CONVEYING ROD FOR VENDING MACHINES

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ABSTRACT

A dispensing device for articles supported thereon in the form of an elongated rod rotatably supported and driven at one end thereof with the rod being constructed in a symmetrical zig-zag or serpentine configuration to provide, in effect, a step rod utilized to hold, convey and dispense any object or product which can be supported, hung or attached thereto such as by means of a hole, hook or the like so that as the rod rotates the articles will be conveyed along the rod in a step-by-step manner and discharged from a free end of the rod with one article being discharged for each 360° of rotation thereof. The step rod has primary utility in vending machines but may also be employed wherever movement or conveyance of items is desired.

8 Claims, 7 Drawing Figures
CONVEYING ROD FOR VENDING MACHINES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a dispensing apparatus for use in a vending machine or other conveying system which is adapted to vend or convey a plurality of articles and discharge the articles one at a time from the end of a stepped or zig-zag dispensing rod that is removably, rotatably and drivingly supported at one end thereof with the other end being free to enable discharge of items therefrom, especially when employed with conventional vending machines having coin control apparatus, discharge chutes and the like.

2. Discussion of the Prior Art

Prior patents have been granted on dispensing apparatuses and conveying devices in which articles are suspended from a rotating shaft or rod constructed in a helical configuration so that as the rod rotates, the articles are dispensed from the rod. Representative of such patents are U.S. Pat. No. 3,294,281, issued Dec. 27, 1966 and U.S. Pat. No. 3,355,064, issued Nov. 28, 1967. Also, prior U.S. Pat. No. 3,248,005, issued Apr. 26, 1966, illustrates a similar type of dispensing rod employed in a vending machine in which the articles are dispensed one at a time in response to rotation of the rod or shaft. While such devices may perform satisfactorily under some circumstances, in some instances, such devices are relatively difficult to load with articles, may in some instances not dispense the articles one at a time and are somewhat restricted since they must be rotated in the particular rotational direction for which they are designed, and in addition are rather difficult to manufacture with the precision of construction necessary for proper operation.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a dispensing apparatus for use in dispensing articles one at a time in a vending machine or for conveying articles in the form of an elongated rod constructed as a step rod or zig-zag rod which may be stamped, cast, molded, formed or shaped from any suitable material and made to any size for use in holding, conveying and dispensing any object or product that can be effectively supported from, hung from or attached to it by means of a hole, hook or other supporting mechanism.

Another object of the invention is to provide a dispensing apparatus in the form of a step rod including symmetrical angled portions disposed in a single plane in which the angles between the portions or steps may be constructed in various angular relations and the distance between the stations or steps may also vary with it being understood that each angular portion or step in the rod will be identical which enables articles to be loaded onto the rod by feeding the product or articles to be conveyed or dispensed onto the step rod from either end thereof until all of the recesses or grooves in the down positions are filled.

A very important object of this invention is the specific construction of the rod and the continuation of edges of one angular portion toward the discharge end of the rod beyond the apex of connecting angular portions to define cam surfaces to cam the article beyond the apex of the connection between adjacent angled steps during the rotation of the rod in either direction thereby assuring that the article or product is moved forward of or outwardly of the center line of the tangent to each apex thus positively causing the article or product to slide forward down the drop angle to the next step in the down position thus assuring that the articles will be dispensed one at a time from the dispensing rod and also assuring that each article will move from one step to an adjacent step during each one-half revolution of the dispensing or conveying rod regardless of whether the conveying rod is rotated clockwise or counter-clockwise.

Another important object of the invention is to provide a dispensing or conveying apparatus in accordance with the preceding objects which is simple in construction, effective for conveying and dispensing articles one at a time, capable of rotation in either a clockwise or counter-clockwise direction with equal dispensing and conveying efficiency, capable of use in various vending machines having a rotary drive assembly and relatively inexpensive to manufacture.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the dispensing apparatus of the present invention illustrated in association with a conventional vending machine, the details of which are not disclosed.

FIG. 2 is a plan view of a portion of the step rod.

FIG. 3 is a transverse, sectional view of the rod illustrating the specific structure of the groove formed between adjacent steps in the rod.

FIG. 4 is an enlarged plan view illustrating a portion of the rod with an article supported therefrom.

FIG. 5 is a plan view of the portion of the rod of FIG. 4 illustrating the rod rotated approximately 90° from the position of FIG. 4.

FIG. 6 is a further plan view illustrating the rod after it has been further rotated from the position of FIG. 5 to illustrate the manner in which the article progresses from station to station.

FIG. 7 is an enlarged side elevational view of one station of the rod when in down position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The dispensing or conveying apparatus of the present invention is generally designated by the reference numeral 10 and is illustrated in association with a conventional vending machine 12 which includes a cabinet or housing 14 of any suitable configuration, shape and size and which includes a front wall 16 which may be provided with a transparent window 18 and an article delivery opening 20 associated with a delivery chute 22 for dispensing products or items 24 in response to deposit of a coin or coins in a coin receiving slot in a manner well known in the dispensing machine art and which construction forms no particular part of the present invention. For example, the vending machine
structure insofar as the cabinet and control mechanism is concerned may be similar to that illustrated in the previously mentioned U.S. patents. A plurality of the articles 24 are supported on the dispensing or conveying apparatus 10 and are discharged one at a time from the forward end thereof to the discharge opening 20. While the present invention has been illustrated in association with a vending machine, it is also capable of use wherever articles or products are desired to be conveyed in a step-by-step manner.

As illustrated in the vending machine, a motor assembly 28 is provided adjacent the rear wall thereof and supported and controlled in any suitable manner with the motor housing including a rotary output and a supporting bearing sleeve 30 rigidly and stationarily supported in relation to the cabinet structure. This structure is conventional in vending machines and the dispensing and conveying apparatus 10 of the present invention is associated therewith in that it includes a cylindrical rod portion 32 at the rear or aft end thereof that is telescopically received in and rotatably journaled in the sleeve bearing 30 with the terminal end of the aft end 32 having a reduced blade-like axial extension 34 thereon which is engaged in a correspondingly shaped socket in the drive or output of the motor assembly 28 thereby establishing a disconnectable driving connection between the dispensing and conveying apparatus 10 and the motor of the dispensing machine. The particular type of driving connection may be varied to adapt the dispensing and conveying apparatus to various machines or conveying systems.

In over-all construction, the dispensing and conveying apparatus is in the form of a step rod which may be generally defined as zig-zag or serpentine in construction terminating in a free or dispensing end 36 at its forward end and including a plurality of angularly oriented steps or portions 38 with the junction between adjacent steps or portions 38 defining spaced apices 40 with all of the apices 40 which are disposed downwardly below a center line of the rod defining stations for supporting the plurality of suspended articles 24 which may be in the form of bagged items having a hole through the upper closed end or tab 42 thereon so that the articles may be moved longitudinally of the rod.

As illustrated, each of the interior angles between adjacent steps or portions 38 is formed with a groove or recess area 44 which defines an inclined flat surface 46 that generally parallels the approaching surface 48 of the step 38 which defines the aft portion of the station defined by each apex when the apex is at its lowest point. The surface 46 is delineated by relatively sharp edge surfaces 50 which, in effect, define camming surfaces which extend beyond the center of the tangent of the apex 40 thus assuring that each article will be moved forwardly on the rod beyond the center of the tangent to the apex as the rod rotates to move the apex from its bottom position illustrated in FIG. 4 to first a horizontal position and then an upper position. As the apex moves from its lower position, regardless of which direction it is rotated in, the flat surface 46 and the cam edge 50 thereof engaged with the hole in the tab 42 which suspends the article from the rod will cause the periphery of the hole and thus the article and tab to move forwardly beyond the center line of the tangent of the apex so that as the apex moves beyond a horizontal position toward an uppermost position as illustrated in FIG. 6, the periphery of the hole in the tab 42 and thus the article will drop by gravity down the surface 48 of the adjacent step 38 toward the front end of the rod with the surface defining the drop angle for the article. This drop angle as well as the angular relation, size and configuration of the rod may vary with the groove or recess 44, flat surface 46 and edges 50 thereof assuring that for each one-half revolution of the rod, the article 24 will be moved from one station to another or from one apex to another so that the articles are always supported from the stations or apices which are at their lowest point below the center line.

The distance between the stations, apices and grooves may vary as may the angle of inclination of the drop angle or surface 48 and the opposite surface of the step 38 may be rounded at 52 to facilitate movement of the periphery of the hole and the tab thereon. Due to the unique construction of the recess or groove 44 and the flat surface 46, when the article or product is hanging in a down position in the groove, it is forward of or offset in relation to its respective station and in relation to the center of the tangent to the apex. This offset relation is maintained when the rod is rotated to the upward position and since the product is forward of the center of the tangent of the apex and is moved out of the groove since the groove then faces downwardly, the product must slide forward down the drop angle or surface 48 toward the next groove and surface 46 which is then in the down position. When the rod has been rotated 180°, the product is moved one step and the endmost product or article has been dispensed from the end 36 of the rod and the next adjacent article will have been positioned in the next adjacent station toward the forward end of the rod as illustrated in FIG. 1. Then, when the rod moves another 180°, the next adjacent article will be positioned in the last station next to the terminal end 36 thereby moving each article two steps for each 360° of rotation and dispensing one article for each 360° of rotation since for each 180 degrees of rotation, the product or article will move one step regardless of which direction of rotation. Thus, in a dispensing apparatus or vending machine, the articles are moved in a step-by-step manner and are discharged one at a time for each revolution of the dispensing apparatus and in a conveying apparatus, the rod will maintain the articles in predetermined spaced relation and will move all of the articles one step of movement for each one-half revolution.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. An apparatus for movably supporting at least one article for movement in a step-by-step manner, said apparatus comprising an elongated member constructed to define substantially a zig-zag path of movement having oppositely disposed apices to provide a supporting area for an article when an apex is at its lowest point during rotation of the elongated member in either rota-
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tional direction, said elongated member including means at each apex utilizing gravity to offset the article in relation to the point of tangency of the apex and maintain this offset relation during rotational movement of the apex from its lowest point toward its highest point thereby causing gravity movement from one apex to the other as the apex is moved from its lowest position toward its highest position during rotation of the elongated member.

2. The structure as defined in claim 1 wherein said elongated member is in the form of an elongated rod having a plurality of symmetrically arranged stepped portions defining a plurality of longitudinally spaced apices with adjacent spacers facing in opposite directions and all of the apices disposed substantially in the same plane for supporting a plurality of articles thereon.

3. The structure as defined in claim 2 wherein said means on each apex includes a groove formed in each apex with the bottom of the groove forming a continuation of the surface of an inclined stepped portion beyond a transverse plane passing through the point of tangency of the apex thus offsetting the article in relation to the point of contact between the outermost surface of the apex and its tangent.

4. The structure as defined in claim 3 wherein all of said apices are formed identically for moving each article from one apex to an adjacent apex longitudinally of the rod during rotation of the rod one-half of a revolution.

5. The structure as defined in claim 4 wherein one end of the rod is free and the other end is provided with means supporting and driving the rod whereby articles will be dispensed singly from the free end of the rod for each revolution thereof.

6. The structure as defined in claim 5 wherein the surface of the groove formed in the interior of the apex is substantially flat with the edges thereof providing cam surfaces to further offset the article longitudinally of the rod during rotation of the apex from its lowest position toward its highest position.

7. A dispensing device for use in a vending machine having a rotary drive output, said dispensing device comprising an elongated rod having a plurality of angularly oriented segments defining a stepped rod of zigzag configuration, means on one end of said rod for separable driving engagement with the rotary drive output of the vending machine, the other end of said rod being free, all of said rod segments being disposed in the same longitudinal plane with the junctures between segments defining a plurality of oppositely facing apices, the interior of each apex having an angular recess offset longitudinally toward the free end of the rod in relation to a transverse plane perpendicular to the tangent of the external surface of the apex at the point of tangency thereof, the surfaces defining the recess diverging outwardly and forming continuations of the diverging surfaces of the rod segments whereby gravity causes an article supported in the interior of the apex to move into the recess and into offset relation to said transverse plane so that gravity moves the article into an adjacent apex toward the free end of the rod during rotation thereof.

8. The structure as defined in claim 7 wherein the surface defining the surface of the recess which extends across said transverse plane is substantially flat and extends laterally outwardly beyond the recess with the lower ends thereof curving inwardly to define cam edges to cause movement of an article regardless of the direction of rotation of the rod.

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