United States Patent

Roast

[15] **3,682,353**

[45] **Aug. 8, 1972**

[54] **APPARATUS FOR DELIVERING TABLETS AND THE LIKE**

[72] Inventor: **William George Roast,** Basingstake, England

[73] Assignee: **Lilly Industries Limited,** London, England

[22] Filed: **Oct. 15, 1970**

[21] Appl. No.: **81,089**

[30] **Foreign Application Priority Data**

Nov. 3, 1969 Great Britain.....53,874/69

[52] **U.S. Cl.**.....**221/277,** 133/3 G, 133/8 R

[51] **Int. Cl.**.....**G07d 9/04**

[58] **Field of Search**.....133/8, 3, 3 G; 221/277, 261, 221/167

[56] **References Cited**

UNITED STATES PATENTS

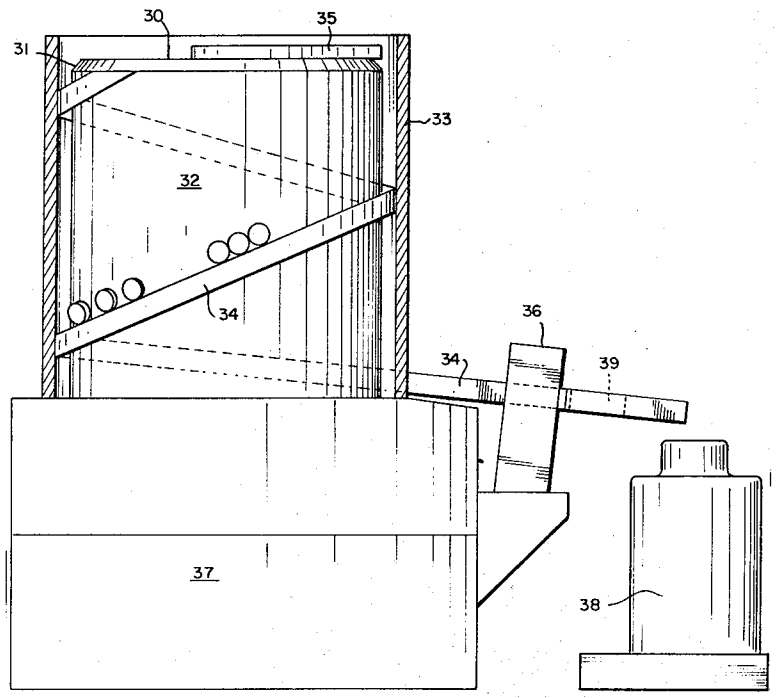
1,893,828	1/1933	Graeme	133/8 B X
3,244,319	4/1966	Fessman	221/277 X
3,206,062	9/1965	Rappaport	221/261 X

Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney—Trask, Jenkins & Hanley

[57] **ABSTRACT**

A tablet counter. Generally disk-shaped tablets on a horizontal circular table are swept to the edge by a rotating arm. A chamfer at such edge tips them edgewise into a vertical opening formed between inner and outer cylindrical walls at the periphery of the table. The opening is of a width to hold the tablets in vertical rolling position and contains one or more helical ramps forming chutes along which the tablets roll to and past a counting device and thence to a receptacle through a gate controlled by such device.

10 Claims, 5 Drawing Figures



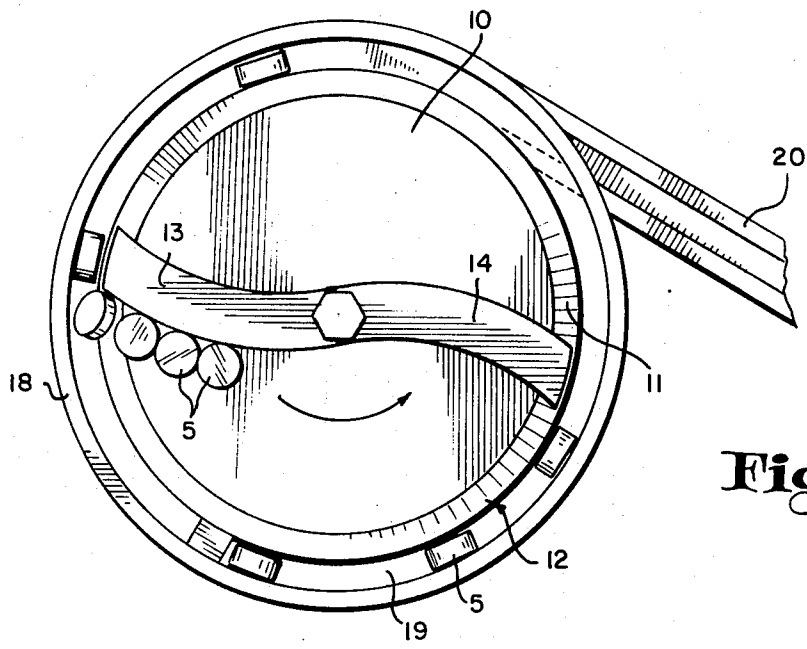


Fig. 1

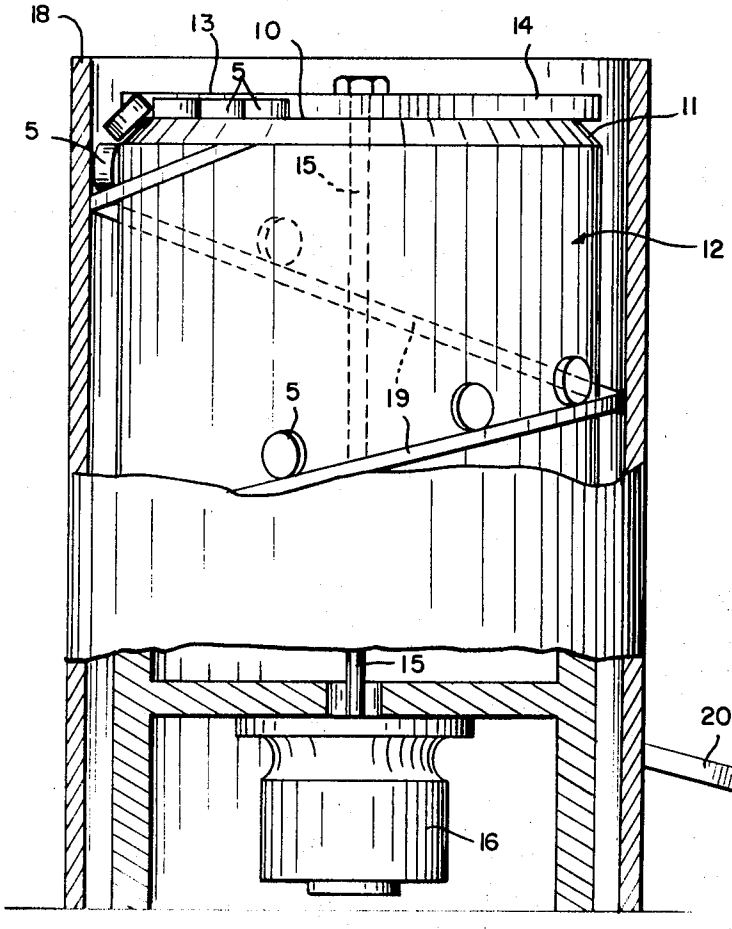


Fig. 2

INVENTOR
WILLIAM GEORGE ROAST
BY
Frank, Sculman & Hanley
ATTORNEYS

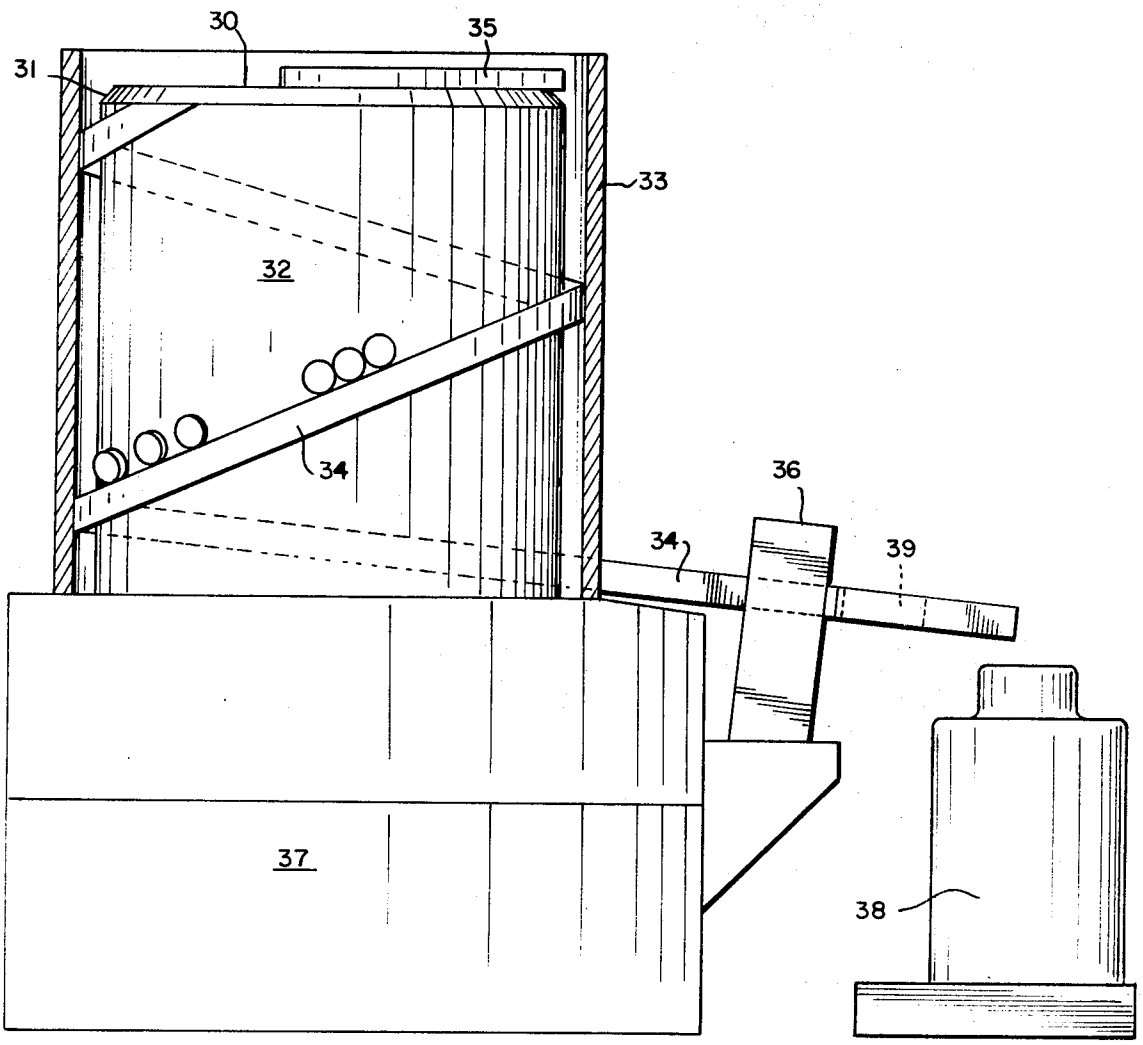


Fig. 3

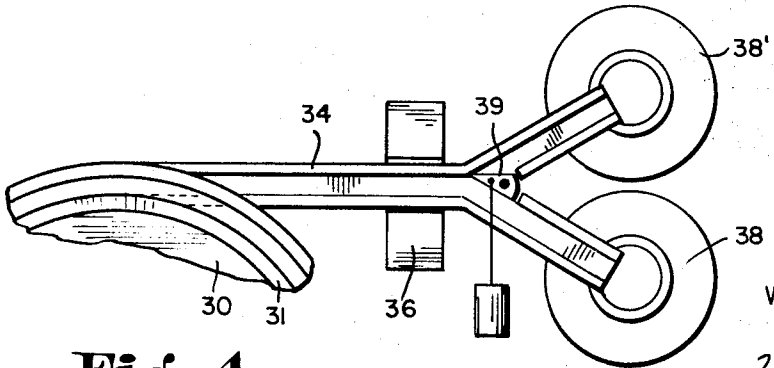


Fig. 4

INVENTOR
WILLIAM GEORGE ROAST
BY
Frask, Jenkins & Hanley
ATTORNEYS

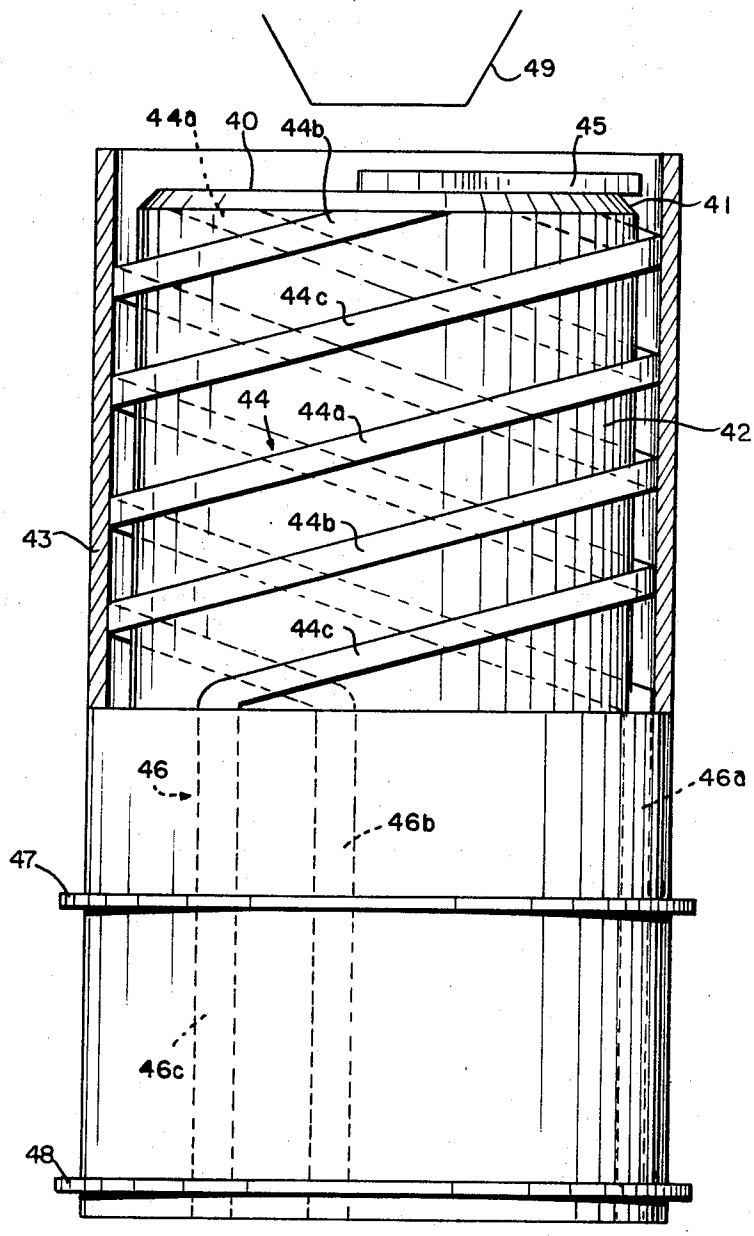


Fig. 5

INVENTOR
WILLIAM GEORGE ROAST
BY
Trask, Jenkins & Hanley
ATTORNEYS

APPARATUS FOR DELIVERING TABLETS AND THE LIKE

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for delivering tablets and the like, and is useful in delivering a stream of spaced single tablets to a counting device.

When it is desired to count a large number of tablets, for example 500, 1,000 or 5,000 tablets, into packages, speed and accuracy are factors of economic importance. Mechanical counting devices, when used at high speeds, may damage the tablets. Electronic counting devices are available, and for efficient use of such devices it is necessary for a succession of single tablets to be passed rapidly past the counting head.

SUMMARY OF THE INVENTION

According to the present invention there is provided apparatus for delivering a succession of single tablets to a counting device which apparatus comprises a horizontal circular table having a downwardly sloping periphery, and at least one chute forming at least part of a helix concentric with the circular table, of a diameter substantially equal to that of the table and disposed below the table in a position to receive tablets edgewise from the sloping edge of the table and of a width to hold the tablets in vertical edgewise position to roll down the chute. A vertical drive shaft passing centrally through the table carries at least one arcuate rotor arm adapted to sweep substantially the whole of the upper surface of the table on rotation of the shaft, and motor means is connected to the drive shaft and adapted to rotate the shaft.

The arcuate rotor arm desirably has a radius of curvature substantially the same as the radius of the circular table, and is rotated about the drive shaft so that the convex side of the rotor art is the leading edge. Tablets, which must be generally in the form of discs, when placed on the table will lie on their flattened sides and on rotation of the rotor arm are swept to the edge of the table and on to the downwardly sloping edge. The outward momentum of the tablets and the downward slope causes them to fall over the edge and in doing so rotate or tip through 90° to fall edgewise in the helical chute which is of a width to hold them in edgewise rolling position. The tablets then roll on their edges down the chute which leads past the counting head of a counting device and thence to a suitable receptacle.

The helical part of the chute desirably runs downwardly in the opposite direction to the direction of rotation of the rotor arm. Thus, if the chute forms a left hand helix, the rotor arm rotates in a clockwise direction viewed from above, and if the chute forms a right hand helix, the rotation of the rotor arm is in a counter-clockwise direction viewed from above.

DESCRIPTION OF PREFERRED EMBODIMENTS

The invention will now be further described with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of one embodiment of the invention;

FIG. 2 is a side view, partly cut away, of the apparatus shown in FIG. 1;

FIG. 3 is a side view, partly cut away, of a modification of the apparatus shown in FIGS. 1 and 2 together with an electronic counting device;

FIG. 4 is a partial plan view, of the apparatus shown in FIG. 3; and

FIG. 5 is a side view of a further modification in which an apparatus like that of FIG. 3 is provided with a mechanical counting device.

FIGS. 1 and 2, in which the same reference numerals denote the same parts, a circular table **10** having a chamfered periphery **11** is formed by one end face of an inner cylinder **12**. A rotor arm comprising two arcuate arms **13** and **14** is fixedly mounted on a shaft **15** which may be driven in a counter-clockwise direction (FIG. 1) by a variable-speed electric motor **16**. The arcuate rotor arms **13** and **14** have a radius of curvature equal to the radius of the inner cylinder **12**.

The inner cylinder is closely surrounded by a coaxial outer cylinder **18** and the space between the inner and outer cylinders is chosen to be slightly greater than the thickness, but less than the diameter, of the tablets **5** which are to be used with the apparatus. Between the inner and outer cylinders is a spiral chute or raceway **19** ending in a straight raceway **20** which leads to a counting device (not shown).

In operation, tablets **5** are fed to the table **10**. Rotation of the arms **13** and **14** results in the tablets being swept to the chamfered edge **11** where the tablets turn on to their edges as they drop into the raceway **19**. The tablets travel down the raceway **19** and emerge on raceway **20** as a single stream sufficiently spaced to enable them to be counted electronically.

It will be appreciated that in the embodiment shown in FIGS. **1** and **2** the helical raceway **19** must make at least one complete circuit of the inner cylinder **12** in order to catch all the tablets falling from the table **10**. Although it has not been shown for the sake of clarity, in practice a plurality of raceways, for example four, might be used, in which case each raceway need only continue to follow a helical path around the inner cylinder until that raceway reached a point below the start of the next raceway.

The raceways would conveniently emerge through the outer cylinder **18** adjacent one another.

The angle of descent of the raceways should be large to obtain a rapid throughput of tablets, but not so large that some tablets will drop a great distance to reach the raceway, because of the risk of tablet fragmentation. Increasing the number of raceways will reduce the maximum possible drop of the tablets and thereby enable steeper gradients to be used, and will allow an increase in the rate of delivery and counting of tablets.

The apparatus shown in FIGS. **3** and **4** is essentially the same as that shown in FIGS. **1** and **2**, having a table **30** with a chamfered periphery **31**, an inner cylinder **32**, an outer cylinder **33** and a helical chute or raceway **34**. However, a single rotor arm **35** is shown. The apparatus is shown set up for use with a photoelectric counting head **36** which is connected to an electronic counter **37** on which the apparatus stands. The raceway **34** runs past the counting head **36** and leads to a receptacle **38**. The reference numeral **39** denotes a deflector plate which is used to transfer the flow of tablets from the receptacle **38** to another receptacle **38'**, and may be actuated in response to the count registered on the head **36**. Alternatively, a simple gate may be used to close the chute **34** for a pre-set time between counts to enable the receptacle **38** to be changed.

FIG. 5 shows a tablet feeding device like that shown in FIG. 3 but adapted to feed a linear counter, having a table 40 with a chamfered periphery 41, an inner cylinder 42, an outer cylinder 43, helical raceways 44 *a*, *b*, and *c*, and a single rotor arm 45. There is also shown a storage hopper 49 from which tablets can be fed to the table 40 below the hopper. Each raceway 44 leads to a straight or sloping chute 46. Chutes 46 *a*, *b*, *c*, are shown, and are connected respectively to the helical raceways 44 *a*, *b*, and *c*. In the chutes 46 are an upper division plate 47 and a lower division plate 48. The chutes 46 and division plates 47 and 48 form a mechanical linear counter. The lower division plate 48 is fitted near the end of the raceways 46, and the upper division plate 47 is fitted at for example 25 or 50 tablet diameters from the lower division plate.

The counting operation comprises closing the lower division plate 48 and opening the upper division plate 47, and allowing the tablets to fill the raceways between the two division plates. The upper division plate 47 is then closed between the 25th and 26 or 50th and 51st tablets and the lower division plate is thereafter opened, allowing 25 or 50 tablets from each raceway 46 to fall into a receptacle or receptacles. If there are, for example, 10 raceways 46, 250 or 500 tablets can be counted in one operation.

I claim:

1. Apparatus for forming a supply of disk-shaped tablets having less thickness than diameter into a succession of single tablets, comprising

a horizontal table for receiving the supply of tablets and having a peripheral edge,

a chamfer at said edge forming a downward sloping surface along said edge,

a downward extending inner wall along said edge and an outer wall spaced from said inner wall, said walls defining an opening along said peripheral edge to receive tablets sliding thereto across said sloping surface, said opening having a width slightly greater than the tablet thickness and less than the tablet diameter,

means to sweep tablets on said table toward and along said peripheral edge, said sloping surface causing the tablets to tip from a horizontal position on the table to a vertical position into said opening,

a sloping raceway formed in said opening to receive the tablets on their edge and cause the same to roll down the raceway in a succession of single tablets,

and a delivery chute connected to the raceway to receive the succession of tablets therefrom for delivery.

2. Apparatus according to claim 1 which includes a plurality of sloping raceways spaced along said peripheral edge to receive respectively the tablets discharged from successive portions of said edge.

3. Apparatus according to claim 1 with the addition of means to count tablets in the succession of tablets delivered along the raceway.

4. Apparatus according to claim 1 in which said table is a circular table, said walls extend downward from the circular edge thereof, and said tablet sweeping means comprises an arm rotatable across the surface of the table about its central axis.

5. Apparatus according to claim 4, in which said raceway is helical about the said central axis.

6. Apparatus according to claim 4, which includes a plurality of sloping raceways spaced along said peripheral edge to receive respectively the tablets discharged from successive portions of said edge.

7. Apparatus according to claim 4, in which said inner and outer walls are cylindrical and said raceway is helical about said central axis.

8. Apparatus according to claim 7, which includes a plurality of sloping raceways spaced along said peripheral edge to receive respectively the tablets discharged from successive portions of said edge.

9. Apparatus according to claim 8, which includes a plurality of raceways in the form of a plurality of axially and circumferentially spaced helixes about the central axis of the table, the upper ends thereof being circumferentially spaced about the periphery of the table to receive separately the tablets discharged from different portions of such periphery, whereby the tablets fall through said opening a lesser distance than with a single raceway of the same pitch.

10. Apparatus according to claim 7,

with the addition of separate chutes to receive the tablets delivered through the separate raceways

and division plates spaced along said chutes to divide off equal predetermined numbers of tablets in each chute, said plates being operable to deliver such numbers of tablets from the chutes in coordinated relation and thereby deliver a multiple count of tablets from such chutes.

* * * * *