United States Patent

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[54] **ARTICLE-VENDING MECHANISM**
23 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** **221/266,** 312/45, 312/73
[51] **Int. Cl.** **G07f 9/00**
[50] **Field of Search** 221/266; 312/45, 73

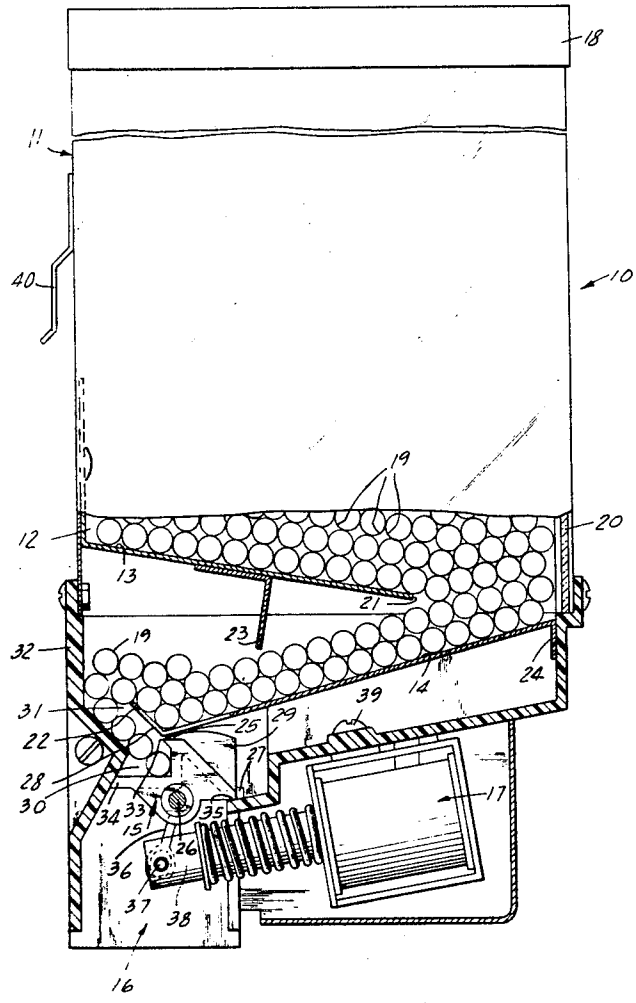
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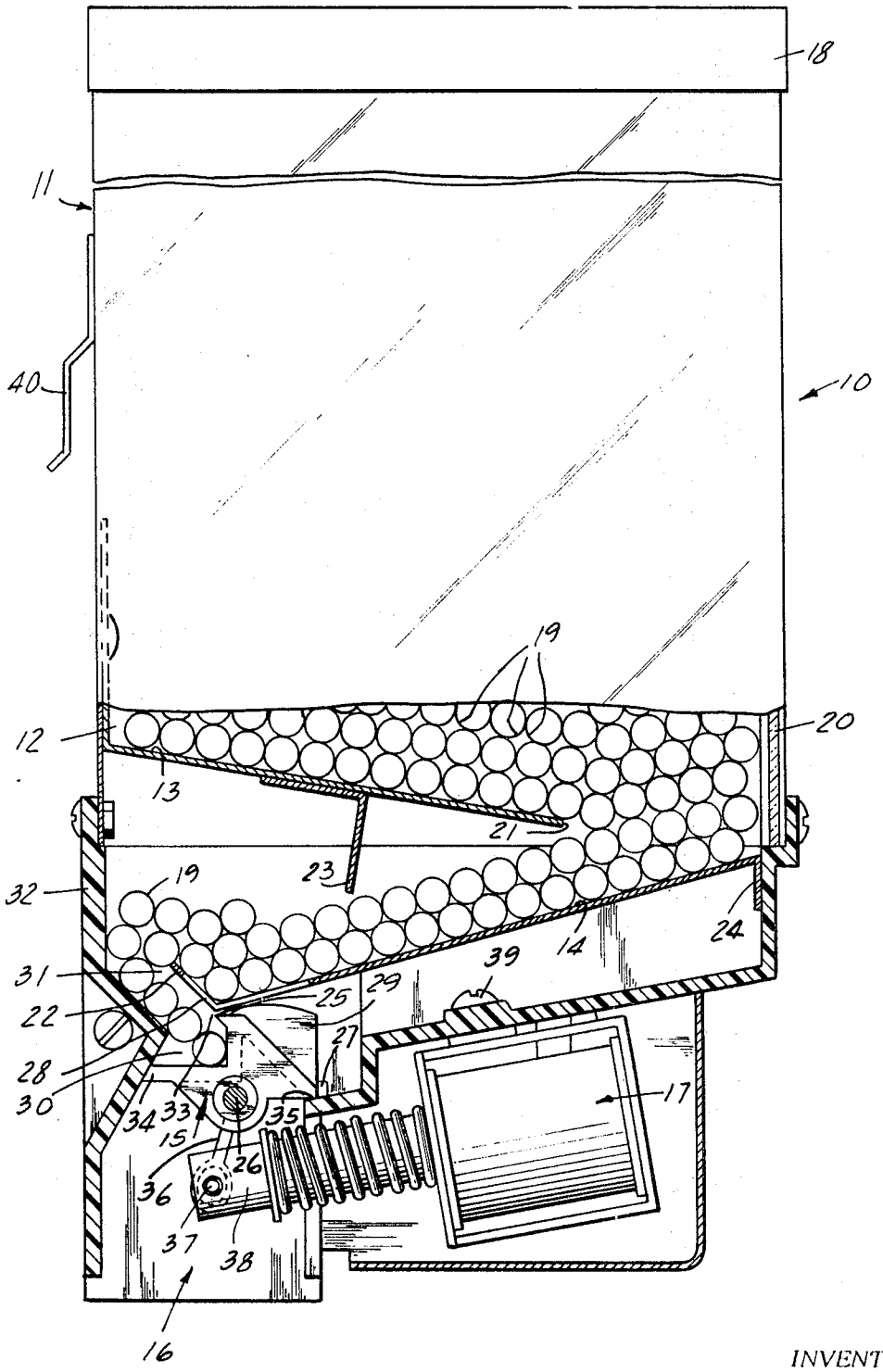
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ABSTRACT: An article-vending mechanism includes a storage compartment that discharges by gravity through a trickle apparatus, thence across a storage ramp in association with means for controlling the height of goods thereon, and then to a movable discharge member which is movable between two positions. In its first position, the movable discharge member provides a sanitary closure and in its second position vends one article to a discharge chute. An actuator drives the movable discharge member which has an abutment for impacting the storage ramp.





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ARTICLE-VENDING MECHANISM

BACKGROUND OF THE INVENTION

This invention pertains to an article-vending mechanism, and more specifically to a hopper receptive of articles in more or less random arrangement in association with a powered discharge member.

SUMMARY OF THE INVENTION

An article-vending mechanism is provided which has a storage ramp which preferably is movable onto which articles such as drinking straws flow under the influence of gravity, an actuator-driven discharge member receiving and vending the next article to be vended from such ramp. Means is provided which limits the total quantity of articles that can flow onto the ramp, the lower end of which is upturned and which is apertured for finger means to reach therethrough to act on articles disposed thereabove.

Accordingly, it is an object of the present invention to provide a simple reliable article-vending mechanism.

Another object of the present invention is to provide an article-vending mechanism which can be electrically actuated for use as a drinking straw vender.

Another object of the present invention is to provide an article-vending mechanism of the type described which is reliable when the articles constitute drinking straws.

A still further object of the present invention is to provide an article-vending mechanism which operates reliably in the presence of a variable height or supply of articles to be vended.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheet of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

ON THE DRAWING

The drawing illustrates an article-vending mechanism for drinking straws, provided in accordance with the principles of the present invention.

AS SHOWN ON THE DRAWING

The principles of the present invention are particularly useful when embodied in a preferred form of article-vending mechanism, namely a straw vender, generally indicated by the numeral **10** on the drawing. The vending mechanism **10** includes a hopper **11** which has an internal storage compartment **12** at the bottom end of which there is a bottom deflection surface **13** which overlies a storage ramp or baffle **14**, the lower end of which leads to a movable discharge member **15** that communicates with a discharge chute **16** in response to operation of an actuator **17**.

The article-vending mechanism **10** has been constructed to be particularly advantageous in connection with the vending of drinking straws which in this example may have a diameter on the order of one-quarter inch and a length of about 6 inches. The hopper **11** has a cover **18** which can be freely removed to fill the compartment **12** with a considerable number of straws **19**, the general amount of which can be determined by visual inspection through a transparent side panel **20** forming a part of the hopper **11**. In the drawing, the effective height of the hopper **11** has been reduced for convenience of illustration, and thus in practice, the exact height of the straws **19** within the hopper **11** may vary considerably. Such variation can, unless suitably allowed for, cause considerable variation in the reliability of vending. In this embodiment, the bottom deflection surface **13** supports a substantial percentage of the mass of the straws **19** and has a slope that extends downwardly from the horizontal by an angle of at least 8°. The lower end of the bottom deflection surface **13** at **21**, in combination with the upper end of the storage ramp **14** constitutes a trickle apparatus. In this embodiment, the gap into which straws **19** can flow by gravity is selected to be greater than one straw diameter and less than the sum of three straw diameters, the illustrated embodiment being shown as having a gap between 2 and 2½ straw diameters. It is the vertical height of the opening between the edge **21** that in effect determines the effective size of the discharge opening from the storage compartment **12**.

The storage ramp or baffle **14** has an upper surface that lies beneath the discharge opening and its upper surface slopes downwardly beneath the bottom deflection surface **13**. The storage ramp **14** has a slope, for example one that extends downwardly from the horizontal by an angle of about 15°. The articles **19** move by gravity over the upper surface of the storage ramp **14** toward its lower end **22** which slopes upwardly and over which upwardly extending slope the articles **19** move upwardly before reaching the movable discharge member **15**.

Means in the form of a weir **23** are secured to the hopper for limiting the total quantity of articles **19** that can flow onto the storage ramp **14**. To this end, the weir **23** is disposed in spaced relation above the ramp **14** and the articles **19** pass under the weir **23** in their movement on the ramp **14**. In this embodiment, the weir **23** is constructed in the form of a flange secured to the lower side of the hopper **11** so that it depends downwardly from the bottom deflection surface **13**. The lower edge of the flange-type of weir **23** is made extremely narrow so as to minimize the area of possible frictional contact with the straws **19**. The lower end of the weir **23** determines the height that will develop of articles **19** lying above the lower end **22** of the storage ramp **14**. As illustrated, and with the proportions used in the illustration, it would be expected that the articles would lie only two or three deep at the lower end **22** but there is space thereabove for a few more such straws. At any event, the total mass of such straws is relatively low and substantially constant so that the effect of a variable supply height that may take place in the storage compartment **12** is eliminated.

The storage ramp or baffle **14** is securely supported at its upper end **24** while no support is provided along the sides so that the lower end **22** is movable as by deflection of the storage ramp **14**. The storage ramp **14** may take the position illustrated due to the internal resilience or reaction of its material against further bending, but if it should bend further, its lower surface would engage the movable discharge member **15** as at **25**. Assuming that there is such engagement, the surface **25** does not lie a constant distance from the pivotal axis **26** of the movable discharge member **15** and so movement of the lower end **22** of the storage ramp **14** would result. In order to insure that there will be such movement, there is provided an abutment **27** which will engage the lower surface of the storage ramp **14** with a slight impact and therefore jiggle all of the articles lying thereon, and also move such storage ramp **14** positively in an upward direction.

In this embodiment, the lower end **22** of the storage ramp **14** is provided with a pair of horizontally spaced apertures, one of which is shown at **28**. These are elongated in the plane of the drawing, and the movable discharge member **15** has a pair of fingers **29** which freely pass into the apertures **28** so as to begin to jiggle the articles **19** at the lower end **22**, even before the ramp **14** might be moved. The width of the projection **27** is such as to be greater than the width of the elongated apertures **28** so as not to pass therethrough.

The movable discharge member **15** has a pocket **30** which communicates with the lower end **22** of the ramp **14**. To that end, there is a passageway **31** formed beneath the lower end **22** of the ramp **14** and an adjacent portion of a mounting base **32**, such passageway **31** having an effective size which is greater than 1 straw diameter but less than 2 diameters. The pocket **30** has an upper edge **33** which is disposed above the bottom of the pocket **30** by a distance which is greater than 1 straw diameter but which is less than 1½ straw diameters so that when the movable discharge member **15** is pivoted in a counterclockwise direction as drawn, the leading edge **33** will

cam the next succeeding straw **19** in an upward direction, so that it entirely clears the pocket **30**. The movable discharge member **15** thus has a first position wherein the pocket means **30** communicates with the lower end of the ramp. When the movable discharge member **15** is rocked to its counterclockwise limit, the discharge member **15** is in a second position wherein it serves to block communication with the lower end of the ramp and to communicate the pocket **30** with the upper end of the discharge chute **16**.

In the position illustrated, the movable discharge member **15** has a pair of flanges **34,35** which extend transversely across the chute **16** and which respectively abut adjacent portions of the hopper base **32** so as to seal the lower end of the hopper **12** when the discharge member **15** is in such first or illustrated position. No seal is needed during the transient condition that exists when the discharge member **15** is pivoted or reciprocated out of such illustrated first position. Thus also the upper end of the chute **16** is sealed at the discharge member so that any vapors that might exist or other contaminants or dust that conceivably could otherwise move up through the chute **16** are kept away from the interior, thereby leaving the contents stored in a sanitary manner.

The pivotal axis **26** of the movable discharge member **15** comprises a shaft which may be corotatable with the discharge member **15**, which may be fixed, or which may be a floating-type of bearing shaft.

To effect the reciprocation of the discharge member **15**, there is provided a radially extending arm **36**, the upper end of which is fixedly secured to the discharge member **15** for rocking it. The lower end of the radially extending arm **36** has an eyelet through which a pin **37** extends which is carried by a spring-loaded plunger **38** of the actuator **17** which is secured by screws **39** to the hopper base **32**.

In operation, the vending mechanism may be supported by a horizontal flange **40** which will slip over a support bar (not shown) so that the discharge chute **16** will cooperate with associated structure at the proper position. The actuator **17** in this instance is electrically powered and drives the discharge member **15** to select only the straw **19** which is in the pocket **30**, thereby also simultaneously opening up the upper end of the chute **16** to permit such selected straw **19** to be discharged while holding back other straws, while jiggling or elevating further straws to enter the passage **31**, and while further jiggling or impacting the storage ramp **14** near the end of the vending movement of the actuator **17**, just as it reaches its aforementioned second position. Straws or other articles that are being handled trickle over the bottom deflection surface **13** through a discharge opening at the bottom of the hopper **11**, and the quantity that accumulates just above the pocket **30** is regulated by the weir **23**. Drinking straws do not always come to rest in as neat arrangement as shows on the drawing, and even when some of the straws end up being slightly skewed or twisted in their disposition, the present mechanism accommodates such circumstance, and serves in the manner described to straighten the straws to the point where each one will be reliably vended, one straw being vended for each and every operation of the actuator **17**.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon, all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim:

1. An article vending mechanism, comprising: article-vending mechanism, comprising:

a. a hopper having a storage compartment with an enlarged discharge opening at its lower end of a size enabling gravity flow of a plurality of the articles simultaneously therethrough;

b. a storage ramp disposed beneath and sloping downwardly from said opening;

c. a movable discharge member having means defining a pocket receptive of the next article to be vended and communicating in a first position with the lower end of said ramp;

d. a discharge chute terminating at its upper end adjacent to said discharge member; and

e. an actuator connected to said discharge member for moving it to a second position blocking said communication with said ramp and communicating said pocket with said discharge chute.

2. An article-vending mechanism according to claim **1**, including means secured to said hopper for limiting the total quantity of articles which may flow onto said ramp through said enlarged opening.

3. An article-vending mechanism according to claim **2**, in which said flow-limiting means comprise a weird spaced above said ramp and under which weir the articles pass on said ramp.

4. An article-vending mechanism according to claim **3**, wherein said hopper has a bottom deflection surface sloping to said discharge opening, said ramp extending beneath said bottom-deflecting surface, and said weir comprising a flange depending downwardly from said bottom deflection surface.

5. An article-vending mechanism according to claim **1**, in which the lower end of said storage ramp is movable upwardly in response to movement of said discharge member to said second position.

6. An article-vending mechanism according to claim **1**, in which the lower end of said storage ramp is movably supported by said discharge member.

7. An article-vending mechanism according to claim **1**, in which said discharge member has an abutment for delivering an impact to the lower end of said storage ramp substantially when said discharge member reaches said second position.

8. An article-vending mechanism according to claim **1**, in which the lower end of said storage ramp is movable vertically, said discharge member having a portion engageable with the lower end of said storage ramp for moving it vertically.

9. An article-vending mechanism according to claim **8**, in which said portion of said discharge member is so disposed as to move the lower end of said storage ramp, substantially when said discharge member reaches said second position.

10. An article-vending mechanism according to claim **1**, in which said movable discharge member and said ramp are disposed within said hopper, said movable discharge member having means substantially sealing the lower end of said hopper in said first position.

11. An article-vending mechanism according to claim **1**, including means on said movable discharge member for directly engaging and moving upwardly a plurality of the articles following said next article to be vended.

12. An article-vending mechanism according to claim **1**, including means defining a passageway extending from the end of said ramp most remote from said discharge opening to said pocket, said passageway being receptive of a plurality of the articles of round cross section, and having a vertical size less than twice the diameter of the articles.

13. An article-vending mechanism according to claim **10**, in which said sealing means comprises a pair of flanges secured to said discharge member and normally abutting said hopper.

14. An article-vending mechanism, comprising:

a. a hopper having a storage compartment with a discharge opening at its lower end to enable gravity flow of a plurality of the articles therethrough;

b. a storage ramp disposed beneath and sloping downwardly from said openings, said ramp having a lower end which terminates in an upwardly sloping surface along which the articles pass moving in an upward direction;

c. a movable discharge member having means defining a pocket receptive of the next article to be vended and communicating in a first position with said lower end of said ramp for receiving articles that have moved over said upwardly sloping surface;

d. a discharge chute terminating at its upper end adjacent to said discharge member; and

e. an actuator connected to said discharge member for moving it to a second position blocking said communication with said ramp and communicating said pocket with said discharge chute.

15. An article-vending mechanism according to claim **14**, said ramp having aperture-defining means at said lower end, and said movable discharge member having finger means movable through said aperture-defining means to urge articles along said upwardly sloping surface.

16. An article-vending mechanism according to claim **14**, including means defining a passageway extending from the upper end of said upwardly sloping surface in a downward direction to said pocket.

17. An article-vending mechanism according to claim **16**, in which said passageway has a downward slope substantially parallel to said upwardly sloping surface for partially supporting the articles therein.

18. An article-vending mechanism according to claim **16**, which includes means in said passageway engaged by the articles to retard their downward movement.

19. An article-vending mechanism, comprising:

a. a hopper having a storage compartment with a discharge opening at its lower end to enable gravity flow of a plurality of the articles therethrough;

b. a storage ramp disposed beneath and sloping downwardly from said opening;

c. a movable discharge member having means defining a pocket receptive of the next article to be vended and communicating in a first position with the lower end of said ramp;

d. a discharge chute terminating at its upper end adjacent to said discharge member; and

e. an actuator of the electric solenoid type connected to said movable discharge member for moving it to a second position blocking said communication with said ramp and communicating said pocket with said discharge chute, said actuator normally serving to hold said movable discharge member in said first position.

20. An article vending mechanism according to claim **15**, including means pivotally supporting said movable member, and a radially extending arm fixedly secured to said electric solenoid.

21. An article-vending mechanism according to claim **11**, the lower end of said storage ramp being movable vertically in response to movement of said discharge member.

22. An article-vending mechanism according to claim **12**, wherein the marginal portion of said end of said ramp at its opposite side comprises part of said passageway means.

23. An article-vending mechanism according to claim **14**, wherein said hopper has a bottom deflection surface sloping to said discharge opening, said upwardly sloping surface lying beneath the upper end of said bottom deflection surface.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,587,925 Dated June 28, 1971

Inventor(s) Paul Keller

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 70 after "2" insert --straw--;

Col. 3, lines 66 and 67, delete "article vending mechanism, comprising:" (second occurrence);

Col. 4, line 14, correct the spelling of "weir";

Col. 6, line 14, after "said" insert --movable member and reciprocably driven by said--.

Signed and sealed this 18th day of July 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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