

[72] Inventor Warren E. Gilson
4801 Sheboygan Ave., Madison, Wis.
53705
[21] Appl. No. 774,967
[22] Filed Nov. 12, 1968
[45] Patented Mar. 16, 1971

2,894,542	7/1959	Alm.....	141/130
2,997,077	8/1961	Rodrigues, Jr.....	141/130
3,208,485	9/1965	Tiffany.....	141/130
3,405,500	10/1968	Rupert.....	141/170x
3,410,321	11/1968	Mitchell.....	141/130

FOREIGN PATENTS

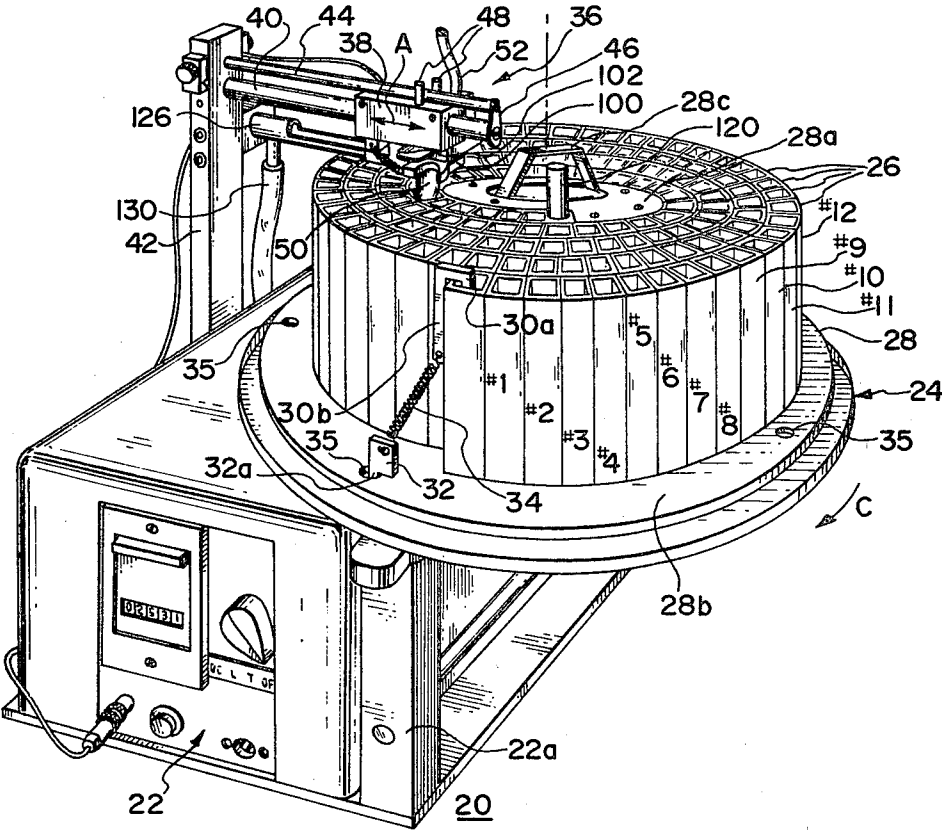
33,567 8/1924 Denmark.....

Primary Examiner—Manuel A. Antonakas
Attorney—Mason, Kolehmainen, Rathburn & Wyss

[54] FRACTION COLLECTOR
26 Claims, 13 Drawing Figs.
[52] U.S. Cl..... 141/1,
23/253, 23/259, 141/130, 141/167
[51] Int. Cl..... B65b 3/04,
G01n 33/00
[50] Field of Search..... 23/253,
259; 73/421, 423 (A); 141/130, 167, 170, 1;
74/142, 126

[56] References Cited
UNITED STATES PATENTS
2,493,382 1/1950 Bell..... 141/130

ABSTRACT: A fraction collector includes a spiral array of containers mounted for free rotation and a filling assembly mounted for free movement along a path intersecting the convolutions of said spiral array. A container engaging member is mounted on said filling assembly, and drive means move said member into engagement with successive containers in the spiral array to rotate said array while moving said filling assembly along said intersecting path.



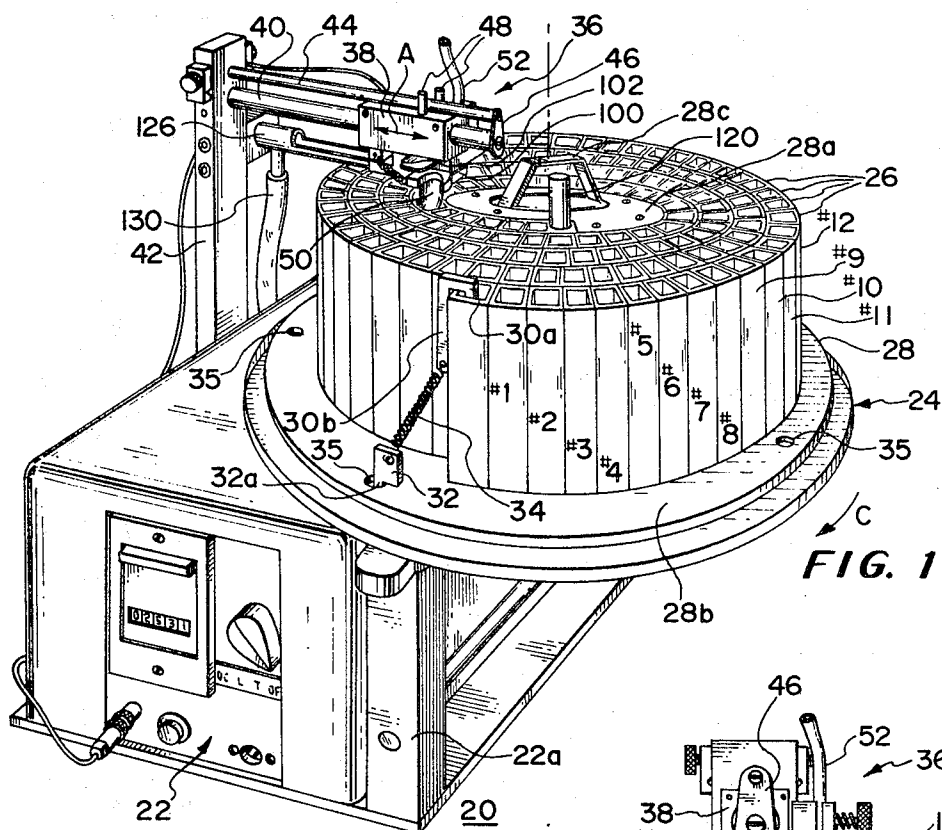
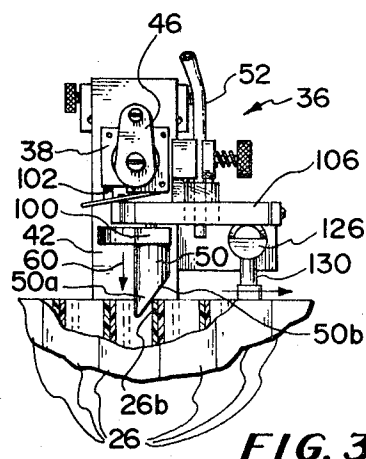
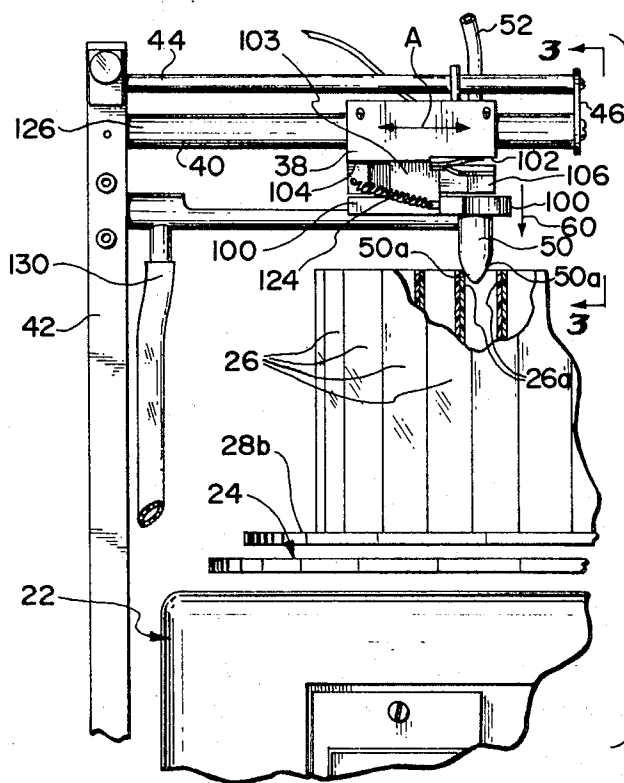


FIG. 2

FIG. 3

INVENTOR
WARREN E. GILSON
By *Mason, Kolehmainen,
Rathburn & Wyss.*
Attorneys

FIG. 4

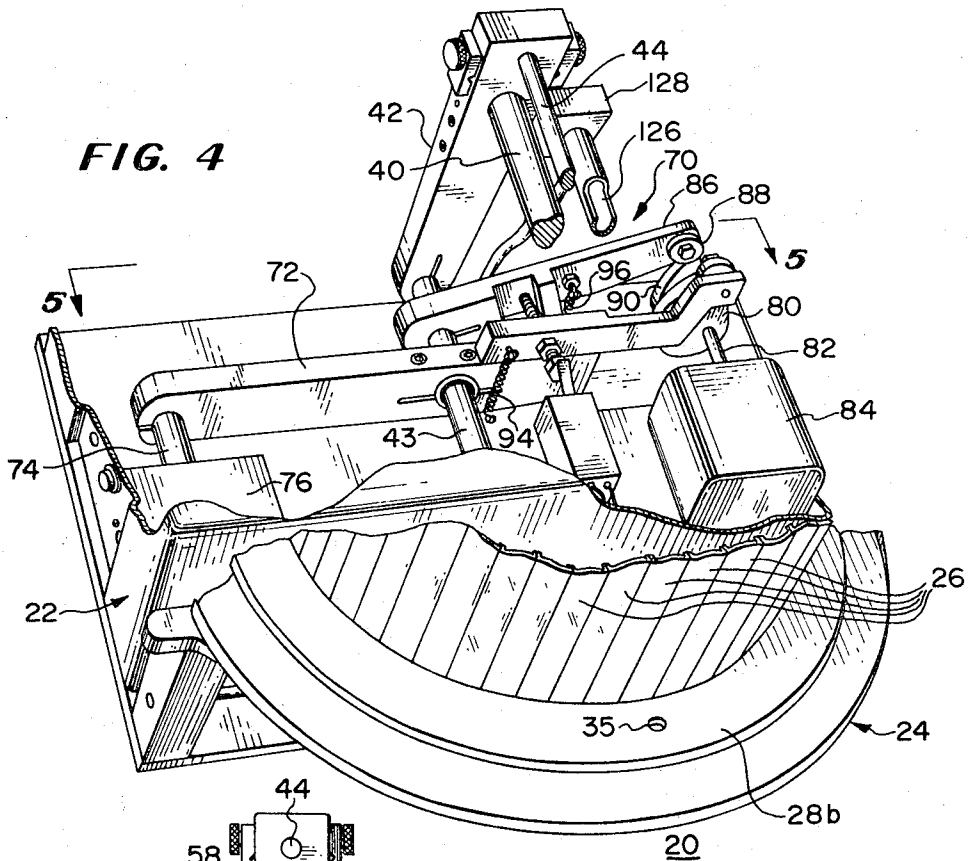
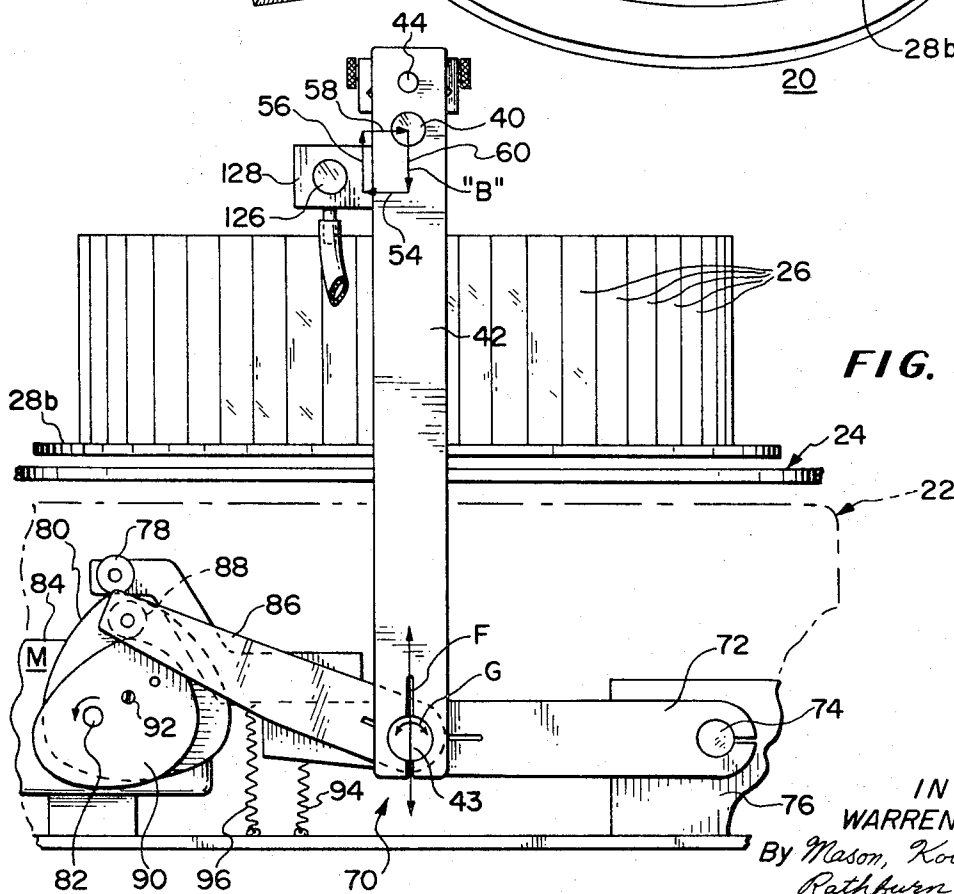


FIG. 5



INVENTOR
WARREN E. GILSON
By Mason, Kolehmainen,
Rathburn & Wyss
Attorneys

FIG. 6

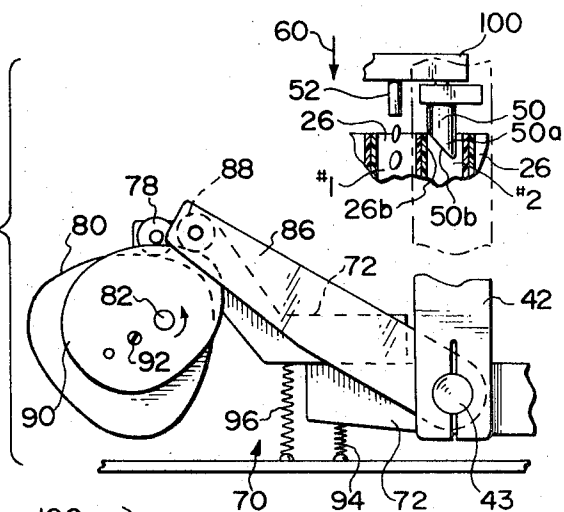


FIG. 7

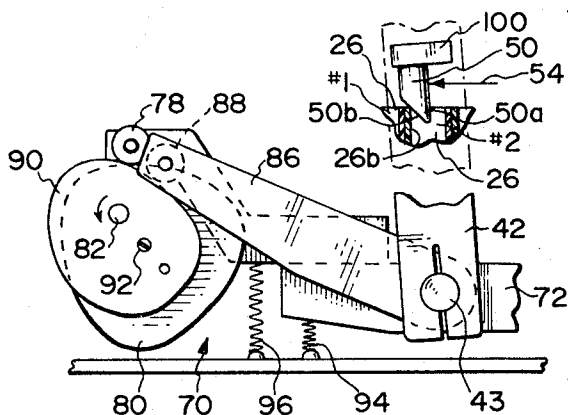


FIG. 8

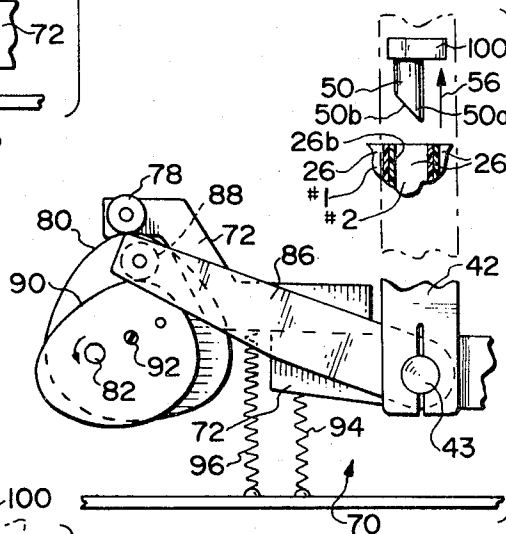
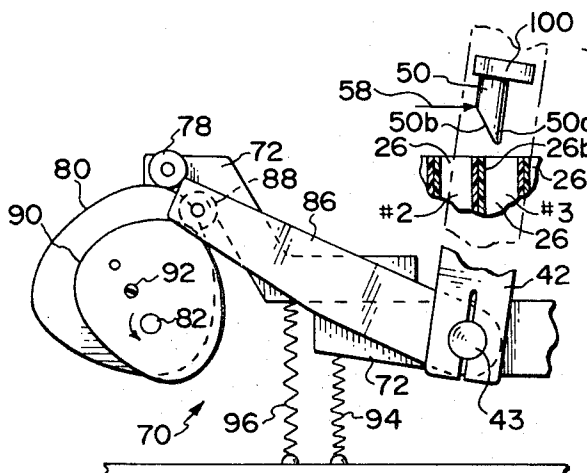


FIG. 9



INVENTOR
WARREN E. GILSON
By *Mason, Kolehmainen,
Rathburn & Wyss*
Attorneys

FRACTION COLLECTOR

The present invention relates to a new and improved fraction collector or laboratory apparatus used for filling a series of containers.

It is desirable in a fraction collector to provide for a maximum number of separate containers in a minimum of space and also to provide a simple mechanism for reliably aligning a filling assembly with successive containers to be filled with a minimum of complex alignment and/or drive mechanism being required. In most devices of this character a measured volume or specified number of drops of liquid are delivered to each container and after a prescribed volume or number of drops have been delivered to one container, the filling assembly and another container are moved into alignment and filled. This process is repeated for any number of successive containers. Many fraction collectors utilize driven, rotating tables for supporting the containers and in many cases the individual containers are spaced in concentric circles or rings about the axis of rotation. The table is driven in synchronism with the filling assembly which moves in steps in a radial direction to the next ring of containers after all of the containers in the first concentric ring have been filled.

Complicated and complex driven mechanisms are required for synchronizing the movements of the filling assembly and rotation of the table in order to fill the containers in proper sequence. Spiral arrays of containers have been used; however, a spiral guide track was always needed for guiding relative movement between the containers and the filling assembly to insure proper sequential filling of the containers. In both types of prior apparatus described, the complex drive and synchronizing mechanism result in high costs and larger bulk, and these units are not easily adaptable for use with containers of several different sizes.

It is an object, therefore, of the present invention to provide a novel and improved fraction collector.

A further object is to provide an improved fraction collector characterized by an exceedingly simple and reliable arrangement for aligning the filling assembly with a series of containers.

Another object of the present invention is to provide a new and improved fraction collector employing a spiral array of containers mounted for free rotation relative to a filling assembly.

Another object of the present invention is to provide a new and improved fraction collector wherein spiral guideways or tracks are not required for guiding relative movement between the containers and the filling assembly.

Another object of the present invention is to provide a novel and improved fraction collector which can readily accommodate containers of different sizes.

Another object of the present invention is to provide a new and improved fraction collector of the character described wherein a maximum number of containers are accommodated in a minimum of space.

In copending U.S. Pat. application Ser. No. 702,419, filed Feb. 1, 1968, therein is illustrated a new and improved container for use in a fraction collecting apparatus, and it is an object of the present invention to provide a new and improved fraction collector especially adapted to use containers of the type described in said application.

Yet another object is to provide a new and improved fraction collector wherein relative movement between a filling assembly of the apparatus and successive containers to be filled is produced by direct engagement between the filling assembly or a component mounted thereon and the containers themselves.

Another object of the present invention is to provide a new and improved fraction collection apparatus of the character described wherein the containers to be filled are mounted on a freely rotatable support and driving means for said support are not required.

Yet another object of the present invention is to provide a new and improved fraction collector including a filling as-

sembly freely movable in a direction transversely intersecting the convolutions of a spiral array of containers to be filled.

Another object of the present invention is to provide a new and improved fraction collector including a filling assembly, drain means, and means for moving the filling assembly from a container filling position to a drain position after the last container has been filled.

Another object of the invention is to provide a new and improved fraction collector which can be easily set up to automatically fill any selected number of containers less than the total number of containers carried by the collector.

Still another object of the invention is to provide a new and improved fraction collector including means for preventing the filling of additional containers after a selected number has been filled.

Yet another object of the present invention is to provide a new and improved fraction collector which is simple in construction, compact in size, simple in operation, and easy to service and maintain.

The foregoing and other objects and advantages of the present invention are accomplished in an illustrative embodiment thereof comprising a new and improved fraction collector having a spiral array of containers mounted for free rotation and a filling assembly mounted for free movement along a path intersecting convolutions of the spiral array. A container engaging finger is mounted on the filling assembly and drive means is provided for moving the finger into engagement with successive containers in the spiral array, thereby to rotate the array while moving the filling assembly along the intersecting path.

For a better understanding of the present invention, reference should be had to the following detailed description, taken in conjunction with the appended claims and the drawings in which:

FIG. 1 is a front perspective view of a new and improved fraction collector constructed in accordance with the features of the present invention;

FIG. 2 is a fragmentary, front elevational view of the left-hand portion of the collector of FIG. 1 showing the filling assembly with portions of the apparatus shown as broken away and in section;

FIG. 3 is a fragmentary elevational view of a portion of the filling assembly looking in the direction of the arrows 3-3 on FIG. 2;

FIG. 4 is a top perspective view of the fraction collector of FIG. 1 with portions of apparatus shown broken away and in section to disclose details of a driving mechanism for the filling assembly;

FIG. 5 is a fragmentary, side elevational view of the driving mechanism looking in the direction of arrows 5-5 of FIG. 4 and illustrating in schematic form the path of orbit or movement of the filling assembly;

FIGS. 6 through 9 are side elevational views of the drive mechanism of FIG. 5 illustrating in sequence different operative positions of the filling assembly during a cycle of operation;

FIG. 10 is a fragmentary, front perspective view of the filling assembly of the apparatus;

FIG. 11 is a horizontal, sectional view of the filling assembly of FIG. 10 looking downwardly in the direction of the arrows 11-11;

FIG. 12 is a side elevational view of the filling assembly looking in the direction of the arrows 12-12 of FIG. 11; and

FIG. 13 is a side elevational view similar to FIG. 12, but illustrating the filling assembly after engagement with a stop member after the last container is filled.

Referring now to the drawings, there is illustrated a new and improved fraction collector generally designated as 20 and constructed in accordance with the principles of the present invention. The apparatus 20 includes a generally rectangular base unit 22 in which is contained a drive mechanism, to be hereinafter described, and other components of the collector, such as a control and counting system.

In accordance with the present invention, a circular table 24 is supported on the base unit 22 for free rotation around a vertical axis extending upwardly from a point on the right-hand side of the base as viewed in FIG. 1. Suitable axle and bearing means are provided on a framework 22a adjacent the right-hand side of the base unit housing (FIG. 1) for supporting the table. The freely rotatable turntable 24 is adapted to support a plurality of upstanding, open ended, liquid containers 26 arranged in a spiral array around the axis of rotation of the table. The liquid containers 26 are preferably of the type disclosed in the aforementioned U.S. copending Pat. application and are formed of integrally molded plastic material.

In order to support the containers, a tray or bobbin 28 including a hub 28a and a flange 28b is frictionally held on the table, as by engagement of the hub 28a with an axle shaft (not shown) to the end that the bobbin together with a supply of containers may be readily loaded onto and unloaded from the table 24. Preferably the hub 28a is formed with an outer surface conforming to a single revolution, spiral surface generated around the axis of rotation of the turntable. Any number of containers can be interconnected in articulation to form a series or string to be wound around the bobbin hub 28a, each convolution of the spiral array of containers progressing farther and farther radially outward of the axis of rotation by a distance equal to the lateral width of the containers. As shown in FIG. 1, a handle 28c may be provided for removing and replacing the bobbin and containers on the turntable 24.

In accordance with the present invention, the fraction collector 20 can be used for filling many different sizes and types of containers having different widths and cross-sectional areas and a substitute bobbin 28 having an appropriately pitched spiral outer surface may be provided for each different type or size of container.

The series or string of hingedly connected containers 26 is held in spiral array on the bobbin or tray 28 by a U-shaped hook 30 which has a downwardly extending leg 30a engaging the interior of the outermost container in the spiral. The opposite leg 30b of the hook is resiliently connected to a lug 32 by means of a spring 34. The lug 32 includes a finger 32a adapted to project into and lock in any selected one of a plurality of openings 35 provided at spaced locations on the flange 28b of the bobbin 28, depending upon the number and size of containers in the spiral array. Tension provided by spring 34 holds the containers in a tightly wrapped spiral array on the tray 28 around the hub 28a.

In accordance with the present invention, the fraction collector 20 includes a filling assembly generally designated as 36 mounted for free movement along a radial path intersecting the convolutions of the spiral array of containers 26. The filling assembly 36 is adapted sequentially to fill successive containers in the spiral array starting from an outer container and continuing along the spiral toward the center, although a reverse or outward sequence could be employed.

More specifically, the filling assembly 36 includes a filling head 38 mounted for free sliding movement on a support rod or arm 40 spaced above the upper open ends of the array of containers. The rod or arm 40 is supported at a point spaced radially outward of the turntable 24 and extends radially inward towards the axis of rotation, and thus crosses each convolution of the spiral. The support arm 40 is supported at its outer end by a movable, upstanding drive leg 42 mounted adjacent the left-hand side (as shown in FIG. 1) of the base unit 22 on the outer end of a drive shaft 43. The arrow A in FIGS. 1, 2 and 10 indicates the direction of movement of the head 38.

Although the filling head 38 is mounted for free, longitudinal sliding movement on the support arm 40, relative rotation of the head about the support arm is prevented by a second, smaller diameter support arm 44 parallel to the arm 40 and also supported at its outer end by the upstanding leg 42. The arms 40 and 44 are interconnected at their inner ends by a stop member 46, best shown in FIG. 3, so that accurate

parallel spacing between the arms is maintained and radial inward travel of the head 38 is limited. A pair of upstanding guide fingers or pins 48 bracket the guide rod 44 (FIG. 10) and positively restrain rotation of the head 38 on the support arm 40 without interfering with the free longitudinal sliding movement.

In accordance with an important feature of the present invention, a novel arrangement is provided for simultaneously moving the filling assembly 36 and the containers 26 thereby sequentially to align each container beneath the filling assembly. In general this is accomplished in a novel manner by repeatedly moving the support for the filling assembly through a closed path so that engagement between the filling assembly and the containers brings about the desired relative movement.

More specifically, the filling assembly 36 includes a container engaging member or drive finger 50 mounted on the filling head 38 and extending downwardly thereof for direct engagement in the upper, open ends of the containers 26. This engagement between the containers and the finger 50 in combination with movement of the support for the filling assembly results in incremental rotation of the turntable 24 to move successive containers under the support arm 40 and also results in incremental longitudinal movement of the filling head 38 along the arm in a radial direction with respect to the spiral array.

The support arm 40 is driven to move in a repetitive cycle around a closed orbit or path so that the finger 50 is moved (FIGS. 6-9) to engage successive containers 26 in the spiral array on the turntable. FIG. 5 illustrates schematically a closed, rectangular orbit or path "B" representing the path traversed by the support arm 40 and the filling head 38 mounted thereon. The upward, downward, forward, and reverse strokes making up the closed orbital path "B" are in a direction or plane generally perpendicular or normal to the axis of the support arm 40.

Referring to FIG. 6, when the depending finger 50 is in an engaged position projecting downwardly into the upper open end of a container 26 labeled 02, the next adjacent container (labeled 01) is in a position to be filled with liquid dispensed from the lower end of a filling tube 52. After the desired quantity of liquid has been dispensed into the 01 container, the drive finger 50 moves on a reverse stroke 54 in a horizontal direction (from right to left as illustrated in FIG. 1) causing the turntable 24 to rotate an incremental amount in a clockwise direction (arrow C), as viewed in FIG. 1.

As shown in FIG. 8, the finger 50 then moves on an upward stroke 56 above and out of engagement with the container 26, labeled 02. When the finger 50 is clear of the upper ends of the containers 26 it is moved on a forward or advancing stroke 58 (from left to right) in a horizontal direction, as shown in FIG. 9, until the finger is positioned over the next successive container (container 03) in the spiral. The drive finger 50 then moves on a downward stroke 60, as indicated in FIG. 6, to complete the closed orbit or path B. In this position the container labeled 02 is beneath the filling tube 52 ready to be filled.

The process or cycle just described is repeated after each container is filled in succession starting with the container labeled 01 until the desired number of containers in the spiral array have been filled. As the drive finger 50 is moved in repetitive closed orbits or paths B generally perpendicular to the longitudinal axis of the support arm 40, direct engagement with successive containers 26 in sequence causes rotation of the turntable 24 and simultaneously results in travel radially inward of the filling assembly 36 until the last container is filled. The filling head 38 is automatically and gently shifted in increments inwardly on the support arm 40 by engagement between inwardly and downwardly tapering, curved lateral edges 50a adjacent the lower end of the drive finger 50 (FIG. 2) against the lateral sidewalls 26a of the containers.

Referring to FIGS. 3 and 6-9, the finger 50 includes a downwardly and forwardly sloped bottom surface 50b adapted

to cammingly engage the back sides or edges 26b (FIG. 7) of the containers 26, and thereby cause the turntable to rotate in increments into a position wherein the next container in the spiral array is aligned beneath the tube 52 for filling. The sloping surface 50b may also engage the back side 26b of the containers as the finger 50 moves on a downward stroke 60 (FIG. 6) accurately to center the next container in the string beneath the filling tube 52.

The filling operation for each container is controlled by suitable control means (forming no part of the present invention) which means may employ an adjustable timer, an electronic drop counter or a volume measuring or sensing device. When a timer is used, after a selected time interval for filling the container has elapsed, an electrical signal is sent to the drive mechanism of the fraction collector 20 causing the drive finger 50 to move through the closed orbital path "B" to align the next container in position for filling. The timed filling interval is then repeated and successive cycles continued until all of the containers have been filled. When a drop counter or volume measuring apparatus is used, an electrical eye mechanism is used to count the passage of liquid droplets from the filling hose 52 into the containers or to sense when the liquid in a container reaches a certain desired level, whereupon an electrical signal is initiated to actuate the drive mechanism.

In order to move the arm 40 through its closed path, a drive mechanism 70 (FIGS. 4 through 9) is contained in the base unit or cabinet 22. The drive mechanism is adapted to move the drive shaft 43 and the upstanding drive leg 42 supported thereby in vertical, reciprocating translation as well as in controlled, rotative oscillation, these motions being indicated by the arrows F and G respectively in FIG. 5. Vertical reciprocation in the direction of the arrow F causes movement of the drive finger 50 on upward and downward strokes 56 and 60, respectively of the path B, and this movement is imparted by an elongated lever 72 having an outer end supported for pivotal movement about the axis of a pivot shaft 74 carried in a bearing block 76 attached to the base of the housing 22. The shaft 43 is freely rotatable in a drilled passage intermediate the ends of the lever 72, and the opposite end of the lever 72 is provided with a follower roller 78 adapted to ride against a rotating cam member 80 mounted on a shaft 82 driven by an electrical motor and reducer 84 (FIGS. 4 and 5).

When the drive finger 50 is to commence an operating cycle around the closed path B, as in FIG. 5, the electric motor 84 is energized for a predetermined time period so that the shaft 82 rotates one complete revolution, as indicated pictorially in the diagrams of FIGS. 6 through 9. The cam 80 is shaped so that during each complete revolution of the shaft 82, the lever 72, the shaft 43 and the leg 42 move upwardly on an upward stroke 56 and return on a downward stroke 60. The acceleration and velocity of the upward and downward strokes are determined by the shape of the cam 80, and the cam can be designed to provide for periods of dwell in the upper and lower positions. It is to be understood that while a truly rectangular orbital path like the path B is desirable it is not necessarily required, and closed paths of other shapes can be used to produce the results desired.

In order to provide for forward and reverse strokes 58 and 54 of the filling assembly and drive finger 50, the shaft 43 is oscillated about its longitudinal axis, as indicated by the arrow G. The upstanding drive leg 42 is fixedly connected to the outer end of the shaft 43 and does not rotate relative thereto, so that when the shaft 43 is rotated about its longitudinal axis in an oscillatory fashion, the upstanding support leg 42 is tilted about its lower end, as indicated in FIGS. 6 through 9. Rotational oscillation of the shaft 43, in synchronism with the vertical reciprocation of the shaft, is accomplished by means of a lever 86 having an outer end fixedly connected to the shaft 43 and an opposite end carrying a follower roller 88 which rides on a second rotating cam 90, carried on and driven by the motor shaft 82. As can be seen from the drawings, the shape of the respective cams 80 and 90 are not necessarily the same

and the cam 90 is designed to produce the desired oscillating rotational motion of the shaft 43. Both of the cam members 80 and 90 are driven by the common shaft 82 and are maintained in the desired phase or angular relationship with one another by means of a setscrew 92. As the gear motor shaft 82 is driven to rotate one complete revolution, the lever 86 is driven by the cam 90 to tilt the leg 42 to the left as shown in FIG. 6 by rotation of the supporting shaft 43 in a counterclockwise direction and subsequently to tilt the leg in a reverse or clockwise direction and past the vertical position to the position of FIG. 9.

From the foregoing it is seen that the shape of the respective cams 80 and 90 and the rotational positions of the cams with respect to each other or phase angle therebetween is effective to control and produce the closed path or orbit B of the desired shape so that the filling head assembly 36 and driven finger 50 thereof can effectively engage and position successive containers on the table for filling. Both of the levers 72 and 86 are biased downwardly toward the base of the base unit 22 by suitable coil springs 94 and 96, respectively, so that the follower rollers 78 and 88 are in continuous contact against the respective cam surfaces.

The drive mechanism 70 of the fraction collector apparatus 20 including the motor 84 and cams 80 and 90 is simple in construction and operation. The interconnecting mechanism between the cams and the shaft 43 which supports the upstanding leg 42 is relatively simple and straightforward in construction and operation. No separate driving interconnections are needed between the drive motor and filling head assembly 36 and between the drive motor and the rotatable turntable 24, nor is a complex mechanism required in order to effect proper sequential filling of the containers mounted on the table. The camming engagement between the movable drive finger 50 and the individual containers 26 in the spiral array provides the necessary driving engagement between these two freely movable components to effect the desired movement of successive containers into a filling position beneath the filling assembly.

Referring now more specifically to the construction of the filling assembly 36 (FIGS. 1-3 and 10-13), one aspect of the invention resides in a novel arrangement for terminating the filling sequence once the desired number of containers has been filled. The filling head 38 is joined by a post 103 to a lower body member 100 supporting the drive finger 50. To one side of the post 103, between the head 38 and member 100, is defined an enlarged recess 102, while on the opposite side of the post 103 an oppositely facing recess 104 is formed. The filling tube 52 is secured to a movable L-shaped support member 106 (FIG. 11) mounted for pivotal movement on a vertical pin 108 extending between the filling head 38 and the member 100 through the recess 104. The L-shaped support member 106 is movable in a horizontal plane around the pin 108, in a counterclockwise direction from the position shown in FIG. 11, as indicated by the arrow J to a draining position wherein fluid from the filling tube 52 is drained off and does not flow into the containers 26.

The tube 52 is supported on the member 106 by a grommet 110 serving to center and support the lower end portion of the filling tube 52 and by a clamping assembly 112 which is mounted on an upstanding post 114 (FIG. 11) secured to the member 106. The clamping assembly includes a knurled knob 112a for tightening and loosening the clamp 112 so that the tube 52 can be easily removed from the clamping assembly and replaced with another tube if desired. As best shown in FIG. 11, the L-shaped member 106 includes a cutout or recess 107 for the post 103 which joins the member 100 with the upper filling head 38.

In accordance with the present invention, a removable stop pin 120 is inserted into any selected one of the containers 26 on the table 24 for terminating a fraction collecting operation. The stop pin extends upwardly from the upper end of a container 26 as shown in FIG. 1, and normally is placed in the innermost container in the spiral array. However, the pin 120

can be positioned in any one of the containers in spiral array to stop the filling action if less than the total number of containers in the array are to be filled. The lower body member 100 of the filling assembly 36 includes a U-shaped stop projection 100a adapted to be engaged by the upper end portion of the stop pin and prevent further rotation of the turntable 24.

FIGS. 10, 11 and 12 illustrate the filling assembly 36 prior to engagement of the stop pin 120 with the projection 100a, and FIG. 13 shows the pin in a fully engaged position between the legs of the projection 100a. The L-shaped support member 106 is normally maintained in a container filling position, as shown in FIG. 11, wherein the filling tube 52 is positioned over a container directly adjacent to a container in which the drive finger 50 is engaged. The L-shaped member 106 is maintained in this position by the engagement of a short pin or projection 116 on the upper surface thereof into an aperture 118a (FIG. 11) formed in a movable latch member 118 hinged to the lower surface of the filling head 38 in the slot 102. The latch member 118 is normally biased downwardly into engagement with the pin 116 by a leaf-type biasing spring 122 connected at opposite ends to the head 38 and latch 118 and the L-shaped support member 106 is thus positively retained in the position shown in FIG. 11. When the latch 118 is pivoted upwardly from a latching position shown in FIG. 12 to an unlatched position as shown in FIG. 13, the pin 116 is no longer engaged in the aperture 118a. The L-shaped member 106 is then free to pivot about the vertical mounting pin 108 in a counterclockwise direction, as indicated by the arrow J, from the filling position (FIG. 11) to a draining position (FIG. 13) wherein liquid from the filling tube no longer flows into the container 26. Pivotal movement or shifting of the member 106 from the filling to the draining position is instituted by a spring 124 connected at opposite ends to a leg of the L-shaped member 106 and one leg of the U-shaped projection 100a, respectively.

After the turntable 24 has been rotated under the filling assembly 36 until the removable stop pin 120 is in contact (FIG. 13) between the legs of the U-shaped projection 100a, further rotation of the turntable is stopped. As the filling head assembly 36 moves on a downward stroke 60, at the end of a cycle as shown in FIG. 13, the outer end portion of the latching lever 118 is engaged on the upper end of the stop pin 120, and this pivots the latch upwardly out of engagement with the latch pin 116. The L-shaped member 106 is then pivoted by the spring 124 in the direction indicated by the arrow J and moves the filling tube 52 out of its normal filling position into a drain position wherein the lower end of the tube is centered above an elongated drainage trough 126. The drainage trough 126 is supported to extend parallel to the support arm 40 and when the latch 118 is unlatched the filling tube will move to a drain position above the trough regardless of the radial portion of the filling assembly 36 on the arm 40. The outer end of the drainage trough is supported in a block member 128 mounted on the upstanding support leg 42 and a suitable drainage hose 130 is connected to the drainage conduit to carry away the liquid.

Although the present invention has been described with reference to a single preferred embodiment, it should be understood that other embodiments and modifications may be devised by those skilled in the art which will fall within the spirit and scope of the invention. Consequently, details of the described embodiment should not be taken to limit the invention which is defined in the following claims.

I claim:

1. Fraction collecting apparatus comprising in combination: a spiral array of containers mounted for free rotation; a filling assembly mounted for free movement along a path intersecting the convolutions of said spiral array; a container engaging member mounted on said filling assembly; and drive means for moving said member into engagement with successive containers in said spiral array thereby to rotate said array while moving said filling assembly along said intersecting path.

2. The apparatus as defined in claim 1 wherein said filling assembly includes an elongated support arm spaced above said array and extending from a position outwardly of said containers toward the center of said array, said container engaging member mounted for free sliding longitudinal movement on said arm.

3. The apparatus of claim 2 wherein said support arm is mounted for movement in a repetitive closed orbit generally normal to the longitudinal axis thereof.

4. The apparatus of claim 3 wherein said member is engaged with a container during only a portion of said orbit, and during said portion said array is rotated to position the next successive container into a filling position beneath said filling assembly.

5. The apparatus of claim 4 wherein said member includes sloped lateral cam surfaces engageable against surfaces of said containers to move said filling assembly longitudinally on said arm as each successive container moves into a filling position.

6. The apparatus of claim 1 wherein said filling assembly includes a discharge opening for dispensing liquid into said container, said opening being spaced from said container engaging member to fill the container next adjacent thereto.

7. The apparatus of claim 6 wherein said filling assembly includes drain means, and means operable to align said discharge opening and drain means after a selected container in said array has been filled.

8. The apparatus of claim 7 wherein said last mentioned means includes a stop member removably mounted in any selected container in said array and engageable with said filling assembly to effect alignment of said discharge opening and drain means.

9. The apparatus of claim 1 including rotating table means supporting said array of containers, means hingedly interconnecting said containers in a string, and means for securing said string in a tightly wrapped spiral around the axis of rotation of said table.

10. The apparatus of claim 9 wherein said last mentioned resilient means exerts tension on said string of containers.

11. Fraction collecting apparatus comprising: a freely rotatable table; a series of containers disposed in a curve on said table; a filling assembly including means for discharging material into said containers; a support means located above said table and mounting said filling assembly for free sliding movement across said curve; and drive means for producing relative movement between said filling assembly and said containers to align said filling assembly sequentially with said containers, said drive means comprising: container engaging means on said filling assembly; means for repeatedly moving said support means through a closed path for bringing said container engaging means into sequential engagement with said containers, said last mentioned means including shaft means connected to and spaced from said support means, motor means having an output shaft and a pair of rotary cams mounted thereon, first linkage means drivingly interconnecting one of said cams and said shaft means for producing oscillatory rotation of the latter, and second linkage means drivingly interconnecting said other of said cams and said shaft means for producing vertical reciprocation of the latter.

12. A method of producing simultaneous movement of a spiral array of containers mounted for rotation and a container treating apparatus mounted for sliding reciprocal movement and including a container engaging member movable through a closed path, said method comprising the steps of:

engaging one container with said member;
moving said member through said closed path in order incrementally and simultaneously to rotate said array and to slide said container engaging member;
disengaging said member from said one container;
moving said member over an adjacent container; and
engaging the adjacent container with said member.

13. The method of claim 12 wherein said steps are carried out by moving said member repeatedly through a cycle of movement.

14. The method of claim 12 further comprising filling said one container while said adjacent container is engaged by said member.

15. Fraction collecting apparatus comprising a series of containers arranged in a spiral path on a support table mounted for free rotation about an upstanding axis, a filling head assembly mounted for free sliding movement generally transversely across adjacent convolutions in said spiral path, and a drive element carried by said filling head assembly and engageable with said containers for simultaneously rotating said table and sliding said filling head assembly.

16. The apparatus of claim 15 wherein said drive element comprises a downwardly depending finger engageable with said containers to align successive containers beneath said filling head.

17. The apparatus of claim 16 wherein said guide finger includes lateral camming surfaces sloping inwardly and downwardly for engaging lateral sides of said containers and producing relative movement of said filling head transversely of said spiral path to a position centered above a container thereon.

18. The apparatus of claim 16 wherein said finger is movable in a repetitive closed path including upward and downward strokes and strokes in opposite directions along said spiral path, said finger and a container operatively engaging one another during one of said latter strokes to rotate said table to align the next adjacent container into position for filling.

19. The apparatus of claim 18 wherein said finger includes an inwardly and downwardly sloping forward cam surface engageable with a side of containers extending between said lateral sides thereof for advancing the same into a filling position.

20. The apparatus of claim 16 wherein said filling head means includes support arm means above said containers and

extending generally radially of the axis of rotation of said table and a filling head supporting said finger mounted for free sliding movement longitudinally of said arm means.

21. The apparatus of claim 20 including motor means for moving said support arm in a repetitive closed circuit generally normal thereto for aligning successive containers in said spiral path into a filling position.

22. The apparatus of claim 21 wherein said motor means includes an upstanding leg connected at its upper end to an outer end of said support arm and a movable shaft supporting the lower end of said leg for vertical movement thereof.

23. The apparatus of claim 22 wherein said motor means includes first and second cams mounted for rotation on a common shaft, first follower means engaging said first cam and said shaft for raising and lowering said shaft upon rotation of said cams, and second follower means engaging said second cam and said shaft for rotationally oscillating said shaft upon rotation of said cams thereby producing said repetitive closed circuit motion of said support arm.

24. For use with a fraction collector, the combination of a supporting surface mounted for rotational movement about an axis normal to and intersecting said surface, a hub member located at said axis, a string of hingedly interconnected containers supported on said surface and having first and second end containers, said first end container being connected to said hub member and said string being disposed in a spiral around said hub member, and means interconnecting said second end container to said surface for holding said string in said spiral.

25. The combination of claim 24 wherein said interconnecting means includes resilient means held in tension to apply tension to said string.

26. The combination of claim 24, a tray comprising said surface and said hub member.

40

45

50

55

60

65

70

75