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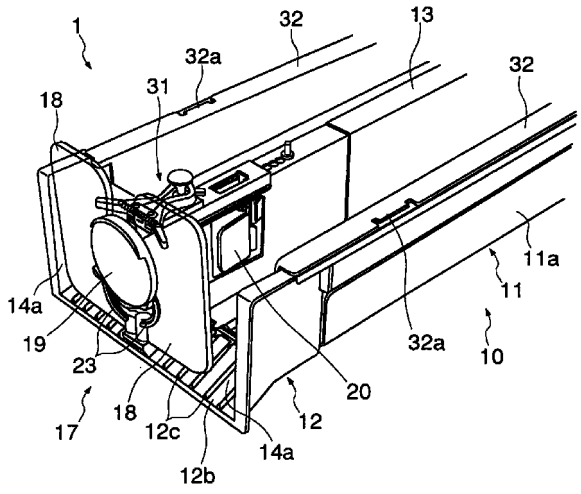
(54) Article container for automatic vending machine

(57) An article container for an automatic vending machine is provided for reliably and smoothly dispensing an article in a simple and inexpensive structure and for improving the appearance of displayed articles. In the article container, a rack body is accommodated in a body of the vending machine and formed with an article passage extending in the longitudinal direction for containing a plurality of articles one after the other. An open /close member is pivotally movable between an open position for opening a dispensing port at a front end of the article passage and a closed position for closing the dispensing port. The open /close member is adapted to pivotally move to the open position when an article is purchased. A pusher is disposed to be longitudinally movable along the article passage and to press articles contained in the article passage in front. An adapter means is attached to a front end of the rack body for feeding a purchased article positioned at the forefront within the plurality of articles contained in the article passage toward the dispensing port when the article is purchased.

FIG. 13



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an article container for an automatic vending machine of the type which contains a plurality of articles arranged one after the other within an article passage such that an article positioned at the forefront is dispensed from the front side of the article passage when the article is purchased.

2. Description of the Related Art

[0002] The applicant has already proposed article container for an automatic vending machine of this type, for example, in Laid-open Japanese Patent Application No. 10-188107. As illustrated in Fig. 1, the proposed article container 50 comprises a plurality of article racks 51 arranged one above the other. Each of the article racks 51 is designed to be longitudinally movable by rollers 53 or the like and drawn from a vending machine body (not shown) for supplementing articles S or for other purposes.

[0003] Each of the article racks 51 is made of bent steel plates or the like, and is partitioned by a central partition wall 54 to form left and right article passages 52. A transparent open/close plate 55 for opening and closing the two article passages 52 is provided at the front end of the partition wall 54. At the rear end of the article rack 51, a pusher 56 is provided in each article passage 52. The pusher 56 is longitudinally movable and urged in front. Further, a holder 57 is arranged behind the open/close plate 55 of the partition wall 54, while a flapper 58 is arranged continuously with the front end of each of the article passages 52.

[0004] The open/close plate 55 is fixed at the front end of a driving shaft 59 which extends through the partition wall 54 in the longitudinal direction. The driving shaft 59 is linked to a driving mechanism having a motor or the like (both not shown), disposed behind the article rack 51. The holder 57 is designed to be movable in the longitudinal direction for adjustment and project into the article passage 52 with rotation of the driving shaft 59. Also, each of the flappers 58 is linked to the driving shaft 59 through an interlock mechanism (not shown) so that it is normally held horizontally, and is free to pivotally move in a lower front direction when released from the held state with the rotation of the driving shaft 59.

[0005] Articles S are contained one after the other in the respective article passages 52, and sandwiched between the open /close plate 55 in a closed position and the pushers 56 during a purchase waiting state. When an article S is sold, the driving mechanism is first actuated to rotate the driving shaft 59, causing the holder 57 to protrude into the article passage 52 to hold the second article from the front (next sold article) S between the holder 57 and an opposing side wall 52a. Then, further rotation of the driving shaft 59 causes the open/close plate 55 to pivotally move to open one of the article passages 52 and also releases the associated flapper 58 from being held by the interlock mechanism to allow the flapper 58 to freely pivotally move in the lower front direction, thereby dispensing the article S at the forefront (purchased article) S from the article passage 52.

[0006] After this dispensing action, the driving shaft 59 is first driven to rotate in the direction opposite to the foregoing, causing the flapper 58 to return to a horizontally held state by the interlock mechanism, the open/close plate 55 to close the article passage 52, and the holder 57 to retract from the article passage 52. With these movements, the entire articles S are pressed by the pusher 56 to move in front until the first article abuts to the open/close plate 55, thereby proceeding to the next purchase waiting state.

[0007] The article container 50 described above, however, still has room for improvement in the following aspects. In the article container 50, the flappers 58 are pivotably attached at the front end of the article rack 51 in order to dispense a purchased article S from the article passage 52. Also, the interlock mechanism must be provided for driving the flappers 58 in association with rotation of the driving shaft 59. The structure of the article container 50 is therefore complicated and causes an increase in cost. Also, the flappers 58 disposed at the front end of the article rack 51 hinder the operability associated with works for drawing and pressing back the article rack 51. In addition, since the front ends of the article racks 51 made of steel are visible from the outside, the entire appearance of articles displayed in the machine is aesthetically less appealing.

[0008] In addition, when the article container 50 described above contains articles S in an inverse conical cup shape having, for example, a cap or a flange around a mouth, the caps or flanges are likely to interfere with each other between adjacent articles S. Further, the articles S in such a shape have the centroid at a relatively high position, the articles S are susceptible to incline in front by pressing forces of the pushers. Particularly, the next sold article S is more susceptible to forward inclination to catch the purchased article S since the holder 57 for sandwiching the next sold article S during a dispensing action abuts to a lower portion of the next sold article S due to its structural nature.

[0009] Consequently, if such interference occurs between the purchased article S and the next sold article S, the purchased article S may possibly be held in the article passage 52 by the next sold article S even with a dispensing action for the purchased article S relying on natural falling as mentioned above, thereby failing to dispense the sold article S. In addition, the next sold article S, if inclining as mentioned above, would prevent the entire articles S from smoothly moving in

order to proceed to the next purchase waiting sate after the dispensing action as well as damages an aesthetical view of displayed articles.

OBJECT AND SUMMARY OF THE INVENTION

[0010] The present invention has been made to solve the problems as mentioned above, and its object is to provide an article container for an automatic vending machine which is capable of reliably and smoothly dispensing an article in a simple and inexpensive structure as well as improving an aesthetical effect of displaying articles.

[0011] To achieve the above object, an article container for an automatic vending machine comprises a rack body accommodated in a body of the vending machine and formed with an article passage extending in the longitudinal direction for containing a plurality of articles arranged one after the other; an open/close member pivotally movable between an open position for opening a dispensing port at a front end of the article passage and a closed position for closing the dispensing port, and adapted to pivotally move to the open position when an article is purchased; and a pusher disposed to be longitudinally movable along the article passage and to press articles contained in the article passage in front, and is characterized by adapter means attached to a front end of the rack body and responsive to a purchase of an article to feed the purchased article positioned at the forefront within the plurality of articles contained in the article passage toward the dispensing port.

[0012] According to this article container for an automatic vending machine, a plurality of articles are contained within the article passage arranged one after the other, sandwiched between the open/close member remaining at the closed position and the pushers urged in front, in a purchase waiting state. When an article is purchased, the open/close member pivotally moves to the open position to open the dispensing port of the article passage, while the adapter means feeds a purchased article at the forefront toward the dispensing port, thereby dispensing the purchased article from the dispensing port of the article passage. In this way, the article container of the present invention feeds the purchased article toward the dispensing port by the action of the adapter means when the article is purchased, thus ensuring that the purchased article can be smoothly dispensed.

[0013] In this case, the adapter means preferably includes a frame-shaped first adapter attached to the front end of the rack body and having an oblique guide surface inclining in a lower front direction and continuous to the bottom of the article passage.

[0014] According to this article container, since the first adapter guides a purchased article in front along the oblique guide surface inclining in a lower front direction, the purchased article can be reliably and smoothly dispensed.

[0015] In this case, the adapter is preferably formed of plastic integrated molding.

[0016] In this article container, the first adapter, which has a relatively complicated shape due to the oblique guide surface, can be readily manufactured at a low cost. In addition, the first adapter attached to the front end of the rack body is only visible from the outside, and the first adapter is made of a plastic material which gives a softer and better impression than a steel plate or the like, so that the appearance of displayed articles is improved.

[0017] Further in this case, it is preferable that the rack body is adapted to be drawable in front from the body of the vending machine, and the first adapter includes a handle for drawing the rack body.

[0018] According to this article container, the first adapter may be used as a handle which is utilized for drawing and pressing back the article rack from the body of the vending machine, so that the operability of the article rack is improved. In addition, such a handle can be formed simultaneously with the molding of the first adapter.

[0019] The first adapter preferably includes a mounting hole for mounting the open/close member.

[0020] In this article container, the first adapter may be used as a mounting member for mounting the open/close member, and the mounting hole can also be formed simultaneously with the molding of the first adapter.

[0021] The foregoing article container preferably comprises a holder pivotally movable between a protruding position at which the holder protrudes into the article passage and a retracting position at which the holder is retracted from the article passage, wherein the holder pivotally moves to the protruding position, when an article is purchased, to hold a next sold article positioned at the second place from the front within the plurality of articles contained in the article passage, and the adapter means includes a second adapter associated with a pivotal movement of the open/close member to the open position to feed the purchased article toward the dispensing port.

[0022] According to the article container for an automatic vending machine, the holder remains at the retracting position and is retracted from the article passage in a purchase waiting state. When an article is purchased, the holder first pivotally moves to the protruding position to protrude into the article passage for holding the next sold article. Then, the open/close member pivotally moves to the open position to open the dispensing port of the article passage. In association with the opening of the open/close member, the second adapter feeds a purchased article toward the dispensing port, thereby dispensing the purchased article from the article rack. After this dispensing action, the open/close member first pivotally moves to the closed position, and then, the holder pivotally moves to the retracting posi-

tion so that the entire articles are moved in front by a pressing force of the pusher, thus proceeding to the next purchase waiting state. In the foregoing manner, in this article container, the second adapter feeds only the purchased article toward the dispensing port in association with the opening of the open/close member upon purchase of the article, so that even if cup-shaped articles, for example, are contained in the article container, and the purchased article is caught by the next sold article due to a cap or the like, the purchased article can be forcibly separated from the next sold article held by the holder, thus ensuring that the purchased article can be dispensed.

[0023] Preferably, in this case, the rack body includes right and left side walls and a partition wall disposed in a central portion between the side walls, the article passage is partitioned into right and left article passages defined by the side walls and the partition wall, and the holder includes right and left holders pivotably attached to the partition wall. Also, the second adapter preferably includes a base having a supporting shaft and attached to a front end of a top surface of the partition wall; right and left arms each attached to the supporting shaft of the base for pivotal movements about a vertical axis, and having a stopper in front of the supporting shaft and a feeder behind the supporting shaft; and a spring for urging the stoppers of the right and left arms in a direction in which the stoppers approach to each other. Also preferably, the stoppers of the right and left arms are outstretched against a spring force of the spring and engaged with the open/close member when the open/close member remains in the closed position, and the feeders are shaped such that they are retracted from the article passages when the stoppers are outstretched, and protrude into the article passages when the stoppers are closed to feed the purchased article toward the dispensing port.

[0024] In this article container, the article passage is partitioned into two lines on right and left sides, two holders are provided for the right and left article passages, and the second adapter is attached to the top surface of the partition wall which partitions the article passage. In a purchase waiting state, a pair of the stoppers of the second adapter are outstretched against the spring force of the spring, and engaged with the open/close member maintained in the closed positions. In addition, a pair of the feeders of the second adapter are retracted from the article passages. When an article is purchased, the open/close member pivotally moves to the open position to release the stoppage of the second adapter, narrowing the spacing between the stoppers by a spring force of the spring. This causes the feeders to protrude into the associated article passages, and feed a purchased article toward the dispensing port by a spring force of the spring. In this way, the purchased article is forcibly separated from the next sold article, thereby making it possible to reliably dispense the purchased article. Furthermore, since the second adapter is actuated utilizing the opening action of the open/close member, the purchased article can be reliably fed by the second adapter in association with the opening action of the open/close member. Since the second adapter can be driven only with a spring force of a spring, it can be relatively simply fabricated.

[0025] Preferably, in this case, the feeder of the second adapter feeds the purchased article toward the dispensing port, and the feeder has such a shape that abuts to the next sold article from the front.

[0026] In this article container, the feeder of the second adapter not only feeds a purchased article toward the dispensing port but also abuts to the next sold article already held by the holder from the front. In this event, since the adapter is disposed on the top surface of the partition wall, the feeder abuts to the next sold article at a position higher than the holder. Therefore, even if the next sold article is held in a forwardly inclined state due to a pressing force of the pusher, the next sold article can be adjusted to its proper posture by the feeder of the second adapter abutting to an upper portion of the next sold article from the front. As a result, it is possible to smoothly move the entire articles after the dispensing actions for proceeding to the next purchase waiting state and to improve the appearance of displayed articles.

[0027] Preferably, in the cases mentioned above, the second adapter is removably attached to the partition wall.

[0028] In this article container, since the second adapter is removable, the article passage can be switched for containing cup-shaped articles and for containing articles of another shape.

[0029] Preferably, in this case, the second adapter comprises a push lock button disposed on the base and made of an elastic material, and the partition wall is formed through the top surface thereof with a mounting hole for removably inserting the push lock button.

[0030] According to this article container, the structure for attaching and removing the adapter is simple, and the adapter can be readily attached only by inserting the push lock button into the mounting hole.

[0031] Preferably, in the cases mentioned above, the article container further comprises a third adapter removably attached to the side wall of the rack body, wherein the third adapter includes a curved guide surface which is curved outwardly at the front end of the side wall to guide the purchased article toward the dispensing port.

[0032] In this article container, when the second adapter feeds a purchased article, the purchased article is guided toward the dispensing port of the article passage by the curved guide surface which is curved outwardly of the third adapter such that the purchased article escapes outwardly. It is therefore possible to smoothly dispense the purchased article from the dispensing port without sandwiching it between the feeder and the side wall of the article passage.

[0033] Preferably, in this case, the third adapter further includes an oblique guide surface extending in the longitudinal direction along the side wall, and inclined at a predetermined angle toward the inside of the article passage.

[0034] In this article container, when cup-shaped articles are contained, the angle of the oblique guide surface of the third adapter can be determined to be coincident with an inclining angle of the side surface of the cup-shaped article to more smoothly move the contained articles for proceeding to the next purchase waiting state.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035]

Fig. 1 is a perspective view of an article container which has been proposed by the Applicant;
Fig. 2 is a front view of an automatic vending machine equipped with an article container according to an embodiment of the present invention;
Fig. 3 is a front view of the automatic vending machine illustrated in Fig. 2 when its door is open;
Fig. 4 is a side sectional view of the automatic vending machine illustrated in Fig. 2;
Fig. 5 is a perspective view of the automatic vending machine when one of article racks is drawn;
Fig. 6 is an enlarged front view of a portion A indicted by the arrow A in Fig. 3;
Fig. 7 is a partially exploded perspective view illustrating an article rack and a dispensing mechanism;
Fig. 8 is a partially exploded perspective view illustrating the article rack, a shelf and the dispensing mechanism;
Fig. 9 is a perspective view illustrating the dispensing mechanism in a purchase waiting state;
Fig. 10 is a perspective view illustrating the action of the dispensing mechanism when an article is purchased;
Fig. 11 is a perspective view illustrating the action of the dispensing mechanism when an article is dispensed from the opposite article passage to that of Fig. 10;
Fig. 12 is a perspective view illustrating the article container before a second adapter and a third adapter are attached thereto;
Fig. 13 is a partial perspective view illustrating a front portion of the article container of Fig. 12 after the second adapter and the third adapter have been assembled;
Fig. 14 is a plan view illustrating the structure and action of the second adapter;
Fig. 15 is a front view of the second adapter;
Fig. 16 is a perspective view illustrating the article container of Fig. 13 with cup-shaped articles contained therein;
Fig. 17 is a front view of the article container illustrated in Fig. 16;
Fig. 18 is a plan view of the article container illustrated in Fig. 16;
Fig. 19 is a plan view of the article container when an article is purchased; and
Fig. 20 is a lateral view of the article container when an article is purchased.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] An article container for an automatic vending machine, to which the present invention is applied, will hereinafter be described with reference to the accompanying drawings. As illustrated in Figs. 2 to 4, an automatic vending machine 2 is of a so-called see-through type which allows potential purchasers to externally view articles, actually sold thereby, such as canned beverages, packed beverages and so on. The automatic vending machine 2 comprises a vending machine body 3 which accommodates an article container 1 according to the present invention, a main door 4 attached on the front of the vending machine body 3, and a transparent heat-insulating door 5 positioned between the vending machine body 3 and the main door 4.

[0037] As illustrated in Figs. 3 and 4, the vending machine body 3 is provided therein with a plurality of article racks 10 which form part of the article container 1. In this embodiment, a total of 24 article racks 10 are provided in such a configuration that they are arranged in eight vertical stages and three horizontal columns, wherein the same kind of articles S are contained in each of the article racks 10.

[0038] The main door 4 is provided on the front surface thereof with a money insertion slot section 4a, a plurality of article selecting buttons 4b, an article pickup port 4c, and a front window 4d constituting an article display. The article selecting buttons 4b are equal in number to the article racks 10, and arranged in the same matrix arrangement as the article racks 10. A purchaser may select an article S at the time of purchase by entering an appropriate amount of money through the money insertion slot section 4a, and pushing an article selecting button 4b corresponding to an article rack 10 which contains the article S to be purchased. The vending machine body 3 is additionally provided with an elevator 6 in an internal space in front of the article rack 10. An article S dispensed from an article rack 10, when sold, is carried on a carrier plate 6a of the elevator 6, transported to the vicinity of a shutter 3a disposed on the bottom by a lowering action of the elevator 6, and finally delivered to the article pickup port 4c through the shutter 3a.

[0039] As illustrated in Figs. 7 and 8, each of the article racks 10 includes a rack body 11 and a first adapter 12 attached to the front end of the rack body 11. The rack body 11 is made of a bent still plate having right and left side walls 11a and provided with a partition

wall 13 in an inner central portion thereof. Right and left article passages 14 are formed by these side walls 11a and the partition wall 13. An open front end of the first adapter 12 forms a dispensing port 14a for each of the article passages 14.

[0040] The adapter 12, in turn, is formed of integral molding made of synthetic resin (for example, polypropylene) in a frame shape, fitted in the front end of the rack body 11, and fixed by screws. In a front end portion of the adapter 12, oblique guide surfaces 12b are formed on both sides of a central horizontal surface 12a. Each of the oblique guide surfaces 12b is inclined in a lower front direction and continuous to the bottom of the associated article passage 14. Each of the oblique guide surface 12b is formed with a plurality of elongated grooves 12c extending in the longitudinal direction. The front end of the oblique guide surface 12b protrudes in a jaw shape to serve as a handle 12d for the article rack 10. The horizontal surface 12a of the adapter 12 is formed with mounting holes 12e for mounting right and left open/close plates 18, later described, respectively.

[0041] The article rack 10 constructed as described above is longitudinally movably carried on a shelf 15 (Fig. 8) disposed in the vending machine body 3 through rollers 16 and so on. The article rack 10 is normally retracted in the vending machine body 3 as illustrated in Fig. 6 or the like, and is drawn in front from the vending machine body 3 for supplementing articles S or for other occasions as illustrated in Fig. 5.

[0042] The article dispensing apparatus 1 is further provided with a dispensing mechanism 17 for dispensing an article S when it is purchased. As illustrated in Figs. 7 and 8, the dispensing mechanism 17 comprises right and left open/close plates (open /close members) for opening and closing dispensing ports 14a at the front ends of the two article passages 14; springs (not shown) for urging the open/close plates 18; a stopper plate 19 for stopping and releasing the two open/close plates 18; right and left holders 20 for holding the second article (next sold article) S from the forefront when the first article S is being purchased; a stopper plate driving mechanism 21 for driving the stopper plate 19; and so on.

[0043] Each of the open/close plates 18 is made of transparent synthetic resin (for example, polycarbonate), and formed with a concentric notch 22 in a semi-arc shape in a lower inside thereof as well as a semi-arcuate protrusion 23 along the notch 22 on the front surface thereof, as illustrated in Fig. 9. Also, pivots 18a are formed beyond upper and lower ends of the inner edge of each of the open/close plates 18 (see Fig. 11 or the like). The upper pivot 18a is fitted in a mounting hole (not shown) of the partition wall 13, while the lower pivot 18a is fitted in a mounting hole 12e of the first adapter 12 of the article rack 10. With this structure, the open/close plate 18 is pivotably supported in a central portion of the article rack 10 about the vertical axis so that it is pivotally movable between a closed position for closing the dispensing port 14a of the article passage 14 and an open position for opening the same. Also, each of the open/close plates 18 is normally urged by the aforementioned spring toward the open position (in the direction indicated by the arrow B in Fig. 9).

[0044] The stopper plate 19, which in turn is formed of a circular plate made of opaque synthetic resin (for example, polyacetal), has the lower end fixed to the distal end of the driving shaft 24. The driving shaft 24 is disposed at a position concentric with the semi-arcuate protrusion 23 of the open/close plate 18, and extends through the partition wall 13 and the notch 22 of the open/close plate 18 in the longitudinal direction (see Fig. 9). Also, the driving shaft 24, which forms part of the stopper plate driving mechanism 21, has its rear end linked to a decelerating gear 25 of the stopper plate driving mechanism 21, so that it is driven by an actuated motor 26 for rotation upon selling an article (see Fig. 8).

[0045] Each of the right and left holders 20, which is positioned behind the associated open/close plate 18, is pivotably supported by the partition wall 13. When the driving shaft 24 is rotated, the two holders 20 pivotally move at the same time by a cam 27 (see Fig. 10) integrally formed with the driving shaft 24 to protrude into the associated article passages 14, thus sandwiching the next sold articles S with the side walls 11a opposing to the partition wall 13. Each of the holders is adjustable in the longitudinal direction by manipulating a lever 28 so that it can be set at an appropriate position.

[0046] As illustrated in Fig. 6, the article container 1 further includes two pushers 29 on right and left sides for pressing articles S in the respective article passages 14 in front; and guide rails 30 for guiding the pushers 29. Each of the pushers 29 is constructed of a block-like pusher body 29a; a pair of front and rear rollers 29b attached to an upper portion of a side surface of the pusher body 29a and formed with a U-shaped groove (a front-side one only is illustrated); and an auxiliary roller 29c attached below the front and rear rollers 29b. Also, the pusher 29 is normally urged in front by an extension spring (not shown).

[0047] The guide rail 30 in turn is formed, for example, of aluminum extrusion molding, and is attached to a central portion of a shelf 15, which carries the upper article rack 10, so as to protrude downwardly and extend in the longitudinal direction. The guide rail 30 is formed on both sides thereof with guide protrusions 30a extending in the vertical direction. The rollers 29b of the pushers 29 engage with the guide protrusions 30a, so that the pushers 29 are smoothly moved in the longitudinal direction along the guide rail 30.

[0048] Next, the operation of the article container 1 constructed as described above will be described with reference to Figs. 9 to 11. In a purchase waiting state illustrated in Fig. 9, the stopper plate 19 is held in a stop position, which is its home position, by the stopper plate driving mechanism 21, and abuts to the right and left open/close plates 18 from the front side to maintain

them at their closed positions. The respective holders 20 in turn remain at their retracting positions and are retracted from the associated article passages 14. In this state, a large number of articles S are contained in the respective article passages 14 arranged one after the other, and sandwiched between the closed open/close plates 18 in the closed positions and the pushers 29.

[0049] When an article S is dispensed from the left-hand article passage 14, the rotating shaft 24 is rotated in the direction indicated by the arrow C in Fig. 10 by the actuation of the motor 26 of the stopper plate driving mechanism 21. The rotation of the driving shaft 24 first causes the cam 27 to drive the two holders 20 which pivotally move simultaneously to their protruding positions to protrude into the respective article passages 14 associated therewith to sandwich the next sold articles S2 together with the opposing side walls 11a. As the driving shaft 24 is further rotated to cause the stopper plate 19 to pivotally move to a predetermined angular position, the stopper plate 19 come off the left-hand open/close plate 18, so that the open/close plate 18 is released. In this event, the notch 22 of the open /close plate 18 functions as a recess for avoiding interference with the stopper plate 19. The released open/close plate 18 is forced to pivotally move to the open position by an urging force of a spring, not shown, to open the dispensing port 14a of the left-hand article passage 14, thus dispensing the article S at the forefront (purchased article) from the article passage 14.

[0050] In this event, the article S inclines in front while guided by the oblique guide surface 12b of the first adapter 12 of the article rack 10. In addition, the elongated grooves 12c in the oblique guide surface 12b reduce friction resistance between the article S and the oblique guide surface 12b. It is therefore possible to smoothly dispense the article S.

[0051] Subsequently, the motor 26 is actuated at predetermined timing to rotate over the same angular distance in the opposite direction, causing the stopper plate 19 to pivotally move again to the stop position illustrated in Fig. 9. The open/close plate 18 is pressed by the pivotally moving stopper plate 19 to return to the closed position against the urging force of the spring. Next, with the holders 20 retracted from the article passages 14, the entire articles S are pressed by the pushers 29 to move in front until the forefront articles S abut to the open/close plate 18, whereby the article container 1 proceeds to the next purchase waiting state. Also, as illustrated in Fig. 11, an article S can be dispensed from the right-hand article passage 14 by rotating the driving shaft 24 in the direction opposite to that indicated in Fig. 10 (the direction indicated by the arrow D in Fig. 11).

[0052] As described above, the article container 1 of this embodiment can smoothly dispense a purchased article S by guiding the article S in front along the oblique guide surface 12b of the first adapter 12 attached to the rack body 11. Thus, flappers and an interlock mechanism, required in the conventional article container 100 illustrated in Fig. 1, are eliminated. Also, since the first adapter 12 itself is formed of plastic integrated molding, so that the above effect can be provided in a very simple and inexpensive structure. Further, the handle 12d integrally formed with the first adapter 12 allows the article rack 10 to be readily drawn and pressed back, thus improving the operability of the article container 1. Furthermore, since the first adapter 12, visible from the outside, is made of plastic, the appearance of the entire vending machine becomes more aesthetically appealing.

[0053] When cup-shaped articles S (see Fig. 16 or the like) are to be contained in the article passages 14 as illustrated in Figs. 12 and 13, the article rack 10 is further provided with a second adapter 31 and a third adapter 32.

[0054] As illustrated in Figs. 14 and 15, the second adapter 31 is attached to the front end of the top surface of the partition wall 13, and comprises a base 33 of an inverted C shape in cross-section; right and left arms 35 attached to supporting shafts 34 perpendicularly projecting from the base 33, for pivotal movements about the vertical axes; and a push lock button 36 disposed on the base 33. Each of the arms 35 includes a stopper 35a in front of the supporting shaft 34 and a feeder 35b behind the supporting shaft 34.

[0055] Each of the feeders 35b has an inwardly curved shape, and is formed in a distal end portion with a notch 35c which can overlap with the counterpart of the other feeder 35b. Each of the stoppers 35a in turn is linearly shaped, and normally urged toward the inside by a coil spring 37 (spring) disposed between them. The push button 36, which is made, for example, of resin having elasticity, is disposed to vertically extend through the base 33 and protrude therefrom.

[0056] As illustrated in Figs. 13 - 15, the second adapter 31 having the structure described above is removably attached to the partition wall 13 by fitting the base 33 into the top surface of the partition wall 13 and inserting the push lock button 36 into a mounting hole 13a formed in the top surface of the partition wall 13. When the second adapter 31 is attached, the stoppers 35a of the arms 35, outstretched against the spring force of the coil spring 37, are engaged with the associated open/close plates 18 at the closed positions. In this state, the feeder 35b of the arm 35 is folded near the push lock button 36, and retraced from the article passages 14, as indicated by two-dot chain lines in Fig. 14.

[0057] The third adapter 32, which may be made of a bent steel plate or the like, is removably attached to each side wall 11a by engaging protrusions 32a engaged with engaging grooves 11b formed in the top surface of the side wall 11a of the article passage 14, as illustrated in Fig. 12 or the like. The third adapter 32 is formed with an oblique guide surface 32b and a curved guide surface 32c. The oblique guide surface 32b, which is provided for guiding the entire articles S in the

longitudinal direction, is inclined toward the inside of the article passage 14 at an angle coincident with an inclining angle of side surfaces of cup-shaped articles S contained in the article passage 14, as illustrated in Fig. 17. The curved guide surface 32c, which in turn is provided for guiding a purchased article S, is positioned at a front end portion of the side wall 11a and extends outwardly in an arc shape, as illustrated in Fig. 17.

[0058] Next, the operation of the article container 1 having the structure described above will be described with reference to Figs. 16 to 20 particularly for the case where cup-shaped articles S are contained therein. In a purchase waiting state illustrated in Figs. 16 to 18, the stopper plate 19 is held at the stop position to stop the right and left open/close plates 18 at their respective closed positions, and the holders 20 are retracted from the article passages 14, as described above. The second adapter 31 in turn has the stoppers 35a of the arms 35 outstretched against the spring force of the coil spring 37 and engaged with the back surfaces of the respective open/close plates 18, and the feeders 35b retracted from the associated article passages 14.

[0059] When an article S is sold, rotation of the driving shaft 24 of the stopper plate driving mechanism 21 causes the holders 20 to pivotally move to their respective protruding positions, while the open/close plate 18 is disengaged from stoppage by the stopper plate 19 and released, as described above. As illustrated in Fig. 19, the released open/close plate 18 causes the stoppers 35a of the arms 35 of the second adapter 31 to come off the open/close plate 18 and the feeders 35b to protrude into the associated article passages 14 by the spring force of the coil spring 37 to forcibly feed a purchased article S1 toward the dispensing port 14a, thus dispensing the purchased article S1 from the article passage 14.

[0060] According to the article container 1 of this embodiment as described above, the feeder 35b of the arm 35 of the second adapter 31 only feeds the purchased article S1 toward the dispensing port 14a in association with the opening of the open /close plate 18, so that even if cup-shaped articles S are contained in the article container 1, a purchased article S1 can be reliably dispensed therefrom. Specifically, even if the purchased article S1 is caught by the next sold article S2 due to their caps or the like, the purchased article S1 can be forcibly separated from the next sold article S2 held by the holder 20. It is therefore possible to reliably dispense the purchased article S1. Also, since the arms 35 of the second adapter 31 are actuated utilizing an opening action of the open/close plate 18, the feeding action of the second adapter 31 can be reliably associated with the opening action of the open/close plate 18. In addition, the second adapter 31 can be driven only by the spring force of the coil spring 37, so that it can be implemented in a relatively simple manner. Furthermore, when the purchased article S1 is fed by the second adapter 31, the purchased article S1 is guided toward the dispensing port 14a of the article passage 14 along the curved guide surface 32c, which is curved outwardly of the third adapter 32, such that the purchased article S1 escapes outwardly, so that the purchased article S1 can be smoothly dispensed without sandwiching the purchased article S1 between the feeder 35b of the second adapter 31 and the side wall 11a of the article passage 14.

[0061] When each of the arms 35 has pivotally moved to protrude into the associated article passage 14, the distal end of the feeder 35b abuts to the next sold article S already held by the holder 20 from the front, as illustrated in Figs. 19 and 20. In this event, the feeder 35b abuts to the next sold article S2 at a position higher than the holder 20, as illustrated in Fig. 20. Therefore, even if the next sold article S2 is inclined in front due to a pressing force of the pusher 29, the next sold article S2 can be adjusted to its proper posture by the feeder 35b abutting to an upper portion of the next sold article S2 from the front.

[0062] Subsequently, when the driving shaft 24 is rotated in the opposite direction to cause the stopper plate 19 to press the open/close plate 18 to the closed position, the stoppers 35a of the second adapter 31 are outstretched by the open/close plate 18 against a spring force of the coil spring 37 so that the arms 35 pivotally move to the positions illustrated in Fig. 18 to retract the feeders 35b from the associated article passages 14. Also, with the pivotal movements of the holders 20 to the retracting positions, the entire articles S are moved in front by pressing forces of the pushers 29, consequently bringing the article container 1 to the purchase waiting state illustrated in Fig. 18. In this event, as described above, since the so far next sold articles S2 have been adjusted in proper posture by the feeders 35b of the second adapter 31, and also since the side surfaces of the cup-shaped articles S are guided along the oblique guide surfaces 32b of the third adapters 32, it is possible to smoothly move the articles for proceeding to the purchase waiting state as well as to provide a good appearance of the displayed articles.

[0063] In addition, the second adapter 31 can be relatively simply fabricated at a low cost, and can be readily mounted only by inserting the push lock button 36 into the mounting hole 13a of the partition wall 13, so that the article passages 14 can be readily switched for containing cup-shaped articles and for containing articles of another shape.

[0064] It is understood that the present invention is not limited to the specific embodiments described above, and may be implemented in a variety of aspects. For example, while in the foregoing embodiment, the article rack is formed with two article passages on right and left sides, each of which is provided with an open/close plate, the present invention is applicable irrespective of the number of article passages or the configuration of the open/close plate. Further, the second adapter for forcibly feeding out a purchased article

is not limited to that illustrated in the embodiment, but may be arbitrarily constructed. Otherwise, details on the structure may be modified as appropriate without departing from the scope and spirit of the present invention.

[0065] As will be appreciated from the foregoing description, the article container for an automatic vending machine according to the present invention is advantageous in that an article can be reliably and smoothly dispensed in a simple and inexpensive structure, and that the appearance of displayed articles can be improved.

Claims

1. An article container for an automatic vending machine comprising:

a rack body accommodated in a body of the vending machine, said rack body formed with an article passage extending in the longitudinal direction for containing a plurality of articles arranged one after the other;
an open/close member pivotally movable between an open position for opening a dispensing port at a front end of said article passage and a closed position for closing said dispensing port, said open/close member adapted to pivotally move to said open position when an article is purchased; and
a pusher disposed to be longitudinally movable along said article passage and to press articles contained in said article passage in front,
said article container characterized by:
adapter means attached to a front end of said rack body and responsive to a purchase of an article to feed the purchased article positioned at the forefront within said plurality of articles contained in said article passage toward said dispensing port.

2. An article container for an automatic vending machine according to claim 1, characterized in that:

said adapter means includes a frame-shaped first adapter attached to the front end of said rack body, said first adapter having an oblique guide surface inclining in a lower front direction and continuous to the bottom of said article passage.

3. An article container for an automatic vending machine according to claim 2, characterized in that said first adapter is formed of plastic integrated molding.

4. An article container for an automatic vending machine according to claim 3, characterized in that said rack body is adapted to be drawable in front from the body of said vending machine, and said first adapter includes a handle for drawing said rack body.

5. An article container for an automatic vending machine according to claim 3 or 4, characterized in that said first adapter includes a mounting hole for mounting said open/close member.

6. An article container for an automatic vending machine according to claim 1, characterized in that:

said article container further comprises a holder pivotally movable between a protruding position at which said holder protrudes into said article passage and a retracting position at which said holder is retracted from said article passage, said holder pivotally moving to said protruding position, when an article is purchased, to hold a next sold article positioned at the second place from the forefront within said plurality of articles contained in said article passage; and
said adapter means includes a second adapter associated with a pivotal movement of said open/close member to said open position to feed said purchased article toward said dispensing port.

7. An article container for an automatic vending machine according to claim 6, characterized in that:

said rack body includes right and left side walls and a partition wall disposed in a central portion between said side walls, said article passage is partitioned into right and left article passages defined by said side walls and said partition wall, and said holder includes right and left holders pivotably attached to said partition wall;
said second adapter includes:

a base having a supporting shaft and attached to a front end of a top surface of said partition wall;
right and left arms each attached to said supporting shaft of said base for pivotal movements about a vertical axis, each of said arms having a stopper in front of said supporting shaft and a feeder behind said supporting shaft; and
a spring for urging said stoppers of said right and left arms in a direction in which said stoppers approach to each other,
wherein said stoppers of said right and left arms are outstretched against a spring force of said spring and engaged with said open/close

member when said open/close member remains in said closed position; and

said feeders are shaped such that said feeders are retracted from said article passages when said stoppers are outstretched, and protrude into said article passages when said stoppers are closed to feed said purchased article toward said dispensing port.

8. An article container for an automatic vending machine according to claim 7, characterized in that said feeder of said second adapter feeds said purchased article toward said dispensing port, and said feeder has such a shape that abuts to said next sold article from the front.

9. An article container for an automatic vending machine according to claim 7 or 8, characterized in that said second adapter is removably attached to said partition wall.

10. An article container for an automatic vending machine according to claim 9, wherein said second adapter comprises a push lock button disposed on said base and made of an elastic material, and said partition wall is formed through the top surface thereof with a mounting hole for removably inserting said push lock button.

11. An article container for an automatic vending machine according to any of claims 7 to 10, characterized in that said article container further comprises a third adapter removably attached to said side wall of said rack body, said third adapter including a curved guide surface which is curved outwardly at the front end of said side wall to guide said purchased article toward said dispensing port.

12. An article container for an automatic vending machine according to claim 11, characterized in that said third adapter further includes an oblique guide surface extending in the longitudinal direction along said side wall, and inclined at a predetermined angle toward the inside of said article passage.

FIG. 1

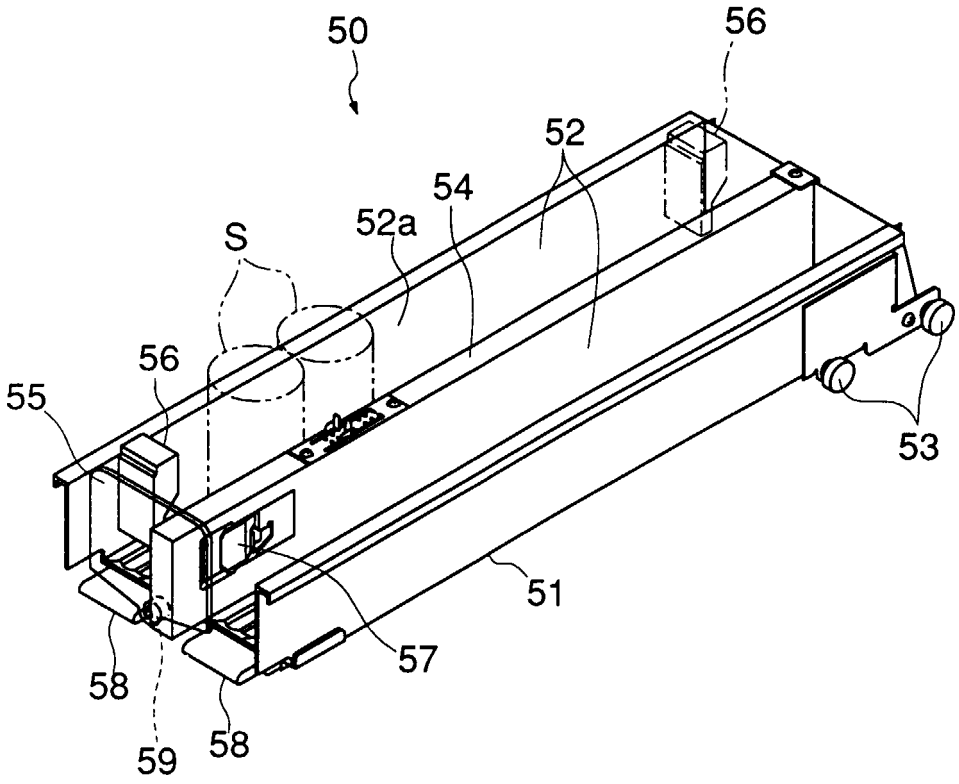


FIG. 2

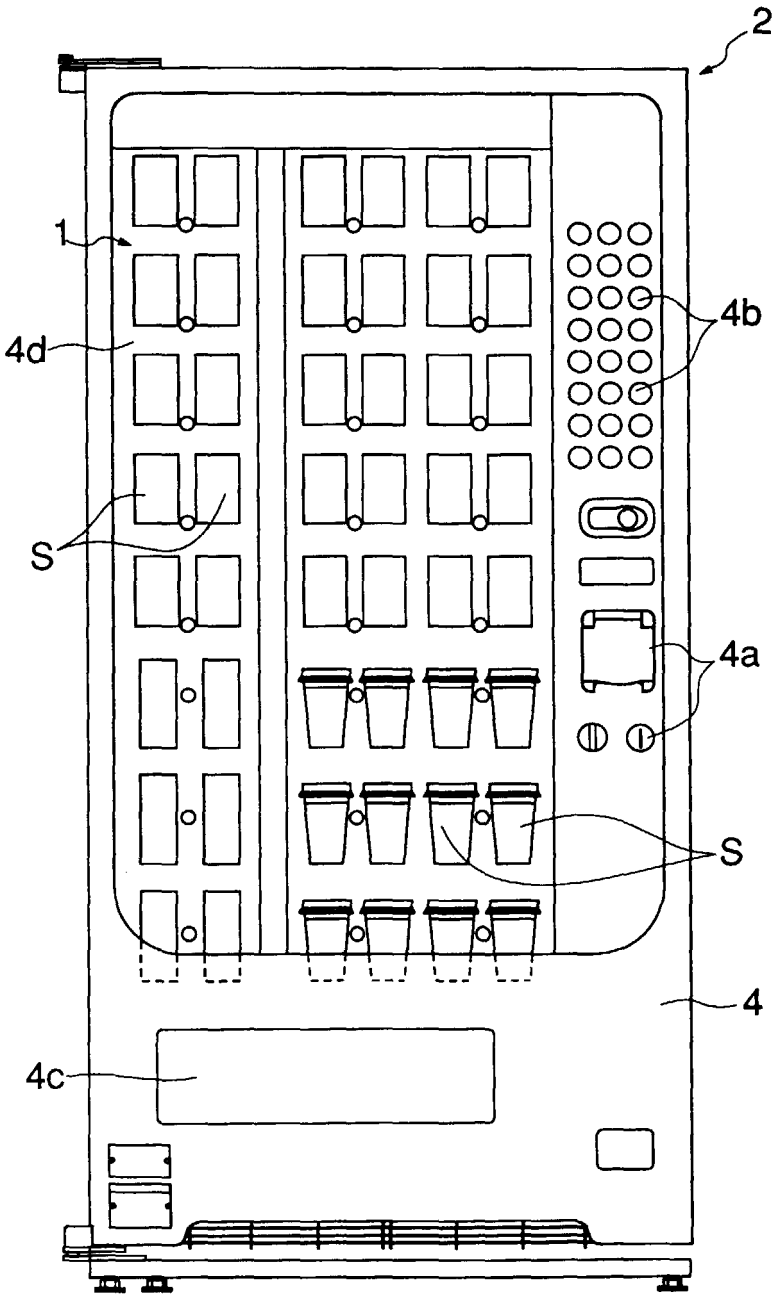
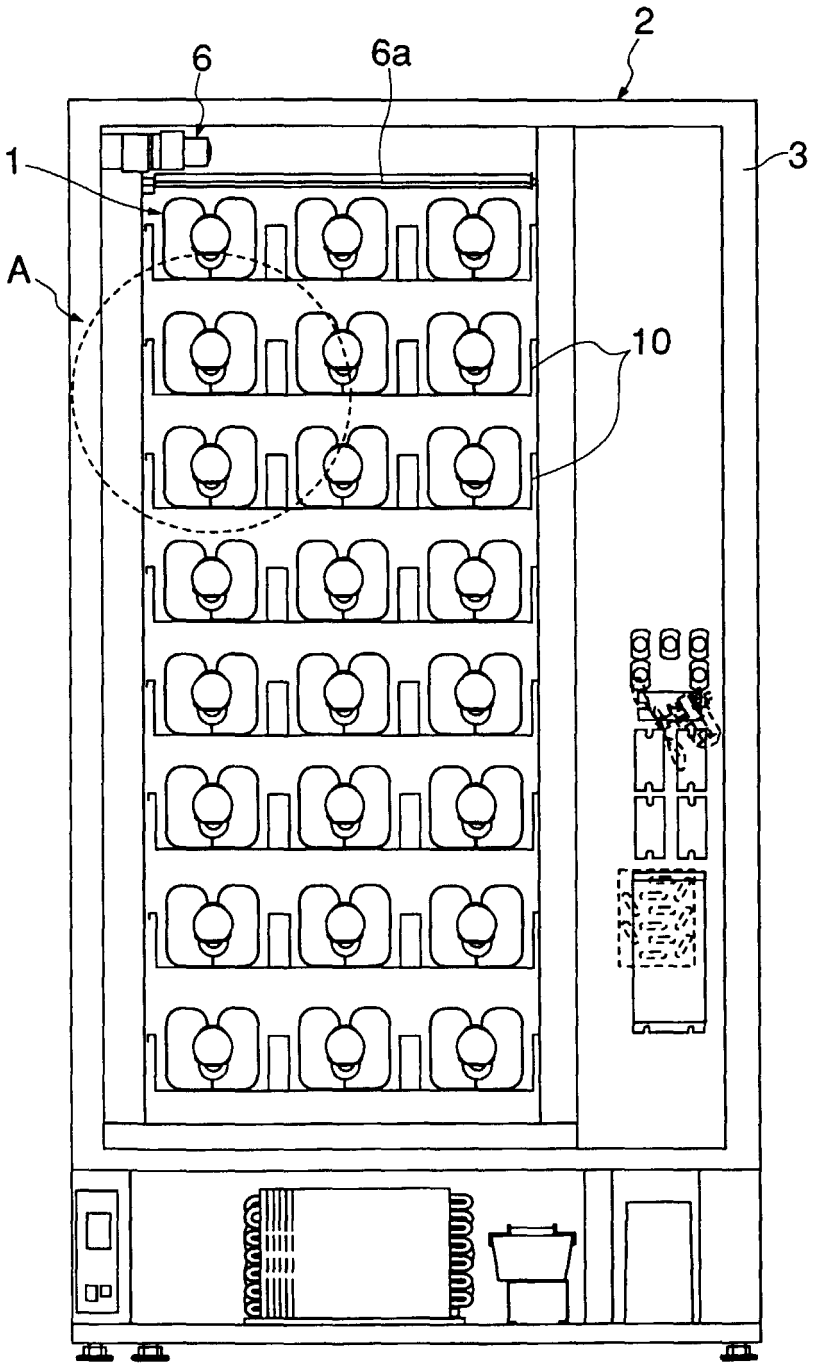


FIG. 3



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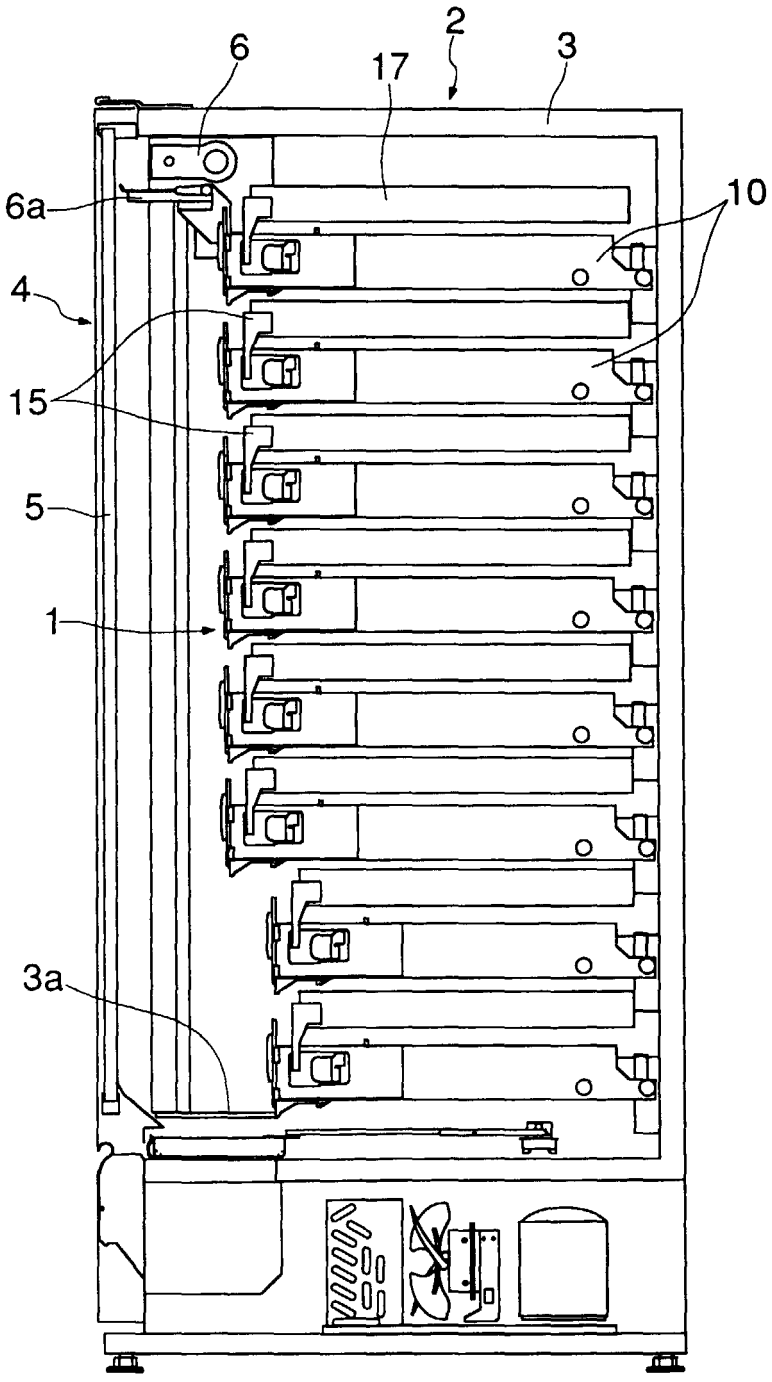

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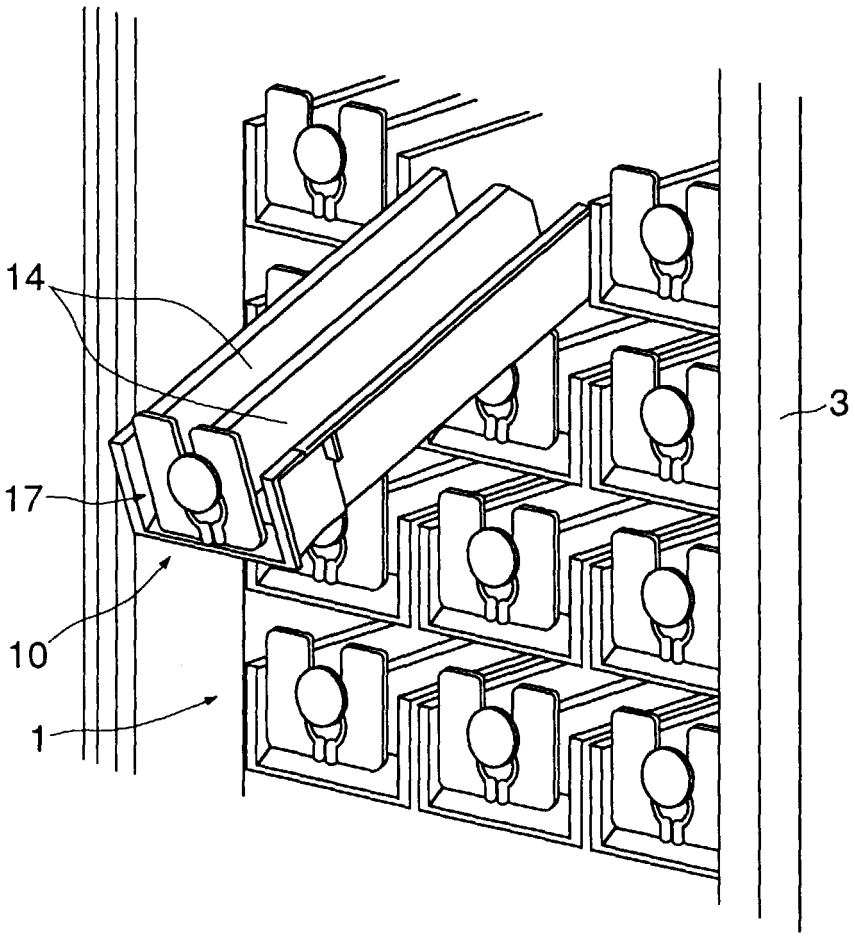


FIG. 6

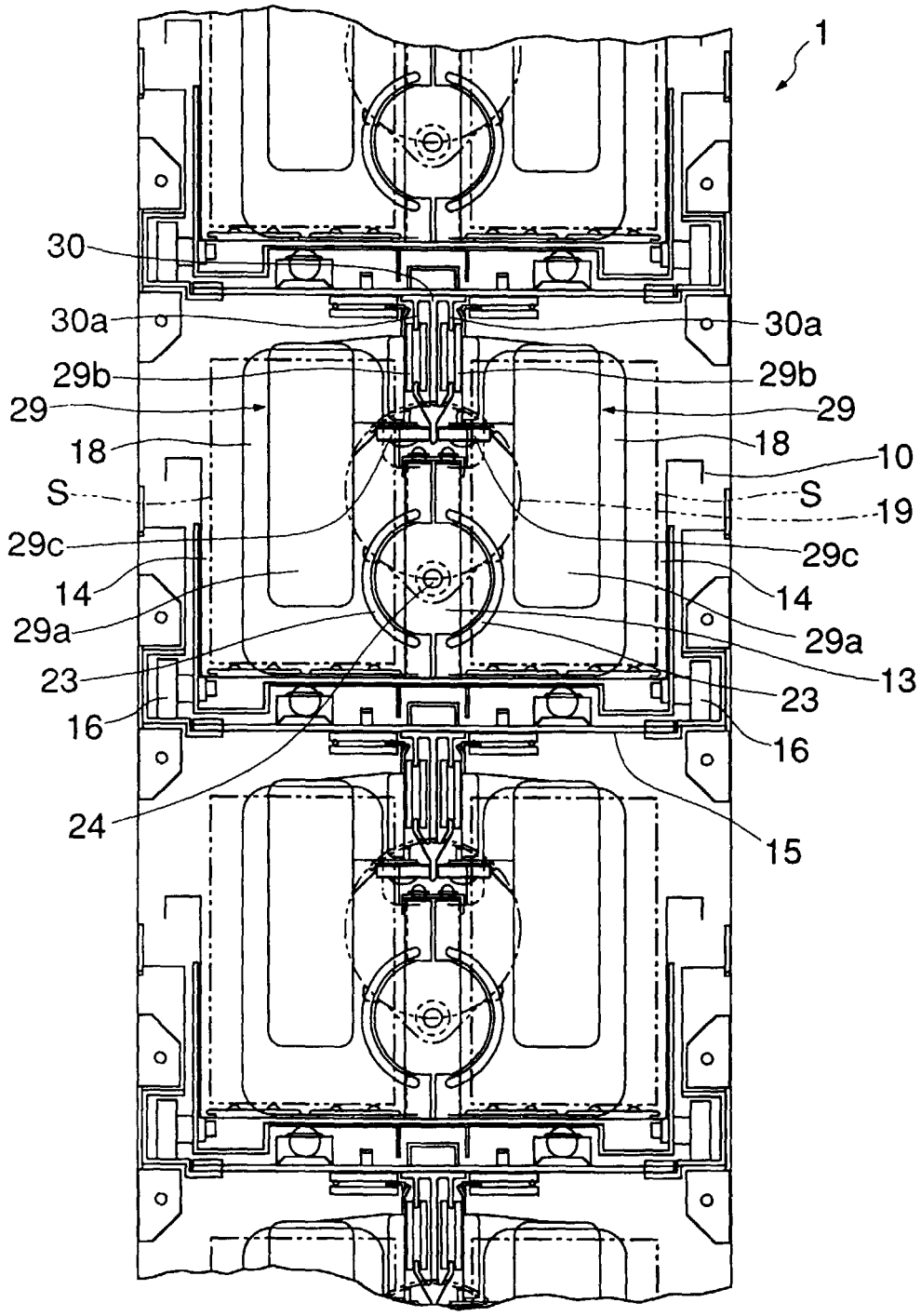
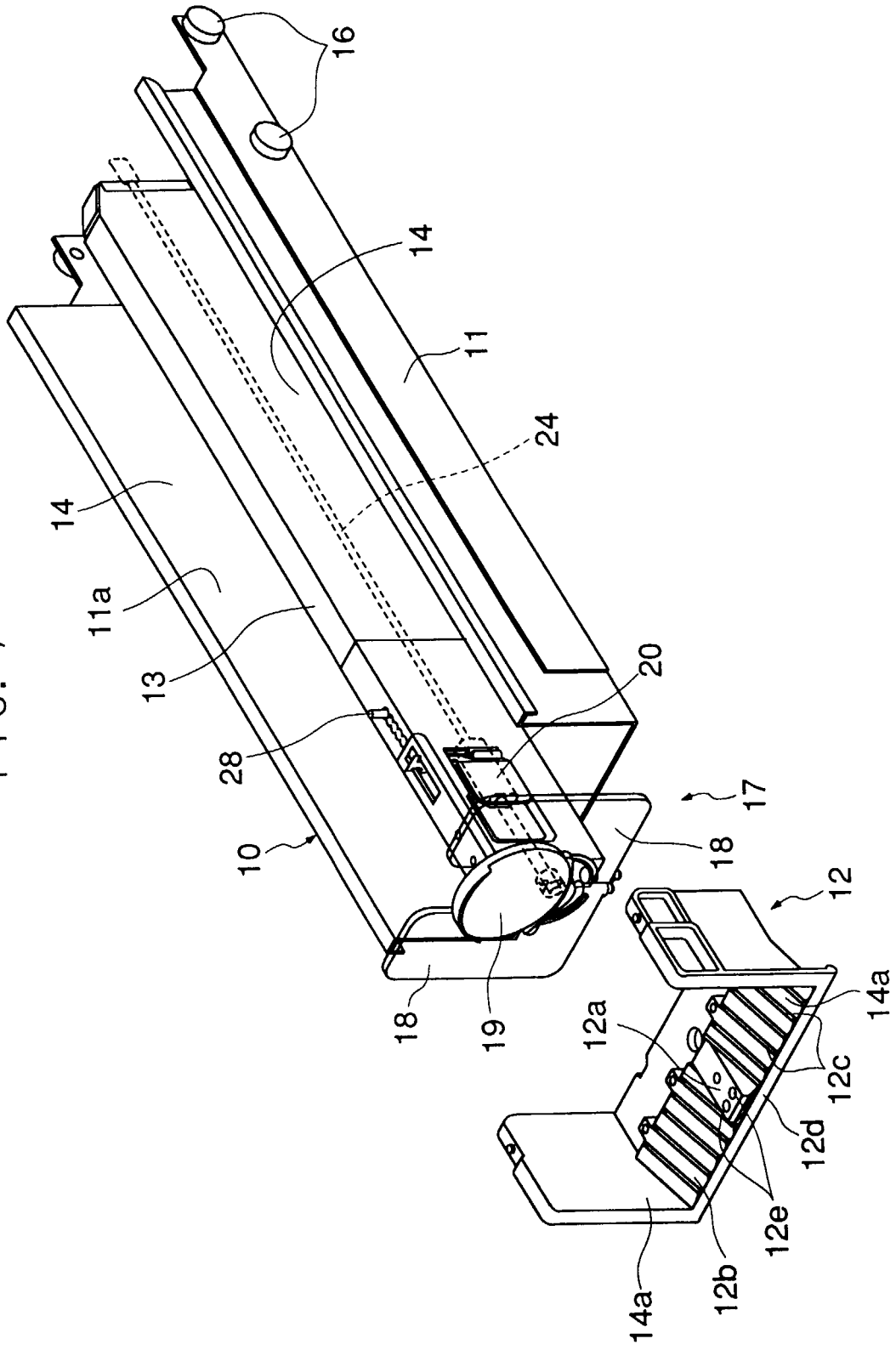


FIG. 7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14a
12b

FIG. 8

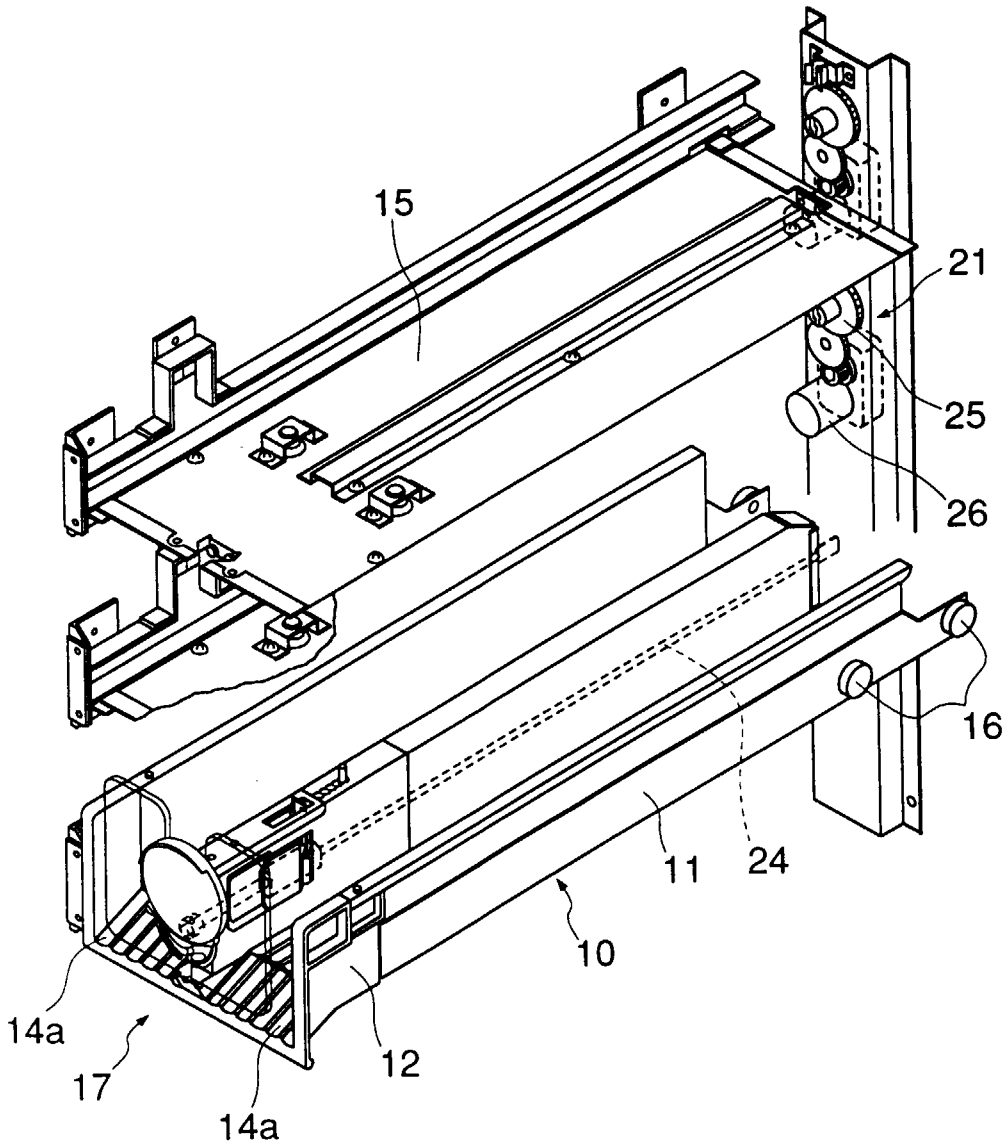


FIG. 9

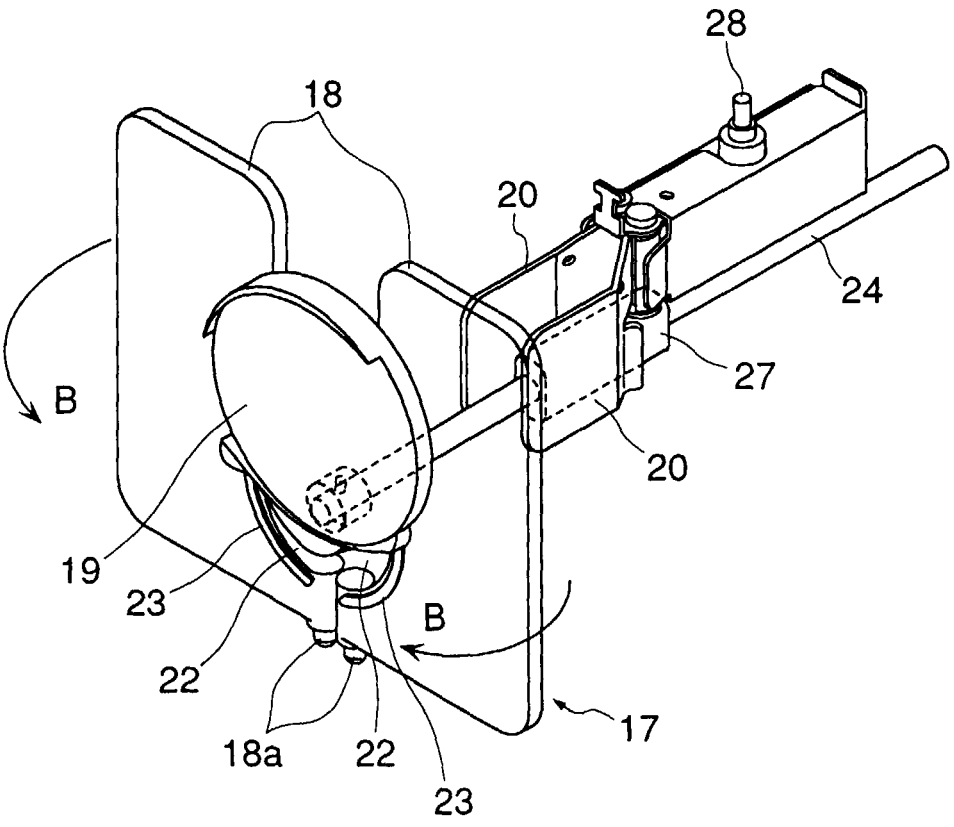


FIG. 10

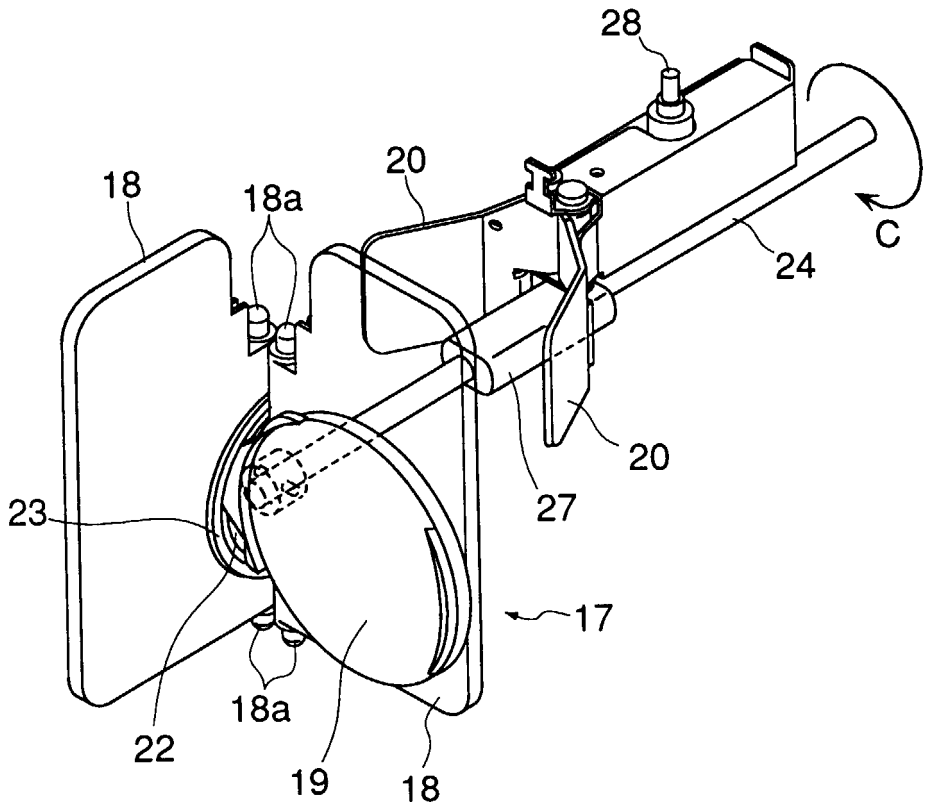


FIG. 11

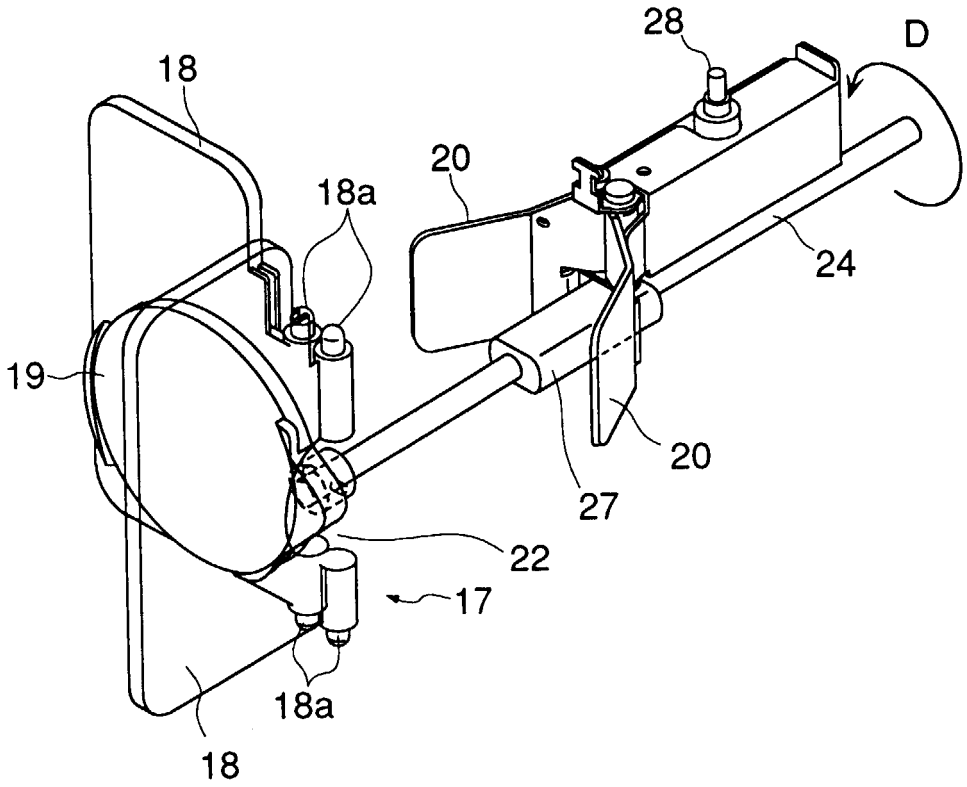
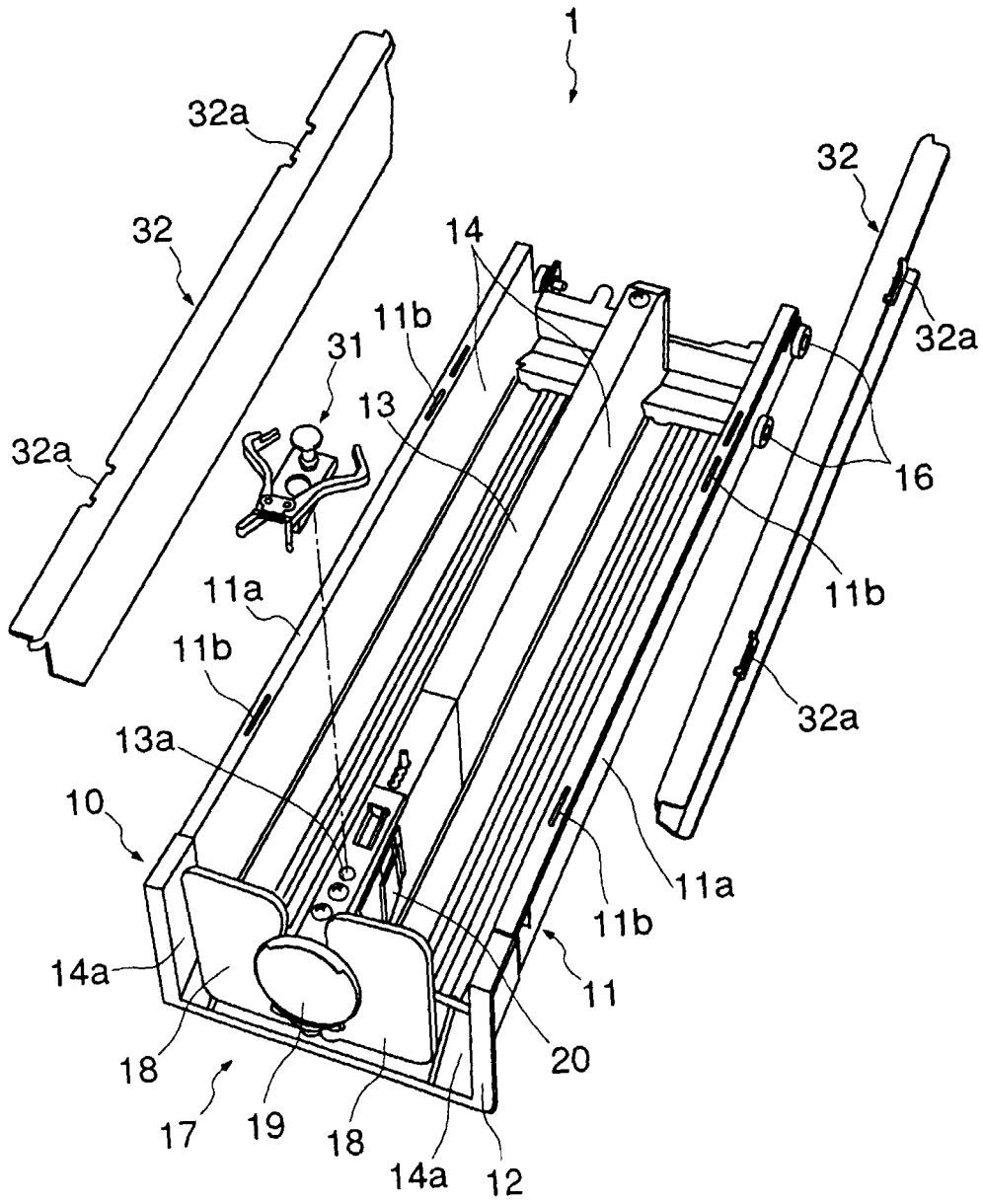


FIG. 12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14a
12

FIG. 13

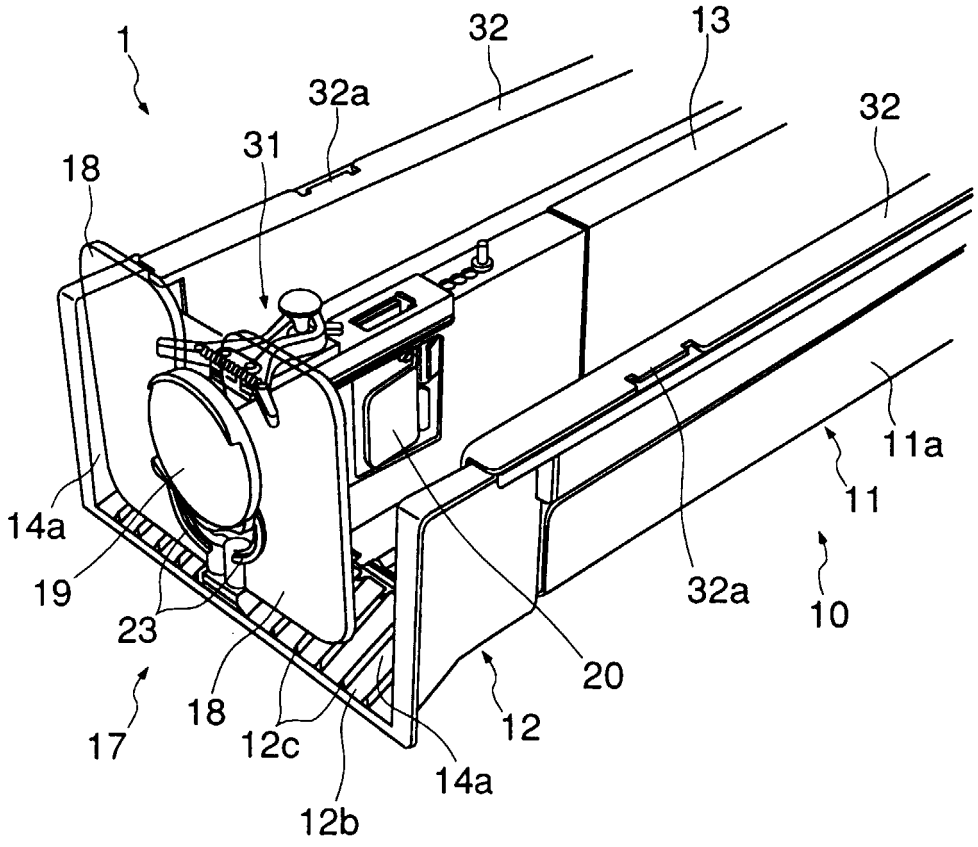

FIG. 14

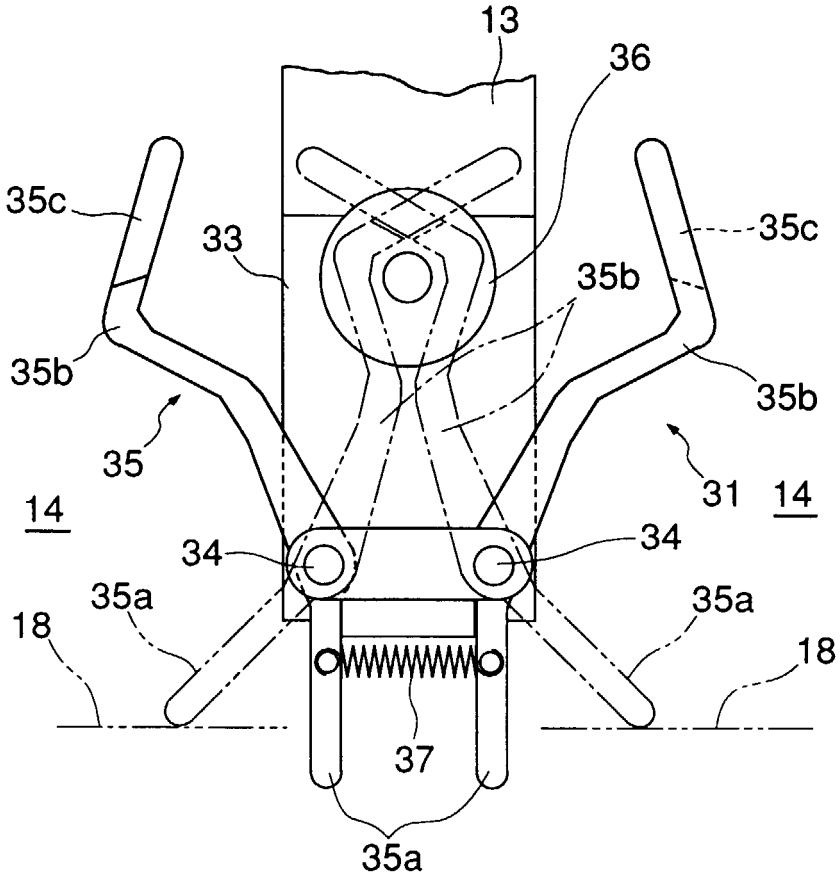
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FIG. 15

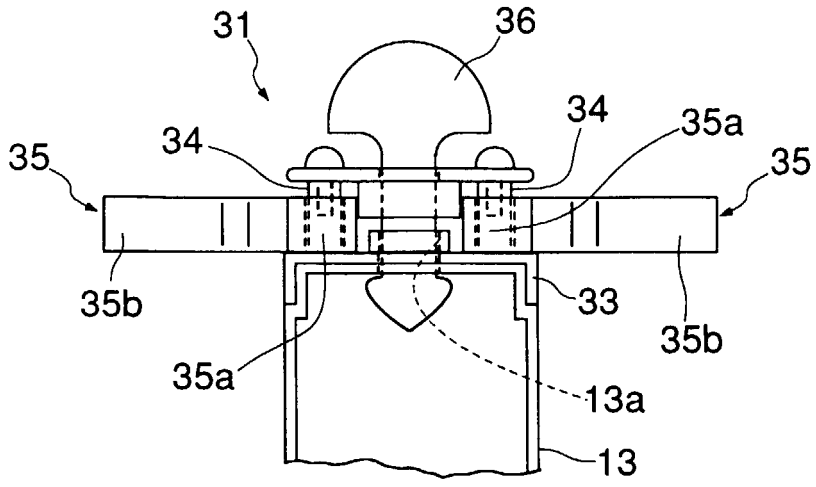
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FIG. 16

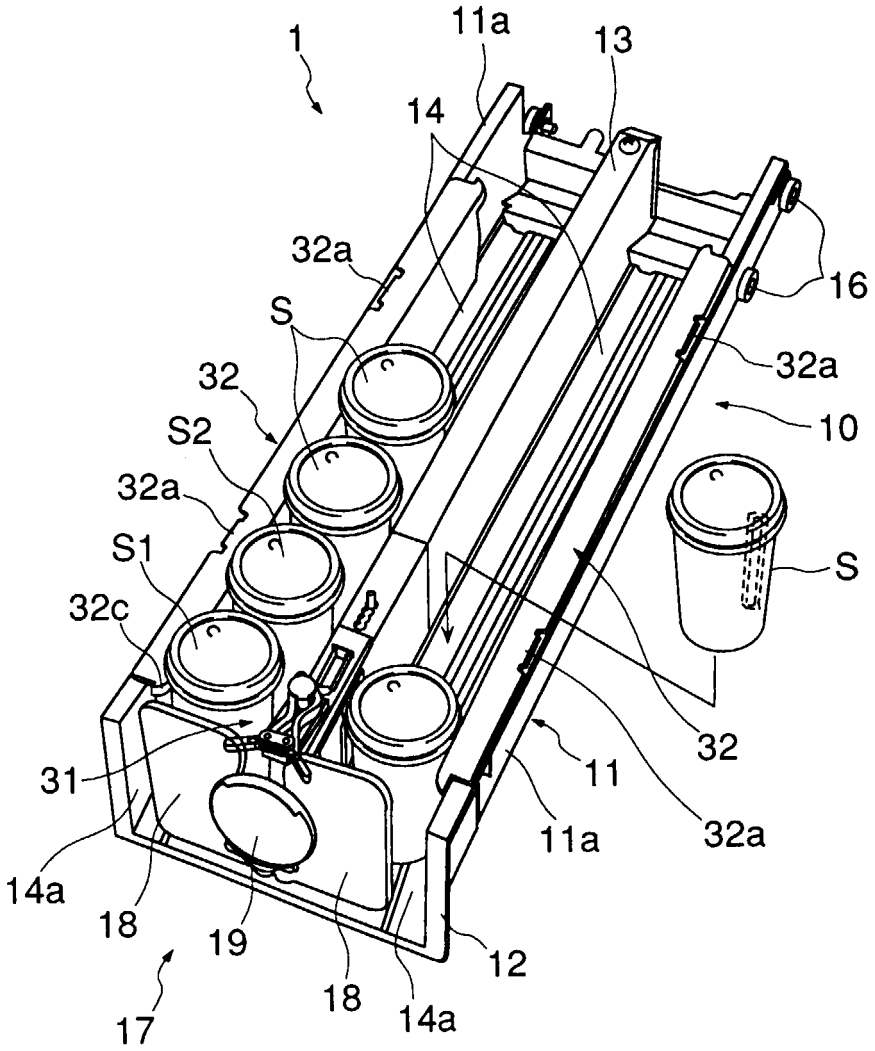
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FIG. 17

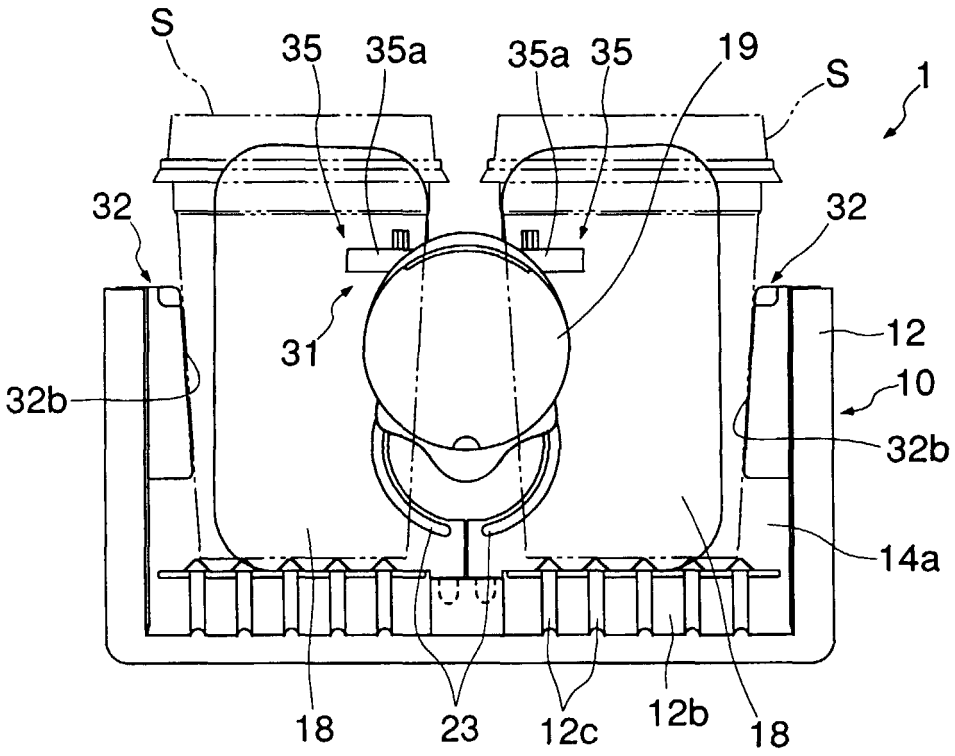

FIG. 18

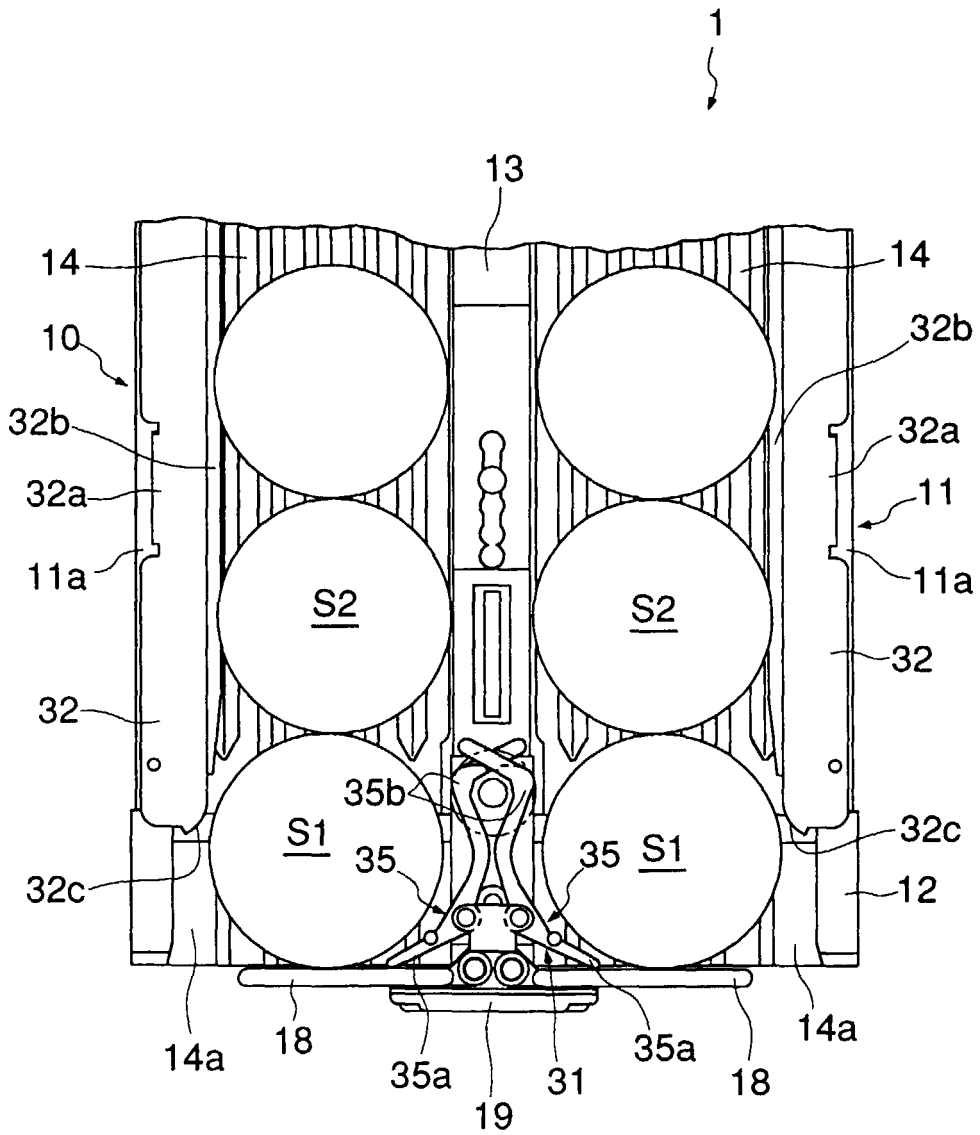
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FIG. 19

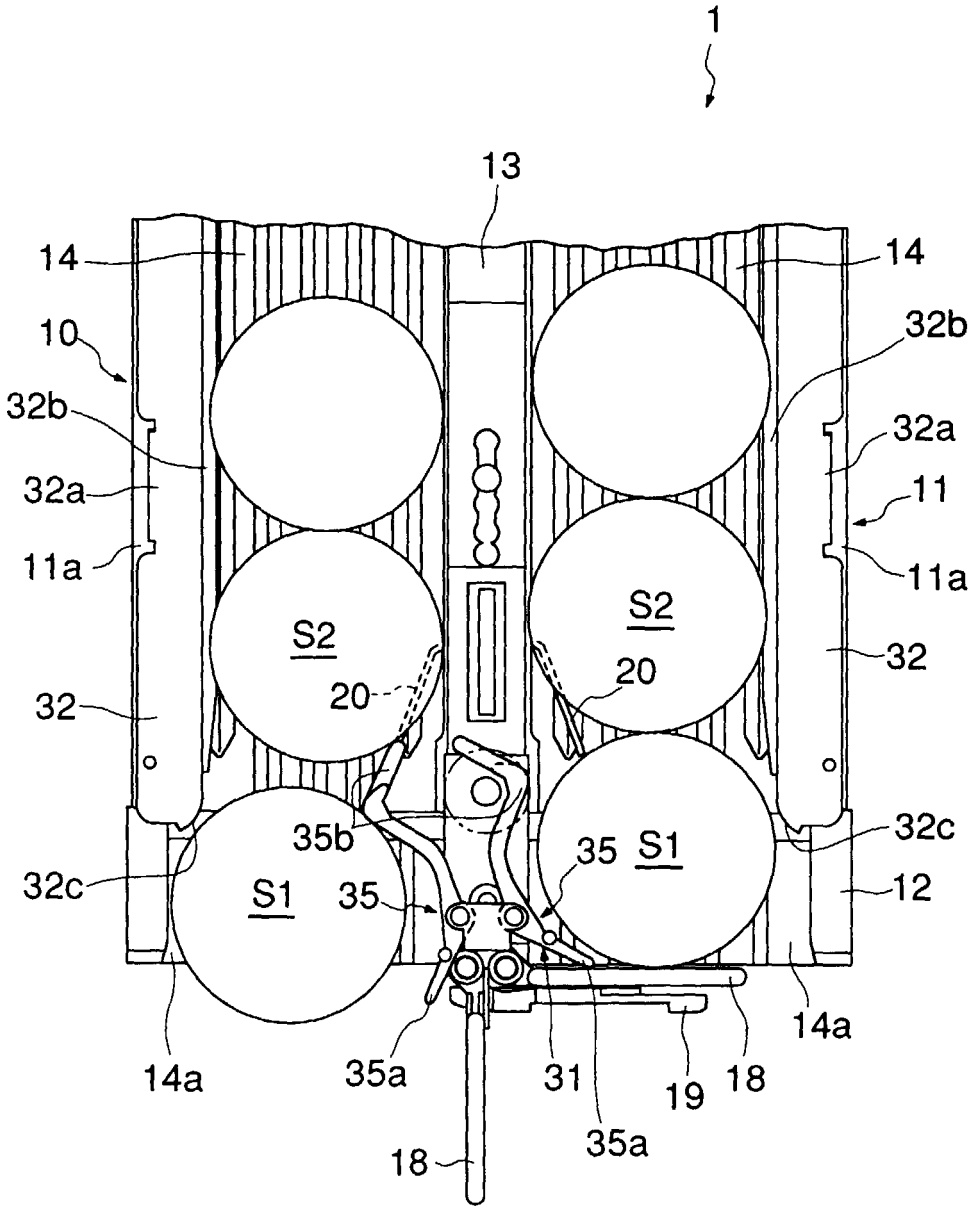
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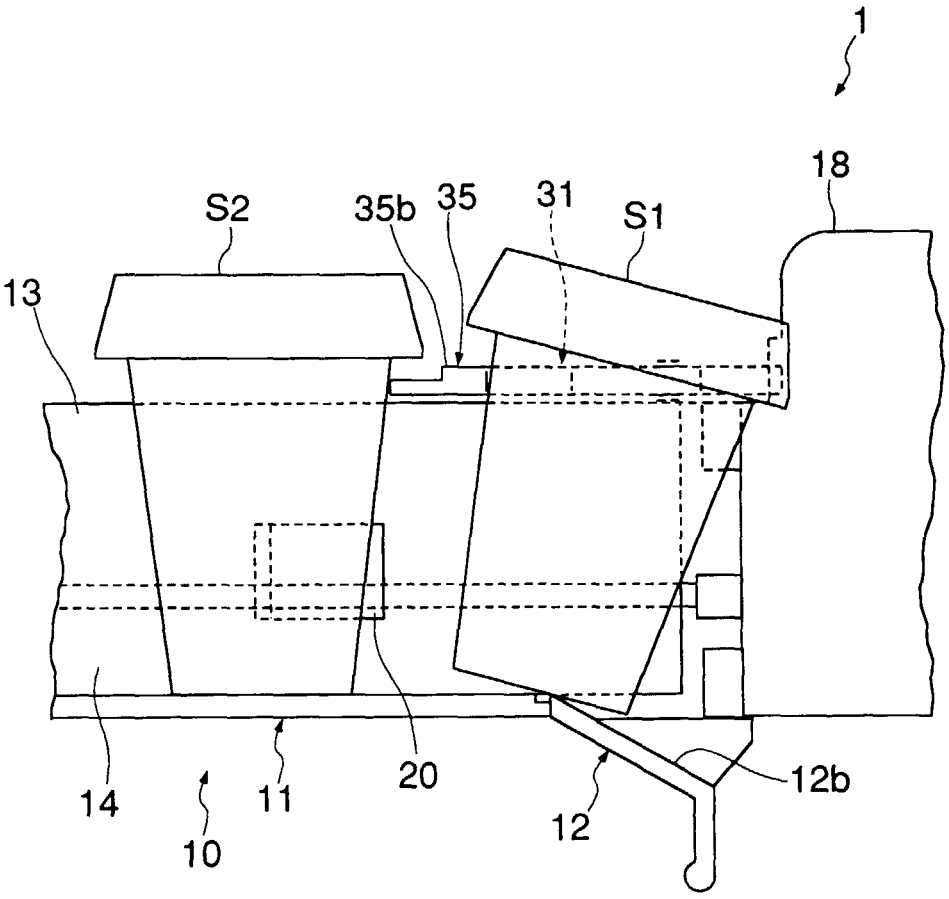
FIG. 20



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 12 2715

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 5 497 905 A (VOGELPOHL GREGORY J ET AL) 12 March 1996 * column 3, line 59 - column 5, line 39 * * column 6, line 11 - column 10, line 7 * * column 11, line 51 - column 13, line 6 * * figures 2-6,10 *	1,2	G07F11/42
A		6	
X	EP 0 806 749 A (MATSUSHITA REFRIGERATION) 12 November 1997 * column 18, line 31 - column 24, line 47 * * figures 1-10 *	1,6	
A		4,7	
X	PATENT ABSTRACTS OF JAPAN vol. 098, no. 010, 31 August 1998 -& JP 10 143749 A (SANYO ELECTRIC CO LTD), 29 May 1998 * abstract; figures 4-11 *	1	
A		4,6,7	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	4 May 1999	Aupiais, B

CATEGORY OF CITED DOCUMENTS

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