United States Patent

[11] 3,559,702

[72] Inventor **James H. Riesenberg**
Amherst, N.Y.

[21] Appl. No. **700,129**
[22] Filed **Jan. 24, 1968**
[45] Patented **Feb. 2, 1971**
[73] Assignee **Consolidated Packaging Machinery Corporation**
Buffalo, N.Y.

[54] **CONTAINER FILLING MACHINE**
10 Claims, 26 Drawing Figs.

[52] **U.S. Cl.** **141/128,** 141/147, 141/150, 141/263, 141/374
[51] **Int. Cl.** **B65b 3/36**
[50] **Field of Search** ..... 141/144, 145, 146, 147, 148, 149, 150, 151, 152, 177, 367, 376, 378, 374, 263, 264, 267, 59; 222/(Inquired)

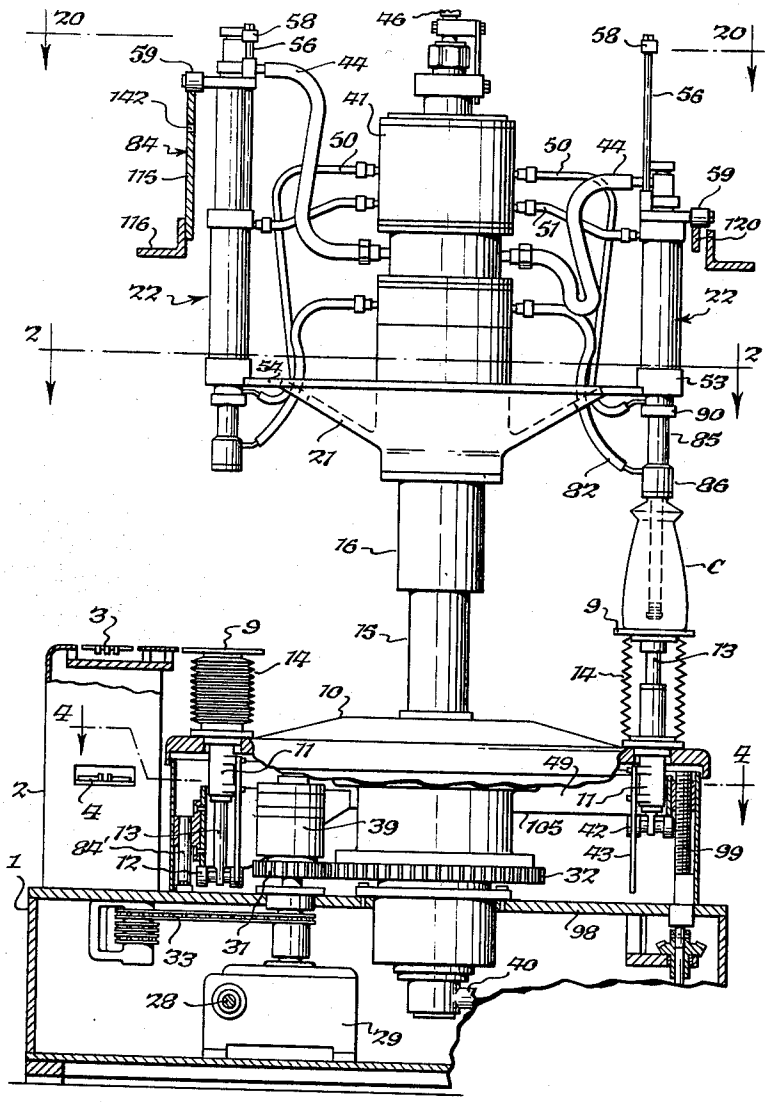
[56] **References Cited**

UNITED STATES PATENTS

3,056,436	10/1962	Fechheimer et al.	141/59
3,168,122	2/1965	Cross	141/147
3,168,123	2/1965	Pellerino et al.	141/147

Primary Examiner—Houston S. Bell, Jr.
Attorney—Christel & Bean

ABSTRACT: A filling head having a stem movable into and out of a submerged filling position relative to a container supporting tray is mounted for movement with the tray through a path and the stem is moved into and out of filling position as the tray and head are moved through the path. The filling position of the stem is controlled by a cam having relatively movable sections one of which determines the spacing between the tray and the stem when the latter is in its fully submerged filling position. The cam also includes relatively movable sections for selectively varying the point along the path at which filling through the stem is cut off.



PATENTED FEB 2 1971

3,559,702

SHEET 1 OF 9

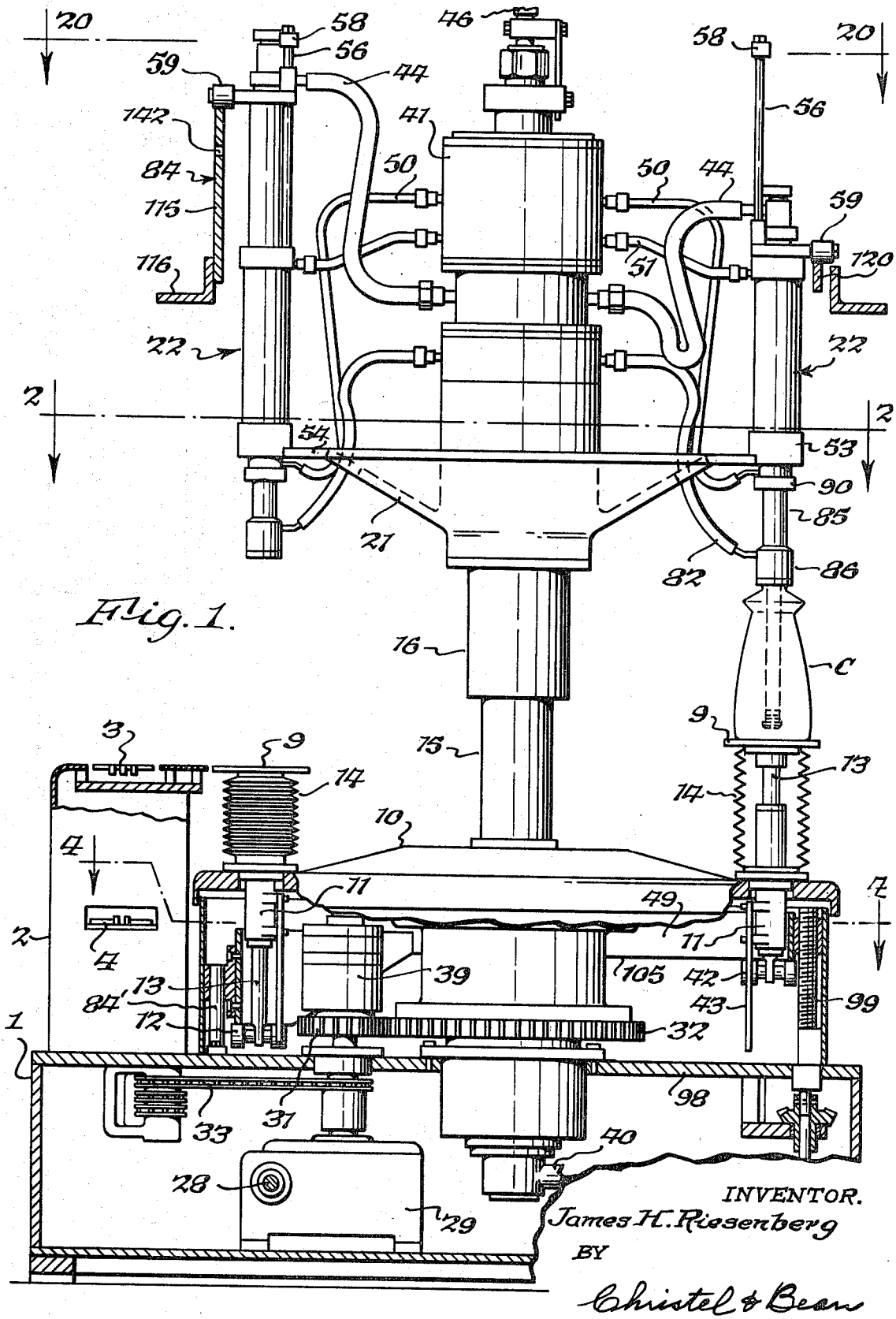
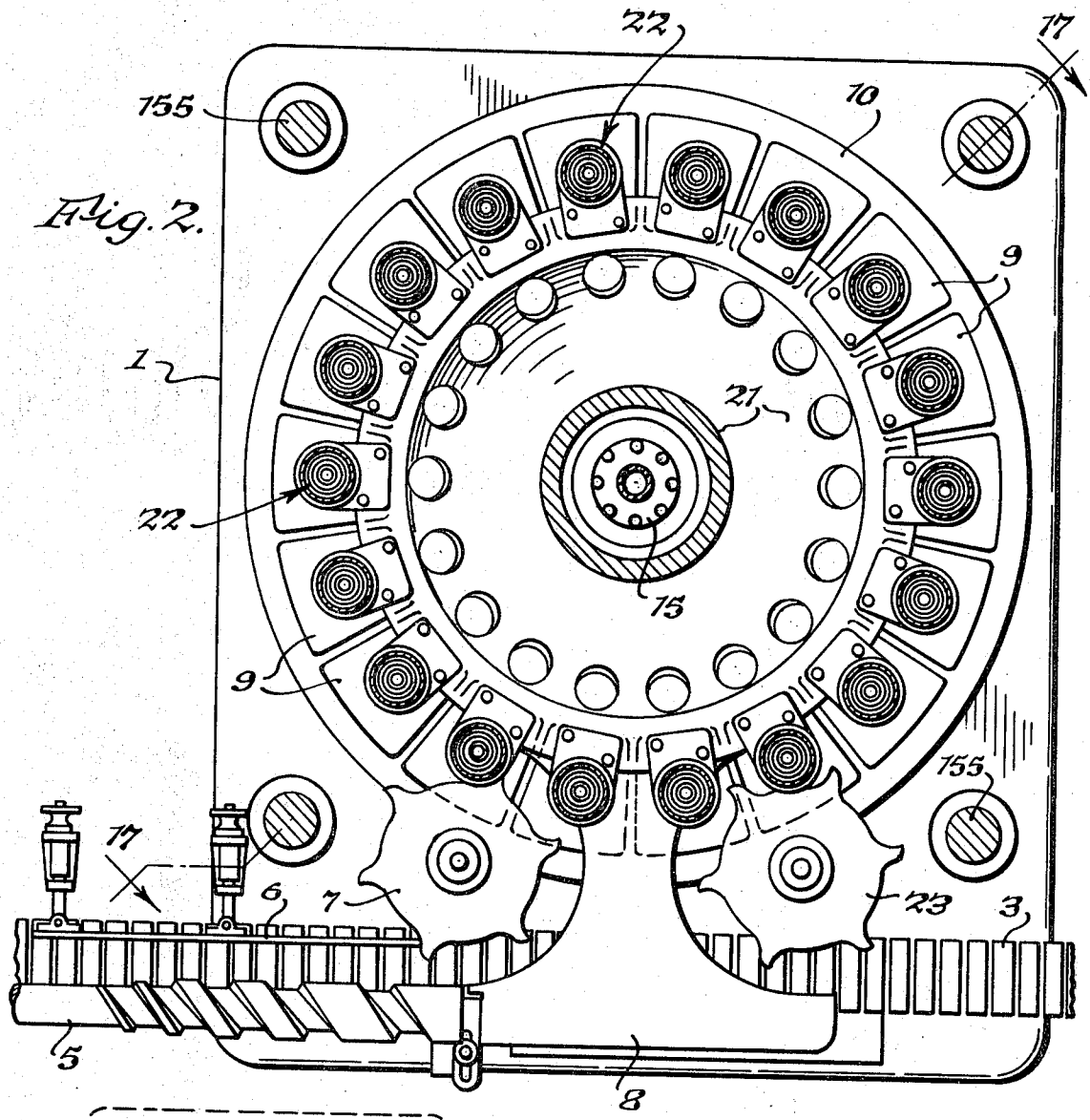


Fig. 1.

INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 2.



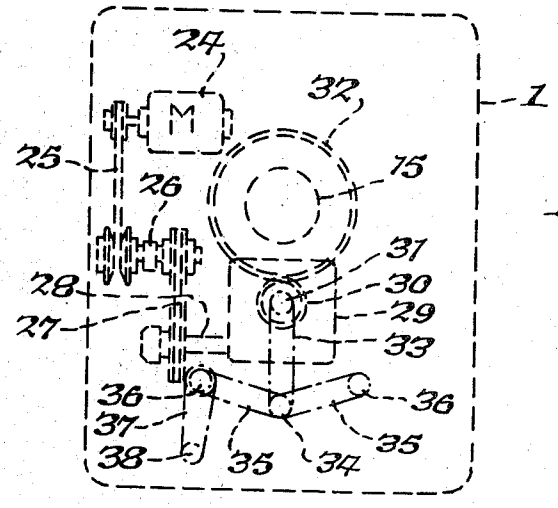
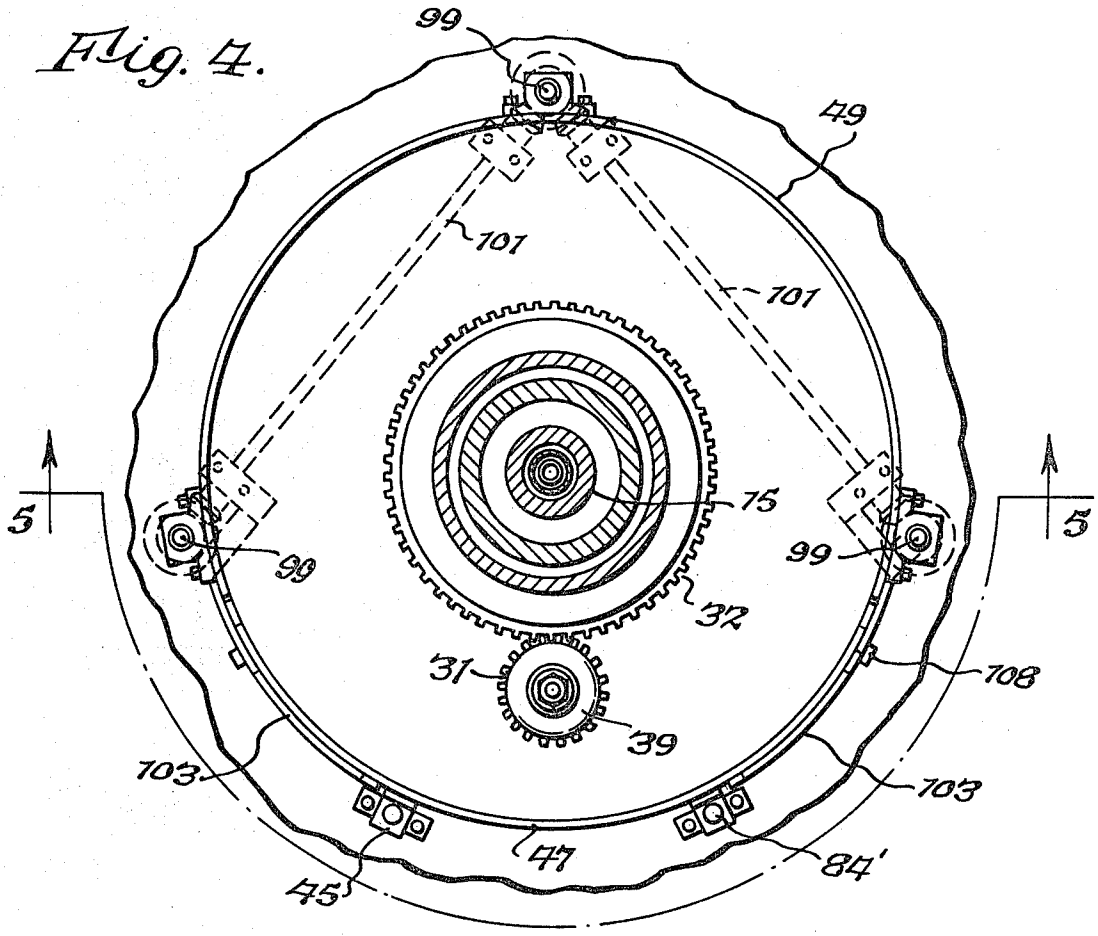


Fig. 3.

INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 4.



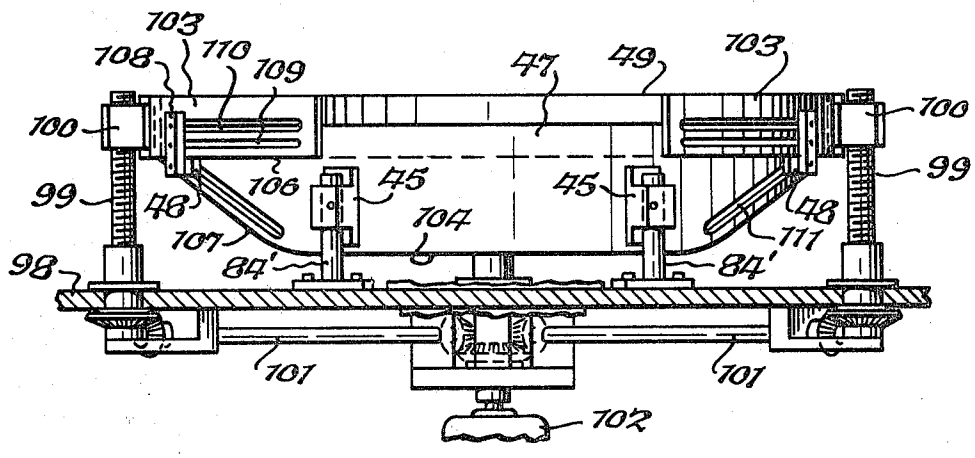


Fig. 5.

INVENTOR
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

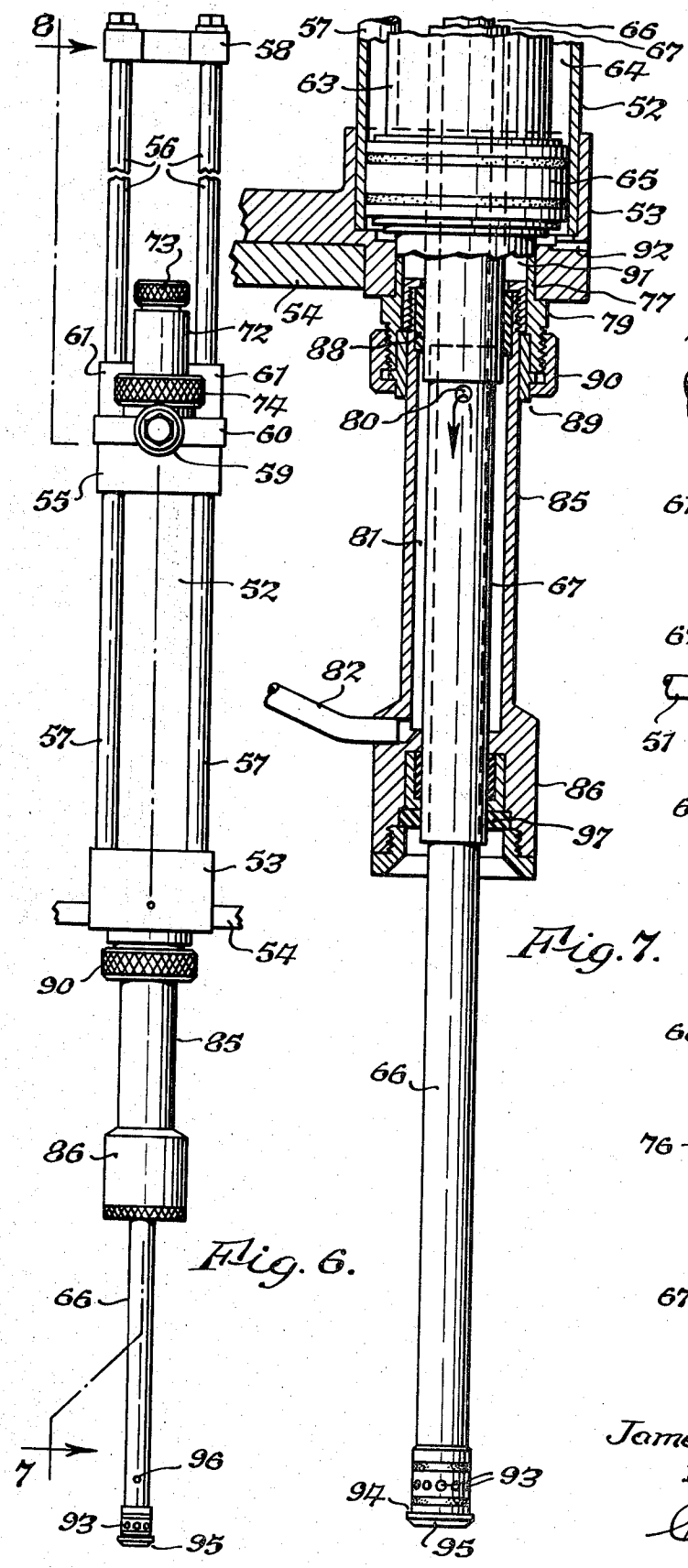


Fig. 6.

Fig. 7.

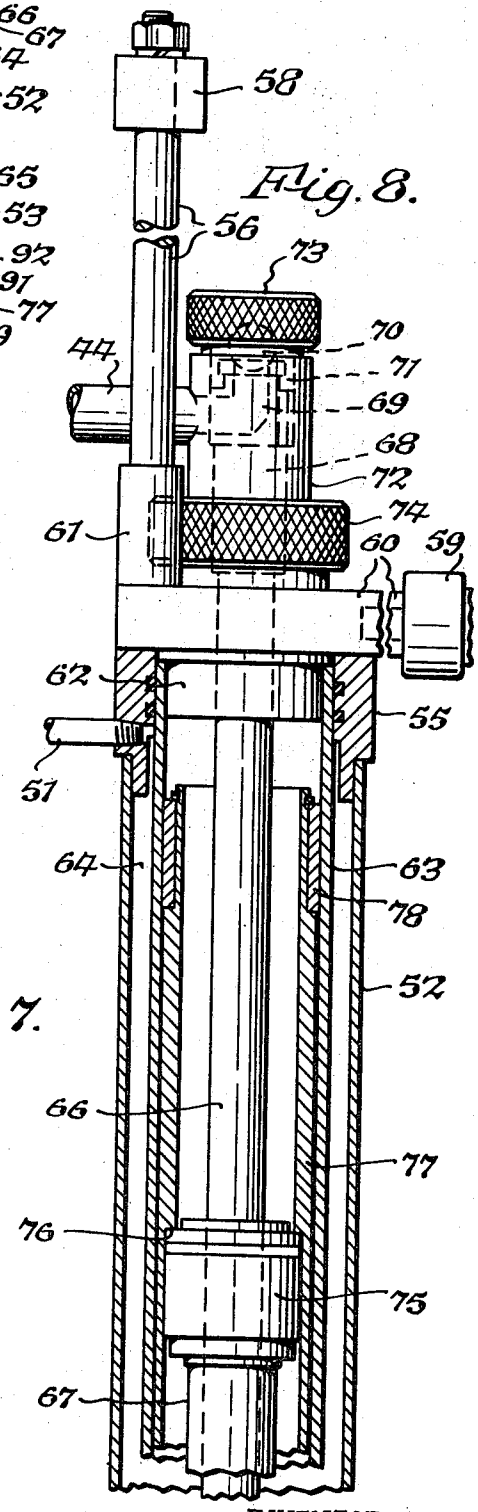


Fig. 8.

INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 9.

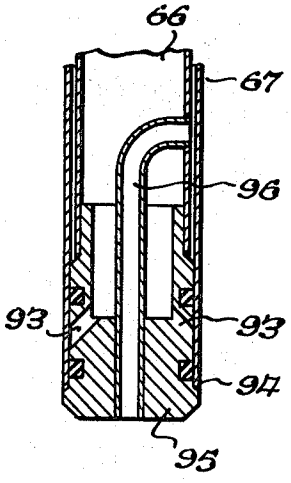


Fig. 10.

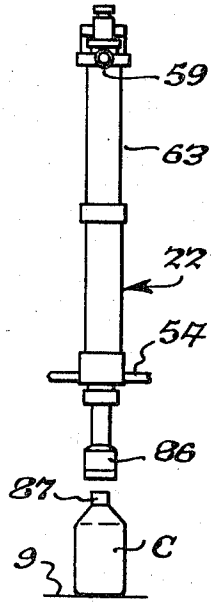


Fig. 11.

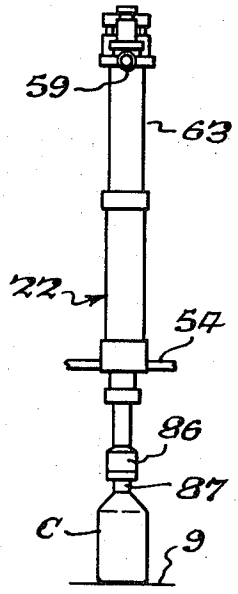


Fig. 12.

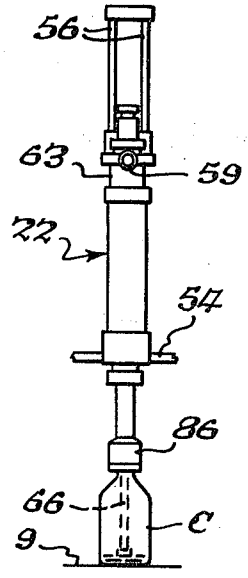


Fig. 13.

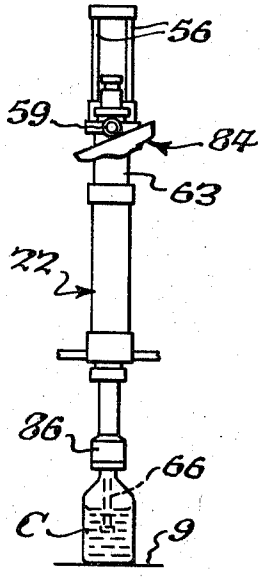


Fig. 14.

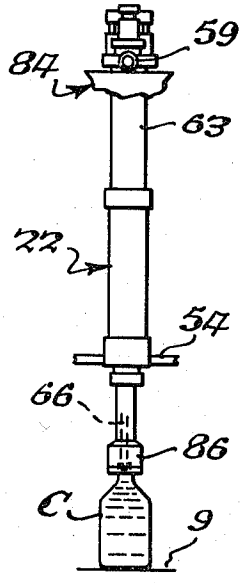


Fig. 15.

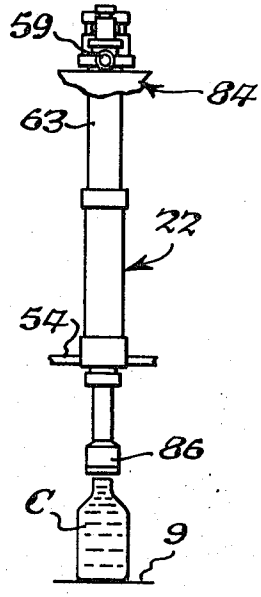
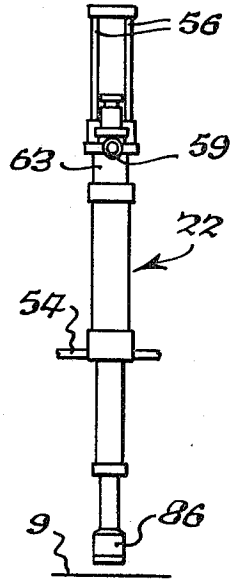
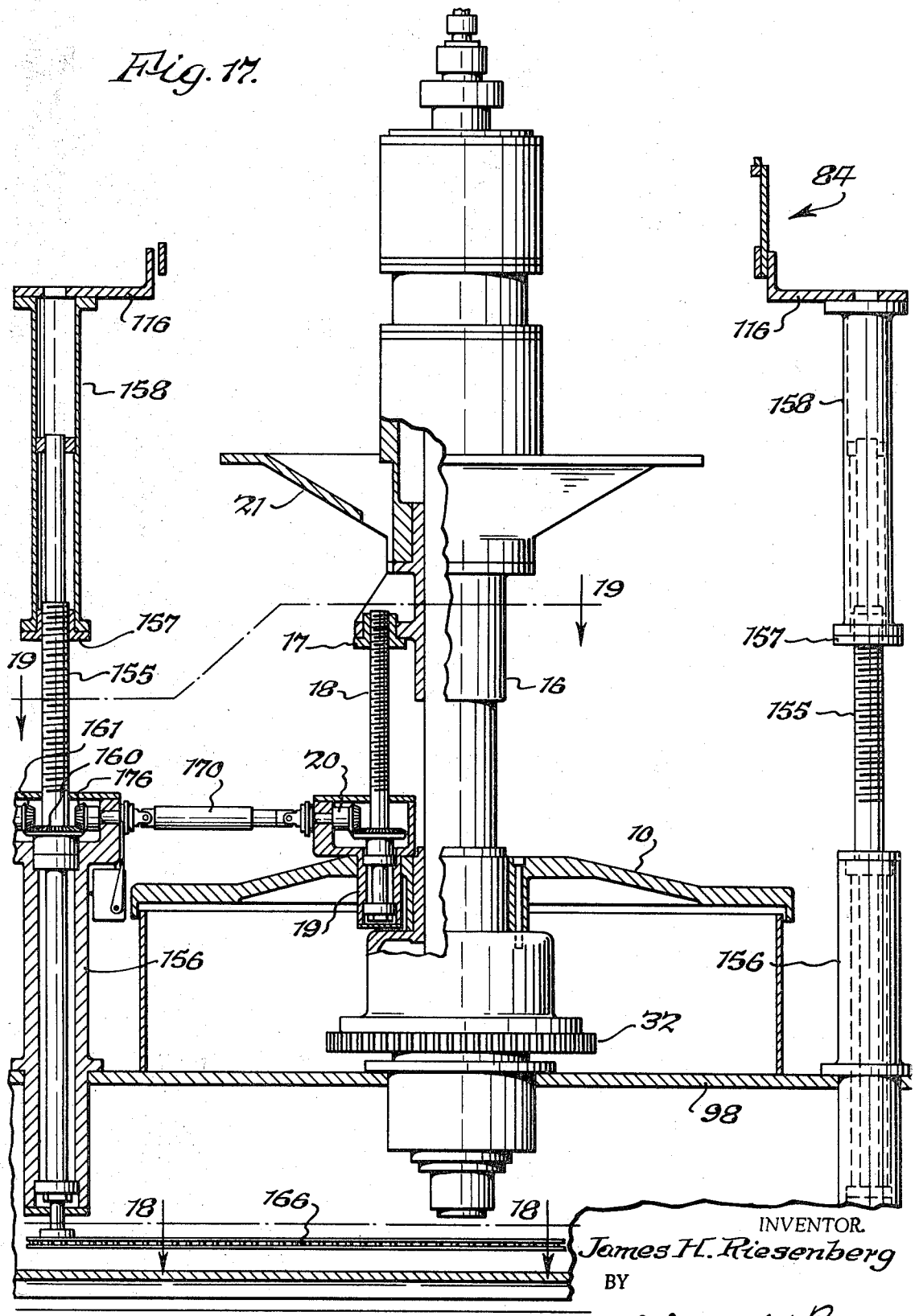


Fig. 16.



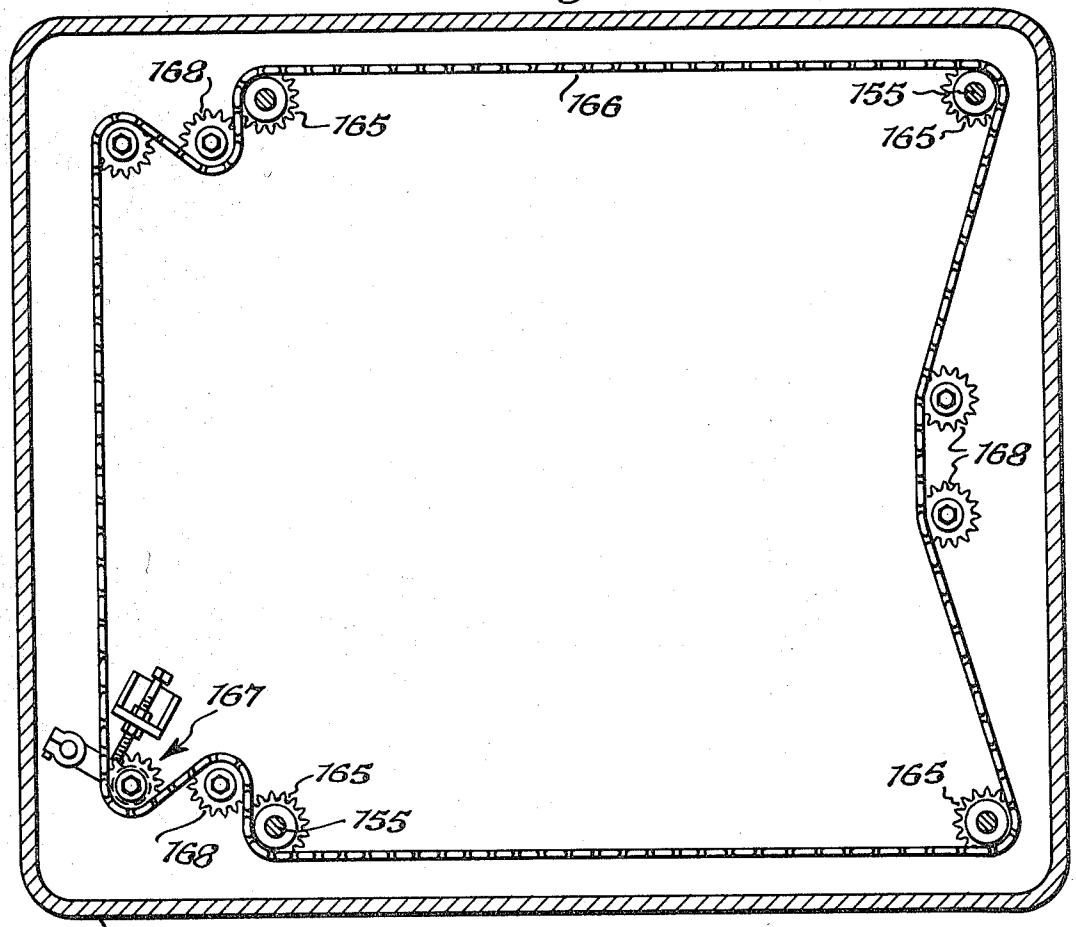
INVENTOR
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 17.



INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 18.



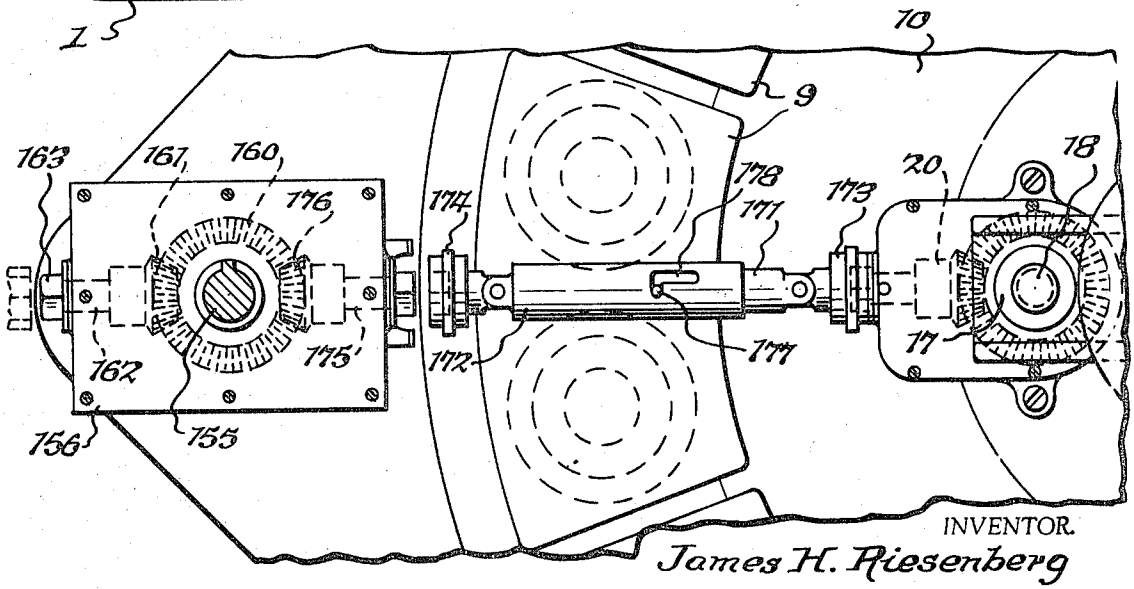
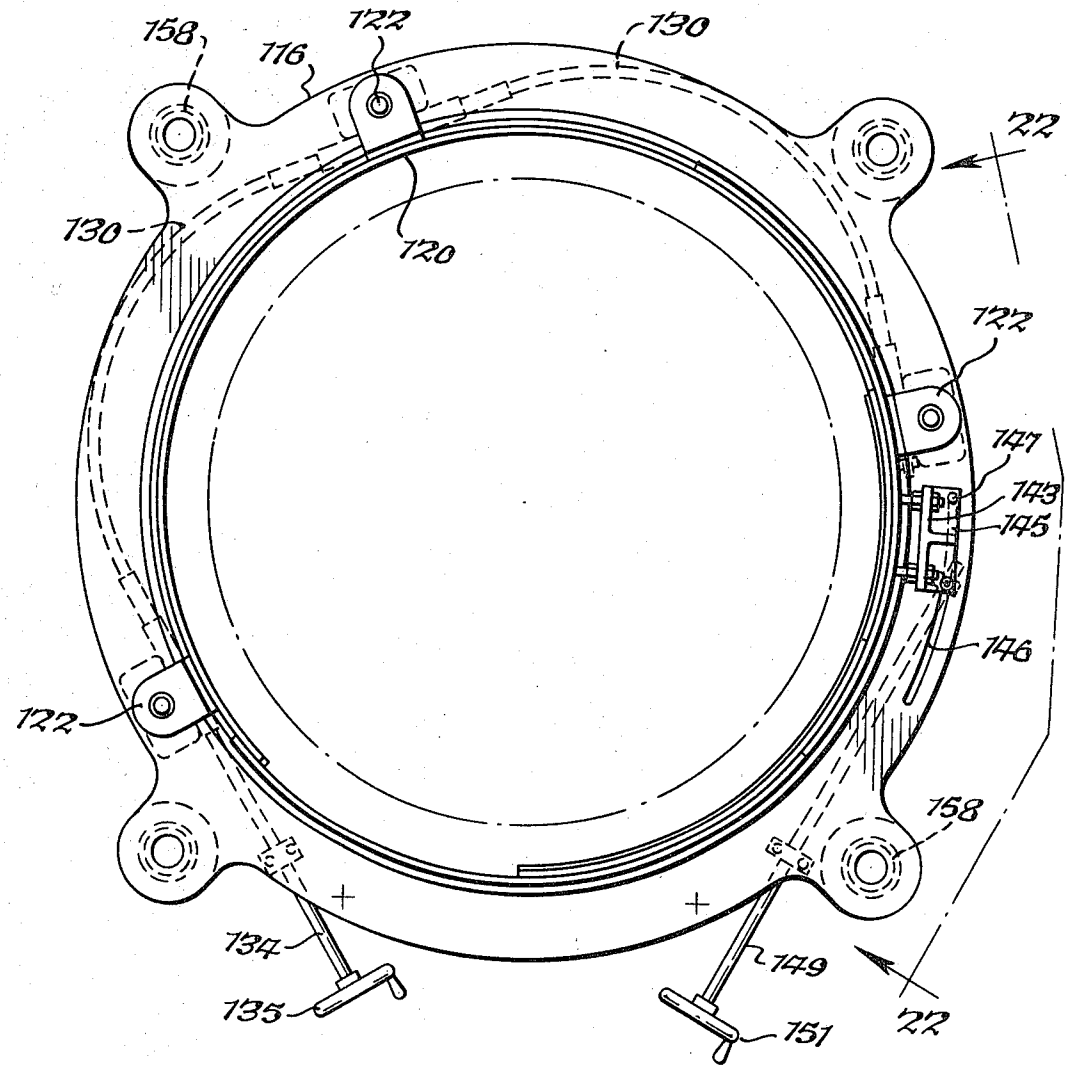


Fig. 19.

INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 20.



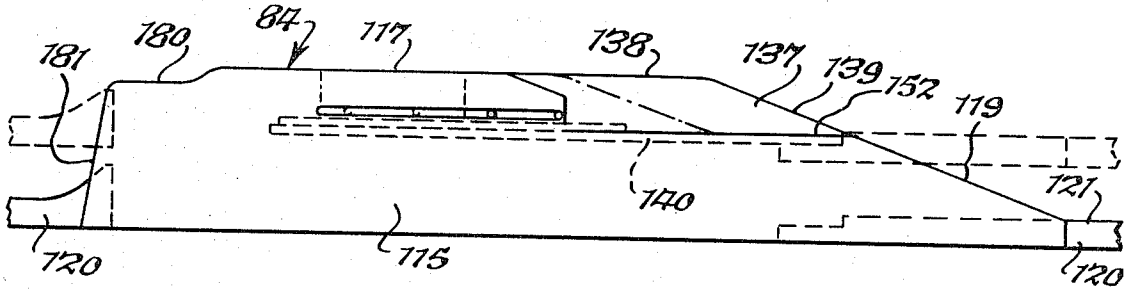


Fig. 21.

INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

Fig. 22.

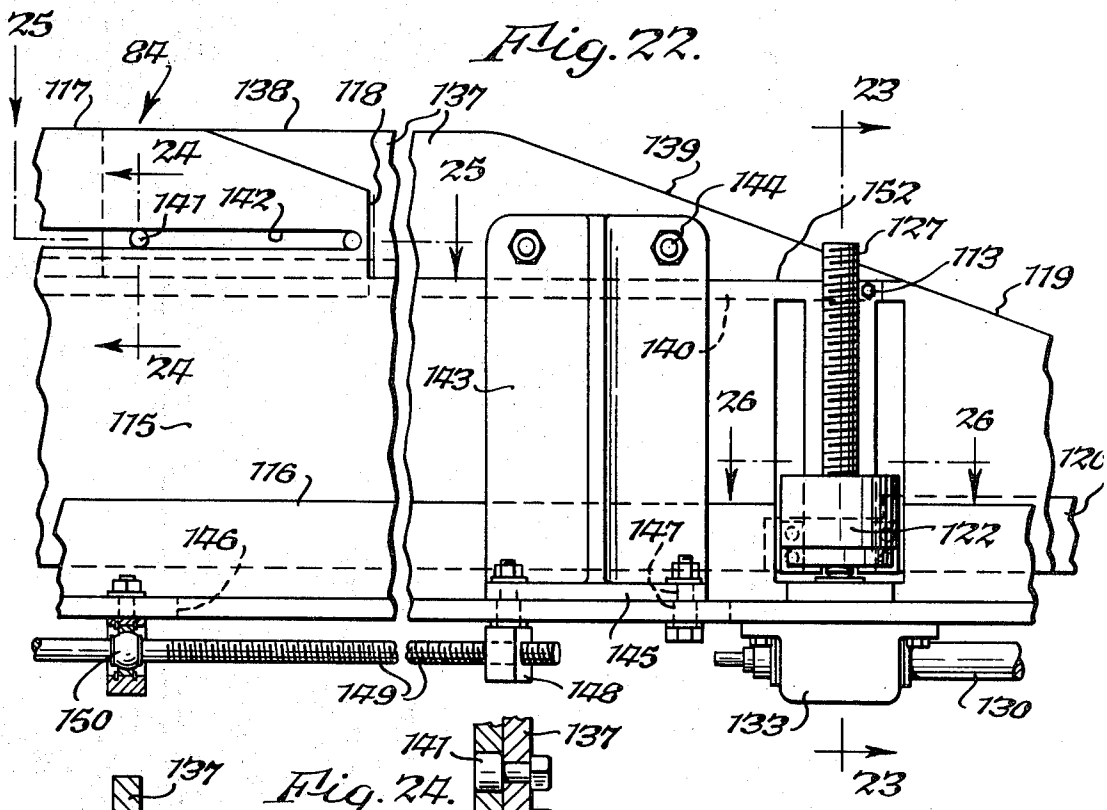


Fig. 24.

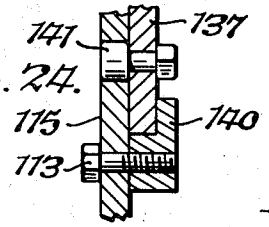


Fig. 25.

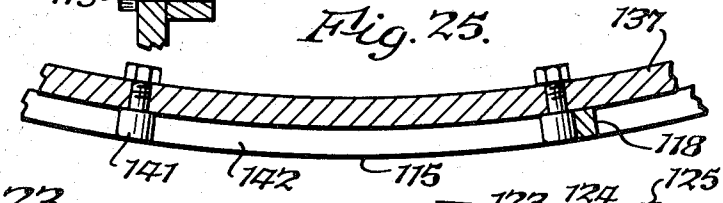


Fig. 23.

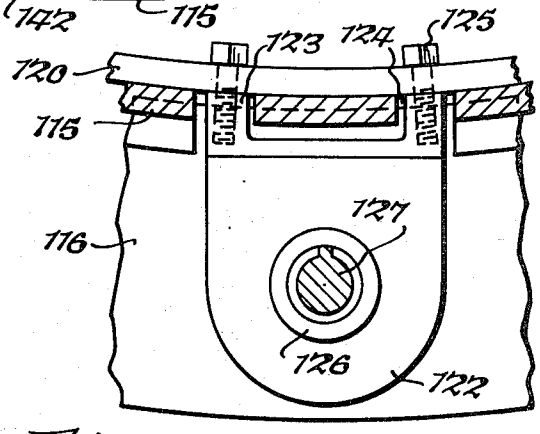


Fig. 26.

INVENTOR.
James H. Riesenberg
BY
Christel & Bean
ATTORNEYS.

CONTAINER FILLING MACHINE

BACKGROUND OF THE INVENTION

In my pending application Ser. No. 507,485 filed Nov. 12, 1965 now U.S. Pat. No. 3,386,480 for a Filling Machine with Adjustable Fill Height Control, there is disclosed an arrangement for selectively varying the fill height during a filling operation utilizing cams controlling the raising and lowering of a series of container supporting trays, the cam having relatively movable sections for accomplishing this.

The fill height control arrangement of my earlier invention also changes the point in the path of travel at which the filled container drops away. This point is delayed as the fill height is increased, thereby lengthening the time available for filling.

It is highly desirable to take advantage of this extended filling time because the filling operation can proceed, more slowly, thereby producing less turbulence. However, where product dispensing is controlled independently of the tray height adjustment, this does not necessarily occur. Also, when the tray height adjustment of my earlier invention is used in conjunction with a submergible filling head, further adjustment is required where the product dispensing stem is to be maintained in closely spaced relation to the bottom of the container.

SUMMARY OF THE INVENTION

A primary object of this invention is to provide a container filling machine which can be quickly and easily adjusted to selectively vary the time during which product is dispensed and thereby provide increased filling time with increased fill height, without interrupting the filling operation.

Another object of this invention is to provide a container filling machine having submergible filling stems and which can be quickly and easily adjusted to vary the fully submerged position thereof without interrupting the filling operation.

It is also an object of this invention to provide a container filling machine in which the foregoing adjustments can be made independently of each other.

Still another object of this invention is to provide a machine as aforesaid and which is readily adjustable to accommodate containers of different heights.

In carrying out my invention, the container filling stems are arranged so that their lowermost, fully submerged filling position can be adjusted while the machine is in operation and without requiring individual adjustment of the filling heads. In like manner, the point in the filling cycle at which the dispensing outlets from the filling stem are cut off can be selectively varied without interrupting the filling operation and without requiring individual adjustment of the filling heads. While these adjustment features find great utility in conjunction with a container filling machine having the fill height adjustment set forth in my pending application, they are also useful apart from such arrangement.

DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a view partly in side elevation and partly in vertical section showing a filling machine incorporating my invention, parts being broken away for ease of illustration;

FIG. 2 is a view thereof partly in plan and partly in horizontal section, taken about on line 2–2 of FIG. 1;

FIG. 3 is a generally diagrammatic view of the drive mechanism thereof;

FIG. 4 is a simplified, fragmentary view thereof partly in plan and partly in horizontal section, taken about on line 4–4 of FIG. 1, various parts being omitted for clarity;

FIG. 5 is a fragmentary view thereof, partly in elevation and partly in vertical section, taken about on line 5–5 of FIG. 4;

FIG. 6 is a view in side elevation, on an enlarged scale, showing one of the submergible filling head assemblies;

FIG. 7 is a fragmentary, vertical sectional view thereof on a further enlarged scale, being taken about on line 7–7 of FIG. 6;

FIG. 8 is a fragmentary, vertical sectional view thereof on the scale of FIG. 7, taken about on line 8–8 of FIG. 6;

FIG. 9 is a fragmentary, vertical section view, on an enlarged scale, showing the dispensing nozzle in its retracted, closed position;

FIGS. 10—15 are generally schematic views showing successive relative positions of the filling head assembly and a container;

FIG. 16 is a view of like those of 10—15 but showing the showing the lowered position of the filling head assembly in the absence of a container;

FIG. 17 is a view partly in side elevation and partly in vertical section, taken about on line 17–17 of FIG. 2;

FIG. 18 is a view, partly in plan and partly in horizontal section, taken about on line 18—18 of FIG. 17;

FIG. 19 is a fragmentary, detail view, on an enlarged scale, taken about on line 19—19 of FIG. 17;

FIG. 20 is a plan view of the upper cam assembly, taken about on line 20—20 of FIG. 1, with parts omitted for greater clarity;

FIG. 21 is a fragmentary, layout view of a portion of the upper cam arrangement;

FIG. 22 is a fragmentary view thereof, on an enlarged scale, taken about on line 22—22 of FIG. 20;

FIG. 23 is a fragmentary vertical section taken about on line 23—23 of FIG. 22;

FIG 24 is a fragmentary, detailed view in vertical section, taken about on line 24—24 of FIG. 22;

FIG. 25 is a fragmentary detailed view in horizontal section, taken about on line 25—25 of FIG. 22; and

FIG. 26 is a fragmentary, detailed view, partly in plan and parts partly in fragmentary, section, taken about on line 26—26 of FIG. 22.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

Referring now in detail to the illustrative embodiment depicted in the accompanying drawings, there is shown a filling machine incorporating my invention. The machine has a base 1 and a conveyor section 2 which includes a conveying mechanism having a conveying flight 3 and a return flight 4. Empty containers are fed to the machine on flight 3 under control of an infeed worm 5, being held in position thereagainst by a laterally adjustable guide 6. Worm 5 delivers containers in properly spaced sequence to an infeed star wheel 7 which carrier carries them around a guide cam 8 and onto the container supporting trays or platforms 9.

In the illustrated machine there are a total of 18 trays 9, although either a larger or a smaller number could be provided. Trays 9 and are mounted on a rotatable cover plate 10 of housing 1 and are vertically reciprocable relative thereto under control of any suitable means such as, for example, pneumatic cylinders 11 urging rollers 12 against a guide cam which regulates the raising and lowering of trays 9 in a manner to be described. Trays 9 can be mounted on the upper end of piston rods 13 which are enclosed by flexible boots 14 from trays 9 to cover plate 10.

Trays 9 are annularly arranged about a rotating central column 15 to which plate 10 is secured 90 rotation rotating therewith. A machine head assembly 21 is mounted on column 15 for rotation therewith, the head 21 having a sleeve 16 arranged in vertical telescopic relation to column 15. A nut 17 (FIG. 17) carried by sleeve 16 engages a threaded post 18 journaled at 19 on plate 10, post 18 having a beveled gear connection to a shaft 20 to be rotated thereby for rising raising and lowering head 21 relative to cover plate 10.

Individual filling head assemblies 22 are provided, equal in number to the number of container supporting trays 9, being generally vertically aligned therewith. The containers fed onto trays 9 are filled by the filling head assemblies 22 as they are carried around the central column 15, and then are discharged by an outfeed star wheel 23 in conjunction with guide cam 8 onto the conveying flight 3.

Central column 15 is rotated by a drive mechanism including a motor 24 having a drive belt connection 25 to a shaft 26

which in turn has a drive belt connection 27 to the input shaft 28 of a speed reducer 29. A gear 30 on the output shaft 31 of speed reducer 29 engages a gear 32 connected to column 15, and a drive chain 33 provides a connection between sprockets on shafts 31 and 34 which latter has chain and sprocket connections 35 to the drive shafts 36 of the infeed and outfeed star wheel 27 and 23. A chain and sprocket drive connection 37 is provided from infeed star wheel drive shaft 36 to a power shaft 38 for worm 5. In this way, column 15, star wheels 7 and 23 and worm 5 are driven by motor 24 in properly synchronized relation. A clutch 39 is interposed in the drive connection between speed reducer 29 and column 15.

The product with which the containers are to be filled is brought in through base 1 via stationary product supply line 40 passing through column 15 and head 21 to a product chamber in a housing 41 on head 21. The product is supplied to the individual filling head assemblies via individual conduits 44.

Air under positive pressure is brought in through stationary conduit 46 along the centerline of column 15, from above, communicating through lateral passages with air chambers in housing 41 which chambers have constant communication with the individual filling head assemblies through conduits 50 and 51 respectively. The air supplied t to the chambers can be at different pressures.

The various filling head assemblies 22 are identical in construction and operation, whereby only one thereof will be described in detail. As shown in FIGS. 6—8, each filling head assembly comprises a cylindrically tubular housing 52 secured at its lower end to a bracket 53 mounting the filling head assembly 22 on the periphery of an annular, horizontal shelf 54 on machine head 21. A tie rod container member 55 is secured to the upper end of housing 52, and provides a mounting support for paired upper and lower tie rods 56 and 57. The upper ends of rods 56 are secured in a cross support 58, while the lower ends of rods 57 are secured in bracket 53. 51,

A roller type cam follower 59 is mounted on a tubular plug 60 having bushings 61 guided by rods 56, and having a reduced diameter portion 62 secured in the upper end of an intermediate tubular member 63 concentric with housing 52 and of smaller diameter, thereby providing an annular hold-down chamber 64 closed at its upper end by bracket 55 and at its lower end by a piston 65 carried by tube 63 for movement therewith. Air is supplied under pressure to chamber 64 via conduit 51 to urge piston 65 toward the lower end of that chamber, to the position shown in FIG. 7, thereby causing roller 59 to follow the retreating surface of a cam, as will be described. A vent 92 is provided for chamber 64, below piston 65.

A filling tube 66 extends through a vacuum sleeve 67 to the member 60, to which it is fixed. At its upper end, filling tube 66 communicates with a product chamber 68 which receives the product to be dispensed via conduit 44, elbow 69, a ball-type check valve 70 and a passage 71. The product supply unit includes a housing 72 closed at its upper end by a cap 73 and secured to the end plug unit 60 by means including a nut 74.

Filling tube 66 is journaled intermediate its ends in a guide 75 engaging an internal shoulder 76 on a tubular member 77 which latter carries an external bushing 78 for relative telescoping movement within member 63. At its lower end, member 77 is provided with an external shoulder 79 seating against the bottom of bracket 53, thereby defining the upper, raised position of member 77.

Guide member 75 is secured to the upper end of vacuum tube 67, which latter is of stepped form having one or more sidewall openings 80 placing the annular chamber between members 66 and 67 in communication with an annular vacuum chamber 81 surrounding member 67 and communicating with a negative pressure source via conduit 82, a chamber in head 21 and a suction line, not shown, extending through column 15 to a suction source. The chamber between member 66 and 67 is sealed above opening 80.

Vacuum chamber 81 is contained within a tubular housing 85 terminating at its lower end in a centering bell 86 adapted to receive the mouth 87 of a container C in a manner understood in the art. At its upper end, housing 85 carries an internal bushing 88 engaging vacuum tube 67. Housing 85 is reciprocable within a bushing 89 secured to the lower end of tube 77 by a nut 90, and at its upper end housing 85 carries a nut which engages against the upper end of bushing 89. The upper end of housing 85 forms a piston movable in a cushioning chamber 91 to which air under pressure is supplied via conduit 50.

At its lower end, filling tube 66 terminates in an end plug having downwardly directed discharge passages 93 arranged therearound. When the filling stem or tube 66 is extended, as shown for example in FIGS. 6 and 7, product will be dispensed through passage 93. When filling stem 66 is retracted into vacuum sleeve 67, as will be described, the sleeve seats on an external shoulder 94 around the end plug and effectively closes passages 93. The bottom surface of plug 95 is cleared of product via a vacuum conduit 96 opening through the bottom of plug 95 and through the sidewall of filling stem 66, in communication with the vacuum chamber provided between tubes 66 and 67.

The operation of the submergible filling heads 22 is as follows, reference being made especially to FIGS. 10—16 and to a single head. The machine is started, with appropriate controls well understood in the art and therefore omitted from this description. Containers C are fed onto successive trays 9 in the manner previously described. Cam 84, carried by the machine, holds tubular member 63 in its elevated position as shown on the left side of FIG. 1, with filling tube 66 thereby being retracted to avoid interference with the infeed of containers. As the filling head is rotated by the machine, clockwise as seen in FIG. 2, cam 84 retreats and roller 59 follows the retreating cam, permitting member 63 and filling stem 66 to lower. Air under pressure is admitted to chamber 64 at all times during the filling cycle, thereby urging piston 65 to its lowered position, shown in FIGS. 6 and 7. As a result, member 63 and stem 66 are forced to follow the retreating cam, insuring proper operation of the filling head.

As cam 84 retreats, members 63 and 66 lower from the position of FIG. 10 to that of FIG. 11. As member 66 lowers, it carries with it vacuum sleeve 67 and guide 75 fixed to the upper end thereof. Lowering of guide 75 permits member 77 and consequently the centering bell assembly 85, 86 to lower until the centering bell engages the open end of the container mouth 87. The latter enters the centering bell and seats against a sealing gasket 97, thereby arresting further downward movement of centering bell 86. The container thus holds centering bell 86 and its tubular extension 85 against further lowering. The fluid pressure in chamber 91 thereupon holds sleeve 67 against further lowering, and product is dispensed as filling stem 66 lowers into the container.

The container supporting tray 9 then is elevated to the position shown in FIG. 12, as will be described, moving bell assembly 85, 86 and guide 75 upwardly until shoulder 79 of member 77 engages bracket 53 and stops upward movement of member 77. This also stops upward motion of vacuum sleeve 67.

Container C continues to move upwardly, taking with it bell assembly 85, 86 which moves into chamber 91 against the air pressure therein, thereby moving the container seal 97 upwardly relative to the end of vacuum sleeve 67 and determining the ultimate height of fill. This can be varied by adjusting the elevation of the tray cam, as described hereafter. Cam 84 continues to retreat, causing stem 66 to position the dispensing end thereof closely adjacent the bottom of the container, this being the position shown in FIG. 12. As this occurs, product is dispensed and the container begins to fill, while being evacuated of air via suction line 82 and vacuum sleeve 67.

As the container begins to fill with product, cam 84 begins to raise and follower 59 starts to lift member 63 and filling

stem 66. This is shown in FIG. 13 and continues until the container is completely filled, at which time the filling head will assume the position depicted in FIG. 14. At this point, filling stem 66 has been retracted into sleeve 67, shutting off product flow as depicted in FIG. 9. Thereafter, tray 9 lowers the filled container which is removed from the filling machine via star wheel 23.

If a particular supporting tray 9 is empty and there is no container to be filled the filling head remains shut off, as follows. The retreating cam 84 will permit members 63 and filling stem 66 to lower from the position of FIG. 10 to that of FIG. 12, as before. However, since there is no container to arrest the downward movement of centering bell 86, sleeve 67 remains seated on shoulder 94, in the position shown in FIG. 9, and continues to follow filling stem 66 to its lowered position. All of the relatively movable filling head parts move downwardly, and the product dispensing passages remain closed whereupon no product is dispensed.

The lower ends of piston rods 13, or extensions thereof, each carry a pair of rollers 12, 42. Rollers 42 are guide rollers, moving in bifurcated guide elements 43 mounted on motor motors 11 and each having a generally inverted U-shaped guide slot. Rollers 12 follow the undersurface of a cam comprising a stationary section 47 (FIG. 5) two transfer sections 48 and a vertically shiftable section 49. Rollers 12 are held against cam sections 47, 48, 49, 42 by pneumatic pressure in motors 11 acting against return springs, not who shown.

Stationary cam 47 is mounted on top wall 98 of base 1 by means of brackets 45 carried by cam 47 and slidably engaging studs 84, being vertically adjustable thereon and having setscrew or other means for clamping them in adjusted position on the studs. movable cam section 49 is mounted on the three upright threaded studs 99 by means including nuts 100 engaging studs 99 and having ears bolted to vertically movable cam 49, whereby rotation of the studs 99 will raise and lower cam section 49. Studs 99 are journaled in thrust bearings mounted on wall 98, and are rotated in unison by means of interconnecting drive shafts 101 carrying bevel bears engaging bevel gears on the lower ends of the two outer studs 99 and a bevel gear on the lower end of the central stud 99, which latter is rotated by a motor 102. Appropriate controls, not shown, are provided for starting, stopping and reversing motor 102, although a manually operated crank, not shown could be used in lieu of motor 48.

Movable section 49 is in circular alignment with fixed section 47, except for radially offset extensions 103 secured to each of the opposite ends of section 49 and offset to overlap section 47. Rollers 12 are sized and arranged to engage and follow the bottom edge 104 of stationary cam 47, the bottom edge 105 of movable cam 49, which is aligned therewith, and also the bottom edges 106 of movable cam extensions 103. At the juncture of stationary cam 47 with movable cam 49, 103 the surface 104 of the former retreats, providing opposite end cam surfaces 107 extending obliquely upwardly. As a result, when section 49, 103 is shifted vertically, the length of edges 106 and 107 traveled by rollers 12 will vary.

Movable cam 49 is positioned at the filling portion of the machine cycle, between the intake and discharge points thereof, and the elevation of cam 49, 103 with its edge surfaces 105, 106 thereby determines the vertical position of trays 9 and the supported containers C during filling. By lowering cam section 49, containers C will have a lower vertical position during filling, thereby increasing the height of fill in the containers. Conversely, raising cam section 49 raises containers C, decreasing the fill height.

Abrupt, jarring discontinuities in the cam surface are avoided by transfer cams 48 which automatically compensate for variations in the relative height of cam sections 47 and 49. This is accomplished by the provision of a transfer cam surface aligned with surface 106, and a lateral extension thereof aligned with surfaces 104 and 107. Each transfer cam guide surfaces coacting with surfaces 106 and 107.

Each transfer cam 48 has an upwardly extending projection or post 108 carrying a headed bolt the head of which is confined in an undercut slot 109 in the associated extension 103, thereby retaining transfer cams 48 in place against extensions 103 with sliding clearance therebetween. Slots 109 are parallel to surfaces 106. A pair of roller followers are carried by each post 108 and extend into guide slots 110 and 111 in extensions 103, parallel to the movable cam surfaces and in cam 47 parallel to the retreating cam surfaces 107 at opposite ends of stationary cam 47. As a result, when movable cam 49 is raised or lowered, it carries with it transfer cams 48 which are shifted horizontally by slots 63, thereby bridging the discontinuities between a cam surfaces 107 and 106 and avoiding the jarring of containers C which otherwise would result. The foregoing is described in greater detail in my aforesaid application Ser. No. 507,485 now U.S. Pat No. 3,386,480.

Rollers 12 will transverse a greater length of cam surfaces 106 when cam section 49 is lowered than they do when cam section 49 is raised. Because of the inclined juncture surfaces 107 of cam section 47, the effective length of cam 48, 49 varies, and since the latter determines the position of the container during filling, the lower the cam the greater the fill height and the longer the filling time. This provides added time for the added fill.

The longer time during which trays 9 are maintained in filling position when the tray controlling cam has been adjusted for increased fill height is highly advantageous, because it provides additional time in which to fill the container to the desired height. This means that a slower filling velocity can be used, reducing turbulence and product foaming. However, the product dispensing outlets 93 are closed upon retraction of filling stem 66 into vacuum line 67, and the point in the filling cycle at which this occurs must be delayed in order to take advantage of the increased available filling time.

Also, lowering the filling position of trays 9 increases the spacing between the fully submerged stems 66 and the bottom of the supported containers. It is desired to position the fully submerged stem closely adjacent the bottom of the container, while avoiding interference therebetween.

It is a particular feature of my invention that both the point in the path of travel at which cutoff occurs and the fully submerged position of stems 66 can be selectively varied without interrupting the filling cycle. To this end, the overhead, filling head controlling cam assembly 84 includes a relatively fixed, stationary cam 115 mounted on the machine by means including a flanged mounting rim 116 and having a cam surface 117 defining the raised, retracted, cutoff position of filling stem 66. The entrance end of cam 115 is cut away, as indicated at 118, for purposes to be described, and includes an inclined follower engaging surface 119 leading from a vertically movable cam section 120 having a horizontal follower engaging surface 121 defining the lowermost, fully submerged position of tubular stems 66.

Cam 120 is supported for vertical adjustment by means including three brackets 122 each having a pair of legs 123 extending through vertical guide slots 124 in cam 115 and bolted to vertically adjustable cam 120 as indicated at 125. The upstanding flange of ring 116 also is cut away to receive legs 123. A liner 126 is bolted to each bracket 122 in threaded engagement with a vertical post 127 journaled in a sleeve 128 bolted to the horizontal flange of ring 116, whereby rotation of post 127 will cause bracket 122 and cam 120 to move vertically, in a direction determined by the direction of rotation of the post 127.

Posts 127 are rotated in opposite directions by shaft means 130 extending between posts 127 and having worms 131 in driving engagement with worm wheels 132 mounted on posts 127, the worm gears 131, 132 being enclosed within housings 133 bolted to the underside of ring 116. A control shaft 134 having a hand wheel 135 at one end is connected to 130 for selectively rotating the latter and associated posts 127 in opposite directions, to raise and lower vertically adjustable cam 120.

Cam **84** is also includes, at the entrance end of stationary cam **115**, an extensible cam section **137** having a follow engaging surface **138** comprising an extension of cutoff cam surface **117**, and having an inclined follower engaging surface **139** comprising a continuation of stationary cam **115** by a flanged guide track **140** bolted thereto as indicated at **113**. Guide pins **141**, which can be rollers, are mounted on cam **137** and extend into horizontal guide slot **142** in cam **115** adjacent cutout portion **118** thereof.

A bracket **143** is bolted to cam section **137** as indicated at **144**. At its lower end, bracket **143** has a base flange **145** seated on the horizontal flange of cam ring **116**, which latter has a guide slot **146** therein receiving guide pins **147** one of which terminates in a block **148** in threaded engagement with a shaft **149**. The latter has a swivel mounting at **150** on the horizontal flange of cam **116**, and terminates at its opposite end in a hand wheel **151**. Rotation of the latter in opposite directions will extend and retract cam **137**, with swivel **150** permitting the drive shaft **149** to accommodate the curvature of guide slot **146**.

When it is desired to advance or retract the point in the path of travel at which filling stem **66** is lifted to the cutoff position as defined by surfaces **117**, **138** handwheel **151** is rotated in the proper direction to move the extensible cam between the fully extended position shown in FIG. **22** and in full lines in FIG. **21** and a retracted position as indicated in phantom in FIG. **21**. As cam follower **59** attached to stem **66** moves from surface **121** to the upwardly inclined surface **119**, stem **66** is raised. If cam **137** is fully extended, stem **66** continues to be raised as follower **59** travels directly from surface **119** to surface **139** and then onto surface **138**. At this point stem **66** is fully retracted, the product dispensing outlets are shut off, and filling of the container stops.

If, however cam **137** has been retracted, cam follower **59** will move from the initial inclined surface **119** to an intermediate horizontal surface **152** on cam **115** defined by cutout portion **118**. This causes stem **66** to dwell in an intermediate position until follower **59** picks up surface **139** and continues raising stem **66** to its cutoff position as defined by surfaces **117**, **138**. The length of dwell is determined by the extent of retraction of cam section **137**. Thus, by extending and retracting cam **137** the product dispensing time of stem **66** can be varied as desired, and to take full advantage of the maximum filling time available, which in the illustrated embodiment also is determined by the relative adjustment of the tray controlling cam.

Rotation of shaft **134** through hand wheel **135** raises and lowers cam **120**, which overlaps cam **115** at the cut off end so that it will intersect with inclined surface **119** at any point therealong, the uppermost position of cam **121** aligning it with intermediate dwell surface **152**. This provides a means for conveniently adjusting the fully submerged position of filling stem **66**, permitting it to be positioned as close to the bottom of the container as may be desired, and to maintain that position with changes in the filling position of the container supporting trays **9** while avoiding interference between stems **66** and the supported containers C.

At its exit end, cam **115** is cut away to provide a lower horizontal follower engaging portion **180** leading to a sharply inclined follower engaging portion **181** intersecting section **120**. As follower **59** moves onto portion **180**, centering bell **86** is lowered onto container C for positioning and gripping container C prior to extension of stem **66**. When it is desired to adjust the position of the entire filling head, for example to accommodate containers of a different size, this can be accomplished by the supporting posts 155 journaled in housings 156 for rotation about vertical axes, and having threaded engagement in nuts **157** carried at the lower ends of tubular mounting sleeves **158**. Four such mounting posts and sleeves **155**, **158** are provided, engaging the horizontal flange of overhead cam supporting ring **116**.

Posts **155** each carry a bevel gear **160**, one of which is engaged by a bevel gear **161** on a shaft adapted at one end, as shown at **163**, to receive a drive wrench, crank or other means for rotating shaft **162**, as indicated in FIG. **19**. At their lower ends, posts **155** carry pinions **165** engaged by a common drive chain **166** whereby rotation of the one post **155** through bevel gear **160** will cause all four posts **155** to rotate in unison. A tension adjusting arrangement **167** is provided for chain **166**, together with idler gears **168** at spaced points therealong.

To raise the entire mounting head, simultaneously with and to the same extent as the overhead cam assembly **84**, a detachable drive coupling generally designated **170** is used. Coupling **170** has telescoping parts **171** and **172**, the former having a socket wrench head **173** pivoted thereto and adapted to engage the mating end of shaft **20**. Part **172** has a wrench head **174** pivoted thereto and adapted to engage the correspondingly configured mating head on a shaft **175** having a bevel gear **176** engaging bevel gear **160**. The telescoping parts **171** and **172** are spring urged in opposite directions to extend the coupling, and part **171** has a pin **177** engaging a J-slot **178** in part **172** for limiting the extension movement thereof and for releasably holding parts **171**, **172** in retracted position.

Posts **155** can be rotated by shaft **162** independently of post **18**, and vice versa, for selective, independent adjustment of overhead cam **84** and head **21**. When it is desired to adjust head **21** and cam **84** in unison, coupling **170** is positioned to drivingly connect shafts **175** and **20**, as shown in FIG. **17**, whereupon rotation of shaft **162** will cause rotation of the posts **155** and **18** in unison, and in the same direction.

While I have disclosed and described in detail only one embodiment of my invention, that has been done by way of illustration only without though thought of limitation, it being intended to include within the scope of the appended claims those variations and modifications which will occur to those skilled in the art.

Having fully disclosed and completely described by my invention, and its mode of operation.

I claim:

1. In a container filling machine, a container supporting tray, a filling head having a filling stem mounted for movement into and out of filling position relative to said tray, means mounting said tray and said filling head for movement through a predetermined path, and means moving said filling stem into filling position as said tray and said head are moved through said path including a cam extending along said path, and cam follower means connected to said filling stem, said cam including first and second sections one of which determines the spacing between said tray and said stem when the latter is in a fully submerged filling position, and means mounting said one cam section for movement relative to the other thereof, thereby to vary said fully submerged filling position of said stem.

2. A container filling machine as set forth in claim **1**, wherein said cam includes an inclined portion for raising said filling stem from said filling position to a cutoff position, wherein said other cam section including a cutoff portion determining the said cutoff position of said filling stem, and an extensible cam section movable relative to said other cam section for varying the point in said path at which said filling stem arrives at said cutoff position.

3. A container filling machine as set forth in claim **2**, wherein said inclined portion is provided both by said other cam section and said extensible cam section, said extendible cam section including a portion comprising an extension of said cutoff portion.

4. A container filling machine as set forth in claim **1**, wherein said means mounting said one cam section for movement relative to the other thereof includes at least two rotatable mounting posts in threaded engagement with said movable one cam section for moving the same upon rotation of said posts, and means for rotating said posts in unison.

5. A container filling machine as set forth in claim **1**, together with means mounting both of said cam sections for movement toward and away from said tray.

5. A container filling machine as set forth in claim 1, together with means mounting both of said cam sections for movement toward and away from said tray.

6. A container filling machine as set forth in claim 5, wherein said cam section mounting means include a cam mounting member and at least two rotatable mounting posts in threaded engagement with said mounting member for moving the same upon rotation of said posts, and means for rotating said posts in unison.

7. A container filling machine as set forth in claim 5, wherein said filling head includes a housing in which said stem moves, means mounting said housing for movement toward and away from said tray, and coupling means selectively engaging said cam and filling head mounting means for movement in unison.

8. A container filling machine as set forth in claim 1, together with means mounting said tray for movement into and out of filling position relative to said filling head, and means for moving said tray into filling position as said tray and said filling head are moved through said path including another cam extending along said path, and cam follower means connected to said tray, said other cam including first and second sections one of which determines the spacing between said filling head and said tray when the latter is in filling position, and means mounting said one tray cam section for movement relative to the other tray cam section thereby to vary the height of fill of a container supported on said tray.

9. In a container filling machine, a container supporting tray, a filling head having a product dispensing stem mounted for extension toward said tray into a filling position and retraction into a product cutoff position, means mounting said tray and said head for movement through a predetermined path, and means moving said stem between filling and cut off positions including a cam extending along said path and cam follower means connected to said stem, said cam including a first section determining the spacing between said tray and said stem when the latter is in a fully submerged filling position, a second section determining the spacing between said tray and said stem when the latter is in said cut off position, and a third section extensible relative to said second section for varying the point in said path at which said stem is retracted into said cut off position.

10. A container filling machine as set forth in claim 9, wherein said first and second sections comprise generally horizontal first and second follower engaging portions, said cam having an inclined follower engaging portion defined in part by said third section and leading from said first section to said second section, said third section comprising an extension of said second section, said cam providing a dwell portion intermediate said first and second portions for continued dispensing of product when said third section is in a retracted position.