Nov. 11, 1969 H. F. TECHTMANN 3,477,617

INDEXING TYPE OF FILLING MACHINE WITH BOTTOM FLAP VALVE

Filed Oct. 31, 1966 3 Sheets-Sheet 1

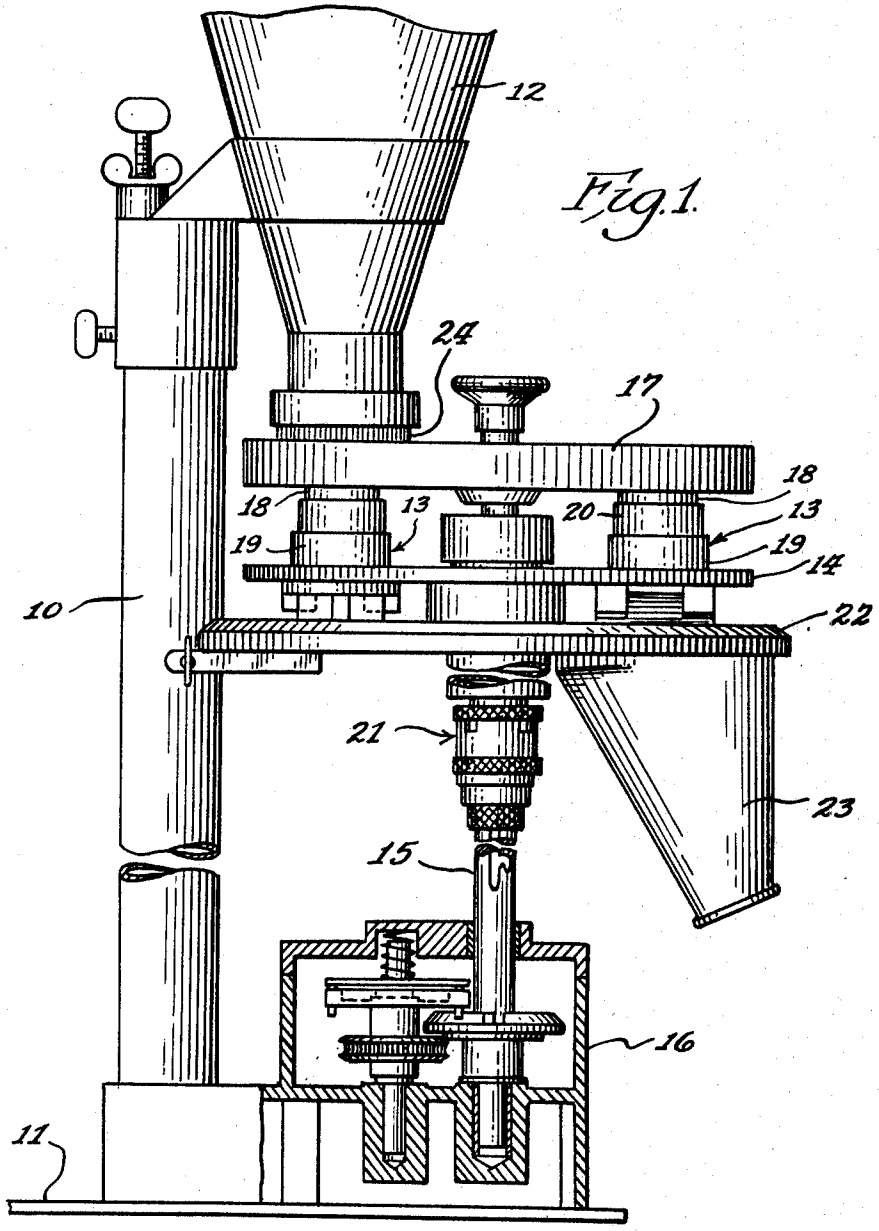

Fig. 1.

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INDEXING TYPE OF FILLING MACHINE WITH BOTTOM FLAP VALVE

Filed Oct. 31, 1966 3 Sheets-Sheet 2

Fig. 3.

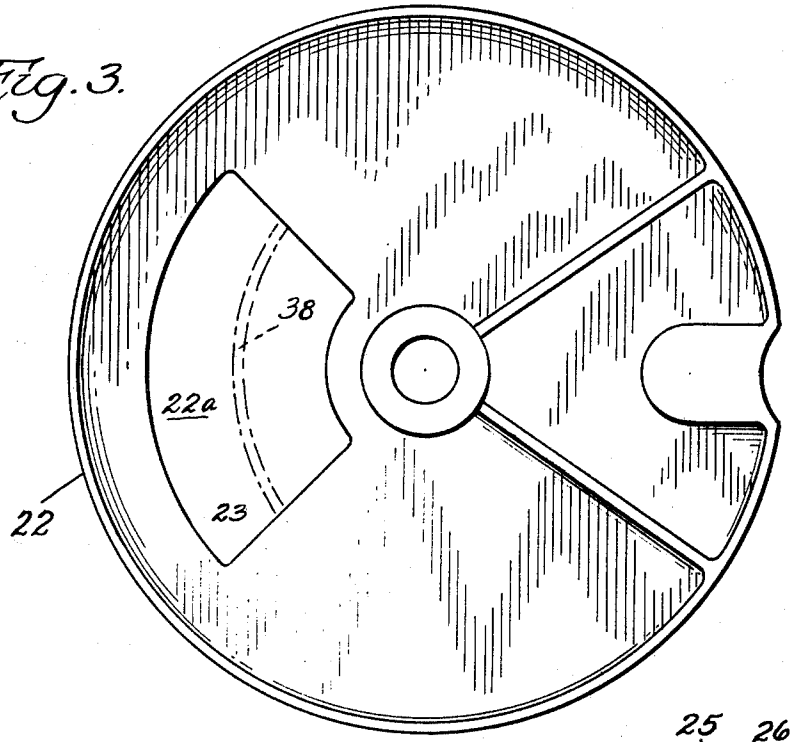
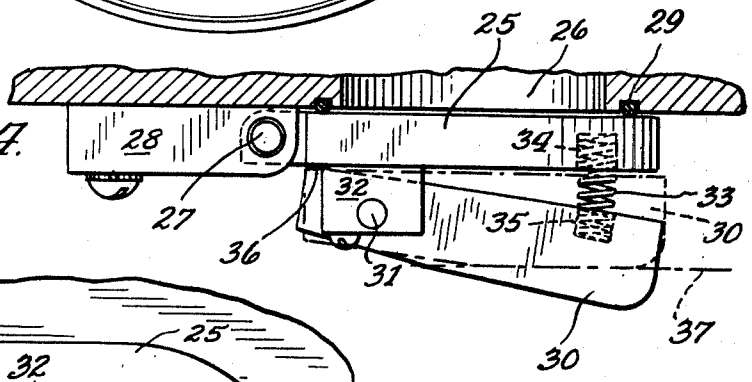


Fig. 4.



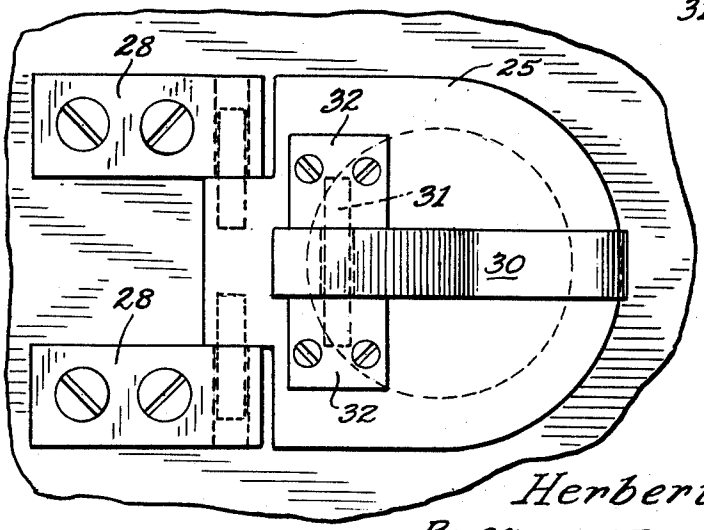


Fig. 5.

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INDEXING TYPE OF FILLING MACHINE WITH BOTTOM FLAP VALVE

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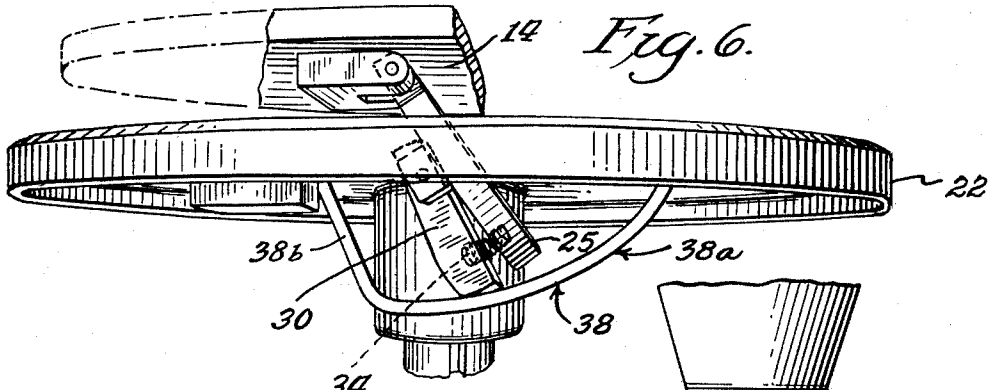
Fig. 6.



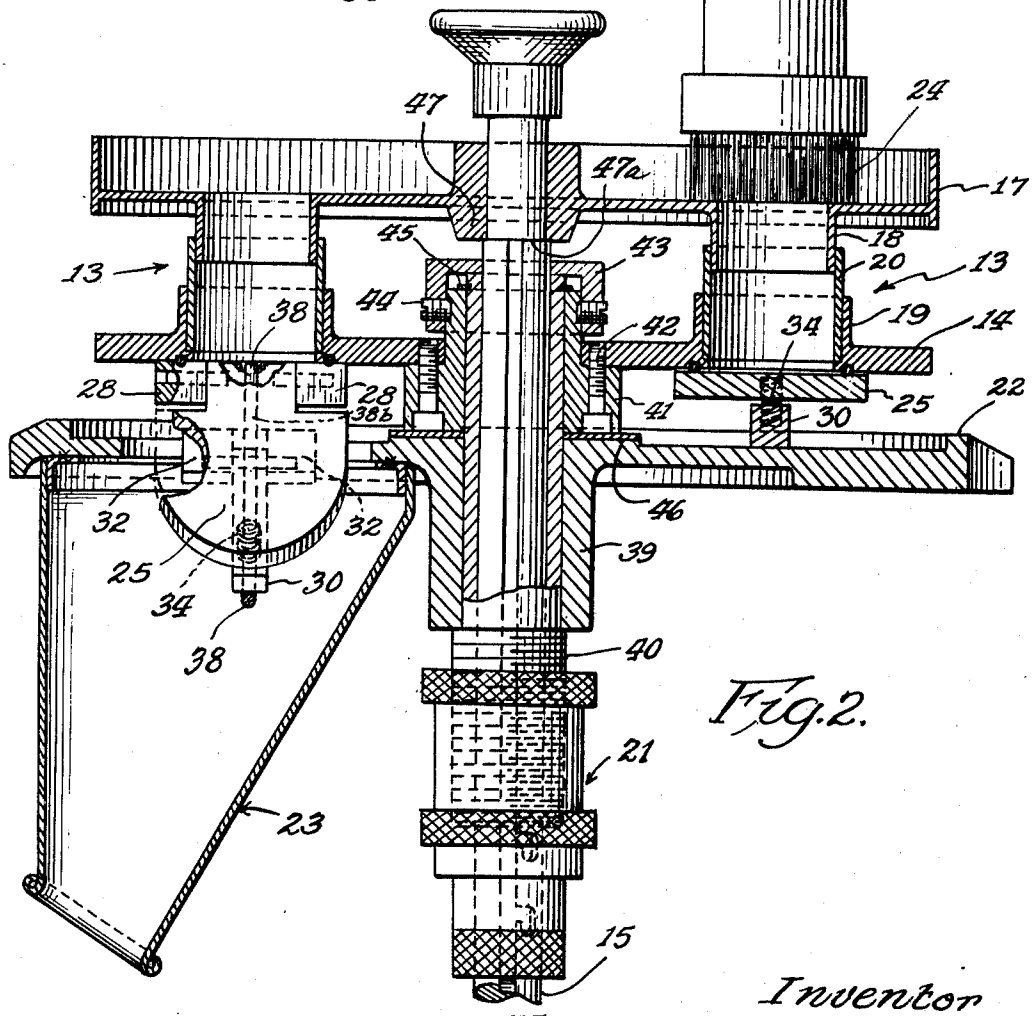


Fig. 2.

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3,477,617

INDEXING TYPE OF FILLING MACHINE WITH BOTTOM FLAP VALVE

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Int. Cl. G01f *11/20, 11/42;* B65b *43/42*
U.S. Cl. 222—370 7 Claims

ABSTRACT OF THE DISCLOSURE

A volumetric dispenser for package filling, in which a rotary cup holder supports a plurality of cups, a filling means for said cups is mounted above the holder, a bottom gate is mounted below each cup, and a track below said cups. The track has means to open and close the gates at the proper time.

The present invention is directed to new and useful improvements in volumetric filling machines of the indexing type and is particularly concerned with improvements which facilitate the use of machines of this type with a wide range of products.

Volumetric filling machines of the general type to which the present invention is applicable are known and have been in use for many years. Examples are found in prior United States patents to Haugen—2,540,259 and 2,616,591. In this class of machine, a cupholder supports a plurality of cups which are equally spaced about the axis of rotation of the cupholders. Discharge openings are formed beneath each cup in the cupholder and the openings are closed by a bottom plate which is stationary and which bears against the undersurface of the cupholder. A discharge opening is formed through the bottom plate at a point which is usually but not necessarily diametrically opposite from a point at which the cup is filled from a suitable hopper or delivery device. The cups, top plate, and cupholder are driven from a vertical shaft in a step by step fashion so that one cup is positioned beneath the device which delivers material thereto while a previously filled cup is positioned over a discharge opening through the bottom plate. Machines of this class may be made so as to fill two diametrically opposite cups at the same time and they may be made to discharge from two diametrically opposite cups at the same time. Other variations are possible. Two or more cups may be positioned on the same radial line so that two or more cups may be filled while two or more are discharging.

Other volumetric filling machines are made to be driven continuously so that the cups which receive and measure the material to be discharged to a suitable package, are under movement continuously under the delivery device. Both the indexing type and continually moving machines usually have adjustable cups so that the cups thereof deliver a pre-selected volume of material to the package being filled.

The indexing type of drive in filling machines of this general class enables use of a lessor number of filling cups resulting in more compact machines and smaller frameworks while still providing versatility in the speed of the machine as well as the particular volume of discharge desired. Indexing further allows maximum time for material to be received and discharged together with a minimum requirement of time for indexing between the receiving and discharging stations. Smaller sized plates and mechanisms result in simple machine designs and ease of changing from one diameter of cup to another to enable large variances in the particular volume of package desired. Packaging speeds on indexing machines of a given size with a given number of cup openings compare favorably with larger machines of the continuously moving

type and having a greater number of cup openings. The maximum percentage of stopped time in the indexing type of machine under the delivery device allows use with free-flowing products as well as some semi-free-flowing products through use of conventional agitators and vibrators for the delivery device. The stopped cups at the discharge device in the index type of machine allow the product to be dropped vertically as compared to the continuous machines which must be filled while under movement which minimizes delivery time and causes tumbling of the product above the cups. The tumbling of the product is disadvantageous when dealing with certain types of products.

Heretofore, the indexing type of machine has not been considered thoroughly suitable for use with certain products such as products which have a low melting point such as pure soap powders, products which are frangible such as food chips and gummy or soft products such as chocolate candies, wrapped products such as candies, crushable products such as instantized non-fat dry milk powders, irregular granular powders and some fruits such as blueberries. The indexing type of machine necessarily causes rubbing of the articles in the lower part of the cups against the surface of the bottom plate as the machine is indexed. This friction will produce adverse effects with products having a low melting point, crushable products, and irregular granular powders, it will break frangible products and it will cause gummy and sticky products to form a film on the bottom closure plate thus rendering this type of machine unsuitable for use with such products. Movement between plates frequently tears wrappers from candy products and the smaller pieces of irregular shaped granular products cause loss of good volume control because they may become lodged between plates in the machine. The continually operating machines are also usually limited to use with the same type of products as the previous indexing machines. The tumbling movement makes the continuously operating machines sometimes unsuitable for use with the latter group of products.

With the foregoing in mind, the principal purpose of the present invention is to so arrange a volumetric filling machine that it has all of the advantages of previous indexing types of volumetric filling machines while at the same time enabling use of the machine not only with free-flowing and some semi-free flowing products but with products which have a low melting point, products which are frangible, gummy and sticky products, crushable products, wrapped products, irregular granular powders and some fruits, all while enabling use of the same basic facilities in indexing types of volumetric package-filling machines with simple conversions and adaptations thereto.

Other purposes will appear from time to time in the course of the ensuing specification and claims when taken with the accompanying drawings in which:

FIGURE 1 is an elevational view of a machine incorporating the principles of the present invention;

FIGURE 2 is a sectional view of the volumetric cup assembly illustrated in FIGURE 1;

FIGURE 3 is a plan view of a bottom plate utilized in the present invention;

FIGURE 4 is a side view of closure facilities for the cups of the machine;

FIGURE 5 is a bottom view of the closure facilities illustrated in FIGURE 4; and

FIGURE 6 is a side view of the machine illustrated in FIGURE 2 while illustrating the closure facilities in an open position.

Like elements are designated by like characters throughout the specification and drawings.

Referring specifically now to the drawings and in the first instance to FIGURE 1, the numeral 1 designates a

supporting column upstanding from a base **11**. A hopper **12** is supported on the column **10** and may be adjusted vertically to a pre-selected position on column **10**. A plurality of adjustable volumetric filling cups generally designated at **13** are carried by a cupholder **14** in the form of a disc-like plate. The cupholder is supported for rotation with an upstanding shaft **15** which is adapted to be rotated in step by step fashion by means of a Geneva drive mechanism generally designated at **16**. It should be understood that the details of the drive mechanism form no part of the present invention. A top plate or filler plate **17** overlies the cupholder **14** and has a sleeve fit with the shaft **15**. It may be fixed to shaft **15** although it need not be. The filler plate **17** has depending circular flanges **18** formed around openings in the bottom of the filler plate **17** and these depending flanges together with upstanding flanges **19** on the cupholder and cylindrical members **20** positioned between the flanges **18** and **19** cooperatively define the cups of the filling machine.

The length of the cups may be adjusted so as to adjust the volume of fill desired in each cup by using longer or shorter cylindrical members **20** together with a variance in the vertical spacing of the filler plate **17** and cupholder **14**. Adjustment of this spatial relation may be accomplished through means of an adjusting mechanism generally designated at **21** and of the general type disclosed in United States patent to Haugen 2,540,259.

In machines of this general class, a plurality of cups, as for example 4 cups, are spaced at equal radial distances from the axis of shaft **15** and are equally spaced angularly thereabout. The shaft **15** is driven so that it rotates, in the case of a 4-cup machine of the type shown 90° and then pauses with diametrically opposed cups in the positions illustrated in FIGURE 1. One cup is then positioned directly beneath hopper **12** for a generally vertical discharge of material into the cup, while the diametrically opposed cup is positioned over a discharge opening **22***a* in a discharge plate **22** through which material flows through a chute **23** to any suitable package or receptacle which is to be filled. A brush **24** may surround the lower end of hopper **12** and be positioned in contact with the upper surface of the filler plate **17** so as to level off material from the top of any cup which has been filled from the hopper **12**.

In accordance with the present invention, the cupholder **14** has a plurality of closure gates **25** mounted on the undersurface thereof and in a position to close the lower open end **26** of the cup. Each gate **25** may be pivotally mounted as at **27** on brackets **28** which are screwed to or otherwise affixed to the bottom of the cupholder. A seal ring **29** may surround the lower open end of the cup and be carried either by the cupholder or by the gate **25** to thus enable a secure sealing of the bottom of each cup when the gate closes against the bottom of the cup.

Each gate carries a lever **30** which is pivotally mounted as at **31** in spaced brackets **32** which are screwed to or otherwise affixed to the bottom of the gate. A compression spring **33** is seated in recesses **34** and **35** in the opposed faces of the gate and lever **30**, respectively, so as to bias the lever to a position away from the gate at one side thereof as is illustrated in FIGURE 4, while the opposite side or end thereof as indicated at **36** abuts against the lower surface of the gate to limit any further movement of the lever away from the gate. The lever on the other hand may swing upwardly from the position shown in full lines FIGURE 4 to a position where it is closely adjacent to or in contact with the undersurface of the gate at the right hand side thereof as shown in dotted lines in FIGURE 4.

Each lever is adapted to contact the upper surface of the discharge plate **22**, as the cupholder **14** moves around the axis of shaft **15** to a point where a cup is positioned over a discharge opening **22***a* in the discharge plate **22**. When the lever **30** is in contact with the upper surface of the discharge plate as diagrammatically represented in outline at **37** in FIGURE 4, the closure gate **25** is yieldingly pressed against the lower portion of the cupholder. The spring **33** compensates for any unevenness which may exist in the top surface of discharge plate **22** and at the same time prevents breakage of the gates in the event some particle or object should become lodged between the gate and the bottom of the closure plate adjacent the seal, which object might otherwise cause breakage of the gate.

As the cupholder is indexed to bring a cup over the discharge opening **22***a*, the lever **30** falls into the opening **22***a* and allows the gate **25** associated therewith to swing by gravity to a generally full open position as is illustrated in FIGURE 2 at the left hand side of the figure. As the cupholder then commences to move through a further indexing step, lever **30** may contact the edge **23** (assuming clockwise rotation in FIGURE 3) of the discharge opening which then forces the lever and gate towards the closed position indicated in FIGURE 4. As an aid in effecting the downward movement by gravity, a pin may be carried by the gate and engageable with an inclined surface carried by plate **22** adjacent the discharge opening to positively force the gate down.

As an aid in effecting closure of the gate **25**, a depending guide rod **38** may be fixed to the opposite edges of the discharge opening **22***a* and be shaped so that lever **30** gradually moves downwardly when its associated cup moves into the discharge position while limiting movement of the gate to an inclined position as shown in FIGURE 6. The rod has a gradual slope **38***a* to allow a gradual opening movement at one side thereof and a more abrupt slope **38***b* at the other side thereof to force the lever and gate to the fully closed position as the cupholder is indexed.

The inclination of the gate, at an angle to the vertical, as shown in FIGURE 6 allows a relatively smooth discharge of material to the chute **23**.

The assembly is arranged so that the shaft **15** drives the cupholder **14** while the discharge or bottom plate **22** remains in fixed position and while the filler plate **17** is driven with the cupholder because of the interlocking action of the cup assemblies. For example, bottom or discharge plate **22** may have a boss **39** which rests on a shoulder of a depending nipple **40** which forms part of the vertical adjusting mechanism. A bushing **41** surrounds the upper part of the nipple **40** and is fixed to the cupholder **14** as by means of bolts **42** carried by a shoulder on the bushing so that the bushing **41** in effect forms a bearing boss for the cupholder. An adapter collar **43** is keyed to shaft **15** and is fixed to the bushing **41** as by means of set screws or the like **44** thereby fixing the cupholder **14** to the shaft **15**. A retaining ring **45** may embrace the upper end of the nipple **40** in underlying relation to the upper end of bushing **41** so as to prevent upward movement of bushing **41**. A bearing boss **47** for the filler plate **17** rests on a shoulder **47***a* on shaft **15**. A suitable washer **46** may be positioned between the lower surface or face of bushing **41** and the upwardly facing surface of the plate **22** adjacent thereto.

Through use of the invention, each adjustable cup of the filling machine has its own closure member, and material supplied to each cup through hopper **12** undergoes a simple vertical discharge as the cup is being filled. At the same time, discharge of the product from each of the cups is in the form of a relatively smooth and simple downward motion by gravity from the cups **13** and through the discharge opening **22***a* to the package being filled. This has the result of minimizing tumbling and substantially eliminating scraping or abrasive contact of the product, thus enabling use of the machine with all of the types of products.

The gates are so arranged that a relatively positive contact insures closing thereof except in those instances when something blocks the discharge opening through the cups.

Whereas I have shown and described an operative form of the invention, it should be understood that this show-

ing and description thereof should be taken in an illustrative or diagrammatic sense only. There are many modifications in and to the invention which will fall within the scope and spirit thereof and which will be apparent to those skilled in the art. The scope of the invention should be limited only by the scope of the hereinafter appended claims.

I claim:

1. A volumetric filling machine for packages and the like including a cupholder mounted on a support for rotation about a generally vertical axis, a plurality of cups of predetermined volumetric capacity carried by said cupholder in equally spaced relation to said axis to thereby traverse the same circle when said cupholder is rotated, a filling plate mounted above said cupholder for rotation therewith and having openings aligned with said cups for filling said cups, fixed means for delivering material to said filling plate, a discharge plate positioned beneath said cupholder and means for holding said discharge plate in a fixed position beneath said cupholder, said discharge plate having means defining a discharge opening located at a fixed position beneath the circle traversed by said cups when moved by said cupholder, means for indexing said cupholder so as to move said cups successively into position over said discharge opening while pausing over said opening for a pre-selected interval of time, said cupholder having bottom closure gates movably mounted thereon for movement against and downwardly away from the entire bottom opening of said cups, separate holding means for each gate engaged with and between said gates and said discharge plate and positioned to traverse said circle for holding each gate closed against the bottom opening of its associated cup, each said holding means being disengaged from said discharge plate when positioned over said discharge opening to thereby allow a gate positioned over said discharge opening to move downwardly and allow discharge of material from the cup positioned over said discharge opening.

2. The structure of claim 1 wherein said separate holding means is in the form of a lever for each gate and acting between each gate and the top surface of said discharge plate, each lever and gate depending from said cupholder and through said discharge opening when their associated cup is positioned over said discharge opening.

3. The structure of claim 2 wherein a depending member spans said discharge opening and is positioned for contact with said lever as said lever and its associated cup move away from said discharge opening, said member being shaped to gradually force said lever and its associated gate towards the cup closing position.

4. A volumetric filling machine including a cupholder mounted on a support for rotation about a generally vertical axis, a plurality of open ended cups of predetermined volumetric capacity carried by said cupholder in equally spaced relation to said axis to thereby traverse the same circle when said cupholder is rotated, a filling plate mounted above said cupholder and having openings aligned with said cups for filling said cups, means for delivering material to said plate, a discharge member positioned beneath said cupholder and means for holding said discharge member in a fixed position beneath said cupholder, said discharge member having means defining a discharge opening located at a fixed position beneath the arc traversed by said cups when moved by said cupholder, means for indexing said cupholder so as to move said cups successively into position over said discharge opening while pausing over said opening for a pre-selected interval of time, each of said cups having a bottom gate movably mounted on said cupholder and positioned to underlie the entire lower end of its associated cup, and means for holding said gates closed against the lower end of its associated cup except when a cup is positioned over said discharge opening, said last-named means including means defining a circular track beneath said gates and extending around the axis of rotation of said cupholder, each gate having a member in contact with said track so as to hold each gate against its associated opening in said cupholder, said track being broken away in the area of said discharge opening so as to allow a gate positioned over said discharge opening to swing downwardly to open its associated cup for discharge through said discharge opening.

5. The structure of claim 4 wherein each gate is pivotally mounted upon the cupholder, each gate having a pivotally mounted lever dependent therefrom and in engagement with said track, and resilient means are positioned between each such lever and its associated gate to bias each said lever into engagement with said track and each said gate toward closing engagement with its associated cup.

6. A volumetric filling machine for packages and the like including a cupholder mounted on a support for rotation about a generally vertical axis, a plurality of cups of predetermined volumetric capacity carried by said cupholder in equally spaced relation to said axis to thereby traverse the same circle when said cupholder is rotated, filling means mounted above said cupholder and cups for filling said cups, each cup having a bottom closure gate associated therewith and movably mounted for movement against and downwardly away from the entire bottom opening of each cup, a track mounted beneath said cups and extending around the axis of said circle, said track being broken away at a fixed position with respect to the circle traversed by said cups, discharge means positioned at the broken-away portion of said track, means for indexing said cupholder so as to move said cups successively into position over said discharge opening while pausing over said opening for a preselected interval of time, and a lever movably carried by each gate and riding on said track for forcibly holding each gate in closed position against its associated cup during movement of each cup around said circle while allowing each gate to move downwardly and allow discharge of material when each cup is positioned over said discharge means and said broken-away portion of said track, each gate having a spring between said lever and the gate so as to bias said lever against said track and its associated closure gate against the bottom opening of its associated cup.

7. The structure of claim 6 including positive means cooperable with each gate for forcing each said gate to closing engagement with its associated cup when each cup commences movement away from said discharge means.

References Cited

FOREIGN PATENTS

721,859 12/1931 France.

ROBERT B. REEVES, Primary Examiner

H. S. LANE, Assistant Examiner

U.S. Cl. X.R.

141—147; 222—302

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,477,617 November 11, 1969

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

Column 6, between lines 58 and 59 insert:

UNITED STATES PATENT

1,001,855	8/1911	Jagenberg	222-108

same column 6, between lines 60 and 61 insert:

690,215	4/1953	Great Britain

Signed and sealed this 12th day of May 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents