A vending machine having a plurality of discharge trays each including a helical element rotatably mounted within a right angular tray and adapted to hold one or more items between the convolutions thereof for discharge from the tray in response to rotation of the helix a predetermined amount, each convolution having a right angular cross section whereby its leading and trailing edges are flat, being disposed normal to the longitudinal axis of the helix.

1 Claim, 9 Drawing Figures
VENDING MACHINE FLAT HELIX DISCHARGE UNIT

This is a continuation of application Ser. No. 326,780, filed Jan. 26, 1973, now abandoned.

BACKGROUND OF THE INVENTION

The provision and utilization of helical elements within a tray mounted in a vending machine for selective discharging of items from the tray, such discharge occurring due to rotation of the helix is not new, as shown in U.S. Pat. Nos. 3,085,711; 3,335,907 and 3,601,281 among others. These patents teach, however, a helix having a round or circular cross section with a center drive rod, and a substantial portion of the helix - with or without a rod, may be mounted within a channel disposed within the base of the tray for rigidity purposes. It is to an improvement of an item driving helix that this invention is directed.

SUMMARY OF THE INVENTION

The invention comprises an item discharge tray unit of which a plurality are placed horizontally disposed, vertically spaced rows within a cabinet portion of a vending machine, each discharge tray having a helical element rotatably mounted therein and extending the length thereof, each helical element having a plurality of convolutions spaced apart so as to permit items to be inserted therebetween, and with each convolution having a right angular cross section such that the leading and trailing edges of each convolution extend normal to the longitudinal axis of the helix.

It is an object of this invention to provide a new and novel vending machine helix discharge unit for dispensing stored items.

It is another object of this invention to provide in a helix discharge unit a helical driving element wherein the leading edge of each convolution is flat.

Yet another object of this invention is the provision of such a helical driving unit wherein the trailing edge of each convolution is also flat and extends parallel to the leading edge, said edges disposed normal to the longitudinal axis of the helix.

Still another object of this invention is the provision of such a helix and wherein a pair of rectangularly formed items having flat surfaces can be placed side-by-side between each adjacent pair of convolutions, and with the front and rear surfaces of the items engaged by the flat trailing and leading edges, respectively, of the convolutions.

It is another object of this invention to provide such a helix wherein substantially the entire front surface of an item being discharged from the tray is exposed for a person purchasing said item.

Another object of this invention is the provision of such a helix wherein the surfaces of the helix engaging and driving forward the item or items in front of same are disposed at right angles to the direction of drive such that items such as cigarettes are prevented from becoming cocked within the tray.

Yet another object of this invention is the provision of a flat helix the lower portion of which is nested within a depression formed in the bottom of the tray, the depth of the depression substantially equal to the radial thickness of each convolution of the helix, whereby flexibly packaged items are efficiently and effectively moved along the tray without being jammed or squeezed within the tray which impairs the operation thereof.

Still another object of this invention is the provision of this type of flat helix nested in a tray bottom channel whereby the base of a flexible package being vended therefrom is maintained substantially flat across the tray bottom, thus obviating unnecessary squeezing which could cause jamming of the tray operation.

These objects, and other features and advantages of this invention will become readily apparent upon reference to the following description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary plan view of the interior of a vending machine showing several of the helix discharge units mounted in a side-by-side relationship;

FIG. 2 is an enlarged side elevational view of one of the helix discharge units, certain parts being broken away for clarity of the invention;

FIG. 3 is a front elevational view taken along the line 3-3 in FIG. 2;

FIG. 4 is a fragmentary vertical sectional view taken along the line 4-4 in FIG. 2;

FIG. 5 is a view similar to FIG. 1 and showing a modified helix discharge unit in side-by-side relationship with other modified units;

FIG. 6 is an enlarged side elevational view of one of the helix discharge units of the FIG. 5 embodiment;

FIG. 7 is a front elevational view taken along the line 7-7 in FIG. 6;

FIG. 8 is a fragmentary plan view taken along the line 8-8 in FIG. 7; and

FIG. 9 is a fragmentary vertical sectional view taken along the line 9-9 in FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and particularly in FIG. 1, a portion of a cabinet 10 for a conventional vending machine is illustrated, showing a plurality of item discharge units indicated generally at 11, which units are mounted in a side-by-side relationship as best illustrated in FIG. 1, the units being indicated 11a, 11b, 11c, 11d, etc. Within each unit 11 there is a plurality of items 12, in this instance being of a flexible package type.

The cabinet 10 includes an upright rear wall 13, and a side wall 14 for enclosing this portion of the machine 10. At the front end of the item discharge units 11 is a discharge chute 16 which receives the items 12 for dispensing same through an opening (not shown) to the front of the cabinet 10.

Each item discharge unit 11 is identical and only one will be described. Each unit 11 comprises a rectangular tray 17 (FIG. 2) within which is mounted an elongated helix 18 for discharging the items 12 from the tray 17, and which helix 18 is rotated by a drive device 19 mounted at the rear of the unit 11.

Each tray 17 has a flat horizontally disposed base 21 (FIG. 3), and a pair of laterally spaced, upright side walls 22, with each tray 17 being completed by an end wall 24 (FIG. 2). The front edge 26 of the base 21 is disposed as illustrated in FIG. 1 immediately above the item discharge chute 16.

A sub-floor 27 (FIG. 3) is provided in this embodiment, being spaced above the base 21 except for a de-
pression 28 which is formed centrally of the sub-floor 27 and along the longitudinal axis thereof, the depression 28 having a depth from the sub-floor 27 equal to the thickness or radial width of each convolution 42 (FIG. 3) of the helix 18.

The drive device 19 (FIGS. 2 and 4) comprises a motor 30 having an output shaft 31 for driving the gears within a gear reduction housing 32, the latter having a drive shaft 33 upon which a collar 34 is secured. The collar 34 has a switch actuator 36 secured therein, and diametrically opposite is a socket 37 for another actuator 36 if desired. A switch 39 which is mounted in the control circuit for the motor 30 is provided with a leaf 38 which normally does not engage a switch plunger 41.

Upon rotation of the collar 34 due to operation of the motor 30 in response usually to the insertion of a coin into the vending machine, upon subsequent engagement of the switch actuator 36 with the leaf 38, the switch 39 is actuated to stop, for example the helix 18 until the motor 39 is again coin operated. Thus it can be understood that rotation of the motor 30 is controlled by the user of the vending machine, and effects through the switch 39 a rotation-in this instance, of 360° of the helix 18 so as to discharge completely one of the items 12 from the tray 22 chosen by the user.

The helix 18 is comprised of a plurality of convolutions 42 (FIG. 2), and with the helix being interconnected to the drive shaft 33 by an end plate 43, secured thereto by a plurality of fasteners 44. Referring to FIG. 2, it will be noted that each convolution 42 has a right angular or rectangular cross section so as to provide a leading edge 46 and a trailing edge 47 which extend parallel to the leading edge 46. Additionally an outer edge 48 and an inner edge 49, these edges also being parallel to each other, are provided. The edges 46 and 47 extend normal to the longitudinal axis of the helix 18, the import of which will be seen hereinafter.

Referring to FIG. 3, it will be noted that the helix 18 has an outside diameter equal substantially to the width of each item 12. The latter item has a flexible wrapper 51 having a sealed top 52 and an substantially straight bottom 53 (FIG. 3), and has side edges 54. It will be seen that due to the provision of the thickness of the convolution 42 being equal to the depth of the depression 28, the bottom 53 of each package 51 is held substantially straight across the sub-floor 27, this being aided by the provision of the inner surface 56 of each convolution 42 at the area of the depression being within a horizontal plane which includes the sub-floor 27. Thus, the bottom 53 of each package 51 is supported substantially even with the level of the sub-floor 27.

Referring to the embodiment of FIGS. 7-9, like elements as compared to the embodiment of FIGS. 1-4 are indicated by the same reference numerals modified by a prime. It is thus believed unnecessary to again describe the elements of the FIGS. 5-9 embodiment as to the said like elements. It will be noted that rather than having flexible packaged items such as those indicated generally at 12 in the first embodiment, a plurality of right angular or rectangularly formed packages 61 and 62 of cigarettes are supported within each tray 22' and between each longitudinally adjacent pair of convolutions 42'. Again it will be noted that each convolution 42' has a rectangular cross section taken radial to the longitudinal axis of the helix 18' with the leading and trailing edges 46' and 47', respectively, of each convolution extended parallel to each other and normal to the longitudinal axis of the helix.

It will be noted further that each adjacent pair of convolutions 42' are longitudinally spaced apart a distance equal to the depth or thickness of the items 61 and 62, and further wherein the outer diameter of each convolution 42' is substantially equal to the width of a combined pair of the cigarette packages 61 and 62 as illustrated in FIG. 8. Furthermore, referring to FIG. 7 it will be noted that each convolution 42' has an outer diameter greater than the height of the items 61 and 62 whereby the convolution 42' embraces each package 61 and 62 from the rear thereof to the front thereof. This is also illustrated in FIG. 8.

Referring to FIG. 8, it should also be noted that by the leading and trailing edges 46' and 47' extending normal to the longitudinal axis of the helix 18', the packages 61 and 62 of cigarettes are tended to be moved in a direction parallel to the longitudinal axis of the helix 18'. Thus, the leading edge 46a of a convolution 42', which edge 46a is flat, engages a like flat rear surface 64 of a packet 61 of cigarettes, further the trailing flat edge 47a of the convolution 42' engages the flat front surface 66 of a packet 63 of cigarettes; further the trailing flat edge 47b of the convolution 42' engages the flat front surface of the package 61, with the leading edge 46b of the convolution 42' engaging the flat rear surface of the next adjacent package 61a of cigarettes; and the trailing flat edge 47c of the convolution 42' engages the flat front surface of the package 62a of cigarettes; etc. The purpose of this description is to show that by each leading and trailing edge of a convolution 42' being flat, and engaging like flat surfaces of the packages of cigarettes, the tendency is to maintain those packages in a manner relative to each other so as to prevent cocking or jamming of the packages of cigarettes as they are discharged.

By rotation of the drive shaft 33' (FIG. 6) an amount of 180°, due to the provision of a pair of diametrically opposite switch actuators 36' and 36a (FIG. 9), each 180° rotation of the helix 18' effects the discharge from each tray 22' of a single package of cigarettes. To ensure that the last package of cigarettes is discharged from the tray 22' of this embodiment, a dummy package 63 (FIG. 8) marked EMPTY is provided.

It will be noted from FIG. 7 that the front of each package 61 and 62 of cigarettes is clearly exposed to the naked eye. Upon the provision of a window (not shown) at the front of the vending machine 10' such that all packages of cigarettes can be seen from the front thereof, upon the EMPTY package 63 (FIG. 8) coming to view in a particular tray 22' a person desiring a package of cigarettes would know that particular tray 22' (FIG. 8) is EMPTY and does not hold any more of that particular brand of cigarettes. Subsequently, the tray 22' would be filled by a service person with packages of cigarettes to the extent that the EMPTY package 63 would again be placed at the complete rear of the particular tray. Referring to FIG. 5, it will be noted that each tray 22' has an EMPTY package 63 of cigarettes for this purpose. Although this provision is not absolutely necessary for this embodiment, it will ensure that all useable packages of cigarettes, or like packages, will be discharged from each tray 22'.
We claim:

1. In a vending machine having a cabinet and within one portion of which is mounted an item discharge chute for dispensing items in flexible packages to be withdrawn from the machine, a plurality of item discharge units mounted in a side-by-side, horizontally disposed arrangement, each item discharge unit comprising:

   tray means having a base, laterally spaced side walls, a rear end, and a front end open to the discharge chute, said tray means adapted to hold a plurality of flexibly wrapped items, said base having a depression formed laterally centrally thereof and extended longitudinally thereof;

   helical means including a helix having a plurality of convolutions disposed within and extended longitudinally of said tray means, each of said convolutions nested within said depression in sliding contact with a bottom portion of said depression, each convolution portion having a radial thickness equal to the depth of said depression whereby the bottom of an item is supported at each end by said base and intermediate said ends by a convolution portion, thereby extending substantially level across said base and above said depression; and customer controlled drive means at said rear end connected to for rotating said helix a predetermined incremental amount.

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