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(54) Dispensing mechanism for vending machine

(57) A chamber of a vending machine is horizontally divided into plural storage areas of articles by shelf elements 30 each of which is provided with a conveyor means 31 to hold the articles, and on demand to convey them to an article delivery means including a bucket 212 which is disposed in the chamber for vertical movement and can be stopped in the predetermined position which is opposite the appropriate shelf element. The dispensed article is thus delivered to the vending stage by the operation firstly of the conveyor and secondly of the bucket which moves whilst upright to its lowermost position, and then tips forwardly to discharge the article through the front of the machine. The conveyors 31 may slope downwardly toward the rear and/or outer sides of the machine, and a plurality of conveyors may be present one behind the other on a given shelf 30.

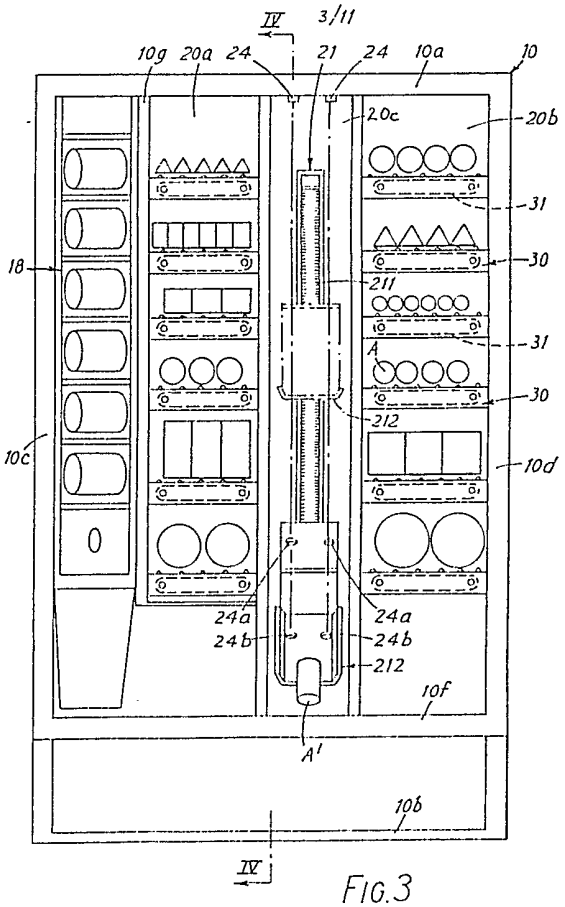

FIG.3

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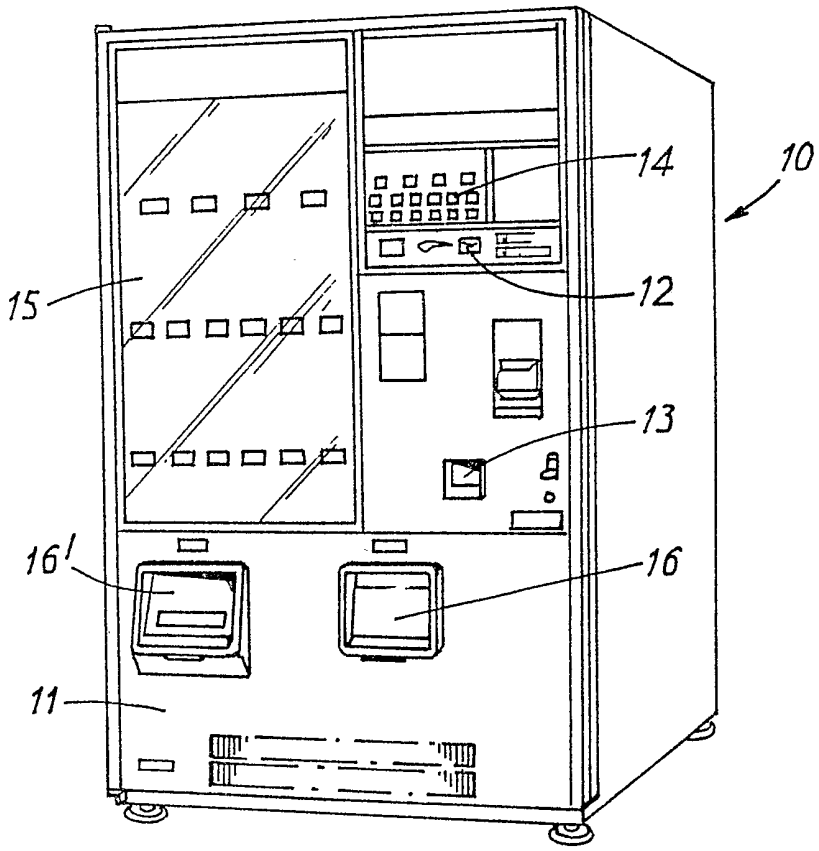
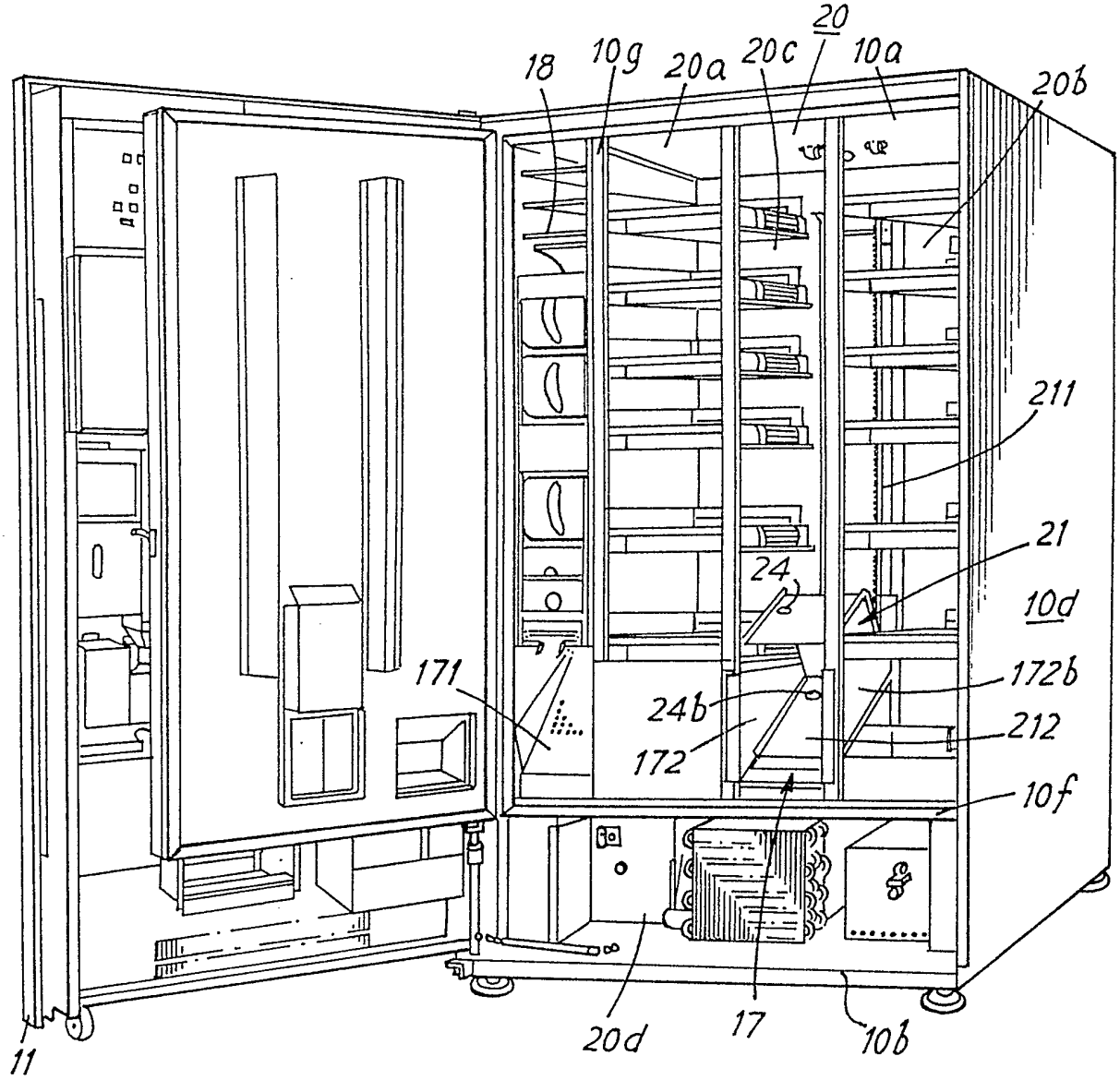


FIG. 1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10g
20a
20c
20
10a
20b
211
21
24
10d
171
172b
24b
212
172
10f
11
20d
17
10b

FIG.2

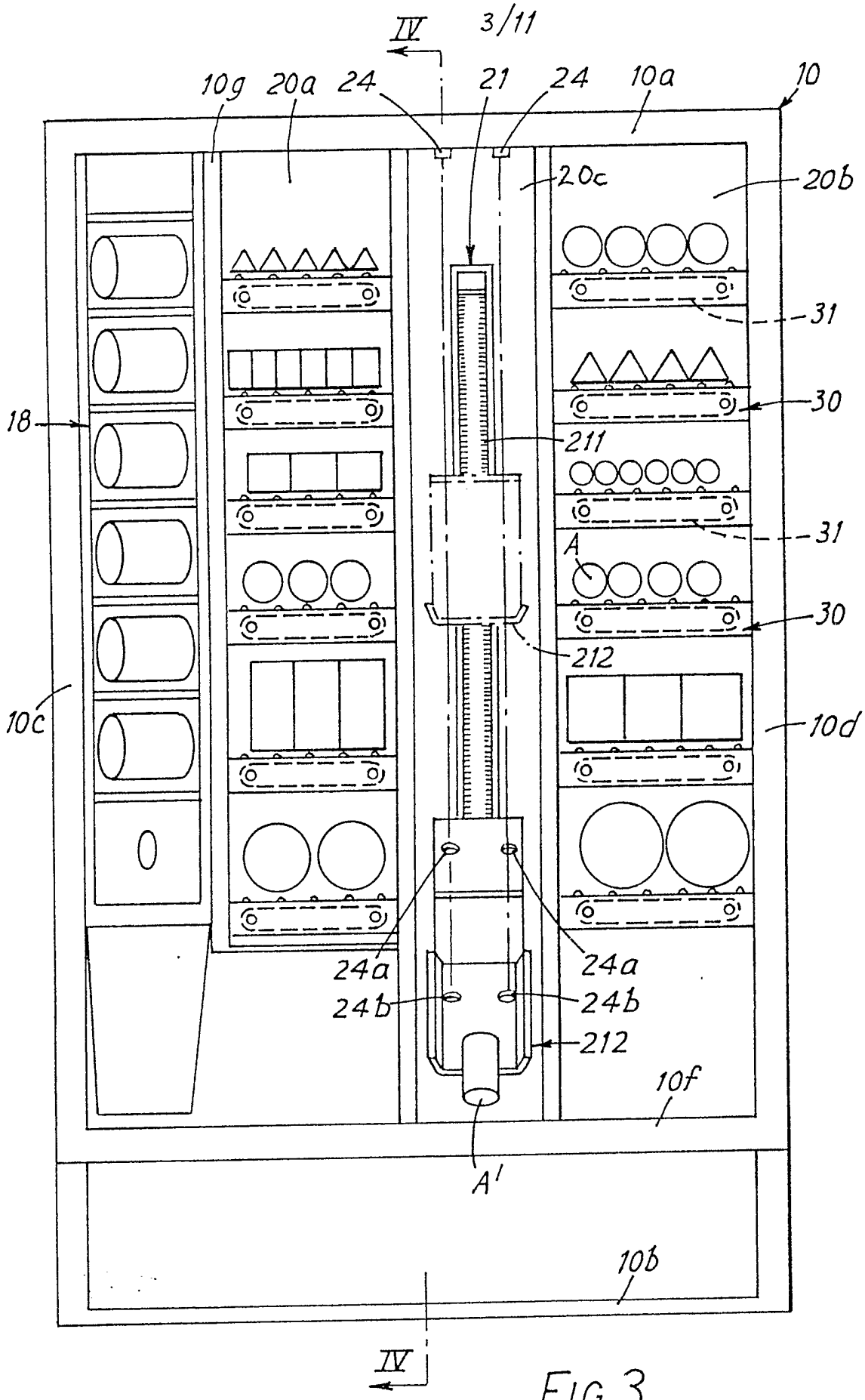

IV
10g
20a
24
21
24
10a
10
20c
20b
31
30
18
211
31
A
30
212
10c
10d
24a
24a
24b
24b
212
10f
A'
10b
IV

FIG.3

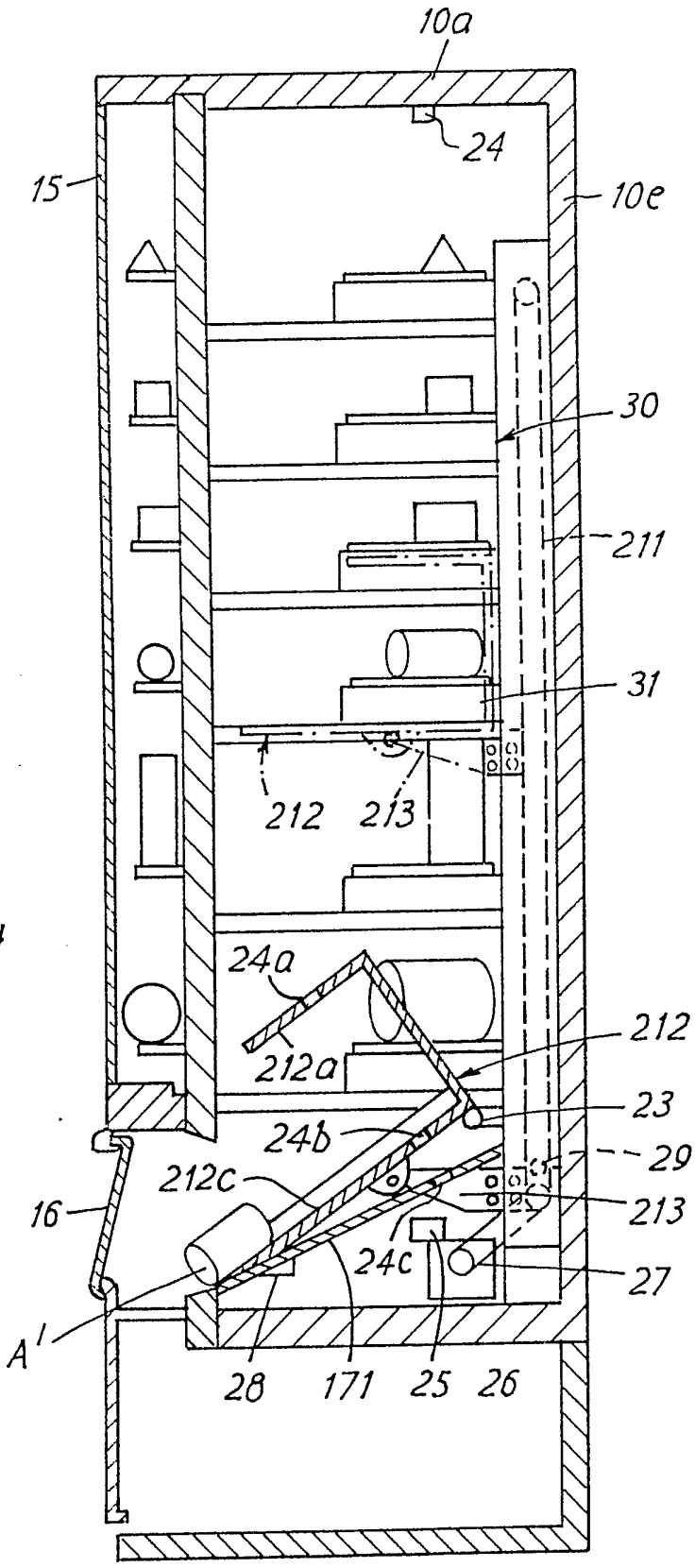

10a
24
15
10e
30
211
31
212
213
24a
212a
212
23
24b
29
212c
213
16
24c
27
A'
28
171
25
26

FIG.4

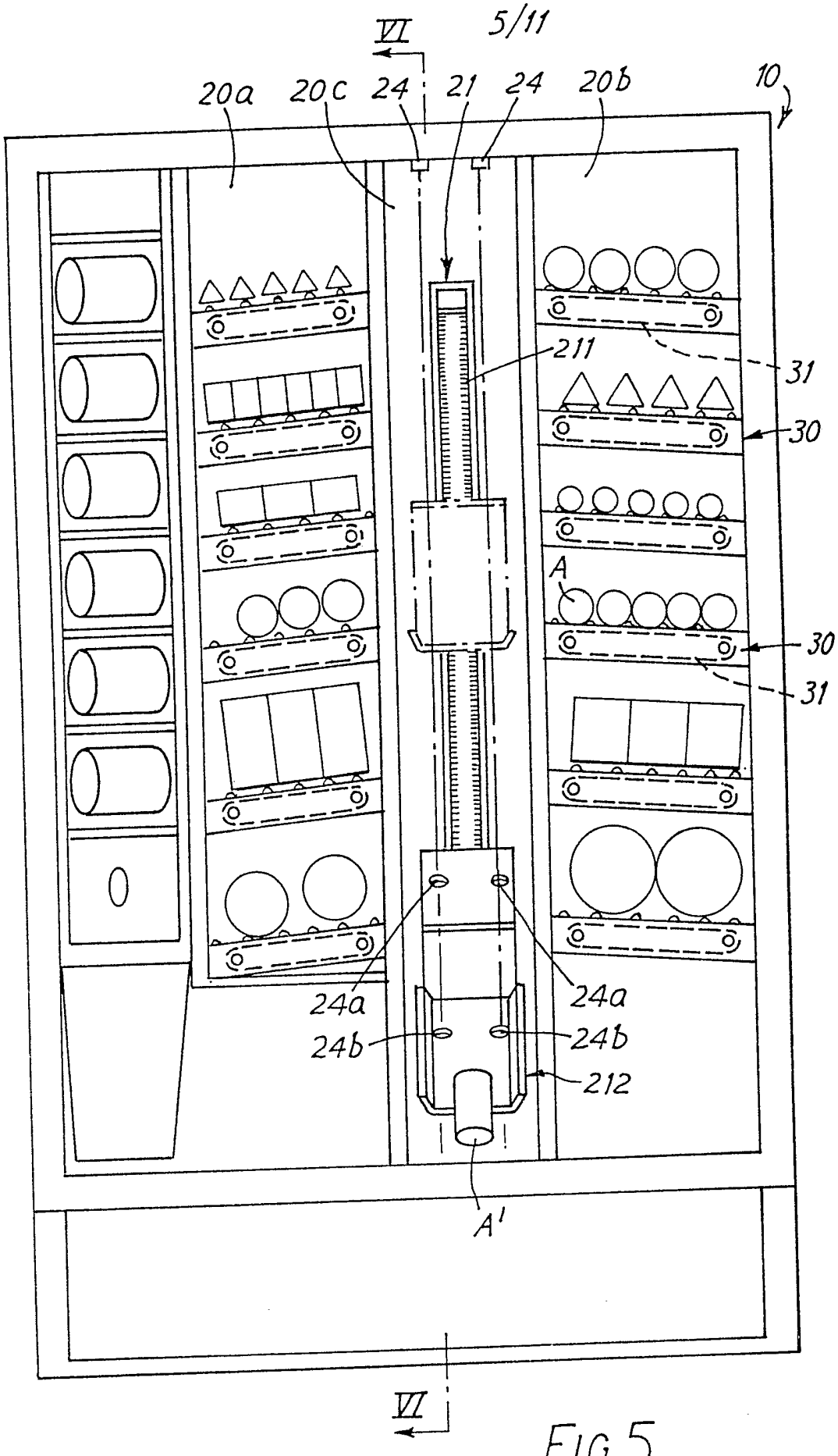


FIG.5

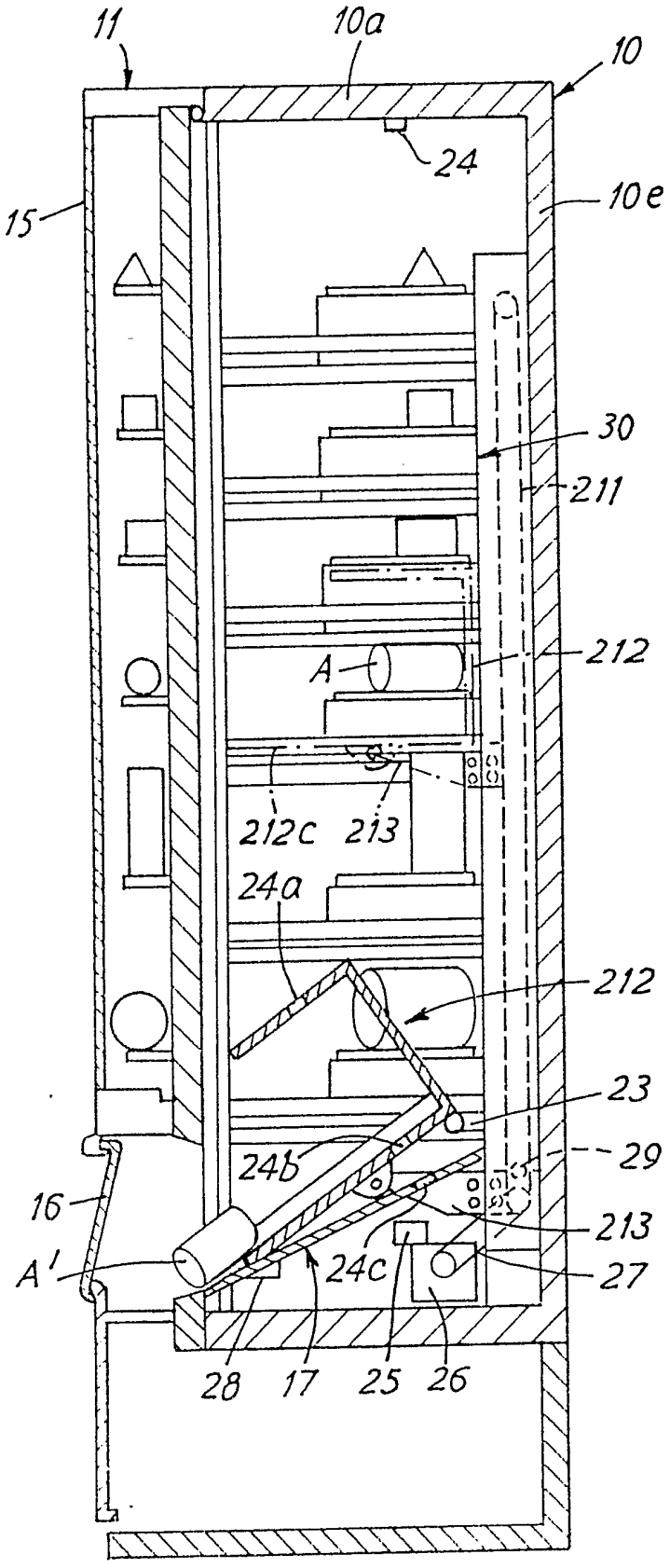

11
10a
10
24
10e
15
30
211
212
A
212c
213
24a
212
23
24b
29
16
213
A'
24c
27
28
17
25
26

FIG.6

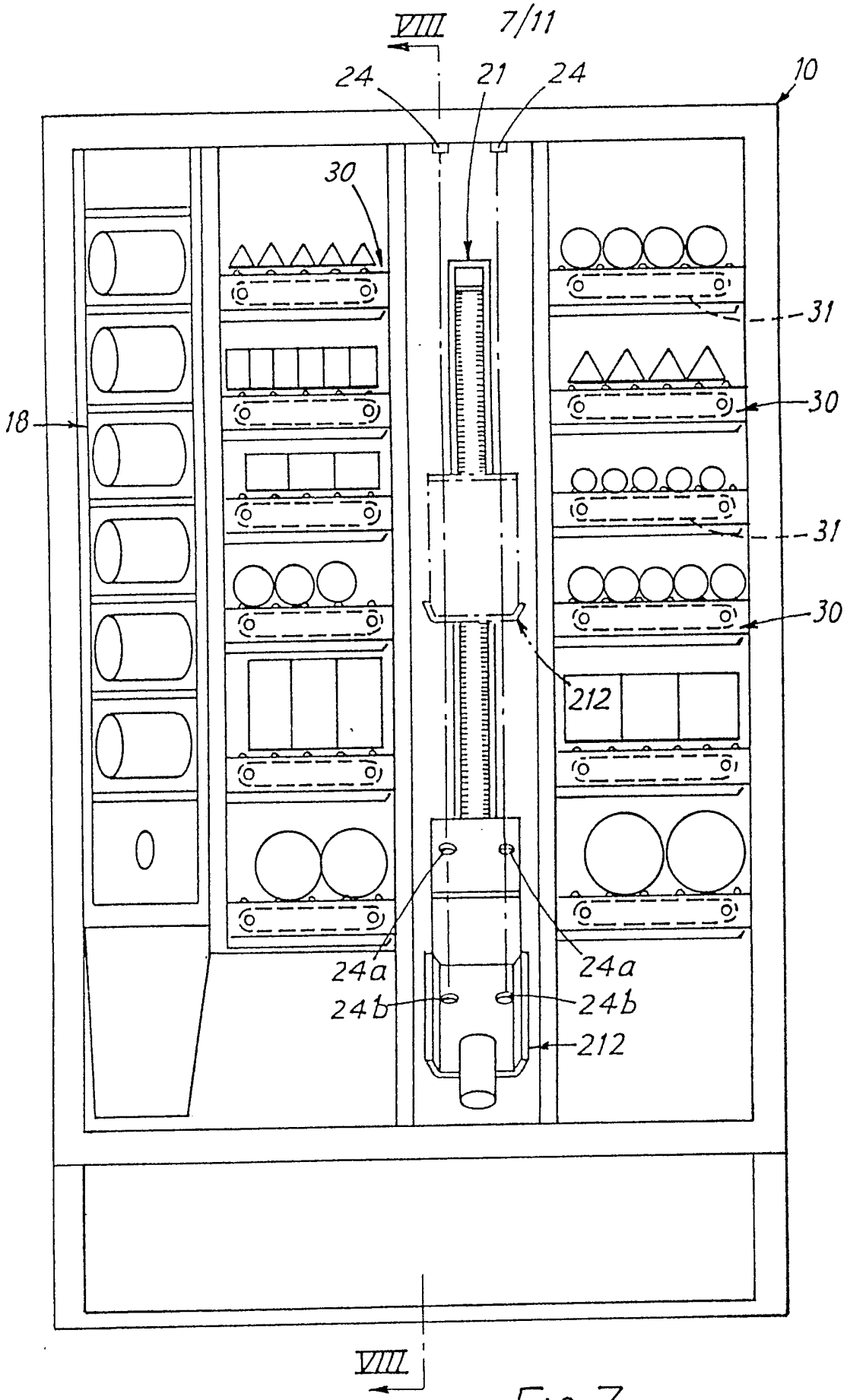
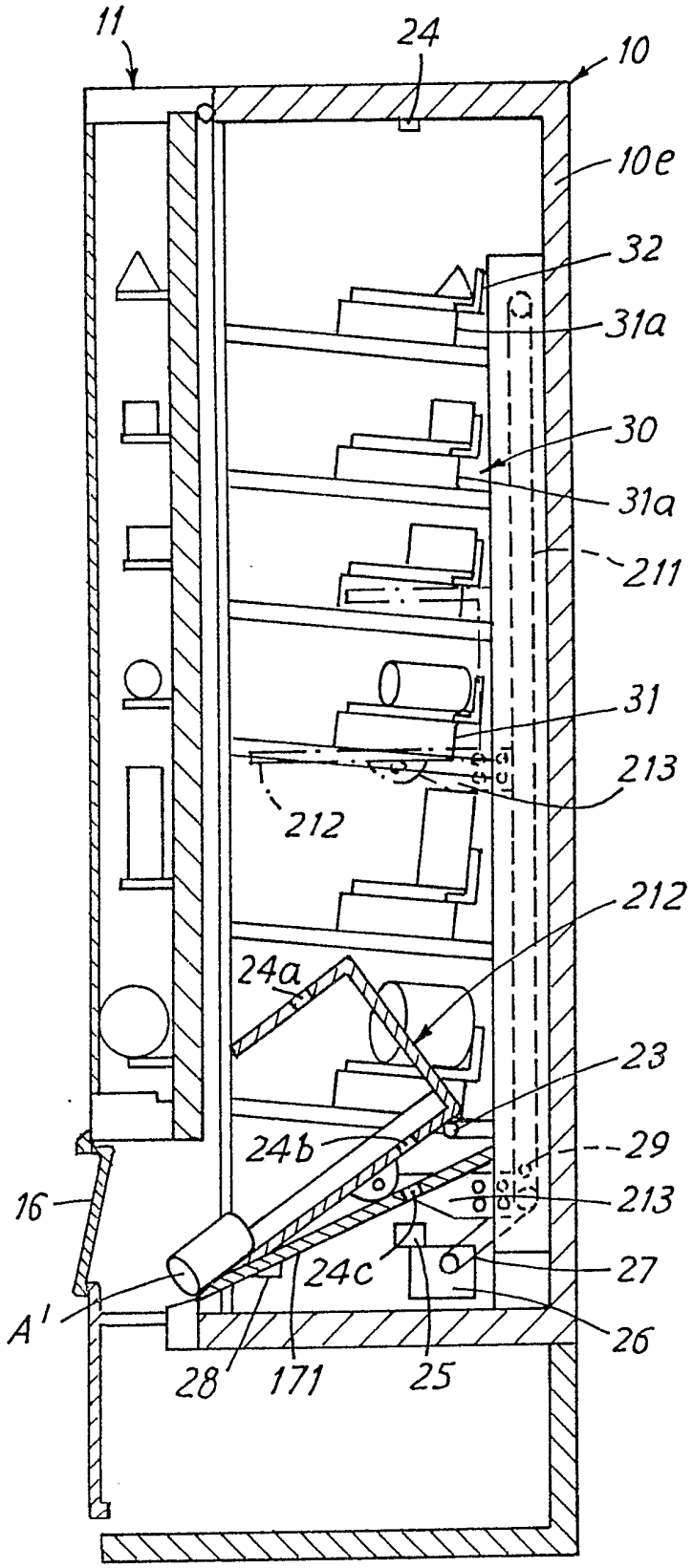


FIG. 7


11
24
10
10e
32
31a
30
31a
211
31
213
212
212
24a
23
24b
29
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213
27
24c
A'
26
28
171
25

FIG. 8

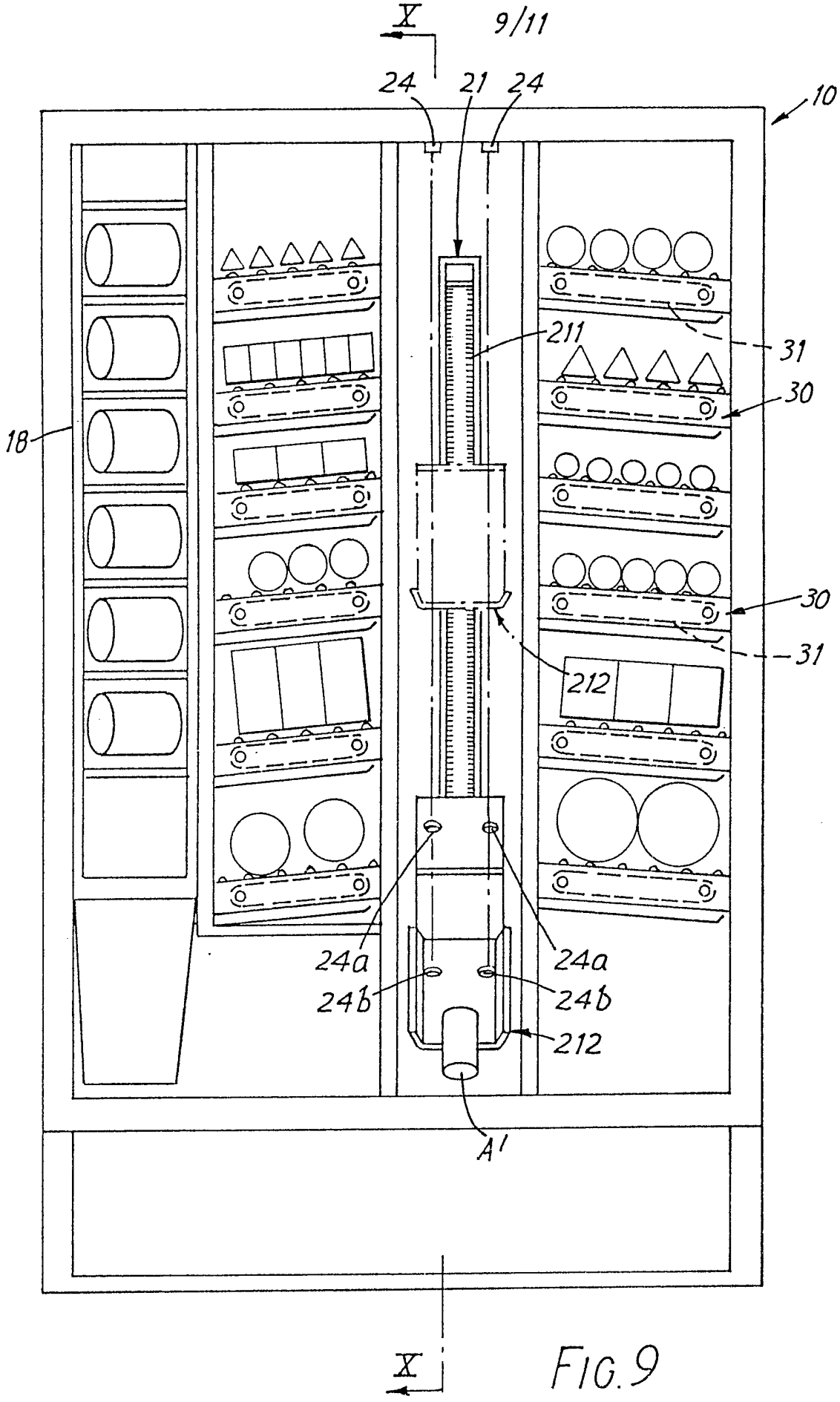
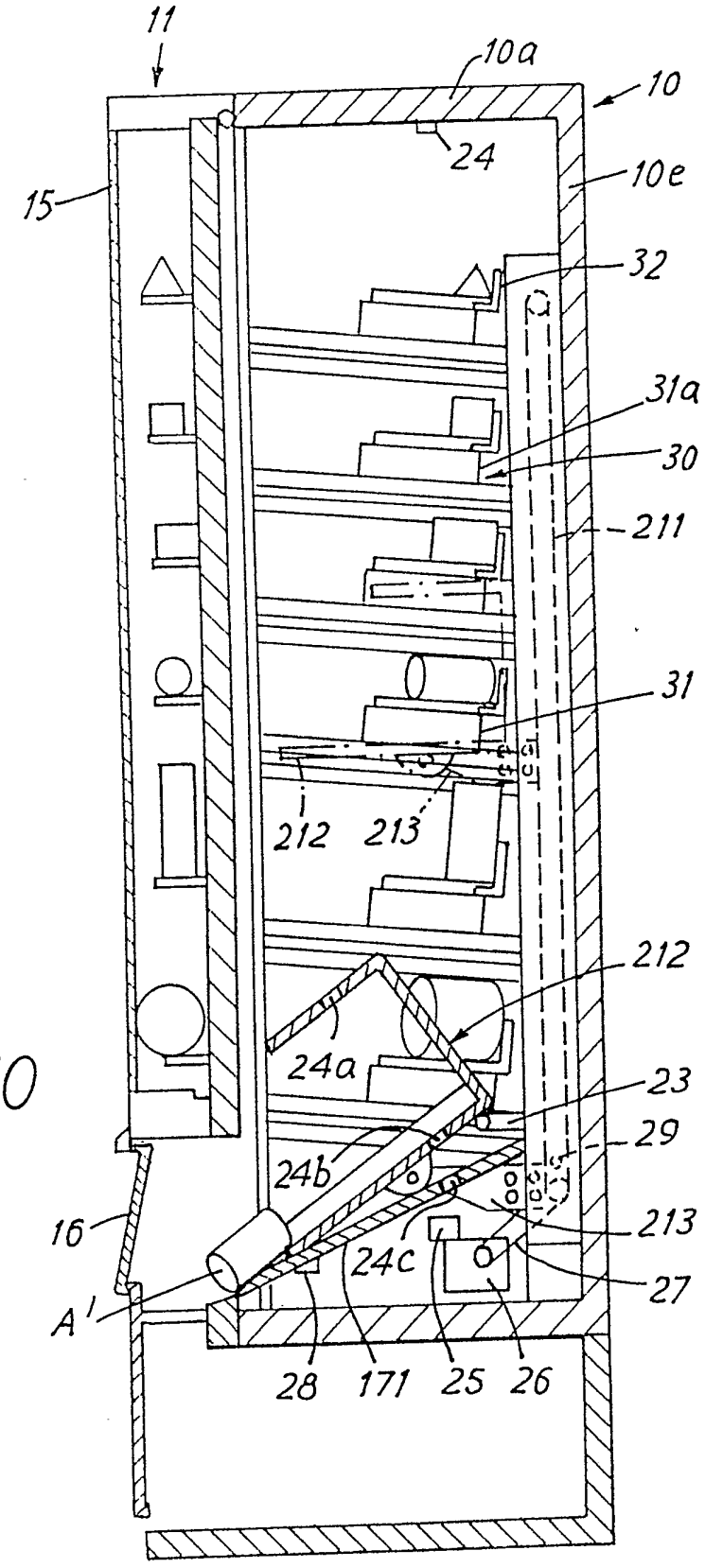


FIG. 9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10a
10
24
10e
15
32
31a
30
211
31
212
213
212
24a
23
29
24b
213
16
24c
27
A'
28
171
25
26

FIG. 10

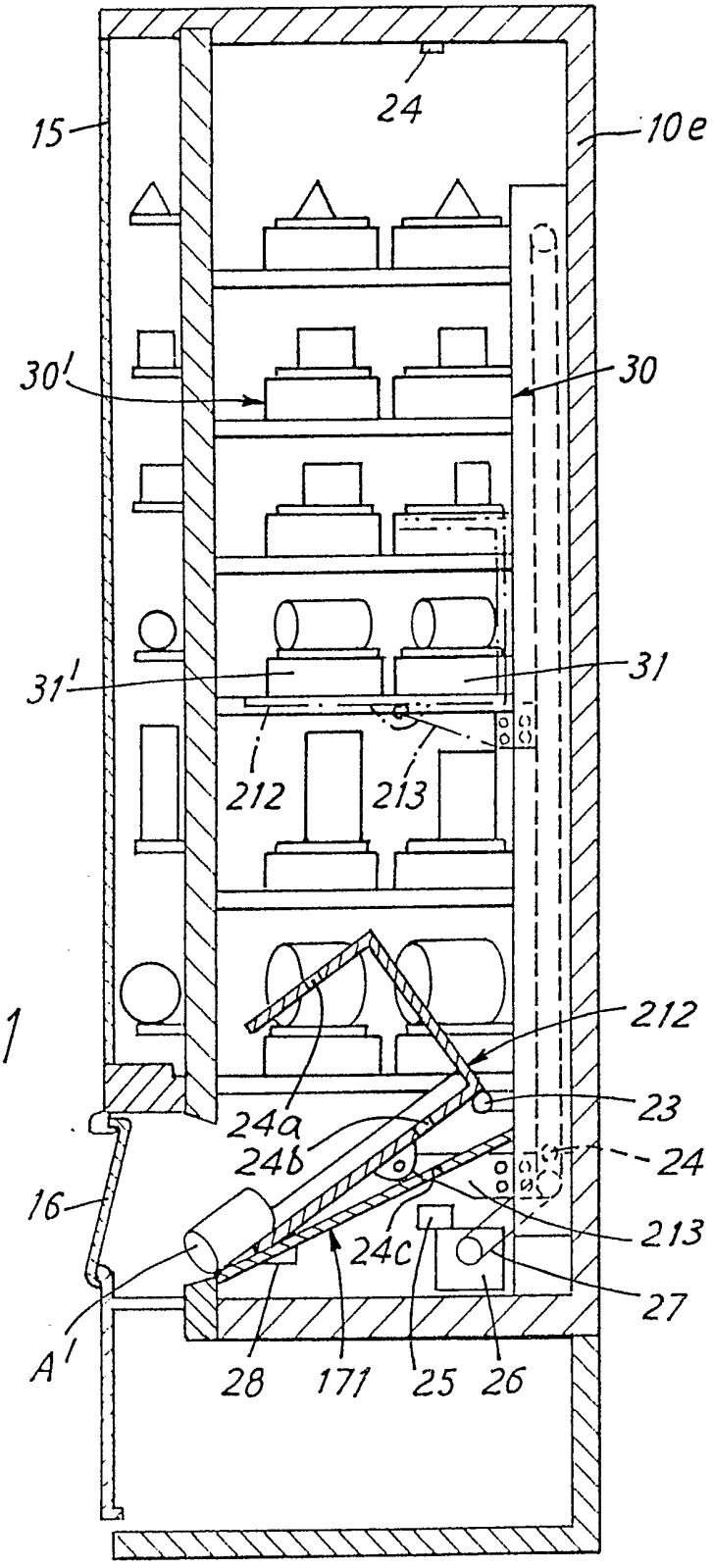
24
15
10e
30'
30
31'
31
212
213
212
23
24a
24b
24
16
213
24c
27
A'
28
171
25
26

FIG.11

SPECIFICATION

Vending machine with dispensing mechanism to enable dispensing of various type articles

This invention relates to a vending machine, and more particularly, to a dispensing mechanism for adapting in the vending machine of a type which may be dispensed a wide variety of articles. The present invention provides structure for selectively dispensing merchandise packaged in boxes, bags, sacks, cans or wrapping paper.

Various types of dispensing mechanism have been used depending on the type of articles being vended. One known type of dispensing mechanism is a slant shelf type which is used to vend bottles or cans.

A slant shelf type dispensing mechanisms, which is shown in U.S. Patent No. 3,276,624 includes at least one slant shelt member which acts as guide for dispensing articles, and a delivery member for dispensing the articles, one by one, from the slanted shelf member. If this type mechanism, spherical or cylindrical shaped articles are easily dispensed, but triangular or quadrangle shaped articles are not easily delivered. Because frictional force between the articles and slanted shelf member is increased as prevent the sliding motion of articles. Also, the articles loaded on the slanted shelf member are usually received the pressing force from the storaged articles, therefore the packages may be deformed by pressing force.

Another type of dispensing mechanism, known as a surpentine type dispensing mechanism, is shown in U.S. Patent Nos. 3,498,497 and 3,613,945. The surpentine type dispensing mechanisms are also suitable for vending bottles or cans and includes a surpentine track having a meandering shape from top to bottom to cause the rolling down of cylindrical shaped articles from the upper end thereof to a discharge opening at lower end thereof. However, this type mechanism has almost same disadvantages as the slant shelf type dispensing mechanism.

A chain-elevator type dispensing mechanism, such as shown in U.S. Patent No. 3,193,135 is another type of known dispensing mechanism for vending the various type of articles or packages. A chain-elevator type dispensing mechanism includes a plurality of supporting elements each of which carries articles or packages. The supporting elements are connected to a chain which is moved by the motor. In this type mechanism, even though the various type of articles or packages are loaded on the supporting elements, during the operation of mechanism, articles or packages on the supporting element are easily moved and striked against the mechanism. Therefore, articles or packages may be damaged. To resolve these disadvantages, special supporting device to correspond with type of each articles should be used.

It is a primary object of this invention to provide a vending machine with a dispensing mechanism to enabling the loaded and dispensed the various type of merchandise.

It is another object of this invention to provide a dispensing mechanism for vending machine in which loading articles are storaged and delivered without damage.

It is still another object of this invention to realize the above objects employing simple construction features.

A dispensing mechanism for a vending machine according to this invention comprises a delivery device including a bucket. The bucket is vertically moved within an inner chamber of vending machine by operation of driving means and stopped the predetermined vertical position. A plurality of shelf elements are disposed in the inner chamber of vending machine to horizontally divided into a plural space to form article storage areas. A conveyor means is disposed on the each shelf elements to loaded on the storage articles and horizontally move the articles. As the conveyor means horizontally moves, articles loaded on the conveyor is delivered within the bucket, one by one.

Further objects, features and other aspects of this invention will be understood from the following detailed description of the preferred embodiment of this invention referring to the annexed drawings.

Figure 1 is a perspective view of a vending machine containing an article dispensing mechanism according to this invention.

Figure 2 is a perspective view of the vending machine of Figure 1 with the loading door opened.

Figure 3 is a front end view of the vending machine without the loading door.

Figure 4 is a sectional view taken on line III-III of Figure 3.

Figure 5 is a front end view of the vending machine containing an article dispensing mechanism in accordance with another embodiment of this invention.

Figure 6 is a sectional view taken on line V-V of Figure 5.

Figure 7 is a front end view of the vending machine containing an article dispensing mechanism in accordance with still another embodiment of this invention.

Figure 8 is a sectional view taken on line VII-VII of Figure 7.

Figure 9 is a front end view of the vending machine containing an article dispensing mechanism in accordance with further embodiment of this invention.

Figure 10 is a sectional view taken on line IX-IX of Figure 9.

Figure 11 is a sectional view of the vending machine illustrating an article dispensing mechanism according to other embodiment of this invention.

Referring to Figures 1 and 2 illustrate an article vending machine 1 which includes a cabinet 10 comprises a upper panel 10a, lower panel 10b, both side panels 10c, 10d and back panel 10e, and having a loading door 11 which extends substantially across the front opening of cabinet 10. Loading door 11 is hinged along left vertical edge of cabinet 10 in a conventional manner (not shown).

Vending machine 1 also is provided with coin slot 12 and coin return opening 13 on front face of loading door 11. A plurality of selector push buttons or switches 14 are provided on the upper and right regions of loading door 11. A wide window portion 15 to display the merchandise for dispensing is also provided on upper and left region of loading door 11. Vending stage 16 which sommunicate with a interiorly disposed discharge hopper 17, are mounted in loading door 11 and placed on it the lower region. In the embodiment shown in Figure 1, two vending stages 16 are mounted in loading door 11 and one of vending stage 16' communicates with discharge hopper 17' disposed on lower discharge opening of a surpentine column, i.e. near the right side pannel 10c, a surpentine column 18 is disposed to dispend the cans or bottles, as shown in Figures 2 and 3.

Referring to Figures 2 and 3, the inner chamber 20 of cabinet 10 is vertically divided into three chamber, such as left side chamber 20a, right side chamber 20b both of which are formed article storage space, and central chamber 20c. Also, machine chamber 20d which located lower portion of the inner chamber 20 and contain the refrigerant unit is divided by lower divided panel 10f. A divided side panel 10g is partitioned right side chamber 20a and side are contained in surpentine column 18.

An article delivery means 21 is disposed on central chamber 20c of cabinet 10 to deliver the dispensing article from the article storage area to discharge hopper 17. Delivery means 21 comprises a pair of endless chains 211 both of which are connected by cam device (not shown), and placed on the inner surface of back panel 10e to enable the vertical movement, a bucket 212 having a U-shaped cross section and connecting means 213 for communicating between the chain 211 and bucket 212. As shown in Figure 4, one end of each connecting means 213 is fastened on chain 211 and horizontally extends. The other end of connecting means 213 is rotatably connected to bottom plate 212c of bucket 212. Therefore, bucket 212 can be moved around connecting point between bottom plate 212c of bucket 212 and connecting means 213. A spring element (not shown) is placed between the bottom plate 212c of bucket 212 and connecting means 213 to hold the horizonal position of the bucket 212.

Discharge hopper 17 which has a slant plate 171 for delivering the dispensing article to vending stage 16 and side plates 172a, 172b for preventing the rolling out of article is placed on lower portion of central chamber 20c. A stopper pin 23 is formed on each of side plates 172a, 172b and placed on to oppose the bottom portion of bucket 212. Thus, in the lower position, bucket 212 is fitted against the stopper pins 23 and, following the down movement, rotated around the connecting point of bucket 212 and connecting means 213.

The upper plate 212a and bottom plate 212c of bucket 212, and slant plate 171 of hopper 17 have a plurality of holes 24a, 24b and 24c, each of which are lay on the same vertical line, during the horizontal position of bucket 212. Light source 24 and receiving device 25 are placed on the upper portion and lower portion of these vertical line which passes through the holes. In the embodiment shown in Figure 4, light source 24 is disposed on the inner surface of upper panel 10a of cabinet 10 and receiving device 25 is placed on the rear side of slant plate 171 of hopper 17 for receiving the light generated by light source 24.

Driving motor 26 is placed on the rear side of slant plate 171 and connected to pair of chain 211 to drive it through connecting chain 27. As mentioned below, driving motor 26 is controlled by the receiving device 25, stopper switch 28 disposed in slant plate 171 and cam switch 29 disposed on the one chain 211.

Both side chambers 20a, 20b of cabinet 10 are horizontally partitioned by a plurality of shelf element 30 to form article storage area.

One end portion and rear side portion of slant element are attahced on the side or divided panel and back panel. One corner of front side portion of shelt element is supported by shore vertically extends within the cabinet 10. Shelf element 30 is provided with a conveyer element 31 to loaded on the articles and to deliver the articles toward bucket 212 by driving of motor (not shown) which is selectively controlled by selector switches 14.

In these arrangements, if one of selector switches 14 is pushed, driving motor 26 to drive the bucket is driven and causes the upwardly movement of bucket 212. Stopped position of bucket 212 is predetermined by the selecting switches and controlled by cam switch 29. When bucket 212 is stoped the predetermined position (in figure the stopped position is shown by dot and line) to face the one of shelf element 30, one of conveyor 31 is operated to deliver one article A from storage space to bucket 212. During the load of article into bucket 212, the light generated by light source 24 is crossed over by article A so motor which move the bucket is operated to down bucket 212.

In the lower position, bucket 212 is fitted against stopper element 171a, 172b, but bucket 212 is further downwardly moved. Therefore, bucket 212 is rotated about the connecting point of bucket 212 and connecting means 213, and opening portion of bucket 212 is moved to fitted the surface of slant plate 171 of hopper 17. As above operation, the article A contained in bucket 212 is delivered to the vending stage 16 through hopper 17. The operation of motor is stopped by the contact of bottom plate 212c of bucket 212 to stopper switch 28 which disposed on slant surface of hopper 17.

Referring to Figures 5 and 6, another embodiment is shown. Since, plural articles loaded on the same conveyor are some times dropped within bucket 212 during one article of dispensing operation, this embodiment is directed to a modification of the configuration of the shelf portion for preventing the dispensing of plural articles. The each of shelf element has slanted, i.e., end portion of each shelf elements which attached side panel 10d or partition panel 10g is declined. Therefore, the articles which storage on conveyor 31 of shelf ele-

ment 30 have usually received the force to move it toward the side panel or partition panel. The article A which should be dispensed is thus securely delivered one by one from shelf element 30 to bucket 212. Also, even if the vending machine is vibrated by enternal power source, the articles storaged on conveyor 31 are not dropped in the central chamber 10c.

Referring to Figures 7 and 8, still another embodiment is shown. Since the articles, particularly small size of articles, which storaged on conveyor 31 of shelf element 30 are sometimes felt by the vibration of the vending machine, this embodiment of this invention is directed to a modification of the configuration of shelf portion to improve the drop of storaged articles. The each of shelf element 30 has slanted, i.e. rear side portion of shelf portion which attached the inner surface of back panel 10e is declined. A stopper plate 32 is formed on the rear guide plate 31a of conveyor 31 for preventing the fall of articles from conveyor 31. Therefore, fall of the articles storaged on conveyor 31 could be prevented without use of any stopper device.

Referring to Figures 9 and 10, the two configurations of shelf portion shown in Figure 5, 6 and 7, 8 should be combined to obtain the involved advantages of both embodiments. That is end portion of each shelf element 30 which attached on side panel 10e or divided panel 10g is declined, and also rear side portion of shelf element 30 which is attached on rear panel 10f is declined. A stopper plate 32 is formed on rear cover 31a of conveyor 31 for preventing the fall of storaged articles on conveyor 31. Therefore, dispensing article could be delivered to bucket 212 from shelf element 30, one by one, and drop out of storaged articles by vibration of the vending machine could be prevented without use of any stopper device.

If the vending machine dispenses small or narrow of size merchandise, as shown in Figure 11 each shelf elements 30' could be provided with plural conveyor 31, 31' each of which is operated by different motor and selector switch 14 to deliver the different articles or to enlarge the storage area.

In the embodiments shown in Figures 3, 5, 7 and 9, the article storage spaces are formed on both sides of delivery means but the article storage could be formed on one side portion of the delivery means.

This invention has been described in detail in connection with a preferred embodiment. This embodiment, however, is merely for example only and the invention is not restricted thereto. It will be easily understood by those skilled in the art that other variations and modifications can easily be made within the scope of this invention, as defined by the appended claims.

CLAIMS

1. A dispensing mechanism for use in a vending machine comprising;

a delivery device including a bucket vertically moved within an inner chamber of vending machine:

a plurality of shelf element disposed within the inner chamber of vending machine horizontally divided into a plurality of spaces to form article storage areas: and

conveyor means disposed on said each shelf elements loaded on the articles, and to horizontally move and dispense the article.

2. A dispensing mechanism for use in vending machine of claim 1 wherein one end portion of said each shelf elements is declined.

3. The dispensing mechanism for use in vending machine of claim 1 or 2 wherein rear side portion of said each shelf element is declined and a support plate is attached on said conveyor means to prevent fall of loaded articles on said conveyor means.

4. The dispensing mechanism for use in vending machine of claim 1, wherein said plurality of shelf elements are disposed on one side portion of said delivery device.

5. A dispensing mechanism for use in vending machine of claim 1 wherein said plurality of shelf elements are disposed on both side portion of said delivery device.

6. A dispensing mechanism for use in vending machine of claim 1 wherein at least one of said shelf element has two conveyor means which are disposed in front and in the rear side position.

7. A dispensing mechanism for use in a vending machine, the mechanism being constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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