United States Patent [19]

Smith

[11] **3,735,898**

[45] **May 29, 1973**

[54] PORTABLE BEVERAGE DISPENSING APPARATUS

[75] Inventor: **Robert L. Smith,** Los Angeles, Calif.

[73] Assignee: **Northrop Corporation,** Los Angeles, Calif.

[22] Filed: **Dec. 28, 1970**

[21] Appl. No.: **101,780**

[52] **U.S. Cl.**.....**222/129.4,** 222/395

[51] **Int. Cl.**.....**B67d 5/56**

[58] **Field of Search**.....222/94, 129.1–129.4, 222/395, 145, 132, 180, 249, 250; 221/279

[56] **References Cited**

UNITED STATES PATENTS

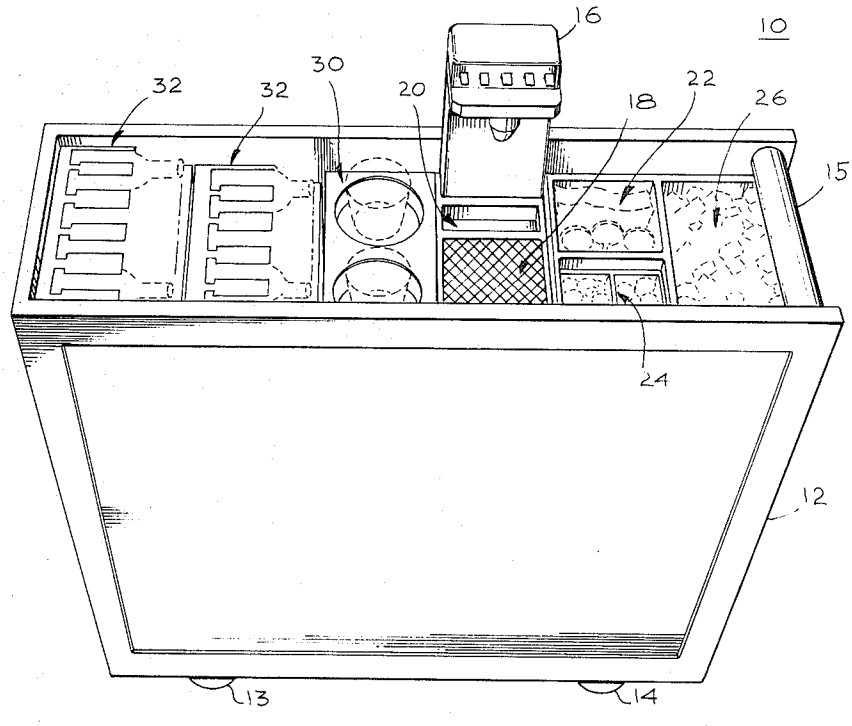
3,198,394	8/1965	Lefer	222/135
3,119,485	1/1964	Bayers	222/129.4 X
3,416,707	12/1968	Pollard	222/94
3,231,140	1/1966	Krop	222/145 X
3,057,517	10/1962	Douglas	222/395 X
3,401,847	9/1968	Downing	222/327
3,240,395	3/1966	Carver	222/129.1
3,591,049	7/1971	Auriemma	221/279
3,428,218	2/1969	Cosa	222/129.4 X
2,440,365	4/1948	Copping	222/129.3 X
3,134,508	5/1964	Bayer	222/129.4 X
2,783,920	3/1957	Negoro	222/250
3,125,136	3/1964	Miller	222/250 X
3,180,578	4/1965	Hagadorn	222/132 X
3,341,073	9/1967	Apps	222/129.4 X
3,664,550	5/1972	Carothers	222/129.4 X

Primary Examiner—Robert B. Reeves
Assistant Examiner—Thomas E. Kocovsky
Attorney—William W. Rundle and Willard M. Graham

[57] **ABSTRACT**

A portable, totally self-contained, liquor and soft drink beverage dispensing cart suitable for use in the narrow confines of commercial aircraft aisles. Various items to be dispensed are stored in separate collapsible compartments within a pressurized tank. The tank is filled with soda water before being pressurized. Tubes for the separate fluids lead through couplings in the wall of the tank to a dispensing head having a plurality of mechanically actuated valve mechanisms, each affording positive operation for both opening and closing. A cooling device is included which makes use of the ice cubes to be served in the individual beverages. The unit includes an individual liquor bottle dispensing and storage device which utilizes a spring mechanism to maintain a constant pressure urging the bottles toward their point of removal.

5 Claims, 17 Drawing Figures



PATENTED MAY 29 1973

3,735,898

SHEET 1 OF 5

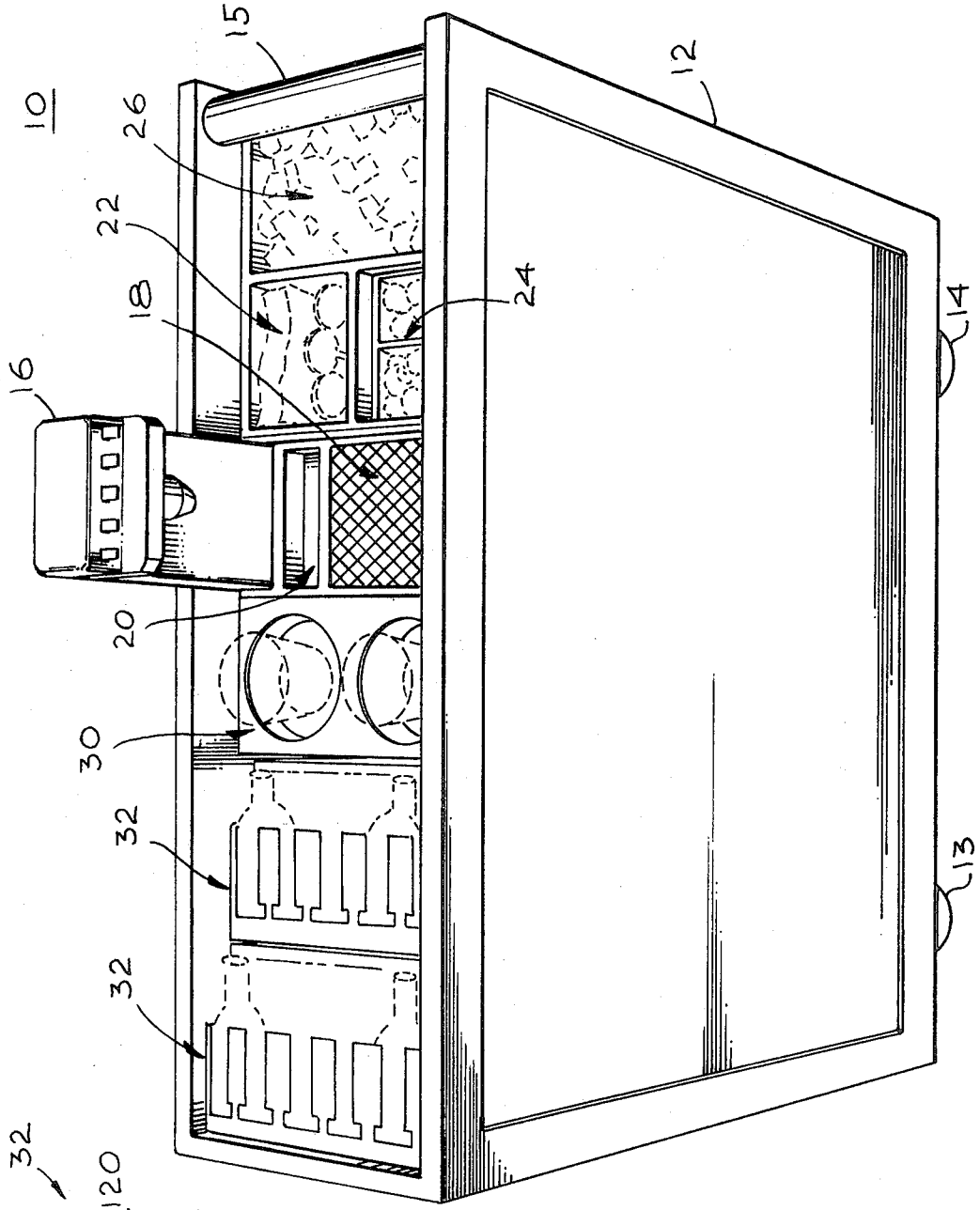


Fig. 1

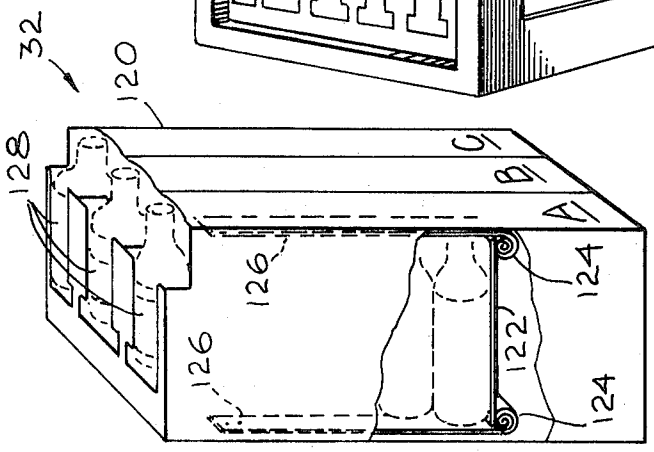


Fig. 10

INVENTOR
ROBERT L. SMITH

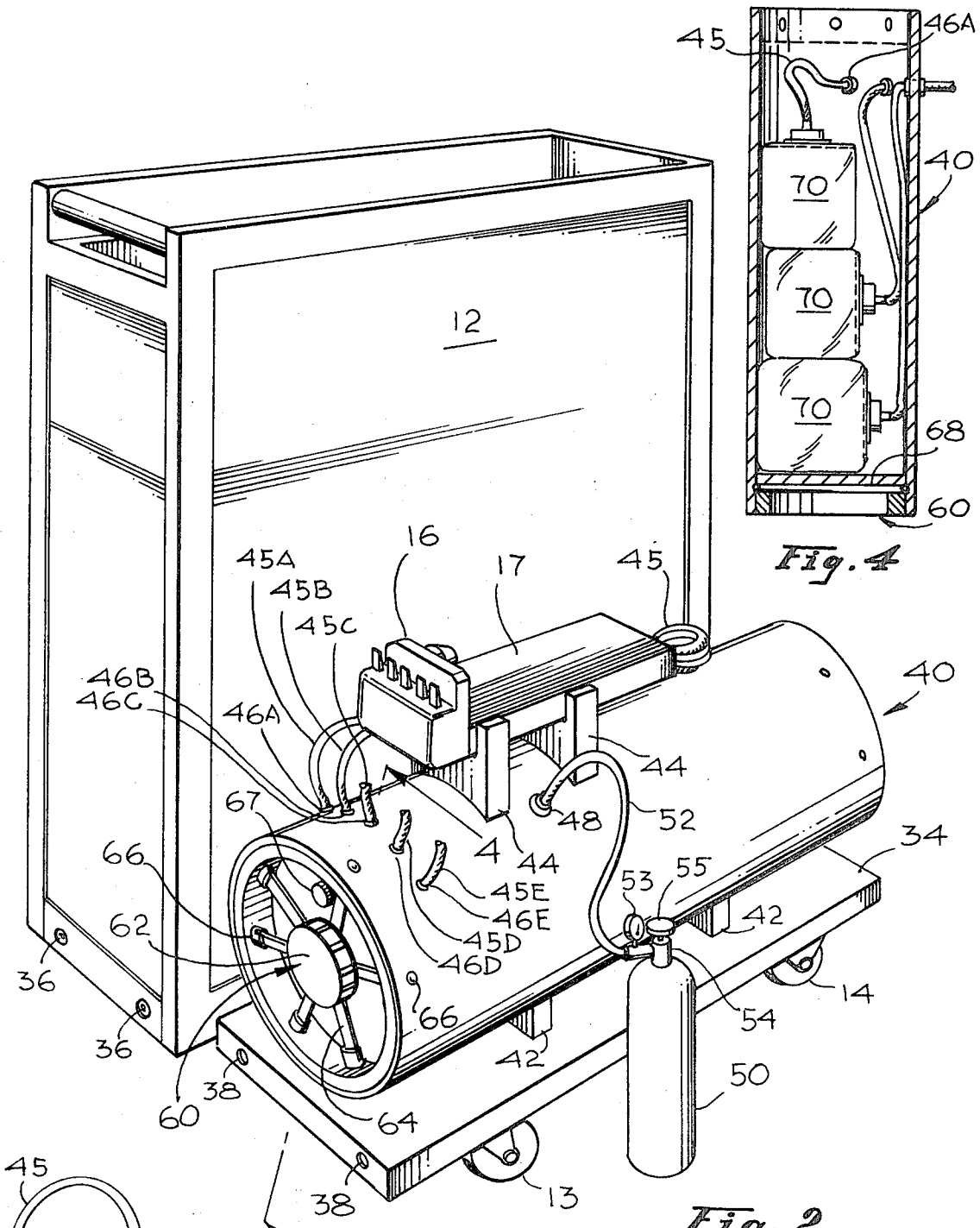


Fig. 4

Fig. 2

Fig. 3

INVENTOR
ROBERT L. SMITH

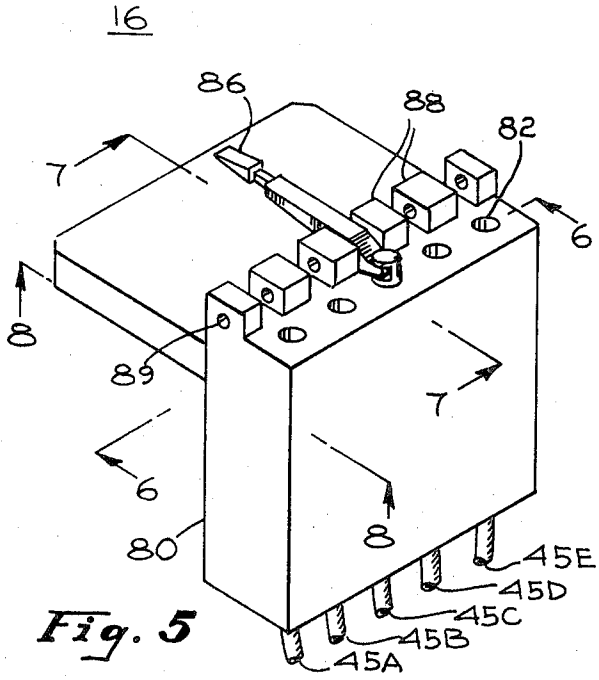


Fig. 5

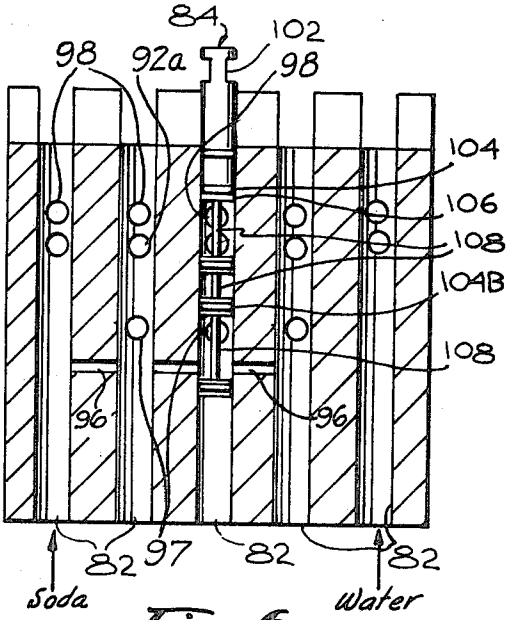


Fig. 6

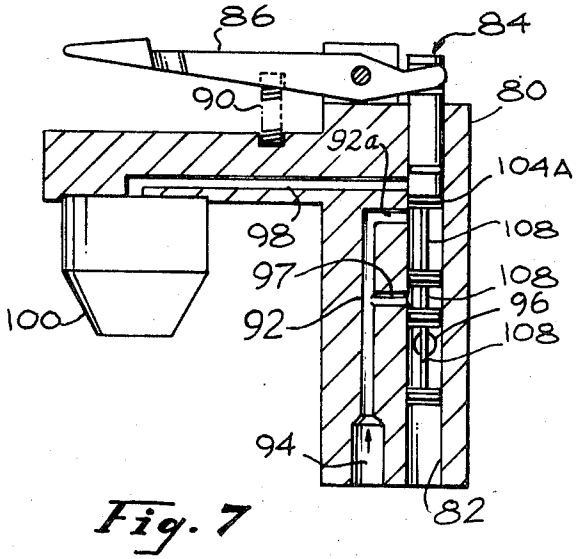


Fig. 7

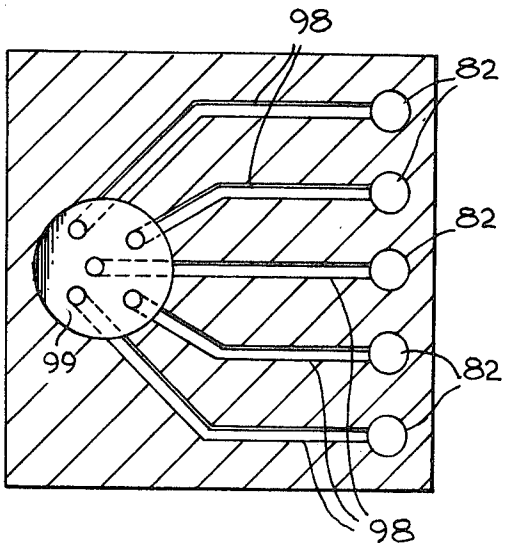


Fig. 8

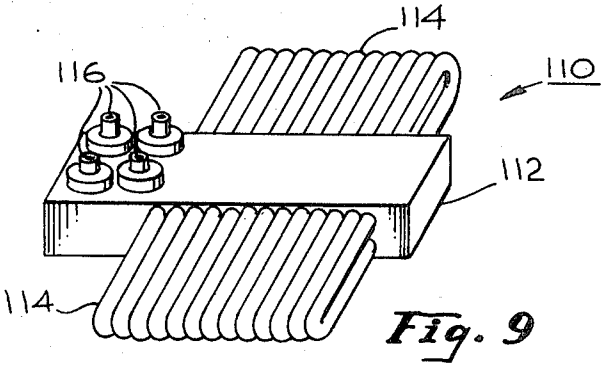


Fig. 9

INVENTOR
ROBERT L. SMITH

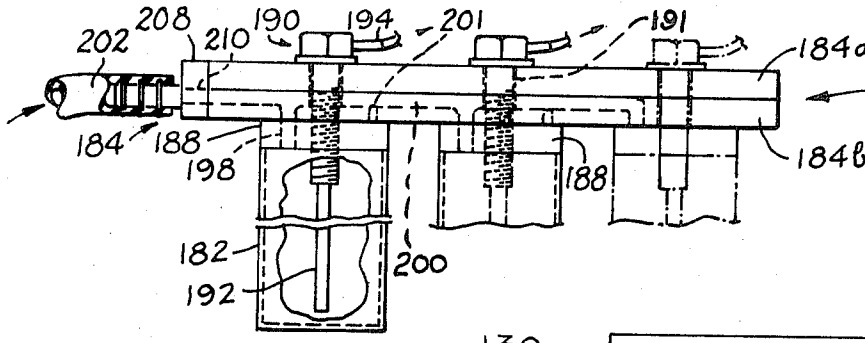


Fig. 15

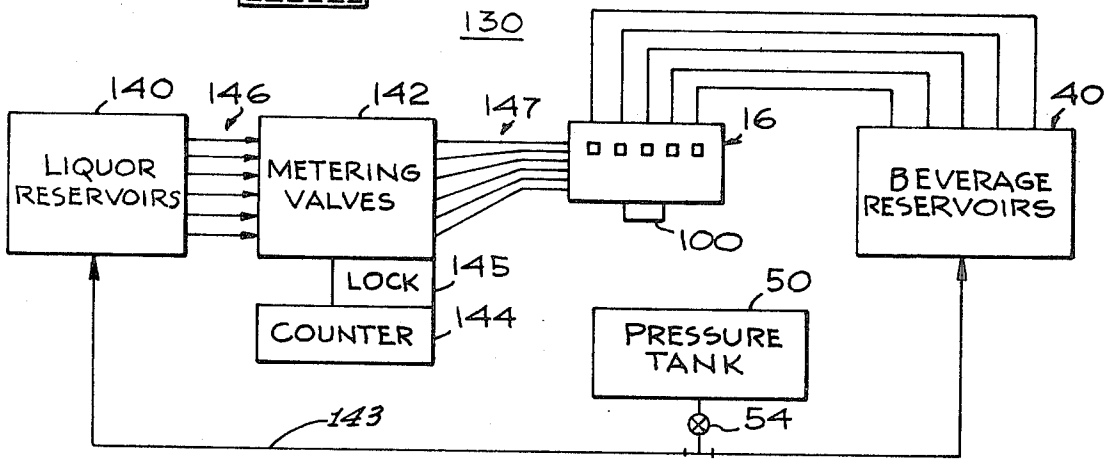


Fig. 11

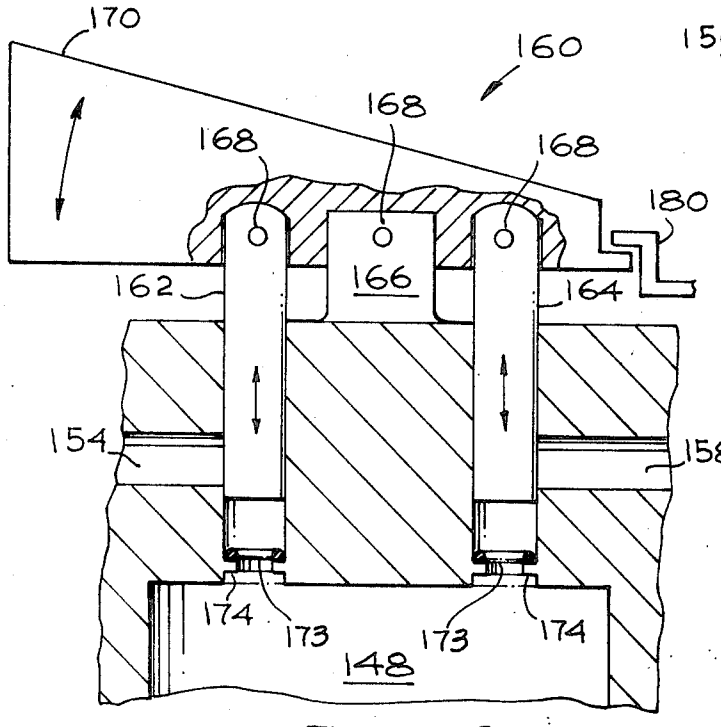


Fig. 13

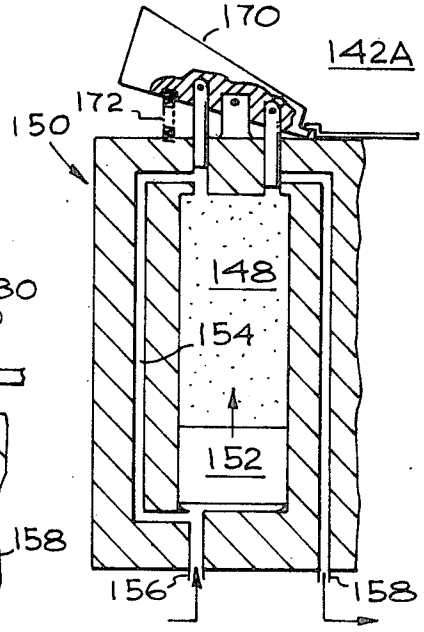
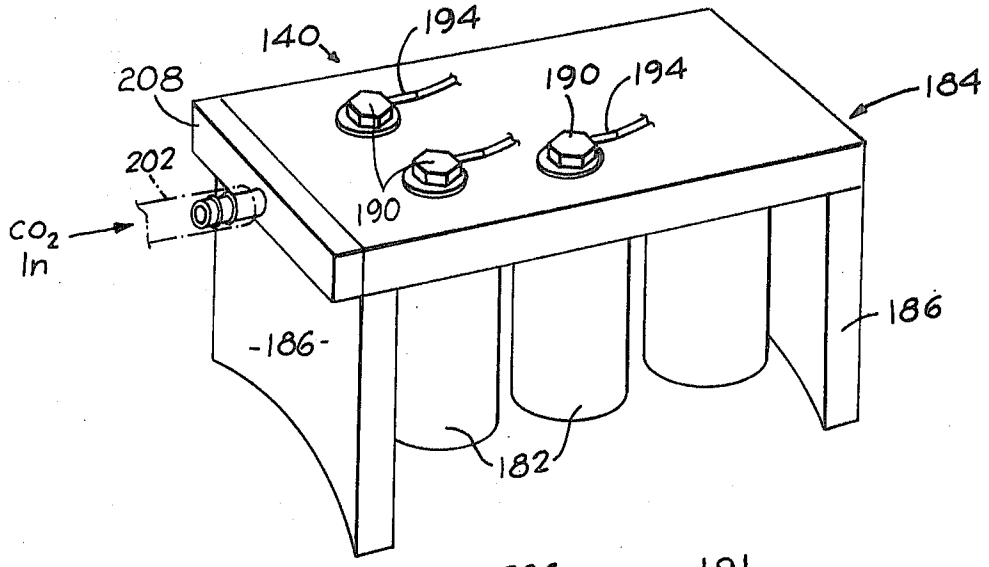


Fig. 12

INVENTOR
ROBERT L. SMITH

Fig. 14



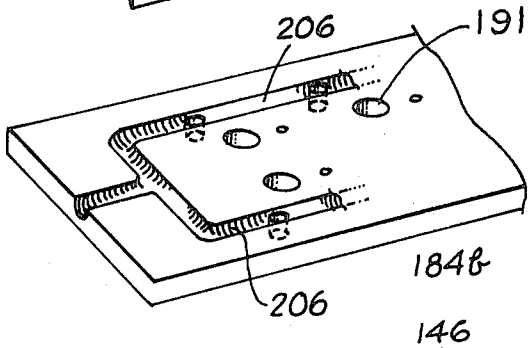


Fig. 17

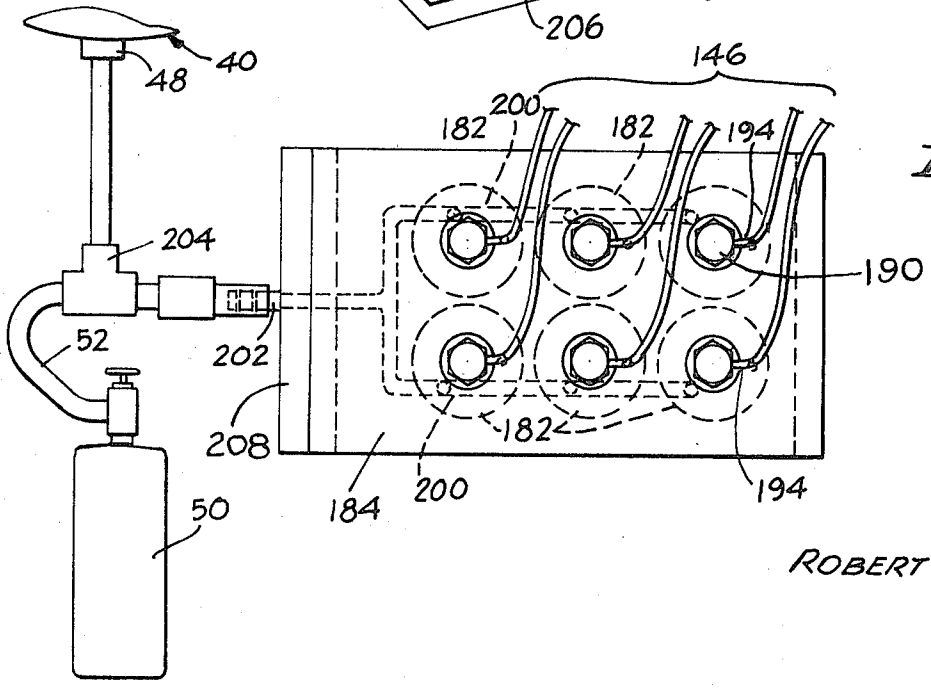


Fig. 16

INVENTOR
ROBERT L. SMITH

PORTABLE BEVERAGE DISPENSING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to apparatus for the dispensing of beverages and, more particularly, to such apparatus specifically designed for use on commercial aircraft.

2. Description of the Prior Art

In the years since the serving of beverages to passengers on commercial aircraft has become commonplace, very little improvement has been made in the manner by which the practice is effectuated. Customarily, a sort of tea cart is employed on which bottles or pull-top cans of soda or other soft drinks are placed along with glasses containing ice and trays of various liquors packaged in individual servings of approximately one-tenth pint. In filling each passenger's order, the stewardess pours the soft drink or mix into one of the glasses containing ice cubes from one of the soft drink containers and hands it to the passenger, along with a liquor bottle if an alcoholic beverage has been requested. Such arrangement is very inefficient because it requires keeping track of the various open soft drink cans, pausing on occasion to pull the tab from another can to open it, hunting for and selecting the type of liquor requested by the passenger, and various other waste motions of the stewardess dispensing the beverages. Moreover, the tea cart thus employed takes up considerable space in the aisle and makes it difficult for passengers and other stewardesses to squeeze past the beverage cart when it is in use.

It is therefore a general object of the present invention to provide a portable beverage dispensing unit which is suitable for use on commercial aircraft.

It is also a general object of the present invention to provide a beverage dispensing cart or portable bar which is completely self-contained with all of the various ingredients for the usual beverages demanded in a single unit.

It is a more specific object of the present invention to provide a portable beverage dispensing unit for commercial aircraft having a storage tank from which various beverages may be dispensed under pressure.

A further object of the present invention is to provide a portable beverage dispensing unit for commercial aircraft in a form which may be readily disassembleable for servicing.

SUMMARY OF THE INVENTION

In brief, particular arrangements in accordance with the present invention comprise a portable unit in the form of a removable hollow cabinet releaseably secured to a base plate mounted on wheels, one pair of which are of the caster type in order to permit ready maneuverability of the unit. The cabinet portion preferably includes various placed supports for removable compartments and storage receptacles for various items utilized in the beverages or the serving thereof, such as liquors, napkins, ice cubes, stirring rods, olives, and cherries, a waste liquid receptacle, and the like. The unit also includes a beverage dispensing head which may be mounted in, and is removable from the cabinet in an upright position for dispensing beverages into glasses by the manipulation of valve levers.

Fastened to and supported on the base plate is a pressurizable tank, preferably in the form of a right circular cylinder having removable sealing mechanisms at both

open ends thereof. The cylinder is fastened to the base in a manner such that when the base is resting on its wheels, the cylinder is on its side in a horizontal position. However, for servicing the unit, such as removing and replacing the contents of the pressurizable tank, the combination of the tank and the base with its wheels is stood on end so that the cylinder is in an upright attitude. The cylinder can be placed with either end up, and then the sealing mechanism at the upper end of the cylinder is removed so that the cylinder is entirely open at the upper end.

In accordance with an aspect of the invention, the various components of the beverages to be dispensed, such as the flavoring syrups, cola syrup, lime syrup and the like, or juices such as orange juice and tomato juice, and drinking water are stored in respective individual collapsible compartments within the pressurizable tank. These compartments may be defined by flexible diaphragms separating segments within the tank or, in a preferred embodiment, they may comprise flexible plastic containers which may be collapsed under pressure until all of the contents are exhausted. Each such collapsible storage compartment has communicating with it an individual flexible tube which, when the storage compartments filled with beverage components are placed in position within the pressurizable tank, are attached to fittings mounted in the wall of the tank and extending therethrough to permit attachment of another flexible tube or hose on the outside of the tank.

In accordance with a further aspect of the invention, it is contemplated that the various beverages or beverage components may be prepared and transferred in the collapsible plastic bags which are stored in sterilized condition within other bags of plastic film. The tubes attached to the collapsible plastic bags have their outer ends sealed off so as to protect the contents and the entire unit is maintained in a sterile condition within the sealed plastic film. In preparation for use, the plastic film is opened, the sealed end of the tube is cut off, and the tubing is attached to a fitting in the wall of the tank, after which the collapsible plastic bag may be dropped into the tank by the operator who handles the bag by holding the outer plastic film and releasing the bag therefrom. Thus, the entire operation of placing the various ingredients within the pressurizable storage tank can be effected without destroying the sterile condition of the collapsible bags. This is important because once the various bags are placed in position within the tank and their respective tubings are connected to the fittings extending through the walls of the tank, the remaining space within the tank is filled with soda water. Thereafter, the sealing mechanism is again placed in the upper end of the tank and locked in position. Finally a hose from a portable gas cylinder of pressurized carbon dioxide (CO_2) is connected to another fitting extending through the wall of the tank and the gas cylinder valve is opened so that the tank is pressurized under CO_2 gas pressure at a selected level. This serves to provide the pressure needed to dispense the contents of the tank upon demand, and also serves to preserve the freshness of the soda water in the tank. Because of the collapsible nature of the individual plastic bags within the tank and the fact that the soda water and CO_2 under pressure pervade all of the spaces within the tank, each of the fluids within the various individual collapsible bags has the same pressure applied to it and will be forced out through the attached hoses

when the valves controlling the openings thereof are opened. One of the fittings through the wall of the tank is for the release of soda water and it has a tubing extending within the tank for pickup of soda water when the tank is in the horizontal position, as is the normal attitude when the entire unit is assembled as a portable bar.

The end sealing unit of the tank in one particular embodiment of the invention comprises a solid cylindrical section having an O-ring seal extending about its circumference so that when the section is placed within the end of the tank, the seal prevents any leakage of either gas or liquid out the end. At the outer end of the sealing section is a locking mechanism in the form of a centrally positioned, rotatable knob having a plurality of links extending radially outwardly therefrom and substantially evenly spaced about the circumference of the knob. At the outer ends of these links are a plurality of pins which can be retracted or extended beyond the circumference of the sealing section to engage correspondingly positioned holes through the wall of the tank. Thus, the entire sealing mechanism is placed in position in one end of the tank, after which the knob is rotated in a clockwise direction to drive the links and their associated locking pins radially outward into engagement with the holes in the wall of the tank. For release preparatory to removal, the knob is turned in the opposite direction to retract the links and their associated pins from engagement with the holes in the wall of the tank. In order to prevent inadvertent release of the mechanism while the tank is under pressure, an event which might result in disaster with the mechanism being propelled outwardly from the tank with explosive force, a combination lock and pressure-relief device is provided. This is a small threaded element which, when in position, extends through the wall of the sealing section to communicate with the interior of the tank. It is so located as to obstruct the free movement of one of the actuating links which extends from the release knob to a corresponding locking pin so that, until the locking element is removed, the release mechanism cannot be moved to the retracted position. The locking element is made so that while it is being unscrewed to remove it from its position of locking the release mechanism, it opens a passage communicating with the atmosphere so that the interior pressure of the tank is bled off through the element. The sound of the gas escaping as the operator is unscrewing the locking element will signal him to stop and wait until all of the pressurized gas within the tank has bled out through the element. It will also remind him to make sure that the pressure valve on the gas cylinder which may be connected to the tank is turned off so that there is no continual build up or maintenance of the pressure within the tank while the bleed port is open.

In accordance with a further aspect of the invention, there is provided a single, beverage dispensing head which contains a plurality of valve and control lever assemblies for mixing and dispensing various beverages, as selected, from a single dispensing nozzle. The hoses leading from the respective fittings of the pressurizable tank are connected to corresponding ports in the dispensing head. The arrangement is such that the dispensing head may be mounted in upright operative position within the cabinet of the portable dispensing unit or, alternatively, when the unit is disassembled for servicing, it may be mounted in fixed position on one side of the pressurizable tank. The beverage dispensing head meters the proper amounts of the various ingredients in a selected beverage, for example the soda water and syrup for a cola drink, mixes them and dispenses the mixed beverage. Because all of the various ingredients are stored and dispensed under the same pressure conditions, variations in pressure do not affect the proportions of the ingredients in a drink.

In a preferred embodiment, selection of the desired ingredients for a given beverage is effected by means of a single valve rod and lever assembly. The assembly includes a return spring which normally urges the assembly towards the off position. However, the entire assembly is positive acting so that if the spring is somehow ineffective because the assembly sticks in some fashion, the operator can simply apply manipulative pressure in the opposite direction to restore the valve to the off position.

In one particular arrangement of the invention, the release and mixing valve comprises a rod having various necked-down portions separated by sealing sections which serve to permit or cut off communication between pairs of laterally extending flow passages within the head, depending upon the position of the rod. The entire unit is assembled in a manner which permits easy disassembly and ready substitution of one particular rod for another when the types of beverages to be dispensed are changed. For example, on a dinner flight the beverages to be dispensed tend more toward soft drinks and mixed drinks including alcoholic beverages. Thus, the beverage fluids are soft drinks, syrups and soda water. Liquor may also be dispensed through the control head if desired. However, on breakfast flights there is more demand for juices, milk and the like. The change may readily be made by changing the contents of the various collapsible plastic bags within the pressurizable tank and by changing the particular seal and valve assemblies within the beverage dispensing head to provide for mixing with soda when needed or direct isolated flow to the dispensing nozzle as the case may be.

In accordance with a further aspect of the invention, a storage receptacle is provided within the portable cabinet for storing individual serving liquor bottles while maintaining the next one to be dispensed in a position where its label is visible for easy identification of the contents. As a given bottle is removed, the mechanism in the storage and dispensing receptacle automatically moves the stack of bottles so that the next one is in position for selection. Preferably, the bottles are placed in columns on top of a tray which is movable under the force exerted by a pair of belt type springs. These springs in the extended position are in a flat attitude along the inside of the storage receptacle and do not take any space away from the storage of the contents of the receptacle. However, as the bottles are successively removed, the lower free ends of the belts roll up and lift the tray with the bottles thereon toward the dispensing position. With this type of arrangement, the force applied against the bottom of the tray to raise the bottles into the desired position is substantially constant, irrespective of the extent of extension of the springs, and is effective even if only a single bottle is left in the column.

The entire arrangement is extremely compact and efficient in operation. The various separate compartments can be readily removed for refilling, replace-

ment, etc. The dimensions of the unit are such that it can be used with ease in the aisles of commercial aircraft and still permit passenger traffic up and down the aisle past the unit. The entire unit may be disassembled and serviced, such as changing over for the dispensing of other types of beverages by the same unit with a minimum of time, effort and trouble. The various carbonated beverages are all kept under pressure in sealed condition until they are actually dispensed for serving, thus eliminating any problem with respect to beverages, mixes and the like going flat from sitting in open cans as is a problem with presently employed dispensing units. Although a pressurized tank is employed, the mechanisms for providing access to the tank are foolproof so that any danger from malfunction is eliminated.

In another particular arrangement in accordance with the invention, a self-contained beverage dispensing system is provided with substitutes bulk storage for the individual serving bottles of liquor as already described and further provides for dispensing of metered, precisely determined quantities of selected liquors on demand through the same dispensing nozzle used for non-alcoholic beverage dispensing, thus simplifying the dispensing of selected mixed drinks and cocktails as well as soft drinks, juices and other beverages from the unit. In accordance with particular aspects of the invention, individual valves are provided in conjunction with individual metering mechanisms to dispense precisely the quantity of a selected liquor for each drink which is preset into the mechanism. A counter is preferably associated with the liquor dispensing valves for indicating the number of drinks sold and a lock may be included to prevent unauthorized use of the liquor dispenser.

In a preferred embodiment of such an arrangement, a compartmented reservoir is provided with individual tube couplings communicating with each respective compartment and a common tube coupling for connection to a gas pressure source. In a typical arrangement, there are six compartments, each holding one-half gallon of a particular kind of liquor. As in the case of the pressurized storage/dispensing unit previously described, the liquor reservoir and valve mechanism may be lifted out of the portable bar unit and transported separately for service and storage.

In accordance with one aspect of the invention, a precisely measured amount (e.g. 1½ ounces) of liquor is first measured and then dispensed under pressure on demand by means of an uncomplicated and extremely reliable valve mechanism. With the valve released, a metering chamber rapidly fills with liquor under pressure to the predetermined amount. When the valve is depressed the chamber inlet is sealed and an outlet is opened. The measured amount of liquor is then expelled from the chamber through a tube to the dispensing nozzle rapidly and effectively by the action of a free-floating piston actuated by pressurized liquor behind it. Releasing the valve handle permits it to return to the position of open inlet/closed outlet in which a bypass passage allows the piston to return to its previous position while the metering chamber again fills with the precise amount of liquor for the next drink.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the present invention may be had from a consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of one particular arrangement in accordance with the invention;

FIG. 2 is a perspective view of the arrangement of FIG. 1, partially disassembled;

FIG. 3 is a schematic representation of an item which is utilized in arrangements in accordance with the invention;

FIG. 4 is a sectional view, taken along the line 4—4 of FIG. 2, of a portion of the invention, including items such as that shown in FIG. 3;

FIG. 5 is a perspective view of one particular element employed in the arrangement of FIG. 1;

FIG. 6 is a sectional view taken along the line 6—6 of FIG. 5;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 5;

FIG. 8 is a sectional view taken along the line 8—8 of FIG. 5;

FIG. 9 is a representation of a particular type of cooling element which may be employed in the arrangement of FIG. 1;

FIG. 10 is a schematic view, partially broken away, of a storage device which may be employed in the arrangement of FIG. 1;

FIG. 11 is a block diagram of an alcoholic beverage dispensing system of the invention;

FIG. 12 is a sectional view of a valve metering mechanism employed in FIG. 11;

FIG. 13 is a partially-broken-away sectional showing further details of the mechanism of FIG. 12;

FIG. 14 is a perspective view showing the arrangement of a bulk liquor assembly employed in FIG. 11;

FIG. 15 is a partial side elevation view of the assembly of FIG. 14;

FIG. 16 is a plan view of the assembly of FIG. 14, also showing in diagrammatic form the pressurizing components connected to this assembly; and

FIG. 17 is a perspective view showing construction details of the manifold of FIG. 15.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the perspective view of FIG. 1, a beverage dispensing unit 10, which may be referred to as a portable bar, is shown comprising a cabinet 12 mounted on wheels 13 and 14 for portability. The cabinet 12 is provided with a handle 15 for manipulating the unit 10 as desired. Preferably, the wheels 13 located on each side of the cart near the forward end thereof are mounted with a fixed axle. However the wheels 14, located on each side of the cart near the rearward end thereof are preferably of the caster type which permit pivoting for ease in steering the cart in the desired direction. The cabinet 12 is shown with a beverage dispensing head 16 fixed in position on one side of the unit. A drain plate 18 positioned in the top of the waste liquid receptacle 20 is located below the outlet of the head 16. As shown, the cabinet 12 also includes other storage receptacles such as the box 22 for napkins and stirring rods, the box 24 for olives and cherries, the box 26 for ice-cubes, the box 30 for drinking glasses, and the storage unit 32 for storing liquor bottles of various types and brands of liquor bottled as individual servings, as is customary for use on commercial airlines.

The beverage dispensing head **16** and each of the various receptacles and boxes just mentioned are mounted within the cabinet **12** on various supports and supporting surfaces (not shown) in a manner which permits them to be readily lifted out of the cabinet **12** when desired for emptying, refilling, cleaning and the like.

FIG. **2** shows a cabinet **12** with its contents removed and itself disassembled from its base. As shown in FIG. **2**, the base of the unit **10** is in the form of a plate **34** to which the wheels **13** and **14** are affixed. For easy removal, the cabinet **12** may be secured to the base **34** by means of quick-release fasteners **36** (two on each end) which are retained in the cabinet **12** and which secure to the base **34** through the openings **38.**

As shown in FIG. **2**, a tank **40** is rigidly affixed to the base **34** by means of supports **42.** It will be seen that in this disassembled configuration, the head **16** is removed from its mounting position in the cabinet **12** and rests on supports **44** affixed to the side of the tank **40.** The head **16** with its vertical support housing **17** is latched to the supports **44** by means of a spring catch mechanism (not shown). The head **16** is coupled to the tank **40** by means of flexible hoses or tubes **45** which extend downward from the head **16** through the vertical support housing **17** and attach to couplings **46A**, **46B**, **46C**, **46D** and **46E** which are mounted in and extend through the cylindrical wall of the tank **40.** Another coupling **48** also extends through the cylindrical wall of the tank **40** and provides for pressurizing the contents thereof from a pressure cylinder **50** which is coupled to the coupling **48** via a flexible hose **52.** The cylinder **50** may be a conventional type containing pressurized carbon dioxide (CO_2) having a pressure gauge **53,** a coupling valve **54,** and valve handle **55.**

The tank **40** as shown in FIG. **2** is provided at the rear end of its cylindrical wall portion with a releasable sealing mechanism **60** which fills the end of the cylindrical tank **40.** Another such mechanism is also provided at the opposite end of the tank **40** so that the tank may be set on end either side up, and either end may be opened for access to the interior of the tank **40.**

The sealing element **60** comprises a rotatable knob **62** from which there extend a plurality of mechanical links **64** that connect to locking pins **66** within corresponding holes in the cylindrical wall of the tank **40.** The locking pins **66** are withdrawn radially inwardly when the knob **62** is rotated in the counterclockwise direction under the action of the links **64** and are extended radially outwardly to again engage the holes in the cylindrical wall of the tank **40** when the knob **62** is rotated clockwise to the locking position. A combination lock-and-pressure-release element **67** is also provided in the sealing member **60** which insures that the pin **66** cannot be retracted so as to release the mechanism **60,** possibly with dangerously explosive force, until the internal pressure has been completely relieved. The member **67** serves to lock the release mechanism of the sealing member **60** by virtue of its fixed position which interfers with an adjacent link **66** and prevents rotation of the knob **62** to the release position. In order to permit rotation of the knob **62** and release of the locking pins **66,** the member **67** must be unscrewed and removed, which process serves to open a relief passage that permits the internal pressure to bleed off before the member **67** is fully unscrewed and removed. An O-ring type seal **68** (shown in FIG. **4**) extends about the outer circumference of the member **60** and serves to provide an effective seal to maintain the contents of the tank **40** under pressure.

FIG. **3** is a view of one of the collapsible plastic containers which is used within the tank **40** in arrangements in accordance with the invention for the storage of various types of syrups, juices and the like for dispensing through the head **16.** As shown, it comprises a thin-walled plastic container **70** having a cap assembly **72** to which a flexible tube **45** is affixed. As intended for use in arrangements in accordance with the invention, such assemblies come in sterilized packaging, already filled with the particular type of fluid to be dispensed, and with the outer end of the tube **45** sealed off.

FIG. **4** is a sectional view taken along the lines **4—4** of FIG. **2,** showing the manner in which the tank **40** may be filled with the various beverage components to be dispensed. In the arrangement of FIG. **4,** a number of the containers **70,** varying in size according to the amount of the particular types of beverage components to be needed on a given flight, are shown within the tank **40.** In preparation for use, the collapsible containers **70** are dropped from their sterile packaging into the tank **40,** the outer end of each sealed tube **45** is clipped off and the now open outer end of the tube **45** is pushed on to the inner end of the coupling such as **46A.** Respective collapsible containers **70** may be filled with the various flavoring components for carbonated beverages, such as cola syrup, lime syrup, orange syrup and the like; other containers **70** may store juices such as tomato juice and orange juice or plain water. When the various containers **70** are placed within the tank **40** and their tubes **45** are connected to the appropriate couplings **46,** the entire tank is filled with soda water and the open upper end is sealed by inserting the corresponding end seal mechanism **60.** The entire base unit as shown in FIG. **2,** comprising the tank and base plate, is then placed on the wheels **13** and **14,** the CO_2 cylinder **50** is attached to the coupling **48** and the valve handle **55** turned to open the valve **54,** admitting CO_2 gas under pressure to the tank **40** so that the entire contents thereof, including each of the individual containers **70,** are placed under uniform pressure. Thus, as a selector in the head **16** is actuated to release the beverage liquid therefrom, the pressure of the CO_2 gas from the cylinder **50** on the contents of the tank **40** serves to drive the fluid ingredients of the particular beverage selected through the tube or tubes **45** to the head **16** for release into a waiting drinking glass.

FIGS. **5-8** show various views of the dispensing head **16** with the outer cover and vertical support housing **17** removed. FIG. **5** is a perspective view of the head **16,** FIG. **6** is a rear sectional view thereof, taken along the lines **6—6** of FIG. **5,** while FIGS. **7** and **8** are side and bottom sectional views taken along the lines **7—7** and **8—8** respectively, looking in the directions of the arrows. In FIG. **6,** only a single valve mechanism is shown for purposes of simplicity, and the actuating handle is omitted.

In the depicted arrangement, the head **16** comprises a block **80** having a plurality of vertical passages **82** in which valve-and-seal assemblies such as **84** are respectively mounted. Each sealing assembly **84** has associated with it an actuating lever **86** affixed to corresponding pivot blocks **88** by means of a pivot rod **89.** A compression spring **90** engages the actuating lever **86** and a horizontal portion of the block **80** to return the actu-

ating lever 86 and the associated valve-and-seal assembly 84 to the closed position when the downward actuating pressure on the outer end of the lever 86 is removed.

Vertical supply passages 92 are provided for connection via respective coupling portion 94 to flexible tubes 45, and upper ends 92*a* of supply passages 92 connect horizontally to each respective passage 82. Lateral passages 96 interconnect four of the passages 82, and horizontal passages 97 connect three of these passages 82 with their respective supply passage 92. Soda water is supplied to left-hand passage 82 in this embodiment, and the passage 96 and 97 are for automatically mixing soda water with particular beverage syrups which require soda. Right-hand passage 82 does not communicate with soda water passages 96, and is intended for dispensing some other beverage which does not include soda water, such as plain water for example. Additional horizontal passages 98 are provided for communication between the passages 82 and the central outlet region 99 to which a nozzle 100 is attached.

The valve-and-seal assembly 84 generally comprises a metal rod having mating recessed portions 102 at the upper end thereof for engaging the adjacent end of the levers 86, and a plurality of sealing rings 104 held in position by adjacent shoulder portions 106. Particular segments of the rod 102 include necked-down portions 108 to permit the passage of fluid vertically along the rod between the seals 104 from one communicating passage to another.

In the operation of the beverage dispensing head 16 to which component fluids of beverages to be dispensed thereby are directed under pressure via the tubes 45, a particular actuating lever 86 corresponding to the particular beverage which is desired is pressed by thumb-and-finger pressure against the spring 90. This raises the valve-and-seal assembly 84 connected thereto to its upward position, as is indicated in FIG. 6. For the middle assembly 84 as shown, this raises the lower necked-down portion 108 into bridging position between the lateral passage 96 and the horizontal passage 97, which connects soda water from the left-hand passage 82 to the supply passage 92 of this actuated assembly 84. At the same time the uppermost necked-down portion 108 is raised into communication between the supply passage 92a and the passage 98 (FIG. 7).

This action permits flow of the desired syrup component from the associated tube 45 mixed with soda water from the passage 97 to be transmitted to nozzle 100. When the desired amount of beverage has been dispensed, the actuating lever 86 is released for return to the upward position under the pressure of spring 90, which in turn moves valve-and-seal assembly 84 downward to the closed position as indicated in FIG. 7. It will be seen that the seal 104A blocks further communication between the passages 94 and 98 (FIG. 7), thus cutting off flow of the beverage, while the seal 104B moves downward to block communication between the passages 92 and 93 (FIG. 6). Other valve and passage arrangements may be provided for the other individual dispenser actuator assemblies so as to achieve the desired release of the selected beverage. It will be noted that the shape and construction of the actuating mechanism including the lever 86, the pivot rod 89, and the valve-and-seal assembly 84 are arranged to provide for essentially foolproof operation. In the event that for some reason the combination may stick in the open position upon release of finger pressure from the lever 86, pressure may be applied in the upward direction from the underside of the lever 86 so as to manually force the seal assembly 84 to the downward closed position, thus eliminating any possibility that the unit may be stuck in the open position without any possibility of closing it off, as is the case with certain other types of dispensers which rely upon a remote actuating unit of the pressure-actuated or electrically-actuated type.

FIG. 9 represents a particular type of cooling arrangement which may be used very effectively in arrangements in accordance with the invention by simply connecting it to respective segments of the flexible tubing 45 and placing it in the bottom of the receptacle 26 containing the ice cubes. As shown in FIG. 9, the cooling unit 110 comprises a central chamber 112 to which a plurality of U-shaped tubes 114 are connected. The chamber 112 contains a plurality, in this instance 4, longitudinal passages with which the U-shaped tubes 114 communicate. The four internal passages of the chamber 112 communicate respectively with the couplings 116. Thus, when liquid is drawn from one of the tubes 45 which would be connected through a pair of the couplings 116, the fluid flows into one of the couplings 116 and out a second coupling 116, passing down and back through two separate passages within the chamber 112. In so doing, it flows through the connecting tubes 114 in parallel and is cooled by thermal conduction with the adjacent ice and ice water in the container 26. Since the tubes 114 and the chamber 112 of the cooling unit 110 are made of metal, preferably copper or aluminum, cooling of the liquid passing through the unit 110 is readily and efficiently accomplished.

FIG. 10 illustrates particular details of the liquor bottle storage receptacle 32. This is shown comprising a shell 120 having various sections A, B and C for bottles of respective types or brands of liquor. Each section, such as A, comprises a base support plate 122 positioned to ride on top of the rolled portions 124 of a pair of belt springs 126 which are secured at their upper ends to the inside of the container 120. Particular shaped openings 128 are provided at the upper end of each of the segments A, B and C, for retaining the individual liquor bottles therein while providing display of their labels and contents and permitting their removal by a pull on the neck of the bottle in a lateral direction. As soon as the uppermost bottle is removed, the belt springs 126 lift the vertical column of bottles resting on the associated support plate 122 so that the next bottle is immediately in position for removal if desired. The springs 126 serve to provide a constant force urging the support plate 122 upwardly, thus urging the entire column of bottles upwardly into position, regardless of whether the compartment is full or has only a single bottle in it. This particular arrangement is vastly superior to other types of liquor bottle storage and dispensing arrangements which store the bottles vertically with only the top visible. Such other arrangements do not provide a display of the label or the contents of the bottle and also have a tendency to destroy or mutilate the tax stamp when such is not desired.

FIG. 11 shows a block diagram of a complete, unitary alcoholic beverage dispensing system 130 in accordance with the invention which may include the arrangement shown in FIG. 1 and in addition includes a

specific liquor storage, metering and dispensing unit, both being coupled to the common outlet nozzle **100.** The portions of the system corresponding to FIG. **1** include the pressure tank **50** and valve **54,** the beverage reservoirs of the pressurized tank unit **40** and the beverage dispensing head unit **16.**

The metering portion of the system **130** for dispensing liquor in measured quantities (e.g. 1½ ounces) from bulk storage comprises a liquor storage assembly **140** having **6** separate liquor containers, metering valves **142,** one of each of the different types of liquor, a counter **144,** a lock **145,** and respective interconnecting tubing **146, 147.** A connection **143** is also shown for the liquor assembly **140** to the pressure tank **50** via valve **54** for maintaining the liquor under suitable gas pressure to effectuate the dispensing procedure.

Details of a single novel valve and metering mechanism **142A** are shown in FIGS. **12** and **13.** These show a metering chamber **148** within a valve block **150** in which various ports and passages are incorporated. The metering chamber **148** includes a free-floating piston **152** movable upward therein under pressure from below and movable downward therein (when the bypass passage **154** is open) in response to gravitational force. If more positive action is desired, a biasing spring (not shown) may be included. Inlet passage **156** and outlet passage **158** are shown within the block **150** arranged for coupling to respective individual tubes **146** and **147** of FIG. **11.** It will be noted that the passage **154** communicates with the inlet passage **156** and the upper portion of the metering chamber **148,** thus providing a bypass between the opposite sides of the piston **152** (when not sealed off).

The valve portion of the unit **142A** is actually a toggle mechanism **160** comprising a pair of individual valve elements **162, 164** coupled to pivot about a fulcrum member **166** by virtue of their connecting to a valve lever **170** via pivot pins **168.** A biasing spring **172** moves the valve assembly to the position shown in FIG. **12** upon release of the lever **170.** As shown in FIG. **13** the valve assembly is in the intermediate position (both passages **154** and **158** closed), which has no practical effect but is helpful in an explanation of the operation of the mechanism. With a valve element **162** or **164** across its associated passage **154** or **158,** such passages are blocked, although a more positive seal is effected by the element **162** or **164** moving downward into positive sealing relationship with an O-ring seal **173** positioned against a corresponding support lip **174.**

With the unit **142A** as shown in FIG. **12** (handle **170** released, outlet valve element **164** down and bypass valve element **162** up) a communicating passage **154** is open between opposite sides of the piston **152.** The piston **152** (which is preferably of stainless steel) thus settles to the bottom of the metering chamber **148,** allowing the upper portion of the chamber **148** to fill with liquor (in this instance, precisely 1½ ounces). When the "shot" so measured is to be dispensed, the valve **170** is depressed about the pivot pin **168** extending into the fulcrum member **166** and the positions of the valve elements **162, 164** are reversed. The element **162** moves downward against its O-ring seal **173** to block any communication between the inlet passage **156**/bypass passage **154** and the upper portion of the chamber **148** while the element **164** moves upward to establish communication of the outlet passage **158** therewith. Since liquor under pressure is pushing against the underside of the piston **152,** the 1½ ounces of liquor segregated above the piston **152** is rapidly pushed out through the outlet passage **158** to the nozzle **100** via an associated tube **147.** Release of the handle **170** restores the condition of FIG. **12,** permitting the piston **152** to settle to the bottom and displace another shot of liquor to the upper portion of the metering chamber **148.**

As indicated in FIGS. **12** and **13,** each time a shot of liquor is dispensed in this fashion, the counter **144** is advanced by one by virtue of actuation of an intercoupled actuating rod **180.** A total of all shots dispensed may be thus registered or, if preferred, an individual count of each different type of liquor may be maintained. A lock **145** (FIG. **11**) may be interposed to block the actuation of the respective valve levers **170** in the locked position, thus ensuring the integrity of the count of the counter **144** and protecting the liquor against theft. The metering system is fabricated and assembled in such a fashion that a cover plate portion may be readily removed to expose the metering chambers **148.** Thus the pistons **152** may be easily removed and replaced with others of greater or lesser thickness to change the amount of liquor for a shot (as for 1 or 2 ounces if preferred). As fabricated, the unit admits of easy cleaning, both for the assembly **140** and the valves **142,** when such is needed. However, with all of the fluid passages totally enclosed as indicated, this is seldom necessary.

Details of the liquor storage assembly **140** are shown in FIGS. **14** through **17.** Here, six bulk liquor containers **182** are fixed at their tops to a manifold **184** supported at each end by legs **186** shaped to fit and rest upon the tank **40** beside the dispensing head **16** when the latter is disassembled from the cabinet **12.** Each container **182** is preferably a ½ gallon size having different respective liquors therein, such as bourbon, scotch, vodka, gin, etc. Container tops **188** are removably attached to the bottom of manifold **184** by means of a large, hollow, threaded bolt **190** passing through a manifold hole **191,** and having a supply tube **192** extending from its lower end and a delivery pipe **194** extending from one side of its head above the manifold **184.** Pipes **194** have the interconnecting tubing **146** connected thereto, which leads to the metering valves **142.**

Contents of containers **182** are pressurized through top openings **198** registering with apertures in the manifold **184** which communicate with internal pressurizing passages **200.** An indexing pin **201** on the top **188** and a mating hole in the manifold **184** may be employed to align the openings **198.** The passages **200** open at one end of manifold **184** where a pressure input line **202** is connected. The line **202** leads from a tee **204** in the CO_2 hose **52** shown in FIG. **2.** Tee **204** is not shown in FIG. **2.**

The manifold **184** is preferably comprised of two halves **184a** and **184b.** The top half **184a** is a plain flat piece of plastic material except for the bolt holes **191.** The lower half **184b** (FIG. **17**) is a similar piece of plastic, but provided with channels **206** in its upper surface which form the internal passages **200** when the two halves are bonded together. An end block **208** (FIG. **15**) may be provided at the inlet end of the manifold **184,** this block having a passage therethrough connecting internal passages **200** to the pressure input line **202.**

There have thus been described hereinabove and shown in the accompanying drawings particular ar-

rangements in accordance with the present invention which provide an extremely compact and efficient liquor and other beverage dispensing system which is particularly adapted for use on commercial aircraft where all power must be self-contained and the unit has to be of such dimensions as will fit within the aircraft aisle while still leaving room for passengers to walk by the unit. One particular arrangement of a unit in accordance with the present invention has preferred dimensions with a width of only 10 inches. This unit is 28½ inches long and 34¼ inches high including the 3 inches height of the wheel mechanism. For disassembly for servicing, the entire contents of the unit can be removed in their respective receptacles and the cabinet disassembled from the base portion in less than half a minute. The pressurized tank of one portion of the system may be quickly depressurized and either end opened for removal of the receptacles inside the tank and the replacement by others in a very short time. The pressure tank is entirely safe, being provided with an interlock so that the end seal cannot be released until the internal pressure has been bled off. The beverage dispensing mechanism is simple in structural configuration, virtually foolproof in operation, and extremely compact and effective in its design which permits various beverages and fluid ingredients including alcoholic liquors to be dispensed from a single dispensing head. Liquors (or other liquids if desired) may be metered in precise fashion to provide a desired amount for one actuation of a valve lever.

Although the pressure manifold **184** for the bulk liquor containers **182** was described hereinbefore as being connected to the same pressure cylinder **50** as supplies CO_2 to the tank **40,** for simplicity, the liquor containers **182** could also be pressurized with air or other suitable gas if desired.

Although there have been described above specific arrangements of portable beverage dispensing apparatus for commercial aircraft in accordance with the invention for the purpose of illustrating the manner in which the invention may be used to advantage, it will be appreciated that the invention is not limited thereto. Accordingly, any and all modifications, variations or equivalent arrangements which come within the scope of the appended claims should be considered to be part of the invention.

What is claimed is:

1. A liquor storage unit for use in a portable beverage dispensing system comprising a mounting member, a plurality of bulk liquor containers, removable fastening means attaching each of said liquor containers to said mounting member, liquor outlet means from each said container through its said fastening means, said fastening and outlet means comprising a container top attached to said container to support its weight, a hollow bolt member passing through said mounting member and threaded into said top, and a supply tube reaching from the lower end of said bolt member to the bottom of said container, said mounting member forming a substantially flat unitary manifold having preformed internal passage means therein communicating with the interior of each said container through said tops, and means for connecting an external source of pressurized gaseous fluid to said passage means.

2. A portable beverage dispensing unit for use on commercial aircraft, comprising: a pressurizable tank having a plurality of storage compartments of variable volume therein, a plurality of fluid conduits extending through said tank from said compartments respectively, means for introducing and carrying water in said tank in contact with the exterior of said variable volume compartments, means for applying pressurized carbon dioxide to the interior of said tank to pressurize and carbonate said water, a soda water fitting extending through said tank and communicating with a point within said tank where said water is likely to collect, a soda water conduit extending on the outside of said tank from said soda water fitting, a dispensing head means for selectively dispensing the contents of said compartments and of said soda water conduit, said dispensing means including a common dispenser outlet from said head, a plurality of valve chambers in said head, a plurality of fluid communicating passages connected from said fluid conduits and said soda water conduit to said valve chambers, and combination valve-and-sealing means mounted within said chambers for selectively providing communication between particular ones of said passages and said common outlet.

3. Apparatus in accordance with claim **2** including a soda water passage in said head connected between the soda water chamber and at least one other chamber, wherein said valve-and-sealing means comprises a rod-shaped device having alternate necked-down portions and sealing portions, said sealing portions being movable across a given communicating passage to permit flow through the accompanying necked-down portion and between two fluid communicating passages connected thereto, and wherein said valve-and-sealing means in said one other chamber includes an additional rod necked-down portion and sealing portion movable relative to said soda water passage to open a flow path between said soda water passage and said dispenser outlet simultaneously with said flow between the accompanying said two fluid communicating passages, whereby soda water is automatically mixed with the dispensed content of the compartment associated with said valve-and-sealing means in said one other chamber.

4. Apparatus in accordance with claim **3** further including a lever attached to said valve-and-sealing means for actuating said means between two predetermined positions.

5. Apparatus in accordance with claim **3** wherein the respective arrangements of sealing portions and necked-down portions of said rod and the fluid communication passages coupled to the valve chamber determine the manner in which various beverage components are mixed for dispensing from said common dispenser outlet.

* * * * *