

April 28, 1959

J. L. D. MORRISON
HOT BEVERAGE DISPENSER

2,883,921

Filed Dec. 1, 1954

11 Sheets-Sheet 1

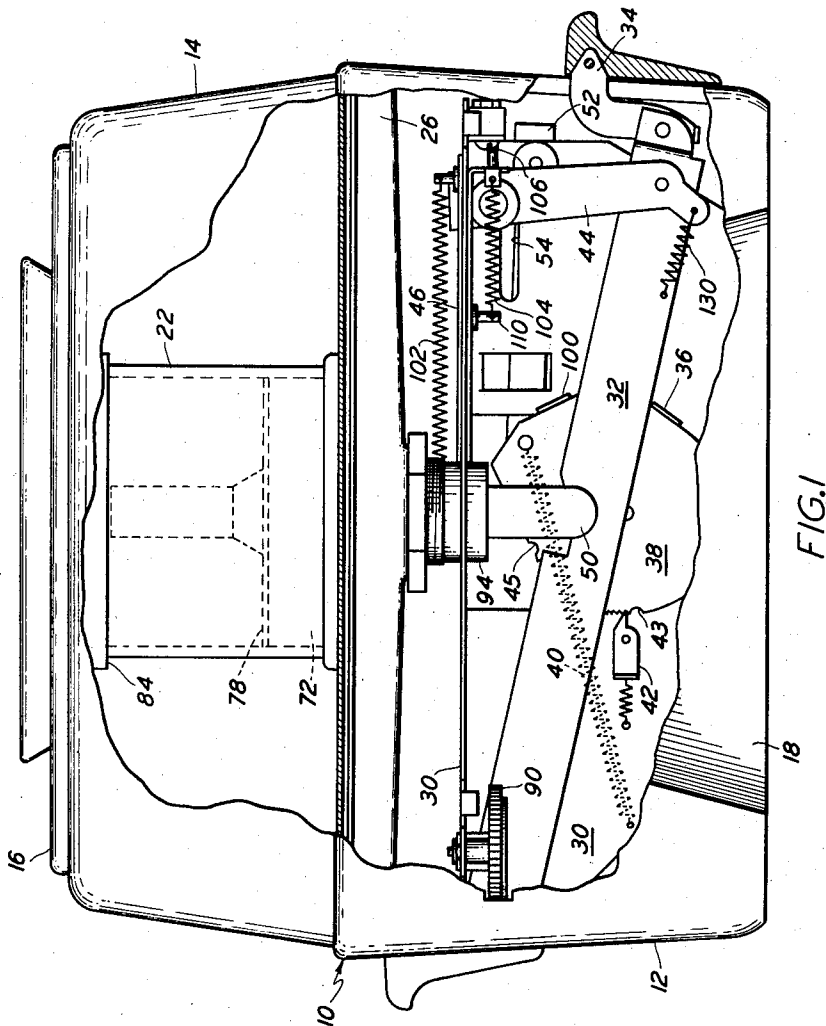


FIG. 1

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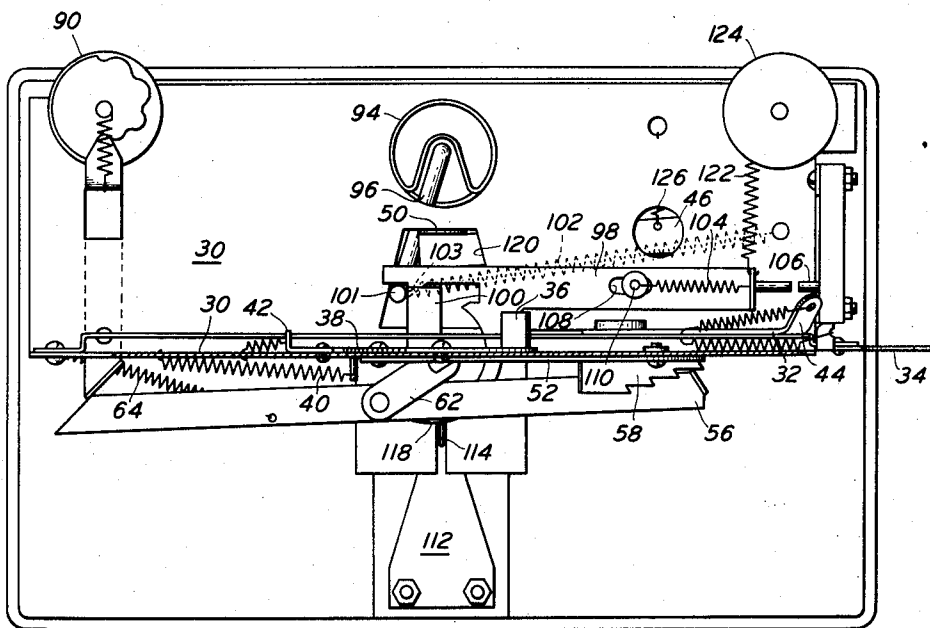


FIG. 3

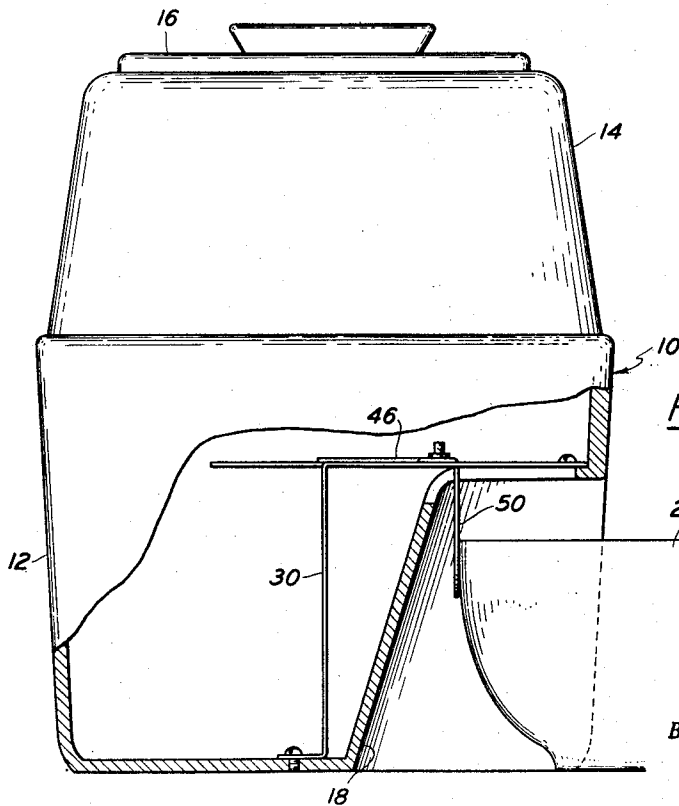


FIG. 2

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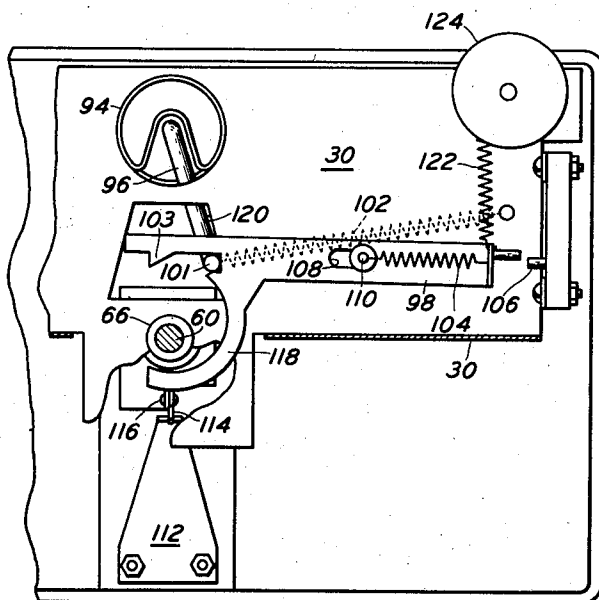
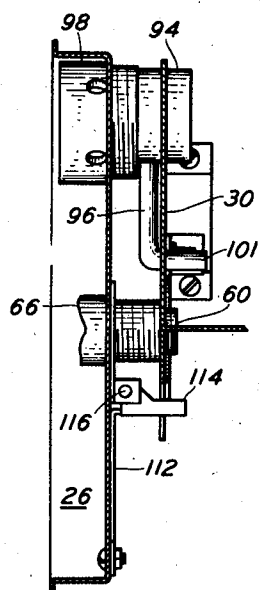
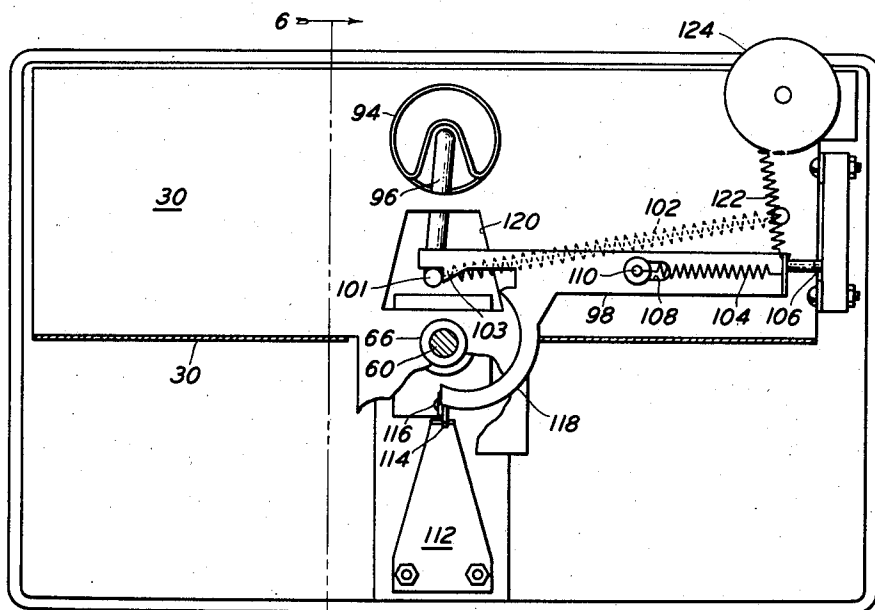
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11 Sheets-Sheet 3



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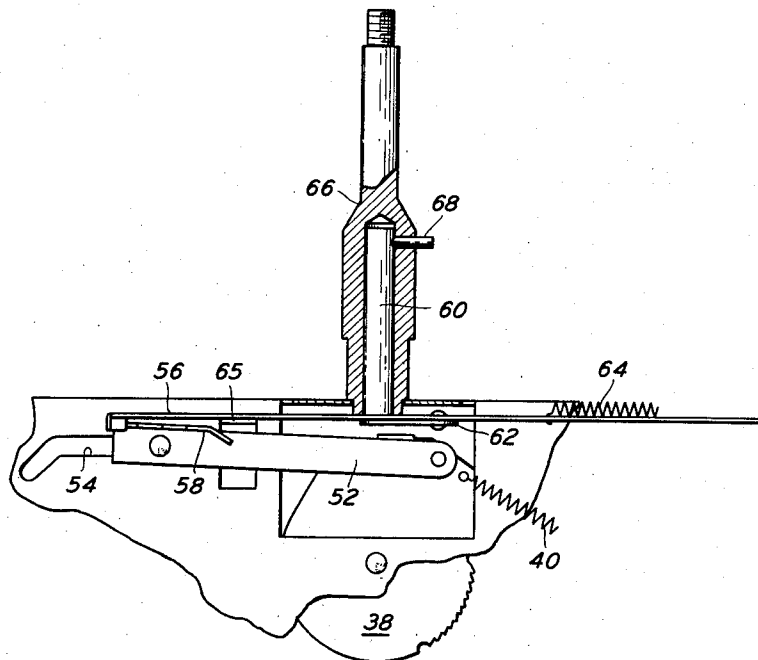


FIG. 7

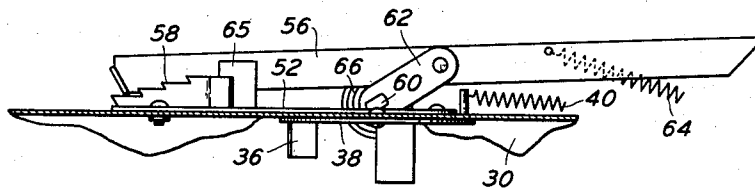


FIG. 8

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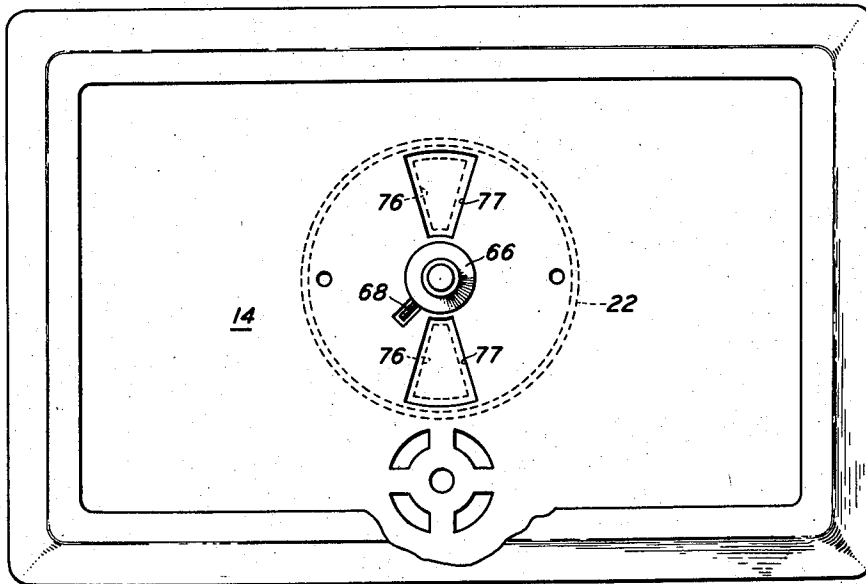
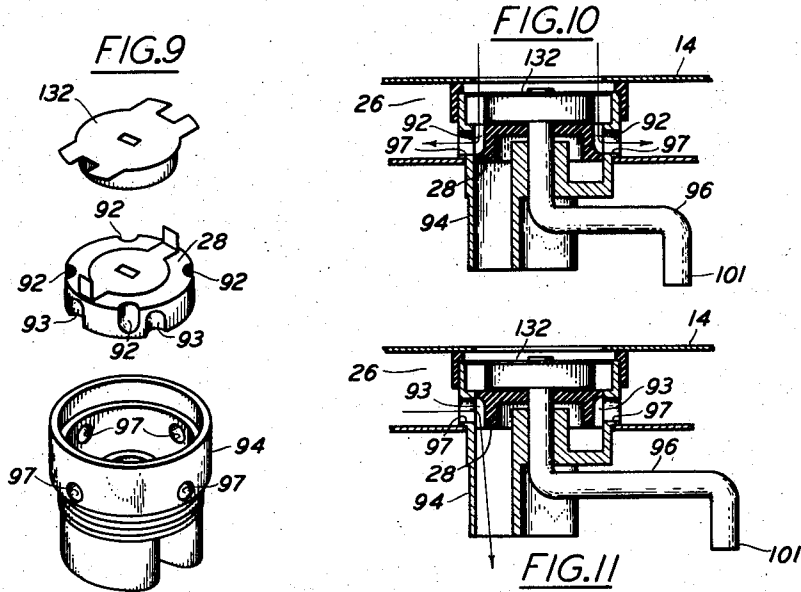


FIG. 21

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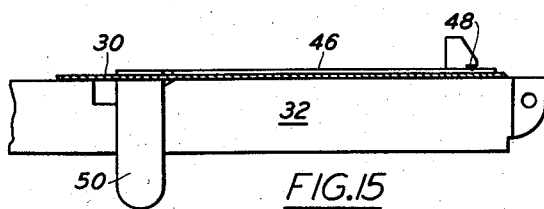
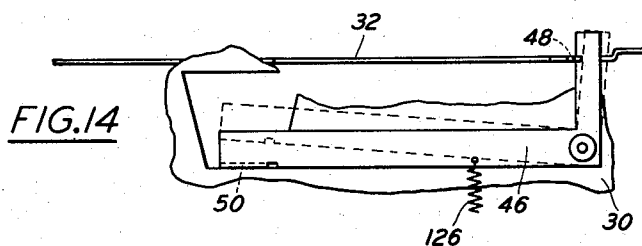
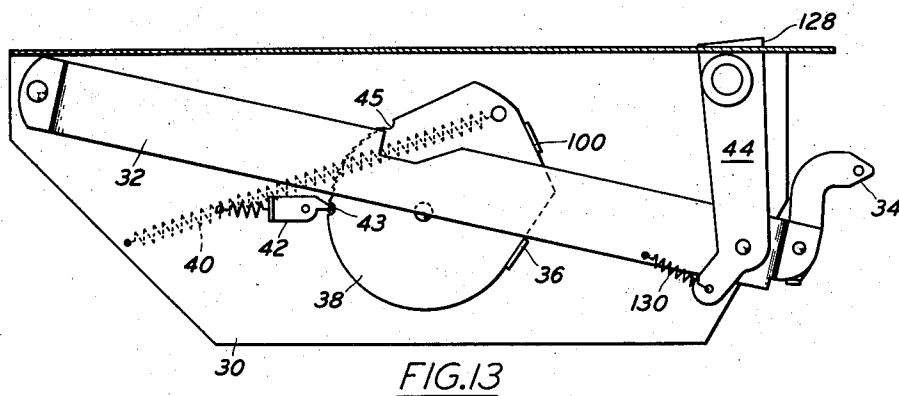
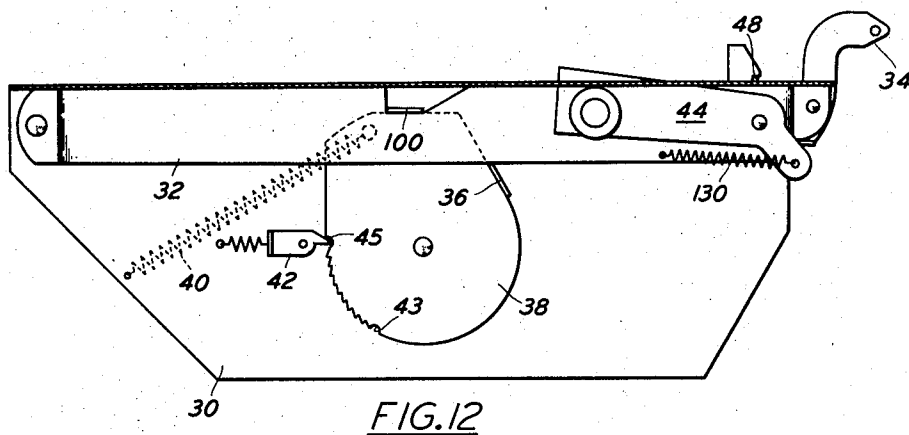
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FIG. 16

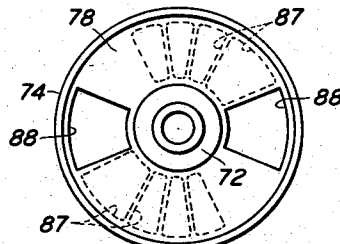
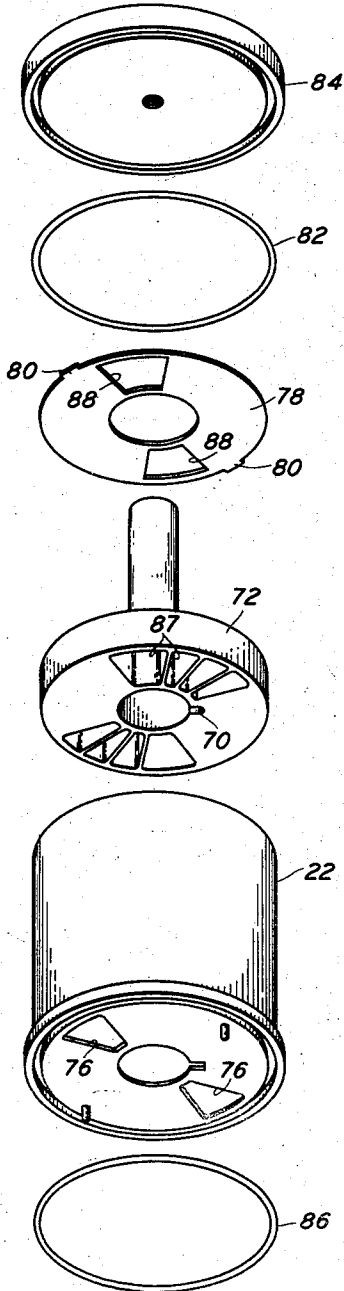


FIG. 17

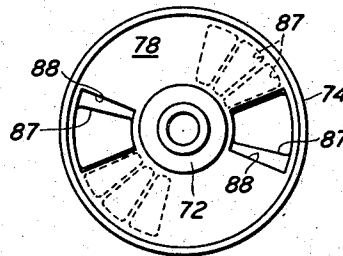


FIG. 18

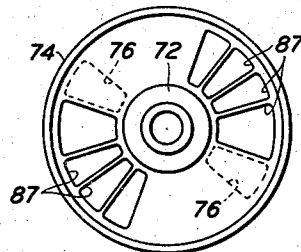


FIG. 19

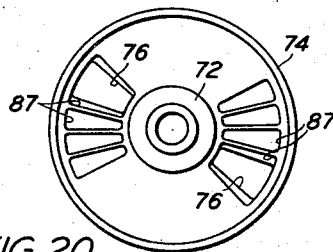


FIG. 20

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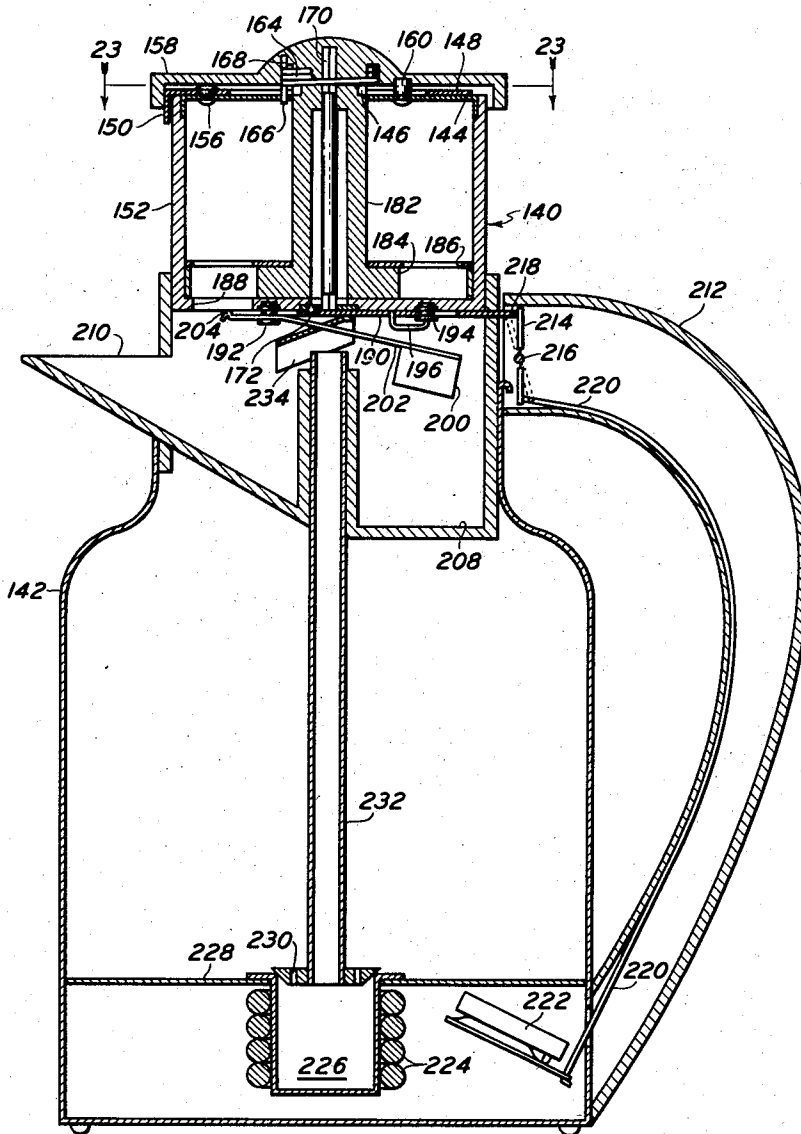


FIG. 22

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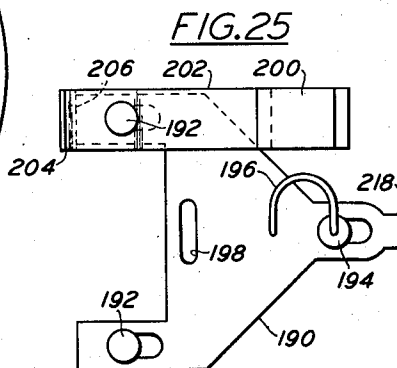
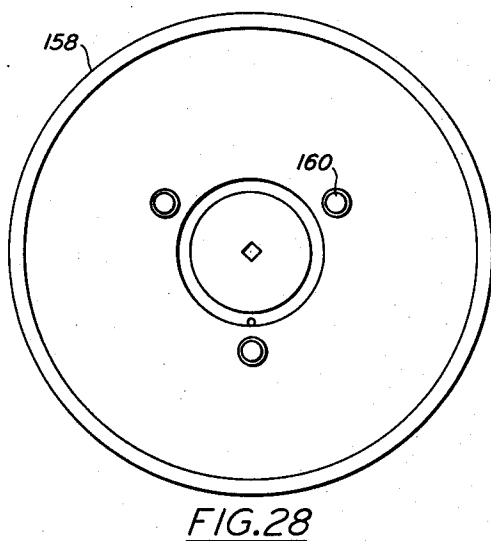
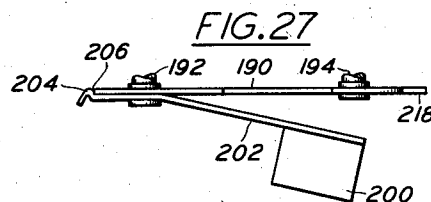
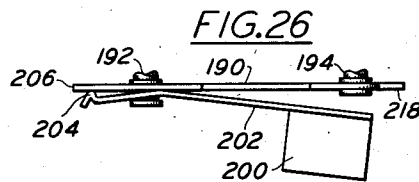
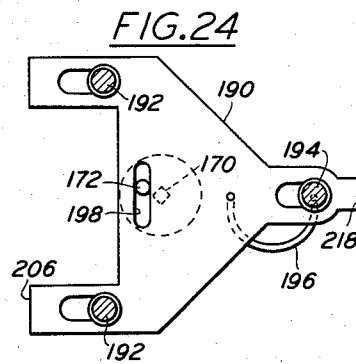
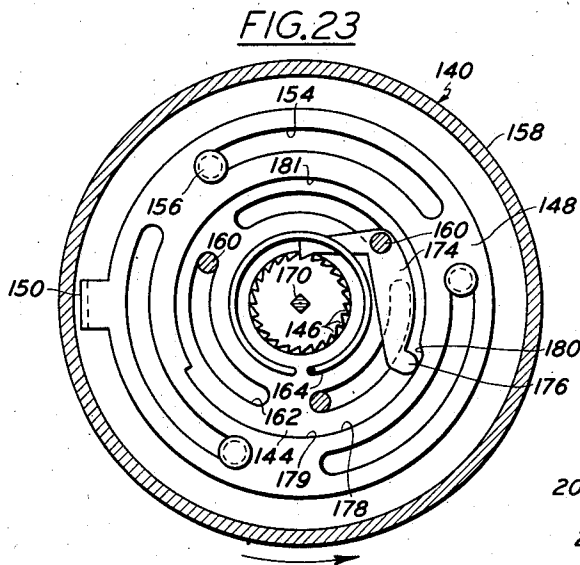
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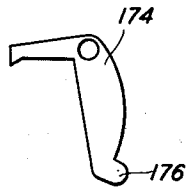


FIG. 29

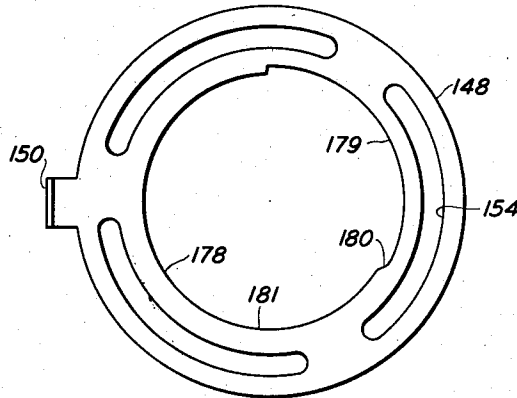


FIG. 30

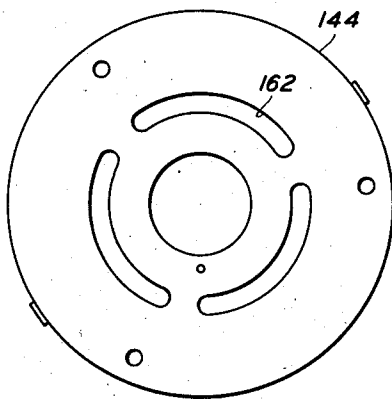


FIG. 31

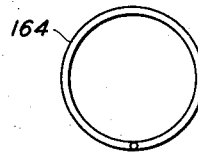


FIG. 32

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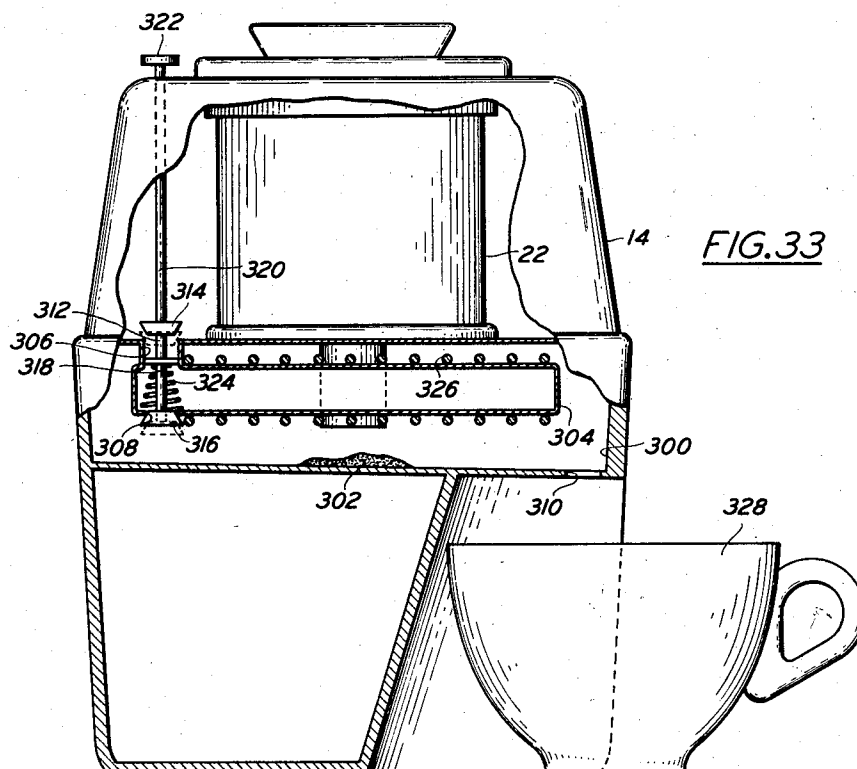
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11 Sheets-Sheet 11



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2,883,921

HOT BEVERAGE DISPENSER

James L. D. Morrison, Benton Harbor, Mich.

Application December 1, 1954, Serial No. 472,442

5 Claims. (Cl. 99—275)

This is a continuation-in-part of application Serial No. 464,122, filed October 22, 1954 now abandoned.

This invention relates generally to a hot beverage dispenser, and more particularly to a home appliance for automatically making and dispensing hot beverages in measured quantities.

The principal deficiency of devices for automatically dispensing hot beverages has been their bulkiness and complexity. Many of these devices require extensive servicing and are costly both to manufacture and to operate. None of these devices with which I am acquainted would be feasible for home appliance application.

It is one of the prime objects of the invention to obtain for regular home usage a compact and low cost beverage dispenser which will function automatically to provide individual servings of hot beverage with the greatest possible convenience.

An additional object of the invention is that the appliance shall successively make and dispense, cup-by-cup, a freshly brewed beverage which is made just prior to its dispensing.

A further object of the invention is to obtain an appliance of the type described which is easily portable, simple to service and quick in operation.

From another standpoint, it is my objective to obtain a means whereby beverage ingredients can be sanitarily stored (in quantity) for relatively long periods of time within the appliance. Along with this objective, it is my further object to so store and operate the appliance that the stored ingredients will not be substantially affected by appliance operation.

To the accomplishment of the above and related objects, my invention may be embodied in the forms illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that specific change may be made in the specific constructions illustrated and described, so long as the scope of the appended claims is not violated.

Additional features of the invention will become apparent during the following description, wherein reference is made to the accompanying drawings, in which:

Fig. 1 is a front elevation of the appliance with a portion of the cabinet and reservoir broken away to show the storage and operating mechanism;

Fig. 2 is an end view of the appliance with a portion of the cabinet broken away to show the mounting frame for the operating mechanism;

Fig. 3 is a bottom view of the appliance with the cabinet removed to show the operating mechanism, which is in a neutral or deactuated condition;

Figs. 4 and 5 are detail views of the switch-and-valve operating mechanism shown in closed and open positions, respectively;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 4;

Fig. 7 is a detail view of the linkage used in dispensing an ingredient of the beverage;

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Fig. 8 is a bottom view of Fig. 7;

Fig. 9 is an exploded view of a two-way valve assembly controlling liquid flow in the appliance;

Figs. 10 and 11 show the two operating positions of the two-way valve assembly controlling liquid flow;

Figs. 12 and 13 are detail views, respectively showing the applying lever and other operating mechanism components in a neutral or "off" position, and in an actuated or "on" position, respectively;

Figs. 14 and 15 show in detail the top and front views of a bell crank serving both to lock and deactuate the operating mechanism;

Fig. 16 is an exploded view of the storage and metering means for an ingredient of the beverage;

Fig. 17 is a top view of the assembled storage means with the cap removed;

Fig. 18 shows the same view as Fig. 17 but with the metering cylinder rotated slightly;

Fig. 19 is the same view as Fig. 18 but with the top plate completely removed;

Fig. 20 shows the metering cylinder rotated slightly further from its position in Fig. 19, so that apertures therein align with apertures in the bottom of the storing cup;

Fig. 21 is a top plan view of Fig. 1 with the cover and storing cup removed;

Fig. 22 is a sectional illustration of another embodiment of the invention;

Fig. 23 is a sectional view taken on section lines 23—23 of Fig. 22;

Fig. 24 is a plan view of the slide plate;

Fig. 25 is a bottom view of the float;

Figs. 26 and 27 are sectional views of two different positions of the float;

Fig. 28 is a plan view of the underside of the actuating cover;

Fig. 29 illustrates the pawl in detail;

Figs. 30 and 31 are plan views of the metering ring and top plate;

Fig. 32 is a separate view of the cover spring; and

Fig. 33 is a partial sectional view of another embodiment of this invention.

The appliance, indicated generally by reference numeral 10 in Fig. 1, appears exteriorly as a cabinet 12 with a superposed liquid reservoir 14 having a removable lid 16. The cabinet has a recessed portion 18 (Fig. 2) within which a receptacle 20 (cup or the like) is placed for receiving the dispensed beverage.

Interiorly of the appliance there is provided a storage cup 22 for a beverage ingredient (powdered coffee, tea, et cetera). A metering device is located within the cup 22, as will be explained more fully later in this description.

Intermediate the reservoir 14 and cabinet 12 is a heating chamber 26 into which flows a fixed amount of liquid from the reservoir 14 through a two-way valve 28. (See Figs. 10 and 11.)

Within the cabinet 12 there is located a frame 30 on which are mounted the components of an operating mechanism which will next be described.

Operating lever 32 is pivotally secured at one end to frame 30, and is swung downwardly by pressing on handle 34 to initiate a beverage making and dispensing cycle. The lever 32 engages a cam 36 on ratchet wheel 38, causing the ratchet wheel to rotate against the resistance of spring 40. Pawl 42 prevents counter-rotation of the ratchet wheel until the handle 34 is completely depressed. The pawl and ratchet teeth are so designed as to permit uninhibited rotation of wheel 38 in, first, a counterclockwise direction until pawl 42 enters a deep notch 43, whereupon clockwise rotation of the wheel shifts the pawl so

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that it will slide over the ratchet teeth to permit the wheel to rotate to starting position as will be explained in more detail hereafter. At this starting position, the pawl enters another deep notch 45 such that counterclockwise rotation of the wheel serves to deflect the pawl clockwise about its pivot to a position which does not lock the wheel against continued movement. Should wheel movement be stopped before a full cycle of rotation, the pawl locks it against returning in the opposite direction. Thus, once a cycle of operation is started, it must be carried through to completion. As best seen in Figs. 12 and 13, a locking bar 44 pivots on operating lever 32 at one end and slides in a slot in the frame at the other end, to assume a position holding the lever 32 downwardly when the lever is fully depressed, as shown in Fig. 13.

Referring to Figs. 2, 14 and 15, bell crank 46 prevents downward movement of the lever 32 by locking engagement with a tooth 48 on the lever 32 (see Fig. 12), unless a receptacle 20 is inserted in cabinet recess 18 (Fig. 2) to rotate the bell crank 46 out of locking engagement by contacting a depending tab 50.

As the ratchet wheel 38 is rotated by the lever 32, slide bar 52, which is pivotally connected at its end to the ratchet wheel (Fig. 7) is cased to move toward the left. This movement of the slide bar is guided in a slot 54 in the frame 30. The slide bar 52 at its left-hand end carries a stepped or ratchet connection 58 which is engageable with an up-turned flange on the left end of the drag link 56 and draws the drag link therewith (toward the left). The drag link 56 acting through a rotary link 62 produces turning of pintle 60. When the slide bar 52 is cammed downwardly in Fig. 7 by the left-hand end of the slot 54, it disengages with drag link 56 which is retracted by a spring 64. It will be noted that drag link movement is confined to reciprocable movement because of sliding engagement with a struck up frame portion 65 of the frame 30. The pintle 60 is thus rotationally rocked back and forth in the upright stationary post 66. A nib 68 on the pintle 60 engages with a keyway 70 (Fig. 16) in metering cylinder 72 to rock the cylinder in conformity with movement of pintle 60 and slide bar 52. This action of the metering cylinder 72 serves to discharge a preferred amount of a beverage ingredient from the storage cup 22 into the heating chamber 26.

The storage cup 22 (Fig. 16) has openings 76 at the bottom thereof which registered with holes 77 (Fig. 21) in the base of the reservoir 14 opening into the heating chamber 26. Metering cylinder 72 is snugly fitted into the cup 22 and is turnable therein on post 66. Top plate 78 having nibs 80 is then fitted over the top of the metering cylinder. The nibs 80 are received in slots formed in the inner wall of the cup to prevent turning of the top plate with the metering cylinder. A seal 82 and cap 84 which is threadably received on top of post 66 make the storage cup airtight.

The top plate 78 closes graduated apertures 87 in the metering cylinder 72 when the operating mechanism is in a neutral or "off" position, as shown in Fig. 17. When the metering cylinder 72 is turned sufficiently, two diametral apertures 87 are brought into alignment with apertures 88 in the top plate. Beverage ingredient in cup 22 on top of plate 78 then fills the aligned apertures in the metering cylinder when they are positioned as indicated in Fig. 18. The relative position of the metering cylinder 72 and cup 22 at this stage is indicated in Fig. 19 wherein top plate 78 is removed for clarity. Further movement of the metering cylinder aligns apertures 87 with openings 76 in the bottom of the cup 22, which register with holes 77 leading into the heating chamber 26. As the metering cylinder apertures 87 and openings 76 are brought into alignment, beverage ingredient drops into the heating chamber 26.

The amount of beverage ingredient which is introduced to the heating chamber 26 depends upon the extent of turning of the metering cylinder, which is governed by

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the extent of shifting of the drag link 56 (Figs. 7 and 8). The distance of drag link movement can be regulated by controlling the location of engagement between stepped connection 58 and drag link 56. This location can be varied by operation of a control wheel 90 (see Fig. 3), as is explained in further detail hereinafter.

A determinate amount of the liquid portion of the beverage flows from the reservoir 14 into the heating chamber 26 when the two-way valve 28 is positioned as indicated in Fig. 10. This is the position of the valve when the operating mechanism is "off," or de-actuated. The two-way valve 28 has a plurality of circumferentially spaced sets of indentations 92 and 93 which do not extend across the entire width of the valve. The valve is mounted in nozzle 94 and is turnable therein by a crank 96 which in one position (Fig. 10) registers the indentations 92 with openings 97 in the nozzle, permitting fluid flow in the direction indicated by the arrows in Fig. 10. The valve is turned to a second position by the crank 96 wherein indentations 93 register with openings 97, thus discharging the contents of the heating pan through the nozzle 94 (Fig. 11), as indicated by the arrow.

The crank 96 position and hence the valve position is controlled by abutting engagement with operating member 98 (Figs. 3, 4 and 5). When the appliance is in an "off" or neutral position, shown in Fig. 3, the ratchet wheel 38 is turned by the spring 40 to a position wherein a laterally extending cam 100 on the ratchet wheel 38 engages a depending arm 101 of the crank 96, turning it against the tension of spring 102 so that the valve is positioned as shown in Fig. 10. When the ratchet wheel 38 is turned so that cam 100 disengages with the depending arm 101 of the crank 96, the spring 102 turns the crank slightly so that the depending arm 101 then bears against tooth 103 on member 98, and moves member 98 toward the right against the resistance of spring 104 (Fig. 4). This movement of member 98 operates switch 106 which controls a conventional resistive heat element in the bottom of the heating chamber 26.

Reciprocable movement of member 98 is permitted because elongated opening 108 in the member 98 slides over a fixed pin 110 and abuts thereagainst after the switch is operated but before the crank 96 has turned the valve to the dispensing position shown in Fig. 11. The crank is held in the position shown in Fig. 4 against the resistance of spring 102.

A bimetal lever 112 is secured to the underside of the heating chamber 26 and is responsive to the temperature developed in the heating chamber 26. As the temperature rises, the bimetal curls away from the underside of the heating chamber and bears against a lever 114, causing turning thereof about pivot 116. This is best seen in Figs. 5 and 6. The lever 114 engages a curved arm 118 of member 98 causing it to pivot clockwise on the pin 110. Pivoting of member 98 on the pin 110 disengages the tooth 103 and the depending arm 101 of the crank, thus permitting the spring 102 to turn the crank 96 counterclockwise which moves the valve to the "dispensing" or "open" position shown in Fig. 11. The crank-spring 102 pulls the crank 96 to a point where the depending leg 101 engages a side of slot 120 formed in the frame 30.

It is possible to control the temperature at which the bimetal can effect disengagement of the tooth 103 and crank 96, by suitably tensioning spring 122 with a control wheel 124. It will be seen that spring 122 opposes turning of member 98 about pin 110 to disengage tooth 103 and crank 96. By selecting the tension force of spring 122, it is possible to govern the temperature at which bimetal operation can disengage the crank 96 and tooth 103 to operate the valve to a dispensing position.

After the hot beverage has been dispensed through the nozzle 94 into receptacle 20, the receptacle 20 is removed, permitting spring 126 (Fig. 14) to return bell

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crank 46 to its original position (shown in full lines, Fig. 14). When the bell crank 46 returns to its original position, one arm thereof forcibly strikes end portion 128 (Fig. 13) of locking bar 44, moving it toward the left as viewed in Fig. 13. This leftward movement of portion 128 is opposed by spring 130, but the movement is sufficient to displace bar 44 from an "off center" or locking position, thus permitting the spring 40 to return the ratchet wheel 38 and operating lever 32 to the position indicated in Fig. 12. The one arm of the bell crank 46 then locks with the operating lever tooth 48 (Fig. 15).

A short resume of the invention will next be given by describing a complete cycle of making and dispensing a hot cup of beverage, which is followed by de-actuation of the operating mechanism.

Liquid from reservoir 14 passes through the two-way valve 28 into the heating chamber 26. Liquid is normally present in the heating chamber when the appliance is "off." The heating chamber 26 is air-tight, and passage of a preferred amount of fluid into the chamber 26 creates super atmospheric pressure which supports the hydrostatic head of fluid in the reservoir, preventing further liquid flow into the heating chamber 26.

Receptacle 20 (Fig. 2) is then placed in the recessed portion 18 of the appliance, where it bears against depending tab 50, rotating the bell crank 46 and disengaging the lock with operating lever 32 at point 48.

The handle 34 is next depressed, swinging the lever 32 downwardly. The handle is held in a depressed position by the lock bar 44 and the operation hereafter is completely automatic.

The downward swinging of the lever 32 causes rotation of the ratchet wheel 38 which moves the slide bar 52. The links 56 and 62 are caused to move with the slide bar, which motion is translated into turning of the metering cylinder 72 through the pintle 60 and pin 68 (Fig. 7). The metering cylinder is then returned to its original position by spring 64 (see Fig. 3) acting through links 56 and 62, when the stepped connection 58 disengages with drag link 56. The rocking movement of the metering cylinder delivers beverage ingredient from storage cup 22 to heating chamber 26.

Disengagement of cam 100 with valve crank 96 permits the spring loaded crank to bear against member 98 which moves sufficiently to operate switch 106 and close an electrical circuit for the heating element carried in heat-transferring relation to the bottom of the heating chamber 26.

The heating chamber then begins to warm the beverage ingredients which have been metered therein. The heating continues until bimetal 112, which acts responsively to the temperature developed in the heating chamber 26, causes rotation of the member 98, disengaging the spring loaded crank from the member 98. The crank 96 then moves to a new position, turning two-way valve 28. The reservoir and heating chamber are now isolated by closure of valve 28, and the contents of the heating chamber are discharged through the two-way valve 28 and nozzle 94 into the receptacle 20.

When the crank 96 and member 98 are disengaged, the member 98 moves away from switch 106 under the influence of spring 104. The heating process is thus terminated.

When the receptacle 20 is removed, the bell crank 46 is caused to turn by spring 126, and one end thereof strikes lock bar 44 at end portion 128 (Fig. 13). The lock bar 44 is displaced sufficiently from an "off center" position to allow the lever 32 to move upwardly under the influence of spring 40 acting through ratchet wheel 38 and cam 36.

The appliance is thus de-actuated by return of all the mechanism components to their original position when the receptacle 20 (Fig. 2) is removed.

The appliance may include a safety device so that if

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the reservoir is empty no heating can be applied to chamber 26. This safety device consists of a float 132 which locks the crank 96 in the position shown in Fig. 3, unless there is sufficient water in the reservoir 14. Locking of the crank 96 in this position prevents operation of switch 106.

I do not regard the particular relative locations of reservoir and heating chamber as essential to the invention. Instead of locating these two portions of the appliance as shown, it would be possible to separate them and have conduit interconnection or other suitable means for delivering liquid from the reservoir to the heating chamber. This separated heating chamber preferably is designed to accept only a single cup of water, with a suitable floating-type valve severing communication between this heating chamber and the reservoir when the chamber is filled.

Instead of arranging the mechanism such that the mixture of powdered coffee, for example, and liquid are both mixed and heated in the same chamber 26, it is desirable in alternative arrangements to utilize two separated chambers similar to chamber 26 which are suitably connected for transferring the contents of one chamber to the other. The liquid reservoir, in this arrangement, is in operative communication with one chamber which is of such size as to accept only a measured quantity of liquid. This chamber is heated by any suitable means to raise the temperature of the measured liquid a suitable amount, after which the heated contents are discharged into the second or mixing chamber. The powdered coffee is directly discharged from the container 22 into this second or mixing chamber, to be combined with the heated liquid from the heating chamber. A suitable valve is interposed between the heating and mixing chambers for controlling communication therebetween.

The foregoing described arrangement is specifically illustrated in Fig. 33 wherein like reference numerals will indicate like parts. In addition to the reservoir 14, there is a mixing chamber 300 therebeneath into which the metering device 22 empties. A measured amount of powdered coffee, for example, is indicated by the reference numeral 302. Inside of the mixing chamber 300 is a closed compartment or chamber 304 which is the heating and measuring chamber for the liquid. This chamber is formed to a predetermined size, for example, equal to a single cup, and has an opening 306 communicating with the interior of the reservoir 14. It is also provided with a discharge opening 308 for emptying the contents into the mixing chamber 300. The mixing chamber 300 has a discharge outlet 310. A flow control valve 312 is provided with upper and lower valve members 314 and 316, respectively, for controlling the opening and closing of the two ports 306 and 308. A suitable stem 318 secures these valve members 314 and 316 in properly spaced relation. A control rod 320 in engagement with the upper side of the valve member 314 carries a suitable push-button 322, as shown. A helical spring 324 bears against a retaining ring on the stem 318 to normally urge the valve 312 to its full line position. Thus, liquid in the reservoir 14 will completely fill the heating and measuring chamber 304. Suitable heating coils 326 are utilized to heat the contents of this chamber 304.

In operation, the metering device 22 is operated to discharge a measured quantity of ingredient 302 into the mixing chamber 300. The heating coils 326 are energized to heat the liquid in the chamber 304. When the liquid is heated, the push-button 322 is manually depressed to discharge the contents of the chamber 304 into the mixing chamber 300. The heated liquid mixes with the powdered ingredient 302 and thereafter is discharged through the outlet 310 into the indicated cup 328. When the push-button 322 is depressed, the inlet port 306 is closed and the outlet port 308 is opened as illustrated by the dashed line configuration. This prevents cold liquid in the chamber 14 from dropping through to the mixing

chamber 300. Preferably, the bottom of the chamber 300 is inclined to insure discharge of all of the contents from the outlet 310.

While the mechanism of the embodiment of Fig. 1 for automatically operating the various components are not shown in this Fig. 33, it will be obvious to a person skilled in the art that such mechanism may be easily adapted within the skill of the art.

From the foregoing, it will be readily understood that the appliance corresponds to the conventional home bread toaster in the respect that it supplies, automatically, a singular quantity of food (beverage) for each cycle of operation. The appliance may be placed on a table, hot coffee, tea or the like dispensed cup-by-cup, according to demand. Currently available heating elements serve to heat a cup of coffee in forty-five (45) seconds. The beverage is thus freshly brewed and is constantly available so long as the reservoir 14 and cup 22 contain ingredients. There is no wastage of brewed beverage, since only the exact amount desired is dispensed.

An alternative design and method to the one hereinabove disclosed comprises a heat-pump type of coffee-maker which delivers hot water in desired quantity to a mixing chamber. A coffee-powder metering mechanism supplies a measured quantity of powder to the mixing chamber whereupon the mixture is ready for dispensing. One primary difference of this alternative arrangement is that mixing of the ingredient occurs after the water is heated, whereas the illustrated embodiment comprehends mixing prior to heating.

This alternative design is more specifically illustrated in Figs. 22 through 32, which will now be described in detail.

The ingredient measuring mechanism indicated generally by the reference numeral 140 is substantially identical in construction to the mechanism 22 of the preceding embodiment as illustrated in Figs. 16 through 20. Therefore, this mechanism 140 need not be described in detail.

Referring to Fig. 22 in particular, the mechanism 140 seats in the upper end of a reservoir or pot 142 and carries a top plate or closure 144 which is specifically shown in plan view in Fig. 31. The metering cylinder 182 is mounted for rotation inside the top plate 144 and has its upper end provided with ratchet teeth 146.

Superposed on the cover plate 144 is a metering ring 148 which is shown in detail in Fig. 30. This ring 148 has a depending flange 150 on its outer periphery which is disposed adjacent the outer periphery of the measuring container 152. This ring 148 is provided with three circumferentially arranged arcuate slots 154 which slidably receive suitable studs or rivets 156 fixedly secured to the top plate 144. The ring 148 may thereby be circumferentially moved with respect to the top plate 144.

Superposed on the ring 148 is an actuating cover 158 which carries three circumferentially arranged studs 160 for slidable reception by three circumferentially arranged arcuate slots 162 in the top plate 144. This cover 158 is thereby movable circumferentially with respect to both the top plate 144 and the metering ring 148. A coiled spring 164 has oppositely extending ends 166 and 168 which fit into companion notches or openings in the top plate 144 and cover 158, respectively. This spring is preformed to urge the cover 158 counterclockwise with respect to the stationary top plate 144 (see Fig. 23). An actuating shaft 170 having a square tip for being keyed to the cover 158 depends coaxially through the measuring mechanism 140 and is provided at its lower end with an eccentric pin 172. Thus, rotation of the cover 158 will cause corresponding movement of the eccentric pin 172.

A pawl 174 (Fig. 29) is pivotably mounted on one of the rivets 160 for cooperative engagement with the metering cylinder ratchet teeth 146. This pawl is crank-shaped with the actuating arm 176 being slidably engageable with the inner periphery 178 of the metering ring 148.

As will be seen more clearly in Fig. 30, this inner periphery 178 is formed with two different curvatures 179 and 181 joined by a cam surface 180 which serves in moving the pawl 174 into or out of engagement with the ratchet teeth 146 as will be explained more fully hereinafter.

The metering cylinder 182 is rotatably mounted on the center shaft 170 and is of substantially the same construction as the metering cylinder 72 previously described. The cylinder openings 184 and the companion mechanism openings 186 and 188 are substantially identical to the parts 87, 88 and 76, respectively, of the mechanism of Fig. 16. Thus, measured amounts of ingredient contained in the storage cup 152 may be discharged by the mechanism through the opening 188 as determined by the degree of rotation of the metering cylinder 182, as has been previously explained.

Slidably mounted on the bottom of the storage cup 152 is a slide plate 190 which is shown in plan view in Fig. 24. Suitable rivets 192 and 194 passing through elongated slots in the slide plate 190 are fastened by some suitable means to the bottom of the cup 152, whereupon the plate 190 may be reciprocated a distance depending upon the length of these slots. A suitable preformed return spring 196 is connected between the slide plate 190 and the cup 152 or some other stationary part of the mechanism for biasing the slide plate toward the left as viewed in Figs. 22 and 24.

The eccentric pin 172 on the center shaft 170 projects through a transverse slot 198 in the slide plate 190 and serves to reciprocate the slide plate when the center shaft 170 is rotated.

One of the rivets 192 secured to the underside of the cup 152 loosely carries for swinging movement a buoyant float 200. This float, as shown more clearly in Figs. 25, 26 and 27, is composed of a supporting arm 202 which is bent at a slight angle and which is provided with a hook 204 on one end. This hook 204 is engageable with the rear transverse edge 206 of the slide plate 190. Thus, when the slide plate is moved forwardly to an actuated position, the float 200 drops and the hook 204 rises to engage the rear edge 206, as illustrated in Figs. 22 and 27. If the float is lifted to disengage the hook 204, the slide plate 190 may be slid rearwardly, as shown in Fig. 26. The float 200 is positioned inside a liquid container or mixing chamber 208 having a pouring spout 210.

Mounted in the handle 212 is a lever 214 pivoted intermediate its ends by means of a pin 216 carried by the handle 212. The upper arm of this lever 214 is operatively engageable by the forward end 218 of the slide plate 190. The lower arm is connected by means of an operating wire or link 220 to an electrical switch 222 of conventional design. This electrical switch is suitably connected in an electrical circuit for applying power to the usual heating coils 224 which surround a water heating chamber 226. A partition 228 separates this heating chamber 226 from the upper portion of the reservoir 142 and carries a suitable number of supply orifices 230 feeding into the heating chamber 226. Thus, chamber 226 is supplied with water or other liquid at a suitable rate by means of orifices 230.

A coaxial supply tube 232 connects between the upper end of the chamber 226 and the upper portion of the mixing chamber 208, and serves to discharge heated water into the chamber 208. A suitable deflecting plate 234 is positioned immediately above the upper end of the tube 232 to deflect the heated liquid downwardly toward the bottom of the mixing chamber 208.

In operation, powdered coffee, for example, is present in the storage cup 152, and water in the reservoir 142. The metering ring 148 is circumferentially moved on the top plate 144 by means of the depending flange 150 to a desired position which determines the amount of powdered coffee which will be measured into the mixing

chamber 208 by the metering cylinder 182. Assuming a random position of the metering ring 148, the cover 158 is slowly rotated clockwise, whereby the pawl 174 engages the ratchet teeth 146 and rotates the metering cylinder 182 therewith. The pawl arm 176 rides on the inner periphery 178 of the stationary metering ring 148 and eventually rides over the cam surface 180. The sequence of cam movement is from the larger diameter ring surface 179 over the cam surface 180 and onto the smaller diameter surface 181. When the pawl arm 176 moves onto the surface 181, it is swung counterclockwise, as viewed in Figs. 23 and 29, whereby the pawl 174 is disengaged from the ratchet teeth 146. At this moment, the metering cylinder 182 is stopped from rotating even though rotation of the cover 158 may be continued. With this rotary movement of the cover 158, the eccentric 172 moves the slide plate 190 toward the right (Fig. 22) to swing the lever 214 clockwise for actuating the switch 222. Simultaneously, the float 200 drops to lock the slide plate 190 in this position. The heating coils 224 are energized and water in the chamber 226 is almost instantaneously raised to boiling. This boiling liquid levitates through the discharge tube 232 and into the mixing chamber 208 until this chamber fills to a point which raises float 200 sufficiently to disengage the hook 204 from the slide plate 190. When this happens, the return spring 196 as well as the cover spring 164 moves the slide plate 190 rearwardly (to the left), thereby moving the lever 214 counterclockwise for deactuating switch 222. The heating coils 224 are thereby turned off and no more water will be heated and transmitted to the mixing chamber 208. Water is supplied constantly to the chamber 226 through the orifices 230.

Since the powdered coffee was previously metered into the mixing chamber 208 by rotation of the cover 158, it will mix with the heated water, thereby completing a coffee-making operation.

The mixed coffee may thereafter be poured from the spout 210.

As in the case of the first embodiment herein described, this alternative design automatically provides a single cup of coffee upon manipulation of the actuating cover 158.

As will now be apparent from the preceding, the beverage ingredient may be in either powder, liquid or pellet form. The metering devices 72 and 140 would, of course, have to be sealed against leakage if a liquid ingredient were used. Furthermore, the ingredient and liquid may be mixed prior to heating or subsequent to heating, or the liquid can be heated and then mixed with the ingredient, as explained previously.

Although a number of embodiments of the invention have been disclosed, it is apparent that the principles of the invention are susceptible of numerous applications. I intend, therefore, to include within the scope of the following claims all equivalent devices by which the same or equivalent results may be obtained.

What is claimed is:

1. A hot beverage dispenser comprising a mixing chamber, a container for storing ingredient, a metering device connecting said container with said chamber, said metering device including means for delivering a measured quantity of ingredient from said container to said mixing chamber upon actuation of said metering device, a reservoir for storing a supply of water, valve means operatively connecting said reservoir to said mixing chamber, a discharge port in said mixing chamber, said valve means being operatively connected to said port for selectively controlling the opening and closing thereof, manually operable linkage operatively connected to said valve means and to said metering device for controlling the operation thereof, said linkage being operable between two different positions, means provided in said linkage for opening said valve means between said reservoir and said chamber without actuating said metering device for one position of said linkage, means further provided

in said linkage for actuating said metering device and maintaining said valve means open between said reservoir and said chamber when said linkage is moved to its other position, and heat responsive mechanism operatively connected between said chamber and said valve means for closing communication between said reservoir and said chamber and for opening said discharge port when the temperature in said chamber reaches a predetermined point.

2. A hot beverage dispenser comprising a mixing chamber, a container for storing ingredient, a metering device connecting said container with said chamber, said metering device including means for delivering a measured quantity of ingredient from said container to said mixing chamber upon actuation of said metering device, a reservoir for storing a supply of water, valve means operatively connecting said reservoir to said mixing chamber, a discharge port in said mixing chamber, said valve means being operatively connected to said port for selectively controlling the opening and closing thereof, manually operable linkage operatively connected to said valve means and to said metering device for controlling the operation thereof, said linkage being operable between two different positions, means provided in said linkage for opening said valve means between said reservoir and said chamber without actuating said metering device for one position of said linkage, means further provided in said linkage for actuating said metering device and maintaining said valve means open between said reservoir and said chamber when said linkage is moved to its other position, heat responsive mechanism operatively connected between said chamber and said valve means for closing communication between said reservoir and said chamber and for opening said discharge port when the temperature in said chamber reaches a predetermined point, a movable locking device having locking engagement with said linkage to hold the latter in said one position, said locking device being movable out of locking engagement with said linkage to permit movement of the latter to said other position, and an element on said locking device adjacent said discharge port which is operable to move said locking device selectively into and out of locking engagement with said linkage.

3. A hot beverage dispenser comprising a mixing chamber, a container for storing ingredient, a metering device connecting said container with said chamber, said metering device including means for delivering a measured quantity of ingredient from said container to said mixing chamber upon actuation of said metering device, a reservoir for storing a supply of water, valve means operatively connecting said reservoir to said mixing chamber, a discharge port in said mixing chamber, said valve means being operatively connected to said port for selectively controlling the opening and closing thereof, manually operable linkage operatively connected to said valve means and to said metering device for controlling the operation thereof, said linkage being operable between two different positions, means provided in said linkage for opening said valve means between said reservoir and said chamber without actuating said metering device for one position of said linkage, means further provided in said linkage for actuating said metering device and maintaining said valve means open between said reservoir and said chamber when said linkage is moved to its other position, heat responsive mechanism operatively connected between said chamber and said valve means for closing communication between said reservoir and said chamber and for opening said discharge port when the temperature in said chamber reaches a predetermined point, a movable locking device having locking engagement with said linkage to hold the latter in said one position, said locking device being movable out of locking engagement with said linkage to permit movement of the latter to said other position, an element on said locking device adjacent said discharge port which is oper-

able to move said locking device selectively into and out of locking engagement with said linkage, an electrical heater applied to said chamber, an electrical switch operatively connected to said heater, and an actuating member movably connected to said linkage and operatively connected to said switch for controlling the operation of the latter.

4. A hot beverage dispenser comprising a mixing chamber, a container for storing ingredient, a metering device connecting said container with said chamber, said metering device including means for delivering a measured quantity of ingredient from said container to said mixing chamber upon actuation of said metering device, a reservoir for storing a supply of water, valve means operatively connecting said reservoir to said mixing chamber, a discharge port in said mixing chamber, said valve means being operatively connected to said port for selectively controlling the opening and closing thereof, a manually operable lever movable between two positions, mechanism operatively connecting said lever to said valve means to open said valve means between said reservoir and said chamber when said lever is in one position, linkage operatively connected between said lever and said metering device for actuating the latter when said lever is moved to its other position, a movable element operatively connected to said valve means retaining the same open between said reservoir and said chamber, and heat responsive mechanism operatively connected to said movable element actuating the latter to close said valve means between said reservoir and said chamber and to open the discharge port.

5. A hot beverage dispenser comprising a mixing chamber, a container for storing ingredient, a metering device connecting said container with said chamber, said metering device including means for delivering a measured quantity of ingredient from said container to said mixing chamber upon actuation of said metering device, a reservoir for storing a supply of water, valve means operatively connecting said reservoir to said mixing chamber,

a discharge port in said mixing chamber, said valve means being operatively connected to said port for selectively controlling the opening and closing thereof, a manually operable lever movable between two positions, mechanism operatively connecting said lever to said valve means to open said valve means between said reservoir and said chamber when said lever is in one position, linkage operatively connected between said lever and said metering device for actuating the latter when said lever is moved to its other position, a movable element operatively connected to said valve means retaining the same open between said reservoir and said chamber, heat responsive mechanism operatively connected to said movable element actuating the latter to close said valve means between said reservoir and said chamber and to open the discharge port, a second lever pivoted for movement into and out of locking engagement with the first mentioned lever, means normally urging said second lever into locking engagement with said first-mentioned lever when the latter is in said one position, and an element on said second lever disposed adjacent said discharge port and actuable to move said second lever into and out of said locking engagement.

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