MOTOR-OPERATED ARTICLE DISPENSING MACHINE

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This invention relates to improvements in dispensing devices and it relates particularly to devices by means of which merchandise such as books, packages, containers and other block-like articles can be selected and dispensed automatically.

An object of the present invention is to provide a simplified form of dispensing mechanism in which each unit of the dispensing device is operated by means of a small electric motor.

Another object of the invention is to provide a dispensing or vending device, each unit of which is driven by a separate electric motor and in which the motor is stopped by the discharge of an article from the dispensing unit driven by the motor.

A further object of the invention is to provide a dispensing device in which the articles dispensed thereby are arranged to be discharged by gravity and upon discharge to discontinue the dispensing or vending operation.

Other objects of the invention and the advantages thereof will become apparent from the following description of a typical form of vending or dispensing device embodying the present invention.

Typical dispensing devices, in accordance with the present invention, may include one or more units, each adapted to dispense articles one by one therefrom and each of the units being actuated by a small electric motor which may be energized to operate the motor and to start the motor.

More particularly, each of the dispensing units may include a generally vertically disposed hopper member adapted to receive a stack of articles to be dispensed, the lower-most article being supported on a pusher member having an inclined upper surface so that the articles are supported in inclined relation to the axis of the hopper member.

Near the top of the hopper member is a discharge opening through which the upper-most article can slide when it has been elevated to the level of the lower edge of the opening. The articles are directed downwardly by a suitable hood onto a platform provided with a switch which is actuated by the weight of the article to shut off the supply of electrical energy to the motor and thereby stop the dispensing operation.

A series of the dispensing units may be arranged side by side, and a selection can be made of any article to be dispensed from the unit by depressing the switch button associated with the dispensing unit containing the selected article.

The above-described system is simplified by the use of an electrical motor which is so arranged that the rotor of the motor is shifted endwise when the armature of the motor is energized. Advantage is taken of the endwise shift of the rotor to complete a holding circuit for continuing the operation of the motor until the article has been dispensed.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

Figure 1 is a view in front elevation of a typical form of dispensing device embodying the present invention;

Figure 2 is a view in section taken on line 2—2 of Figure 1;

Figure 3 is a view in section taken on line 3—3 of Figure 2 with the electrical circuit shown diagrammatically thereon; and

Figure 4 is a diagrammatical illustration of the coils and rotor of the motor used in each unit.

The dispensing device 10 chosen for purposes of illustration includes four dispensing units 11, 12, 13 and 14, all of which are alike. Each unit may consist of a hopper member 15 of generally rectangular or square cross-section, as shown in Figure 3, formed of sheet metal or other suitable material. The hoppers 15 of each of the units 11, 12, 13 and 14 are mounted on a suitable base member 16 which may be formed of a pair of channel-shaped metal plates 16a and 16b, welded to the bottoms of the hopper members 15 and joining them together in unitary construction.

Each of the units, for example, the unit 11 is provided with a box-like cover 17 (Figures 1 and 2) which is connected by means of a hinge 18 to the top of the hopper 15 so that it can be swung upwardly to permit the hopper to be filled with a plurality of articles 1A, 1B, 1C, etc. The front of the cover 17 may be provided with a hasp and latch arrangement 19 of any desired type, which may be secured by means of a padlock 20, or any other type of locking mechanism, to retain the cover 17 in closed position.

Below the dividing line between the hopper member 15 and the cover 17 is a discharge opening 21 through the wall of the member 15, through which articles may be discharged, as shown in Figure 2. A hood 22 is provided to cover the opening 21 and prevent manual removal of the articles therefrom. The hood may be provided with an inclined upper wall 22a, a substantially vertical front wall 22b and generally trapezoidal side walls 22c. The bottom of the hood is open to permit the articles to drop downwardly therefrom.
The articles A, A2, A3, etc. are lifted upwardly from the bottom of the hopper by means of a pusher or elevator member 25 formed preferably of sheet metal and which includes a pair of generally triangular shaped edges 26a and 26b connected at their bottom edges by a transverse generally rectangular plate 25c and having their upper inclined edges connected by another acutely inclined plate 25d which forms an inclined supporting surface for the articles A, A2, A3, etc. As best shown in Figure 2, the articles are supported in echelon or in inclined relationship to the axis of the hopper member 15 and are normally urged by gravity against the wall of the hopper member below the opening 21. When the pusher member 25 is moved upwardly, the articles will clear the lower edge 21a of the opening 21, and as they clear this edge, the force of gravity will cause the upper-most article to slide through the opening 21, downwardly through the hood 22 onto a platform 26 mounted in the front of the dispensing unit, from which it may be removed by the operator.

In order to assure the discharge of the upper-most article, the cover 17 may be provided with an inclined cam plate 17a extending transversely of the cover in the path of the upper corner of the articles so that as the pusher member 25 is pushed toward the opening 21 as the article comes into alignment with the opening. In this way, the articles are positively discharged even if there is some tendency for the articles to stick together.

The pusher member 25, as illustrated, may be moved upwardly along the hopper member 15 by means of an electric motor 21 and associated gearing 28. The motor 27 preferably is a shaded pole alternating current motor of the type now commonly used in fractional horsepower applications. It will be understood, of course, that for installations handling heavy articles, more powerful electric motors may be used. A feature of the motor 21, as shown in Figure 4, is the provision of a rotor 27a which operates between the pole pieces 27b and 27c and is supported by a shaft 27d that moves axially to permit the rotor to move between the dotted and full line positions shown. Thus, when the poles of the motor are deenergized, the rotor 27 will be in the full line position and out of alignment with the pole pieces of the motor. When the field windings on the poles are energized, the rotor is shifted axially into the dotted line position in alignment with the poles. Advantage is taken of this movement for a purpose described later herein.

The casing 28 of the motor 27 preferably is mounted on a plate member 33 which is secured to the side plate 25a of the pusher member with the motor 27 extending partially through the side plate 25a. The rotor shaft 27d is provided with a gear 31 which meshes with a larger gear 32 carried on a shaft, not shown, which extends between a bearing in the casing 28 of the motor and a bearing mounted in a T-shaped plate 33. (Figures 2 and 3) on the motor casing 28.

A second smaller gear 35 is fixed to the shaft 32 and drives another larger gear 36 supported on a shaft 37 mounted in a bearing which is secured to the plate 33. The shaft 37 also carries a larger gear 39 that extends through a notch in the bottom plate 25c and meshes with a rack 40 fixed to the back wall of and extending parallel to the longitudinal axis of the hopper member 15. Thus, when the motor 27 is energized, the gear 35 is rolled along the rack 40 by means of the reduction gearing 28, and the pusher member 25 is moved upwardly along the hopper member 15.

In order to assure relatively frictionless movement of the pusher member 25, it may be provided with a pair of rollers 41, 42 and 43, arranged in generally triangular relationship on each of its sides. The rollers bear against the rails 46, 47, 48 and 49 fixed to the interior of the hopper member and extending vertically therefrom. As best shown in Figure 2, the rails 48 and 49 terminate at the lower edge of the opening 21 so that the articles A1, A2, A3, etc. may be wider than the pusher member 25, may pass through the opening 21.

Inasmuch as the combined weights of the articles A1, A2, A3, etc. the pusher member 25 and the motor 27, together with the gearing 28, may be sufficient to cause the pusher member to move downwardly in the hopper member when the motor 27 is deenergized, the pusher member 25 is provided with a pivoted pawl 50 carried at its upper edge which cooperates with a rack or ratchet 51 mounted in the interior of the hopper member 15. The pawl 50 may be swung out of engagement with the rack by means of a finger piece or lever 50a thereon to permit the pusher member to be lowered or retracted in the hopper member.

The platform 26 for receiving the discharged article may consist of a generally square or rectangular plate having an upturned lip 26a. The platform 26 is provided with a pivot 26b downwardly turned lugs 26b by means of which the platform 26 is pivotally supported on a rod or shaft 52 extending between the flanges 53 and 54 which extend upwardly from the base plate member 16b. The platform 26 is normally urged upwardly by means of a spring 55 which is interposed between the portion of the platform 26 and a flange 56 which extends downwardly from the upper surface of a microswitch 57. The contacts of the microswitch 58 are normally closed when the platform 26 is elevated but are opened when the platform 26 is depressed by means of an article falling thereon.

Adjacent to the microswitch is a manually operated push button switch 60 of the momentary contact type which also is mounted on the base portion 16b.

Each of the above-described units may include the structure described above, and further, each of these units is provided with a limit switch 61 mounted in the cover 17 so as to prevent overrunning of the pusher member 25 when all of the articles have been discharged.

As shown in Figure 3, the unit may be connected to the terminals 64 and 65 which are adapted to be connected to a power line. The terminal 65 is connected by conductor 66 to one terminal 67 of the microswitch 57. The opposite terminal 68 of the microswitch is connected by the conductor 69 to a contact 70a of a switch or relay 70, which is movable, the movable portion of the relay 70a being connected to the terminal 21d of the motor. An opposite fixed contact 70b is connected by the conductor 71 and the conductor 72 to one terminal of the motor 27. The opposite terminal of the motor is connected by the conductor 73 to the contact 61a of the normally closed limit switch, the opposite contact 61b being connected by the conductor 74.
of the invention described above should be considered as illustrative and not as limiting the scope of the following claims.

We claim:

5. A dispensing device comprising a substantially vertical tubular member for receiving a stack of articles, said member having at least one substantially vertical side, a pusher for engaging at least one of said articles to advance said articles along said member, said pusher having an upper surface inclined downwardly toward said side at an acute angle to the axis of said member for supporting said articles in an inclined position with respect to said axis and in sliding engagement with each other and said side, a discharge opening in said side adjacent to the upper end of said member, an electric motor mounted on and movable with said pusher for moving said pusher along said tubular member to bring said articles successively into alignment with said opening for discharge by gravity from said stack through said opening, a movable platform for receiving an article from said opening, and a switch opened by movement of said platform to deenergize and stop said motor.

20. A dispensing device comprising a substantially vertical tubular hopper member, a pusher member movable up and down said hopper member, said pusher member having an acutely inclined upper surface for supporting a stack of articles for relative sliding movement toward one wall of said hopper member, a discharge opening in said one wall through which the uppermost article in said stack can slide when it comes into alignment with said opening, an electric motor mounted on said pusher member, a fixed rack extending vertically in said hopper member, and reduction gearing interposed between said rack and said motor for moving said pusher upwardly when said motor is energized.

3. A dispensing device comprising a member for receiving a row of articles, a pusher member movable along said receiving member for advancing said articles along said receiving member toward one end thereof, said receiving member having an edge at said one end over which said articles are discharged to fall by gravity, an electric motor mounted on and movable with said pusher member, manually operated means for starting said motor, a rack fixed to and extending lengthwise of said receiving member, reduction gearing connecting said motor to said rack to move said pusher member toward said one end of said receiving member upon energization of said motor, a switch for stopping said motor, and means below said edge engageable by an article discharged over said edge for actuating said switch to stop said motor.

4. A dispensing device comprising a member for receiving a row of articles, a pusher member movable along said receiving member for advancing said articles along said receiving member toward one end thereof, said receiving member having an edge at said one end over which said articles are discharged to fall by gravity, rollers on said pusher member, guide rails on said receiving member engaging said rollers for guiding and supporting said pusher member, an electric motor mounted movable with said pusher member, manually operated means for starting said motor, a rack fixed to and extending lengthwise of said receiving member, reduction gearing connecting said motor to said rack to move said pusher member toward said one end of said receiving member upon energiza-
tion of said motor, a switch for stopping said motor, and means below said edge engageable by an article discharged over said edge for actuating said switch to stop said motor.

5. A dispensing device comprising a member for receiving a row of articles, a pusher member movable along said receiving member for advancing said articles along said receiving member toward one end thereof, said receiving member having an edge at said one end over which said articles are discharged to fall by gravity, an electric motor mounted on and movable with said pusher member, manually operated means for starting said motor, a rack fixed to and extending lengthwise of said receiving member and reduction gearing connecting said motor to said rack to move said pusher member toward said one end of said receiving member upon energization of said motor, releasable pawl and ratchet means on said receiving member and said pusher member for restraining the latter against movement away from said one end of said receiving member, a switch for stopping said motor, and means below said edge engageable by an article discharged over said edge for actuating said switch to stop said motor.

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