May 2, 1961 L. E. AUSTIN 2,982,447

DISPENSING APPARATUS FOR USE ON AN ENGINE DRIVEN VEHICLE

Filed Jan. 5, 1955 3 Sheets-Sheet 1

Fig. 1.

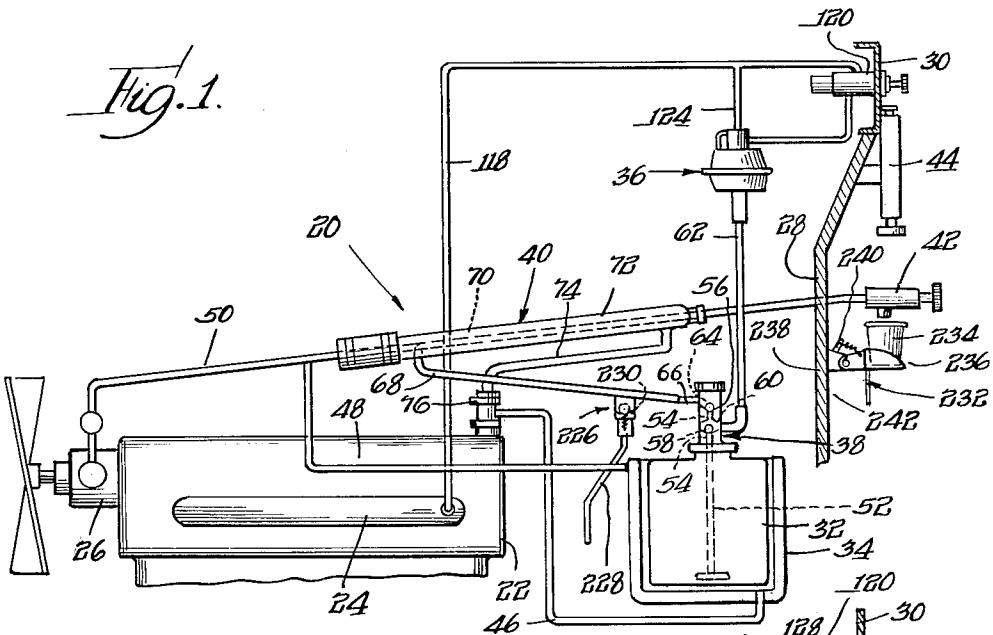

Fig. 2.

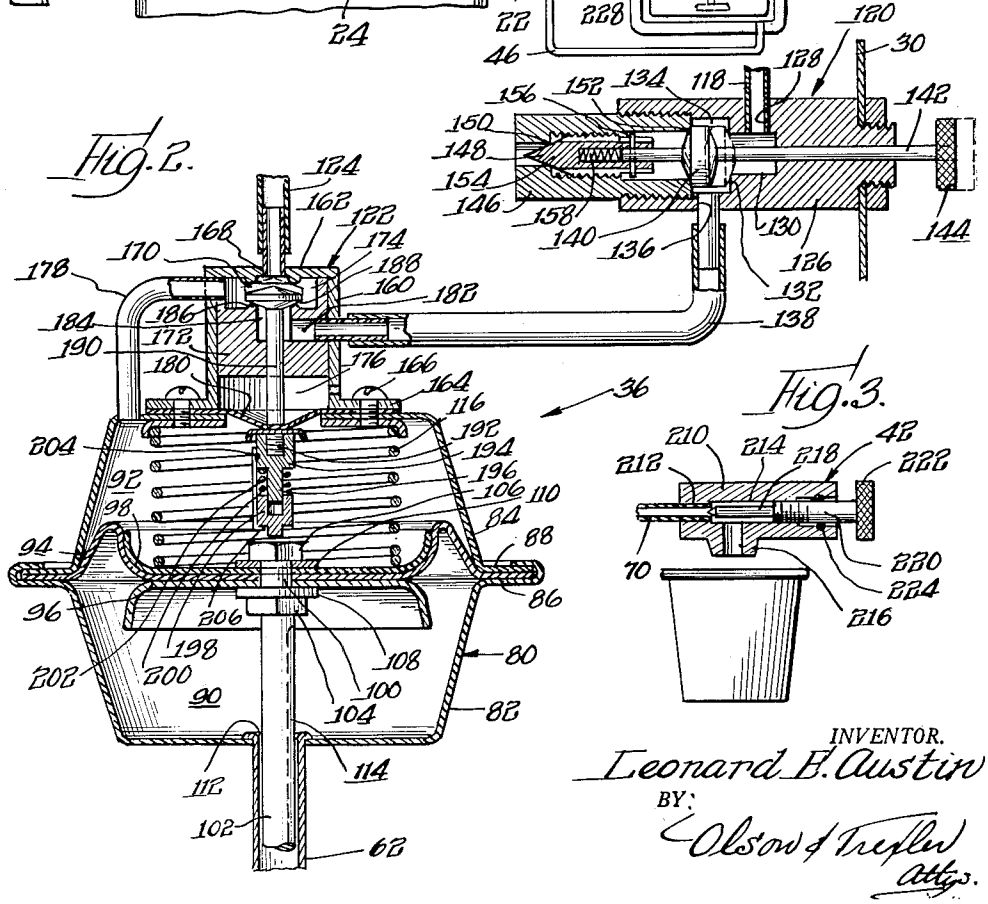

Fig. 3.

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May 2, 1961 L. E. AUSTIN 2,982,447

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Filed Jan. 5, 1955 3 Sheets-Sheet 2

Fig. 4.

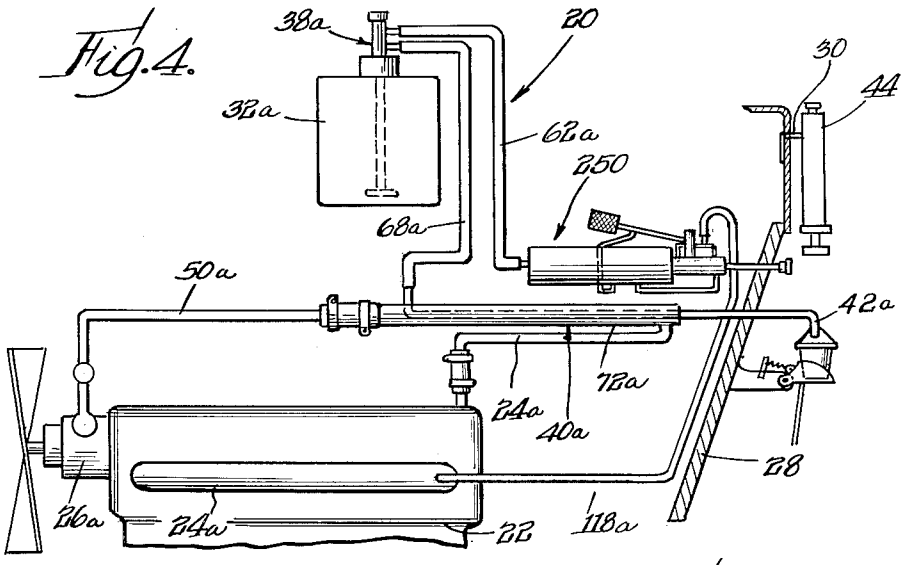
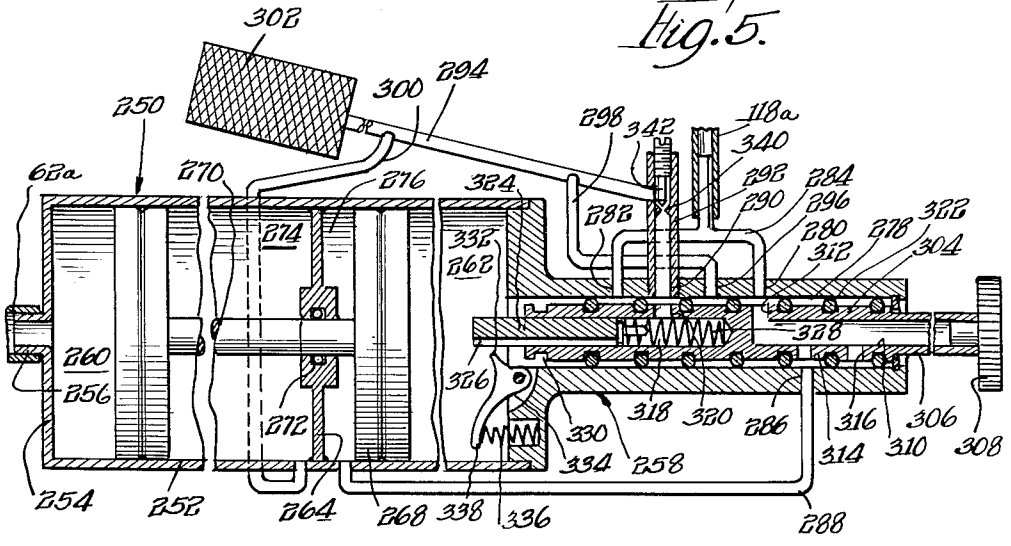


Fig. 5.



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Filed Jan. 5, 1955 3 Sheets-Sheet 3

Fig. 6.

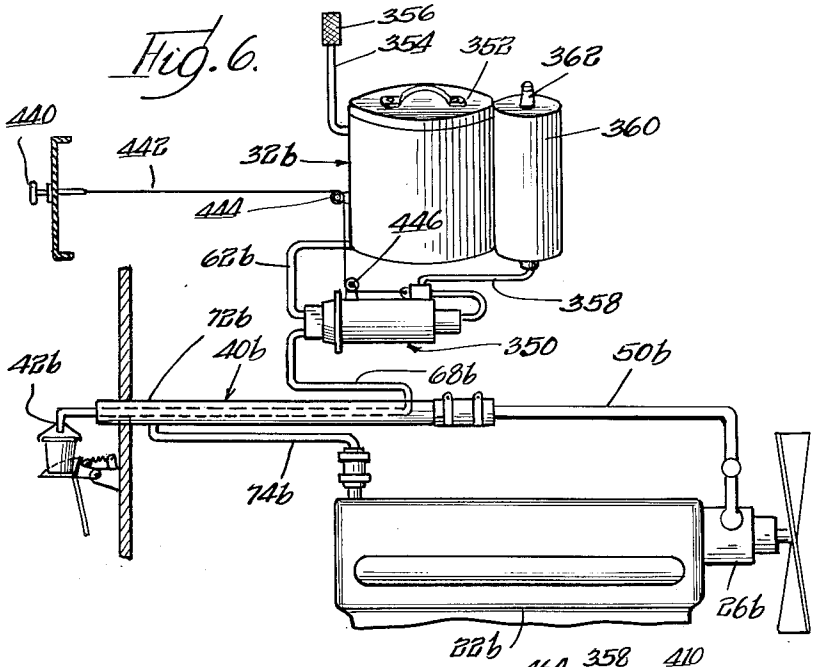
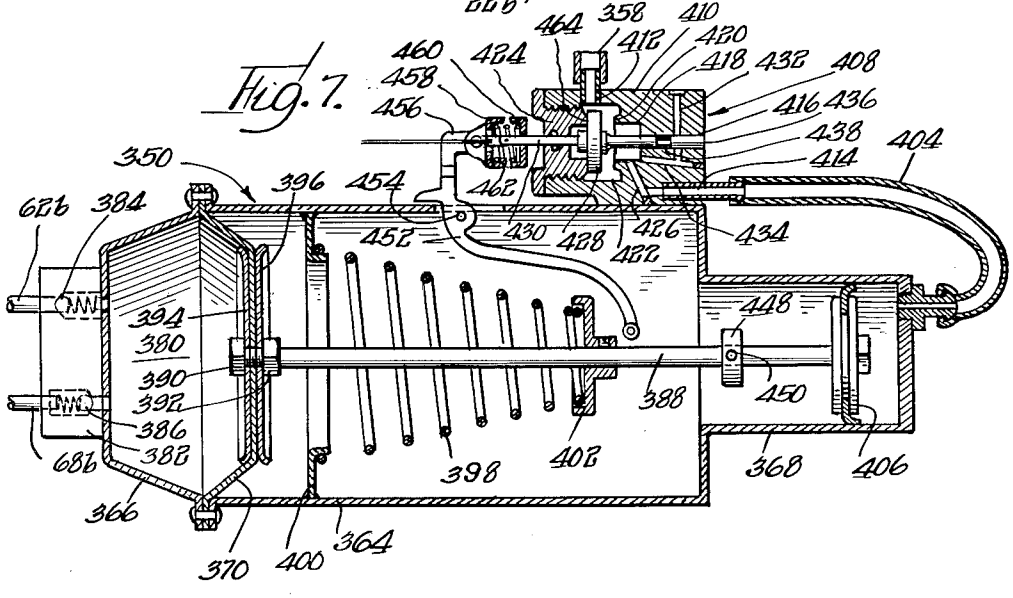


Fig. 7.



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DISPENSING APPARATUS FOR USE ON AN ENGINE DRIVEN VEHICLE

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8 Claims. (Cl. 222—146)

The present invention relates to a novel apparatus which is particularly useful for providing hot drinks and the like, and more particularly to a novel apparatus which may be installed in a motor vehicle so as to provide the vehicle passengers with means for mixing themselves a hot beverage.

As is well known, persons traveling in motor vehicles frequently feel the need for a refreshing beverage such as coffee, hot cocoa, tea and the like, and it is a usual practice for such persons to stop at a roadside restaurant to obtain the desired beverage. There are many occasions when such stops are undesirable since they will unduly delay the trip and on other occasions, it may be impossible to locate a convenient satisfactory restaurant. Therefore, it is an important object of the present invention to provide a novel apparatus for installation in motor vehicles for dispensing hot beverages for the use of the vehicle passengers.

Another object of the present invention is to provide a novel apparatus of the above described type which utilizes the engine heat or energy for heating the liquid of the beverage.

A further object of the present invention is to provide a novel apparatus for dispensing and heating a predetermined measured quantity of liquid.

A more specific object of the present invention is to provide a novel apparatus of the above described type which is constructed so that the temperature to which the liquid is heated may be easily controlled.

A further object of the present invention is to provide a novel dispensing apparatus particularly adapted for use in motor vehicles, which apparatus may be easily operated by the vehicle driver so that the driver is not unduly distracted from the road.

Other and more specific objects of the present invention will become apparent from the following description and the accompanying drawings wherein:

Fig. 1 is a diagrammatic view showing an apparatus embodying the principles of this invention installed in an automobile;

Fig. 2 is a sectional view showing the means for pumping and measuring a predetermined quantity of beverage liquid to be dispensed;

Fig. 3 is a sectional view showing the discharge nozzle of the apparatus;

Fig. 4 is a diagrammatic view showing an apparatus embodying a modified form of the present invention;

Fig. 5 is a sectional view showing the pumping and measuring means of the apparatus of Fig. 4;

Fig. 6 is a diagrammatic view showing another modified form of the present invention and;

Fig. 7 is a sectional view showing the pumping and measuring means of the apparatus shown in Fig. 6.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, an apparatus **20** embodying the principles of this invention is diagrammatically shown in

Fig. 1 as installed on a motor vehicle having an engine **22** with an intake manifold **24**, a water pump **26**, a firewall **28** between the engine and passenger compartments and a dashboard **30**. In general, the apparatus **20** includes a container **32** adapted to contain a body of liquid to be dispensed, a hot water jacket **34** surrounding the container for the purpose described below, pump means **36**, a valve assembly **38**, a heat exchanger **40**, a dispensing nozzle **42**, means **44** for containing and dispensing various beverage ingredients, and suitable conduits connecting various of the above mentioned elements together.

The container **32** is preferably in the form of a flexible rubber or plastic bag so that in the event the vehicle is to be operated in cold climates, the container will not be injured if the water or the liquid therein should freeze during periods when the vehicle is idle. In this connection the hot water jacket **34** is provided around the container to prevent the liquid in the container from freezing while the vehicle is in operation and to thaw any prozen liquid within the container after the vehicle has been idle. Hot water is directed into the water jacket **34** from the water jacket of the engine through a conduit or hose **46** and is discharged from the jacket **34** through a conduit **48**. The conduit **48** is, in turn, connected with a conduit **50** which communicates with the inlet of the pump **26**. As will be understood, the liquid in the engine cooling system and, therefore, flowing to and from the jacket **34** may be water or a suitable coolant that will not freeze at temperatures to which the vehicle may be subjected when idle. The container or bag **32** is constructed so that it may be sealed after it is filled with the liquid or fresh water so as to prevent the surrounding atmosphere from contaminating the water.

As shown in Fig. 1, a tube **52** is provided for extending substantially to the bottom of the container or bag **32**, which tube is connected with the central passageway **54** in the valve assembly body **56**. Liquid or water which is drawn from the container or bag by the pump means in the manner described below passes up through the tube **52** past a spring biased ball type check valve **58** and into the passageway **54**. From the passageway **54** the fluid flows through a passageway **60** and a conduit or hose **62** to the pump means. The liquid returning from the pump means flows back through the hose **62** and into the passageway **54**. The check valve **58** prevents returning fluid from flowing back into the container so that the fluid must flow past another spring biased ball type check valve **64** into a passageway **66** and then into a conduit or hose **68**.

The hose **68** is connected with a pipe or tube **70** which extends through the heat exchanger and is connected with the nozzle **42**. Preferably, the heat exchanger includes a cylinder **72** which surrounds a portion of the tube **70** and provides a water jacket. One end of the cylinder is connected with the conduit **50** and the opposite end is closed. A conduit **74** is connected to the cylinder adjacent the closed end thereof and is also connected by coupling means **76** with the outlet of the engine water jacket so as to direct the heated engine coolant into the heat exchanger.

Referring specifically to Fig. 2, the beverage liquid measuring and pumping means **36** will be described in detail. This means includes a pump housing **80** having a pair of opposed cup-shaped members **82** and **84** with inner locking peripheral flanges **86** and **88**. The housing is divided into chambers **90** and **92** by a flexible diaphragm **94** which has its periphery clamped between the flanges **86** and **88**. The central portion of the diaphragm is clamped between a pair of dish-shaped members **96** and **98** which form a piston-like assembly and which are provided with central apertures for receiving an

upper threaded end portion **100** of a guide rod **102**. The dish-shaped members are fixed on the guide rod and are clamped together by means of nut members **104** and **106** which are threaded onto the rod. Preferably, washers **108** and **110** are disposed between the nut members and the dish-shaped piston members. The guide rod **102** extends through an aperture **112** in the end of the pump housing member **82** and into the tube **62**. In order to permit the beverage liquid to flow freely between the tube **62** and the chamber **90**, the guide rod **102** is provided with an axially extending slot **114**. It will be appreciated that when the piston assembly and diaphragm are moved upwardly so as to expand the chamber **90**, the beverage liquid will be drawn into the chamber, and when the piston assembly and diaphragm are moved downwardly, the beverage liquid will be expelled from the chamber. In accordance with the present invention, the piston assembly and diaphragm are formed and actuated so that upon each downward stroke, a predetermined measured quantity of the beverage liquid is expelled from the chamber **90**, forced through the heat exchanger and ejected from the discharge nozzle. This predetermined quantity of liquid may, for example, be sufficient to fill one beverage cup.

In order to actuate the piston assembly, a compression spring **116** is provided for shifting the piston assembly downwardly through collapsed chamber **90**, and means is provided for evacuating the chamber **92** so as to cause the piston assembly to shift upwardly against the action of the spring **116**. This last named means includes a vacuum line **118** which has one end connected to the engine intake manifold **24** and an opposite end connected with a valve assembly **120** which may be mounted on or beneath the dashboard **30**. In addition, the vacuum line **118** is connected with a valve assembly **122** on the pump housing by branch vacuum line **124**.

The valve assembly **120** includes a body member **126** having an inlet port **128** connected with the vacuum line **118** and intersecting a bore **130**. A valve seat **132** is formed in the body member between the bore **130** and a counter bore **134** and a port **136** communicates with the counter bore and is adapted to be connected with a conduit **138** extending to the valve assembly **122**. A valve member **140** fixed on a stem **142** is provided for engagement with the valve seat **132** and interrupting communication between the vacuum lines **118** and **138**. As will be understood, the reduced pressure in the line **118** tends to hold the valve **140** against the valve seat. The dispensing operation which will be described fully hereinbelow is initiated by shifting the valve **140** from the valve seat **132** and this is accomplished by the operator pushing inwardly on a button or knob **144** fixed to the outer end of the valve stem.

The valve assembly **120** also includes an auxiliary body member **146** threaded into the body member **126** and having an air vent or port **148** surrounded by a valve seat **150**. In addition, the inner end of the auxiliary body member is formed with a valve seat as at **152** which is cooperable with the valve member **140** when the valve member is shifted from the broken line position to the solid line position to block the air vent from the vacuum line **138**.

A needle valve member **154** is threaded into the auxiliary body member **146** for controlling the effective size of the air vent or port, and a needle valve is provided with a central bore slidably receiving the valve stem **142**. A cross pin **156** extends from the valve stem **142** through elongated slots in the needle valve so that the needle valve may be turned and adjusted relative to the valve seat **150** by turning the knob **144**. A compression spring **158** is provided between the inner end of the valve stem **142** and the needle valve for biasing the valve member **140** back toward the valve seat **132** after an operator has depressed the button or knob **144** to initiate the dispensing operation and then released the button.

The valve assembly **122** includes a cylindrical body member **160** having a closed end **162** and a peripheral flange **164** which is secured to the pump housing member **84** by a plurality of screws **166**. The closed end **162** is provided with a port **168** which is surrounded by valve seat **170** and which is connected with the branch vacuum line **124**. A body member **172** is disposed between the cylindrical body member **160** and provides chambers **174** and **176**. The chamber **174** is connected with the chamber **92** in the pump housing by the tube **178** and a chamber **176** is separated from the chamber **92** by a flexible diaphragm **180** which is clamped between the pump housing member **84** and the flange **164**. In order to establish communication between the chamber **174** and the vacuum line **138**, passageway means **182** and **184** are formed in the valve body members. A valve seat **186** surrounds the passageway **184**. A valve member **188** is disposed within the chamber **174** and is shiftable to and from the broken and solid line positions for alternate cooperation with the valve seats **170** and **186**. The valve member **188** is fixed on a valve stem **190** which is slidably mounted in the body member **172** and which has a threaded end portion **192** extending through a sealed aperture in the flexible diaphragm **180**. For a purpose to be described below, a cap **194** is threaded onto the valve stem portion **192** and carries or is made integral with a depending elongated pin **196**. Another cap **198** is slidably disposed on the lower end of the pin **196** and a compression spring **200** is disposed between the two caps, so that they are resiliently urged apart. The cap **198** is held in assembled relationship with the pin by a sheet metal clip member **202** which is welded or otherwise fixed to the cap **194** as at **204** and which has a hook portion **206** extending beneath a shoulder on the cap **198**. It should be noted that the clip member is constructed so that when the cap **198** is in its lowermost position in engagement with the hook **206**, the bottom end of the pin **196** and the bottom of the bore in the cap **198** are spaced apart a predetermined amount.

The measuring and pumping means described above functions to dispense a predetermined quantity of beverage liquid in the following manner. The valve members **140** and **188** are normally held against the valve seats **132** and **170** respectively, since there is a vacuum or reduced pressure in the lines **118** and **124**, and atmospheric air is admitted behind these valves through the port or vent **148**. To dispense the beverage liquid, the operator merely has to press the button **144** inwardly to shift the valve member **140** away from the valve seat **132** and against the seat **152**. Substantially instantaneously, vacuum or reduced pressure is established in the line **138**, the passageways **182** and **184**, the chamber **174**, the tube **178** and the pump chamber **92**. This causes the piston assembly of the pump to start its upward movement, and at the same time this causes the flexible diaphragm **180** to shift from the broken line position to the solid line position. As the flexible diaphragm **180** is drawn into the chamber **92**, it draws with it the valve stem **190** and valve member **188** so that communication is established directly between the vacuum line **124** and the tube **178**. When this is accomplished, the push-button **144** may be released, and in actual practice it is only necessary for the operator to apply momentary pressure to the push-button. When the push-button is released, the valve **140** again shifts against the valve seat **132** to block the vacuum line **118** and the line **138** is again vented to the atmosphere. However, the line **138** is blocked from the chamber **174**, the tube **178**, and the pump chamber **92** by the valve **188** which has been pulled down against valve seat **186** by the flexible diaphragm **180**. Therefore, the reduced pressure is maintained in the pump chamber **92** even after the push-button **144** has been released, so that the piston assembly continues to rise and the beverage liquid or water con-

tinues to be drawn into the pump chamber **90**. When a predetermined quantity of water has been drawn into the pump chamber **90**, the chamber **92** is vented to the atmosphere so that the spring **116** functions to actuate the piston assembly to discharge the liquid from the chamber **90**. The venting of the chamber **92** to the atmosphere is accomplished by shifting the valve member **180** at a predetermined instant away from the valve seat **186** and against the valve seat **170** so as to establish communication between the chamber **92** and the vent port **148** through the tubes or lines **178** and **138** and the valve assemblies. The valve member **188** is shifted in response to movement of the piston assembly, and this is accomplished by engagement of the nut member **106** with the lower end of the cap **198**. Thus, as the piston assembly rises, the nut member **106** forces the cap **198** upwardly, so that the spring **200** is compressed. When the cap member **198** has been raised to the point where the lower end of the pin **196** engages the bottom of the bore in the cap, further upward movement of the piston assembly and the cap **198** positively shifts the valve member **188** from the seat **186**. With the vacuum in the chamber **92** thus broken, the spring **200** functions to shift the valve member **188** against the valve seat **170** to block the vacuum line **124**.

It will be appreciated that the temperature to which the beverage liquid is heated will depend to a considerable extent on the length of time the liquid is within the heat exchanger **40** or in other words, on the rate of flow of the liquid through the heat exchanger. The rate of liquid flow through the heat exchanger may be controlled by turning the knob **144** to vary the size of the vent or port **148**. This varies the rate at which atmospheric air may flow to the pump chamber **92** and thus the rate at which the reduced pressure in the chamber is relieved so that the spring **116** may force the piston assembly downwardly. A more positive control of the rate of beverage liquid flow may be obtained by utilizing the discharge nozzle structure which is shown in detail in Fig. 3. More specifically, the discharge nozzle structure **42** includes a body member **210** having an inlet port **212** connected with the tube **70** and communicating with an axially extending bore **214**. The nozzle body is also provided with a transverse outlet orifice **216** which communicates with the bore. A needle valve **218** is provided for controlling the effective size of the inlet port **212** and thus the rate of beverage liquid flow. The needle valve is secured to or made integral with a stem **220** which is threaded into the nozzle body and which is provided with a knob **222** at its outer free end for easy adjustment. An O-ring **224** is provided for preventing the escape of any of the beverage liquid around the needle valve stem. It is important to note that the beverage liquid flows through the heat exchanger in a direction opposite to the direction of flow of the heated engine coolant through the tube **72**. With this arrangement, the beverage liquid may be heated to substantially the same temperature as the engine coolant leaving the engine water jacket, if desired.

It should be noted that, as shown in Fig. 1, the tubes **70** and **68** are inclined downwardly from a discharge nozzle **42**. In addition, a check valve assembly **226** is connected with the tube **68** adjacent the lower end thereof. The check valve assembly **226** has an outlet port which may be connected to a drain line **228**, if desired, and has a ball valve **230** which is spring biased so as normally to establish communication between the drain line and the tube **68**. Thus, after each dispensing operation the beverage liquid remaining in the tubes **70** and **68** flows through the check valve and out the drain line. This prevents liquid from being overheated in the heat exchanger between dispensing operations and also eliminates the possibility of liquid remaining in the tubes **70** and **68** which might freeze and injure the tubes. It is understood, of course, that when the beverage liquid is forced through the tube **68** under pressure during the dispensing operation, the check valve is closed by the liquid pressure.

If desired, a holder assembly **232** may be provided for positioning a cup **234** beneath the discharge nozzle to receive the beverage liquid. The holder assembly includes a scoop-shaped member **236** adapted to receive and support a cup as shown in Fig. 1, and pivotally mounted to any suitable support such as the firewall by bracket means **238**. A tension spring **240** is provided between the upper edge of the scoop member and a suitable anchor pin so that when the cup is removed, the scoop member is tilted upwardly. A drain line **242** is connected with the bottom of the scoop member as shown in Fig. 1, so that any beverage liquid splashing from the cup during the dispensing operation or dripping from the nozzle after the dispensing operation is collected by the scoop member and is discharged through the drain line.

In Figs. 4 and 5 there is shown a modified form of the present invention which, except for the measuring and pumping means, **250**, is substantially identical to the above described apparatus as indicated by the application of like reference numerals with the suffix *a* added to corresponding elements. The measuring and pumping means **250** includes a cylinder **252** having an end **254** with a nipple **256** connected to the beverage liquid conduit **62***a*, and an opposite end closed by a valve body member **258**. The cylinder is divided into two chamber **260** and **262** by a central partition **264**. Pistons **266** and **268** are respectively slidably disposed in the chambers **260** and **262** and are rigidly interconnected by a rod **270** which slidably extends through an aperture in the partition. This aperture is sealed by an O-ring **272** or any other suitable packing means. It will be appreciated that the pistons also provide in combination with the partition, chambers **274** and **276**. In this embodiment, the pistons are reciprocated to draw a measured quantity of beverage liquid into the chambers **260** and then expel the liquid from the chamber by alternately connecting the chambers **262** and **276** with the vacuum line **118***a* and with a vent to the atmosphere.

The valve body **258** is provided with a central bore **278** which is intersected at axially spaced points by ports **280** and **282**. These ports are connected with the vacuum line by a tube **284**. In addition, the valve body **258** is provided with a port **286** which is connected with the pump chamber **276** by a conduit **288** and with another port **290** which is vented to the atmosphere through tubes **292** and **294**.

Another vent port **296** is also connected with the tube **294** by a branch tube **298**. The pump chamber **274** is continuously vented to the atmosphere by a tube **300** which is preferably also connected with the tube **294**, and the tube **294** is connected with a filter **302**. Preferably, the filter is enclosed in a housing or heat exchanger adjacent the engine exhaust manifold or exhaust pipe so that all of the air entering the pump will be filtered and sterilized.

Slidably disposed in the bore **278** of the valve body member **258** is a valve member **304** which is connected to a stem **306** adapted to extend through the firewall and provided with a button or knob **308** so that it may be manipulated by an operator within the passenger compartment of the vehicle. The valve member **304** is provided with a central passageway **310** which is intersected by ports **312**, **314** and **316**. In addition, the valve member is provided with another axially extending passageway **318** which opens into the pump chamber **362** and which is intersected by a port **320**. A plurality of O-rings **322** are spaced along the valve member for sealing the axially spaced ports from each other. A rod **324** having a groove **326** therein is slidably disposed in the bore or passageway **318** and is resiliently urged toward the extended position shown by a compression spring **328**. For a purpose to be described below, the valve member **304** is provided with a groove or notch **330** which is adapt-

ed to receive a finger 332 of a pivotally mounted lever member 334. A compression spring 336 acts against an arm 338 of the lever member for resiliently urging the finger portion to a position for cooperation with the groove 330.

The operation of the measuring and pumping means 250 is as follows. The pistons and the valve member 304 are normally in the positions shown in Fig. 5, at which positions the pump chamber 276 is connected with the vacuum line through the conduit 288, the ports 286 and 314, the passageway 310, the ports 280 and 312, and the tube 284. At the same time, the pump chamber 262 is vented to the atmosphere through the groove 326, the passageway 318, and the ports 320 and 290. In order to initiate the dispensing operation, the operator merely presses inwardly on the push-button 308 so that the valve member 304 is shifted toward the left as viewed in Fig. 5. This causes the ports 312 and 316 in the valve member to become aligned respectively with the vent port 296 and the port 286 so that the pump chamber 276 is vented to the atmosphere. At the same time, the port 320 in the valve member aligns with the vacuum port 282 so that the pump chamber 262 is connected with the vacuum line. The finger 332 of the lever member enters the groove 330 to hold the valve member 304 in the shifted position. As the pressure in the chamber 262 is reduced, the pistons shift toward the right so that the beverage liquid is drawn into the chamber 260. As the pistons near the end of their movement toward the right, the piston 268 first engages the end of the rod 324 and shifts the rod into the passageway 312 to compress the spring 328, then the piston 268 engages the arm 338 of the lever member and pivots the lever member so as to draw the finger 332 from the groove 330 and release the valve member 304. When this occurs, the spring 328 acting against the piston through the rod 324 shifts the valve member 304 back to the position shown in Fig. 5 so that the chamber 276 is again connected with the vacuum line, and the chamber 262 is again vented to the atmosphere. This causes the pistons to shift back toward the left and force the beverage liquid from the chamber 260. In order to control the rate at which the beverage liquid is forced from the chamber 260 and thus through the heat exchanger, a restricted orifice 340 is provided in the vent tube 292 and an adjustable needle valve 342 is provided for controlling the effective size of the orifice. Furthermore, the discharge nozzle 42*a* shown in Fig. 4, which is a simple jet nozzle, may be replaced by the above described nozzle structure 42 so that the rate of liquid flow through the heat exchanger may be more positively controlled.

In Figs. 6 and 7 there is shown another modified form of the present invention which, except for the measuring and pumping means 350, is similar to the above described apparatus as indicated by the application of identical reference numerals with the suffix *b* added to corresponding elements. Another modification is found in the fact that, instead of the above described flexible bag or container for holding a supply of the beverage liquid, this embodiment may be provided with a rigid tank 32*b* having a hermetically sealed closure 352. This container is preferably vented to the atmosphere by a line 354 which is connected with a filter 356. Preferably, the air entering the vent line is also heated and sterilized in the manner described above. As will be understood, the tank 32*b* may be replaced by a flexible beverage liquid container of the type described above.

The measuring and pumping means 350 is especially adapted to be used in vehicles having engines such as diesel engines which do not have an intake manifold with sufficient reduced pressure or vacuum for operating the above described measuring and pumping device. More specifically, the measuring and pumping means 350 is adapted to be actuated by air under pressure that is supplied thereto through a line 358. If the vehicle is provided with air brakes, the line 358 may be connected with a pressure line of the brake system, but, if desired, the line 358 may be connected with a pressure tank 360 having check valve means 362 for permitting charging thereof. When the pressure tank 360 is used, it may be periodically filled or charged with compressed air at automobile service stations.

Referring particularly to Fig. 7, it is seen that the measuring or pumping device 350 includes a housing having an elongated tubular section 364, a cup-shaped member 366 secured to and closing one end of the tubular section, and an air cylinder 368. A flexible diaphragm 370 is clamped between the flanges of the housing members 364 and 366 to provide a chamber 380. A valve body 382 is mounted on the end of the housing member 366 and contains a pair of check valves 384 and 386. The beverage liquid line 62*b* is connected with the pump chamber 380 through the check valve 384 and the liquid line 68*b* is connected to the pump chamber through the check valve 386. Thus, when the diaphragm 370 is shifted to expand the pump chamber, liquid will be drawn into the chamber from the line 62*b* and through the check valve 384, and when the diaphragm is shifted to collapse the chamber, the liquid will be expelled through the check valve 386 and into the line 68*b*. In order to actuate the diaphragm toward the right to expand the pump chamber 380, the diaphragm is connected with a rod 388 by means of nut members 390 and 392 threaded on the rod and clamping the disks 394 and 396 against the diaphragm, and a compression spring 398 which is backed up by an annular plate 400 biases the rod toward the right by acting against a disk-shaped washer 402 fixed on the rod. The rod 388 and therefore the diaphragm, is shifted toward the left to pump the beverage liquid from the chamber 380 by the compressed air which is directed into the cylinder 368 through a tube 404 and acts against a piston 406 on the rod.

Operation of the measuring and pumping device is controlled by valve means 408 which includes a body member 410 conveniently mounted on the housing member 364 and having an inlet port 412 connected with the pressure line 358 and an outlet port 414 connected with the tube 404. The valve body is also provided with a central bore 416, a larger counterbore 418 surrounded by a valve seat 420 and a still larger counterbore 422 which has its outer end closed by a plug 424. A passageway 426 connects the port 414 and the counterbore 418. A valve member 428 mounted on a slidable valve stem 430 is provided for engaging the valve seat 420 and blocking the pressure inlet port 412 from the outlet port 414. In order to vent the air cylinder 368 to the atmosphere when the valve member 428 is sealed against the valve seat 420, the valve body 410 is provided with a vent passageway 432 which intersects the bore 416 and which is then connected with the counterbore 418 by a passageway 434. An elongated valve member 436 is fixed to and removable with the valve member 428 for blocking the vent passageway 432 when the valve member 428 is open. However, when the valve member 428 is closed, a reduced diameter portion 438 of the valve member 436 registers with the vent passageway 432 so that the air under pressure may pass from the cylinder 368 through the tube 404, the port 414, and the passageways 426, 434, and 432 to the atmosphere.

The air pressure normally holds the valve member 428 against the valve seat 420 so that the normal position for the diaphragm 370 is that shown in Fig. 7. In order to initiate the dispensing operation, the operator pulls on a handle 440 which may be conveniently mounted on the dashboard and which is connected with the valve stem 430 by a cable 442 that passes around one or more guide pulleys 444 and 446. When the operator pulls on the handle 440, the valve member 428 is shifted to the position shown in Fig. 7, so that air under pressure is admitted into the cylinder 368 and acts against the piston 406 to shift the rod 388 and the diaphragm toward the

left. The distance which the rod 388 may shift toward the left, and therefore the amount of beverage liquid dispensed, is controlled by providing means for automatically shifting the valve member 428 back against the valve seat 420 after the rod 388 has shifted a predetermined amount. This means includes a collar 448 adjustably fixed on the rod 388 by a set screw 450 and adapted to engage and actuate a lever 452 that is pivotally mounted as at 454. The lever has an upper bifurcated end portion 456 that carries a cup-shaped member 458 having a central aperture through which the valve stem 430 extends. An opposing cup-shaped member 460 is fixed on the valve stem 430, and a compression spring 462 is disposed between the cup-shaped members. When the collar 448 on the rod 388 initially engages the lever 452, the lever is pivoted in a clockwise direction as viewed in Fig. 7 so that the spring 462 is compressed between the cup-shaped members 458 and 460. However, the force of the spring is insufficient to shift the valve member 428 away from the seat 464 against which the valve is held by the air pressure. The spring 462 continues to be compressed until the cup-shaped member 458 positively engages the cup-shaped member 460. When this occurs, the valve member 428 is positively shifted away from the seat 464 so that the seal therebetween is broken and a spring 462 functions to shift the valve member 428 rapidly against the valve seat 420, so that the pumping stroke of the apparatus is terminated. Of course, when the valve member 428 has been shifted back against the seat 420, the spring 398 returns the diaphragm 370 to the position shown so that another charge of beverage liquid is drawn into the pump chamber 380.

From the above description, it is seen that the present invention has provided a novel apparatus with which the passenger in or the operator of a motor vehicle may easily prepare a hot beverage without unduly diverting his attention from the road. While various beverages may be prepared merely by placing suitable ingredients in the dispensing means 44, the preparation of a cup of hot coffee will be described for the purpose of illustrating the present invention. Of course, the dispensing means 44 will normally be filled with the beverage ingredients before the trip is started. When the operator desires a cup of coffee, he clips a cup 234 beneath the discharge nozzle of the dispensing means 44 to dispense a measured amount of coffee into the cup. Then he removes the cup from the dispensing means 44 and places it beneath the liquid dispensing nozzle 42 and momentarily presses the push-button 144. Then a predetermined measured quantity of hot water will be discharged automatically from the nozzle in the manner described above, and at a relatively high velocity so that the water will thoroughly mix with the beverage ingredients in the cup.

While the preferred embodiments of the present invention have been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

The invention is claimed as follows:

1. A dispensing apparatus for use on an engine driven vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with the container for directing the liquid to a point of discharge, heat exchanger means associated with a portion of said conduit means for heating the liquid in said conduit means, pump means connected with said conduit means for forcing liquid through the conduit means, said pump means including a housing, reciprocable pumping means in said housing and providing a pumping chamber, pneumatic means for actuating said reciprocable pumping means, a control valve shiftable to and from positions for energizing and de-energizing said pump means, and means operable by said reciprocable pumping means for initially positively shifting said control valve from said energizing position toward said de-energizing position and then resiliently biasing said control valve to said de-energizing position after a predetermined measured quantity of the liquid has been forced through the conduit means to said point of discharge.

2. A dispensing apparatus for use on a vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with said container for directing liquid to a point of discharge, heat exchanger means associated with said portion of said conduit means for heating liquid in said conduit means portion, pump means connected with said conduit means for forcing the liquid through said conduit means, said pump means including a housing, flexible reciprocable diaphragm means disposed within said housing and providing a substantially sealed chamber which is connected with said conduit means, spring means engaging said diaphragm means for resiliently biasing said diaphragm means to collapse said chamber and force liquid therefrom, a pneumatic line adapted to be connected with a source of reduced pressure, means including first control valve means connecting said pneumatic line with said housing behind said diaphragm means, means including a second control valve means connecting said pneumatic line with said housing behind said diaphragm means and by-passing said first control valve means, said first control valve means being manually operable to an open position for establishing communication between said housing and said pneumatic line and resiliently biased to a closed position, means for shifting said second control valve means from a closed position to an open position in response to opening of said first control valve means and to maintain said second control valve means in said open position after said first control valve means has been returned to its closed position, and said second control valve means being operable in response to a predetermined movement of said diaphragm means to its closed position whereby said pump means functions to deliver a predetermined measured quantity of liquid each time the first control valve means is manually operated.

3. A dispensing apparatus for use on an engine driven vehicle comprising a container for a supply of liquid to be dispensed, a heat exchanger, conduit means connected with said container and having a portion extending through said heat exchanger to a point of discharge, pump means connected with said conduit means for forcing a predetermined measured quantity of liquid through said conduit means and to said point of discharge, and normally opened check valve means connected with said conduit means between said heat exchanger and said container, which check valve means closes when the liquid in said conduit means is under pressure from said pump means, said conduit means being inclined downwardly with respect to the horizontal from said point of discharge to said check valve means so that the liquid will drain therefrom through the check valve means after a dispensing operation.

4. A dispensing apparatus for use on an internal combustion engine driven vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with said container for directing liquid to a point of discharge, pump means connected with said conduit means for forcing liquid through said conduit means, said pump means including pneumatically operable reciprocable pumping means, a pneumatic line connected with said pump means and connectable with a source of air under a pressure lower than atmospheric control valve means in said pneumatic line, manually operable means for actuating said control valve means to energize said pump means to draw liquid from said container, means for holding said control valve means in said energize position after the withdrawal of manual force from said manually operable means, and means operable in response to predetermined movement of said reciprocable pumping means for actuating said control valve means to de-energize said pump means.

5. A dispensing apparatus for use on an engine driven vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with said container for directing liquid to a point of discharge, pump means connected with said conduit means, a pumping member in said pump means responsive to pneumatic pressure for drawing a predetermined measured quantity of liquid from said container into said pump means, a pneumatic line adapted to connect said pump means with a source of reduced pressure, control valve means in said line shiftable to and from positions for energizing and de-energizing said pump means, manual means for shifting said control valve means toward said energizing position, means for holding said control valve means in said energizing position, and means operable by said pumping member for shifting said control valve means from said energizing position toward said de-energizing position.

6. A dispensing apparatus for use on an engine driven vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with said container for directing liquid to a point of discharge, pump means connected with said conduit means, a pneumatic line connected with said pump means and adapted for connection with a source of air under a pressure lower than atmospheric pressure, a pumping member in said pump means responsive to pneumatic pressure for drawing a predetermined measured quantity of liquid from said container with said pump means, an atmospheric vent connected to said pump means, control valve means movable in response to manual pressure to a first position to co-ordinately open said pneumatic line and close said vent, said control valve means being moved to a second position by movement of said pumping member to a predetermined position wherein said pneumatic line is closed co-ordinately with the opening of said vent, and means urging said pump members in a direction to discharge liquid from said pump means.

7. A dispensing apparatus for use on an engine driven vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with said container for directing liquid to a point of discharge, pump means connected with said conduit means, a pneumatic line connected with said pump means and adapted for connection with a source of air under a pressure lower than atmospheric pressure, a pumping member in said pump means responsive to pneumatic pressure for drawing a predetermined measured quantity of liquid from said container with said pump means, an atmospheric vent connected to said pump means, control valve means movable in response to manual pressure to a first position to co-ordinately open said pneumatic line and close said vent, said control valve means being moved to a second position by movement of said pumping member to a predetermined position wherein said pneumatic line is closed co-ordinately with the opening of said vent, and means associated with said control valve means for varying the effective size of said vent.

8. A dispensing apparatus for use on an engine driven vehicle comprising a container for a supply of liquid to be dispensed, conduit means connected with said container for directing liquid to a point of discharge, pump means connected with said conduit means for forcing liquid therethrough, a movable pumping element in said pump means movable in a liquid intake direction in response to a source of vacuum, manually operable means controlling a vacuum line in communication with said pump means for energizing said pump means, and means actuated directly by said pumping element for automatically de-energizing said pump means in response to a predetermined movement of said movable pumping element.

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