

Nov. 14, 1939.

W. E. DOUGHTY

2,179,688

DISPENSING' DEVICE

Filed May 23, 1938

2 Sheets-Sheet 1

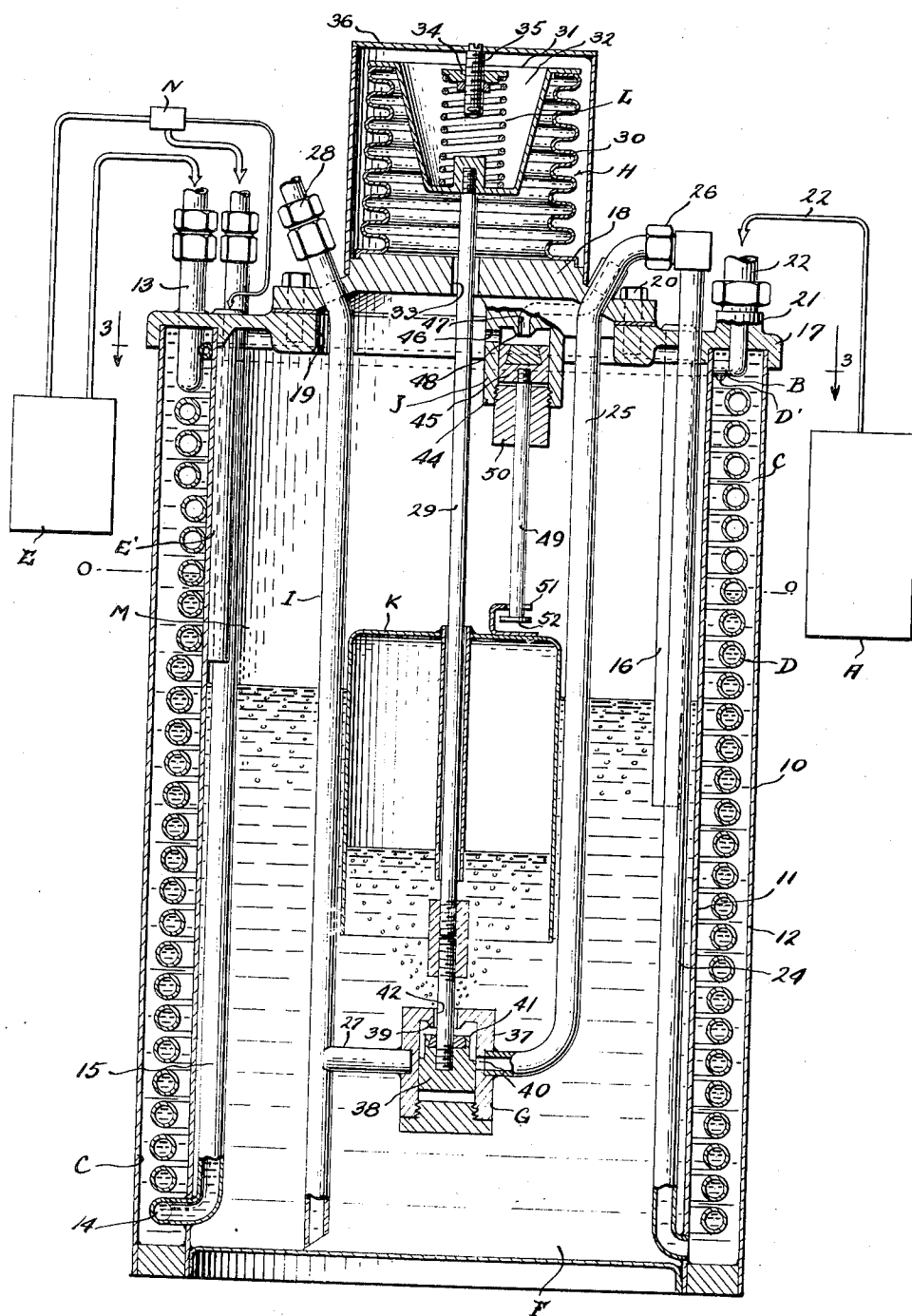


Fig. 1.

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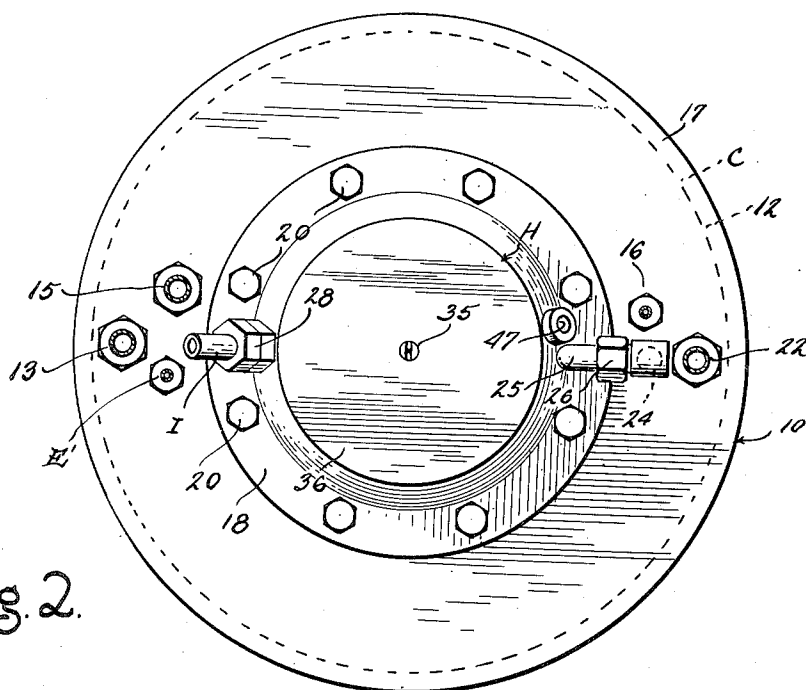


Fig. 2.

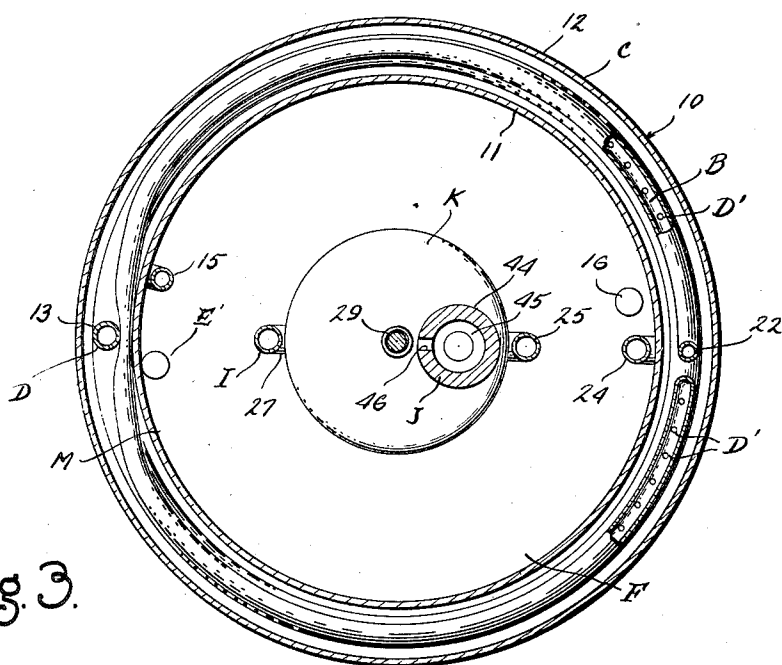


Fig. 3.

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2,179,688

DISPENSING DEVICE

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Application May 23, 1938, Serial No. 209,579

18 Claims. (Cl. 225-9)

The present invention relates generally to dispensing equipment and refers more particularly to improvements in apparatus of this character finding special utility in dispensing carbonated beverages and the like.

It is generally customary in dispensing carbonated beverages to provide a tank or other source of supply of the beverage under high pressure and to conduct this beverage to a container forming a settling chamber where the pressure of the beverage is reduced to such an extent as to permit dispensing the same without an objectionable amount of foam.

The present invention contemplates relatively simple improved means for automatically controlling the amount of beverage admitted to the settling chamber and for likewise automatically controlling the pressure of the gas accumulated in the settling chamber.

In addition to the above, this invention provides a relatively simple and highly effective cooling system embodying refrigerating coils compactly arranged in the settling chamber to cool the beverage in the chamber to the desired temperature in the minimum length of time.

Another object of the present invention consists in the provision of a construction wherein all of the beverage flowing from the source of supply to the settling chamber is required to flow in heat conducting relationship with the refrigerating coils, and this feature contributes materially to effectively cooling the beverage in the minimum length of time.

Still another feature of this invention resides in the provision of a beverage dispensing device of the character set forth in the preceding paragraphs wherein the refrigerating coils, pressure regulating means, and the means for controlling the amount of beverage admitted to the settling chamber form an assembly with the latter capable of being installed as a unit.

A further advantageous feature of this invention consists in the provision of a construction wherein the pressure regulator and beverage volume control means form a sub-assembly separate from the refrigerating coil unit and capable of being inserted into and removed from the settling chamber as a unit.

The foregoing, as well as other objects, will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a semi-diagrammatic view illustrating my improved beverage dispensing equipment;

Figure 2 is a top plan view of the construction shown in Figure 1; and

Figure 3 is a cross sectional view taken substantially on the plane indicated by the line 3-3 of Figure 1.

In general, carbonated beverage under relatively high pressure is supplied from the storage tank A to an annular distributing manifold B located in the upper end of an annular chamber C and having circumferentially spaced discharge apertures D' through which the high pressure beverage flows into the chamber C. A refrigerating coil D is supported in the annular chamber C and the opposite ends of the coil are respectively connected to the high and low pressure sides of a mechanical refrigerating unit, diagrammatically illustrated in Figure 1 by the reference character E.

Upon reference to Figure 1, it will be noted that the annular manifold B in the upper end of the chamber C distributes the discharge of the high pressure beverage into the chamber C more or less uniformly around the latter and, when considering that the width of the annular chamber C is relatively small as compared to the diameter of the cooling coils, it follows that all of the beverage discharged into the chamber C is required to flow in heat conducting relationship to the refrigerating coils. As a consequence, the temperature of the beverage drops substantially as it flows from the top of the annular chamber C to the bottom of the latter, and this is desirable in that it insures effectively cooling a large volume of the beverage in the minimum time interval.

The beverage is discharged from the bottom of the annular chamber C into the settling chamber F through a pressure operated valve G supported within the settling chamber F in a manner to be presently described. The valve G is automatically operated by a pressure regulator H to control the amount of beverage discharged into the settling chamber. As will be more fully hereinafter described, the pressure regulator is set to open the valve G when the pressure in the settling chamber F drops below a predetermined amount and to close this valve when the pressure exceeds this amount. The pressure required for operating the valve G is ordinarily dependent upon the head or distance that the beverage must flow vertically through the discharge conduit I to the point of demand, and provision is made for adjusting the regulator to vary this pressure.

When the valve G is opened by a drop in pressure below the predetermined amount aforesaid,

the high pressure beverage flowing into the settling chamber F liberates a gas, and this gas is allowed to escape from the settling chamber through the medium of a valve J. The valve J is automatically operated by means of a float K and gas continues to escape through this valve until the level of the beverage in the settling chamber F has reached a point where the float K is raised to such an extent as to close the valve J. As a consequence, the gas liberating from the beverage in the settling chamber builds up a pressure in the latter and when this pressure exceeds the predetermined required amount, it operates the pressure regulator H to close the valve G. It will be noted from Figure 1 that as the beverage is drawn from the settling chamber through the conduit I, the float K moves downwardly in the settling chamber F and permits the valve J to open. As a result, gas in the settling chamber escapes from the latter and when the pressure drops below the predetermined required amount, the spring L operates the pressure regulator to open the valve G and allow another supply of carbonated beverage to flow into the settling chamber.

Referring now more in detail to the specific construction selected herein for the purpose of illustration, it will be noted that I have illustrated in Figure 1 a tank 10 having radially spaced concentric vertical walls 11 and 12 cooperating with each other to form the annular chamber C. The width of the annular chamber exceeds the diameter of the refrigerating coil D and the latter is housed in the chamber in a manner to extend for substantially the full axial length of the latter. The upper end 13 of the coil is connected to the low pressure side of the refrigerating unit E and the lower end 14 of the coil is connected to the high pressure side of the refrigerating unit through the medium of a vertically extending conduit 15 projecting into the settling chamber F through the inner wall 11 at the bottom of the chamber C. The operation of the refrigerating unit E is automatically controlled to maintain the temperature to a predetermined amount by means of the usual bulb 16 located in heat conducting relationship with the carbonated beverage.

The refrigerating circuit also includes a temperature operated bulb E located in the well M to control the operation of an expansion valve N which, in turn, controls the level of the liquid refrigerant in the coils D. In the present instance, the liquid refrigerant level is maintained substantially at the point O and, as a result, is prevented from spilling into the crank case (not shown) of the compressor. Also, with the above construction, the warm beverage entering the chamber C from the tank A assists in vaporizing the refrigerant in the coils D above the point O and thereby increases the efficiency of operation of the refrigerating unit.

The top wall of the tank 10 is formed of two sections, an annular outer section 17 and a central section 18. The section 18 closes the central opening 19 through the section 17 and is demountably secured to the top of the section 17 by means of the fastener elements 20. The outer section 17 is shown as apertured to receive the opposite ends of the refrigerating coil and is also apertured to provide for extending the intake nipple 21 of the manifold B therethrough. The intake nipple 21 projects upwardly from the annular distributing manifold B and is connected to the source of supply A of carbonated beverage by

means of the conduit 22. Upon reference to Figure 3, it will be noted that the annular manifold B surrounds the inner wall 11 and the circumferentially spaced outlet ports D' in the bottom thereof are so arranged as to uniformly discharge the beverage into the annular chamber C.

The beverage is required to flow in heat conducting relationship to the convolutions of the cooling coil D from the top of the chamber C to the bottom thereof, and is discharged from the bottom of the annular chamber C into a vertically upwardly extending conduit 24. The extreme upper end of the conduit 24 projects through the outer section 17 of the cover and is connected to the upper end of a conduit 25 through the medium of a readily detachable nipple 26. The conduit 25 extends downwardly through the central closure section 18 and communicates at the lower end thereof with the valve G which is supported in the settling chamber F adjacent the bottom of the latter. As shown in Figure 1, the valve G is shown as connected to the beverage discharge conduit I by means of a brace 27, and the upper end of the discharge conduit extends through the central closure section 18. A nipple 28 is provided at the extreme upper end of the discharge conduit I for connection with a suitable discharge valve (not shown).

The pressure regulator H is supported on the top surface of the central closure section 18 exteriorly of the settling chamber F and is connected to the valve G for operating the latter by means of a rod 29 extending downwardly through the closure section 18. The rod 29 also forms a guide for the float K and the valve J, operated by the float K, is also carried by the central closure section 18.

The foregoing arrangement is such that the pressure regulator H, valve G, valve J, float K, discharge conduit I, and intake conduit 25 are all removable as a unit with the central closure section 18. It will also be observed that removability of the foregoing instrumentalities may be readily effected by merely removing the screws 20 and detaching the nipples 26 and 28.

The pressure regulator H is shown in Figure 1 as comprising an expansible chamber 30, in the form of bellows, having the lower end fixed to the closure section 18 and having the upper end secured to a fitting 31. The central portion of the fitting 31 is depressed to form a well 32 and the base of the well is secured to the upper end of the rod 29 in order to effect axial movement of the rod in dependence upon the operation of the expansible member. The central opening 33, through the closure section 18 for receiving the rod 29, is of slightly greater diameter than the rod in order to permit the gas in the settling chamber F to flow into the expansible member or bellows 30.

The bellows 30 are normally urged to their collapsed position by the spring L having the lower end abutting the base of the well 32 and having the upper end engaging an abutment 34. The abutment 34 is threadedly mounted on an adjusting screw 35 having a head portion abutting the top wall of a closure cup 36 and accessible for manipulation through an opening in said top wall. The construction is such that adjustment of the screw 35 varies the tension of the spring L and determines the pressure required to expand the bellows 30.

In the present instance, expansion of the bellows 30 lifts the rod 29 and closes the valve G. As shown in Figure 1, the valve G comprises a 75

casing 37 and a plunger 38 reciprocally mounted in the casing 37. The interior of the casing communicates with the beverage supply line 24 through the medium of a port 40 and the plunger 38 has a reduced portion 41 at the upper end effective, in the lowermost position of the valve plunger 38, in the casing 37, to allow beverage to flow from the supply line 24 into the casing. The opening 42 in the top wall of the casing 37, through which the rod 29 extends, is enlarged allowing the beverage to be discharged into the settling chamber F and is formed with a valve seat 39 adapted to be engaged by the upper end of the plunger to close communication to the settling chamber.

The foregoing construction is such that when the pressure of the gas in the bellows 30 exceeds a predetermined desired amount, the valve plunger 38 is raised in the valve casing 37 by expansion of the bellows 30 until the upper end of the valve plunger engages the seat 39 and closes the port 40. On the other hand, when the pressure of the gas in the bellows falls below the predetermined amount aforesaid, the spring L collapses the bellows 30 and moves the valve plunger 38 to a position wherein the reduced portion 41 registers with the port 40. In this connection, attention is called to the fact that the valve G is supported in the settling tank F below the level of the beverage, and this is desirable in that the beverage discharged from the valve serves to not only agitate the beverage in the settling tank, but to assist in cooling the latter.

The drop in gas pressure in the settling chamber F required to operate the valve G is effected by the valve J and the operation of the latter is, in turn, controlled by the level of the beverage in the settling chamber F. As stated above, the valve J vents the settling chamber F to the atmosphere. This valve comprises a casing 44 and a plunger 45 reciprocally mounted in the casing. The casing is cast integral with the central closure section 18 and the interior of the casing 44 communicates with the settling chamber F by a port 46 through one side wall of the casing. The casing 44 also communicates with the atmosphere through a passage 47 in the top wall thereof and this passage is provided with a seat 48 adapted to be engaged by a relatively soft material inserted into a recess in the top of the valve plunger 45. The lower end of the valve plunger is connected to an operating rod 49 extending downwardly through the bottom wall 50 of the casing 44 and adapted to be engaged by the top wall of the float K. The float K is guided by the rod 29 and is provided with a finger 51 spaced above the top wall thereof. The finger is apertured to slidably receive the rod 49 and the latter is formed with an enlarged head 52 at the lower end forming an abutment for engaging the underside of the finger 51.

With the above construction, it will be noted that when the level of the beverage rises, the float K engages the lower end of the rod 49 and moves the valve plunger 45 upwardly into engagement with the seat 48. In this position of the valve plunger 45, gas is prevented from escaping to the atmosphere and is trapped in the settling chamber F. However, when the level of the beverage drops, the resulting downward movement of the float K permits the valve plunger 45 to move downwardly in the valve casing and to open the passage 47 to the atmosphere. The gas escaping from the settling chamber F reduces the pressure in the latter to such an extent as to per-

mit the spring L to open the valve G and allow an additional quantity of high pressure beverage to flow into the settling chamber F. As the level of the beverage rises, the float K moves upwardly and closes the valve J. The resulting increase in pressure in the settling chamber expands the bellows 30 against the action of the spring L and closes the valve G.

What I claim as my invention is:

1. In carbonated beverage dispensing equipment, a settling tank adapted to receive a high pressure carbonated beverage to permit settling of the same, a chamber surrounding the tank and having the upper end communicating with a source of carbonated beverage under pressure, valve controlled means establishing communication between the lower end of the chamber and interior of the settling tank, and a refrigerating coil arranged in said chamber with the convolutions thereof surrounding said tank.

2. In carbonated beverage dispensing equipment, a settling tank having spaced side walls forming an annular chamber around the tank, means establishing communication between the upper end of the chamber and a source of supply of carbonated beverage, means establishing communication between the lower end of the chamber and the interior of the settling tank, and a refrigerating coil housed in said chamber with the convolutions thereof encircling said tank.

3. In carbonated beverage dispensing equipment, a settling tank, an annular chamber surrounding the settling tank for substantially the full length thereof and communicating at the lower end with the interior of the tank, a refrigerating coil arranged in the annular chamber with the convolutions of the coil extending around the settling tank, means establishing communication between the upper end of the annular chamber and a source of supply of carbonated beverage, and means controlling the flow of the carbonated beverage from the lower end of the annular chamber to the interior of the tank.

4. In carbonated beverage dispensing equipment, a settling tank, an annular chamber surrounding the settling tank and having the lower end communicating with the interior of the settling tank, a refrigerating coil housed in the annular chamber with the convolutions thereof surrounding the tank, an annular distributing manifold housed in the upper end of the annular chamber and having circumferentially spaced discharge ports, and means establishing communication between the distributing manifold and source of carbonated beverage supply.

5. In carbonated beverage dispensing equipment, a settling tank having a refrigerating chamber surrounding the side walls thereof and communicating at the upper end with a source of carbonated beverage supply, means establishing communication between the interior of the settling tank and the lower end of the chamber, means controlling the flow of beverage from the chamber to the interior of the tank including a valve supported in the settling tank adjacent the bottom of the latter and having the discharge side opening into the settling tank below the level of the beverage, a pressure regulator comprising an expansible member located at the top of the settling tank and expansible against the action of suitable spring means by the pressure of the gas liberated from the beverage in the settling chamber, and a rod connecting the expansible member to said valve.

6. In carbonated beverage dispensing equip-

ment, a settling tank having a refrigerating chamber surrounding the side walls thereof and communicating with a source of carbonated beverage supply at the upper end thereof, means establishing communication between the lower end of the chamber and the interior of the settling tank below the level of the beverage in the tank, a valve controlling the flow of beverage from the chamber to the interior of the tank, and means responsive to the pressure of the gas liberated by the beverage in the tank to operate said valve.

7. In carbonated beverage dispensing equipment, a settling tank having a refrigerating chamber surrounding the side walls thereof and communicating at the upper end with a source of carbonated beverage supply, means establishing communication between the lower end of the chamber and the interior of the settling tank below the level of the beverage in the tank, a valve controlling the flow of beverage from the chamber to the interior of the tank, a pressure regulator located above the valve and comprising a member expansible against the action of spring means by the gas liberated from the beverage in the settling tank, and a rod operatively connecting the expansible member to the valve.

8. In carbonated beverage dispensing equipment, a settling tank, means establishing communication between a source of carbonated beverage supply and the interior of the settling tank below the level of the beverage in the tank, a valve controlling the flow of beverage from the source of supply to the interior of the tank, means for operating the valve in response to pressure variations in the settling tank including a rod operatively connected to said valve and movable by said pressure responsive means, a float operated by the beverage in the settling tank and guided by the rod, and a pressure relief valve actuated by said float.

9. In carbonated beverage dispensing equipment, a settling tank, means establishing communication between a source of carbonated beverage supply and the interior of the tank, a valve controlling the flow of beverage from the source of supply to the tank and located in said tank adjacent the bottom thereof with the discharge side opening into the tank below the level of the beverage in the tank, means responsive to variations in pressure in the tank to operate said valve including a rod connected to the valve and movable by said pressure responsive means, and a pressure relief valve for the tank responsive to variations in the level of the beverage in the tank.

10. In carbonated beverage dispensing equipment, a settling tank, means establishing communication between a source of carbonated beverage supply and the interior of the tank, a valve controlling the flow of beverage from the source of supply to the tank and located in said tank adjacent the bottom thereof with the discharge side opening into the tank below the level of the beverage in the tank, means responsive to variations in pressure in the tank to operate the valve including a rod operatively connected to the valve and movable by said pressure responsive means, a float slidably supported on the rod and responsive to variations in the level of the beverage in the tank, and a pressure relief valve for the tank operated by said float.

11. In carbonated beverage dispensing equipment, a settling tank having an opening through one wall thereof, a closure cap for said opening, a beverage intake conduit carried by the closure cap and extending into the settling chamber, a

valve also carried by the closure cap and controlling communication between the lower end of the intake conduit and the interior of the settling chamber, and means mounted on the closure cap and responsive to the pressure of the gas liberated by the beverage in the settling tank to operate said valve.

12. In carbonated beverage dispensing equipment, a settling tank having an opening through one wall thereof, a closure cap for the opening, a beverage intake conduit carried by the closure cap and extending into the settling tank below the level of the beverage, a valve carried by the closure cap controlling the flow of the beverage to the interior of the settling tank, a beverage outlet conduit carried by the cap and communicating with the interior of the settling tank below the level of the beverage in the latter, and a pressure regulator mounted on the beverage cap and operatively connected to the valve for actuating the latter.

13. In carbonated beverage dispensing equipment, a settling tank having an opening in one wall thereof, a closure cap for the opening, means establishing communication between a source of beverage supply and the interior of the tank including a valve supported in the settling tank below the level of the beverage and carried by the closure cap, a pressure regulator mounted on the closure cap for actuating the valve, and a pressure relief valve for the settling tank also carried by the cap.

14. In carbonated beverage dispensing equipment, a settling tank having an opening in one wall thereof, a closure cap for the opening, means establishing communication between a source of carbonated beverage supply and the interior of the settling tank, a valve controlling the flow of beverage from the source of supply to the interior of the settling tank and carried by the closure cap, a pressure regulator for actuating the valve and mounted on the closure cap, a float carried by the closure cap and located in the settling tank, and a pressure relief valve mounted on the closure cap and actuated by the float.

15. In carbonated beverage dispensing equipment, a settling tank having an opening in one wall, a closure cap for the opening, a beverage intake conduit carried by the cap and extending downwardly into the settling tank, a valve carried by the cap controlling the flow of beverage from the lower end of the conduit into the settling tank, a pressure regulator mounted on the closure cap above the valve, a float carried by the closure cap and responsive to variations in the level of the beverage in the settling tank, a pressure relief valve mounted on the closure cap and operated by the float, and a beverage outlet conduit carried by the cap and communicating with the interior of the settling tank adjacent the lower end thereof.

16. In carbonated beverage dispensing equipment, a settling tank adapted to receive a high pressure carbonated beverage to permit settling of the same, a chamber exteriorly of the tank in heat conducting relation with the side walls of said tank and communicating at a point adjacent the upper end thereof with a source of carbonated beverage under pressure, valve control means establishing communication between the lower end portion of the chamber and the interior of the settling tank at a point below the level of the beverage, and refrigerating means arranged in said chamber to cool the beverage as it passes through the chamber to the tank.

17. In carbonated beverage dispensing equipment, a settling tank adapted to receive a high pressure carbonated beverage to permit settling of the same, a chamber arranged exteriorly of the tank in heat conducting relationship with the side walls of the tank and communicating at a point adjacent the upper end thereof with a source of carbonated beverage under pressure, means establishing communication between the lower end portion of the chamber and the interior of the settling tank at a point below the level of the beverage in said tank, a valve operated by the pressure of the beverage in the settling tank for controlling communication between said tank and chamber, and means located in the chamber for cooling the beverage passing through said chamber to the tank.

18. In carbonated beverage dispensing equipment, a settling tank adapted to receive a high pressure carbonated beverage to permit settling of the same, a chamber surrounding the tank in heat conducting relation with the side walls thereof and communicating adjacent the upper end with a source of carbonated beverage under pressure, means establishing communication between the lower end portion of the chamber and the tank at a point below the level of the beverage in said tank including a valve controlled by the pressure of the gas liberated from the beverage in the tank, and a refrigerating coil encircling the tank and housed in said chamber for cooling the beverage during its passage through said chamber to said valve.

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