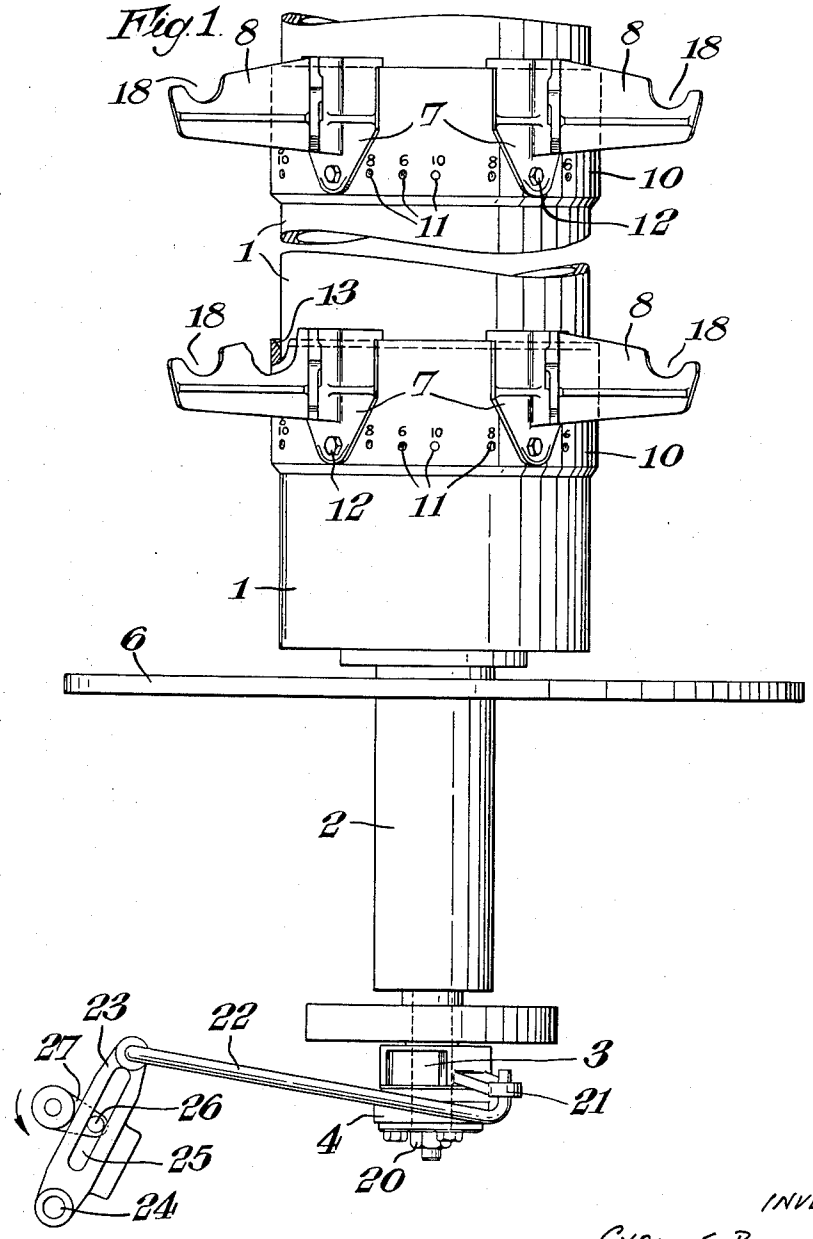
July 9, 1963 C. E. BOURACIER 3,096,907

AUTOMATIC VENDING MACHINE

Filed March 6, 1961 5 Sheets-Sheet 1

Fig. 1.



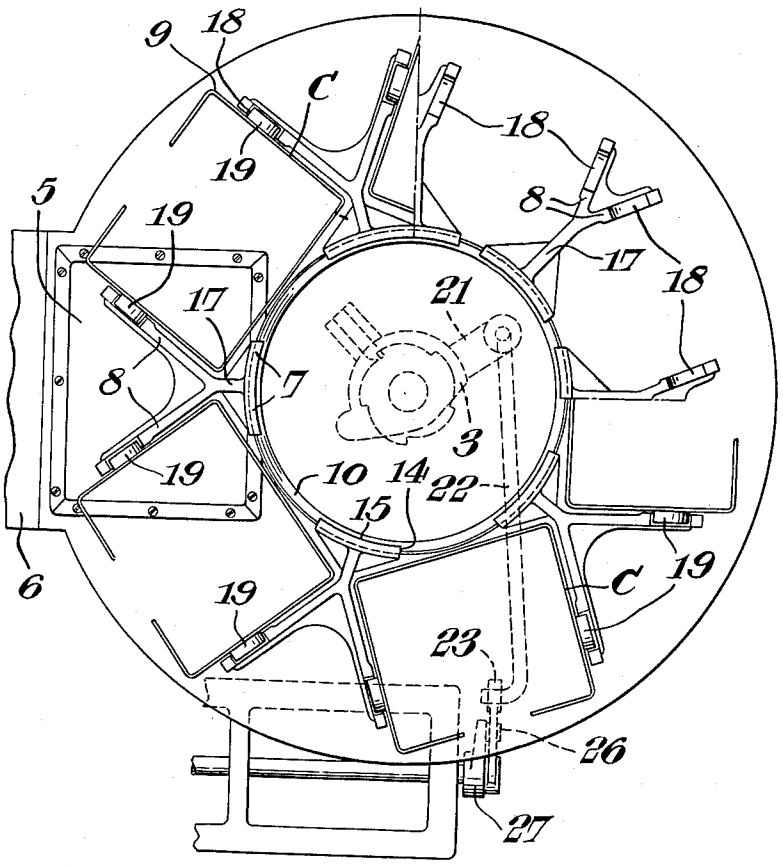
INVENTOR
CYRIL E. BOURACIER
By Emory L. Groff Jr.
Atty

July 9, 1963 C. E. BOURACIER 3,096,907

AUTOMATIC VENDING MACHINE

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Fig. 2.



INVENTOR
CYRIL E. BOURACIER
By Emery L. Groff Jr.
ATTY

July 9, 1963 C. E. BOURACIER 3,096,907

AUTOMATIC VENDING MACHINE

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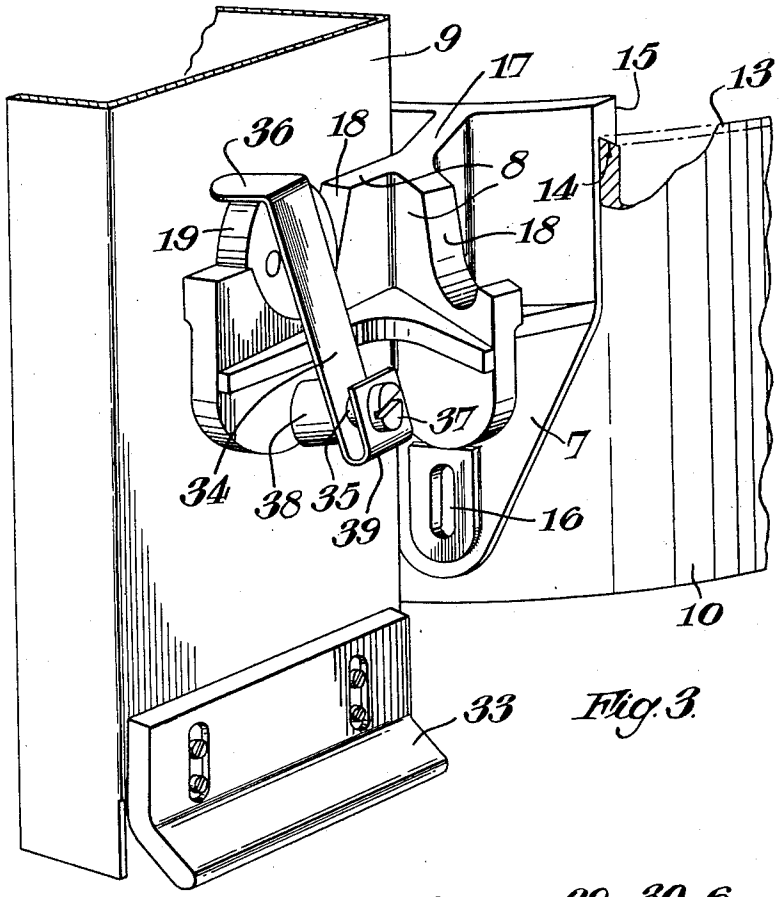


Fig. 3.

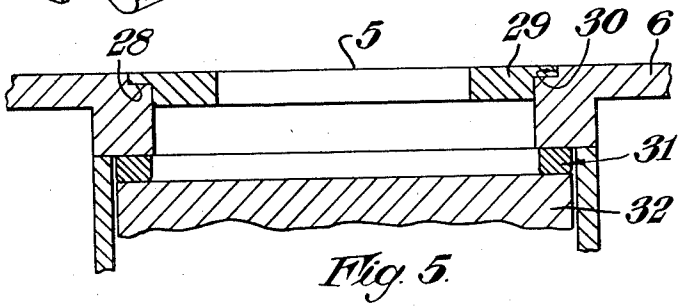


Fig. 5.

INVENTOR

CYRIL E. BOURACIER

By Emory L. Groff Jr.

AHY

July 9, 1963 C. E. BOURACIER 3,096,907

AUTOMATIC VENDING MACHINE

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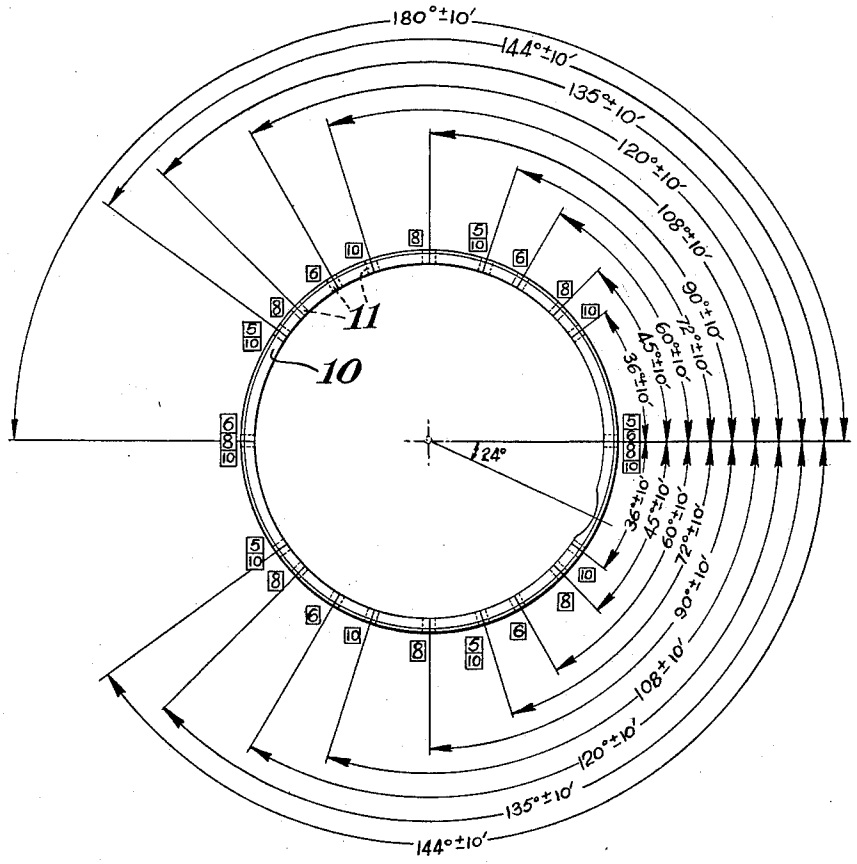


Fig. 4.

INVENTOR
CYRIL E. BOURACIER
By Emery L. Groff Jr.
ATTY

July 9, 1963 C. E. BOURACIER 3,096,907

AUTOMATIC VENDING MACHINE

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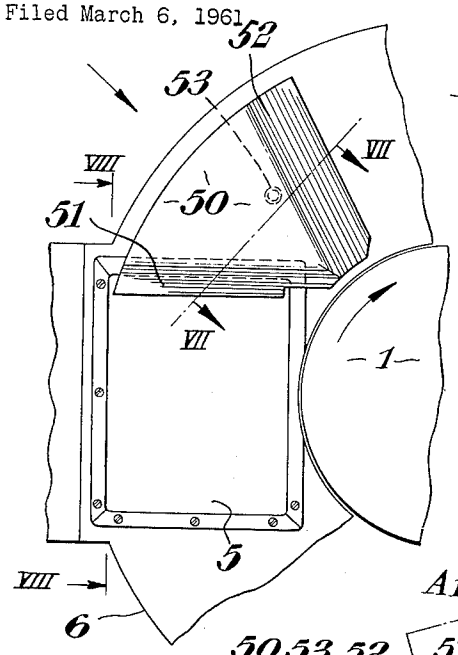


Fig. 6.

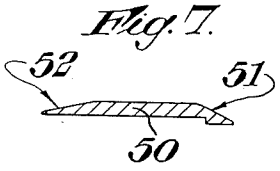
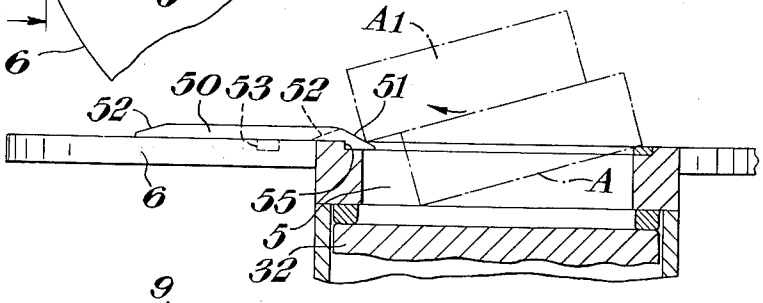


Fig. 7.

Fig. 8.



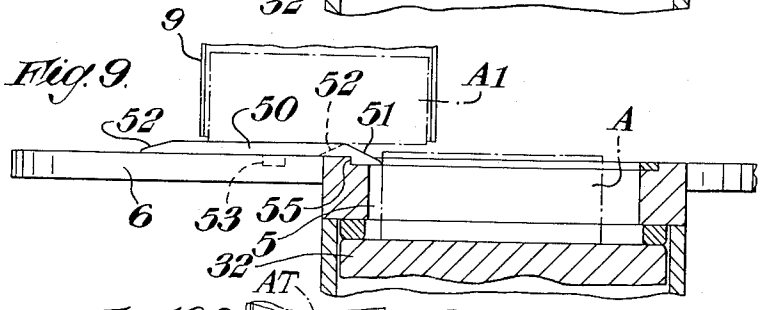


Fig. 9.

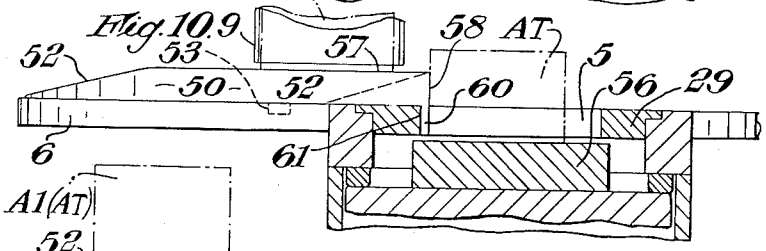


Fig. 10.

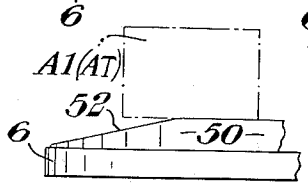


Fig. 11.

INVENTOR
CYRIL E. BOURACIER
By Emery L. Groff Jr.
Atty

United States Patent Office

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AUTOMATIC VENDING MACHINE

Cyril Eugene Bouracier, 340 Bensham Lane,
Thornton Heath, Surrey, England

Filed Mar. 6, 1961, Ser. No. 93,619
Claims priority, application Great Britain May 9, 1960
1 Claim. (Cl. 221—113)

This invention relates to vending machines of the columar type wherein the articles to be vended are stacked in vertical columns in suitable compartments or magazines arranged radially about a vertical drum which can be rotated step-by-step to bring the compartments in turn above a delivery opening.

The object of the invention is to provide a simple method of delivering different size articles from the machine, and in particular to enable the size of the compartments or magazines to be varied to suit the size of the article to be contained therein.

According to the invention there is provided a vending machine of the type in which articles are stacked in columnar compartments on a rotary vertical drum and are delivered from the bottom of each column through a relatively fixed delivery opening, wherein said compartments have means for stacking different size articles, and the compartment drum has provision for interchangeably mounting thereon compartments or magazines of different article size or capacity. Thus by means of the invention, the number of article compartments about the vertical drum may be varied to suit size requirements of the articles to be vended and in practice it has been found that it will be convenient to provide in the adjustment for 5, 6, 8 or 10 magazine compartments radiating from the drum.

To ensure accurate positioning of the compartments above the delivery opening, the drum drive requires an adjustment for altering its stroke according to the number of compartments selected for the drum. This drive adjustment will be adapted to suit the type of drive employed. In the case of a ratchet arrangement, interchangeable ratchets are provided having number of teeth to correspond with the numbers of compartments selected for the drum, and the driving pawl has an adjustable stroke.

The invention employs interchangeable compartment defining elements which can be exchangeably mounted top and bottom of the magazine drum to form holders for appropriate size magazine boxes in which the articles are stacked.

The magazine drum is formed or provided with support rings top and bottom, on which can be hooked and/or secured by screws, compartment defining brackets, each having a pair of magazine box holder arms set angularly according to the number of compartments required about the drum. Thus the arms of the brackets for a five compartment drum will be set at a wider angle than those for brackets related to a greater number of compartments. For example, if there are four compartments selected for the drum, the arms of the respective brackets may be set at right-angles; while for a five compartment drum the arms may be set at 72 degrees, and so on.

To facilitate mounting the brackets on the support rings, the latter may have a series of locating and/or fixing points, such as tapped holes which are angularly spaced and which may appropriately numbered according to the numbers of different compartment-defining brackets associated with the drum.

In order that the invention may be readily understood, an example thereof will now be described with reference to the accompanying drawings as applied to the general type of vending machine disclosed in the aforesaid patent

specifications. In the drawings, which are generally diagrammatic:

FIGURE 1 shows in vertical elevation the improved variable size compartment drum with the interchangeable drive mechanism which is adjusted according to the number of compartments on the drum;

FIGURE 2 is a composite plan view of the drum showing on part of the left hand side a five compartment arrangement, and on the right hand side an eight compartment arrangement;

FIGURE 3 is a pictorial view of one of the compartment defining brackets and shows one convenient way of holding the article magazine in the compartment as well as the method employed for hooking the bracket on to the associated mounting ring.

FIGURE 4 is a plan of a bracket mounting ring showing the layout of screw holes for accommodating 5, 6, 8 or 10 compartments, and

FIGURE 5 is a detail cross section of the delivery aperture to show how the size thereof can be altered to suit the size of the compartment for which the drum is set up.

FIGURE 6 is a diagrammatic scrap plan view of the delivery aperture in the delivery plate over which rotates the magazine drum showing a lead-off ramp device;

FIGURE 7 is a section on line VII—VII of FIGURE 6;

FIGURES 8 and 9 are cross sections of the delivery plate and delivery opening with one form of ramp which is referred to as type A, the views being taken generally along the line VIII—VIII of FIGURE 6 and showing, in FIGURE 8, the entry of an article into the delivery opening and, in FIGURE 9, the stabilisation of the article on the delivery valve.

FIGURE 10 is a cross section also taken generally on the line VIII—VIII of FIGURE 6, but showing a slightly modified form of ramp—referred to as the type B—for comparatively deep articles; and FIGURE 11 shows a scrap section of the lead-off end of the ramp to show how it tapers down to the surface of the delivery plate.

In these machines there is a centre magazine drum **1** mounted on a vertical spindle **2** and driven by a pawl and ratchet mechanism **3**, **4** so that the bottom ends of the vertical magazine compartments C (FIGURE 2) are brought in turn above a delivery opening **5** in a fixed horizontally disposed plate **6**. According to the invention the compartments are defined by exchangeable brackets **7** having angularly set arms **8** which form holders for the magazine boxes **9** in which the articles to be vended are stacked. For any given drum several sets of brackets are provided, the magazine holder arms of the respective brackets being set angularly in different positions in one set as against those of another set according to the variation in the number of compartments to be provided about the drum.

In the present instance provision is made for four different sets of brackets to cater for 5, 6, 8 and 10 compartments respectively.

Each bracket is adapted for hooking on to the drum in the appropriate circumferential position, and it is convenient to provide on the drum **1** at top and bottom ends thereof bracket support bands **10** each of which has a ring of angularly spaced tapped location holes **11** for engagement by location fixing screws **12** in the brackets, the holes being spaced and numbered to suit the required compartmentalization of the drum. Thus, for the instance given, there will be twenty such holes with spacing on either side of the centre line of 36, 45, 60, 72, 90, 108, 120, 135, 144 and 180 degrees as will be seen in FIGURE 4, the numbers against the holes **11** indicating the particular sets of brackets **7** applicable thereto.

Each bracket support band **10** has a ledge **13** in its upper periphery above the location holes **11** over which a hook element **14** on the respective brackets can be

engaged. The hook element 14 is curved to the shape of the centre drum and has a location surface 15 which seats closely to the drum surface when the hook is in position. The hook element forms part of the back plate of the bracket, the lower end of which has an elongated slot 16 to receive a fixing and location screw 12 for engagement with one of the tapped holes 11 in the supporting bands 10 to lock the bracket tightly in its hooked position.

From the centre of the back plate a projection 17 extends into a pair of magazine holding arms 8, which diverge and are equi-angularly set about the centre of the bracket, the spacing between the arms determining the numbers of compartments which will be provided about the drum using this particular bracket.

In the present instance, the machine is provided with four sets of brackets, the arms of the respective sets being disposed at 72, 60, 45 and 36 degrees for the 5, 6, 8 and 10 compartments respectively, FIGURE 2 indicating brackets for five and eight compartments.

Along the upper edge of each arm 8 and near the outer end thereof is formed a recess 18 or other suitable mounting for removably mounting therein the locating boss 19 of the magazine box 9.

When a set of brackets is mounted on the drum 1 there will be a series of outwardly projecting arms 8 top and bottom of the drum, the arm on one bracket being parallel to a corresponding arm on the next adjacent bracket so that virtually there are pairs of parallel arms at the bottom end of the drum aligning with similar pairs at the top so that rectangular magazine boxes 9 can be positioned and held by the aligned arm pairs as will be evident from FIGURE 2.

From the foregoing it will be evident that the brackets may be changed to vary the number of magazines in any machine, and they are each held in position by one screw 12, the tapped holes 11 in the support bands 10 being suitably numbered to facilitate correct spacing about the drum as previously referred to.

As an example of the application of the invention, if a large package article is to be vended, then a large magazine is required, which thus determines the number of magazines to be provided on the machine, which by virtue of the exchangeability of the brackets can be selectively adjusted to suit any requirement in the bracket set range provided.

When an adjustment is made it is also necessary to adjust the drive of the compartment drum accordingly. In the present instance, the drum spindle 2 carries two ratchet wheels 3, 4 one (3) for driving and the other (4) for location or stopping the drum. For each set of brackets there will be provided an appropriate set of ratchet wheels the teeth of which correspond in number to the number of compartments which can be provided by the related brackets. The ratchet wheels are held in position on the drum spindle by a suitable nut 20 which allows them to be exchanged as required (see FIGURE 1). The pawl which drives the ratchet wheel 3 of each set is located in an element which has an arm 21, said arm being connected by a link 22 to a reciprocating arm 23 oscillatable about a pivot 24 and having a longitudinal slot 25 in which engages the pin 26 of a driving crank 27. For varying the drive to suit the number of ratchet wheel teeth, the driving crank radius may be adjustable, or a set of different radius driving cranks may be provided. By adjusting or fitting a crank of the correct length, the appropriate angular movement of the drive ratchet arm 21 may be obtained, so as to set related columns accurately above the delivery plate opening 5 each time the drum is turned by the ratchet.

The delivery aperture in the delivery plate may be variable in size to suit the appropriate size of magazine compartments in the drum. Thus, for example, the aperture may be rebated at 28 to receive a removable frame 29 having the aperture required therein, the frame having a flange 30 which engages the periphery of the aperture so as to be located in the required position. On the bottom side of the aperture there is a sealing gasket 31 against which engages a valve 32 for controlling the exit of articles from the delivery aperture; such a valve may be a hinged member fixed to a spindle which rotates through 75 degrees when opening or closing the valve.

Provision may be made for retaining the magazine boxes 9 which may have a foot 33 (FIGURE 3) from rising during their travel over the delivery plate 6. Preferably the retaining means are removable or otherwise displaceable to enable them to be placed in an inoperative position when not required. In a simple construction the retaining means take the form of clips 34 mounted on the bottom bracket arms 8 for engagement respectively with a catch on the related magazine box. Conveniently, the clips are adapted for co-operation with the locating bosses 19 on the magazine boxes, when the bosses are resting in the mounting recesses 18 in the bracket arms 8. Thus, for example, the clips may be single arm levers 34 carried on horizontal pivots 35 projecting from the bracket arms immediately underneath the mounting recesses 18, the upper ends of each clip lever 34 being turned over to provide a lip 36, which, by turning the lever about its pivot 35, can be engaged over the magazine boss 19 (when in the mounting recess) to prevent the magazine from rising. When the clip lever is not required, it may be turned in either direction to disengage the lip from the boss, or the lever may be wholly removable by providing the pivot with a removable retaining screw 37 or other means. Thus, as indicated in FIGURE 3 a bracket arm may have a pivot boss 38 cast integral therewith and drilled and tapped to take a pivot screw 37 on which the clip lever is mounted, being preferably provided on its mounting end with a U-bend 39 to constitute a springy mounting so that the outer short arm of the U resiliently engages the head of the pivot screw 37 so as to give sufficient friction for retaining the clip lever in set position.

Referring to FIGURES 6–11 there is shown a lead-off ramp device which is advantageously employed. The horizontal delivery plate 6 with the delivery opening 5 is, as in the previous construction, controlled by the pivoted, slide or other valve 32 set below the upper face of the plate 6, so as to provide a comparatively deep recess in which an article A can be accommodated as it is delivered by gravity from the bottom of a compartment or magazine C (as in FIGURE 2) extending radially from the rotary drum indicated generally by reference 1 in FIGURE 6. An attitude control ramp 50 is mounted to one side of the opening 5 at the second edge of the opening met with in respect to the direction of rotation of the compartment or magazine—shown by the arrow in FIGURE 6—and it may be of two types which are conveniently called type A (FIGURES 8 and 9) and type B (FIGURE 10) respectively.

In the type A ramp, there is an abutment surface 51 at the lip edge sloping upwards and away from the delivery opening 5, and adapted so that the corner of the second or penultimate article A1 from the bottom of a column of articles in the magazine in delivery position, engages therewith to act as a fulcrum, causing the article to lift, and thus preventing the leading edge of the article tilting downwards and jamming against the edge of the delivery opening.

The effect of lifting the second article brings it clear of the bottom article A already stabilised in the opening (FIGURE 9) and standing on the valve plate 32. Thus when the valve opens, the bottom article can fall through cleanly and without interference which sometimes occurs when the attitude control ramp is not employed, since in that event the second article is not supported clear of the bottom article and rests on one corner thereof, thus tending to tilt up the bottom article and causing it to jam in the delivery opening.

As indicated by the dotted lines, in particular in FIGURES 6 and 10, the ramp **50** has a "lead off" surface **52** on the last edge thereof met with during the rotation of the magazine drum from the highest point of the ramp so as to guide the second article A1 (now the bottom article) as the column leaves the delivery opening **5**, smoothly on to the delivery plate **6**, as the drum continues its step-by-step rotation.

The ramp has a spigot **53** on the underside which engages in a location recess in the delivery plate **6**. Location is also provided by a lip **55** on the underside of the leading edge **51**, i.e. the attitude control edge, the lip engaging in a rebate in the edge of the delivery opening **5** as shown.

The type B ramp (FIGURE 10) is particularly suitable for use when the machine is handling articles AT which are thick, i.e. deeper than the depth of the delivery opening recess **5**, but relatively short in relation to the width of the opening.

Normally, when a thick article is being vended, the full depth of the delivery recess is used, i.e. no packing is placed on the valve plate. However, in the case of a thick but short article, the drop from the delivery plate surface to the full depth of the recess sometimes causes the bottom package to tilt forward and try to stand on its end.

To prevent this, packing **56** is usually fixed to the top of the valve to reduce the depth of recess, but this makes the article stand well above the delivery plate surface when in the recess, and thus there is a substantial drop for the penultimate article as it slides over the bottom one, already in the opening.

To prevent this "drop," the ramp has an attitude control surface **58** of substantial thickness to accommodate the whole or a substantial proportion of the projection of the article above the delivery plate surface, and the "lead off" surface **52** extends from the highest point **57** of this control surface **58** in the direction of rotation of the magazine drum so that each column of articles is lowered smoothly down the ramp as it leaves the delivery opening **5** during step-by-step rotation of the drum as shown in FIGURE 6.

The attitude control surface **58** acts as a correcting fulcrum to the bottom article AT so as to tilt it into the vertical stabilised position shown in FIGURE 10. The verticality of the attitude control surface may be as required to suit the articles. It may be normal to the plane of the delivery plate as shown, or inclined or rounded.

Where a standard delivery opening **5** is employed, the dimensions of the inlet thereto may be varied and determined by an insert frame **29** which engages in the rebate **55** at the edge of the opening, as is indicated in FIGURE 10. Mounting of the attitude control ramp (type B) may be similar to type A, but instead of the lip and rebate engagement as in the latter, the attitude control surface **58** may be extended downwardly as a lip **60** which engages over the edge **61** of the insert frame **29**.

I claim:

A vending machine comprising a vertically mounted rotatable drum, a pluraltiy of removable vertical magazine boxes all of like size disposed in equally spaced array around said drum to hold stacks of articles for vending, a horizontal flat plate beneath said magazine boxes whereon the lowermost articles in said stacks slide as said drum is rotated, a delivery opening in said plate directly below the path of said magazine boxes to receive articles from said magazine boxes, and intermittent drive means to rotate said drum at each actuation through a fraction of a complete revolution equal to the reciprocal of the number of magazine boxes on said drum, one of said magazine boxes passing over said delivery opening at each actuation of said drive means to allow the lowermost article of the stack contained in that box to fall into said delivery opening, there being a plurality of compartment defining members removably mounted around said drum, and mounting means for said members whereby they may be mounted in equally spaced array around said drum, said magazine boxes being supported on said members, pairs of said compartment defining members being formed integrally in a unit, in which the members are constituted by arms which diverge from said unit at an angle to suit the size of compartment to be defined thereby, there being a number of units equal to the number of compartments to be defined in combination with support rings at the top and bottom of said drum which are formed with annular locating means, said units being formed to engage said locating means whereby each unit may be located by a ring and fixed in position by a single fixing means.

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