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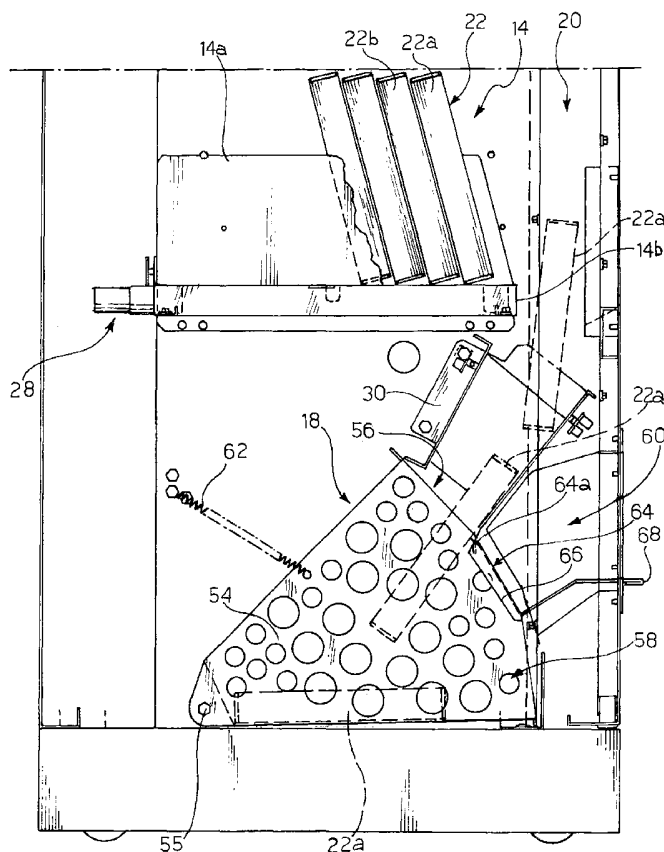
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[Continued on next page]

(54) Title: VENDING MACHINE FOR ARTICLES



(57) Abstract: The automatic vending machine for articles includes a cabinet (10) which includes - at least one store (14) for containing a stack (22) of articles; - a dropping zone (20) arranged between the store (14) and a receptacle (18) from which the articles can be retrieved by a user; the stack (22) of articles includes a first article (22a) which can be transferred from a storage position to a delivery position in which it is contained in the receptacle (18); - retaining members (24) operable to hold the first article (22a) in the storage position; - transfer members (28) operable to move the stack (22) of articles, causing the first article (22a) to move from the storage position to the delivery position; - sensor means (30) positioned in the dropping zone (20); and - means for controlling the transfer members (28) operable to interrupt the action of the transfer members (28) once the sensor means (30) detect the passage of the first article (22a) into the dropping zone (20).



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Vending machine for articles

The present invention relates to an automatic vending machine for articles, according to the preamble to Claim 1.

A vending machine of the type mentioned above is known from Patent Application No. TO2001 A000212.

This prior art vending machine has inclined stores, each with a release mechanism having first and second retaining teeth able to cooperate with each other. This release mechanism can adopt a first working configuration, in which a first item in a series is held in a display position, and a second working configuration, in which the first item is released from this position to fall into a receptacle from which it can be retrieved by a user, while a second item of the series is retained.

This prior art vending machine has several drawbacks.

A first drawback consists in the fact that the release mechanism is configured to contain a single type of item, since the pair of retaining teeth is only able to retain articles of the same thickness. If it were desired to dispense articles with a different thickness, it would therefore be necessary to modify the release mechanism so that the retaining teeth are able to cooperate effectively to retain and release the new type of articles.

A second drawback consists in the fact that the pair of

retaining teeth of the release mechanism acts on the front face of the item to be released into the receptacle. This involves a risk of damaging the main face of the item, of particular concern in the case of a compact disc case or other fragile article.

Other known vending machines, with horizontal stores, have release mechanisms comprising a pusher member controlled by a geared motor operable to push the entire stacked series of articles towards the dropping zone. One drawback of such a system consists in the fact that a bi-directional geared motor is required since, when the store is empty and the pusher member is in its fully advanced position, the pusher needs to be returned to its starting position so the chamber can be refilled with a new selection of articles. The geared motor connected to the release mechanism must therefore be able to reverse the advancing movement, thereby increasing costs compared to the use of a unidirectional motor.

A fourth drawback affecting the vending machine described in Patent Application T02001 A000212 consists in the fact that the receptacle can be subject to attempts of breakage to steal the contents of the store. A receptacle of the above-mentioned type offers no protection against illicit access to the delivery zone from outside.

The object of the present invention is to provide an improved vending machine in which each store can contain a variety of articles, or differently shaped articles, and which has the same release mechanism for all types of article.

A further object of the invention is that of providing an automatic vending machine having a simplified release mechanism in which the reloading of articles is facilitated.

An additional object of the invention is to provide an automatic vending machine with an improved receptacle which prevents illicit access to the dropping zone from outside.

These objects are achieved according to the invention by providing an automatic vending machine having the features claimed in Claim 1. Further embodiments of the invention are defined in the dependent Claims.

The object of the invention will become clearer from the following detailed description with reference to the appended drawings which illustrate a preferred embodiment, and in which:

Figure 1 is a perspective view of an automatic vending machine according to the invention which includes a plurality of store columns side by side;

Figure 2 is a side elevation of a store containing a series of flat items and having a transfer device according to the invention;

Figure 3 is a plan view from above of the store of Figure 2;

Figure 4 is a partial view of an automatic vending machine in which a basket according to the invention is shown in a first operating position;

Figure 5 is a partial view of an automatic vending machine in which the basket is shown in a second operating position;

Figure 6 is a side elevation of a store with a transfer

device according to the invention shown in a working configuration;

Figure 6a is a front view of the transfer device shown in Figure 6, without the stack of articles;

Figure 7 is a side elevation of a store including the transfer device shown in a first operating position;

Figure 7a is a front view of the transfer device shown in Figure 7;

Figure 8 shows a detail, indicated VIII in Figure 6, of the transfer device;

Figure 9 is a view of a detail, indicated IX in Figure 7, of the transfer device;

Figure 10 is a view of a detail, indicated X in Figure 6a, of the transfer device;

Figure 11 is a view of a detail, indicated XI in Figure 7a, of the transfer device;

Figure 12 is a front view of a coupling formation of the transfer device of the invention;

Figure 12a is a side view of the coupling formation of Figure 12;

Figure 13 is a front view of an alignment guide of the transfer device;

Figure 13a is a side view of the alignment guide of Figure 13;

Figure 14 is a front view of a coupling guide of the transfer device;

Figure 14a is a side view of Figure 14;

Figure 15 is a perspective view of a basket according to the invention intended to be used as a receptacle in the automatic vending machine.

With reference to Figure 1, an automatic vending machine according to the invention includes a casing in the form of a cabinet, generally indicated 10.

Conveniently, the cabinet 10 has a transparent front panel 12 exposing a plurality of stores 14, each of which contains a stack of articles (not shown), in particular flat articles such as cases containing CD's.

Alongside the transparent panel 12 are selection and payment devices, generally indicated 16 which, in known manner, enable a user to select the desired item, pay for it by inserting coins, banknotes, credit cards or the like into the apertures provided, and to control the release of the selected article. The selection and payment devices 16 will not be described hereafter, since they are not relevant to the present invention.

Each store 14 conveniently has side walls 14a and a base structure 14b in the form of a shelf.

Figure 1 also shows a receptacle 18 from which the user can withdraw the items which have been dispensed.

A dropping zone 20 is situated between the stores 14 and the receptacle 18, as can be seen more clearly in Figures 4 and 5.

With reference to Figures 2 and 3, a stack 22 of articles is contained in the store 14 delimited by the side walls 14a and the base structure 14b. The spacing of the above-mentioned

side walls 14a can be preferably adjusted according to the dimensions of the stack 22 of articles.

In the embodiment illustrated, each side wall 14a has leaf springs 24 acting as retaining members for a first article 22a in the stack 22, facing the dropping zone 20. In alternative embodiments (not shown) the retaining members 24 could consist of leaf springs mounted on only one of the side walls 14a or of any equivalent arrangement operative to retain the first item 22a at two lateral portions 26 thereof.

Transfer members 28 are mounted movably on the base structure 14b for pushing the stack 22 of articles towards the dropping zone 20 and then for transferring the first article 22a from its storage position (shown in Figure 4) within the store 14 to a delivery position (shown in Figure 5) in which it is contained in the receptacle 18.

With reference to Figure 4, the transfer members 28 are configured to push the stack 22 towards the dropping zone against the action of the leaf springs 24, causing the first article 22a to drop from the storage position to the delivery position and placing a second article 22b into the position facing the dropping zone 20. The path along which the first article 22a falls into the receptacle 18 is shown in broken outline.

With reference to Figure 5, the second article 22b is in the position previously occupied by the first article 22a in Figure 4, while this latter is now in the delivery receptacle. The

path of the first article 22a, as a customer removes it from the receptacle 18, is shown in broken outline.

The dropping zone 20 has a photocell sensor 30 near the bottom, close to the receptacle 18. The action of the transfer members 28 is interrupted by a control system (not shown) when the photocell sensor detects that the said first article 22a has passed into the dropping zone 20.

In alternative embodiments it is possible to use different types of sensor 30 to achieve the same purpose or to use a plurality thereof, positioned at different points in the dropping zone 20.

Figures 6, 6a, 7 and 7a show a store 14 having transfer members 28 which conveniently include a coupling formation 36 connected to a pusher member 32 and a unidirectional drive motor 34.

The transfer members 28 are shown in their working condition in Figures 6, 6a, 8 and 10 and in a disengaged condition in Figures 7, 7a, 9 and 11.

In Figure 6, and in more detail in Figure 8, the coupling formation 36 is shown able to cooperate with a lead screw shaft 38 connected to the motor 34 for advancing the pusher member 32 in a single direction towards the dropping zone 20.

With reference to Figures 12 and 12a, the coupling formation 36 is seen in front and side views respectively, having a rod 37 for connecting a pair of opposite laminar portions 37a having

slots 37b for receiving the lead screw 38. A lower half-worm 36a is mounted between the two laminar portions 37a for meshing with the lead screw 38.

With reference in particular to Figures 8 and 10, the coupling formation 36 is preferably fixed to one end 40b of a lever 40 mounted for rotation about a pin 44 secured to a portion 32a of the pusher member 32. Conveniently, a tension spring 42 is fixed at one end to a portion 40a of the lever 40 and at the other to the pusher member 32, and is able to hold the lever 40 in said working condition. In the working configuration, the motor 34 drives the lead screw 38 to rotate, and this motion is converted by engagement with the half-nut 36a into unidirectional advancing movement of the pusher member 32, which drives the stack 22 of articles towards the dropping zone 20.

With reference in particular to Figures 8 and 11, the store 14 is shown empty of articles and the coupling formation 36 is shifted into its release configuration by the action exerted on the portion 40a of the lever 40 in the direction of the arrow F1 (shown in Figure 7). The pusher member 32 conveniently has a slot 32b (seen in Figures 6a and 7a) enabling a user to reach the portion 40a to manipulate the lever 40. The lower half-nut 36a is moved from a raised position (seen in Figure 10) to a lowered position (seen in Figure 11), thereby releasing it from the lead screw 38 and thus releasing the pusher member 32 from the action of the motor 34. The pusher member 32 can then be pushed in the direction of the arrow F2 of Figure 7 back to its start of travel position in which it is possible to reload the

store 14 with a new stack of products 22.

With reference to Figures 8 to 11, the transfer members 28 preferably include a locating guide 46 fixed to the pusher member 32, most advantageously by means of screws 48 through holes 46a (see Figures 14 and 14a). As seen in Figures 14 and 14a, the locating guide 46 has a lower cavity 46b for cooperating with the coupling formation 36 in order to secure the meshing of the lower half-nut 36a with the lead screw 38, thereby preventing them from becoming disengaged when in the working configuration.

In this embodiment, it is particularly advantageous to use an alignment guide 50 fixed to the pusher member 32 by screws 52 through holes 50b. As can be seen better in Figures 13 and 13a, the coupling guide 50 has an alignment hole 50a for housing the lead screw 38 so as to keep it aligned with the half-nut 36a in the released configuration.

With reference to Figures 4, 5 and 15, the receptacle 18 includes a basket 54, conveniently mounted for rotation about a fulcrum 55 inside the cabinet 10. The basket 54 includes a first aperture 56 and a second aperture 58, in communication respectively with the dropping zone 20 and with a retrieval passage 60 facing to the outside. For preference, a compression spring 62 is fixed to an outer portion of the basket 54 and at the other end to an inside portion of the cabinet 10 and is able to move the basket 54 from the delivery position shown in Figure 5 to a reception position shown in Figure 4.

With reference in particular to Figure 4, in the reception position a panel 64 of the basket 54 prevents communication between the basket 54 and the retrieval passage 60. The aperture 56 is able to receive the first article 22a coming from the dropping zone 20, while a door 66, mounted for rotation inside the cabinet 10 and able to be drawn by a section 64a of the panel 64, is disposed in a rest position, behind the panel 64.

With reference in particular to Figure 5, in the retrieval position, the section 64a draws the door 66 into its closed position, in which it closes the dropping zone and prevents communication between the basket 54 and the dropping zone 20. At the same time the aperture 58, now facing the retrieval passage 60, allows communication between the basket 54 and the retrieval passage 60, enabling a purchaser to withdraw the released article 22a. This arrangement ensures that the retrieval passage 60 and the dropping zone 20 are not communicating therebetween at the same time, thereby preventing the articles contained in the store 14 from being taken without the consent of the selection and payment device 16.

With reference to Figure 15, the basket 54 advantageously further includes a flange 68 facing outwardly of the cabinet 10 and enabling a customer to grip it so as to turn the basket 54 manually from its reception position to its delivery position.

Naturally, the principle of the invention remaining unchanged, embodiments and manufacturing details may vary widely from those described and illustrated here purely by way of non-

limitative example, without departing thereby from the scope of the invention, as claimed in the appended Claims.

CLAIMS

1. An automatic vending machine for articles, including a cabinet (10) comprising

- at least one store (14) for containing a stack (22) of articles,
- at least one dropping zone (20) arranged between the store (14) and a receptacle (18) from which the articles can be withdrawn by a customer, said stack (22) of articles being slidable in the direction of the dropping zone (20) and comprising a first article (22a) able to be transferred from a storage position in which it is contained in the store (14) to a delivery position in which it is contained in the receptacle (18);
- retaining means (24) for retaining the said first article (22a) in the storage position;
characterised in that the said vending machine includes
- transfer means (28) for moving the said stack (22) of articles towards the dropping zone against the action of the said retaining means (24), causing the first article (22a) to move from the storage position to the delivery position;
- sensor means (30) positioned in the dropping zone (20);
and
- means for controlling the transfer means, operable to interrupt the action of the transfer means (28) when the sensor means (30) detect the passage of the said first article (22a) into the dropping zone (20).

2. An automatic vending machine for articles according to Claim 1, characterised in that the sensor means include at least one sensor (30) positioned in the dropping zone (20).

3. An automatic vending machine for articles according to Claim 2, characterised in that said sensor includes a photocell sensor (30) arranged near the receptacle (18).

4. An automatic vending machine for articles according to Claim 1, characterised in that

- said store (14) is delimited by a pair of side walls (14a); and
- said retaining means include at least one retaining spring (24) mounted on at least one of the walls (14a).

5. An automatic vending machine for articles according to Claim 4, characterised in that said retaining means include at least one pair of leaf springs (24) facing each other and fixed mounted on opposite walls (14a).

6. An automatic vending machine for articles according to Claim 4, characterised in that the distance between said walls (14a) can be adjusted according to the dimensions of the article.

7. An automatic vending machine for articles according to Claim 1, characterised in that said transfer means (28) comprise

- a pusher member (32) for moving the said stack (22) of articles;

- a unidirectional drive motor (34) for controlling the pusher member (32);
- a coupling formation (36) operable selectively to adopt either a working configuration, in which it enables unidirectional advancing motion to be transmitted to the pusher member (32), and a disengaged configuration in which it disengages the pusher member (32) from the motor (34), making it possible to move the pusher member (32) manually in the opposite direction to that of the advance motion.

8. An automatic vending machine for articles according to Claim 7, characterised in that said coupling formation (36) includes a half-nut (36a) operable to mesh with a lead screw (38) driven to rotate by said drive motor (34).

9. An automatic vending machine for articles according to Claim 7, characterised in that said coupling formation (36) is able to pass from a working configuration to a disengaged configuration by means of a selector device (40).

10. An automatic vending machine for articles according to Claim 8, characterised in that said selector device is a lever (40) biased by a tension spring (42) and operable selectively to move said half-nut (36a) into the working configuration or the disengaged configuration.

11. An automatic vending machine for articles according to Claim 7, characterised in that the said transfer means (28) include a biasing guide (46) for preventing the lead screw (38)

and the half-nut (36a) from becoming disengaged when in the working configuration.

12. An automatic vending machine for articles according to Claim 11, characterised in that said transfer means (28) further include an alignment guide (50) for keeping the half-nut (36a) aligned with the lead screw (38) when in the released condition.

13. An automatic vending machine for articles according to Claim 10, characterised in that the pusher member (32) has a slot (32b) to allow a user to operate said lever (40).

14. An automatic vending machine for articles according to Claim 1, characterised in that the said receptacle includes

- an inner basket (54) including first and second apertures (56, 58) and displaceable between a reception position, in which it respectively allows communication between the first aperture (56) and the dropping zone (20) and prevents communication between the second aperture (58) and the retrieval opening (60) which is in communication with the outside, and a retrieval position in which it respectively prevents communication between the first aperture (56) and the dropping zone (20) and allows communication between the second aperture (58) and the retrieval opening (60).

15. An automatic vending machine for articles according to Claim 14, characterised in that it includes a door (66) mounted for rotation in the cabinet (10) and turnable by a section

(64a) of a panel (64) carried by the basket (54), between a resting position in which said panel (64) closes the retrieval opening (60) when the basket (54) is in its reception position, and a closed position, in which said profile (64a) causes said door (66) to close the dropping zone (20) when the basket (54) is in the retrieval position.

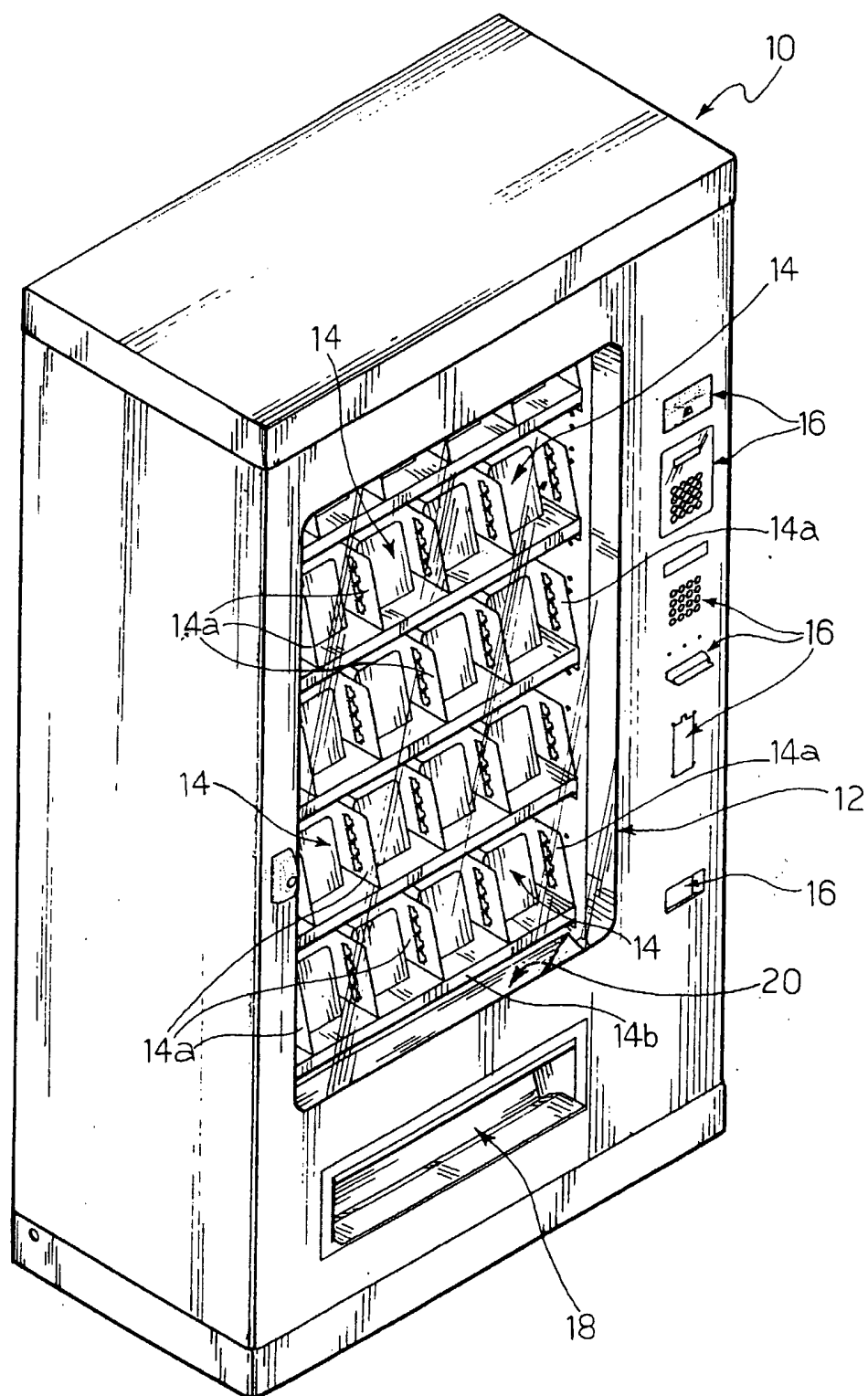
16. An automatic vending machine for articles according to Claim 15, characterised in that the basket (54) is mounted for rotation relative to the cabinet (10) and includes elastic biasing means (62) able to move the basket (54) from the retrieval position to the reception position.

17. An automatic vending machine for articles according to Claim 16, characterised in that said elastic means comprise a compression spring (62) fixed at one end to the cabinet (10) and at the other to the basket (54).

18. An automatic vending machine for articles, according to Claim 17, characterised in that the basket (54) has an outwardly facing flange (68), operable to enable a customer to grip it in order to move the basket (54) manually from the reception position to the retrieval position.

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FIG. 1



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FIG. 2

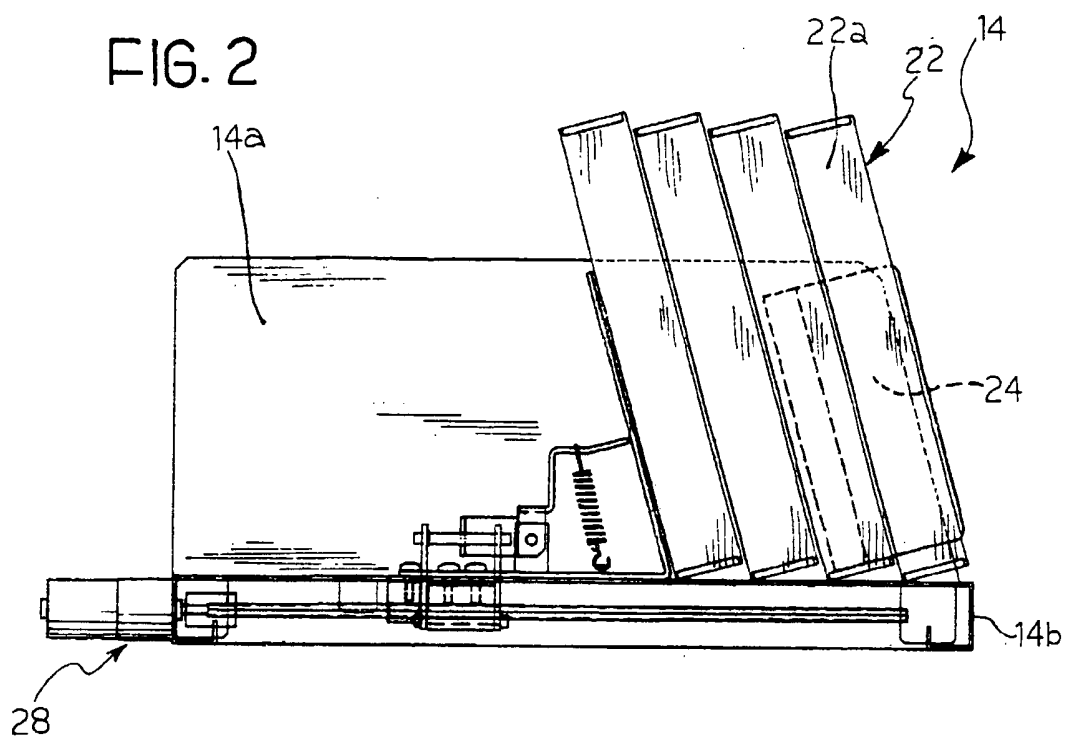
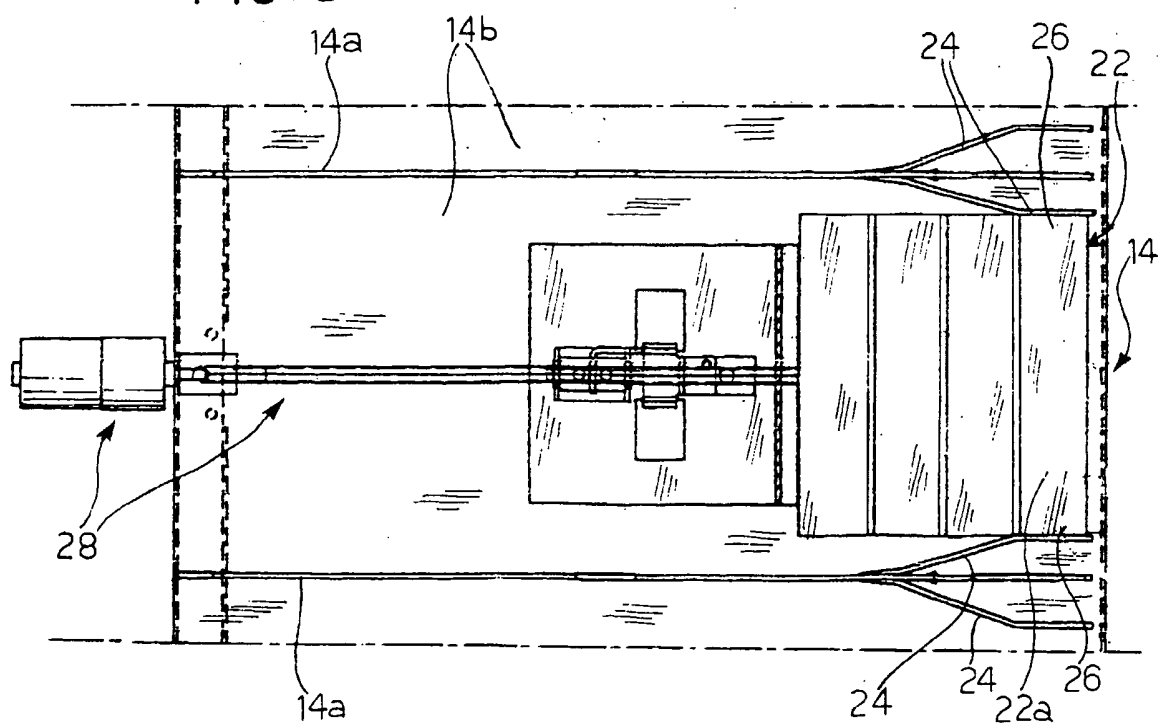


FIG. 3



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FIG. 4

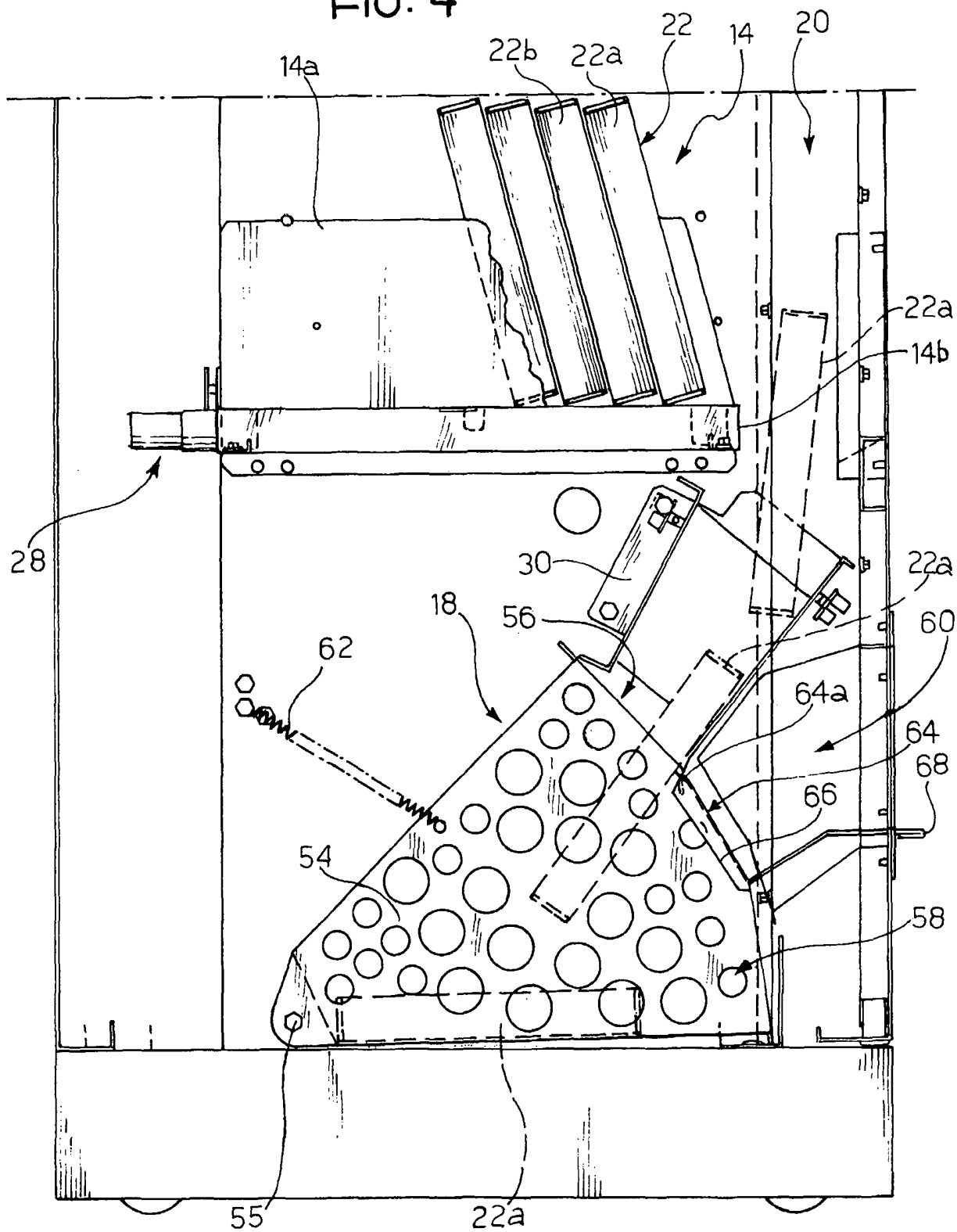


FIG. 5

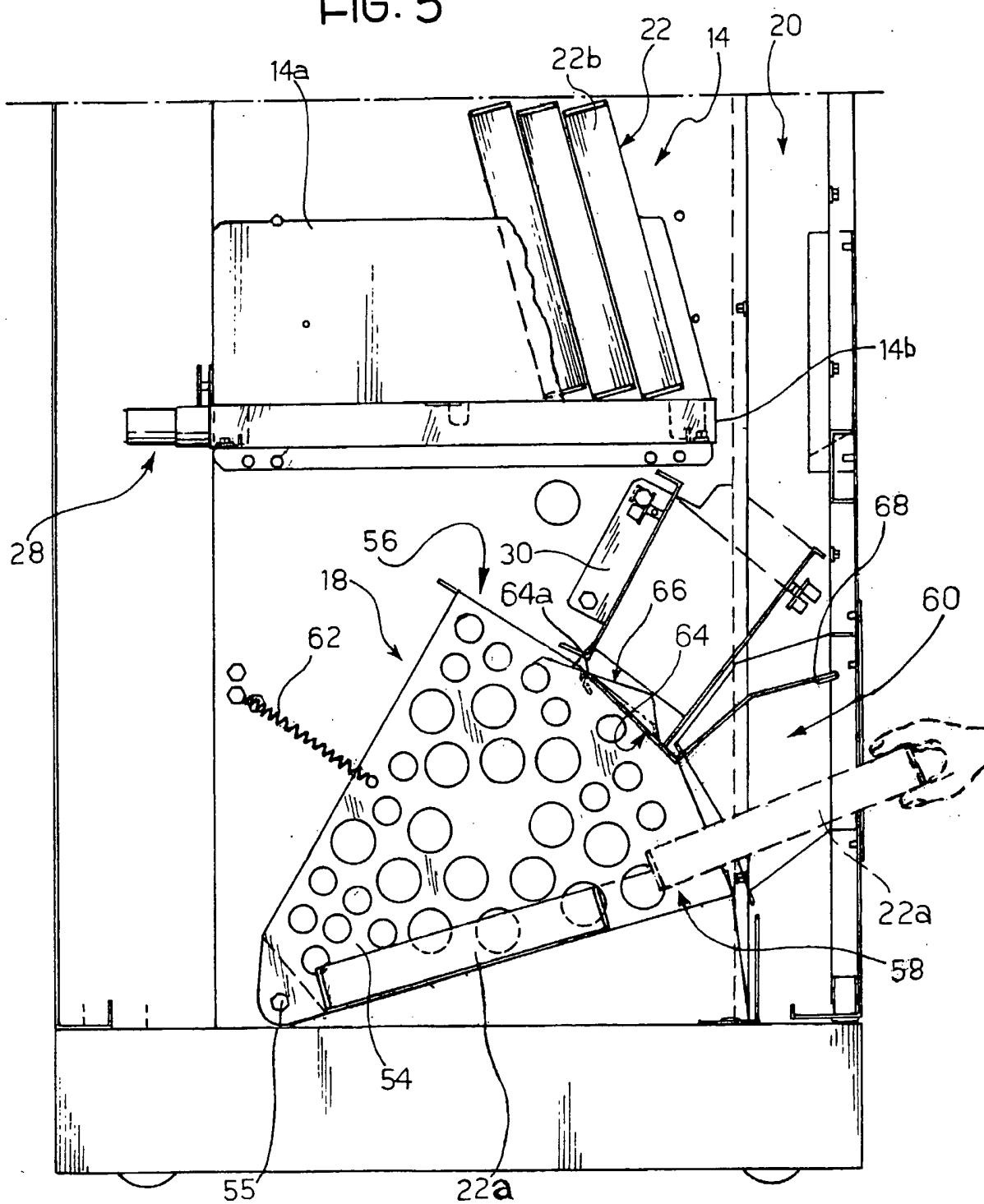


FIG. 6

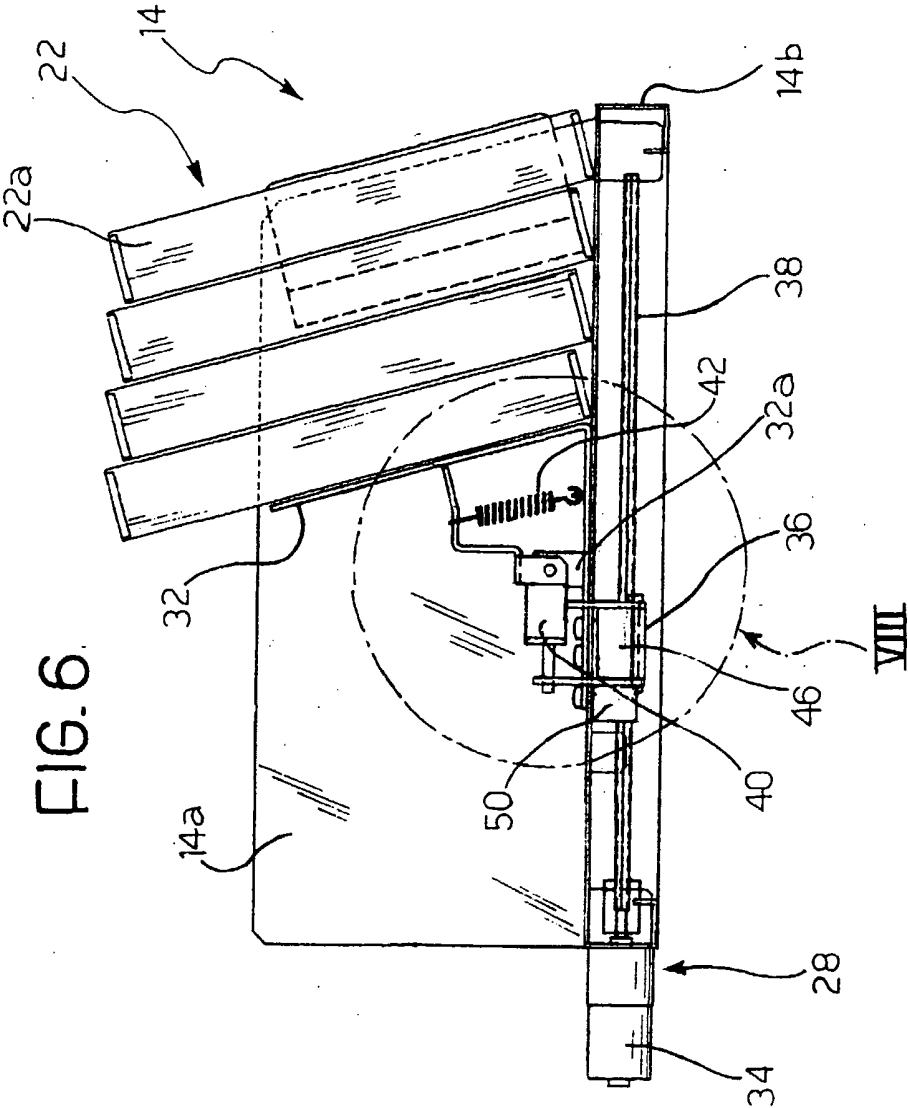
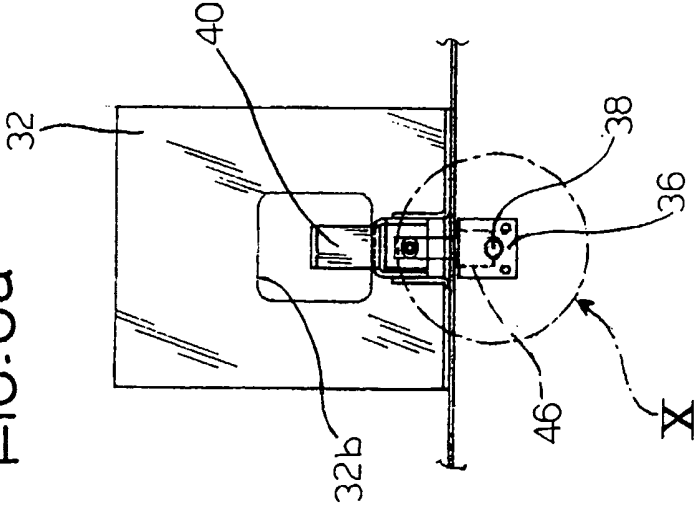
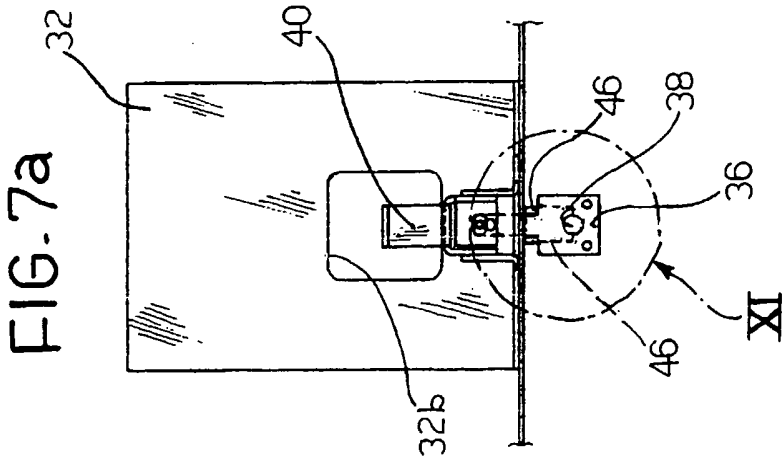
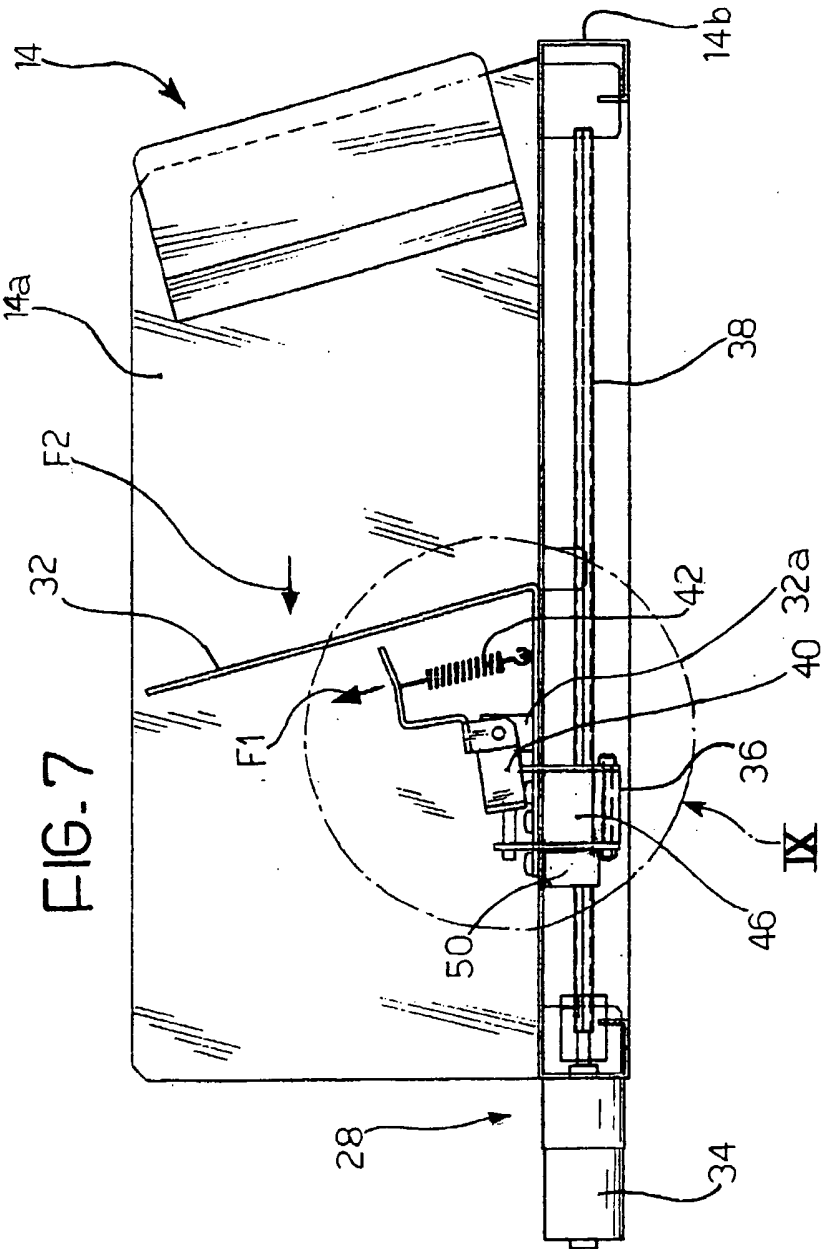


FIG. 6a



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FIG. 8

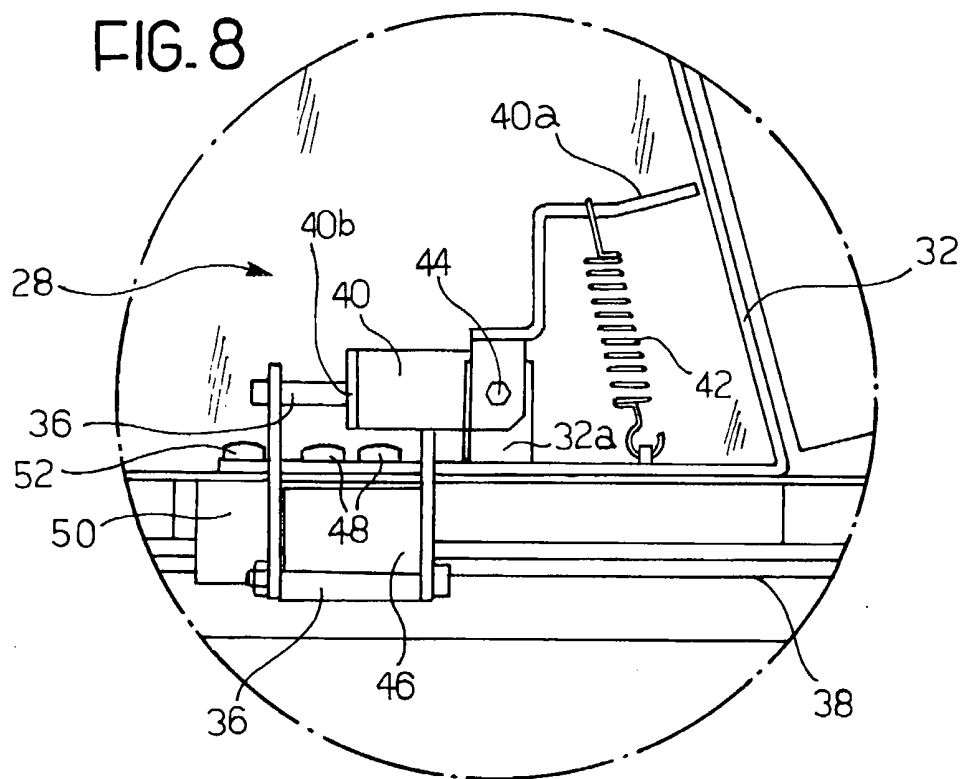
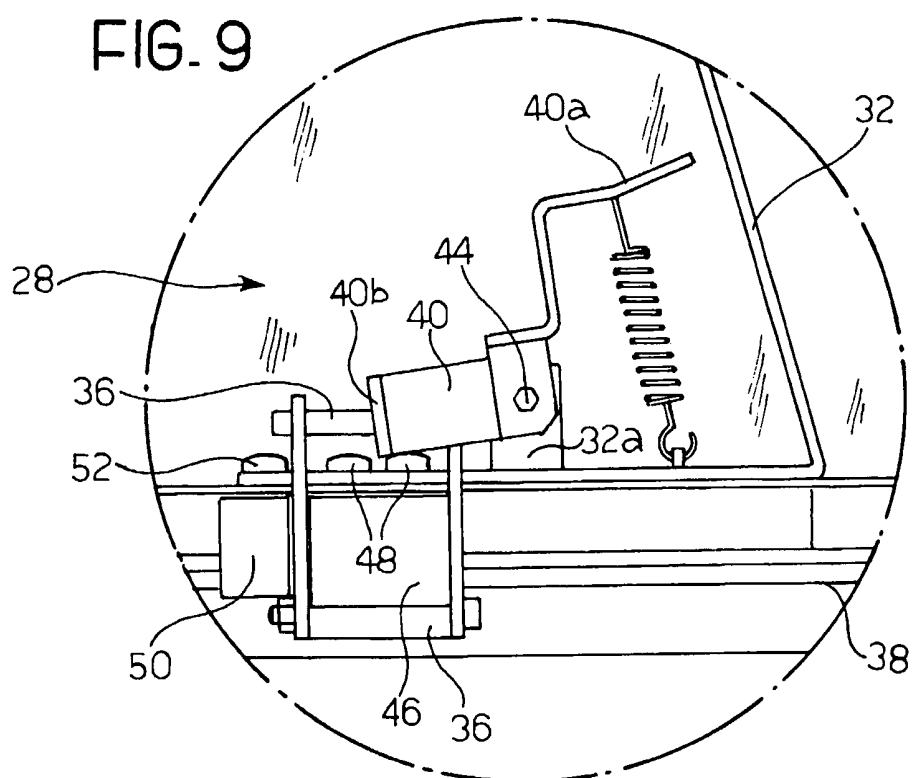


FIG. 9



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FIG. 10

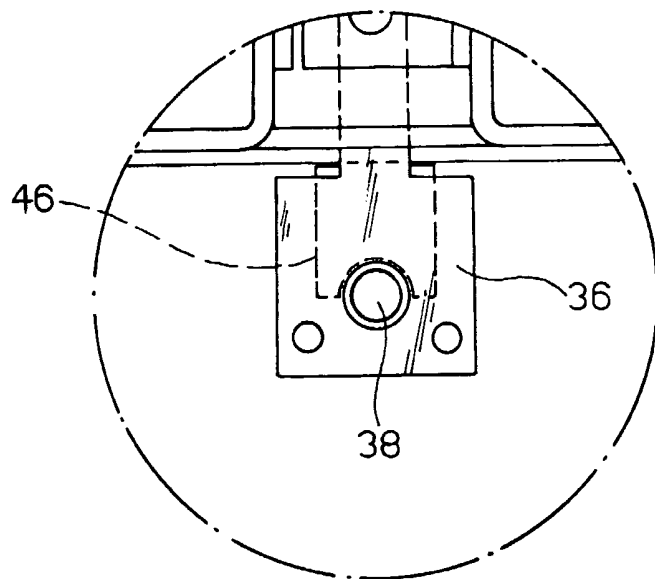
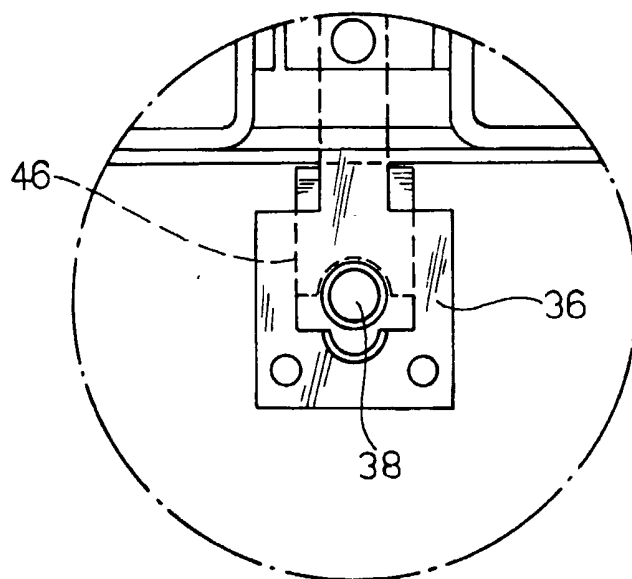


FIG. 11



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FIG. 12

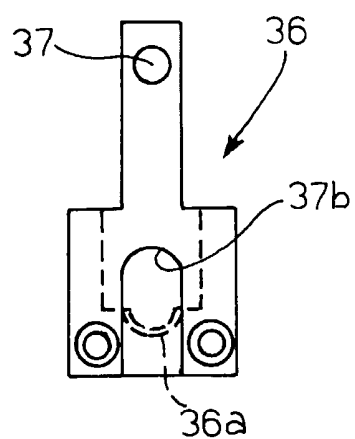


FIG. 12a

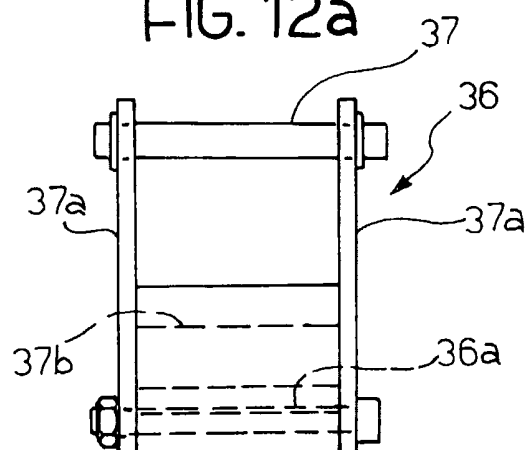


FIG. 13

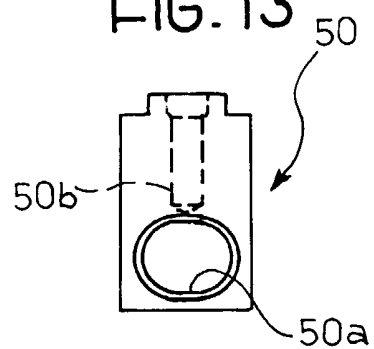


FIG. 13a

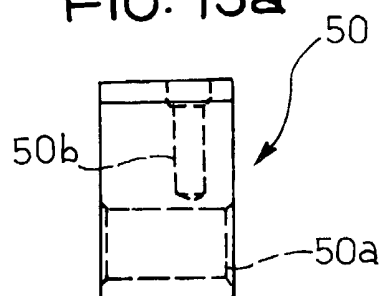


FIG. 14

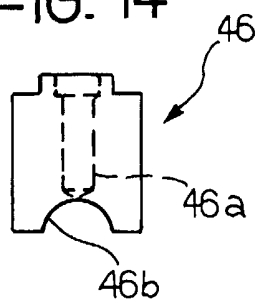


FIG. 14a

