Nov. 17, 1959 E. C. SALISBURY 2,913,142

DISPENSER

Filed April 2, 1954 4 Sheets-Sheet 1

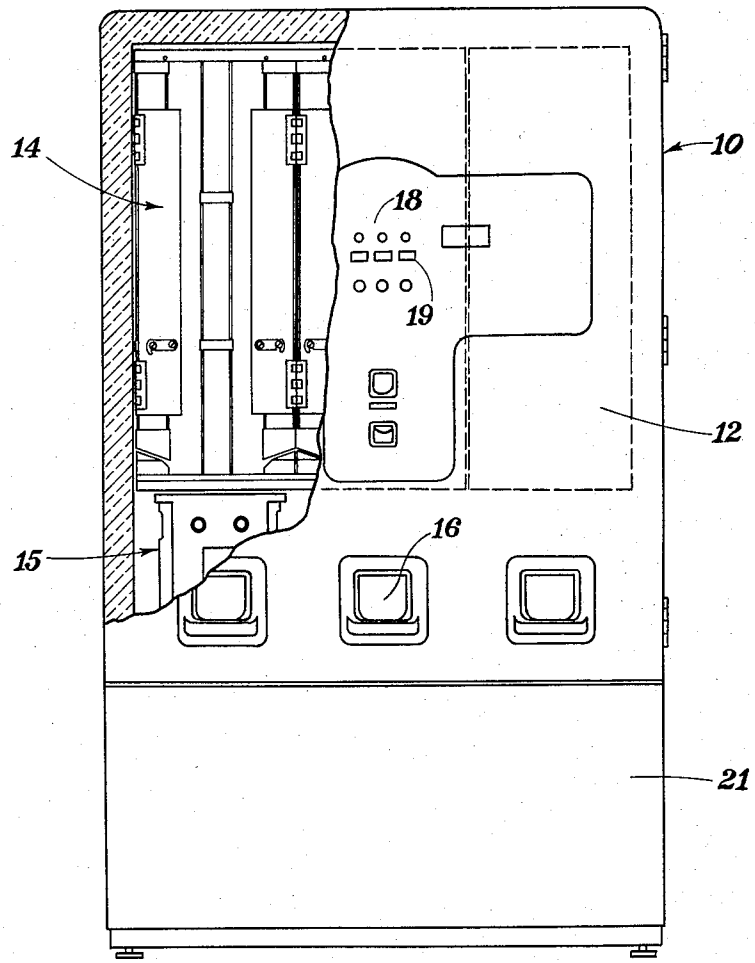


Fig. 1.

INVENTOR.
Ellsworth C. Salisbury
BY
Schmieding and Fultz
ATTORNEYS.

Nov. 17, 1959 E. C. SALISBURY 2,913,142

DISPENSER

Filed April 2, 1954 4 Sheets-Sheet 2

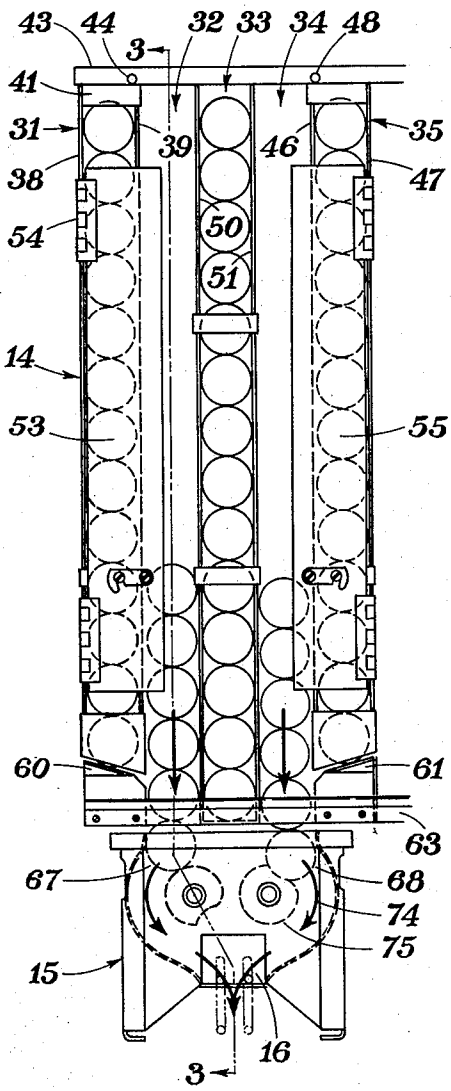


Fig. 2.

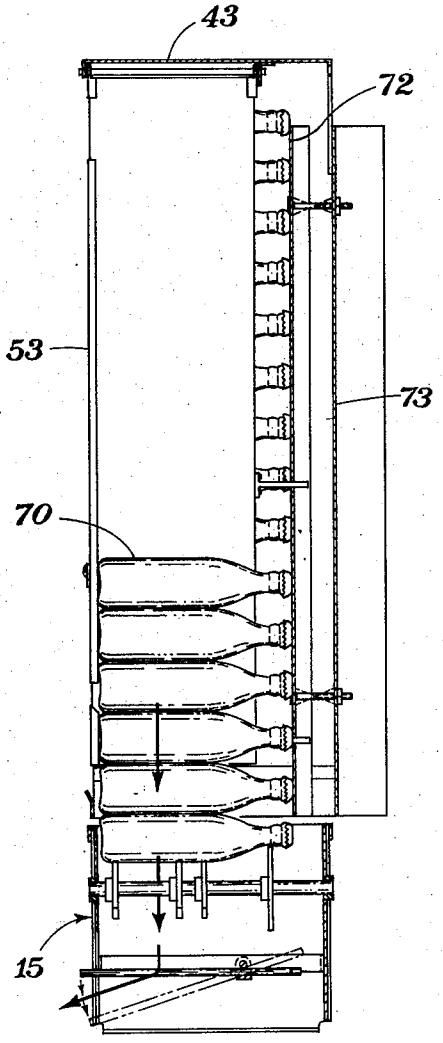


Fig. 3.

INVENTOR.
Ellsworth C. Salisbury
BY
Schmieding and Foltz
ATTORNEYS.

Nov. 17, 1959 E. C. SALISBURY 2,913,142

DISPENSER

Filed April 2, 1954 4 Sheets-Sheet 3

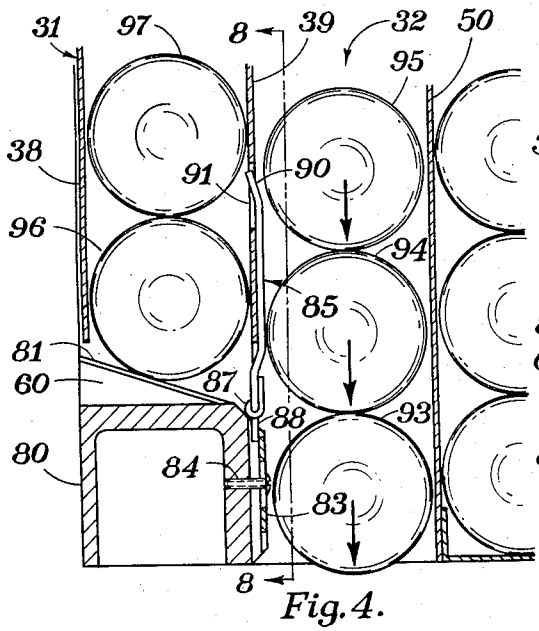


Fig. 4.

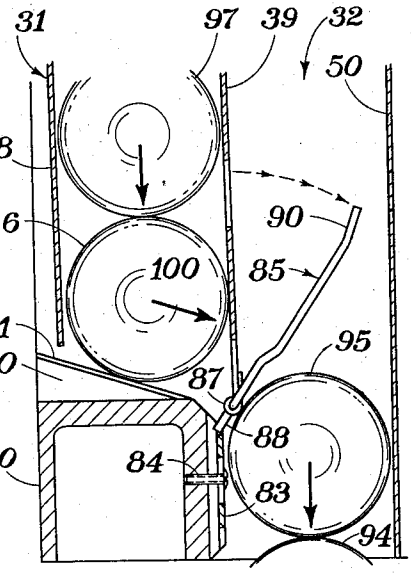


Fig. 5.

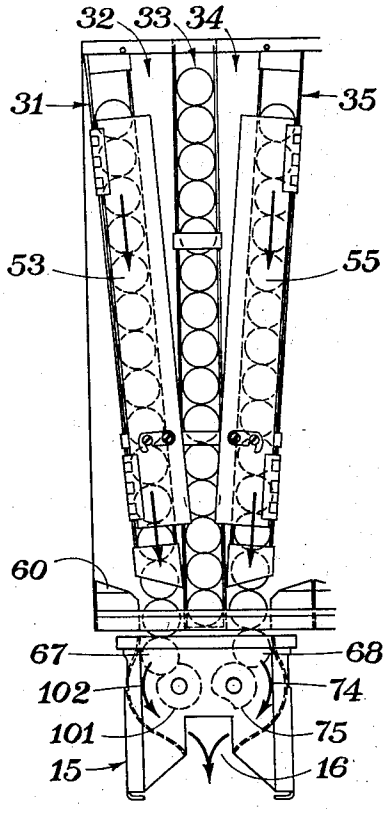


Fig. 7.

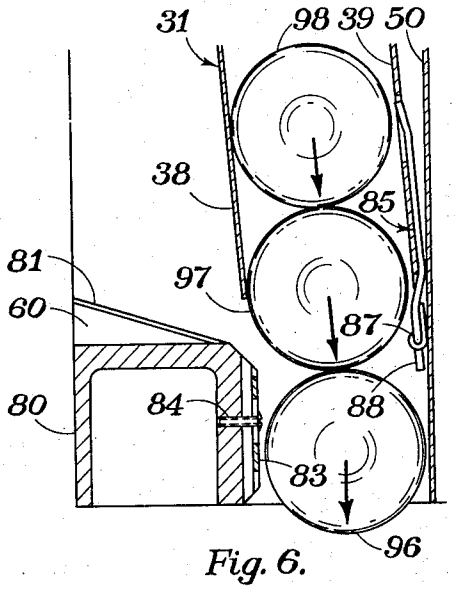


Fig. 6.

INVENTOR.
Ellsworth C. Salisbury
BY Schmieding and Fultz
ATTORNEYS.

Nov. 17, 1959 E. C. SALISBURY 2,913,142

DISPENSER

Filed April 2, 1954 4 Sheets-Sheet 4

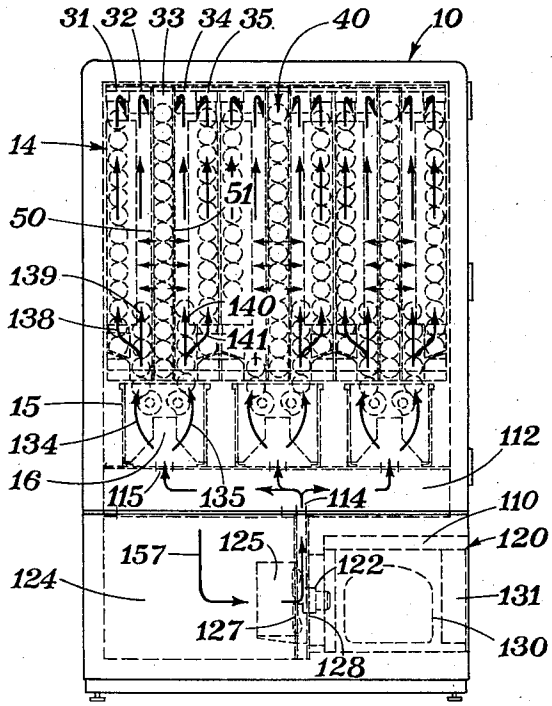


Fig. 9.

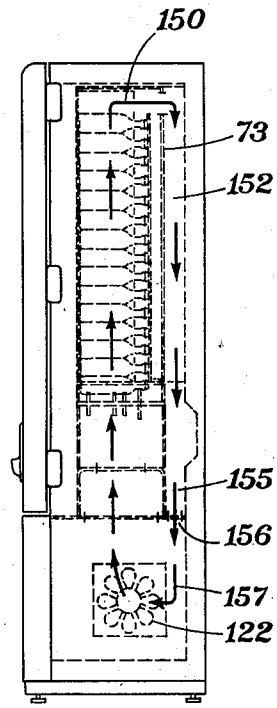


Fig. 10.

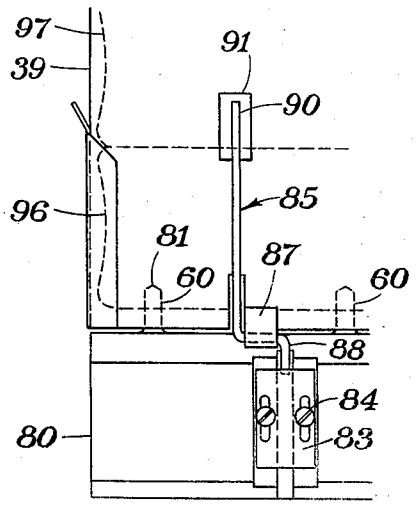


Fig. 8.

INVENTOR.
Ellsworth C. Salisbury
BY Schmieding and Fultz
ATTORNEYS.

United States Patent Office 2,913,142 Patented Nov. 17, 1959

2,913,142

DISPENSER

Ellsworth C. Salisbury, Columbus, Ohio, assignor to Mundean Mfg. Co., Columbus, Ohio, a corporation of Ohio

Application April 2, 1954, Serial No. 420,566

2 Claims. (Cl. 221—105)

This invention relates to article dispensing machines and has special reference to apparatus for storing and delivering articles to a coin-operated release mechanism.

In general, vending machines includes storage means for the articles to be vended and suitable coin operated release means, adapted to release a single article, responsive to insertion of a coin in the machine. The present invention provides a novel storage rack having a multiplicity of vertical stacks or rows, each of which has articles stacked vertically therein, which rack permits such articles to feed downwardly by gravity to a suitable release mechanism. With the present apparatus, when the storage rack is fully loaded with articles, one of the vertical stacks has a discharge opening normally aligned with an intake opening of a release mechanism. The other vertical stacks have lower discharge openings normally disaligned with the intake opening of the release mechanism. After the articles have been completely exhausted from the first mentioned stack, a second stack is automatically brought into alignment with the single intake opening of the same release mechanism. Being thus aligned, the second stack is adapted to exhaust the articles stacked therein. In a like manner, additional stacks can be provided so as to automatically align with the intake opening of the same release mechanism upon exhausting of articles from the preceding stack.

It is an object of the present invention to provide an apparatus of the type described wherein a succeeding vertical stack is automatically transferred into alignment with the intake of a release mechanism responsive to the exhausting of articles from a preceding vertical stack.

It is another object of the present invention to provide apparatus of the type described which, when applied to a dual inlet release mechanism such as is mentioned in the preceding paragraph provides a vertical precool stack which is particularly efficient for precooling bottles to be later placed in the vertical dispensing stacks.

It is another object of the present invention to provide dispensing stacks of the type described wherein cold air can be directed upwardly through the associated release mechanism to concentrate the refrigeration effect on the bottles first to be vended. This procedure is compatible with the normal thermal circulation of warm air from the packages being cooled. Moreover, after the first stack is emptied, the packages in the subsequent stack to be vended receive a similar concentration of upwardly moving cold air.

Still another object of the present invention resides in providing a dispensing stack arrangement of the type described which forms a precool space which is more completely enclosed than was the case with prior dispensers. This arrangement effects gradual cooling of the articles in the precool stack so that such articles are cooled in sufficient time to start a new loading cycle without seriously diverting the refrigeration effect from the articles in the vertical dispensing stack which are ready to be vended.

It is another object of this invention to provide a dispensing machine having novel vertically extending stacks with certain of said stacks being initially maintained in disaligned relationship with the intake opening of a release mechanism and with a novel locking means for maintaining said stacks in such disaligned relationship. By means of such novel locking means the articles in the stack being dispensed maintain the locking means in locked configuration until the articles are exhausted from the stack being dispensed. This invention provides, as another of its objects, apparatus of the type described having a plurality of stacks successively registerable with an intake opening of a release mechanism and a means which serves to unlock a succeeding stack from its position of disalignment with the release mechanism when the last article in the first stack has dropped to a suitable level, at which time the second stack is permitted to move towards the intake opening of the release mechanism in a controlled manner. With this arrangement the first article in the succeeding stack can be brought into contact with the last article in the first stack without shock or abrupt movement. This advantage is particularly important in the vending of carbonated beverages, since it cuts down breakage and wear on bottles, prevents increase in carbonic pressure in bottles, achieves quietness of operation, and eliminates wear and stresses on the mechanism.

As still another object of the present invention, the multiple stack arrangement of the type described is provided with novel means for utilizing the potential energy of the articles being vended, as they gravitate to a lower level, to effect successive alignment of stacks with a single intake opening of a release mechanism. Moreover such novel means is adjustable to function properly with articles of various lengths.

Still another advantage of the present invention resides in providing in an apparatus of the type described, a unit consisting of a plurality of vertical stacks associated with a single common release mechanism, with such unit being extremely compact for its article capacity, and, further, with each unit being suitably shaped such that a plurality of the units can be combined side by side in a single cabinet. Each unit can then be loaded with a different flavored article or beverage, and the result is a compact and efficient multiple flavor vending machine characterized by a large vending capacity for the size of the machine, and requiring relatively few release mechanisms.

A further object of the present invention is to provide, in a vending machine of the type described, a cold air flow system adapted to concentrate most of the total available refrigeration effect on the articles first to be vended.

A further object of the present invention is to provide, in a vending machine adapted to successively vend articles from vertically extending stacks, a cold air flow system adapted to distribute the total flow of cold air in a manner whereby a relatively large portion of the total cold air available is directed to the stacks first to be vended, a smaller portion of the cold air is directed to the stacks next to be vended, and a still smaller portion of the cold air is directed to precool stacks. In this manner, the total available refrigeration is distributed in an efficient manner.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of embodiment of the invention is clearly shown.

In the drawings:

Figure 1 is a front elevational view of a vending machine constructed according to the present invention. The view is partially broken, through the front cover for

the machine, revealing a unit of the novel vertical stacks constructed according to the present invention;

Figure 2 is a front elevational view of the vertical stacks shown in Figure 1;

Figure 3 is a side sectional view of the unit of vertical stacks shown in Figure 2, with the section being taken substantially along the line 3—3 of Figure 2;

Figure 4 is a partial front sectional view of the lower end of the unit of stacks of the preceding figure.

Figure 5 is a view corresponding to Figure 4 showing a dispensing stack being exhausted of articles and a second dispensing stack in the process of moving into alignment with the intake opening of the release mechanism;

Figure 6 is a view corresponding to Figure 5 showing the second dispensing stack after it has moved into alignment with the intake opening to the release mechanism;

Figure 7 is a partial front view, corresponding to Figure 6, but showing the complete unit of vertical stacks including the upper portion thereof;

Figure 8 is a partial side sectional view showing the lower portion of a vertical stack and locking means for holding such stack out of alignment with the intake opening to the release mechanism. The section is taken substantially along 8—8 of Figure 4;

Figure 9 is a front elevational view of a vending machine of the present invention schematically showing the flow of air from the refrigeration unit through the vertical stacks of the present invention;

Figure 10 is a side elevational view corresponding to Figure 9 showing the return flow of air to the refrigeration unit.

Referring to the drawings, and particularly to Figure 1, a vending machine is shown having a cabinet indicated generally at **10**. Such cabinet is provided with a front cover **12** forming a door which provides access to the interior of the machine. Within the cabinet, the machine is provided with a plurality of vertically extending stacks for receiving articles in stacked relationship.

Below a storage compartment **14** three coin-operated release mechanisms are located. One of these release mechanisms is indicated generally at **15**. With further reference to Figure 1, it will be noted that the front cover **12** of the machine is provided with three discharge openings **16**, through which the bottle is discharged to the customer. The upper front of panel **12** is further provided with suitable coin-receiving mechanism in the vicinity of **18**. This mechanism includes three coin-receiving slots **19** each of which electrically actuates one of the three release mechanisms **15**. In this manner the particular machine is adapted to selectively vend three different flavors. The cabinet **10** is further formed with a front panel **21** which serves to enclose the front of the lower portion of the cabinet in which a refrigeration unit is contained.

The general layout of the cabinet **10** having been set forth, attention will next be directed to the upper storage portion indicated generally at **14** in Figure 1, and shown in enlarged relationship in the subsequent figures. In Figure 2 it is seen that the storage compartment **14** consists of five vertically extending stacks respectively indicated at **31**, **32**, **33**, **34**, and **35**. Stack **31** is formed as an open-ended rectangular box having side walls **38** and **39**. A top cross member **41** serves to join the side walls and pivotly mount the stack to a frame member **43** at pivot **44**. In a like manner the right stack **35** is formed as an open-ended rectangular box having side walls **46** and **47**. Stack **35** is pivoted to frame member **43** at pivot **48**. A centrally disposed precool stack **33** is also formed as an open-ended rectangular box having side walls **50** and **51**. It should be mentioned at this point that precool stack **33** is not pivotally suspended as was the case with stacks **31** and **35**, but stack **33** has its sidewalls fixedly mounted to upper and lower frame members as it is merely used as a storage compartment for precooling articles and into which articles are inserted and removed by hand. That is to say, articles are vended only from the stacks **31**, **32**, **34** and **35**. It will be noted that stack **32** is formed by the right side wall **39** of stack **31** and the left side wall **50** of stack **33**. In a like manner, stack **34** is formed by the side walls of the adjacent stacks **33** and **35**.

A door hinged at **54** serves to retain the articles in stacks **31** and **32** as such articles move downward. In a like manner door **55** serves to retain articles in the stacks **34** and **35**.

Referring further to Figure 2 it will be seen that the lower end of stacks **31** and **35** are normally in alignment with inclined ramps **60** and **61**, which ramps are mounted on a lower frame member **63**. As long as racks **31** and **35** have their lower open ends lined with ramps **60** and **61**, the articles are retained in the stacks.

As seen in Figure 2, stack **32** is normally aligned with an intake opening **67** in the release mechanism **15**. In a like manner stack **34** is normally aligned with an intake opening **68** in the release mechanism **15**. As long as there are articles in the stacks **32**, the articles in the adjacent pivoted stack **31** cannot be vended, and as long as there are articles in the stack **34**, the articles in the adjacent pivoted stack **35** cannot be vended. Upon exhausting the articles from either of the stacks **32** or **34**, which are normally aligned with the release mechanism, the respective adjacent pivoted stack, i.e., either stack **31** or **35**, will automatically move into a position wherein articles can be vended in a manner later to be described.

Reference is next made to Figure 3 which represents a side sectional view taken through the vertical stack **32** along line 3—3. A plurality of articles in the form of the bottles **70** are shown in stacked relationship in the stack **32**. The articles are retained at one end by the door **53** and at the other end by an adjustable backplate **72** which can be adjusted forwardly or rearwardly, relative to the door **53**, depending on the length of the articles being vended.

It will be noted in Figure 2 that the lower one of the articles **70** in stack **34** has entered the intake opening **68** of the release mechanism and is ready to be vended out through the opening **16** by way of the arcuate path indicated by the arrow **74** upon rotation of the cam **75**.

Reference is next made to Figure 4 in which the lower end of the vertical stacks **31** and **32** are shown in detail to illustrate the present arrangement for moving stack **31** into alignment with the intake opening of the release mechanism after all of the articles have been exhausted from the vertical stack **32**. Beneath the opening in the lower end of chute **31** a frame member of U-shaped cross section is indicated at **80**. The member **80** carries two inclined ramps **60** and **61**. On the right side of the member **80** a plate **83** is secured by means of threaded fastenings **84**. A locking lever, indicated generally at **85**, is hinged to wall **39** at hinge **87**. Locking lever **85** is formed with a lower end portion **88** which is latchingly engageable with the upper edge of plate **83**. Locking lever **85** is further provided with an upper end portion **90** which extends to left, as seen in Figure 4, and into a slot **91** provided in wall **39**. As seen in Figure 4, the bottles **93**, **94** and **95** successively contact the upper portion of locking lever **85**, above the hinge **87**, thereby locking vertical stack **31** in its normal vertical position as shown. It will be observed, particularly from Fig. 4, that the bottle-engaging surface of the lever **85** has a length at least substantially equal to the diameter of one of the stacked bottles; the purpose of this is so that, for example, when bottle **94** clears the lever arm, the bottle **95** will be in contact with the lever arm; in this manner there is no tendency for the walls **39** to swing to the right prematurely, i.e., into the space between the periphery of two bottles. Should the wall **39** swing inwardly or to the right prematurely, that is, before all bottles in stack **32** are exhausted, except the lowermost, the weight of the bottles in stack **31** would

cause the stack 31 to move to the right and effect binding relationship between the wall 39 and the bottles in stack 32. As long as one of the bottles, such as bottle 94, Figure 4, contacts a portion of locking lever 85, above the hinge, the lower end 88 of the locking lever remains in locking engagement with the upper edge of plate 83.

To continue the description of the arrangement for transferring the stack 31 into alignment with the intake opening of the release mechanism, reference is made to Figure 5 which shows the last bottle in the stack 32 just leaving stack 32 to enter the intake opening of the release mechanism. The upper portion of locking lever 85, above the hinge 87, has swung to the right and away from the wall 39 and is in contact with the bottle 95. The movement of locking lever 85, responsive to lowering of the bottle 95, causes the lower end 88 of the locking lever to disengage the upper edge of plate 83. The lower end of stack 31 will then move to the right as seen in Figure 5 and into the position of Figure 6 wherein stack 31 is in alignment with the intake opening of the release mechanism. It will be understood that stack 31 is free to move to the right since it is pivotally suspended at its upper end at pivot 44. It is desirable to locate the pivot 44 to the right of a vertical center line for the stack 31, as seen in Figure 7, so that the weight of stack 31 will tend to rotate the stack about pivot 44 such that the lower end thereof will be urged toward the intake opening of the release mechanism.

The lower bottle 96, of stack 31, will roll down the inclined ramp 60 as the lever 85 swings to the right. In rolling down the ramp, bottle 96 exerts a force against the wall 39 in the direction of the arrow 100. Bottle 96 will continue to roll until it contacts the upper side of bottle 95 after the lever 85 disengages the plate 83. As the right wall 39 of stack 31 is moved over against wall 50, as seen in Figure 6, lever 85 automatically assumes a flat position along the wall 39. Stack 31 is thereby permitted to align with the intake opening of the release mechanism. Swinging stack 31 will remain in this position until all of the articles have been exhausted therefrom.

It should be noted that upper knife edges 81 are provided on the inclined ramps 60 and 61 to minimize rolling friction of the lower bottle 96 in effecting movement down the ramps. In this manner, the kinetic energy of the rolling bottle 96 is utilized for moving the stack 31 to the right.

Figure 7 shows a complete unit of five stacks and a release mechanism wherein the two stacks first to be exhausted, 32 and 34, are shown empty, and both of the swinging stacks 31 and 35 have been transferred into alignment with the intake openings 67 and 68 of the release mechanism 15. Upon rotation of the cam 75, bottles in stack 35 will be successively released along the path 74 and out of the opening 16. In a like manner, upon actuation of the cam 101, bottles in stack 31 will be released along the path 102 and out through the opening 16.

In operation, the central precool stack 33 serves as a fixed storage compartment from which precooled bottles can be transferred to the adjacent dispensing stacks. After one of the stacks which is initially aligned with the intake opening of the release mechanism, such as stacks 32 and 34, has been exhausted of articles, an adjacent swinging stack will automatically move over into alignment with an intake opening of the release mechanism. All of the articles stacked in the latter-mentioned stack will be successively dispensed through the intake opening. After both the initial and successively positioned stacks have been exhausted, the front of the cabinet is opened for reloading. A swinging stack, such as 31, is moved to the left to a position wherein the inclined ramp 60 forms a closure for the lower end of the stack. Locking lever 85 is then placed into locking engagement with the plate 83. Hinged door 53 is opened and precooled articles are first stacked in the stationary stack 32. As soon as the first few articles have been placed in stack 32, such articles will engagingly hold lever 85 to the left and against the right side of wall 39. The person loading the machine can then fill stack 32 to capacity with precooled articles being placed in the lower portion of the stack. The stack 31 is next filled after which the door 53 is again closed. In a like manner, stacks 34 and 35 can be loaded. The front door 12 of the vending machine is then closed and the machine is ready for operation.

Reference is next made to the cooling system of the present invention and to Figures 9 and 10, wherein the air flow system is set forth in detail. The lower portion of the vending machine cabinet 10 is formed with a refrigeration compartment 110 which lies below the dispensing stacks, and is separated therefrom by a dispenser support 112. As seen in Figure 9, dispenser support 112 is provided with an intake opening 114 and three outlet openings 115.

To supply cold air to the manifold 112, a package refrigeration unit, indicated generally at 120, is mounted in the lower portion of the vending machine. A fan located at 122 serves to draw air from an air tank 124 through a cooling coil 125. The cold air is directed upwardly between the plates 127 and 128 and into the manifold 112. As best seen in Figure 9, the package refrigeration unit 120 includes a refrigerant medium circulating mechanism 130 and a condenser 131 together with suitable associated mechanism.

Considering the flow of cold air from the manifold 112 upwardly, reference is made to only the unit of stacks on the lefthand side of the dispensing compartment 40, and to the flow of cold air therethrough. A similar cold air flow pattern will occur through the other two units of stacks, each of which received cold air from the manifold 112, in the manner shown in Figure 9.

Referring particularly to the unit of stacks on the left side of the vendor, in Figure 9, it will be seen that the cold air, leaving the exit port 115 in the top of the manifold 112, will enter the exit opening 16 of the release mechanism 15. The cold air then divides and forms two paths indicated by the arrows 134 and 135. It will be noted that these air flow paths are in the reverse direction from the article dispensing paths previously described. The cold air is then forced upwardly into the four dispensing stacks as indicated by the arrows 138, 139, 140 and 141. It will be understood, upon consideration of Figure 9, that when stacks 32 and 34 are still full of articles, such stacks, which are the first to dispense the articles carried therein, receive the greatest portion of the upwardly flowing cold air; hence the greatest portion of the total available refrigeration effect is directed to the articles first to be vended. This occurs when the vertical stacks are disposed in the configuration shown in Figure 2. Although the greatest portion of the cold air is following the paths of arrows 139 and 140, a certain amount of the cold air will also be directed to the stacks 31 and 35 along the paths designated by arrows 138 and 141. Hence the articles in stacks 31 and 35 will gradually be cooled so that by the time the first two stacks are exhausted of bottles, the articles in the second two stacks will have become cooled to proper vending temperature.

Reference is next made to the precool stack 33 which actually enclosed articles in isolated relationship relative to the upwardly flowing cold air. Walls 50 and 51 form closure members for the sides of the precool stack 33, and the adjoining cabinet front and rear wall serve to close the front and back of the precool stack. With the precool stack 33 substantially sealed in this manner, the flowing cold air is in no way diverted from the vending stacks, which require concentration of the refrigeration capacity. At the same time, it is desirable to gradually

precool the stored articles, over a relatively long time, so that such articles will be reduced to vending temperature by the time the dispensing stacks have become exhausted. This gradual precool effect is achieved by passing the flowing cold air, which moves upwardly in the stacks 32 and 34, along the walls 50 and 51 such that heat transfer through these walls will cause the temperature in the pre-cooled stack 33 to be lowered but only gradually. Hence it will be seen that the refrigeration capacity is only slightly diverted from the articles in stacks 32 and 34 so that such articles are rapidly cooled since they are first to be vended.

Proceeding with consideration of the cold air flow pattern, it will be seen, from Figure 10, that after the cold air passes vertically through the vending stacks, it is diverted towards the rear of the machine along the path 150, and then downwardly through the passage 152 which is formed by the plate 73 and the rear of the cabinet. The air then passes behind the manifold 112, through the passage 155, and then out the exit port 156. From there, the air follows the path 157 through the air tank 124 and into the cooling coil 125 to complete the air flow cycle. It is therefore seen that a closed air flow circulation is provided beginning with the cooling of the air by the cooling coil in the refrigeration unit, and continuing with the distribution of the cold air to the respective units of vertical stacks, with such distribution of the cold air being accomplshed in a novel and advantageous manner to the stacks first to be vended, the stacks to be successively vended, and to the precool stacks. After passing upwardly through the stacks, the air has become warmed and it is then directed downwardly along the back of the machine and redelivered to the cooling coil to complete the cycle.

In summary, the present invention provides a novel vending machine of large article containing capacity which serves to vend a multiplicity of article types with only a relatively few number of release mechanisms. The present novel mechanism serves to successively present stacks of articles to a single release mechanism as such stacks of articles are successively exhausted of articles. In addition, a precool arrangement is utilized in a manner whereby the available space within the machine is efficiently utilized. In combination with the above mentioned structural advantages, a cold air flow system is arranged, in a novel manner to efficiently apportion the total available refrigeration capacity to the stacks first to be vended, the stacks next to be vended, and to the stacks being precooled.

While the form of embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. A machine for vending articles comprising a release mechanism including a bottle receiving opening therein, a compartment located above the release mechanism, means in said compartment adapted to retain a stack of bottles in alignment with the bottle receiving opening, a vertically extending container for containing a second stack of bottles, said container being transversely moveable into alignment with the receiving opening responsive to exhausting of bottles from the first stack, and means for effecting said movement of the container, including a continuous inclined ramp member mounted below the container and contacted by the lower bottle therein when the container is disaligned with the receiving opening of the release mechanism and latching means including a lever mounted on the lower portion of said container, said lever including a vertically extending retaining arm of a length at least substantially equal to the diameter of one of the bottles and engageable with bottles in the lower portion of said first stack for retaining the container in a fixed position prior to exhausting of the bottles from the first stack.

2. A machine for vending articles comprising a release mechanism including a bottle receiving opening therein, a compartment located above the release mechanism, means in said compartment adapted to retain a stack of horizontally disposed cylindrical bottles in alignment with the bottle receiving opening, a vertically extending container for containing a second stack of horizontally disposed cylindrical bottles, said container being transversely movable into alignment with said bottle receiving opening responsive to exhausting of bottles from the first stack, and means for automatically effecting said movement of the container, and including inclined ramp means mounted below the container and contacted by the lower bottle therein when the container is disaligned with the receiving opening of the release mechanism, and latch means including a lever fulcrumed on the container, said lever including a vertically extending lever arm of a length at least substantially equal to the diameter of one of the stacked bottles and engageable with a bottle or bottles in the bottom of the compartment for retaining the container in a fixed position prior to exhausting of the bottles from the first stack.

References Cited in the file of this patent

UNITED STATES PATENTS

1,107,462	Taylor	Aug. 18, 1914
1,841,389	Weis	Jan. 19, 1932
2,205,192	Fry	June 18, 1940
2,274,065	Hull et al.	Feb. 24, 1942
2,304,484	Smith	Dec. 8, 1942
2,309,802	Vogel	Feb. 2, 1943
2,359,397	Steiner	Oct. 3, 1944
2,371,845	Robison	Mar. 20, 1945
2,389,283	Stewart	Nov. 20, 1945
2,501,816	Holinger	Mar. 28, 1950
2,594,147	Fry	Apr. 22, 1952

FOREIGN PATENTS

372,081	Great Britain	of 1932