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- 1 -

VENDING MACHINE

This invention relates to a vending machine for vending articles and, in particular, those which have a regular shape. The invention has particular application to the vending of compact discs but, as will be apparent, the vending machine could be used to vend other articles if desired or required.

Vending machines generally comprise a storage compartment in which articles to be sold are kept. Upon purchase of an article, the vending machine generally moves the article to a position by means of a spiral wire or by opening a door to enable the article to fall under the influence of gravity to an outlet opening for collection by the purchaser. If spiral wires are used to bend articles, a separate motor for each wire is required which increases cost and size. Conventional vending machines are not suitable for the vending of compact discs. The main reason for this is due to the number of discs which would need to be maintained in the vending machine to make the machine viable for the vending of compact discs. Conventional storage systems would not store a large number of different discs unless the storage space and therefore the vending machine was extremely large. Furthermore, the dispensing technique of merely allowing the article to drop a significant distance under gravity is also not suitable for compact discs because of the possibility of cracking or breaking of the cases if the discs are handled in that manner.

The object of the present invention is to provide a vending machine for vending articles such as compact discs.

The invention may be said to reside in a vending machine for vending articles, including:

- 2 -

user input means for allowing a user to input information relating to purchase of one of the articles;

payment receiving means for receiving payment relating to purchase of the article;

5 a vending unit for storing the articles and for dispensing the articles to a purchaser;

control means coupled to the vending unit, the user input means and the payment receiving means for receiving data from the user input means concerning the
10 article to be purchased, determining that payment has been made and for causing the vending unit to dispense the article; and

wherein the vending unit includes:

15 a storage compartment for storing a plurality of the articles;

a carriage mounted below the storage compartment and movable relative to the storage compartment, the carriage having an open bottom;

20 a floor below the open bottom of the carriage;

an outlet opening in the floor;

moving means for moving the carriage to align the carriage with a particular one of the articles stored in the storage compartment and
25 then to the outlet opening after receipt of the article; and

release means for releasing the article from the storage compartment so the article falls under the influence of gravity into the aligned
30 carriage so that the carriage can receive the article and transport the article to the outlet opening with the article sliding on the floor and dropping from the carriage through the outlet opening when the carriage arrives at the outlet
35 opening to thereby dispense the article.

- 3 -

Since the vending unit includes the storage compartment and the carriage which is moved to receive an article a large number of articles can be stored in a relatively small area for collection by the carriage and for movement to the dispensing station and since the carriage receives the article and transports the article to the dispensing station, articles can be dispensed without articles having to free fall a significant distance under the influence of gravity.

10

Preferably the storage compartment includes a plurality of sections so that articles can be stacked in the sections one above the other.

15 Preferably the release means comprises a pivotally mounted latch for holding the aligned articles in each section.

Preferably the carriage is mounted for movement below the compartment and includes a plunger for contacting the latch moving the latch to release the article so the article can drop into the carriage for transportation to the dispensing station.

20 Preferably the plunger includes a solenoid for moving the plunger from a retracted position to an extended position so that in the extended position the plunger engages the latch and pivots the latch out of engagement with the article to enable the article to drop into the carriage.

25 Preferably the carriage is coupled to an endless belt and the belt is driven by a stepping motor to drive the carriage beneath the storage compartment into registry with a particular one of the articles stored in the storage compartment.

35

Preferably the carriage includes a wheel for facilitating movement of the carriage.

- 4 -

Preferably the carriage includes:

- a sensor for determining the position of the carriage beneath the storage compartment,
- 5 a sensor for detecting when the carriage is in a home position;
- a sensor for determining whether an article is within the carriage; and
- 10 a sensor for determining whether articles are stored in the sections of the storage compartment.

Preferably the sensors are optical sensors.

- 15 Preferably the carriage has an open bottom so that when an articles is received in the carriage, the article contacts a floor of the vending unit for sliding movement on the floor when the carriage transports the article to the dispensing station.

- 20 Preferably the dispensing station comprises an opening in the floor of the unit so that when the carriage is brought into registry with the opening, the article is able to fall from the carriage through the opening for collection by the purchaser.

- 25 Preferably the opening is closed by a spring biased closure door which is open by the carriage when the carriage moves into registry with the opening.

- 30 Preferably the user input means comprises a touch screen which displays information so that the user can input commands by touching the screen in response to the information displayed on the screen. Preferably the user input means also includes a pinpad for input of information
- 35 into the pinpad.

- 5 -

Preferably the payment receiving means comprises a card reader for receiving a financial transaction card such as a credit card or EFTPOS card or smart card for enabling payment in respect of the article. However, in other
5 embodiments, the payment receiving means could comprise coin or note slots for receipt of coins or notes in order to make the payment.

The invention also provides a vending machine for vending
10 articles, including:

 user input means for allowing a user to input information relating to purchase of one of the articles;

 payment receiving means for receiving payment relating to purchase of the article;

15 a vending unit for storing the articles and for dispensing the articles to a purchaser;

 control means coupled to the vending unit, the user input means and the payment receiving means for receiving data from the user input means concerning the
20 article to be purchased, determining that payment has been made and for causing the vending unit to dispense the article; and

 wherein the vending unit includes:

 a plurality of storage compartments each for
25 storing articles stacked one above another;

 a carriage movable relative to the storage compartments;

 moving means for moving the carriage to align the carriage with a particular one of the
30 articles stored in the storage compartment;

 a latch associated with each of the plurality of storage compartments, each latch having an engaging portion for engaging a lowermost one of the articles stacked in each
35 plurality of storage compartments and for holding the articles, and each latch having a retaining portion so that when the latch is moved to

- 6 -

5 withdraw the engaging portion from the lowermost
article to release the lowermost article, the
retaining portion is moved concurrently into
engagement with the article above the lowermost
10 article to hold the article above the lowermost
article and any articles above that article so
that only the lowermost article is dispensed from
the respective storage compartment and upon
return of the latch the retaining portion
15 disengages so that the articles can drop under
the influence of gravity and be held by the
engaging portion within the storage compartment.

The invention still further provides a vending machine for
15 vending articles, the articles having a bottom and a front
face, including:

user input means for allowing a user to input
information relating to purchase of one of the articles;
payment receiving means for receiving payment
20 relating to purchase of the article;
a vending unit for storing the articles and for
dispensing the articles to a purchaser;
control means coupled to the vending unit, the
user input means and the payment receiving means for
25 receiving data from the user input means concerning the
article to be purchased, determining that payment has been
made and for causing the vending unit to dispense the
article; and

wherein the vending unit includes:
30 a storage compartment for storing a
plurality of the articles with the bottom being
substantially horizontal and the front face being
substantially vertical;
a carriage mounted below the storage
35 compartment and movable relative to the storage
compartment, the carriage having an open bottom;

- 7 -

a floor below the open bottom of the carriage;

an outlet opening;

moving means for moving the carriage to
5 align the carriage with a particular one of the articles stored in the storage compartment and then toward the outlet opening after receipt of the article;

an abutment adjacent the floor so that when
10 the carriage moves the article over the abutment the article drops in front of the abutment, the moving means being for reversing movement of the carriage so that the article is drawn backwards and is tipped, by the backward movement of the
15 carriage and engagement of the article with the abutment, onto the front face of the article to remove the article from the carrier; and

dispensing means for dispensing the article out of the vending unit through the opening.

20

Preferably, the dispensing means comprises the carriage which, after the article is removed from the carriage during backward movement of the carriage, the carriage is moved towards the opening by the moving means to push the
25 tipped article through the opening.

Preferably, the floor has a plurality of strips and the abutment is formed by an end of the strips spaced from the outlet opening so that when the carriage is moved towards
30 the outlet opening the bottom of the article slides on the strips and then drops over the end of the strips as the carriage passes over the end of the strips.

Preferably, the carriage has a front flap movable from a
35 closed position to an open position as the carriage moves backwards to enable the article to be removed from the

- 8 -

carriage as the article is tipped by the abutment during backward movement of the carriage.

Preferred embodiments of the invention will be described,
5 by way of example, with reference to the accompanying drawings in which:

Figure 1 is a front view of a vending machine according to one embodiment;

Figure 2 is a perspective view of a vending unit
10 according to the embodiment of Figure 1;

Figure 3 is a side view of the vending unit of Figure 2 partly broken away to show internal detail;

Figure 4 is a view along the line IV-IV of Figure 3;

15 Figure 5 is a view along the line V-V of Figure 3;

Figure 6 is a partly broken away perspective view of the part of the vending unit shown in Figure 3;

Figure 7 is a rear view of a carriage used in
20 this embodiment of the invention;

Figure 8 is a front view of the carriage of Figure 7;

Figure 9 is a side view of the carriage of Figures 7 and 8;

25 Figure 10 is a view of an abutment member for release of articles used in this embodiment of the invention;

Figure 11 is a block diagram showing the electronic control of this embodiment;

30 Figure 12 is a detail showing power supply control system of Figure 11;

Figure 13 is a block diagram of a vending unit module of Figure 11;

Figure 14 is a block diagram of Figure 11;

35 Figure 15 is a view showing display on a screen of the vending unit for facilitating purchase of articles;

Figure 16 is a view of a further display;

Figure 17 is a view of yet a further display;

Figure 18 is a perspective view of a vending unit according to a second embodiment of the invention;

Figure 19 is a plan view of the floor of a dispensing unit according to the embodiment of Figure 18;

Figure 20 is a view along the line XX-XX of Figure 19;

Figure 21 is a front perspective view of a carriage used in the embodiment of Figures 18;

Figure 22 is a side view of the carriage of Figure 21;

Figure 23 is a block circuit diagram applicable to the embodiment of Figure 18;

Figure 24 is a front view of a gate mechanism used in the second embodiment of the invention;

Figure 25 is a view similar to Figure 24 showing additional detail; and

Figure 26 is a cross-sectional view along the line XXVI-XXVI of Figure 24.

With reference to Figure 1, a vending machine 10 of the preferred embodiment is shown. The vending machine 10 has an outer housing 12 which houses a vending unit 14, a touch screen 18 and a vending terminal 20. The vending terminal 20 includes a slot 22 of a card reader (not shown in Figure 1) for receipt of a credit card or EFTPOS card to enable payment for a purchase from the vending machine. A printer outlet 24 is provided for providing a printed receipt and a keypad 26 is provided for input of information if required.

The touch screen 18 can be touched by a purchaser to input commands relating to the purchase of a particular article such as a compact disc from the vending machine 10. The storage unit 14 includes a lockable door 30 which can be opened to enable access to the vending unit to load articles such as compact discs into the vending unit 14 and also for maintenance purposes.

- 10 -

The vending machine 10 may also have openable doors or compartments (not shown) to enable access to the interior of the vending unit for maintenance in respect of the video
5 monitor 18 and the terminal 20 as well as control circuitry (which will be described in more detail hereinafter) contained within the housing 12.

Figure 2 is a view of the vending unit 14 within the
10 housing 12. The vending unit 14 has a storage compartment 46 which is closed by a door 48 which can be pivoted upwardly in the direction of arrow A in Figure 2 to gain access to the storage compartment 46.

15 The compartment 46 can slide in and out of the housing 12 in the direction of arrow B in Figure 2. The housing 12 includes a rear wall portion 49 which includes a U-shaped track 50 which receives a correspondingly shaped rail 52 connected to the compartment 46. Thus, the compartment 46
20 can be drawn out of the housing 12 in the form of a drawer so that the door 48 can be opened to enable loading of compact discs into the storage compartment 46.

The vending unit includes a floor 54 which is formed from
25 or covered with a generally slippery material such as plastics material or the like to enable sliding movement of a compact disc along the floor 54 as will be described in more detail hereinafter.

30 The floor 54 has a rectangular dispensing opening 58 which is closed by a spring biased closure 60. The closure 60 is biased into a position covering the opening 58 so that people cannot attempt to reach up through the opening 58 and steal articles stored in the storage compartment 46.
35 The opening 58 is in registry with a dispensing outlet 59 (see Figure 1) so that articles dispensed by the vending machine 10 can be collected by the purchaser.

Arranged below the storage compartment 45 is a carriage 70. The carriage 70 is movable in the direction of double headed arrow C in Figure 2 relative to the compartment 45
5 for receiving an article from the storage compartment 45 and transporting the article to the dispensing opening 58 for dispensing to the purchaser.

With further reference to Figures 3, 4, 5 and 6 which show
10 the storage compartment 48 with the door 46 effectively open or removed, a number of sections 74 are provided within the storage compartment 48 for storing compact discs 75. In the drawings, only one of the sections 74 is shown including compact discs for ease of illustration. Each of
15 the sections 74 would house a different compact disc and in the embodiment shown in the drawings, three compact discs of the same type are in each section 74 with the compact discs being stacked one above the other in the sections 74. The sections 74 are defined by plates 78 (see Figure 2
20 which shows only some of the plates 78 also for ease of illustration) so that the sections 74 are in the form of narrow spaces defined by the plates 78 which are substantially the thickness of a compact disc. It should be noted that the plates 78 are only schematically shown in
25 Figures 3 and 6 once again for ease of illustration.

A pivot rail 79 passes through the plate 78 as best seen in Figure 2 for mounting of a retaining latch 80 (which will be described in more detail with reference to Figure 10).
30

Thus, according to the preferred embodiment, compact discs are loaded into each of the sections 74 so that each section 74 includes three compact discs of the same type.

35 The carriage 70 is movable relative to the storage compartment 48 in the direction of double headed arrow C in Figures 2 and 3 so that the carriage 70 can move into

- 12 -

registry with one of the sections 74 to receive a compact disc from that section 74 and then transport the compact disc to the dispensing opening 58.

5 The carriage 70 is shown in more detail in Figures 7, 8 and 9. With reference to Figures 7, 8 and 9, the carriage 70 has a base plate 93 and an upstanding front wall 95. The front wall 95 may include slots 97 simply to reduce material and weight. The carriage 70 has a side wall 99
10 which may be integral with the front wall 95 or connected to the front wall 95. The base 93 is connected to the front wall 95 and the side wall 99. The front wall 95 has two forwardly projecting side walls 101 and 103. A rail 105 is arranged between the walls 101 and 103 and is spaced
15 from the front wall 95 by a distance slightly greater than the thickness of a compact disc to be dispensed by the vending unit 14. The carriage also has an upper wall 109 which is integral with the front wall 95. Mounted to the bottom of the upper wall 109 is a solenoid 111. The base
20 wall 93 supports a solenoid driver board 121 which carries electronic componentry for activating the solenoid 111. The componentry can include capacitors 123 and other componentry and connectors generally designated by the reference 126. The solenoid 111 has an armature 113. A
25 plunger 115 is arranged between the front wall 95 and the solenoid 111 and includes a flange 117 which includes a finger 119 which projects outwardly from the flange 117. The plunger 115 also has a base portion 121 which is connected to the armature 113 of the solenoid 111. Thus,
30 when the solenoid 111 is activated, the plunger 115 is moved with the armature 113 so as to move the plunger from a retracted position shown in Figure 7 in the direction of arrow D to an extended position to enable a compact disc to be released from the storage compartment 46 as will be
35 described in more detail hereinafter.

- 13 -

The side wall 99 supports an optical sensor 124 for detecting the position of the carriage and for supplying signals back to a controller which will be described with more detail with reference to Figures 11 to 14.

5

The side wall 99 also carries second sensor 125 for determining the position of the plunger 115 so that information can be provided to the controller to ensure that the plunger 115 is operating correctly. A third
10 optical sensor 127 is also carried at the top of the side wall 99 for determining whether compact discs are located in each section 74 of the compartment 46. Finally, a fourth sensor 131 (see Figure 9) is provided at the bottom of the base plate 93 for determining whether a compact disc
15 has been correctly loaded into the carriage 70 as will be described in more detail hereinafter.

The side wall 99 also carries a sensor bar 141 for registry with a sensor 142 (see Figure 3) so that the plate 141 can
20 be received within the sensor 142 for indicating that the carriage 70 is at the rear of the vending unit 46 shown in Figure 3 which defines a home position.

The side wall 101 also carries a wheel 137 for engaging the
25 floor 54 of the unit 14 and for enabling the carriage to move along the floor 54 in the direction of double headed arrow C.

Returning to Figures 2 to 6, arranged below the wall
30 portion 49 of the housing 12 is a housing section 159. The housing section 159 mounts a further channel 161 for receiving a rail 163 to facilitate movement of the storage compartment 46 out of the housing 12 as previously described. The housing section 159 also supports a U-
35 shaped channel 165 which receives a bearing block 172 (see Figures 4 and 5) connected to the side wall 99 of the

carriage 70 for facilitating movement of the carriage in the direction of double headed arrow C in Figure 2.

5 Housing section 159 also mounts a stepping motor 173 which has a pulley 171. A pulley 169 is arranged at the opposite end of the housing section 159 and an endless belt 167 passes around the pulleys 169 and 171. The carriage 70 is connected to the endless belt 167 by coupling the side wall 99 to the endless belt 167.

10

The stepping motor 173 receives control commands from the controller to be described with reference to Figures 11 and 14 and therefore moves the belt 167 to in turn move the carriage 70 in the direction of double headed arrow C with the bearing block (172) being guided in the channel 165 and the carriage rolling on the wheel 137. By appropriate control of the stepping motor 173, the carriage 70 can be moved into registry with any one of the sections 74 of the storage compartment 46 to receive a compact disc 75 from the storage compartment 46. Thus, depending on the selection of the compact disc which is made by the purchaser, the controller will move the carriage 70 into registry with the section 74 which holds those compact discs so that one of the compact discs can be loaded into the carriage 70 and moved to the opening 58 for dispensing to the purchaser.

15 In order to hold the compact disc 75 in the sections 74 between the plates 78, latches 80 shown in Figure 10 are pivotally mounted on the rod 79. Each of the sections 74 has one of the latches 80 (only one being shown in Figure 6) for holding the compact discs within the sections 74.

20 As shown in Figure 10, the latch 80 comprises an arm 181 which has a hole 183 so that the rod 79 can pass through the hole 183 to pivotally mount the arm 181. The arm 181 has a spring section 184 which comprises a L-shaped plate

185 which is fixed to the compartment 46. A leaf spring 187 is arranged between the arm 181 and the plate 135 for biasing the arm into the position shown in Figure 10. The arm 181 carries an abutment section 189 which could be
5 integral with the arm 181 but in the embodiment shown is a separate component which includes a boss 193 which is a friction fit in a slot 195. The section 189 carries a depending abutment portion 197 for engagement with the finger 119 carried by the plunger 115. The portion 189 has
10 a ledge 196 which projects into the sections 74 and holds the compact discs 75 in the section 74 as is best shown in Figures 4 and 5. When the finger 119 contacts the portion 197, the arm 181 is pivoted on the rod 79 against the bias of the spring 187.

15

The arm 181 has a flat upper surface 181' which serves to hold the compact discs stacked above the lowermost compact disc when the lowermost compact disc is dispensed into the carriage 70. As is best shown in Figures 4 and 5, the
20 storage compartment 46 has a rear wall section 46a which extends vertically and then a rear wall section 46b which extends down at an inclined angle of approximately 3° to the vertical. The inclined wall 46b causes the lowermost cassette 75 shown in Figures 4 and 5 to be tilted slightly
25 so that the bottom edge of the compact disc is supported by the ledge 196 as clearly shown in Figures 4 and 5. The compact discs labelled 75' and 75'' in Figures 4 and 5 above the disc 75 are also supported on an inclined angle as can be clearly seen in view of the inclination of the
30 lowermost disc 75 so a bottom portion 75a of the article 75' above the lowermost article 75 is exposed by extending beyond the lowermost article 75. When the arm 181 is pivoted about the rod 79 to remove the ledge 196 from beneath the lowermost disc 75, the upper surface 181' is
35 moved in the direction of arrow F in Figures 4 and 5 so as to engage beneath the compact disc 75'. This holds the compact disc 75' in place until the compact disc 75 has

15a

dropped from the storage location into the carriage 70.
When the arm 181 returns to the position shown in Figures 4
and 5, the ledge

- 16 -

196 is moved back to the position shown in Figures 4 and 5 and the upper surface 181' withdrawn from the cassette 75' so the cassette 75' can drop to the lower position where it will be caught by the ledge 196 and supported within the storage compartment.

Thus, when the stepping motor 171 is activated to move the carriage 70 into registry with one of the sections 74, such as to the position shown in Figure 6, the carriage 70 is located below the required compact disc 75 which the purchaser wishes to buy. Once the carriage 70 is located in the correct position, the solenoid 111 is activated to extend the plunger 115 so that the finger 119 engages the portion 189 of the arm 181 to pivot the arm 181 on the rod 79 so the ledge 196 is removed from beneath the lowest compact disc 75 and the surface 181' engages the disc 75' above the lowermost disc 75 so the compact disc 75 drops from the position shown in Figure 6 into the carriage 70 between the rail 105 and the front wall 95 of the carriage 70. The compact disc 75 rests on the floor 54 of the unit 14 between front wall 95 and rail 105.

The solenoid 111 then deactivates so that the plunger 117 is returned to its retracted position. A spring (not shown) may be included to retract the plunger 115 to ensure complete retraction of the plunger 115. This allows the arm 181 to return under the bias of the spring 187 so the ledge 196 moves back into the section 74 so as to catch the next compact disc 75' as the surface 181' is withdrawn from the disc 75' so the disc 75' falls to the lowermost position. The disc 75' falls to the position previously occupied by the disc 75'.

The sensor 137 detects that a compact disc 75 is properly loaded into the cartridge 70 as is shown in Figure 8 and the stepping motor 173 is again activated to drive the carriage 70 from the position shown in Figure 6 to the door

- 17 -

60. When the side walls 101 and 103 contact the door 60, they push the door 60 open against the bias of the return spring (not shown) to open the opening 58 so that as soon as the carriage 70 registers above the opening 58, the compact disc 75 will drop through the opening 58 to be collected from the dispensing outlet 59 shown in Figure 1.

As the carriage 70 moves back and forward on floor 54 collecting and delivering cassettes to the opening 58, the sensor 127 will detect whether compact discs still remain in each of the sections 74 and output appropriate control signals so that the controller (to be described with reference to Figures 11 to 14) can determine whether compact discs still remain in the sections 74 or whether the storage compartment 46 requires refilling.

The position of the carriage 70 relative to the sections 74 can also be continuously monitored by the sensor 125 by the sensor 124 detecting bar codes or grids on housing section 159 which are arranged in registry with the sensor 124 so that the exact position of the carriage 70 can always be determined. Furthermore, when the carriage returns to the home position at the end of the vending unit (which is the right hand end in Figure 3), the plate 141 will register between the portions of sensor 142 to indicate that the carriage 70 is at the home position. This also provides information to the controller for positioning the carriage 70.

Figure 11 is a block diagram of a controller 200 of the preferred embodiment. The controller 200 comprises a power supply unit 201, a user interface module 202 and a vending unit 203. The modules 201 to 203 are interconnected by a bus 205.

35

The power supply control module 201 is more fully shown in Figure 12 and includes a conventional plug 210 for

connection to mains power electricity. A surge protector 211 and circuit breaker 213 are provided. An earth leakage sensor 214 is also provided and an uninterruptable power supply unit 215 is also included. A further earth leakage
5 sensor 217 and a circuit breaker 218 are also provided in the power supply. The earth leakage sensor 214 is connected to a power switch 219 and the circuit breaker 218 is connected to a second power switch 220 which are turned on and off by a control and alarm processing module 240.
10 The switch 220 is connected to a supply 223 for providing 24 volt DC power and to a second supply 224 for providing 16 volt or 35 volt DC power.

The processing module 240 which performs alarm and
15 processing and control functions and is coupled to the bus 205 and is powered by the second power supply 224. Module 240 receives information from the bus 205 and supplies output commands onto the bus 205. Security switches and sensors 242 are connected to the module 240 so that if the
20 vending unit 10 is tampered with by someone trying to break open a door or the like, an alarm signal can be provided.

The bus 205 also connects to two telephone line networks 260 and 270 via transient barriers 261 and 271 so as to
25 connect the vending machine 10 to a telephone network for EFTPOS or credit card checks and payments in a known way. The telephone connection also allows central networking for data gathering and software updates and the like. The alarm and processing module 240 is also connected to a fan
30 241 for cooling purposes. An alarm sounder unit 259 is also connected to the module 240 for sounding an audible alarm in the event that an alarm condition is detected by the module 240. The bus 205 is also connected to a light box 216 for providing light to illuminate advertising signs
35 (not shown) which may be included on the housing 12. The bus 205 also connects to speakers 257 for playing samples of the discs which are stored on hard disc (not shown)

which can be vended by the unit as the user goes through the purchase protocol which will be described in more detail hereinafter.

5 Figure 13 shows the vending module 203 which includes vending units 1 and 2 which are connected on bus 205 so that control signals can be received and forwarded to the alarm and processing module 240 and processor 340 (see Figure 14) such as a PC for controlling the carriage 70 and
10 also the solenoid 111 for enabling compact discs to be received from the storage compartment 46. The module 203 also provides signals to the stepping motor 173 for driving and controlling the stepping motor 173.

15 In Figure 13, two vending units labelled vending unit 1 and vending unit 2 are shown. In the embodiment previously described, only one vending unit 46 is shown. However, if desired, two or more vending units identical to those described with reference to Figures 1 to 10 could be
20 included in side by side relationship and controlled in master/slave fashion. In the embodiment shown in Figure 13, the bus 205 is connected by bus 310 to a master control unit 291 which controls slave control unit 291' (and any other slave control unit for additional vending units which
25 may be included) which can then provide signals to carriage controllers 292, 292' etc to control the carriages 70. Thus, data from the sensors 124, 125, 127 and 137 so output signals can be supplied to the master controller 291 and also to the processor and alarm module 240 for processing.

30 Appropriate commands supplied on the bus 310 to the master controller 291 and then to the controller 292 control both the stepping motor 173 and the plunger 115 to position the carriage 70 in the required place and open a storage section 74 to receive a compact disc and then to move the
35 carriage 70 to the opening 58 for supplying the compact disc to the purchaser. Data supplied from the carriage 70 also includes data relating to whether compact discs are

still remaining in any of the sections 74 so that the vending machine can be refilled when required.

Figure 14 shows the user interface module 202 which
5 includes the monitor 18 which has the touch screen for
input of commands which is connected to bus 205 by line
330. The PC 340 is also connected to the bus 205 by lines
342 for receipt of data and manipulation and processing of
data within the PC 340. A printer 244 and pin pad 26 are
10 also coupled to the bus 205. Bus 205 is also connected to
a pin pad and terminal 960 which are coupled to the
telephone line networks 260 and 270 for transmission of
data relating to the financial transaction to enable
payment for the compact discs. A wireless keyboard sensor
15 970 may also be coupled to the processor 340 for receiving
infrared controls from a maintenance person in order to
perform maintenance on the vending unit 10.

Figures 15 to 17 show the protocol for purchasing a compact
20 disc from the vending machine 10. When a purchaser
approaches the machine 10, the purchaser need only touch
the monitor touch screen 26 in order to activate the
vending machine 10. When the touch screen 18 is touched on
any part of the screen, an initial menu is displayed which
25 may give choices for compact disc selection such as shown
in Figure 15 which comprise new releases, rock and roll
compact discs, country and western compact discs or the
like. The purchaser will make a choice, for example, new
releases by merely touching the new release display on the
30 touch screen 26. This will bring up a new menu as shown in
Figure 16 which will show all of the compact discs stored
within the vending machine under that heading. For
example, three compact discs can be displayed at any one
time and if the user wishes to scroll through all of the
35 compact discs available the arrows 400 and 401 shown in
Figure 16 can be touched to cause the monitor 18 to display
additional titles which can be purchased.

- 21 -

When the user has made up his or her mind as to which compact disc is to be purchased, the image of that compact disc on the touch screen 26 is touched. This causes a new
5 display such as that shown in Figure 17 to be displayed which shows the front and back cover of that compact disc and also includes a buy indicator 430 on the touch screen 26.

10 . Once the user is satisfied that that is compact disc required, the user can touch the buy symbol which will then change to a pay flashing signal. At the same time, the processor 340 can output audio data on line 342 to bus 205 for playing a sample of the compact disc through the
15 speakers 257 shown in Figure 12.

User then makes payment by inserting his or her credit card or EFTPOS card into the slot 22 so that it can be read by the terminal 260 and the appropriate financial data
20 transmitted to the bank or credit facility over the telephone lines via the telephone networks 260 or 270 in a manner which is known and conventional for normal EFTPOS purchases or credit authority. Once the appropriate acknowledgment of payment or credit is received back by the
25 terminal 260, appropriate signals are outputted onto the bus 205 to activate the carriage 70 to cause the carriage 70 to move to the appropriate storage location in which the selected compact disc resides so that the compact disc can be loaded into the carriage 70 in the manner described
30 above and transported to the opening 58 whereupon the compact disc drops through the opening 58 for collection by the purchaser from the outlet 59 on the front of the vending machine 10.

35 A receipt will be printed by the printer 244 and outputted through slot 24 to the purchaser.

- 22 -

Data relating to the location of the various compact discs in the sections 74 is stored in the processor 340 so that when the appropriate compact disc is selected, the processor 340 can output the required storage section
5 information to the vending module 203 to cause the vending module 203 to drive the carriage 70 to the correct location for collection of the compact disc and delivery of the compact disc to the outlet opening 58.

10 A second embodiment of the invention is described with reference to Figures 18 to 23. This embodiment is the same as the embodiment previously described except that the manner of dispensing articles from the carriage 70 is different. This embodiment also uses a linear motor rather
15 than a stepping motor in order to drive the carriage (so increased power can be delivered if necessary) and includes a slight modification to the control system.

Figure 18 is a front perspective view of a vending unit 14
20 according to the second embodiment. Like parts designate similar components to those described with reference to Figures 1 to 17. In this embodiment the sections 74 are slightly larger to accommodate boxes (having a bottom 504 and a front face 506) which are somewhat bigger than the
25 compact disc 75 described in the previous embodiment. The boxes are shown by reference numeral 500 and may be packaged with a single article or various loose articles such as merchandise associated with movies, entertainment groups or the like. The boxes 500 are dispensed from the
30 compartment 75 by movement of latches 80 (not shown in Figure 18) which are identical to those described in the embodiment of Figure 1.

The vending unit 14 has side rails 501 which enables the
35 storage compartment 46 to slide in and out of the machine 10 (shown in Figure 1) in generally the same manner as the vending unit described with reference to the embodiment of

- 23 -

Figure 1. A side door 502 is provided which can swing downwardly into an open position to gain access to the compartment 48 (shown in Figure 18) provided in the unit 14. Fixed side walls 503 are provided below the door 502 as are end walls 307. Outlet opening 58 in this embodiment is provided on a front end of the vending unit rather than the floor of the vending unit and the outlet 59 (see Figure 1) of the machine 10 is aligned with the opening 58 in the unit 14.

10

Figure 19 is a plan view of the floor of the vending unit 14 of Figure 18. The floor includes a generally flat base 503 upon which are adhered two plastic strips 504. The strips 504 terminate slightly short of the outlet opening 58 and have end edges 505. As shown in Figure 20 the end edges 505 define abutments. As explained in the embodiment of Figures 1 to 18 the carriage 70 has an open bottom and when moved in the direction of arrow P in Figure 19 the carriage 20 will move over the edges 505 of the strips 504. The article 500 (shown in Figure 20 in dotted lines) will move in front of the abutments formed by edges 505 and drop down in the carriage onto the base 503 so as to sit in front of the edges 505 formed by the ends of the strips 504. The distance from the edges 505 and the outlet opening 58 should be greater than the width of the articles 500.

The articles are dispensed from the sections 75 into the carriage 70 in the same manner as described with reference to the embodiment of Figure 1. The embodiment of Figure 18 also includes all the sensors described with reference to Figure 1 for sensing movement of the carriage 70 and also movement of the articles 500.

The carriage 70 of this embodiment is shown in Figures 21 and 22. The carriage is similar to that of the previous

- 24 -

embodiment except that it is designed to receive articles 500 therefore the top opening 95 is slightly wider.

In this embodiment the rod 119 pivotally mounts a flap 507
5 which is biased to a closed position (ie a vertical position) by a spring 509. The carriage in this embodiment may or may not include a wheel 137 as described with reference to the embodiment of Figure 1.

10 When the carriage is moved towards the outlet opening 58 and over the edges 505 of the strips 504 the article 500 will drop down onto the base 503 as previously described. The carriage 70 is then moved in the reverse direction by the linear motor used to drive the carriage back and forth
15 along the floor of the vending unit. Because the article 500 will engage behind the ledge 505 formed by the ends of the strips 504 backward movement of the carriage 70 will cause the article 500 to tip onto its front face 506 as shown in Figures 21 and 22. The tilting movement of the
20 article 50 as it moves from the vertical position to a generally horizontal position will push the flap 507 open thereby enabling the article 500 to release from the carriage as the carriage moves backwards away from the opening 58. The carriage 70 moves a sufficient distance to
25 enable the article 500 to drop from the vertical position to the horizontal position as shown by the reference numerals 500a, 500b, 500c and 500d in Figures 21 and 22 which show sequentially how the article 500 moves during backward movement of the carriage 70. The sequential
30 movement shown by reference numerals 500a to 500d is illustrative only. It should be noted that the corner of the box marked C in Figure 21 remains substantially in the same position when the carriage 70 is moved backwards with box 500 pivoting downwardly from the vertical position to
35 the horizontal position generally about the corner C which is engaged behind the ledge 505. The flap 507 controls movement of the box 500 and generally guides the movement

- 25 -

from the vertical position to the horizontal position to ensure that the box 500 is properly delivered into the horizontal position. In this regard, the door 507 supplies a slightly downward pressure on the box 500 as the flap 507
5 is pushed open thereby assisting in the controlled movement of the box 500 from the vertical position to the horizontal position. As the article 500 drops to the fully horizontal position the flap 507 can close under the influence of the spring 509. When the article 500 is completely released
10 from the carriage in the above mentioned manner the carriage again moves forward towards the opening 58 so that the back wall 95 of the carriage 70 will push the article 500 forward and through the outlet opening 58 to position shown in Figure 18 so the article can simply be removed by
15 the purchaser.

Movement of the carriage 70 to dispense the article through the outlet opening 58 is under the control of controller 600 shown in Figure 23. The controller, as in the previous
20 embodiment, controls all operation of the machine 10 including the vending unit 14 and linear motor which will drive the carriage 14 backward and forward along the vending unit 14 in the manner described with reference to Figure 1. In this embodiment, as is clear from the above
25 description, when the carriage 70 initially receives the article and moves towards the outlet opening 58 so as to deposit the article 500 in front of the ledge 505, the controller controls the carriage 14 to move backwards to tilt the article as described and shown in Figures 21 and
30 22 so the article tips from a vertical position to a generally horizontal position and is removed from the carriage 70 and then the carriage 70 is again moved forward to push forward the article out through the opening 58.

35 With reference to Figure 23 the vending unit 203 used in the embodiment of 18 is shown in Figure 23 and includes all of the functions described with reference to Figure 11 and

- 26 -

Figure 12. In this embodiment a central microprocessor 600 controls each vending unit 14, 14' (if there is more than one vending unit) and so on. The microprocessor 600 receives data and outputs data on lines 601 and telephone
5 lines 603 in same manner as previously described. Lines 601 effectively form the bus 205 shown in Figure 23 and once again like reference numerals in Figure 23 correspond to those with reference to Figures 11 and 12.

10 In this embodiment of the invention, the carriage 70 in the vending unit 14 may include additional sensors for controlling the reverse movement of the carriage 70 so as to tip the articles 500 onto their front face 506 and also to control and monitor movement of the carriage 70 as it
15 pushes the articles 500 out through the outlet opening 58.

Figures 24 to 26 show a gate mechanism used for closing and selectively opening the outlet opening 58 to enable articles to be dispensed through the outlet opening 58.

20 The gate mechanism is arranged between the front cover of the machine as shown in Figure 1 and the vending unit 14. The gate mechanism has a rear plate 507 which may be the front wall 507 of the vending unit shown in Figure 18. In the arrangement shown in Figure 24, the gate mechanism is a
25 dual gate intended to operate with two side-by-side vending units for dispensing articles through corresponding outlet openings 58. However, if desired, only one gate could be employed if only one vending unit is used.

30 The plate 507 is provided with four slots 601, 601 and 602, 602. A first vertically moving gate 603 is arranged for sliding movement along the slots 601 and a second vertically moving gate 604 is arranged for sliding movement along the slots 602. Rollers 605 (see Figure 25) may be
35 arranged on axles 606 for guiding movement of the gate 603 and 604 in the respective slots 601 and 602.

- 27 -

Each of the gates 603 and 604 are effectively a mirror image of one another and the gates 604 has a main panel portion 609 which closes the outlets 58, a first depending leg 610 and a second depending leg 611. The first leg 610
5 is provided with a ledge 612 and a slot 613. The second leg 611 is provided with a button 614 at its lower end.

First sensor switches 615 are provided for detecting release and re-locking of the gates 603 and 604 and second
10 sensor switches 616 are provided for determining when the gate 616 is in the fully opened position. The switches 616 can be mounted in four different positions on mounts 617 at different heights so as to sense when the gates 603 and 604 are at a fully open position. The different heights
15 correspond to different widths of articles which are to be dispensed so that the gate only opens the distance necessary to dispense the required article through the outlet 58. If the article is a compact disc, the gate 604 need only open outlet opening 58 for, say, a third of
20 the height of the opening 58. If a larger box is to be dispensed, the sensor 616 can be positioned so as to detect when the gate opens to a greater extent to expose more of the outlet opening 58 so the box can be dispensed with the outlet opening 58.

25

The sensors 615 and 616 have reed switches 619 which are opened and closed to operate the sensors 615 and 616 as will be described in more detail hereinafter.

30 A pair of latches 620 are pivotally mounted to the face 507. Only one of the latches is shown in Figure 24, the other being a mirror image and being removed to show the detail of leg 610. The latches 620 have a shoulder 621 which abuts the reed switch 619 on the sensors 615.

35

The legs 610 also have an arcuate cutout 621 which accommodates a lever 622. The lever 622 is pivotally

- 28 -

mounted on a pivot pin 623 and is driven by a motor 624
(see Figure 25) as will be described hereinafter. The
latches 620 are coupled together by a spring 626 so they
are biased into the closed position shown in Figure 24. As
5 is best shown in Figures 25 and 26, the latches 620 have a
front panel 631 and a rear panel 632 which is integral with
or fixed onto the front panel 631. The front panel 631 has
an end 633 and the rear panel 632 is provided with a step
or ledge 635.

10

The lever 623 carries a projecting stud 640 and the latches
620 are pivoted to the face 605 on pivot pins 641.

When it is desired to dispense an article through the
15 outlets 58, the carriage moves the article as described
above. The controller described with reference to Figure
23 also controls operation of the gates 603 and 604 to open
the outlets 58 to enable the article to be dispensed. The
controller operates the motor 624 to swing the lever 622 to
20 the right or to the left in Figure 24 to open one of the
gates 603 or 604. Initial movement of the lever 622 to,
for example, the right in Figure 24 will cause the lever
623 to initially abut the end edge 633 of the latch 620.
This will pivot the latch 620 against the bias of the
25 spring 626 so that the ledge 635 is removed from the ledge
612 of the legs 610 to thereby release the leg 610 and the
gate 604. Continued pivotal movement of the lever 622 will
drive the stud 640 into the slot 630 so as to lift the gate
604 vertically with the rollers 605 rolling and being
30 guided in guide slots 602. Figure 25 shows the gate 604
lifted to its full extent to open the outlet opening 58.
As the lever pushes the latch 620, the latch is pivoted
around pivot point 641 which will raise shoulder 621
upwardly away from reed switch 619 so that the switch 615
35 can detect release of the arm 610. As the gate is pushed
upwardly in the direction of arrow Y in Figure 24 to the
fully open position shown in Figure 25, the button 614 will

- 29 -

contact the reed 619 of the switch 616 to provide an indication that the gate is at the required fully open position. The motor 624 will then stop so that the article can be released through the outlet opening 58. A sensor
5 (not shown) may be provided to determine when the purchaser withdraws the article 500 from the outlet opening so that a signal can be provided to the controller shown in Figure 23 to close the gate 604.

10 After release of the article through the outlet opening 58, the gate 604 can be closed by reversing the direction of the motor 624 so that the lever 622 swings back to the position shown in Figure 24. As the lever swings back to the position shown in Figure 24, the arcuate edge 651 of
15 leg 610 will ride on the edge 653 of panel 632 of the latch 620 and push the latch slightly open so as to enable the shoulder 612 to seat below the shoulder 635 on the latch to again lock the legs 610 and therefore the gate 604 in the closed position. The pivoting movement of the latch 620
20 will again operate the switch 615 in the same manner as described above so as to indicate that the latch 620 has re-locked the leg 610 in position to close the outlet opening 58.

25 Thus, the outlet opening 58 is secured so that articles cannot be pushed into the outlet opening 58 with a view to vandalising the machine or an attempt cannot be made to steal articles from the machine by reaching through the outlet opening 58.

30

Apart from dispensing compact discs and boxes, the vending machine 10 could also perform ancillary functions such as issuing of movie tickets or the like by appropriate inputs from a user in response to commands shown on the touch
35 screen 26 so that the user can pay for and receive a printed movie ticket from the machine for use at a movie house in which the vending machine may be located.

- 30 -

Since modifications within the spirit and scope of the invention may readily be effected by persons skilled within the art, it is to be understood that this invention is not
5 limited to the particular embodiments described by way of example hereinabove.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A vending machine for vending articles,
including:

5 user input means for allowing a user to input
information relating to purchase of one of the articles;
payment receiving means for receiving payment
relating to purchase of the article;

10 a vending unit for storing the articles and for
dispensing the articles to a purchaser;

control means coupled to the vending unit, the
user input means and the payment receiving means for
receiving data from the user input means concerning the
article to be purchased, determining that payment has been
15 made and for causing the vending unit to dispense the
article; and

wherein the vending unit includes:

20 a plurality of storage compartments each for
storing articles, the storage components having
engaging means for contacting the articles and
causing the articles in each component to be
stacked one above the other with a bottom portion
of the article stacked above a lowermost of the
articles being exposed by extending beyond the
25 lowermost of the articles;

a carriage movable relative to the storage
compartments;

30 moving means for moving the carriage to
align the carriage with a particular one of the
articles stored in the storage compartment;

35 a latch associated with each of the
plurality of storage compartments, each latch
having an engaging portion for engaging a
lowermost one of the articles stacked in each
plurality of storage compartments and for holding
the articles, and each latch having a retaining
portion so that when the latch is moved to

withdraw the engaging portion from the lowermost article to release the lowermost article, the retaining portion is moved concurrently into engagement with the exposed bottom portion of the article above the lowermost article to hold the article above the lowermost article and any articles above that article so that only the lowermost article is dispensed from the respective storage compartment, and upon return of the latch the retaining portion disengages from the exposed bottom portion so that the articles can drop under the influence of gravity and be held by the engaging portion within the storage compartment.

15

2. The machine of claim 1, wherein the latch is a pivotally mounted latch for holding the aligned articles in each section.

20

3. The machine of claim 1, wherein the carriage is mounted for movement below the compartments and includes a plunger for contacting the latch and for moving the latch to release the lowermost article so the article can drop into the carriage for transportation to the dispensing station.

25

4. The machine of claim 3, wherein the plunger includes a solenoid for moving the plunger from a retracted position to an extended position so that in the extended position the plunger engages the latch and pivots the latch out of engagement with the article to enable the article to drop into the carriage.

30

5. The machine of any one of claims 1 to 4, wherein the carriage is coupled to an endless belt and the belt is driven by a stepping motor to drive the carriage beneath

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the storage compartment into registry with a particular one of the articles stored in the storage compartment.

6. The machine of any one of claims 1 to 4, wherein
5 the carriage includes a wheel for facilitating movement of the carriage.

7. The machine of any one of claims 1 to 6, wherein the carriage includes:
10 a sensor for determining the position of the carriage beneath the storage compartment,
a sensor for detecting when the carriage is in a home position;
a sensor for determining whether an article is
15 within the carriage; and
a sensor for determining whether articles are stored in the sections of the storage compartment.

8. The machine according to claim 1, wherein the
20 engaging portion includes a ledge which locates below the lowermost article to retain the articles in each compartment and the retaining portion comprises an uppermost surface of the latch.

25 9. The machine of claim 8, wherein the latch is pivotally mounted on a pivot between the ledge and the uppermost surface so that when the ledge is in engagement with the lowermost article, the uppermost surface is outwardly of the lowermost article so as not to interfere
30 with the articles stacked in each compartment and when the latch is pivotally moved to withdraw the ledge from the lowermost article, the upper surface is moved into alignment with the articles to engage the article above the lowermost article to retain the article above the lowermost
35 article and any article above that article within the storage compartment.

10. The machine according to claim 1, wherein the articles in each compartment are stacked in an inclined staggered manner so that the exposed bottom portion of each article projects outwardly towards the latch so that when
5 the latch moves to release the lowermost article the retaining portion is able to engage the exposed bottom portion edge of the article immediately above the lowermost article to hold that article within the storage compartment.

10

11. The machine according to claim 1 wherein the engaging means comprises a first substantially vertical wall portion and a second wall portion inclined with respect to the vertical wall portion and located below the
15 vertical wall portion.

12. A vending machine for vending articles, the articles each having a bottom and a front face, including:
 user input means for allowing a user to input
20 information relating to purchase of one of the articles;
 payment receiving means for receiving payment relating to purchase of the article;

 a vending unit for storing the articles and for dispensing the articles to a purchaser;
25 control means coupled to the vending unit, the user input means and the payment receiving means for receiving data from the user input means concerning the article to be purchased, determining that payment has been made and for causing the vending unit to dispense the
30 article; and

 wherein the vending unit includes:

 a storage compartment for storing a plurality of the articles with the bottom being substantially horizontal and the front face being
35 substantially vertical;

a carriage mounted below the storage compartment and movable relative to the storage compartment, the carriage having an open bottom;

a floor below the open bottom of the carriage;

an outlet opening;

moving means for moving the carriage to align the carriage with a particular one of the articles stored in the storage compartment and then toward the outlet opening after receipt of the article;

an abutment adjacent the floor so that when the carriage moves the article over the abutment the article drops in front of the abutment, the moving means being for reversing movement of the carriage so that the article is drawn backwards and is tipped, by the backward movement of the carriage and engagement of the article with the abutment, onto the front face of the article to remove the article from the carriage; and

dispensing means for dispensing the article out of the vending unit through the opening.

13. The machine of claim 12, wherein the storage compartment includes a plurality of sections, each section being for storing a plurality of articles in a stacked manner one above another.

14. The machine of claim 12 or 13, wherein the release means comprises a pivotally mounted latch for holding the articles in each section.

15. The machine of any one of claims 12 to 14, wherein the carriage includes a plunger for contacting the latch and moving the latch to release the article so the article can drop into the carriage for transportation to the outlet opening.

16. The machine of claim 15, wherein the plunger includes a solenoid for moving the plunger from a retracted position to an extended position, so that in the extended
5 position the plunger engages the latch and pivots the latch out of engagement with the article to enable the article to drop into the carriage.

17. The machine of any one of claims 12 to 16,
10 wherein the carriage is coupled to an endless belt and the belt is driven by a motor to drive the carriage beneath the storage compartment into registry with a particular one of the articles stored in the storage compartment.

18. The machine of any one of claims 12 to 17,
15 wherein the carriage includes a wheel for facilitating movement of the carriage.

19. The machine of any one of claims 12 to 18,
20 wherein the carriage includes:
a sensor for determining the position of the carriage beneath the storage compartment,
a sensor for detecting when the carriage is in a home position;
25 a sensor for determining whether an article is within the carriage; and
a sensor for determining whether articles are stored in the sections of the storage compartment.

20. The machine of claim 19, wherein the sensors are
30 optical sensors.

21. The machine of any one of claims 12 to 20,
wherein the user input means comprises a touch screen which
35 displays information so that the user can input commands by touching the screen in response to the information displayed on the screen.

22. The machine of any one of claims 12 to 21, wherein the payment receiving means comprises a card reader for receiving a financial transaction card such as a credit
5 card or EFTPOS card or smart card for enabling payment in respect of the article. However, in other embodiments, the payment receiving means could comprise coin or note slots for receipt of coins or notes in order to make the payment.

10 23. The machine of any one of claims 12 to 21 wherein the dispensing means comprises the carriage which, after the article is removed from the carriage during backward movement of the carriage, is moved towards the opening by the moving means to push the tipped article through the
15 opening.

24. The machine of any one of claims 12 to 23 wherein the floor has a plurality of strips and the abutment is formed by an end of the strips spaced from the outlet
20 opening so that when the carriage is moved towards the outlet opening the bottom of the article slides on the strips and then drops over the end of the strips as the carriage passes over the abutment formed by ends of the strips.

25 25. The machine of any one of claims 12 to 24 wherein the carriage has a front flap movable from a closed position to an open position as the carriage moves backwards, to enable the article to be removed from the
30 carriage as the article is tipped by the abutment during backward movement of the carriage.

26. The machine of any one of claims 12 to 24 wherein a vertically slidable gate is provided for selectively
35 opening and closing the outlet opening.

27. The machine of claim 26 wherein the gate has a main body panel and a pair of leg members, one of the leg members having a slot and a shoulder, a latch pivotally mounted for engaging the shoulder of the leg to secure the gate in a closed position, a lever pivotally mounted for movement to engage the slot and release the latch from the shoulder to enable the gate to be moved by the lever vertically from a closed position to an open position to enable an article to be dispensed through the outlet opening.

28. The machine of claim 27 wherein a sensor is provided for sensing the position of the latch to determine when the latch releases the gate and/or re-locks the gate in the closed position, the gate having a second leg and a second sensor for sensing the position of the second leg as the gate moves to the open position to determine when the gate is in the fully opened position to enable an article to be released through the outlet opening.

20

29. The machine of claim 27 wherein a spring is provided for biasing the latch into a closed position to secure the gate in the closed position.

25 30. A vending machine for vending articles, including:

user input means for allowing a user to input information relating to purchase of one of the articles;

30 payment receiving means for receiving payment relating to purchase of the article;

a vending unit for storing the articles and for dispensing the articles to a purchaser;

control means coupled to the vending unit, the user input means and the payment receiving means for receiving data from the user input means concerning the article to be purchased, determining that payment has been

made and for causing the vending unit to dispense the article; and

wherein the vending unit includes:

5 a storage compartment for storing a plurality of the articles;

a carriage mounted below the storage compartment and movable relative to the storage compartment, the carriage having an open bottom;

10 a floor below the open bottom of the carriage;

an outlet opening in the floor;

moving means for moving the carriage to align the carriage with a particular one of the articles stored in the storage compartment and then to the outlet opening after receipt of the article; and

15 release means for releasing the article from the storage compartment so the article falls under the influence of gravity into the aligned carriage so that the carriage can receive the article and transport the article to the outlet opening with the article sliding on the floor and dropping from the carriage through the outlet opening when the carriage arrives at the outlet opening to thereby dispense the article.

20 31. The machine of claim 30, wherein the storage compartment includes a plurality of sections, each section being for storing a plurality of articles in a stacked manner one above another.

32. The machine of claim 30 or 31, wherein the release means comprises a pivotally mounted latch for holding the articles in each section.

35 33. The machine of any one of claims 21 to 32, wherein the carriage includes a plunger for contacting the

latch and moving the latch to release the article so the article can drop into the carriage for transportation to the outlet opening.

5 34. The machine of claim 33, wherein the plunger includes a solenoid for moving the plunger from a retracted position to an extended position so that in the extended position the plunger engages the latch and pivots the latch out of engagement with the article to enable the article to
10 drop into the carriage.

35. The machine of any one of claims 30 to 34, wherein the carriage is coupled to an endless belt and the belt is driven by a stepping motor to drive the carriage
15 beneath the storage compartment into registry with a particular one of the articles stored in the storage compartment.

36. The machine of any one of claims 30 to 35,
20 wherein the carriage includes a wheel for facilitating movement of the carriage.

37. The machine of any one of claims 30 to 36, wherein the carriage includes:
25 a sensor for determining the position of the carriage beneath the storage compartment,
 a sensor for detecting when the carriage is in a home position;
 a sensor for determining whether an article is
30 within the carriage; and
 a sensor for determining whether articles are stored in the sections of the storage compartment.

38. The machine of claim 37, wherein the sensors are
35 optical sensors.

39. The machine of any one of claims 30 to 33,
wherein the opening is closed by a spring biased closure
door which is open by the carriage when the carriage moves
into registry with the opening.

5

40. The machine of any one of claims 30 to 39,
wherein the user input means comprises a touch screen which
displays information so that the user can input commands by
touching the screen in response to the information
10 displayed on the screen.

41. The machine of any one of claims 30 to 40,
wherein the payment receiving means comprises a card reader
for receiving a financial transaction card such as a credit
15 card or EFTPOS card or smart card for enabling payment in
respect of the article. However, in other embodiments, the
payment receiving means could comprise coin or note slots
for receipt of coins or notes in order to make the payment.

20 42. A vending machine for vending articles,
including:

user input means for allowing a user to input
information relating to purchase of one of the articles;
payment receiving means for receiving payment
25 relating to purchase of the article;

a vending unit for storing the articles and for
dispensing the articles to a purchaser;

control means coupled to the vending unit, the
user input means and the payment receiving means for
30 receiving data from the user input means concerning the
article to be purchased, determining that payment has been
made and for causing the vending unit to dispense the
article; and

wherein the vending unit includes:

35 a plurality of storage compartments each for
storing articles stacked one above another;

a carriage movable relative to the storage compartments;

moving means for moving the carriage to align the carriage with a particular one of the articles stored in the storage compartment;

a latch associated with each of the plurality of storage compartments, the latch being pivotally mounted at an intermediate portion of the latch between a top of the latch and a bottom of the latch, a separate engaging component which includes an engaging portion, the engaging component being coupled to the latch by a recess in one of the latch or engaging component and a boss on the other of the latch or engaging component engaged in the recess, the engaging portion being for engaging a lowermost one of the articles stacked in each plurality of storage compartments and for holding the articles, and each latch having a retaining portion so that when the latch is moved to withdraw the engaging portion from the lowermost article to release the lowermost article, the retaining portion is moved concurrently into engagement with the article above the lowermost article to hold the article above the lowermost article and any articles above that article so that only the lowermost article is dispensed from the respective storage compartment and upon return of the latch the retaining portion disengages from the exposed bottom portion so that the articles can drop under the influence of gravity and be held by the engaging portion within the storage compartment.

43. The machine of claim 42, wherein the carriage is mounted for movement below the compartments and includes a plunger for contacting the latch and for moving the latch

to release the lowermost article so the article can drop into the carriage for transportation to the dispensing station.

5 44. The machine of claim 43, wherein the plunger includes a solenoid for moving the plunger from a retracted position to an extended position so that in the extended position the plunger engages the latch and pivots the latch out of engagement with the article to enable the article to
10 drop into the carriage.

45. The machine of any one of claims 42 to 44, wherein the carriage is coupled to an endless belt and the belt is driven by a stepping motor to drive the carriage
15 beneath the storage compartment into registry with a particular one of the articles stored in the storage compartment.

46. The machine of any one of claims 42 to 44, wherein the carriage includes a wheel for facilitating
20 movement of the carriage.

47. The machine of any one of claims 42 to 46, wherein the carriage includes:
25 a sensor for determining the position of the carriage beneath the storage compartment,
 a sensor for detecting when the carriage is in a home position;
 a sensor for determining whether an article is
30 within the carriage; and
 a sensor for determining whether articles are stored in the sections of the storage compartment.