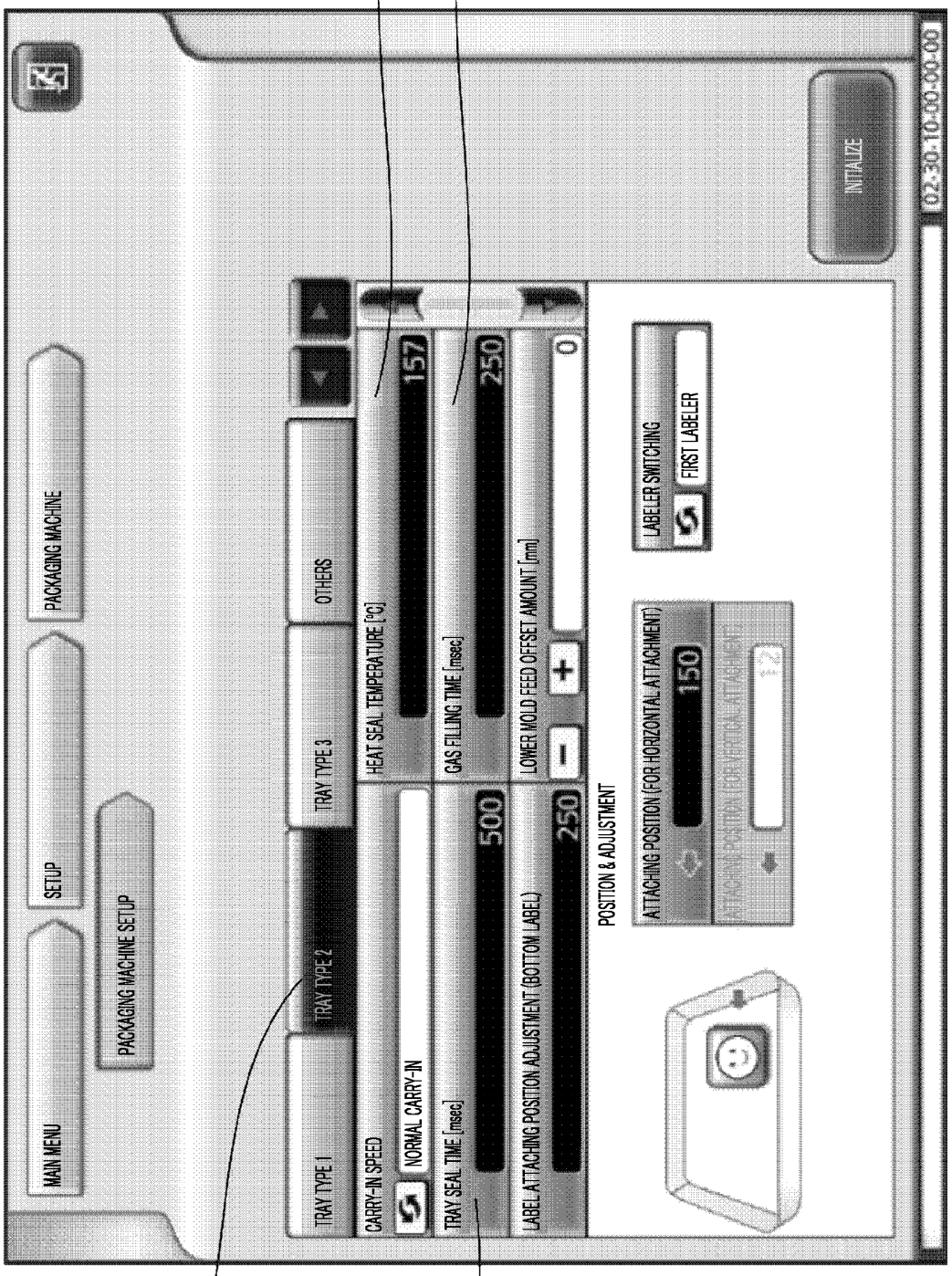

I2
I4
I1
I3
MAIN MENU
SETUP
PACKAGING MACHINE
PACKAGING MACHINE SETUP
TRAY TYPE 1
TRAY TYPE 2
TRAY TYPE 3
OTHERS
CARRY-IN SPEED
NORMAL CARRY-IN
TRAY SEAL TIME [msec]
500
LABEL ATTACHING POSITION ADJUSTMENT (BOTTOM LABEL)
250
HEAT SEAL TEMPERATURE [°C]
157
GAS FILLING TIME [msec]
250
LOWER MOLD FEED OFFSET AMOUNT [mm]
0
POSITION & ADJUSTMENT
ATTACHING POSITION (FOR HORIZONTAL ATTACHMENT)
150
LABELER SWITCHING
FIRST LABELER
INITIALIZE
02-30-10-00-00-00

FIG. 34

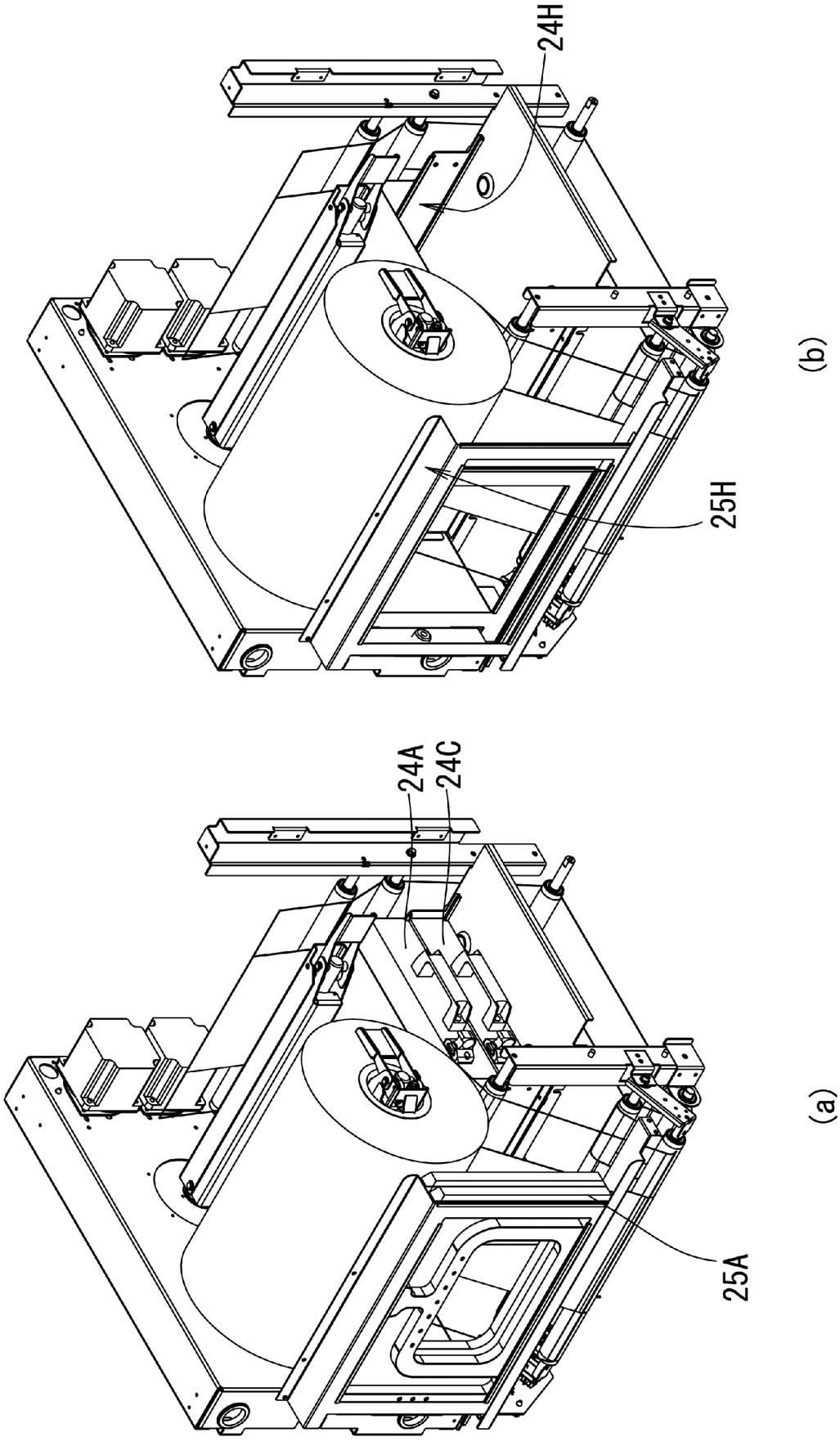


FIG. 35

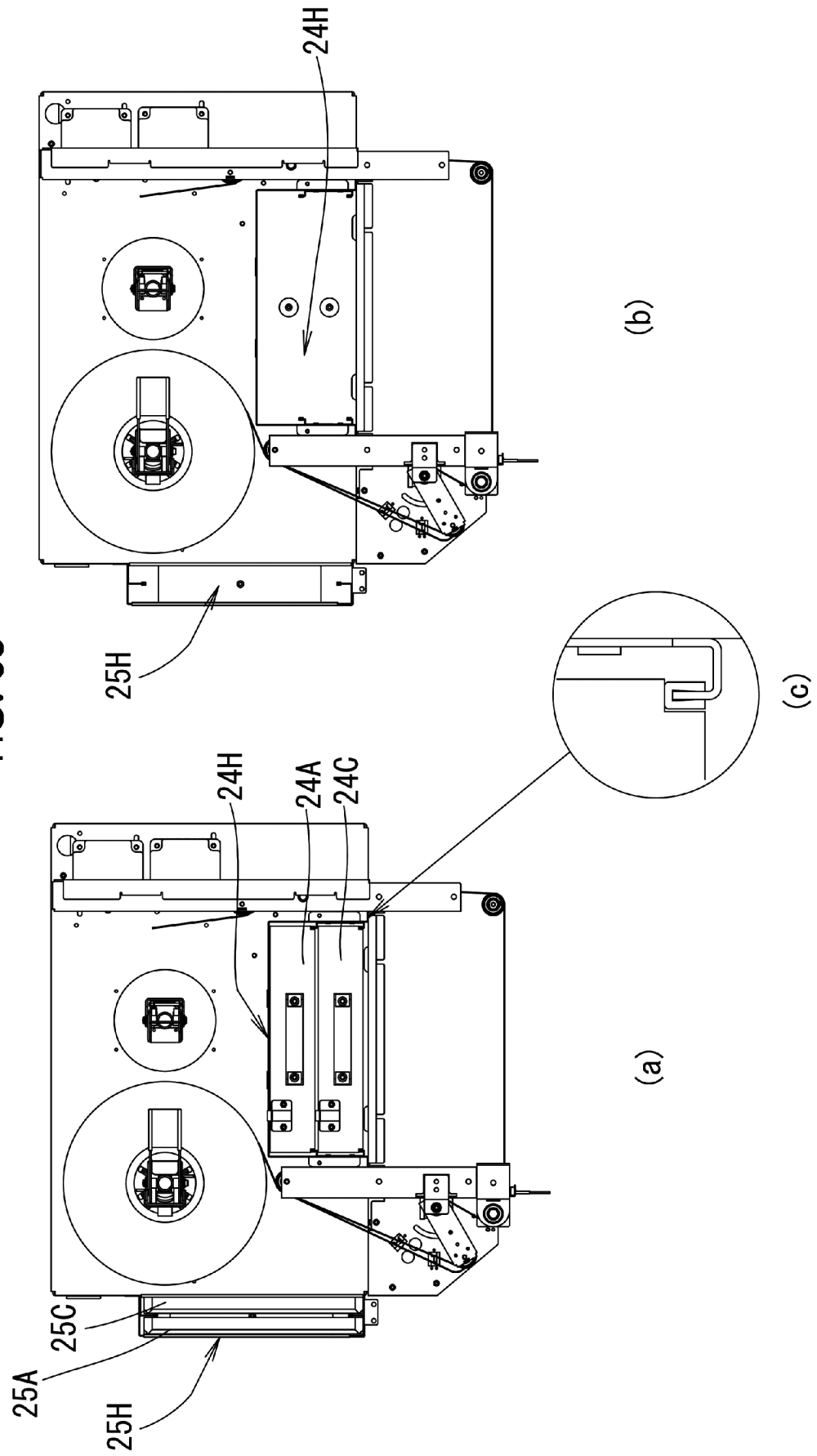


FIG. 36

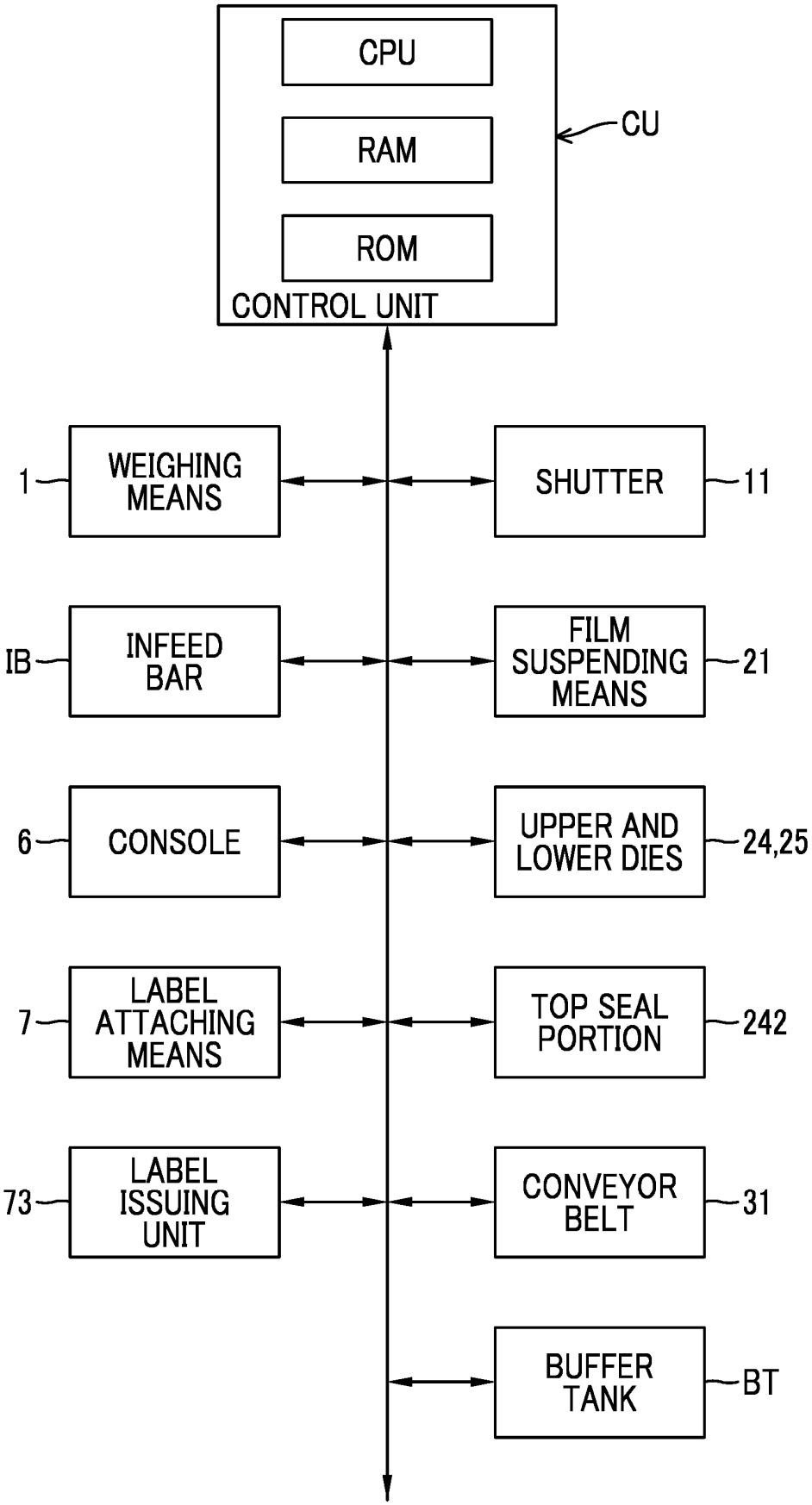

CPU
RAM
ROM
CONTROL UNIT
CU
1
WEIGHING MEANS
SHUTTER
11
IB
INFEED BAR
FILM SUSPENDING MEANS
21
6
CONSOLE
UPPER AND LOWER DIES
24,25
7
LABEL ATTACHING MEANS
TOP SEAL PORTION
242
73
LABEL ISSUING UNIT
CONVEYOR BELT
31
BUFFER TANK
BT

FIG. 37

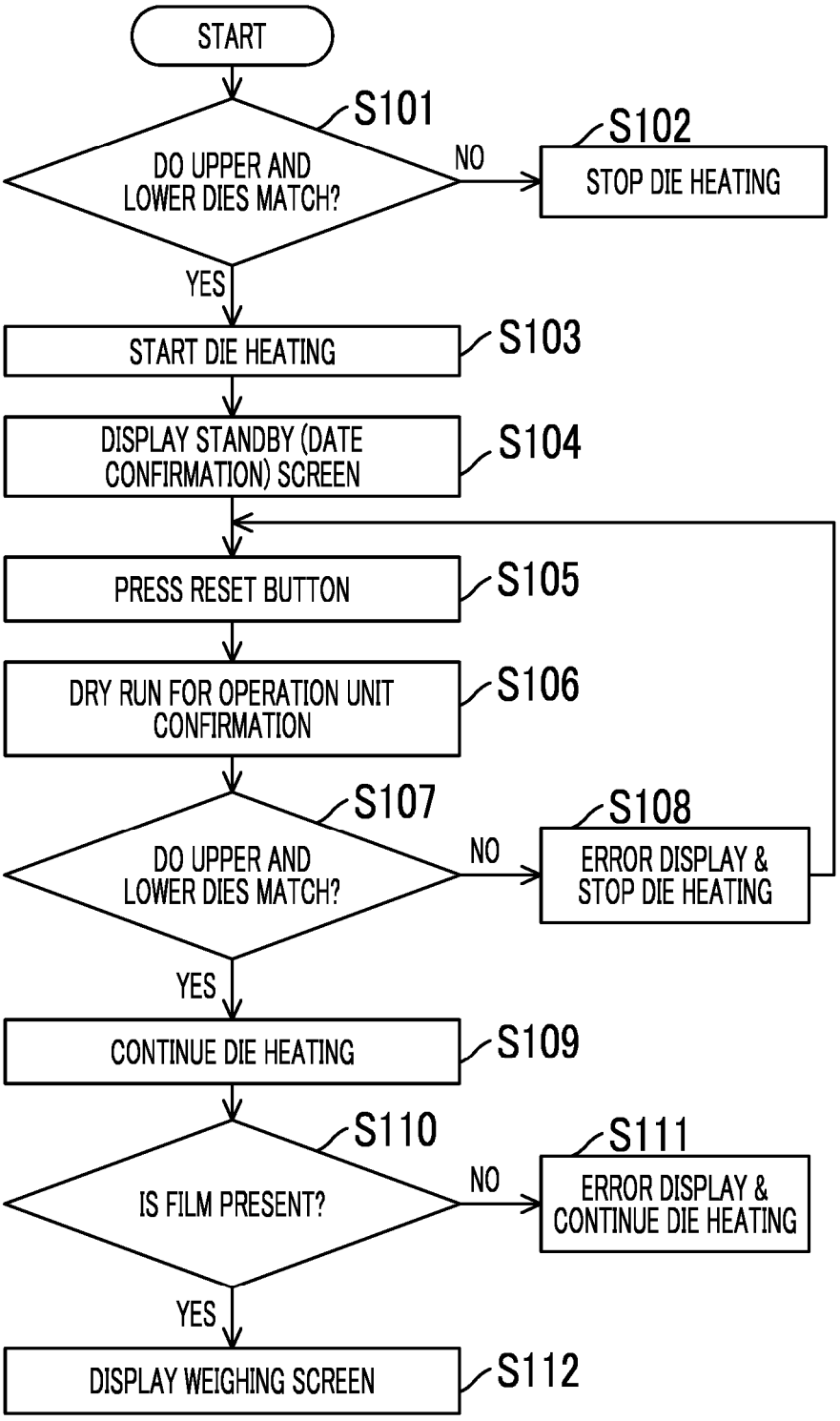
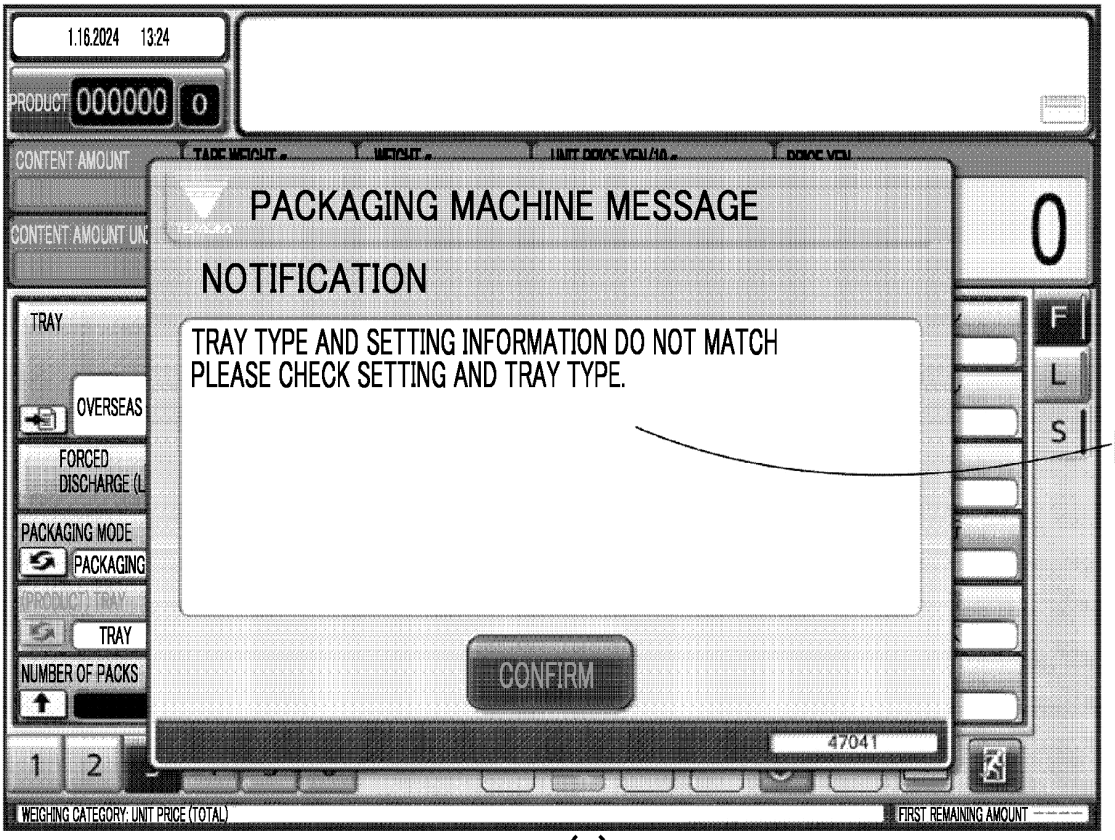
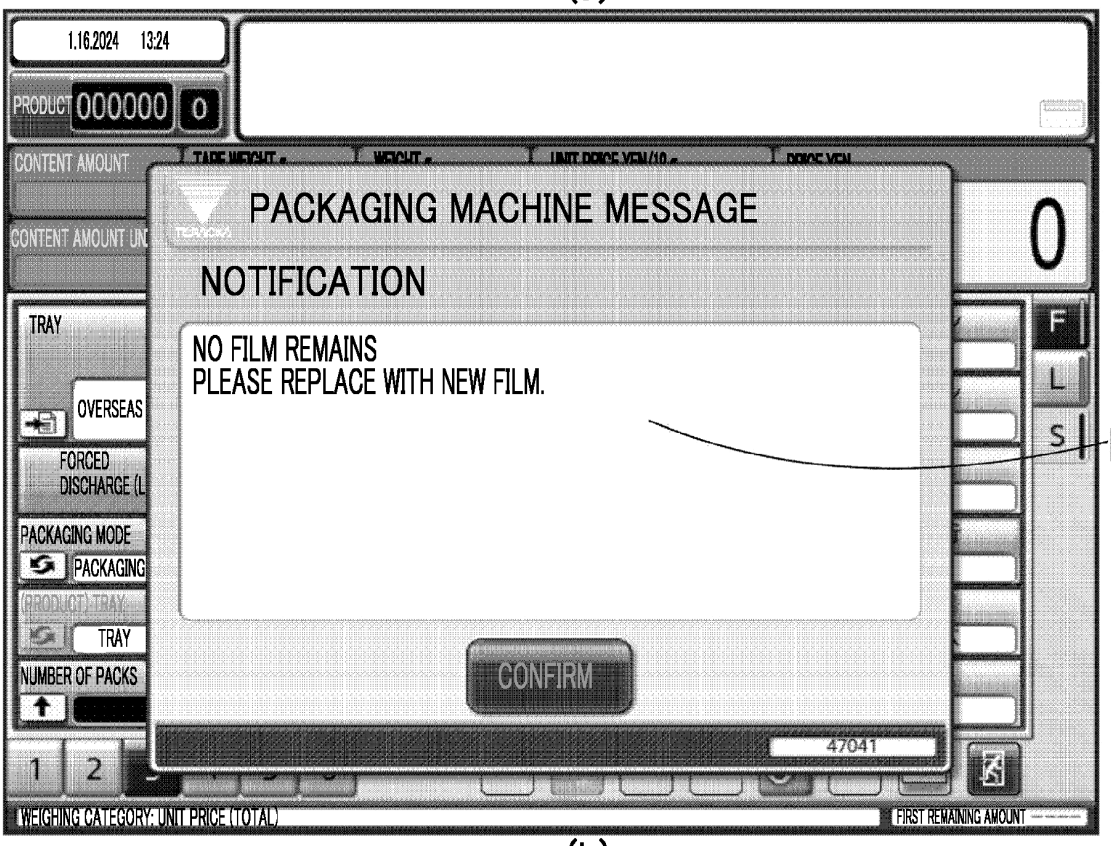

START
S101
DO UPPER AND LOWER DIES MATCH?
NO
S102
STOP DIE HEATING
YES
START DIE HEATING
S103
DISPLAY STANDBY (DATE CONFIRMATION) SCREEN
S104
PRESS RESET BUTTON
S105
DRY RUN FOR OPERATION UNIT CONFIRMATION
S106
S107
DO UPPER AND LOWER DIES MATCH?
NO
S108
ERROR DISPLAY & STOP DIE HEATING
YES
CONTINUE DIE HEATING
S109
S110
IS FILM PRESENT?
NO
S111
ERROR DISPLAY & CONTINUE DIE HEATING
YES
DISPLAY WEIGHING SCREEN
S112

FIG. 38


1.16.2024 13:24
PRODUCT 000000 0
CONTENT AMOUNT
CONTENT AMOUNT UNI
TRAY
OVERSEAS
FORCED DISCHARGE (L
PACKAGING MODE
PACKAGING
(PRODUCT) TRAY
TRAY
NUMBER OF PACKS
PACKAGING MACHINE MESSAGE
NOTIFICATION
TRAY TYPE AND SETTING INFORMATION DO NOT MATCH
PLEASE CHECK SETTING AND TRAY TYPE.
CONFIRM
47041
0
F
L
S
1
2
WEIGHING CATEGORY: UNIT PRICE (TOTAL)
FIRST REMAINING AMOUNT
PW1

(a)


1.16.2024 13:24
PRODUCT 000000 0
CONTENT AMOUNT
CONTENT AMOUNT UNI
TRAY
OVERSEAS
FORCED DISCHARGE (L
PACKAGING MODE
PACKAGING
(PRODUCT) TRAY
TRAY
NUMBER OF PACKS
PACKAGING MACHINE MESSAGE
NOTIFICATION
NO FILM REMAINS
PLEASE REPLACE WITH NEW FILM.
CONFIRM
47041
0
F
L
S
1
2
WEIGHING CATEGORY: UNIT PRICE (TOTAL)
FIRST REMAINING AMOUNT
PW2

(b)

FIG. 39

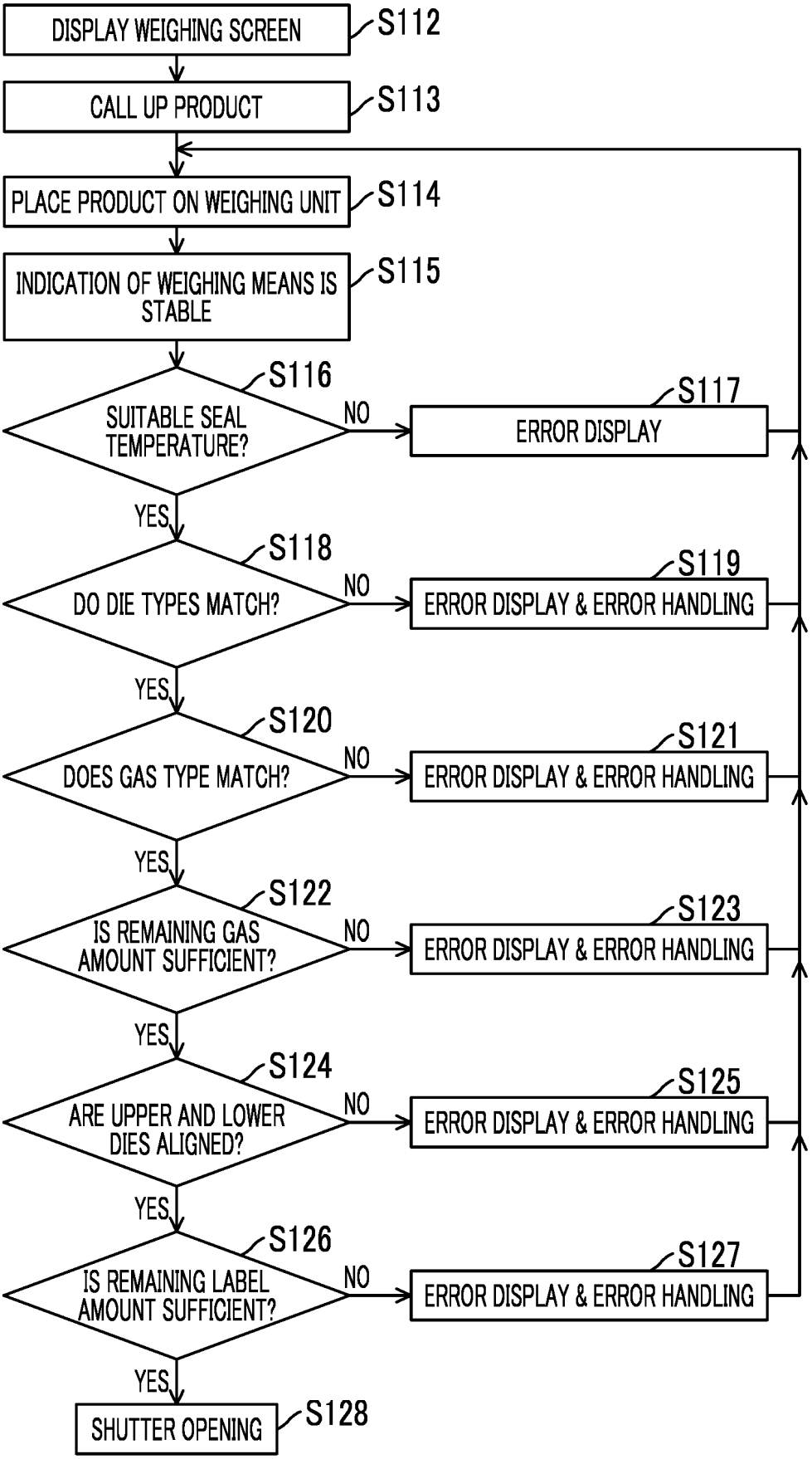
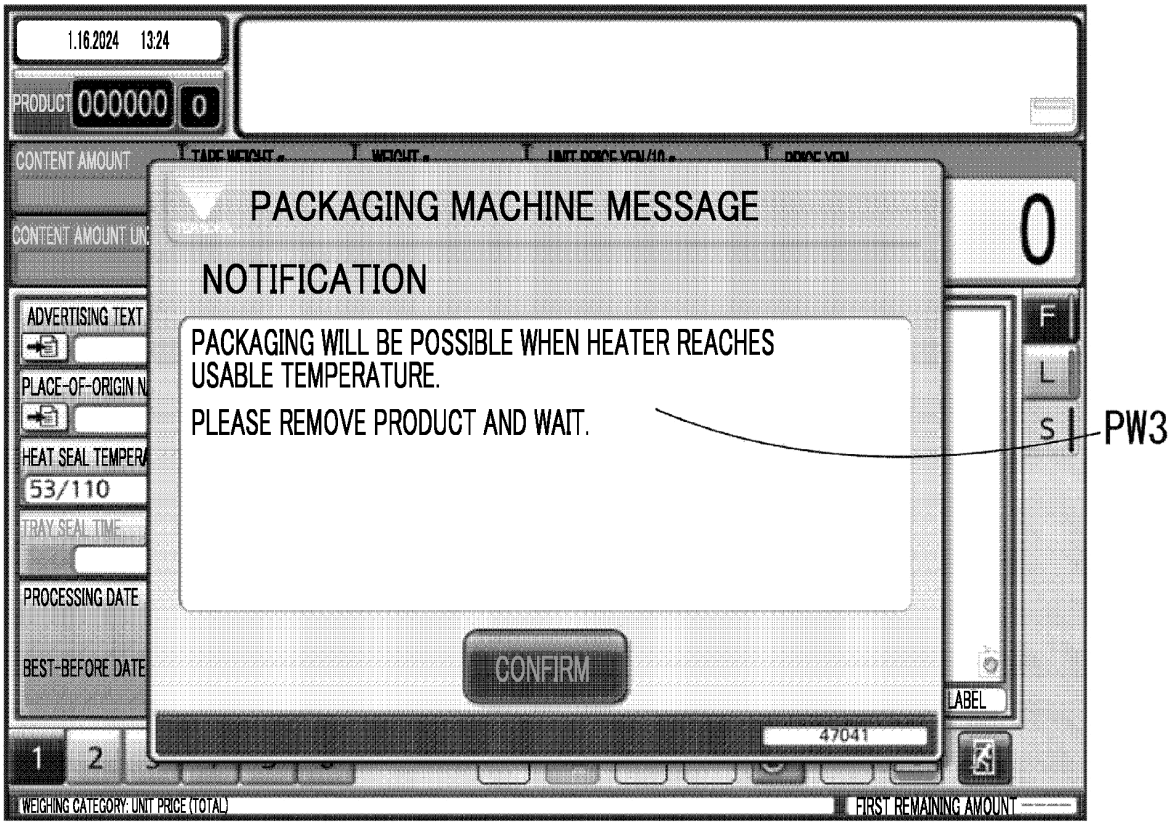
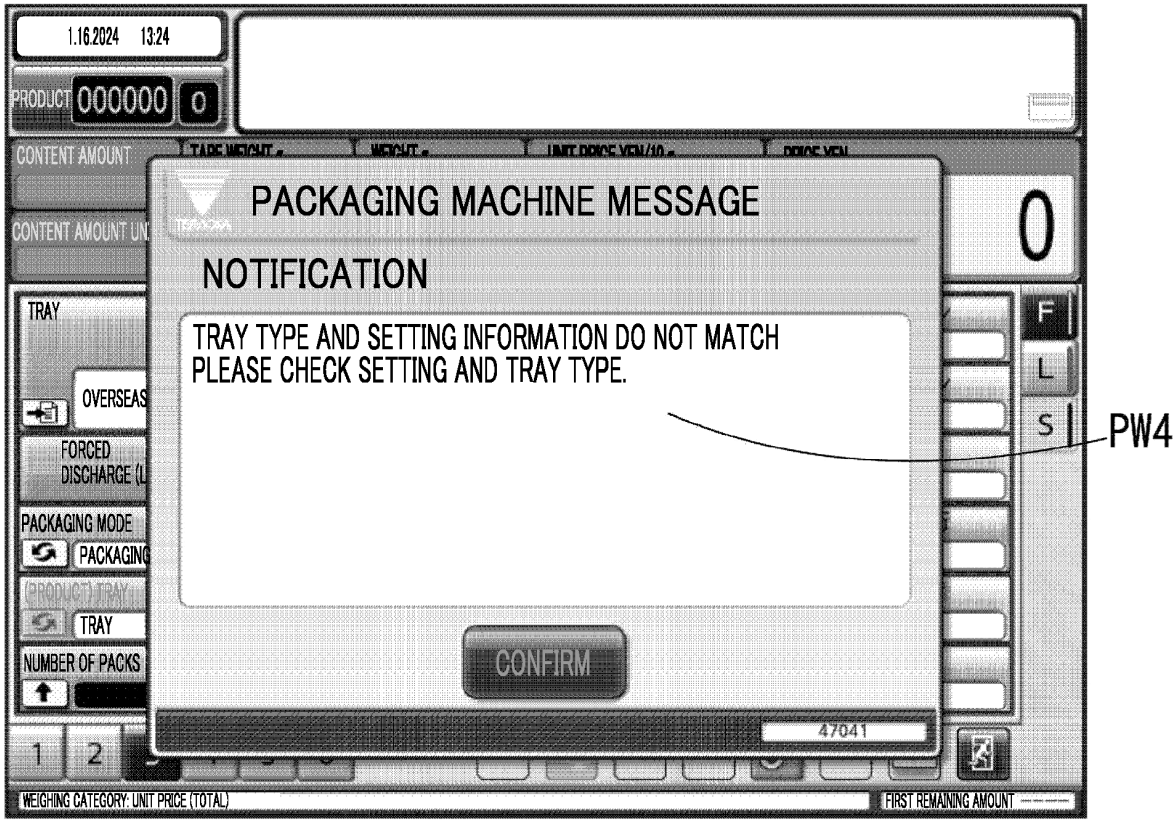

DISPLAY WEIGHING SCREEN
S112
CALL UP PRODUCT
S113
PLACE PRODUCT ON WEIGHING UNIT
S114
INDICATION OF WEIGHING MEANS IS STABLE
S115
S116
SUITABLE SEAL TEMPERATURE?
NO
S117
ERROR DISPLAY
YES
S118
DO DIE TYPES MATCH?
NO
S119
ERROR DISPLAY & ERROR HANDLING
YES
S120
DOES GAS TYPE MATCH?
NO
S121
ERROR DISPLAY & ERROR HANDLING
YES
S122
IS REMAINING GAS AMOUNT SUFFICIENT?
NO
S123
ERROR DISPLAY & ERROR HANDLING
YES
S124
ARE UPPER AND LOWER DIES ALIGNED?
NO
S125
ERROR DISPLAY & ERROR HANDLING
YES
S126
IS REMAINING LABEL AMOUNT SUFFICIENT?
NO
S127
ERROR DISPLAY & ERROR HANDLING
YES
SHUTTER OPENING
S128

FIG. 40


1.16.2024 13:24
PRODUCT 000000 0
CONTENT AMOUNT
PACKAGING MACHINE MESSAGE
NOTIFICATION
PACKAGING WILL BE POSSIBLE WHEN HEATER REACHES USABLE TEMPERATURE.
PLEASE REMOVE PRODUCT AND WAIT.
CONFIRM
47041
ADVERTISING TEXT
PLACE-OF-ORIGIN N
HEAT SEAL TEMPERA
53/110
TRAY SEAL TIME
PROCESSING DATE
BEST-BEFORE DATE
LABEL
WEIGHING CATEGORY: UNIT PRICE (TOTAL)
FIRST REMAINING AMOUNT
PW3

(a)


1.16.2024 13:24
PRODUCT 000000 0
CONTENT AMOUNT
PACKAGING MACHINE MESSAGE
NOTIFICATION
TRAY TYPE AND SETTING INFORMATION DO NOT MATCH
PLEASE CHECK SETTING AND TRAY TYPE.
CONFIRM
47041
TRAY
OVERSEAS
FORCED DISCHARGE (L
PACKAGING MODE
PACKAGING
TRAY
NUMBER OF PACKS
WEIGHING CATEGORY: UNIT PRICE (TOTAL)
FIRST REMAINING AMOUNT
PW4

(b)

FIG. 41

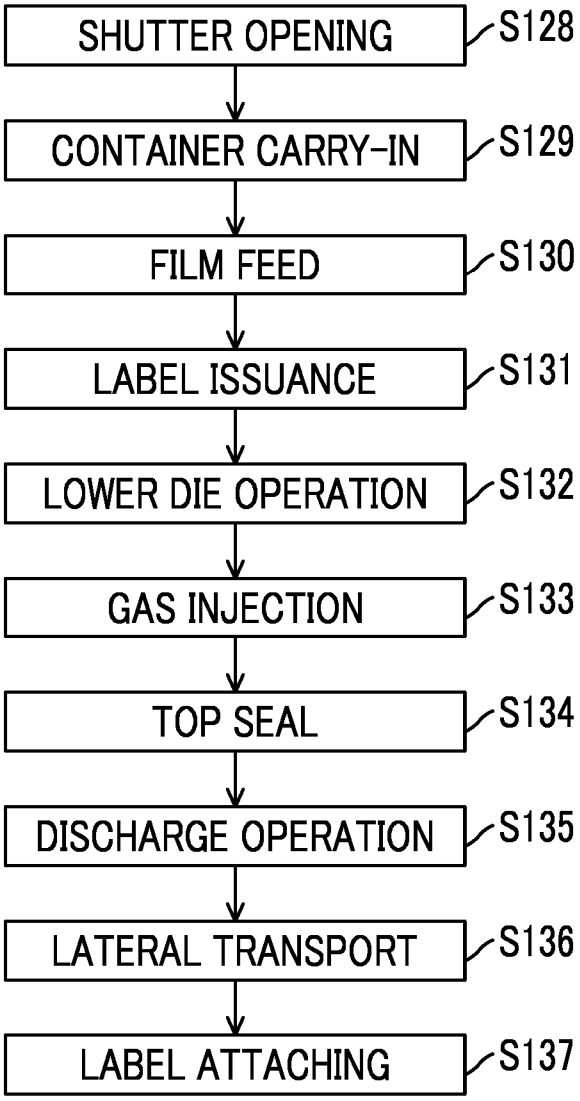

SHUTTER OPENING
S128
CONTAINER CARRY-IN
S129
FILM FEED
S130
LABEL ISSUANCE
S131
LOWER DIE OPERATION
S132
GAS INJECTION
S133
TOP SEAL
S134
DISCHARGE OPERATION
S135
LATERAL TRANSPORT
S136
LABEL ATTACHING
S137

FIG. 42

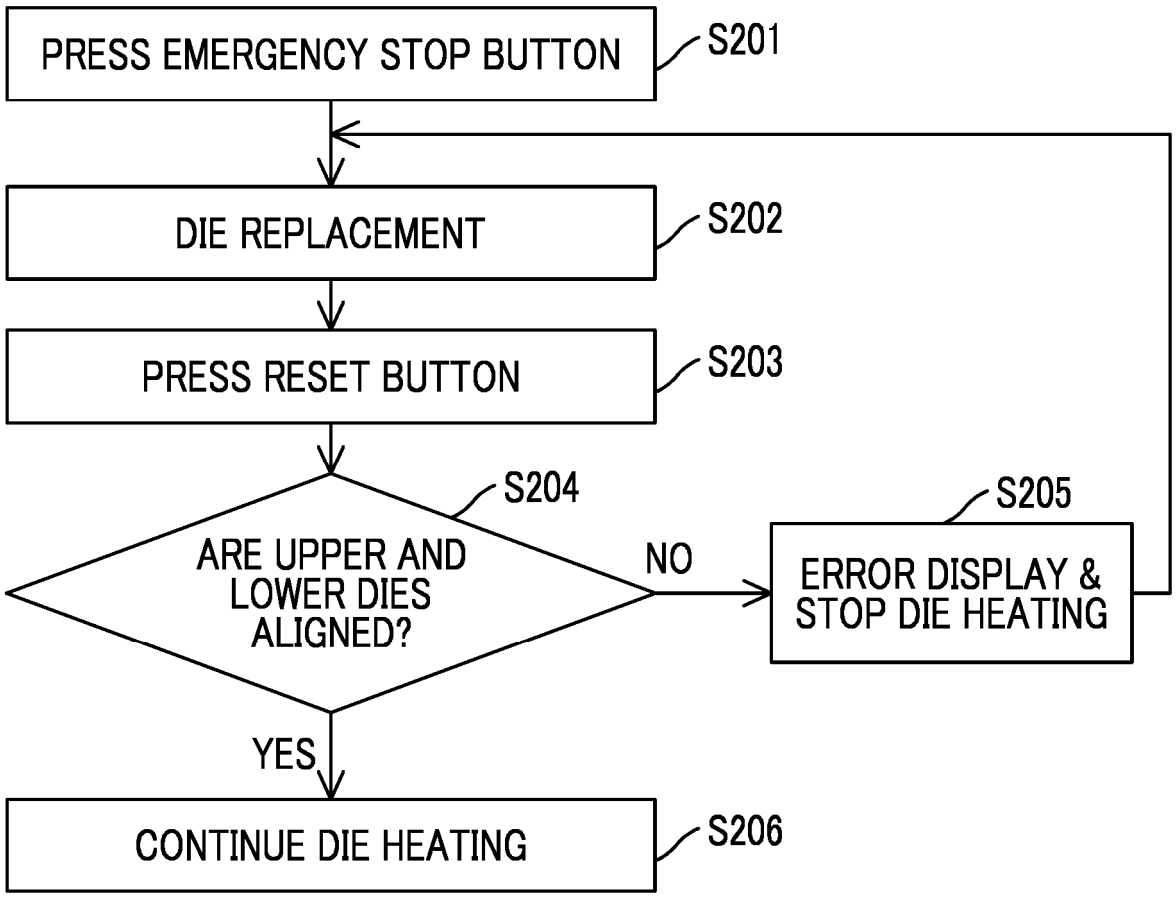

PRESS EMERGENCY STOP BUTTON
S201
DIE REPLACEMENT
S202
PRESS RESET BUTTON
S203
S204
ARE UPPER AND LOWER DIES ALIGNED?
NO
S205
ERROR DISPLAY & STOP DIE HEATING
YES
CONTINUE DIE HEATING
S206

FIG. 43

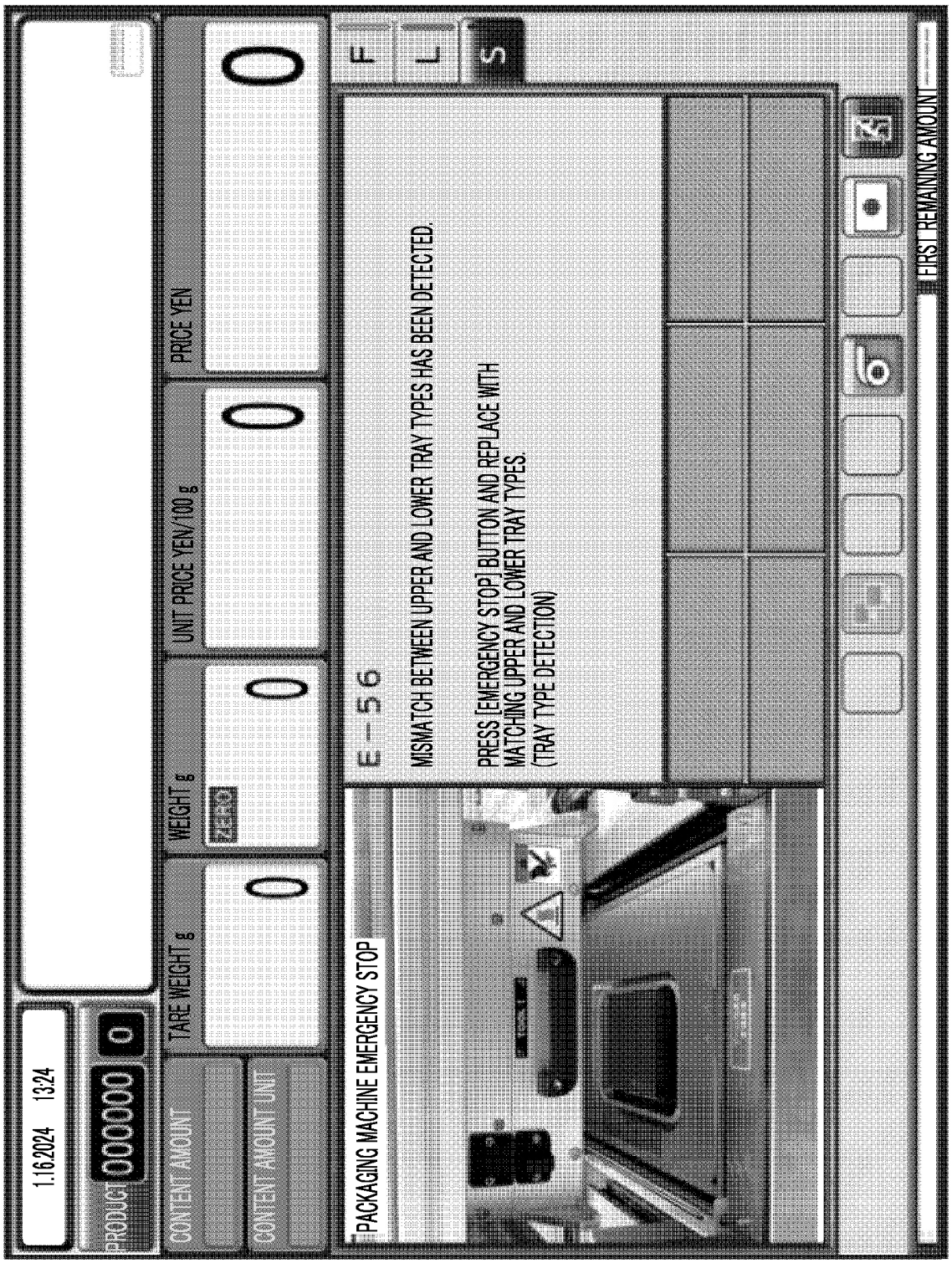
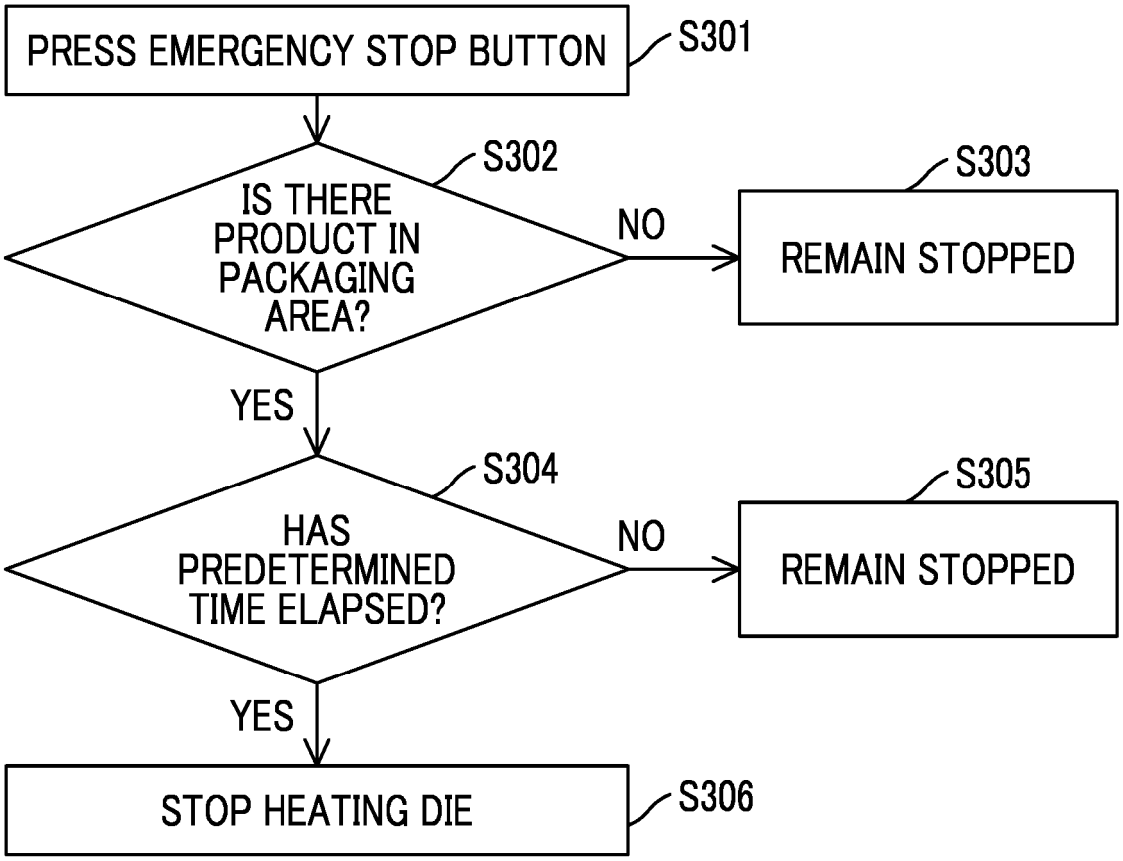

1.16.2024 13:24
PRODUCT 000000 0
CONTENT AMOUNT
TARE WEIGHT g
0
WEIGHT g
ZERO
0
CONTENT AMOUNT UNIT
UNIT PRICE YEN/100 g
0
PRICE YEN
0
F
L
S
PACKAGING MACHINE EMERGENCY STOP
E-56
MISMATCH BETWEEN UPPER AND LOWER TRAY TYPES HAS BEEN DETECTED.
PRESS [EMERGENCY STOP] BUTTON AND REPLACE WITH MATCHING UPPER AND LOWER TRAY TYPES.
(TRAY TYPE DETECTION)
FIRST REMAINING AMOUNT

FIG. 44


PRESS EMERGENCY STOP BUTTON
S301
S302
IS THERE PRODUCT IN PACKAGING AREA?
NO
S303
REMAIN STOPPED
YES
S304
HAS PREDETERMINED TIME ELAPSED?
NO
S305
REMAIN STOPPED
YES
STOP HEATING DIE
S306

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2025/004277

A. CLASSIFICATION OF SUBJECT MATTER

B65B 7/28(2006.01)i; ***B65B 7/16***(2006.01)i; ***B65B 51/10***(2006.01)i; ***B65B 51/14***(2006.01)i; ***B65B 57/00***(2006.01)i; ***B65C 9/46***(2006.01)i
FI: B65B7/28 B; B65B57/00 C; B65B51/10 200; B65C9/46; B65B7/16 J; B65B51/14; B65B51/10 210

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65B7/28; B65B7/16; B65B51/10; B65B51/14; B65B57/00; B65C9/46

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996
Published unexamined utility model applications of Japan 1971-2025
Registered utility model specifications of Japan 1996-2025
Published registered utility model applications of Japan 1994-2025

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 88382/1992 (Laid-open No. 51106/1994) (NAGAFUJI SANGYO KABUSHIKI KAISHA) 12 July 1994 (1994-07-12), paragraphs [0005]-[0008], fig. 1-3	1-4
A		5
Y	JP 2014-144817 A (SARONG SPA) 14 August 2014 (2014-08-14) paragraph [0175], fig. 6	1-4
Y	JP 2023-41253 A (TERAOKA SEIKO KK) 24 March 2023 (2023-03-24) paragraphs [0030]-[0032]	2-4
Y	JP 52-9791 A (GLORY KOGYO KK) 25 January 1977 (1977-01-25) page 3, lower left column, lines 8-18	3-4
A	JP 2014-231367 A (TERAOKA SEIKO KK) 11 December 2014 (2014-12-11) paragraph [0051]	5

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
04 March 2025	**18 March 2025**
Name and mailing address of the ISA/JP **Japan Patent Office (ISA/JP)** **3-4-3 Kasumigaseki, Chiyoda-ku, Tokyo 100-8915** **Japan**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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