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(54) **PACKAGING APPARATUS**

(57) Providing a packaging apparatus that can inhibit the pulling back of trays by a discharge pusher. A packaging apparatus (1) includes a film conveyance unit (3), a lift unit (6), a folding unit (7), and a discharge pusher (8). The film conveyance unit (3) conveys a film (T) to a packaging position (L1). The lift unit (6) lifts a tray (T) toward the packaging position (L1). The folding unit (7) folds a peripheral edge portion of the film (F) that has covered the tray (T). The discharge pusher (8) pushes a side surface of the tray (T) to discharge the tray (T) in a first direction (D). The discharge pusher (8) includes a

first pusher member (81). The first pusher member (81) has a first arm (811), a first member (812), and a first projection (813). The first member (812) extends in a direction intersecting the first direction (D) and abuts against a side surface of the tray (T). The first projection (813) extends in the first direction (D) beyond the first member (812) and abuts against a lower portion of the side surface of the tray (T). A lower end of the first member (812) is positioned lower than an upper end of the first projection (813).

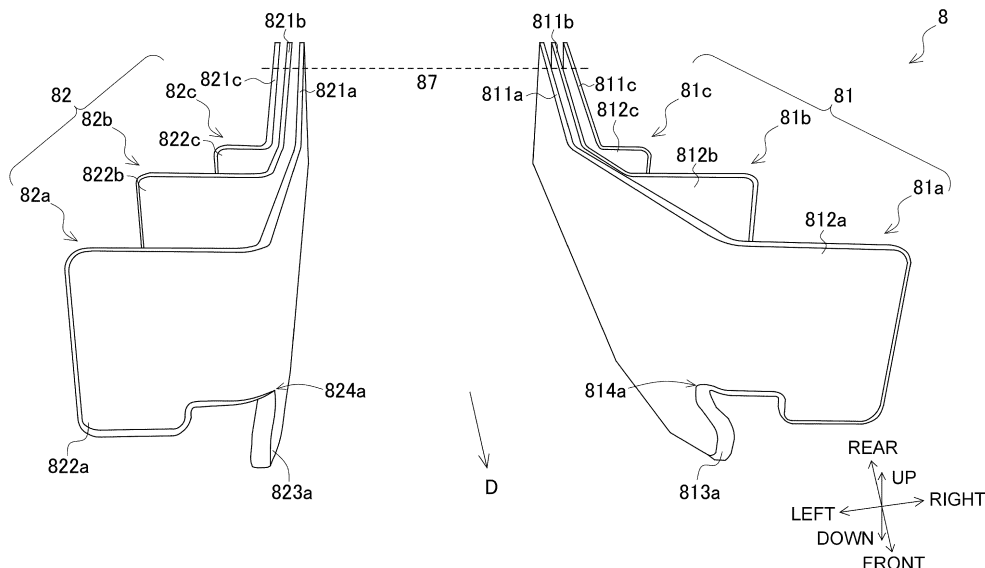


FIG. 4

Description

BACKGROUND

Technical Field

[0001] The present invention relates to a packaging apparatus.

Related Art

[0002] Patent Document 1 (JP-A No. 2011-20700) discloses a packaging machine that uses a film to package trays containing articles and discharges, with a discharge pusher, the trays from a packaging position.

SUMMARY

Technical Problem

[0003] In a conventional packaging machine, when the discharge pusher discharges the trays from the packaging position, sometimes the distal end of the discharge pusher gets caught on the trays such that, when the discharge pusher goes back, the trays are pulled back to the packaging position and are not completely discharged from the packaging machine.

[0004] The packaging machine disclosed in Patent Document 1 also does not consider the problem of relatively light trays being pulled back by the discharge pusher.

[0005] It is an object of the present invention to provide a packaging apparatus that can inhibit the pulling back of trays by the discharge pusher.

Solution to Problem

[0006] A packaging apparatus according to a first aspect includes a film conveyance unit, a lift unit, a folding unit, and a discharge pusher. The film conveyance unit is configured to convey, in an extended state, a film unwound from a film roll to a packaging position. The lift unit is configured to lift a tray containing an article toward the film disposed in the packaging position. The folding unit is configured to fold, under the bottom of the tray, a peripheral edge portion of the film that has covered the tray. The discharge pusher is configured to push one side surface of the tray packaged by the film to discharge in a first direction the tray covered by the film. The discharge pusher includes a first pusher member. The first pusher member has a first arm, a first member, and a first projection. The first arm extends in the first direction. The first member extends in a direction intersecting the first direction at a distal end portion of the first arm and is configured to abut against the side surface of the tray. The first projection extends in the first direction beyond the first member from the distal end portion of the first arm and is configured to abut against a lower portion of the

side surface of the tray. A lower end of the first member is positioned lower than an upper end of the first projection.

[0007] This packaging apparatus can inhibit the pulling back of trays by the discharge pusher.

5 [0008] A packaging apparatus according to a second aspect is the packaging apparatus of the first aspect, wherein the first pusher member is configured to swing up and down about a horizontal shaft that is located in a position away from the packaging position and extends in a direction orthogonal to the first direction.

10 [0009] A packaging apparatus according to a third aspect is the packaging apparatus of the second aspect, wherein the discharge pusher includes a plurality of the first pusher members in which the lengths of the first arms from the horizontal shaft to the distal end portions are different.

15 [0010] A packaging apparatus according to a fourth aspect is the packaging apparatus of any of the first to third aspects, wherein the discharge pusher further includes a second pusher member. The second pusher member has a second arm, a second member, and a second projection. The second arm extends in the first direction. The second member extends in a direction intersecting the first direction at a distal end portion of the second arm and is configured to abut against the side surface of the tray. The second projection extends in the first direction beyond the second member from the distal end portion of the second arm and is configured to abut against a lower portion of the side surface of the tray. A lower end of the second member is positioned lower than an upper end of the second projection. The first pusher member and the second pusher member are disposed planarly symmetrical to each other relative to a vertical plane extending in the first direction.

20 25 30 35 [0011] A packaging apparatus according to a fifth aspect is the packaging apparatus of the third aspect, wherein the plural first pusher members are disposed such that, the longer the length of the first arm from the horizontal shaft to the distal end portion is, the more inward they are.

40 45 [0012] A packaging apparatus according to the sixth aspect is the packaging apparatus of any of the first aspect to the fifth aspect, further including a restraining member. The restraining member is configured to restrain, from above, the tray covered by the film in a case where the discharge pusher moves the tray in the first direction.

Advantageous Effects of Invention

50 [0013] The packaging apparatus pertaining to the present invention can inhibit the pulling back of trays by the discharge pusher.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is an external view showing a tray T containing an article G;

FIG. 2 is an external view of a packaging apparatus 1;

FIG. 3 is a perspective view showing a conventional discharge pusher P1;

FIG. 4 is a perspective view showing a discharge pusher 8;

FIG. 5 is a flowchart showing the operation of the packaging apparatus 1;

FIG. 6 is an external view of the packaging apparatus 1;

FIG. 7 is an external view of the packaging apparatus 1;

FIG. 8 is an external view of the packaging apparatus 1;

FIG. 9 is an external view of the packaging apparatus 1;

FIG. 10 is a right side view showing the discharge pusher 8 and the tray T;

FIG. 11 is an external view of the packaging apparatus 1;

FIG. 12 is a right side view showing the discharge pusher 8 and the tray T;

FIG. 13 is a right side view showing the conventional discharge pusher P1 and a tray Td1;

FIG. 14 is an external view of the packaging apparatus 1;

FIG. 15 is a right side view showing the discharge pusher 8 and the tray T;

FIG. 16 is a right side view showing the conventional discharge pusher P1 and a tray Td2; and

FIG. 17 is an external view of the packaging apparatus 1.

DETAILED DESCRIPTION

(1) Overview

[0015] The packaging apparatus of the present application uses a film F to package a tray T containing an article G (hereinafter sometimes abbreviated as "tray T") and discharges the tray T with a discharge pusher P1.

[0016] FIG. 1 is an external view showing the tray T containing the article G, which is an item to be packaged by the packaging apparatus. The tray T has a shape with an opening in the upper portion thereof, and has a shape where the opening in the upper portion is wider than the bottom of the tray T. Examples of the article G include foods, but the article G is not limited to this.

(2) Overall Configuration

[0017] The overall configuration of a packaging apparatus 1 pertaining to the present invention will now be described. FIG. 2 is an external view of the packaging apparatus 1. The packaging apparatus 1 weighs the tray T containing the article G, uses the film F to package it,

discharges the tray T, and issues a label La on which product information such as the price of the article G is printed.

[0018] The packaging apparatus 1 mainly includes a film support unit 2, a film conveyance unit 3, a weighing unit 4, a tray conveyance mechanism 5, a lift unit 6, a folding unit 7, a discharge pusher 8, a drive unit 9, a restraining member 10, a label issuing unit 13, a display unit 14, an operation unit 15, and a control unit (not shown in the drawings).

[0019] The operation of the packaging apparatus 1 will be briefly described. In the packaging apparatus 1, the tray T containing the article G is placed on the weighing unit 4. The weighing unit 4 weighs the tray T containing the article G. The weighing result obtained by the weighing unit 4 is sent to the control unit. The control unit causes the display unit 14 to display the weighing result. The lift unit 6 lifts to a packaging position L1 the tray T conveyed thereto from the weighing unit 4. In the packaging position L1, the film F is held in a stretched state. The lift unit 6 lifts the tray T to push up the tray T against the film F stretched in the packaging position L1 and cover the tray T with the film F. Thereafter, the folding unit 7 folds a peripheral edge portion of the film F under the tray T covered by the film F to thereby package the tray T. The discharge pusher 8 discharges the packaged tray T to a discharge position L2. The label issuing unit 13 issues the label La on which the product information is printed. On the label La are printed the weight of the article G contained in the tray T and the price of the article pertaining to that tray T. The control unit calculates the weight and the price based on the weighing result obtained by the weighing unit 4.

(3) Problem with Conventional Packaging Apparatus

[0020] FIG. 3 is a perspective view showing the conventional discharge pusher P1. The discharge pusher P1 mainly has a member P2, a projection P3, and a groove P4. The member P2 abuts against a side surface of the tray T. The projection P3 abuts against a lower portion of the side surface of the tray T. The groove P4 is a "relief" portion formed when bending the member P2, and is a recessed portion formed at the intersection of the projection P3 and the member P2. The lower end of the member P2 is positioned higher than the upper end of the projection P3. Between the lower end of the member P2 and the upper end of the projection P3 is formed a space C. The space C is a space whose bottom lies in a plane that extends in the left and right direction and the front and rear direction and includes the upper end of the projection P3 and whose top lies in a plane that extends in the left and right direction and the front and rear direction and includes the lower end of the member P2.

[0021] In a state in which the member P2 and the projection P3 are abutting against the tray T, the discharge pusher P1 discharges the tray T. If a shallow tray T tilts forward or backward during the discharge, the edge

of the tray T can get stuck in at least either of the space C and the groove P4. For that reason, if the distal end of the discharge pusher P1 gets caught on the tray T, a problem may occur where, in a case where the tray T is light, it gets pulled back when the discharge pusher P1 goes back and the tray T is not completely discharged.

(4) Detailed Configurations of Packaging Apparatus of Present Invention

(4-1) Film Support Unit

[0022] The film support unit 2 supports a film roll 21 in which the film F is wound in a roll. The film support unit 2 has a pair of support rollers 22 (a support roller 22a and a support roller 22b) that support the side surface of the lower portion of the film roll 21 from the left and right sides. Furthermore, the film support unit 2 has one or a plurality of guide rollers (not shown in the drawings) that guide to the film conveyance unit 3 the film F unwound from the film roll 21. Inside the film support unit 2 is provided a holding unit (not shown in the drawings) that tensely holds, in a state in which it applies tension to, end portions of the film F.

(4-2) Film Conveyance Unit

[0023] The film conveyance unit 3 conveys, in an extended state, the film F unwound from the film roll 21 to the packaging position L1. For that purpose, the film conveyance unit 3 has upper and lower conveyance rollers 31, a film feed unit 32, and a film cutting unit (not shown in the drawings).

[0024] The upper and lower conveyance rollers 31 are driven to rotate and convey to the film feed unit 32 the film F unwound from the film support unit 2. The film feed unit 32 grips with upper and lower belts and conveys to the packaging position L1 both front and rear direction end portions of the film F. When the film F is conveyed to the packaging position L1, the film cutting unit cuts the film F and cuts it away from the film roll 21.

(4-3) Weighing Unit

[0025] The weighing unit 4 measures the weight of the article G, which has been placed on a weigh table 41, and sends to the control unit weight information including the tare of the tray T containing the article G.

(4-4) Tray Conveyance Mechanism

[0026] The tray conveyance mechanism 5 has a pair of conveyance mechanisms (a pusher 5a and a pusher 5b) that convey the tray T containing the article G from the weigh table 41 to the lift unit 6.

[0027] When the weighing unit 4 measures the weight, the tray conveyance mechanism 5 is retracted under the weigh table 41, and when the weighing by the weighing

unit 4 ends, the tray conveyance mechanism 5 rises from under the weigh table 41 and advances rearward in a state in which it abuts against the front side surface of the tray T to convey the tray T to the lift unit 6.

(4-5) Lift Unit

[0028] The lift unit 6 lifts the tray T containing the article G toward the film F disposed in the packaging position L1.

10 The lift unit 6 is configured by a plurality of lift members 61.

(4-6) Folding Unit

15 **[0029]** The folding unit 7 folds, under the bottom of the tray T, a peripheral edge portion of the film F that has covered the tray T. The folding unit 7 includes a rear folding member 7a, a left folding member 7b, a right folding member 7c, and a front folding member 7d.

20 **[0030]** The rear folding member 7a moves forward and folds the film F on the rear side of the tray T under the bottom on the rear side of the tray T. The left folding member 7b moves rightward and folds the film F on the left side of the tray T under the bottom on the left side of the tray T. The right folding member 7c moves leftward and folds the film F on the right side of the tray T under the bottom of the right side of the tray T. The front folding member 7d folds, under the bottom on the front side of the tray T, the film F on the front side of the tray T moved forward by the rear folding member 7a.

(4-7) Discharge Pusher

35 **[0031]** The discharge pusher 8 pushes forward, from the rear side, one side surface of the tray T packaged by the film F to discharge in a first direction D (see FIG. 4) the tray T covered by the film F. In the present embodiment, the "one side surface" is the rear side surface, and the first direction D is the forward direction. The tray T is discharged from the packaging position L1 to the discharge position L2 by the discharge pusher 8.

[0032] FIG. 4 is a perspective view showing the discharge pusher 8. The discharge pusher 8 includes three first pusher members 81 (81a, 81b, 81c) and three second pusher members 82 (82a, 82b, 82c). It will be noted that the discharge pusher 8 may include one, two, or four or more first pusher members 81 and may include one, two, or four or more second pusher members 82.

50 (4-7-1) First Pusher Members

[0033] The first pusher member 81a has a first arm 811a, a first member 812a, a first projection 813a, and a first groove 814a. The first pusher member 81b has a first arm 811b, a first member 812b, a first projection 813b (not shown in the drawings), and a first groove 814b (not shown in the drawings). The first pusher member 81c has a first arm 811c, a first member 812c, a first projection

813c (not shown in the drawings), and a first groove 814c (not shown in the drawings). The first pusher members 81a, 81b, 81c has a similar shape except for the lengths of the first arms 811a, 811b, 811c.

[0034] The first pusher members 81 are swingable up and down about a horizontal shaft 87 that is located in a position away from the discharge position L1 and extends in a direction orthogonal to the first direction D.

(4-7-1-1) First Arms

[0035] The first arms 811a, 811b, 811c are long and narrow plate-like members and extend in the first direction D.

[0036] The length of the first arm 811a from the horizontal shaft 87 to the distal end portion of the first arm 811a is longer than the length of the first arm 811b from the horizontal shaft 87 to the distal end portion of the first arm 811b. The length of the first arm 811b from the horizontal shaft 87 to the distal end portion of the first arm 811b is longer than the length of the first arm 811c from the horizontal shaft 87 to the distal end portion of the first arm 811c.

[0037] The first arm 811a is disposed on the inner side, the first arm 811c is disposed on the outer side, and the first arm 811b is disposed between the first arm 811a and the first arm 811c. In other words, the first pusher members 81 are disposed such that, the longer the length of the first arm 811 from the horizontal shaft 87 to the distal end portion is, the more inward they are.

(4-7-1-2) First Members

[0038] The first members 812a, 812b, 812c are plate-like members. The first member 812a extends in a direction intersecting the first direction D at the distal end portion of the first arm 811a and abuts against the side surface of the tray T when the discharge pusher 8 discharges the tray T. Examples of the "direction intersecting the first direction D" include "a direction (rightward direction) orthogonal to the first direction D." It will be noted that the "direction intersecting the first direction D" need not be a direction orthogonal to the first direction D. The first member 812b extends in a direction intersecting the first direction D at the distal end portion of the first arm 811b and abuts against the side surface of the tray T when the discharge pusher 8 discharges the tray T. The first member 812c extends in a direction intersecting the first direction D at the distal end portion of the first arm 811c and abuts against the side surface of the tray T when the discharge pusher 8 discharges the tray T.

(4-7-1-3) First Projections

[0039] The first projections 813a, 813b, 813c are projecting members. The first projection 813a extends in the first direction D beyond the first member 812a from the distal end portion of the first arm 811a and abuts against

the lower portion of the side surface of the tray T when the discharge pusher 8 discharges the tray T. The first projection 813b extends in the first direction D beyond the first member 812b from the distal end portion of the first arm 811b and abuts against the lower portion of the side surface of the tray T when the discharge pusher 8 discharges the tray T. The first projection 813c extends in the first direction D beyond the first member 812c from the distal end portion of the first arm 811c and abuts against the lower portion of the side surface of the tray T when the discharge pusher 8 discharges the tray T.

[0040] The lower end of the first member 812a is positioned lower than the upper end of the first projection 813a. The lower end of the first member 812b is positioned lower than the upper end of the first projection 813b. The lower end of the first member 812c is positioned lower than the upper end of the first projection 813c. For that reason, in the first pusher members 81a, 81b, 81c, a space like the space C (FIG. 3) in the conventional discharge pusher P1 is not formed.

(4-7-1-4) First Grooves

[0041] The first groove 814a is a "relief" formed at the intersection between the first member 812a and the first projection 813a and is a recessed part in the distal end of the first arm 811a. Likewise, the first groove 814b is a "relief" formed at the intersection between the first member 812b and the first projection 813b, and the first groove 814c is a "relief" formed at the intersection between the first member 812c and the first projection 813c.

(4-7-2) Second Pusher Members

[0042] The discharge pusher 8 includes the second pusher members 82a, 82b, 82c. The second pusher member 82a has a second arm 821a, a second member 822a, a second projection 823a, and a second groove 824a. The second pusher member 82b has a second arm 821b, a second member 822b, a second projection 823b (not shown in the drawings), and a second groove 824b (not shown in the drawings). The second pusher member 82c has a second arm 821c, a second member 822c, a second projection 823c (not shown in the drawings), and a second groove 824c (not shown in the drawings). The first pusher members 82a, 82b, 82c has a similar shape except for the lengths of the first arms 821a, 821b, 821c.

[0043] The second pusher member 82a, the second pusher member 82b, and the second pusher member 82c are swingable up and down about the horizontal shaft 87 that is located in a position away from the discharge position L1 and extends in a direction orthogonal to the first direction D. The second pusher member 82a, the second pusher member 82b, and the second pusher member 82c are secured, by for example bolts (not shown in the drawings) provided in the horizontal shaft 87, such that they freely rotate.

[0044] The second pusher members 82a, 82b, 82c and

the first pusher members 81a, 81b, 81c are disposed planarly symmetrical to each other relative to a vertical plane extending in the first direction D.

(4-7-2-1) Second Arms

[0045] The second arms 821a, 821b, 821c are long and narrow plate-like members and extend in the first direction D.

[0046] The length of the second arm 821a from the horizontal shaft 87 to the distal end portion of the second arm 821a is longer than the length of the second arm 821b from the horizontal shaft 87 to the distal end portion of the second arm 821b. The length of the second arm 821b from the horizontal shaft 87 to the distal end portion of the second arm 821b is longer than the length of the second arm 821c from the horizontal shaft 87 to the distal end portion of the second arm 821c.

[0047] The second arm 821a is disposed on the inner side, the second arm 821c is disposed on the outer side, and the second arm 821b is disposed between the second arm 821a and the second arm 821b. In other words, the second pusher members 82 are disposed such that, the longer the length of the second arm 821 from the horizontal shaft 87 to the distal end portion is, the more inward they are.

(4-7-2-2) Second Members

[0048] The second members 822a, 822b, 822c are plate-like members. The second member 822a extends in a direction intersecting the first direction D at the distal end portion of the second arm 821a and abuts against the side surface of the tray T when the discharge pusher 8 discharges the tray T. The second member 822b extends in a direction intersecting the first direction D at the distal end portion of the second arm 821b and abuts against the side surface of the tray T when the discharge pusher 8 discharges the tray T. The second member 822c extends in a direction intersecting the first direction D at the distal end portion of the second arm 821c and abuts against the side surface of the tray T when the discharge pusher 8 discharges the tray T.

(4-7-2-3) Second Projections

[0049] The second projections 823a, 823b, 823c are projecting members. The second projection 823a extends in the first direction D beyond the second member 822a from the distal end portion of the second arm 821a and abuts against the lower portion of the side surface of the tray T when the discharge pusher 8 discharges the tray T. The second projection 823b (not shown in the drawings) extends in the first direction D beyond the second member 822b from the distal end portion of the second arm 821b and abuts against the lower portion of the side surface of the tray T when the discharge pusher 8 discharges the tray T. The second projection 823c (not

shown in the drawings) extends in the first direction D beyond the second member 822c from the distal end portion of the second arm 821c and abuts against the lower portion of the side surface of the tray T when the discharge pusher 8 discharges the tray T.

[0050] The lower end of the second member 822a is positioned lower than the upper end of the second projection 823a. The lower end of the second member 822b is positioned lower than the upper end of the second projection 823b. The lower end of the second member 822c is positioned lower than the upper end of the second projection 823c. For that reason, in the second pusher members 82a, 82b, 82c, a space like the space C (FIG. 3) in the conventional discharge pusher P1 is not formed.

(4-7-2-4) Second Grooves

[0051] The second groove 824a is a "relief" formed at the intersection between the second member 822a and the second projection 823a and is a recessed part in the distal end of the second arm 821a. The second groove 824b is a "relief" formed at the intersection between the second member 822b and the second projection 823b and is a recessed part in the distal end of the second arm 822b. The second groove 824c is a "relief" formed at the intersection between the second member 822c and the second projection 823c and is a recessed part in the distal end of the second arm 821c.

(4-8) Drive Unit

[0052] The drive unit 9 is a single device that collectively causes the three first pusher members 81 and the three second pusher members 82 to move in a direction along the first direction D. The drive unit 9 is, for example, a motor provided inside the packaging apparatus 1.

(4-9) Restraining Member

[0053] The restraining member 10 is a long and narrow plate-like member and is disposed in the front and rear direction between the first pusher members 81a, 81b, 81c and the second pusher members 82a, 82b, 82c. The rear end portion of the restraining member 10 is attached to the apparatus frame via a parallel link mechanism so as to be movable in the up and down direction and immovable in the front and rear direction. The restraining member 10 inhibits the tray T from turnover by restraining, from above with its own weight, the tray T covered by the film F when the discharge pusher 8 moves the tray T in the first direction D.

(4-10) Label Issuing Unit, Display Unit, Operation Unit, Control Unit

[0054] The label issuing unit 13 issues the label La on which the product information such as the weight, price, and name of the article G is printed. The display unit 14 is

a display device that displays the product information such as the weight, price, and name of the article G. It will be noted that the display unit 14 may be a touch panel operable by the user. The operation unit 15 is configured by a plurality of buttons which, as a result of being depressed by the user, allow the user to operate content input to the packaging apparatus 1. The control unit controls each of the components of the packaging apparatus 1.

(5) Operation

[0055] The operation of the packaging apparatus 1 (with emphasis given particularly to operations associated with the discharge of the tray T by the discharge pusher 8) will now be described while comparing the discharge pusher 8 with the conventional discharge pusher P1. FIG. 5 is a flowchart showing the operation of the packaging apparatus 1.

[0056] FIG. 6 is an external view of the packaging apparatus 1 in step S1. The user operates the operation unit 15 to call up the product information relating to the target product (hereinafter, "the article G") and thereafter places the tray T containing the article G on the weigh table 41 (step S1). Thereafter, the weighing unit 4 measures the total weight of the tray T containing the article G that has been placed on the weigh table 41. The weighing unit 4 sends the total weight of the tray T it has acquired to the control unit. The control unit calculates the net weight of the article G based on the tare weight of the tray T that was called up and the total weight of the tray T. The display unit 14 displays the weight and price of the article G calculated by the control unit.

[0057] FIG. 7 is an external view of the packaging apparatus 1 in step S2. The tray conveyance mechanism 5 (the pusher 5a and the pusher 5b) rise from under the weigh table 41 and abut against the front side surface of the tray T (step S2).

[0058] FIG. 8 is an external view of the packaging apparatus 1 in step S3. The tray conveyance mechanism 5 conveys the tray T rearward (to the lift unit 6) (step S3).

[0059] FIG. 9 is an external view of the packaging apparatus 1 in step S4. The tray T is lifted by the lift unit 6 to the packaging position L1, and the upper portion of the tray T becomes covered by the film F (step S4). FIG. 10 is a right side view showing the discharge pusher 8 and the tray T in step S4. The discharge pusher 8 is lifted up about the horizontal shaft 87 in accordance with the size of the tray T lifted by the lift unit 6. For example, if the tray T is a large size, the longest first pusher member 81a and second pusher member 82a and the next longest first pusher member 81b and second pusher member 82b are lifted up by and ride on the tray T. Furthermore, if the tray T is an intermediate size, the first pusher member 81a and the second pusher member 82a are lifted up by and ride on the tray T. Furthermore, if the tray T is a small size, the first pusher member 81a and the second pusher member 82a discharge the tray T without riding on it. Next, the

folding unit 7 folds, under the bottom of the tray T, the peripheral edge portions of the film F that has covered the tray T (step S5).

[0060] FIG. 11 is an external view of the packaging apparatus 1 in a state in which the rear folding member 7a has moved close to the front folding member 7d in step S5. FIG. 12 is a right side view in which the longest first pusher member 81a and second pusher member 82a are riding on the tray T and the next longest first pusher member 81b and second pusher member 82b discharge the tray T without riding on it in step S5. In step S5, the tray T is moved forward (in the first direction D) by the rear folding member 7a. For that reason, the first member 812b and the first projection 813b that did not ride on the tray T contact the rear side surface of the tray T and discharge the tray T. Because of this, the discharge pusher 8 is configured so that even when the rear folding member 7a moves to the front folding member 7d and, for example a large-size tray T is pushed out to the discharge position L2, the tray T does not fall from the discharge position L2.

[0061] FIG. 13 is a right side view showing the conventional discharge pusher P1 and a tray Td1 in step S5. The discharge pusher P1 has the space C. For that reason, there are cases where the tray Td1 tilts or the discharge pusher P1 moves up and down, and the tray Td1 gets caught in at least either of the space C and the groove P4. In contrast, as shown in FIG. 12, the space C is not formed in the discharge pusher 8, and a situation where the tray T gets caught in at least either of the space C and the groove P4 is inhibited.

[0062] FIG. 14 is an external view of the packaging apparatus 1 in step S6. The drive unit 9 is driven and causes the discharge pusher 8 to move in the first direction D and abut against the rear side surface of the tray T (step S6). FIG. 15 is a right side view in which, when the size of the tray T is small, the first member 812a and the first projection 813a of the first pusher member 81a are abutting against the rear side surface of the tray T.

[0063] FIG. 16 is a right side view showing the conventional discharge pusher P1 and a tray Td2 in a case that the height of tray Td2 is low. In this case, the discharge pusher P1 has the space C. For that reason, when the member P2 and the projection P3 abut against the tray Td2, a situation can occur where the tray Td2 gets caught in at least either of the space C and the groove P4.

[0064] In contrast, as shown in FIG. 15, the space C is not formed in the discharge pusher 8, and a situation where the tray T gets caught in at least either of the space C and the groove P4 is inhibited.

[0065] FIG. 17 is an external view of the packaging apparatus 1 in step S7. The drive unit 9 is driven and causes the discharger pusher 8 to move further in the first direction D. The discharge pusher 8 advances in the first direction D in a state in which it is abutting against the rear side surface of the tray T and discharges the tray T to the discharge position L2 (step S7).

[0066] During or after step S7, the lift unit 6 is lowered

and goes back to its state before it was raised. Furthermore, during or before step S7, the label issuing unit 13 receives information from the control unit and issues the label La on which the product information such as the weight, price, and name of the article G is printed. The user takes the issued label La from the label issuing unit 13 and can stick it on the film F of the discharged tray T. **[0067]** After step S7, the discharge pusher 8 is returned to its position before it discharged the tray T (e.g., the position of the discharge pusher 8 in FIG. 6). If the tray Td1 or the tray Td2 is caught in the conventional discharge pusher P1, the discharge pusher P1 that is returned may also pull back the tray Td1 or the tray Td2 from the discharge position L2 to the packaging position L1. However, in the discharge pusher 8 of the present embodiment, such catching does not occur.

(6) Characteristics

[0068] (6-1)

The packaging apparatus 1 includes the film conveyance unit 3, the lift unit 6, the folding unit 7, and the discharge pusher 8. The film conveyance unit 3 conveys, in an extended state, the film F unwound from the film roll 21 to the packaging position L1. The lift unit 6 lifts the tray T containing the article G toward the film F disposed in the packaging position L1. The folding unit 7 folds, under the bottom of the tray T, a peripheral edge portion of the film F that has covered the tray T. The discharge pusher 8 pushes one side surface of the tray T packaged by the film F to discharge in the first direction D the tray T covered by the film F. The discharge pusher 8 includes the first pusher member 81. The first pusher member 81 has the first arm 811, the first member 812, and the first projection 813. The first arm 811 extends in the first direction D. The first member 812 extends in a direction intersecting the first direction D at the distal end portion of the first arm 811 and abuts against the side surface of the tray T. The first projection 813 extends in the first direction D beyond the first member 812 from the distal end portion of the first arm 811 and abuts against the lower portion of the side surface of the tray T. The lower end of the first member 812 is positioned lower than the upper end of the first projection 813.

[0069] The packaging apparatus 1 can inhibit the pulling back of trays by the discharge pusher 8.

(6-2)

[0070] In the packaging apparatus 1, the first pusher member 81 is swingable up and down about the horizontal shaft 87 that is located in a position away from the packaging position L1 and extends in a direction orthogonal to the first direction D.

[0071] In the process of the packaging of the tray T, the tray T is pushed upward, beyond the position where the film F is stretched, by the rising of the lift unit 6. At that time, the first pusher member 81 of the three first pusher members 81 that did not ride on the tray T discharges the tray T.

(6-3)

[0072] In the packaging apparatus 1, the discharge pusher 8 includes a plurality of the first pusher members 81 in which the lengths of the first arms 811 from the horizontal shaft 87 to the distal end portions are different. Consequently, when the tray T is a large size, the longest first pusher member 81a and the next longest first pusher member 81b of the first pusher members 81 ride on the tray T, and the shortest first pusher member 81c abuts the side surface of the tray T and discharges the tray T. Furthermore, when the tray T is an intermediate size, the longest first pusher member 81a rides on the tray T, and the next longest first pusher member 81b abuts the side surface of the tray T and discharges the tray T. Moreover, when the tray T is a small size, the longest first pusher member 81a abuts the side surface of the tray T and discharges the tray T.

[0073] Because of this, even when the tray sizes are different, each tray T can be stopped in a fixed position in the discharge position L2 and prevented from falling forward.

(6-4)

[0074] In the packaging apparatus 1, the discharge pusher 8 further includes the second pusher member 82. The second pusher member 82 has the second arm 821, the second member 822, and the second projection 823. The second arm 821 extends in the first direction D. The second member 822 extends in a direction intersecting the first direction D at the distal end portion of the second arm 821 and abuts against the side surface of the tray T. The second projection 823 extends in the first direction D beyond the second member 822 from the distal end portion of the second arm 821 and abuts against the lower portion of the side surface of the tray T. The lower end of the second member 822 is positioned lower than the upper end of the second projection 823. The first pusher member 81 and the second pusher member 82 are disposed planarly symmetrical to each other relative to a vertical plane extending in the first direction D.

[0075] Because of this, the first pusher member 81 and the second pusher member 82 can abut against the tray T in two places. For that reason, even when the center of gravity of the tray T varies, the tray T is discharged in the first direction D if the center of gravity of the tray T is inside the two places at which the first pusher member 81 and the second pusher member 82 abut against the tray T (inside of sides where there are extension lines extending from the first direction D). Consequently, the packaging apparatus 1 can discharge the tray T in the first direction D in correspondence to the state of the tray T of various states.

(6-5)

[0076] In the packaging apparatus 1, the plural first pusher members 81 are disposed such that, the longer the length of the first arm 811 from the horizontal shaft 87 to the distal end portion is, the more inward they are.

[0077] Because of this, the packaging apparatus 1 can

be made smaller.

(6-6)

[0078] The packaging apparatus 1 further includes the restraining member 10. The restraining member 10 restrains, from above, the tray T covered by the film F when the discharge pusher 8 moves the tray T in the first direction D. Because of this, the tray T can be inhibited from turnover when it is discharged from the packaging position L1.

Reference Signs List

[0079]

1	Packaging Apparatus
3	Film Conveyance Unit
6	Lift Unit
7	Folding Unit
8	Discharge Pusher
9	Drive Unit
10	Restraining Member
81	First Pusher Member
82	Second Pusher Member
87	Horizontal Shaft
811	First Arm
812	First Member
813	First Projection
821	Second Arm
822	Second Member
823	Second Projection
21	Film Roll
D	First Direction
F	Film
G	Article
T	Tray
L1	Packaging Position

Citation List

Patent Literature

[0080] Patent Document 1: JP-A No. 2011-20700

Claims

1. A packaging apparatus (1) comprising:

a film conveyance unit (3) configured to convey, in an extended state, a film (F) unwound from a film roll (21) to a packaging position (L1);
a lift unit (6) configured to lift a tray (T) containing an article (G) toward the film disposed in the packaging position;
a folding unit (7) configured to fold, under the bottom of the tray, a peripheral edge portion of the film that has covered the tray; and
a discharge pusher (8) configured to push a side

surface of the tray packaged by the film to discharge in a first direction (D) the tray covered by the film;
wherein
the discharge pusher includes:

a first pusher member (81) having a first arm (811) that extends in the first direction,
a first member (812) that extends in a direction intersecting the first direction at a distal end portion of the first arm and is configured to abut against the side surface of the tray, and
a first projection (813) that extends in the first direction beyond the first member from the distal end portion of the first arm and is configured to abut against a lower portion of the side surface of the tray; and

a lower end of the first member is positioned lower than an upper end of the first projection.

2. The packaging apparatus according to claim 1, wherein the first pusher member is configured to swing up and down about a horizontal shaft (87) that is located in a position away from the packaging position and extends in a direction orthogonal to the first direction.

3. The packaging apparatus according to claim 2, wherein the discharge pusher includes a plurality of the first pusher members in which lengths of the first arms from the horizontal shaft to the distal end portions are different.

4. The packaging apparatus according to any one of claims 1 to 3, wherein

the discharge pusher further includes:

a second pusher member (82) having a second arm (821) that extends in the first direction,
a second member (822) that extends in a direction intersecting the first direction at a distal end portion of the second arm and is configured to abut against the side surface of the tray, and
a second projection (823) that extends in the first direction beyond the second member from the distal end portion of the second arm and is configured to abut against a lower portion of the side surface of the tray;

a lower end of the second member is positioned lower than an upper end of the second projection; and
the first pusher member and the second pusher

member are disposed planarly symmetrical to each other relative to a vertical plane extending in the first direction.

5. The packaging apparatus according to claim 3, wherein the plural first pusher members are disposed such that, the longer the length of the first arm from the horizontal shaft to the distal end portion is, the more inward they are.
6. The packaging apparatus according to any one of claims 1 to 5, further comprising a restraining member (10) configured to restrain, from above, the tray covered by the film in a case where the discharge pusher moves the tray in the first direction.

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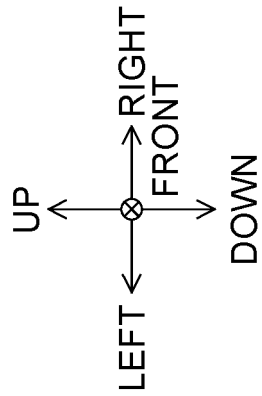
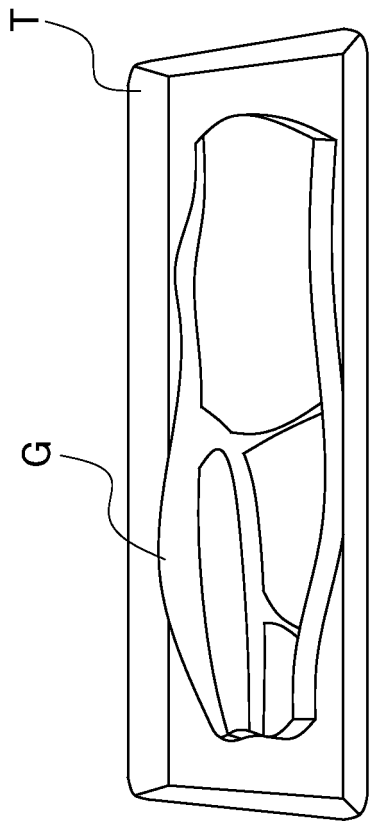


FIG. 1

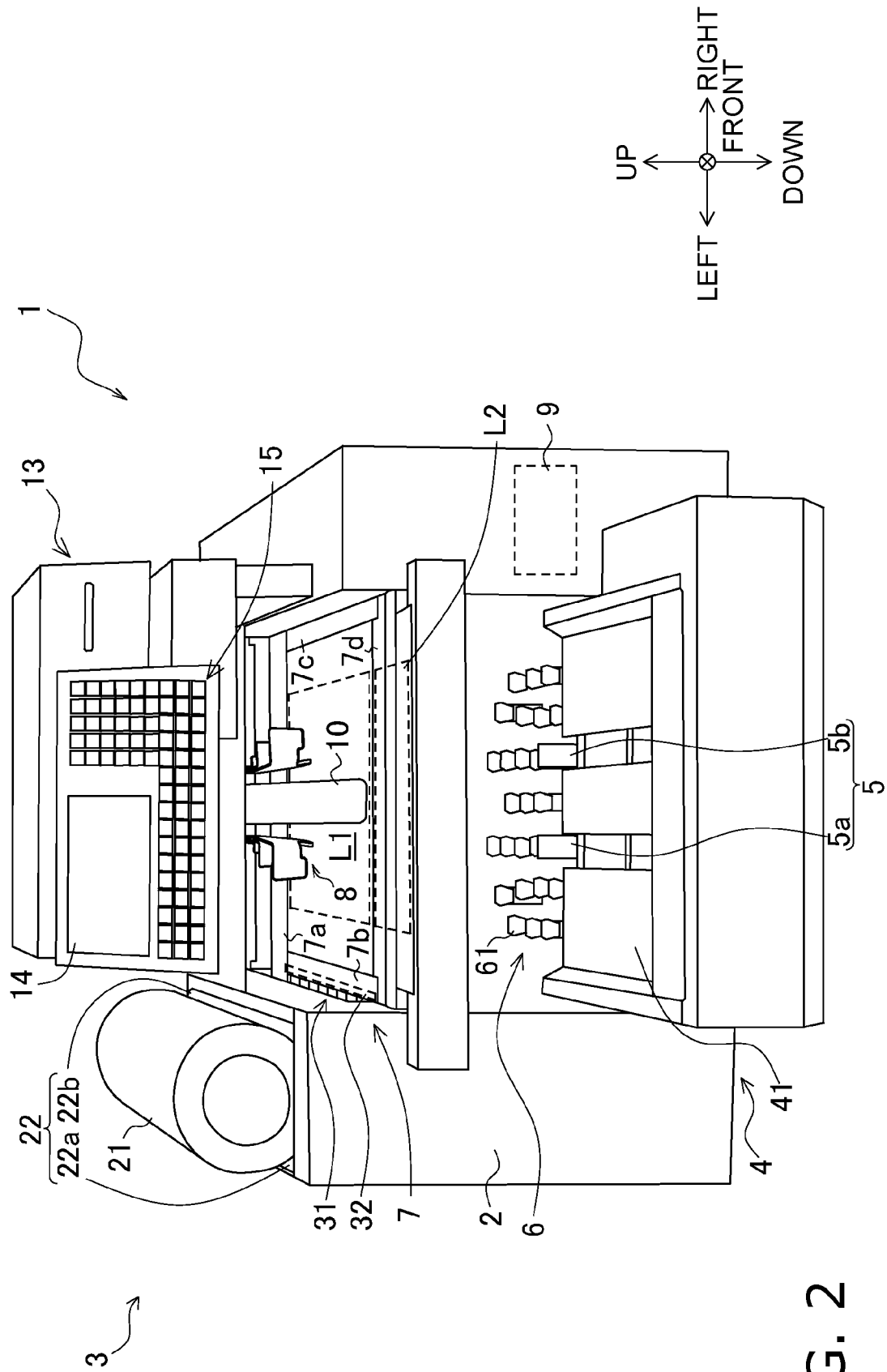


FIG. 2

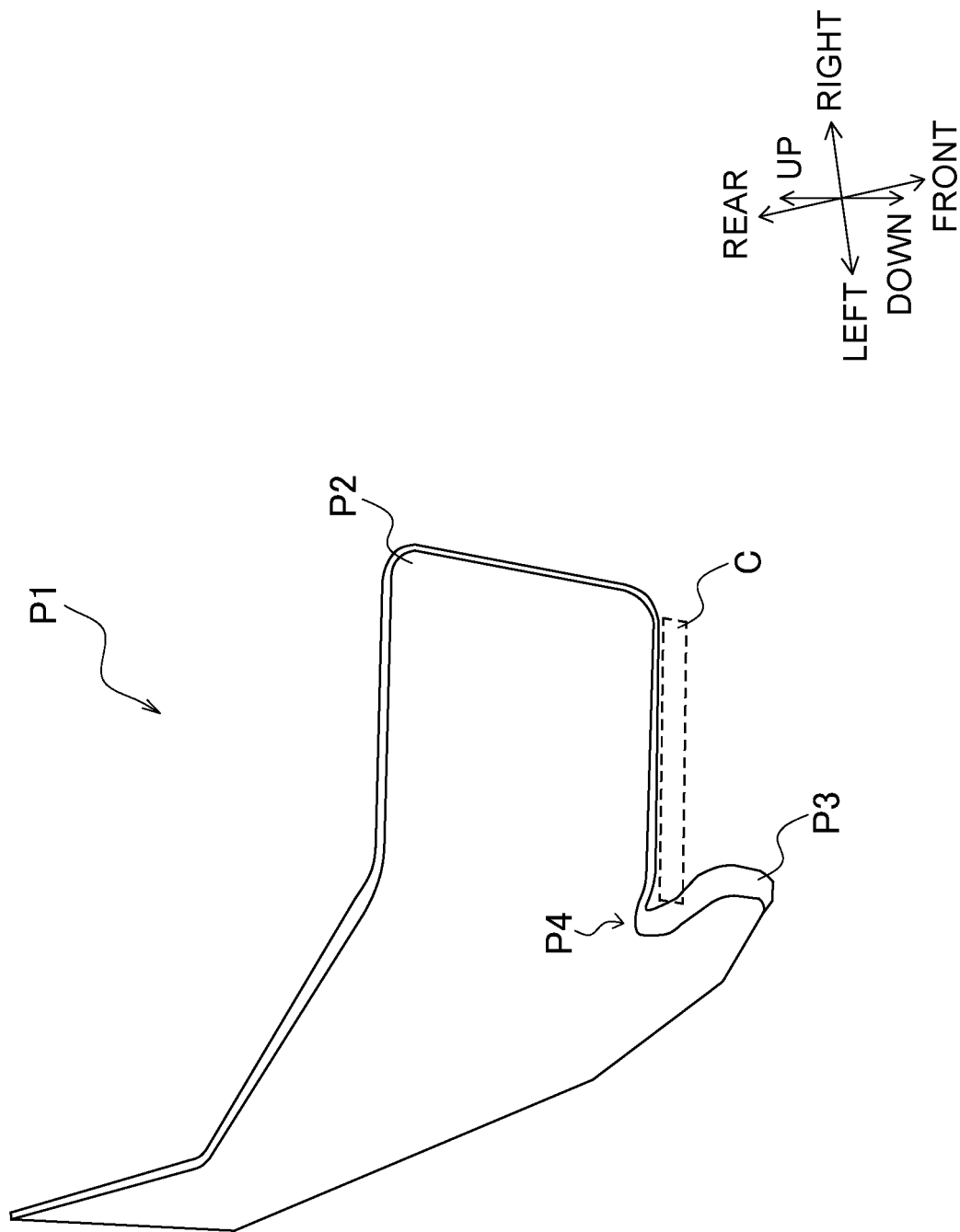


FIG. 3

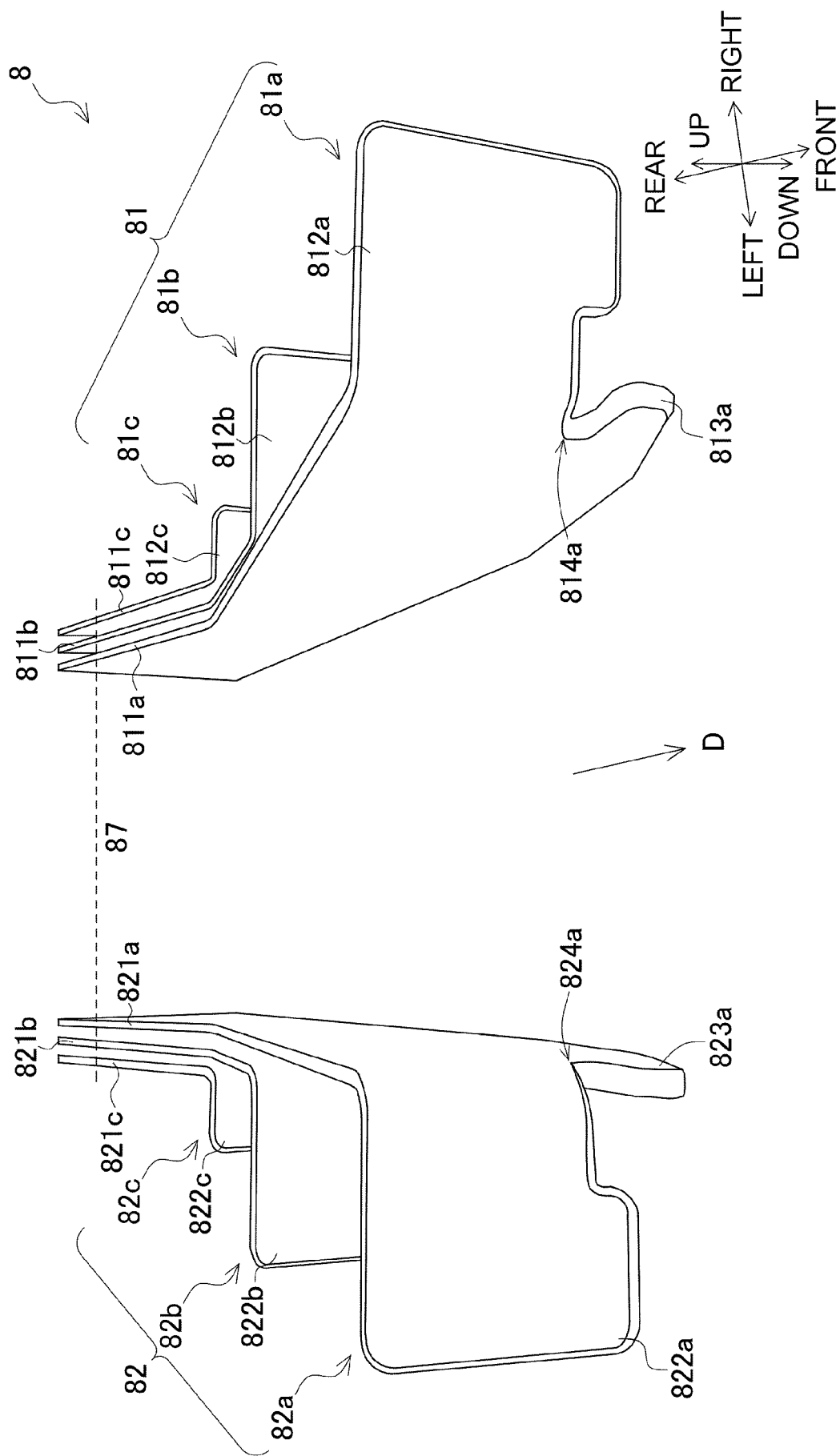


FIG. 4

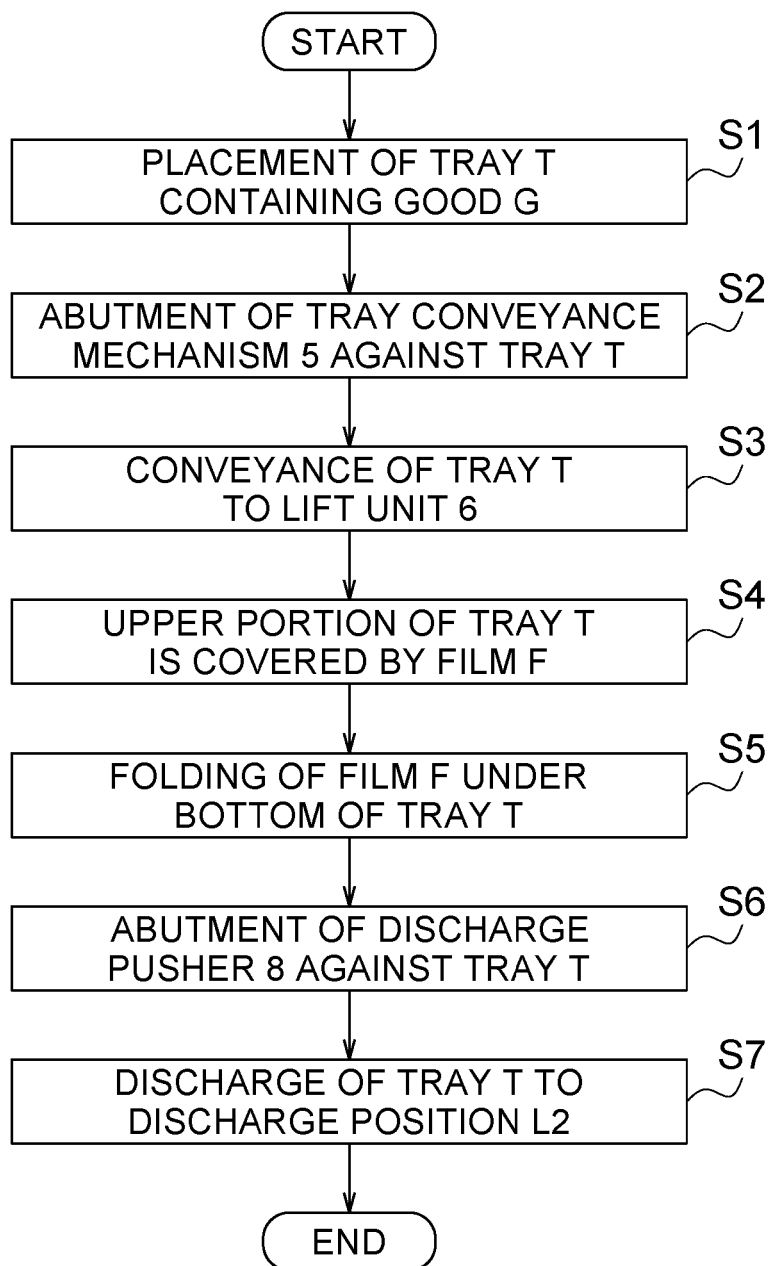


FIG. 5

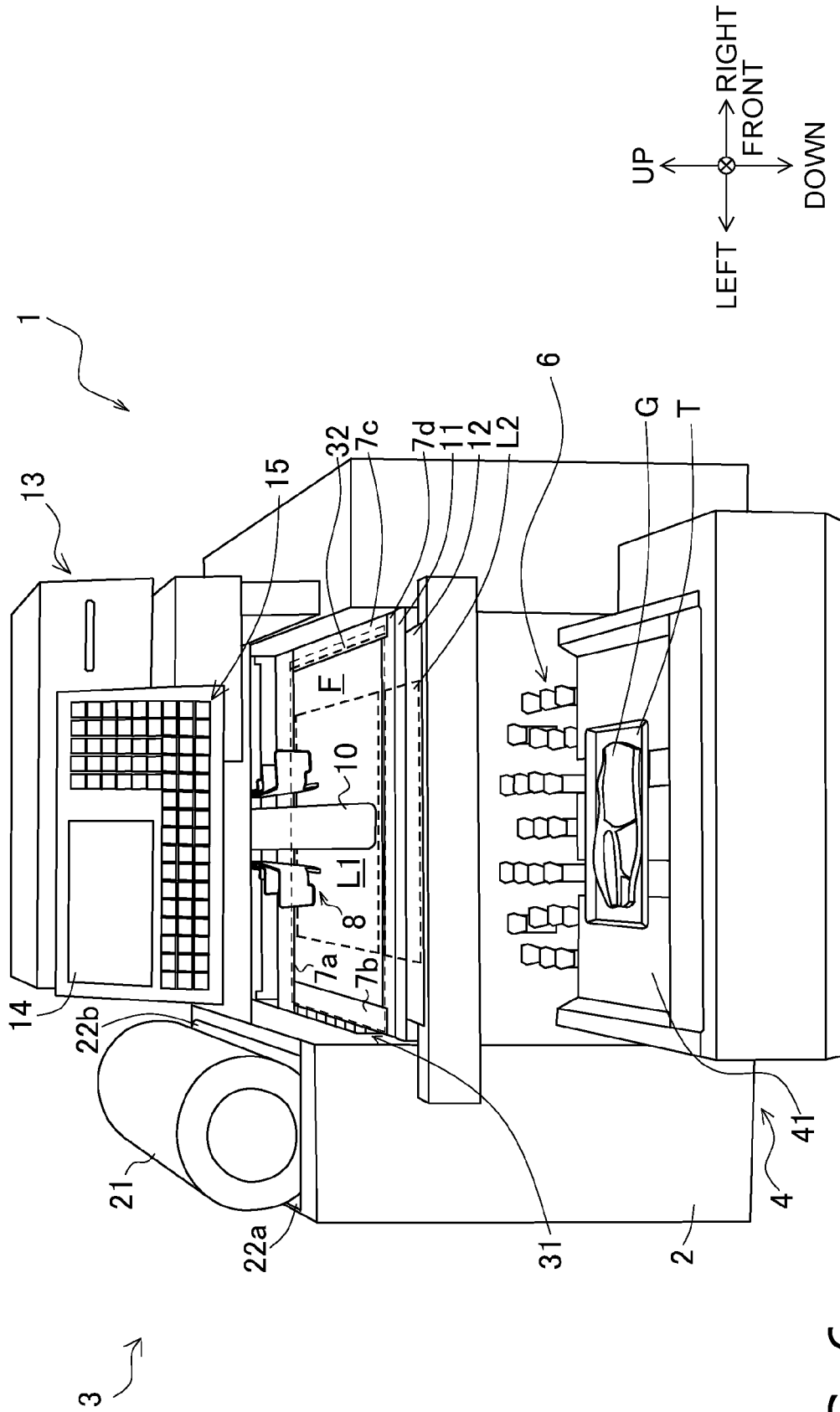
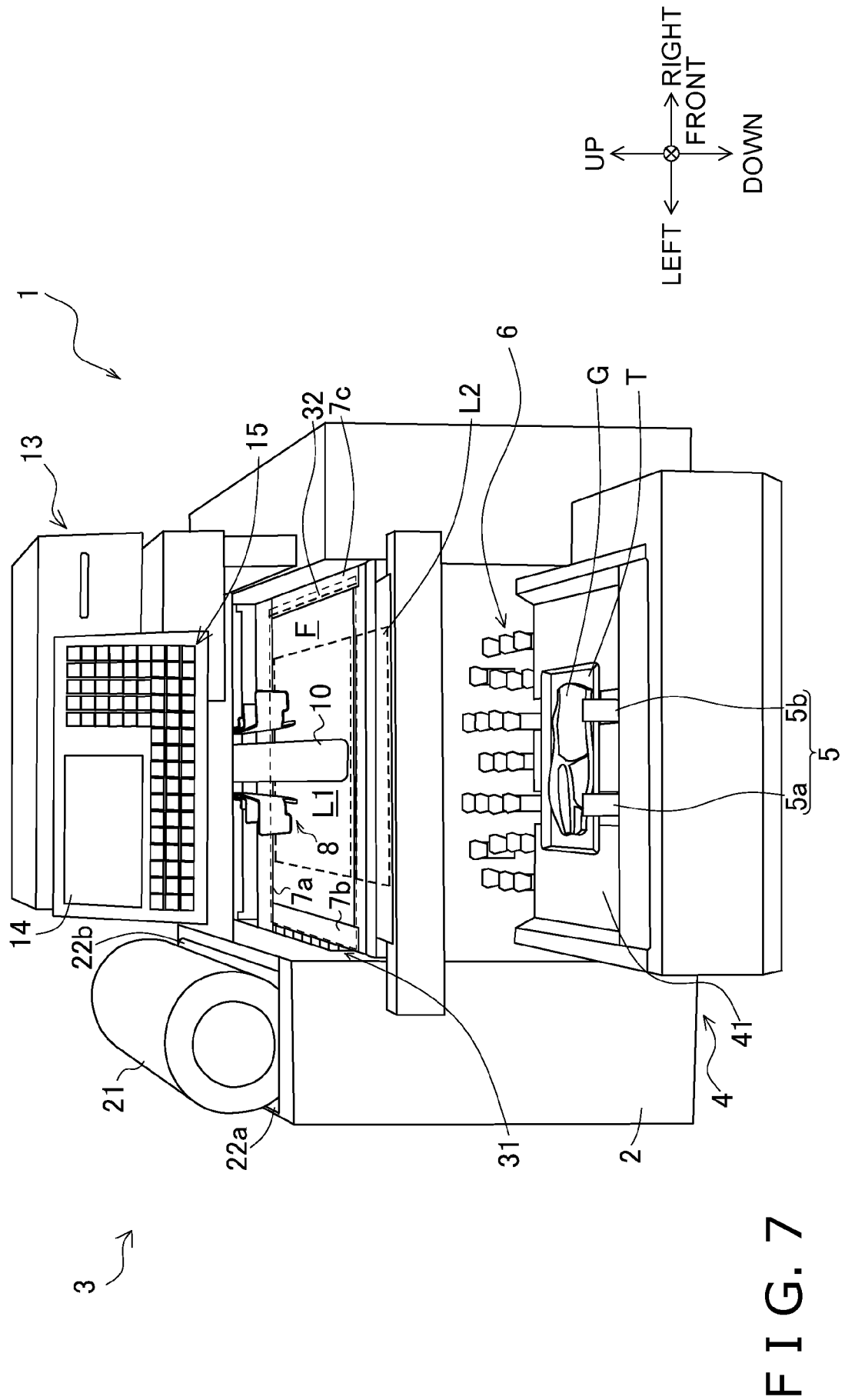


FIG. 6



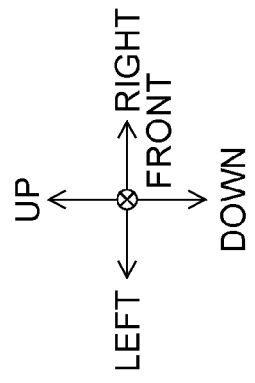
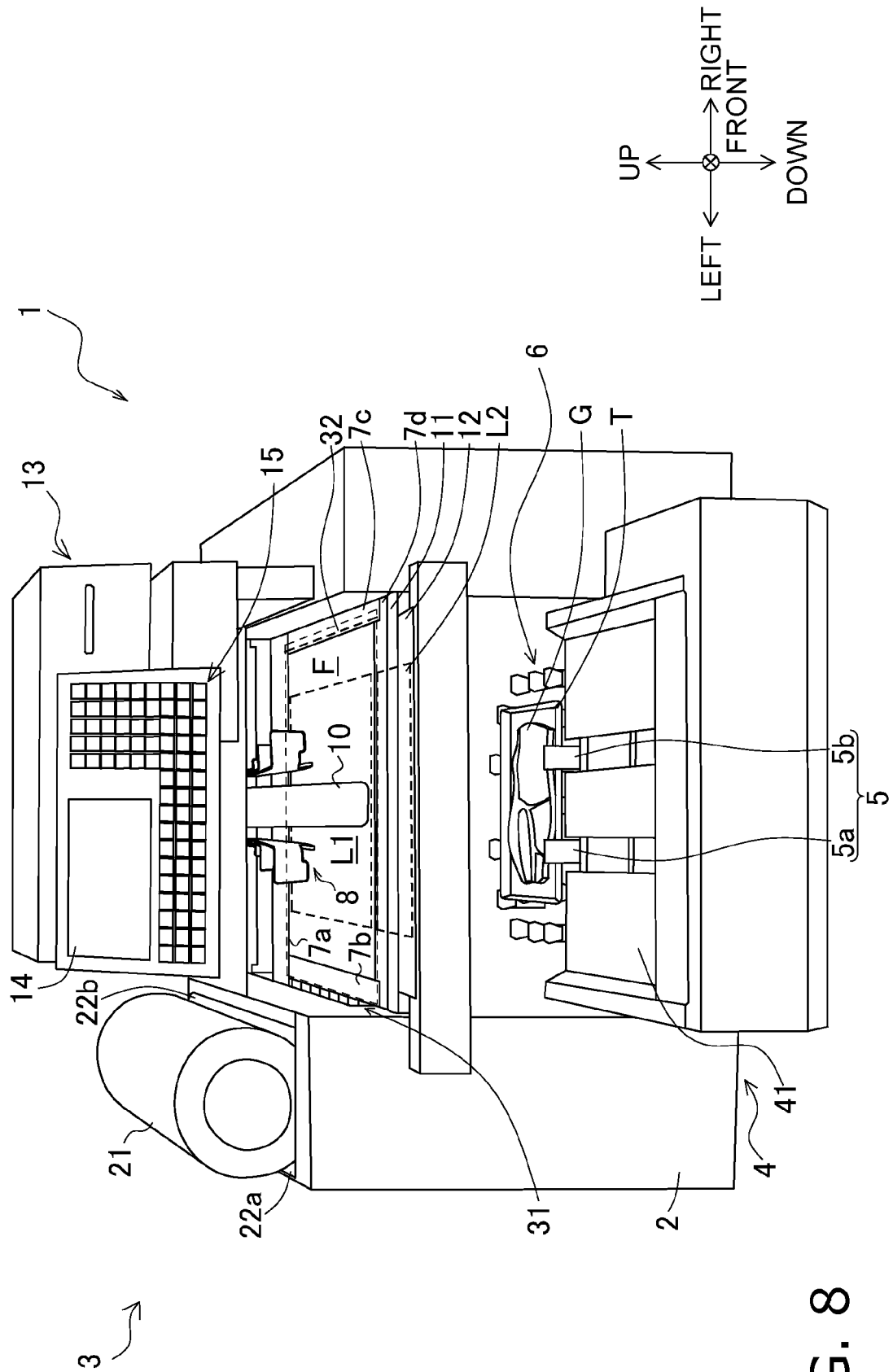


FIG. 8

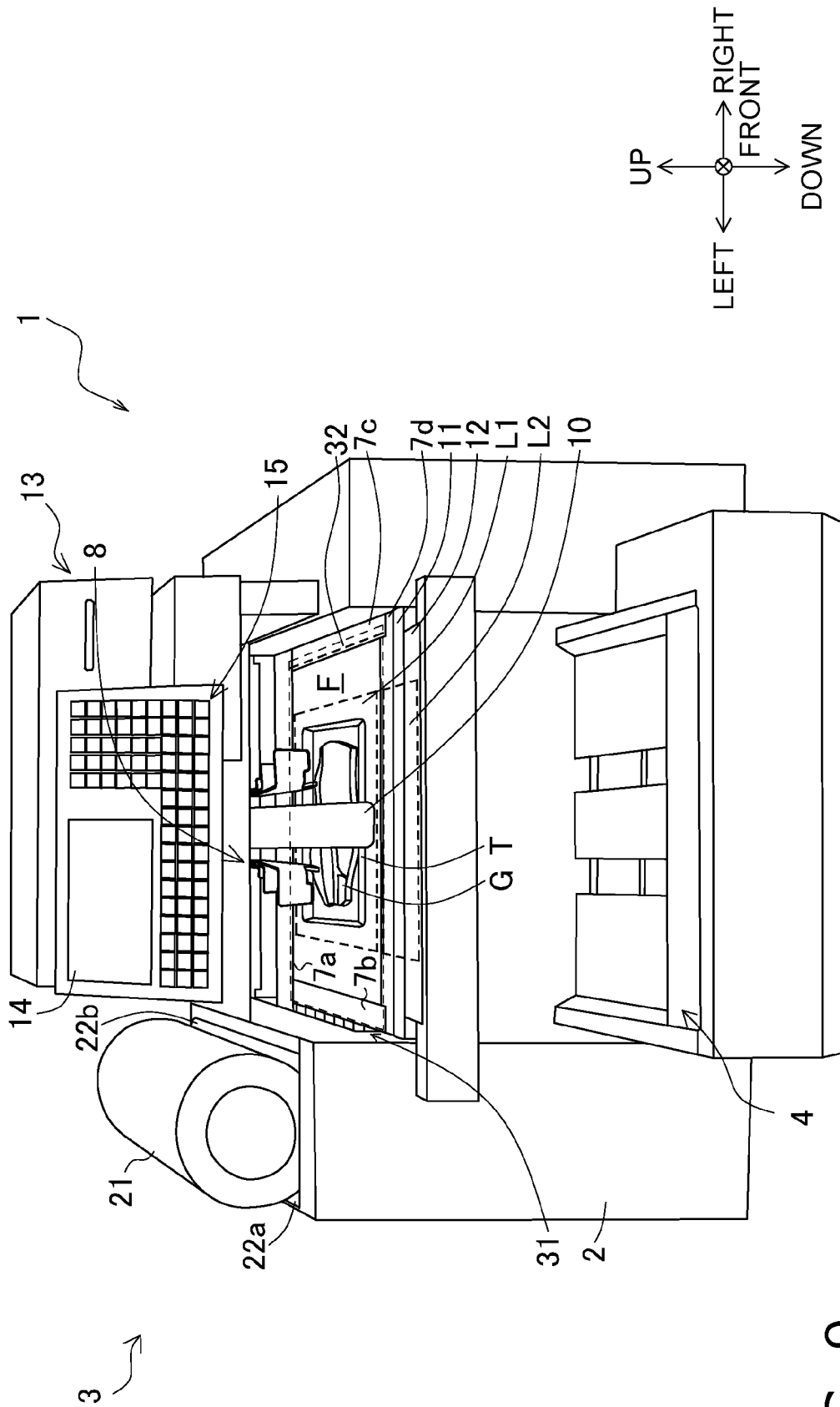


FIG. 9

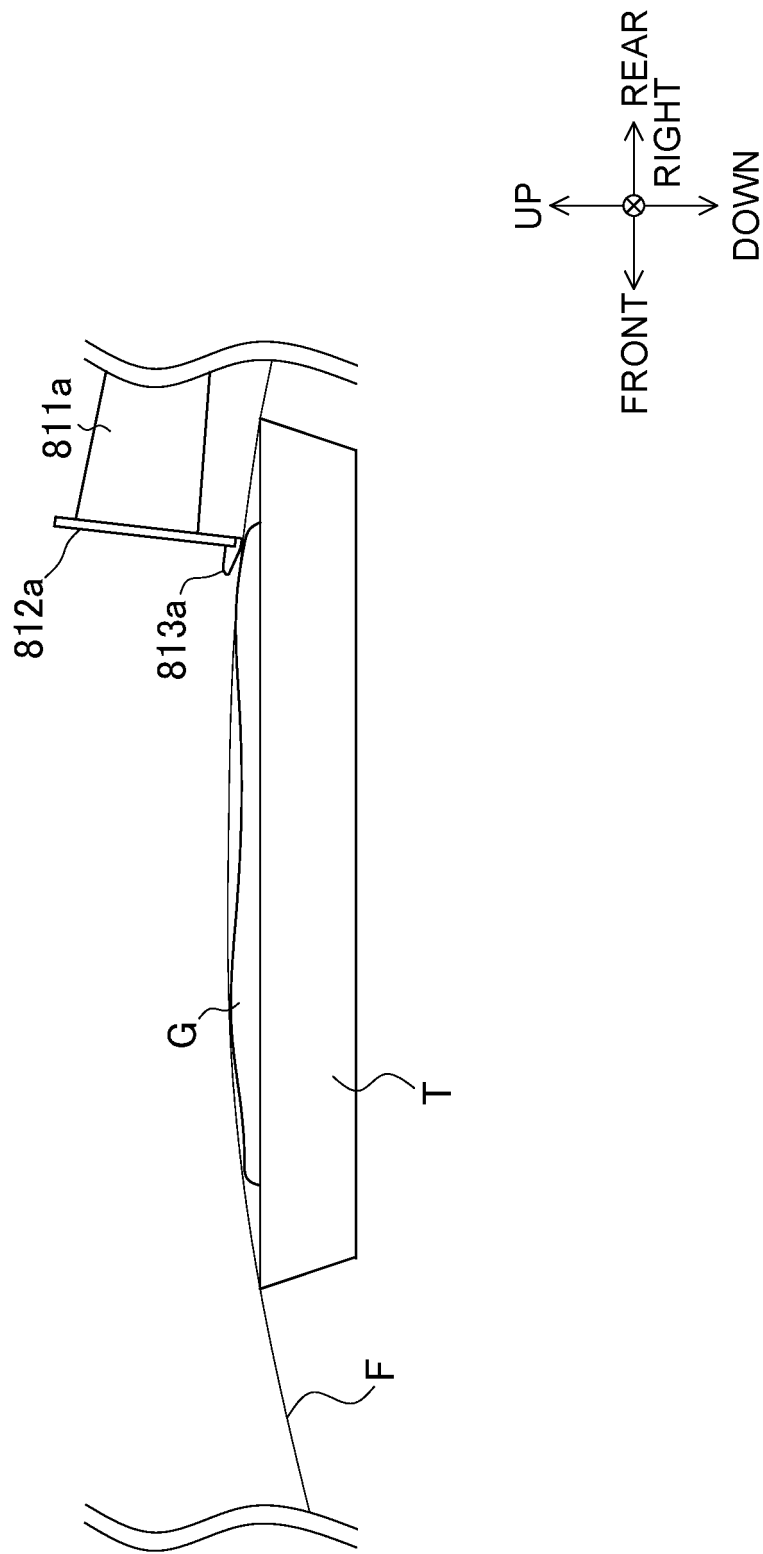


FIG. 10

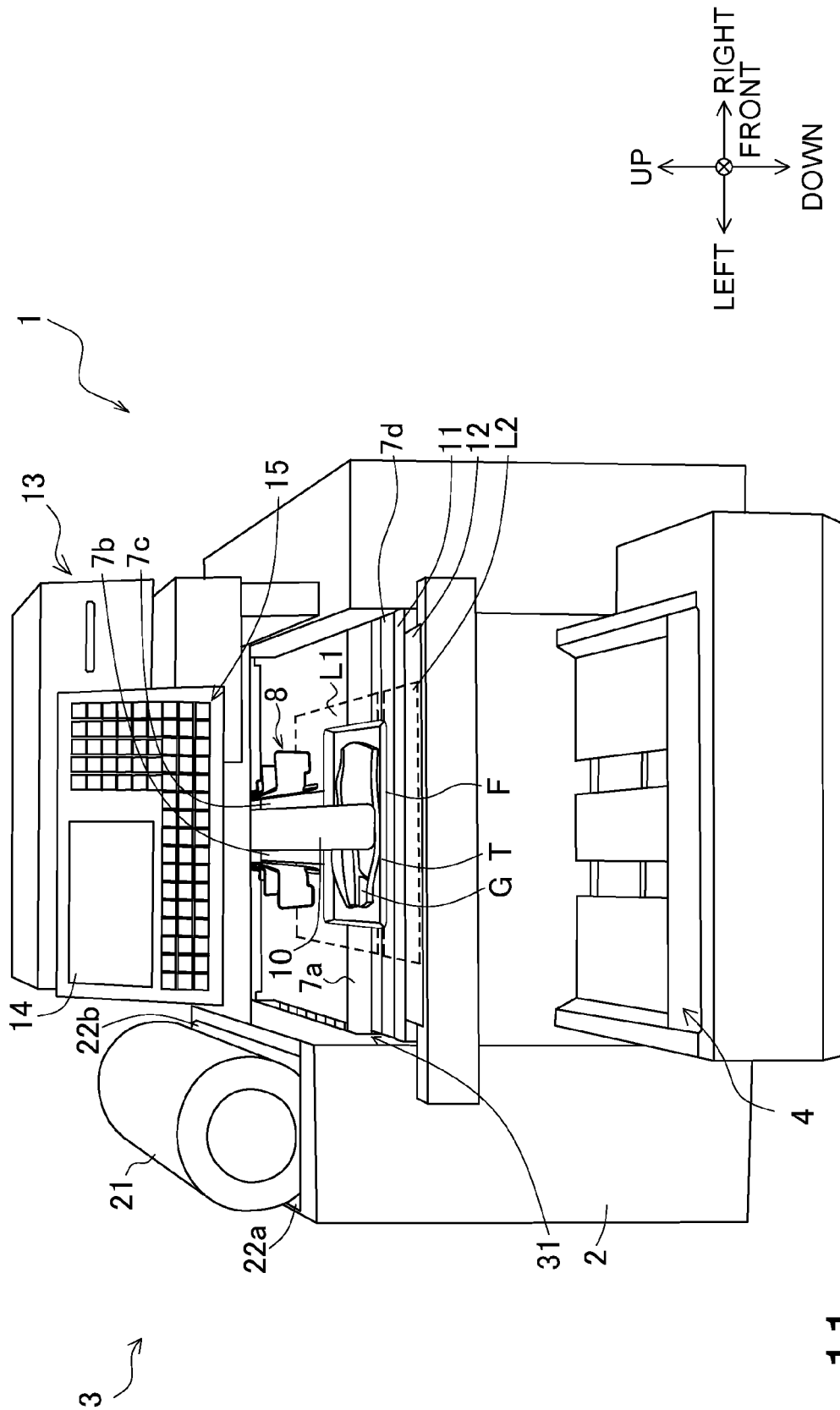


FIG. 11

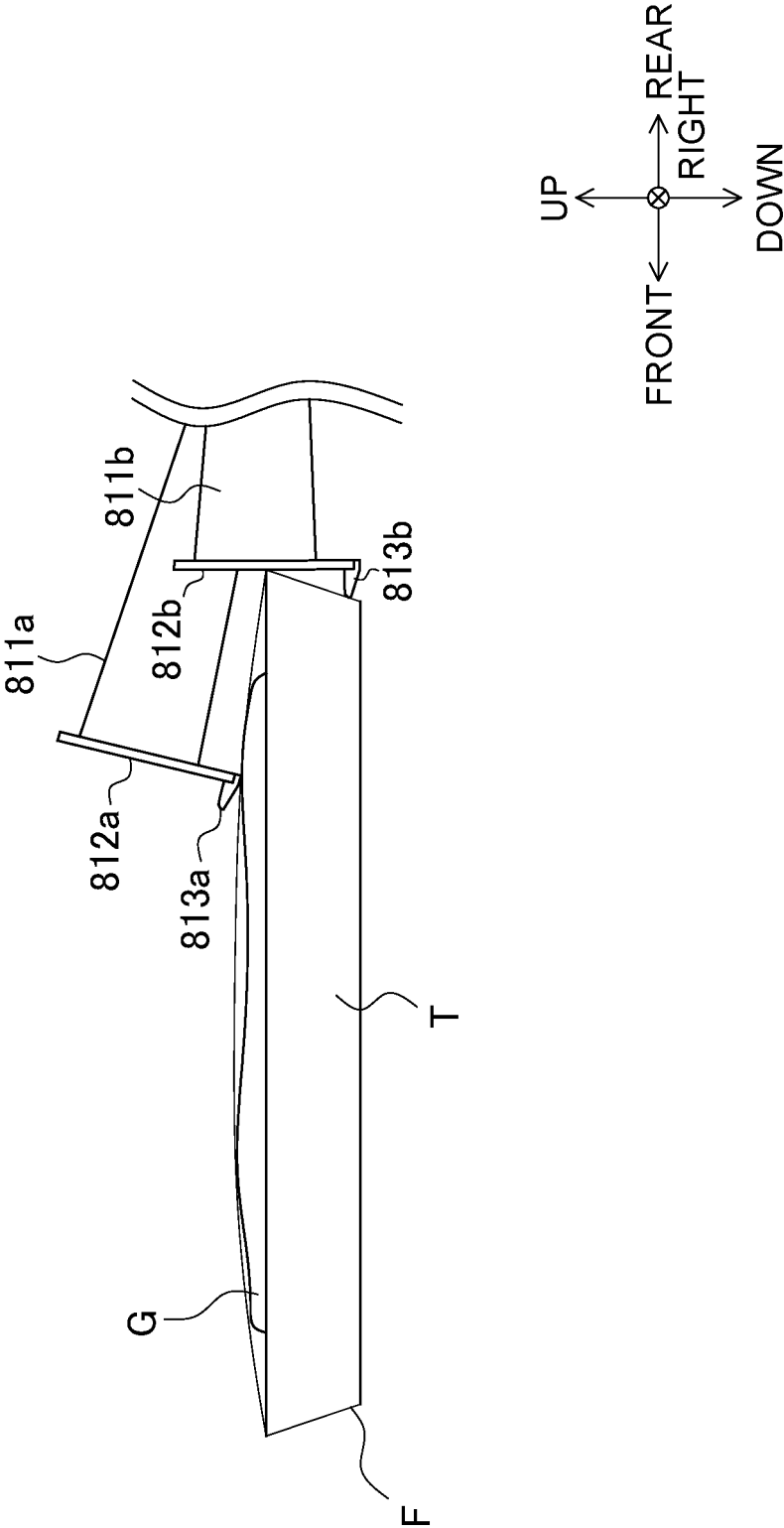


FIG. 12

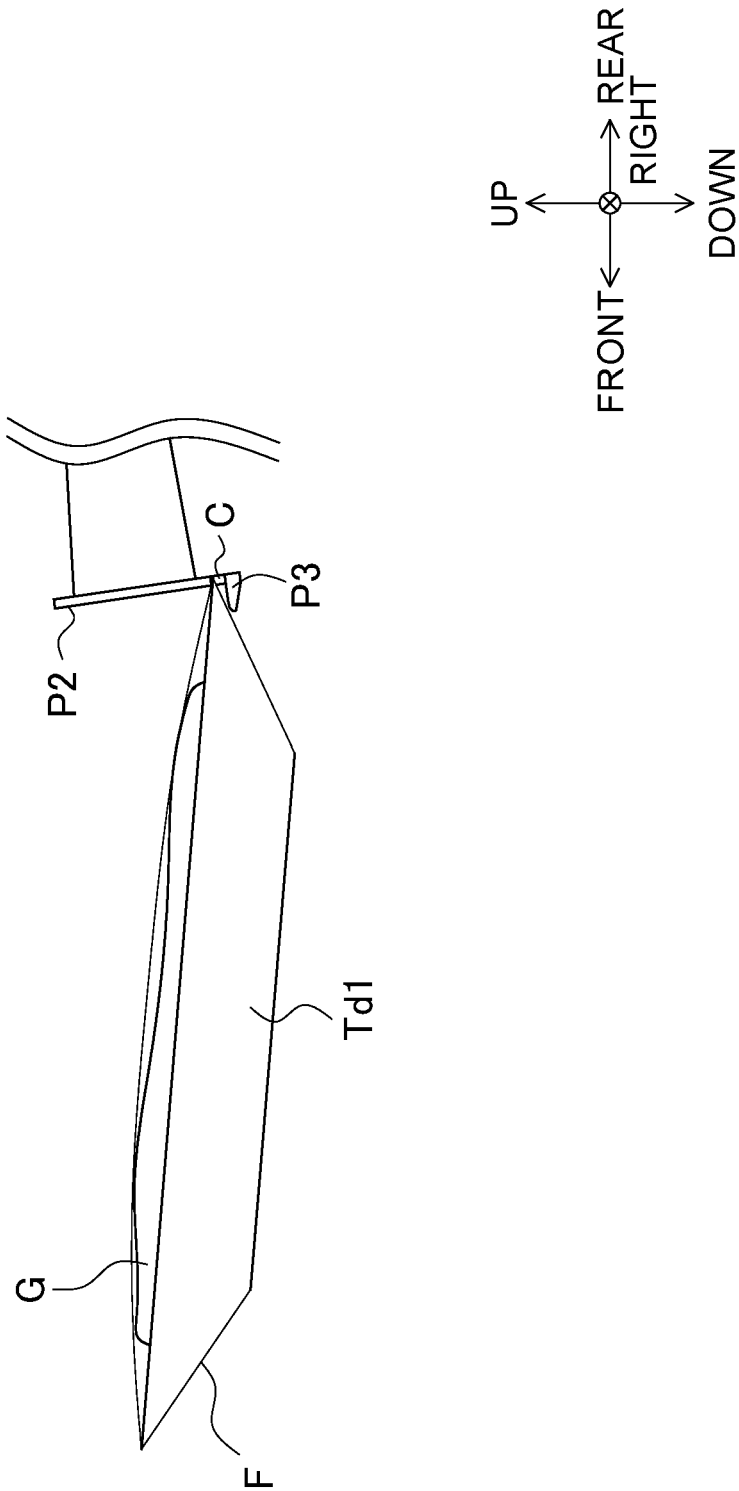


FIG. 13

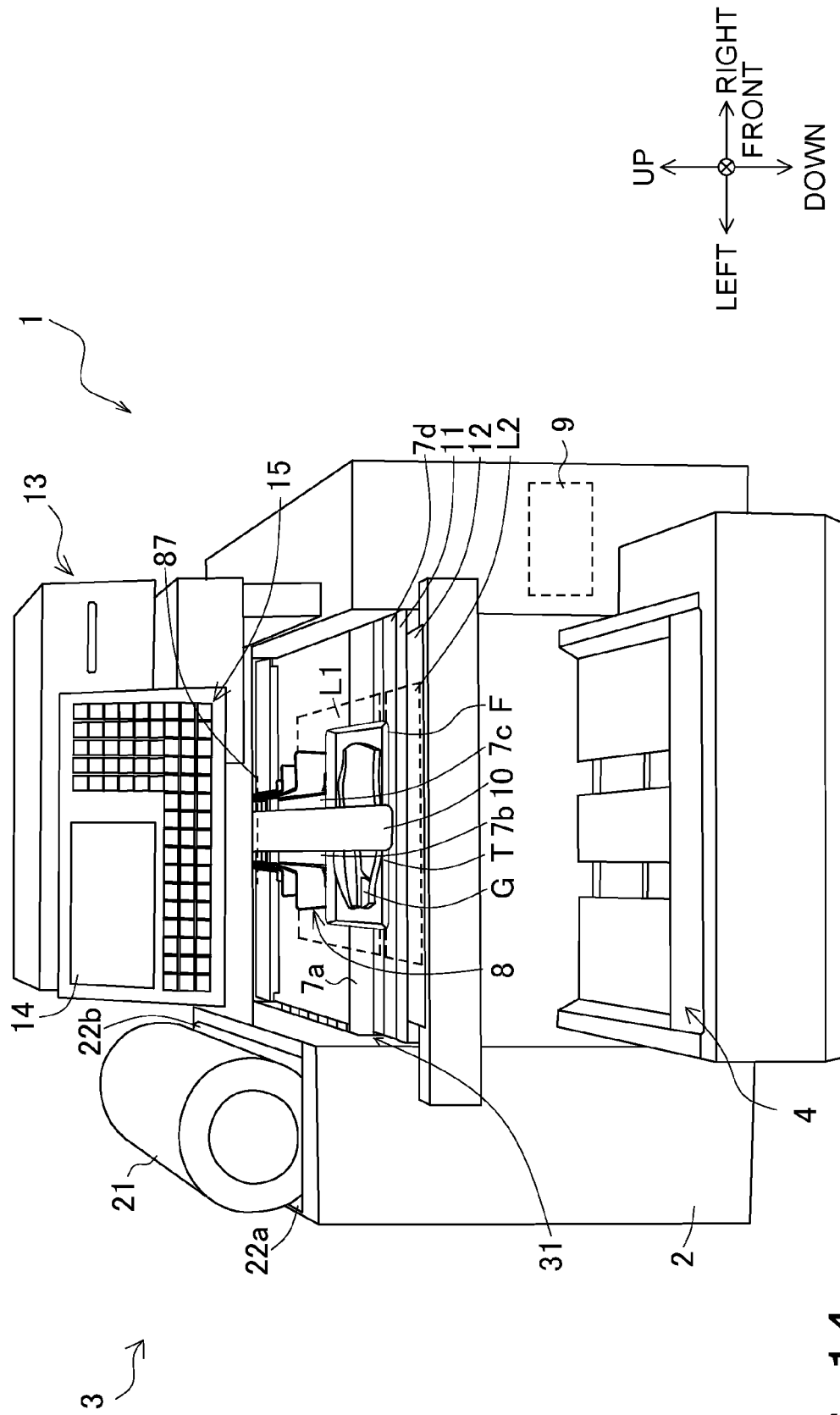


FIG. 14

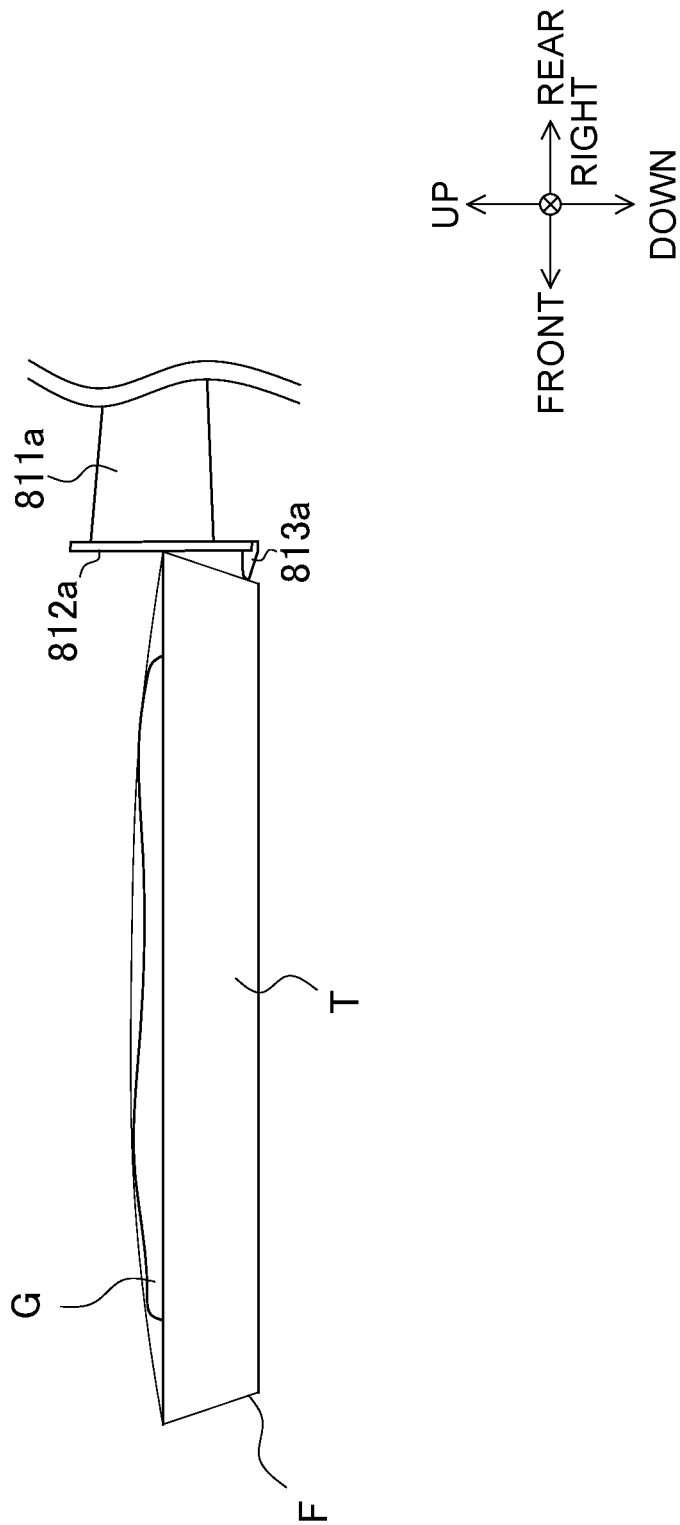


FIG. 15

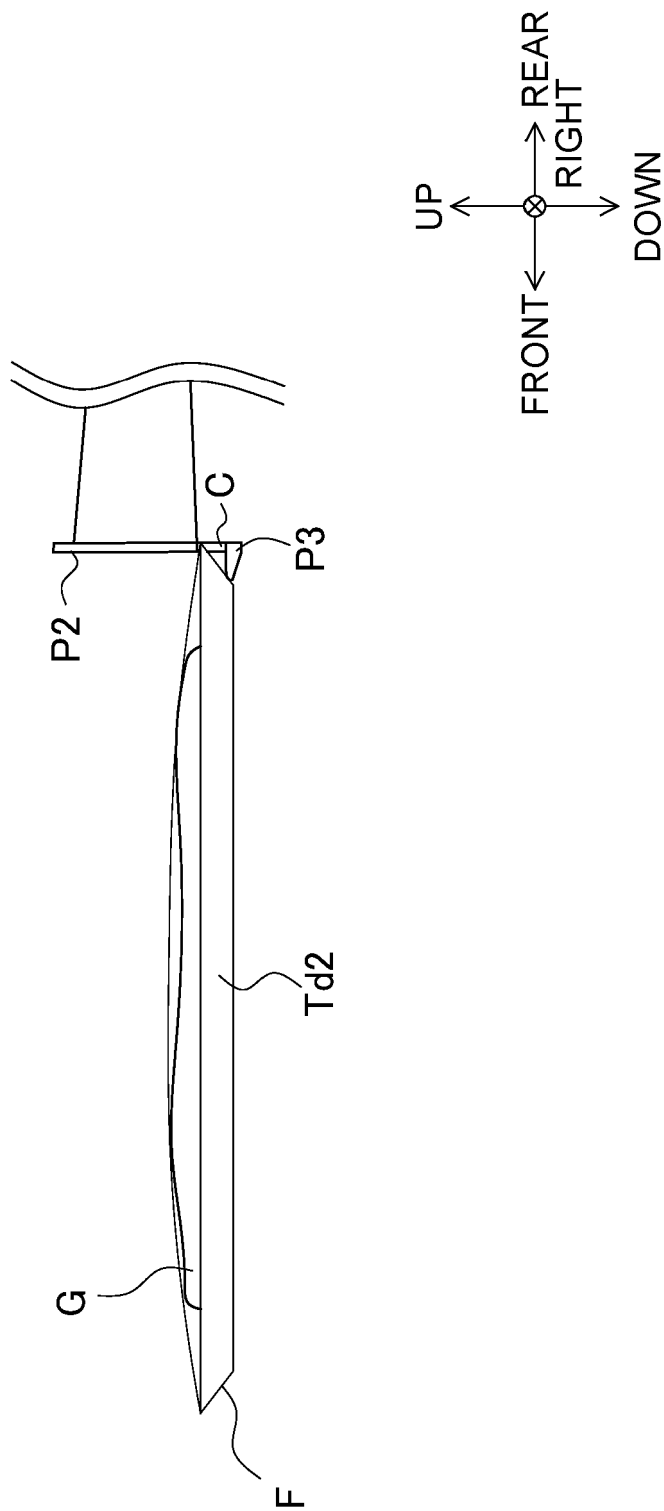


FIG. 16

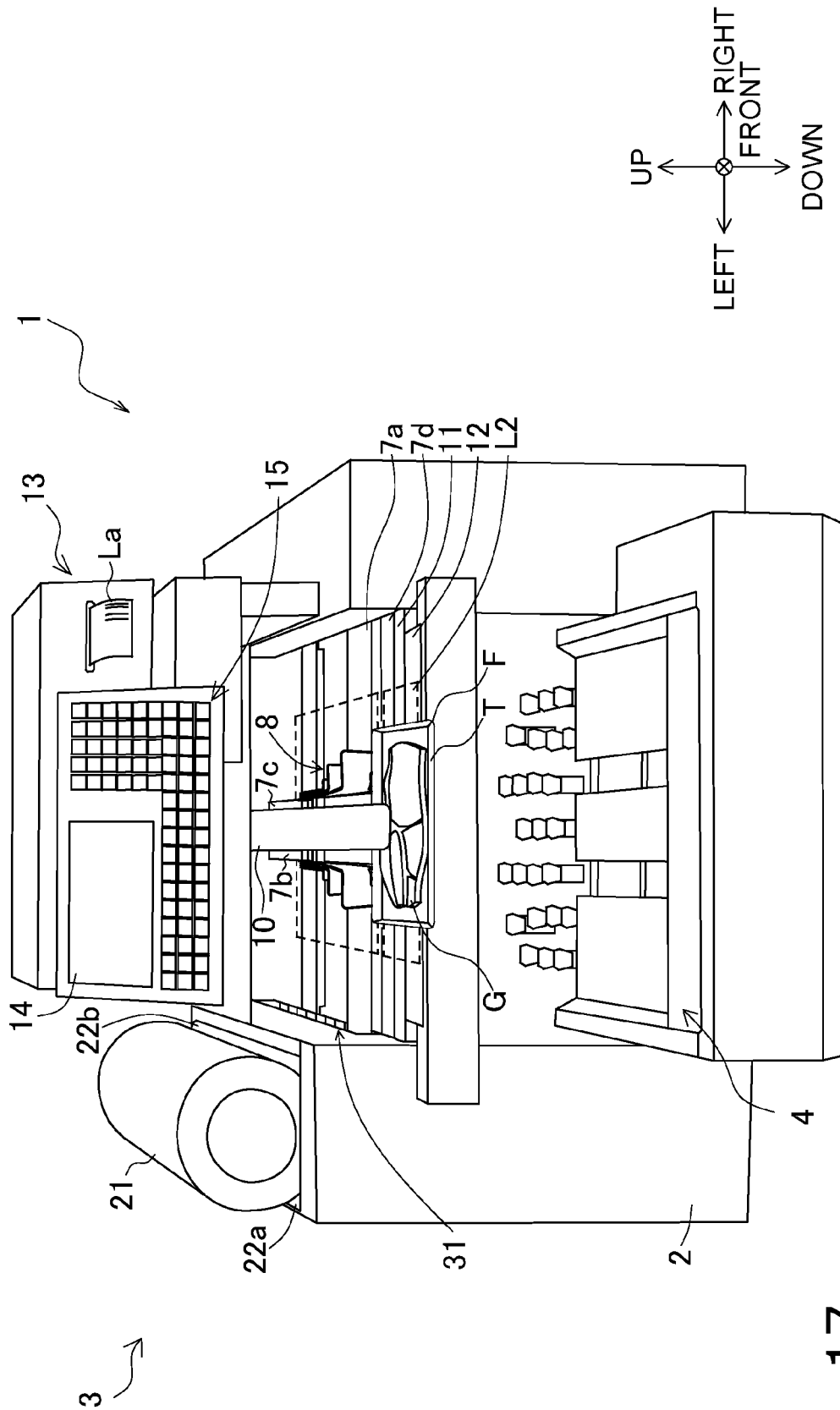


FIG. 17



EUROPEAN SEARCH REPORT

Application Number

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Munich		8 May 2025	Kiggen, Marc
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