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(54) **An automatic vending machine for flat articles such as cases containing compact discs**

(57) The automatic vending machine comprises at least one magazine (14) arranged for holding a series of articles (30) in an arrangement in which these articles are packed against one another. The magazine (14) has guide means (36) which allow the series of articles (30) to slide towards a transparent flat wall (12), as well as thrust means which act resiliently on the article of the series situated at the end remote from the transparent

wall (12) and which hold the larger face (16) of the article (30a) situated nearest to this wall against that wall. Beside the magazine there is a release station (18) beneath which there is a receptacle from which the articles can be withdrawn by a purchaser. Transfer means (66) are provided for dragging the article (30a) which is disposed against the transparent wall (12) from the magazine (14) to the release station (18), each time.

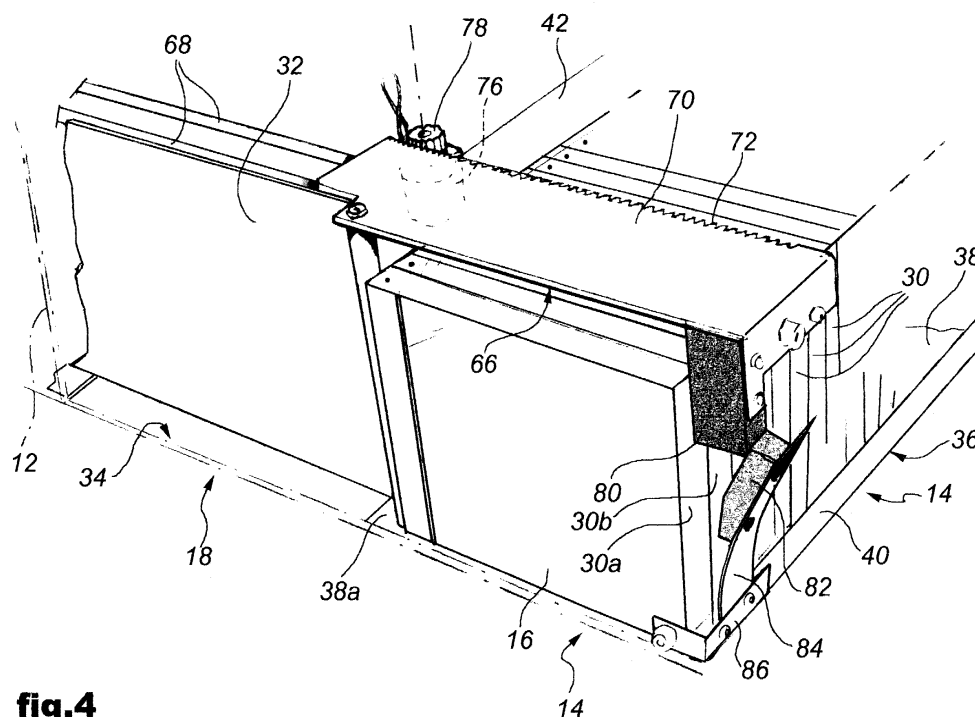


fig.4

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Description

[0001] The present invention relates to an automatic vending machine for flat articles such as cases containing compact discs, according to the preamble to Claim 1.

[0002] An automatic vending machine according to the preamble to Claim 1 is known from the document US-A-5 415 319.

[0003] In this known vending machine the flat objects such as compact discs, video cassettes or music cassettes in their cases, or even books, are arranged in series in respective magazines between the coils of a rotary conveyor helix. Associated with the conveyor helix is an electric motor which, as a result of a payment, performs one rotation and advances the series of articles contained in the magazine by one step, as a result of which the article nearest to the transparent wall is released from the coils of the helix and falls into an underlying receptacle forming part of a release station, from which the article can be withdrawn by the purchaser.

[0004] The known vending machine suffers from some disadvantages.

[0005] A first disadvantage is that, in relation to the space available in the cabinet, each magazine can hold a fairly limited number of articles arranged in series since the articles arranged in series are spaced apart by the coils of the conveyor helix.

[0006] A second disadvantage is that, during the rotation of the helix, the coils scrape against the larger faces of the articles and this scraping is repeated upon each forward step of the series, with the risk of spoiling the appearance of these faces and, in particular, of the faces which carry graphical elements.

[0007] This second disadvantage is aggravated by the fact that, when the conveyor helix is rotated, its coils tend to contract, increasing friction and hence the possibility of the larger faces of the articles being scratched.

[0008] The second disadvantage can be remedied partially with the use of special helices having treated surfaces, for example, velvety surfaces, but this does not exclude scratching of the faces of the articles by dust particles.

[0009] A third disadvantage is that, since the conveyor helix is rotated from only one end, that is, the end remote from the transparent wall, as well as contracting around the articles transported, it may also be subject to jamming.

[0010] The object of the invention is to provide an automatic vending machine according to the preamble to Claim 1 which does not have the above-mentioned disadvantages and which has a very simple and functional structure.

[0011] According to the invention, this object is achieved by means of an automatic vending machine as claimed.

[0012] By virtue of the solution claimed, the first disadvantage is eliminated owing to the fact that the articles are packed together without the interposition of spacers

such as the coils of a conveyor helix and, moreover, the transparent wall of the cabinet is utilized as an abutment for restraining the series of articles packed together and as a guide for each article which is transferred from the magazine to the release station.

[0013] The second disadvantage is eliminated by virtue of the fact that, during the forward movement of the group of articles, no sliding takes place relative to a conveyor element such as a conveyor helix which could scratch the articles.

[0014] The third disadvantage is eliminated by virtue of the fact that the thrust means act resiliently only on the last article of the series and, since the thrust means are not motor-driven, they are not easily subject to jamming.

[0015] The invention has been developed for application to an automatic vending machine for compact discs packed in cases in the form of flat boxes but is applicable to the automatic vending, for example, of video cassettes, music cassettes and books.

[0016] An advantageous application of the invention is for the sale of telephone cards.

[0017] In this application, a telephone card is sold in a package in which the wrapper of the card is constituted by a compact-disc or CD-ROM case.

[0018] As is known, these cases, made of transparent plastics material, are quite fragile and, above all, the portions articulating their two halves are subject to breakage.

[0019] A package constituted by a compact-disc or CD-ROM case containing a telephone card may be very welcome to purchasers who, as well as obtaining the card, thus obtain a new case to replace a broken case of one of their compact-discs or CD-ROMs.

[0020] The subject of the invention will become clearer from the following detailed description, given with reference to the appended drawings which illustrate a preferred embodiment thereof and in which:

Figure 1 is a perspective view of an automatic vending machine according to the invention which comprises two columns of magazines, disposed side by side, between which columns there is a common release station and an underlying receptacle, also common, for the withdrawal of the articles purchased,

Figure 2 is a partially cut-away top plan view showing one of the magazines of the vending machine and one half of the release station disposed beside it,

Figure 3 is a partially cut-away elevational view taken on the arrow III of Figure 2, and

Figures 4 and 5 are partial perspective views which illustrate the front portion of the magazine, the adjacent release station, as well as the means for

transferring the articles from the magazine to the release station, in a rest condition, and in a condition for the transfer of an article, respectively.

[0021] With reference to Figure 1, an automatic vending machine according to the invention comprises a casing in the form of a cabinet, generally indicated 10.

[0022] The cabinet 10 has a flat, transparent front wall constituted by a vertical sheet of glass or of plastics material, for example "Plexiglas".

[0023] The cabinet 10 contains two columns of magazines 14 each of which in turn contains, as will be explained below, a horizontal series of flat articles such as cases containing compact discs.

[0024] In Figure 1, the larger faces of these cases, which are fitted against the transparent wall 12 and which carry graphical elements visible through the wall, are indicated 16.

[0025] A release station common to the two columns of magazines 14 and disposed between them is generally indicated 18.

[0026] The release station 18 is arranged as a narrow columnar duct to which the articles purchased are transferred from the magazines 14 in order then to fall into an underlying common withdrawal receptacle 20.

[0027] The receptacle 20 preferably has a soft covering to prevent damage to the articles which fall into it.

[0028] Indicated 22, 24 and 26, respectively, are slots for the insertion of payment means such as coins 22, bank notes 24, and credit cards 26.

[0029] A receptacle for the withdrawal of change in coins is indicated 28.

[0030] The introduction of a payment means through a respective slot 22, 24 or 26 activates consent means (not shown) which, as a result of the payment, cause transfer means described further below, to perform a cycle during which the transfer means transfer an article from one of the magazines 14 to the release station 18 and are then made ready for a subsequent transfer.

[0031] Selection push-buttons associated with each magazine 14 are indicated 29.

[0032] In order to purchase a compact disc (or other article), before or after making the payment, the purchaser pushes the push-button 29 situated beside the article desired in order thus to set in motion the transfer means associated with the magazine 14 which contains both this article and a plurality of other identical articles, in series.

[0033] According to an advantageous alternative, not shown, the push-buttons 29 are replaced by a single numerical keypad, possibly with a display for supplying all of the information relating to the articles for sale.

[0034] In this case, the various compact discs or other articles are identified by progressive numerals disposed at the side in place of the push-buttons 29.

[0035] In order to select the desired article, the purchaser enters the number corresponding to that article by means of the keypad.

[0036] In Figure 1, an automatic vending machine which comprises two columns of magazines 14 and a common release station 18 is considered.

[0037] However, the subject of the invention extends, on the one hand, to an automatic vending machine comprising a single magazine and a single release station with the respective withdrawal receptacle and, on the other hand, to an automatic vending machine comprising more than two magazines, not only arranged in one or more columns, but also several magazines in a radial arrangement or several columns of magazines in a radial arrangement, for example, housed in a cabinet which is rotatable like a carousel, together with one or more withdrawal stations.

[0038] Although the drawing relates to an automatic vending machine in which the transparent wall 12 is vertical, the invention is applicable to automatic vending machines in which the transparent wall is an upper, horizontal wall, such as a surface of a sales counter, or is inclined.

[0039] Only one of the magazines 14 of Figure 1 and the respective release station 18 or part thereof will be considered in the following detailed description relating to Figures 2 to 5.

[0040] In Figures 2 to 5, the flat articles for sale are indicated 30 and are in the form of cases each containing a compact disc.

[0041] The first article of the series is indicated 30a and a larger face thereof, again indicated 16, is fitted against the transparent wall, again indicated 12.

[0042] The second article of the series is indicated 30b and the last article is indicated 30c.

[0043] The release station situated beside the magazine 14 is again indicated 18.

[0044] This release station 18 is defined at the front by the transparent wall 12 and at the rear by a restraining or guide wall 32.

[0045] The distance between the transparent wall 12 and the restraining wall 32 is slightly greater than the thickness of a single article 30.

[0046] The two walls 12 and 32 define between them a narrow vertical duct 34 to which the first article 30a of the series is transferred each time, upon purchase, in order then to fall therein as far as the withdrawal receptacle 20 of Figure 1.

[0047] The magazine 14 has guide means in the form of a channel 36 of sheet-metal or the like.

[0048] The channel 36 comprises a base wall 38, on which the series of articles 30 bears, and a pair of opposed side flanges acting as restraining side walls for the articles 30.

[0049] One of the side walls, indicated 40, is constituted by a smaller right-angled flange, remote from the release station 18.

[0050] The other side wall, indicated 42, is constituted by a larger right-angled flange, adjacent the release station 18.

[0051] The base wall 38 has a front edge 38a which

extends beyond the side wall 42 and which reaches the glass wall 12 on which the first article 30a of the group bears.

[0052] As will be understood, the guide means constituted by the channel 36, or rather by its base wall 38 and by its side walls 40, 42, allow the series of articles 30 to slide towards the transparent wall 12.

[0053] Thrust means associated with the channel 36 act resiliently on the last article of the series, indicated 30c and situated at the end remote from the transparent wall 12, and hold the larger face 16 of the article 30a situated nearest to the transparent wall 12 against that wall.

[0054] In the preferred embodiment, shown in Figures 2 to 5, the thrust means comprise a thrust member in the form of a slide 44 slidable longitudinally in the channel 36.

[0055] The slide 44 is constituted by a box-like element of sheet metal or the like which comprises, amongst other things, a base wall 46, side walls 48, 50 and a front wall 52.

[0056] The base wall 46 is slidable on the base wall 38 of the channel 36 and the side walls 48, 50 cooperate with the side walls 40, 42 of the channel 36, respectively.

[0057] The front wall 52 constitutes a face for pressing or pushing against the last article 30c of the series.

[0058] The side wall 42 of the channel 36 has a longitudinal guide slot 54 (Figure 3) which acts as a track for a pair of grooved rollers 56 mounted rotatably on the outside of the wall 50 of the slide 44.

[0059] A helical tension spring 58 extending along the side wall 42 of the channel, on the outer side thereof, also forms part of the thrust means.

[0060] The spring 58 is anchored at a fixed point 60 at one end and, at the other end, to a pin 62 on which the roller 56 remote from the transparent wall 12 is mounted rotatably.

[0061] As will be understood, the spring 58 keeps the articles 30, 30a, 30b, 30c of the series packed together, by means of the slide 44, as well as holding the larger face 16 of the article 30a situated nearest to the transparent wall against that wall.

[0062] The side wall 48 of the slide 44 has a tab 64 which is bent at right angles and serves as a grip; the slide 44 can be moved rearwardly against the biasing force of the spring 58 by finger action on the grip 64 so as to move the slide away from the last article 30c of the series or group, so that further articles 30 can be inserted in the channel 36 as the group is gradually used up.

[0063] The transfer means which serve to transfer one article at a time from the magazine 14 to the release station 18, after payment of the corresponding amount, each time, will now be described.

[0064] The transfer means comprise a slide 66 slidable along the transparent wall 12 along fixed horizontal guide rods 68 parallel to the wall 12.

[0065] The slide 66 is constituted substantially by a plate 70 of sheet metal or the like, of which an edge re-

mote from the transparent wall 12 is toothed so as to form a set of teeth 72.

[0066] A bracket 74 fixed firmly to the slide 66 carries a reversible geared electric motor unit 76.

[0067] A pinion 78 keyed to the output shaft of the geared motor unit 76 meshes with the set of teeth 72.

[0068] The set of teeth 72 has a length such as to allow the slide 66 to move to and fro between the magazine 14 and the release station 18 in order to transfer the first article 30a of the series or group from the magazine 14 to the station 18.

[0069] In order to effect this transfer, the slide 66 has a thrust member in the form of a block 80, preferably made of plastics material with a low coefficient of friction, situated at the end of the slide 66 remote from the release station 18.

[0070] The thrust block 80 has a thickness, in the direction of movement of the group of articles, no greater than the thickness of each article 30, so that it can push the first article 30a from the magazine 14 to the release station 18 without interfering with the second article 30b.

[0071] Before the operation of the transfer means is described, retaining means which temporarily prevent the group of articles 30 from moving towards the transparent wall 12 when the first article 30a of the group is transferred will be described.

[0072] In the preferred embodiment shown in particular in Figures 4 and 5, the retaining means comprise a retaining block 82, preferably made of plastics material with a low coefficient of friction, carried by a resiliently flexible plate 84.

[0073] A lower end of the plate 84 is anchored at a fixed point on the side wall 40 of the channel 36, as indicated at 86, and the retaining block 82 is carried by the plate 84 in the vicinity of the free end thereof.

[0074] The retaining block 82 is thus arranged facing the thrust block 80 and, in the same manner as this block 80, has a thickness, in the direction of movement of the group of articles 30, no greater than that of the articles, so that it can be disposed in front of the article 30b which succeeds the first article 30a when the first article leaves the magazine under the thrust of the thrust block 80.

[0075] In Figure 4, the slide 66 is disposed in the region of the magazine 14 and the thrust block 80 acts as a repulsion member which engages the retaining block 82 and keeps it in an inactive position, as shown in Figure 4, by virtue of the resilient bending of the plate 84.

[0076] In this inactive position, the retaining block 82 does not interfere with the second article 30b of the group.

[0077] When the first article 30a is transferred by the slide 66, by means of the thrust block 80, in the direction of the arrow F2 of Figure 5, the spring plate 84 straightens and brings the retaining block 82 to an active position, shown in Figure 5, in which this block 82 interferes with the second article 30b and can no longer move forwards, together with the articles 30 following it, under the thrust of the slide 44, acted on by the spring 58, in

the direction of the arrow F1 (Figure 2).

[0078] This function of the retaining block 82 will be explained further in the description of the operation of the vending machine given below.

[0079] When a purchaser has paid the necessary sum and has selected the article desired by pressing the respective button 29 (Figure 1), the consent means cause the geared electric motor unit 76 to be energized so as to operate in the direction corresponding to translation of the slide 66 from the position corresponding to Figure 4 to a travel limit position coinciding with the duct 34 of the release station 18, as indicated by the arrow F2 of Figure 5.

[0080] In Figure 5, the slide 66 is on the point of reaching this travel limit position.

[0081] During this movement of the slide 66 in accordance with the arrow F2, the thrust block 80 drags along the first article 30a which is moved towards the release station 18, sliding on the front edge 38a of the base wall 38.

[0082] When the slide 66 has reached its travel limit position in the release station 18, the first article 30a falls through the duct 34 to reach the receptacle 20 (Figure 1).

[0083] The reaching of this travel limit position of the slide 66 is indicated to the consent means by a microswitch, not shown. This microswitch reverses the movement of the geared motor unit 76 so that the slide 66, without the article delivered, returns to the original position of Figure 4 in the opposite direction to that of the arrow F2, so as to be ready for a subsequent transfer.

[0084] When the slide 66 returns to its original position which coincides with the magazine 14, its block 80, acting as a repulsion member, pushes the retaining block 82 back to the position of Figure 4 in which it no longer interferes with the next article 30b of the group.

[0085] The spring 58 then pushes the entire group of articles 30 in the direction of the arrow F1 of Figure 2, by means of the slide 44, until the first article is fitted against the transparent wall 12.

[0086] The conditions for the delivery, after payment, of a further first article such as that indicated 30a in Figures 2 to 4 are thus re-established.

Claims

1. An automatic vending machine for flat articles (30) such as cases containing compact discs, of the type comprising a cabinet (10) or similar housing which contains:

- at least one magazine (14) which is defined by a transparent flat wall (12) and can hold a series of the articles (30) with a larger face (16) of a first article (30a) of the series facing the transparent wall so that graphical elements which are on this larger face are visible through the

wall,

- at least one release station (18) with an underlying receptacle (20) from which the articles (30) can be withdrawn by a purchaser,
- transfer means (66) for transferring the article (30a) of the series which is nearest to the transparent wall (12) from the magazine (14) to the release station (18), each time, and
- transfer consent means which can be activated as a result of the insertion of payment means such as coins, bank notes or credit cards, in order to cause the transfer means (66) to perform, as a result of a payment, a cycle in which it transfers the first article (30a) from the magazine (14) to the release station (18) and is then made ready for a subsequent transfer,

characterized in that:

- the magazine (14) is arranged to hold the series of articles- (30) in an arrangement in which the articles are packed against one another,
- the magazine (14) has guide means (36) which enable the series of articles (30) to slide towards the transparent wall (12), and thrust means (44, 58) which act resiliently on the article (30c) of the series situated at the end remote from the transparent wall (12) and which hold the larger face (16) of the article (30a) situated nearest the transparent wall (12) against that wall,
- the release station (18) is situated beside the magazine (14), and
- the transfer means (66) can drag the article (30a) which is disposed against the transparent wall (12) from the magazine (14) to the release station (18), each time.

2. An automatic vending machine according to Claim 1, characterized in that the guide means comprise a channel (36) for the sliding of the articles (30), and the thrust means comprise a slide (44) slidable longitudinally in the channel (36) and a spring (58) which urges the slide towards the transparent wall (12).

3. An automatic vending machine according to Claim 2, characterized in that the spring is a helical tension spring (58) which extends along a side wall (42) of the channel (36).

4. An automatic vending machine according to any

one of Claims 1 to 3, characterized in that the transfer means comprise a slide (66) slidable along the transparent wall (12) between the magazine (14) and the release station (18) and having a thrust member (80) which engages, with pressure, the article (30a) held against the transparent wall (12), on the side of the article remote from the release station (18), in that the slide (66) has a set of teeth (72), in that the transfer means further comprise a reversible electric motor (76) an output shaft of which carries a pinion (78) meshed with the set of teeth (72), the set of teeth having a length such as to allow the slide (66) to move to and fro between the magazine (14) and the release station (18), and in that retaining means (82) are provided for preventing the article (30b) succeeding that which has been withdrawn from taking up the position of the withdrawn article (30a) until the slide (66) has returned to the magazine (14).

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5. An automatic vending machine according to Claim 4, characterized in that the retaining means comprise a retaining block (82) movable between an active position in which it interferes with the succeeding article (30b) and prevents it from reaching the position of the withdrawn article (30a), and an inactive position in which it allows the succeeding article (30b) to take up the position of the withdrawn article, resilient means (84) for biasing the block (82) to the active position, and repulsion means (80) fixed firmly to the slide for urging the retaining block (82) back to the inactive position when the slide (66) returns to the magazine (14), and for holding the retaining block (82) in the inactive position when the slide (66) is stationary in the region of the magazine (14).

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6. An automatic vending machine according to Claim 5, characterized in that the resilient biasing means of the retaining block (82) consist of a resiliently flexible plate (84) one end of which is anchored at a fixed point (86) on a side of the magazine (14) remote from the release station (18), and to another, free end of which the retaining block (82) is fixed, and in that the repulsion means consist of a repulsion member (80) carried by an end of the slide (66) remote from the magazine (14), for engaging the retaining block (82) in order to urge it back to the inactive position and to hold it in this position, by virtue of the resilient bending of the plate (84).

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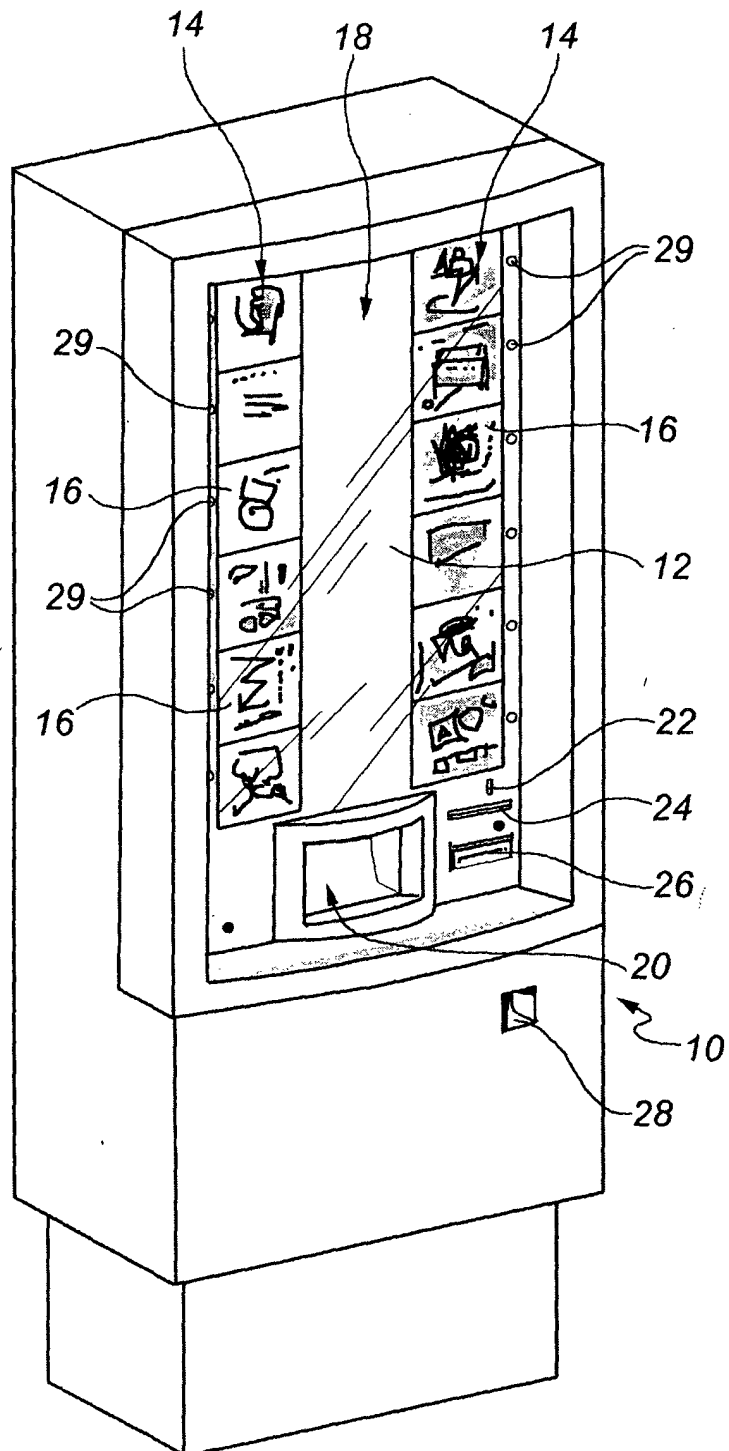
7. An automatic vending machine according to Claim 6, characterized in that the thrust member and the repulsion member are constituted by a single block (80).

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8. An automatic vending machine according to any one of the preceding claims, characterized in that, in the operative condition of the vending machine,

the transparent wall (12) is vertical and the guide means (36) and the series of articles (30) extend horizontally, perpendicular to this wall.

fig.1



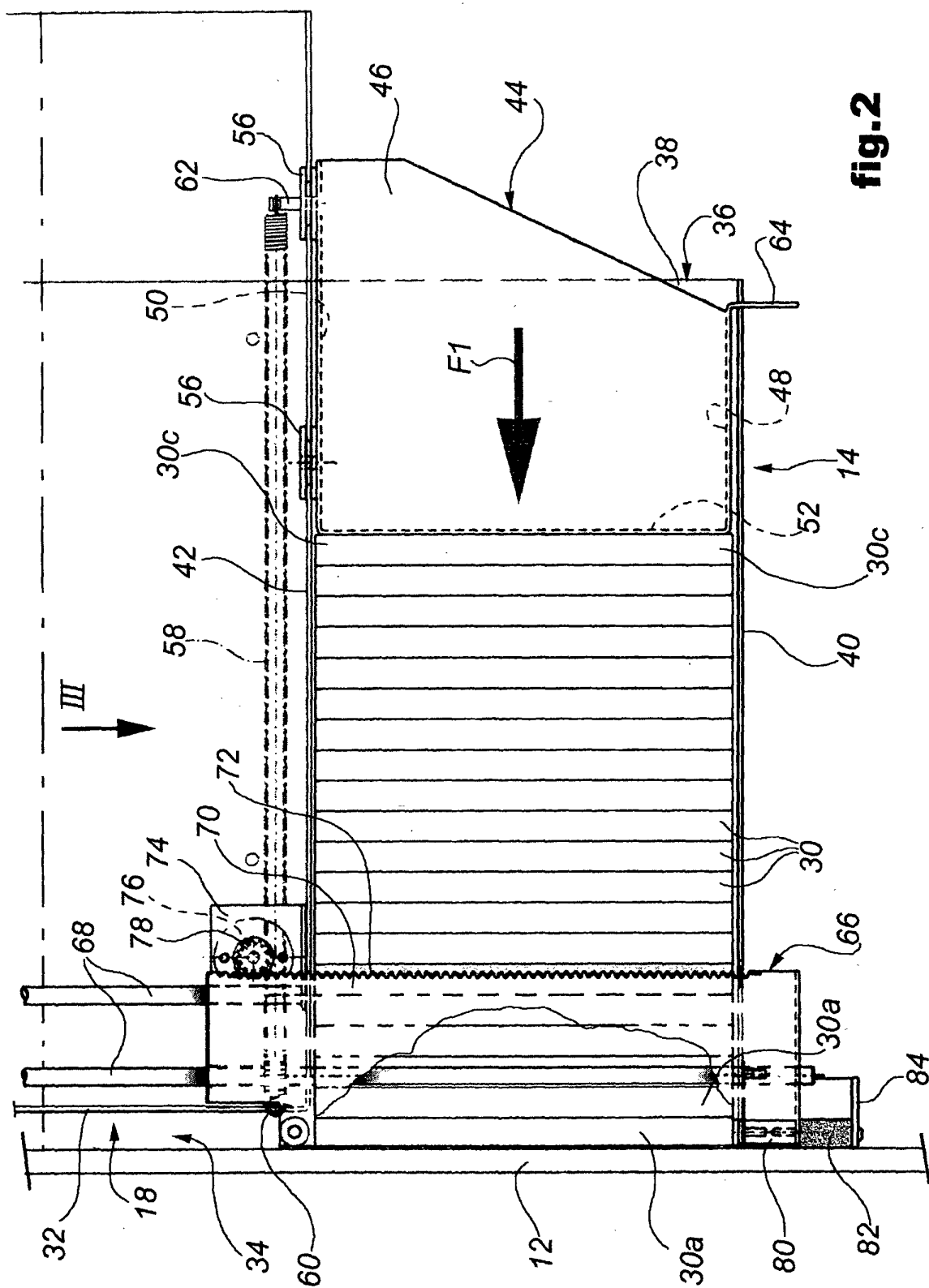
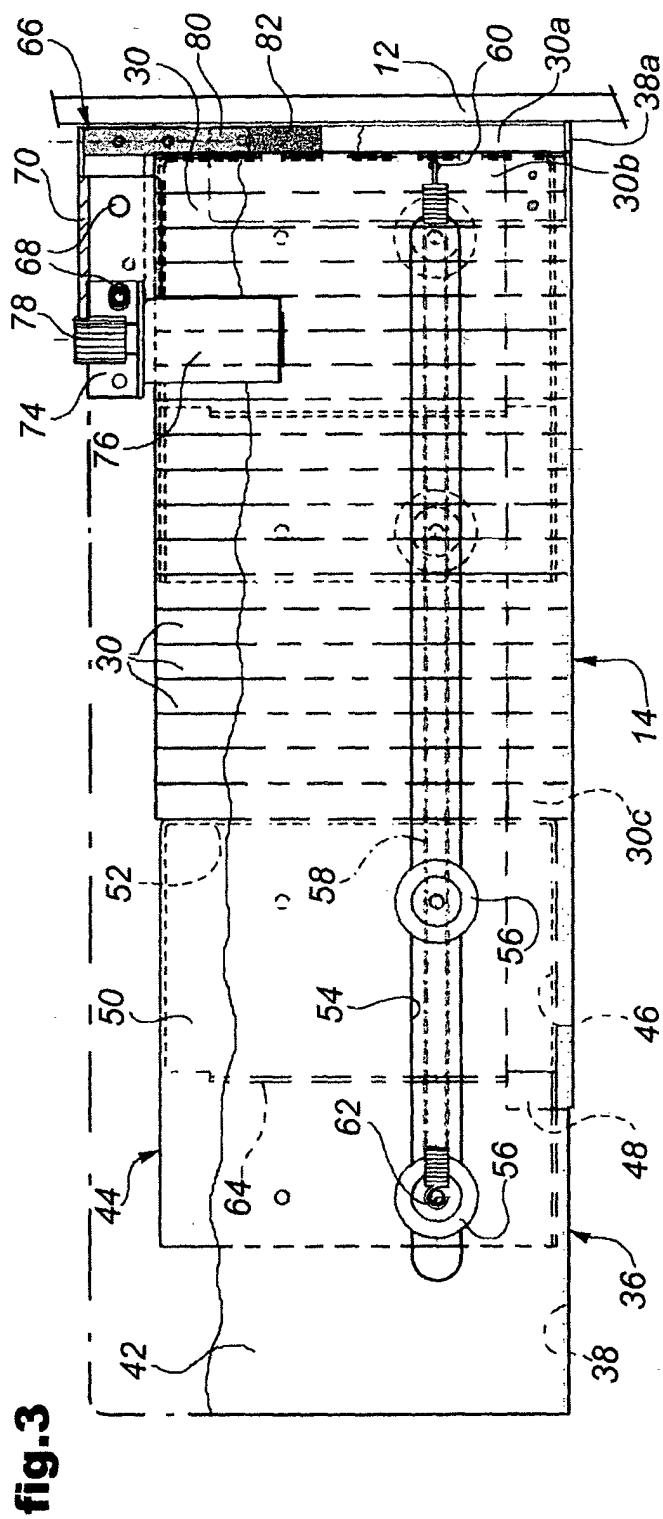


fig.2



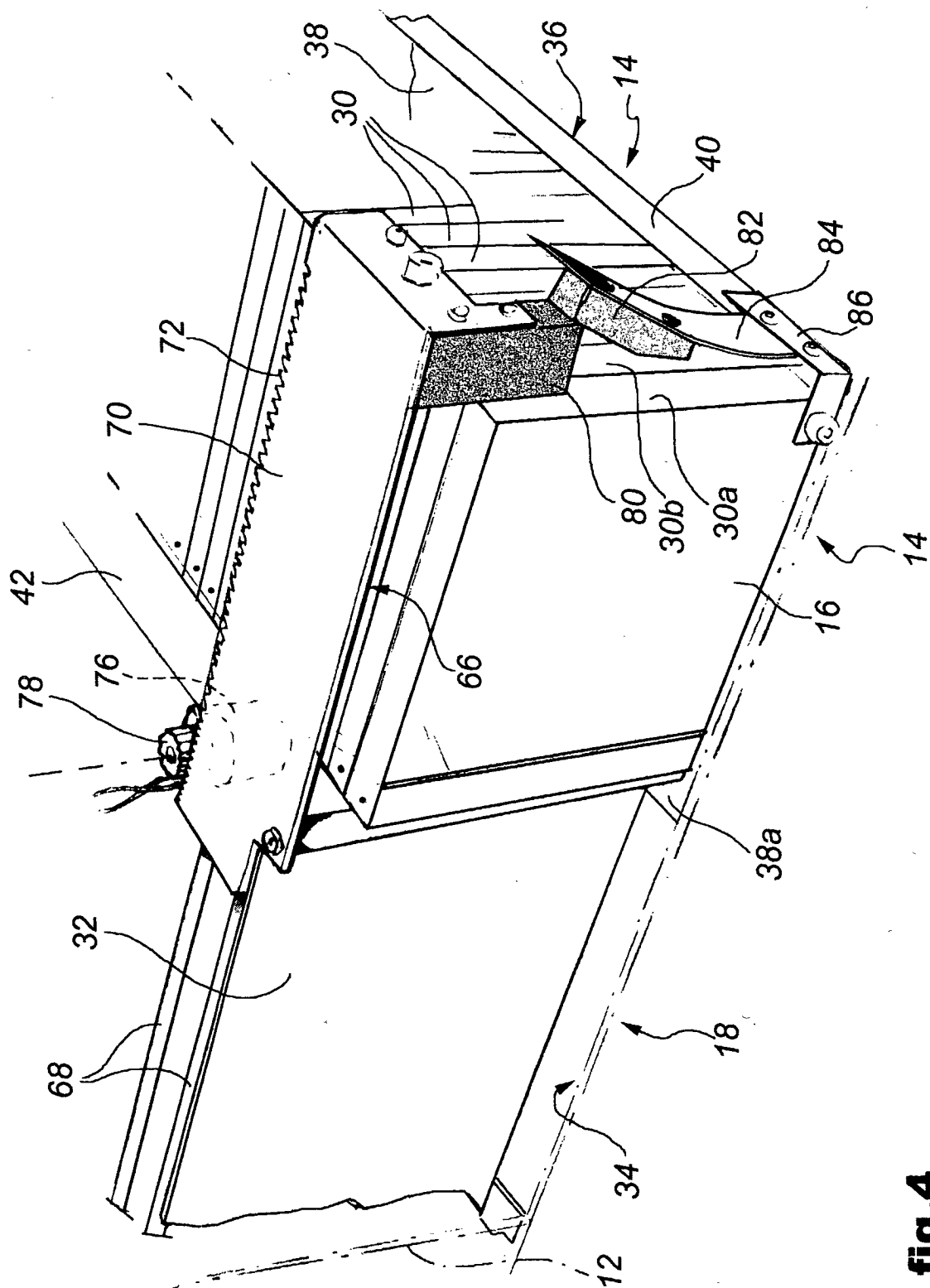


fig.4

fig.5

