Jan. 2, 1951 E. H. THOMPSON 2,536,400

APPARATUS FOR TREATING AND DISPENSING LIQUIDS

Filed Oct. 30, 1946 2 Sheets-Sheet 1

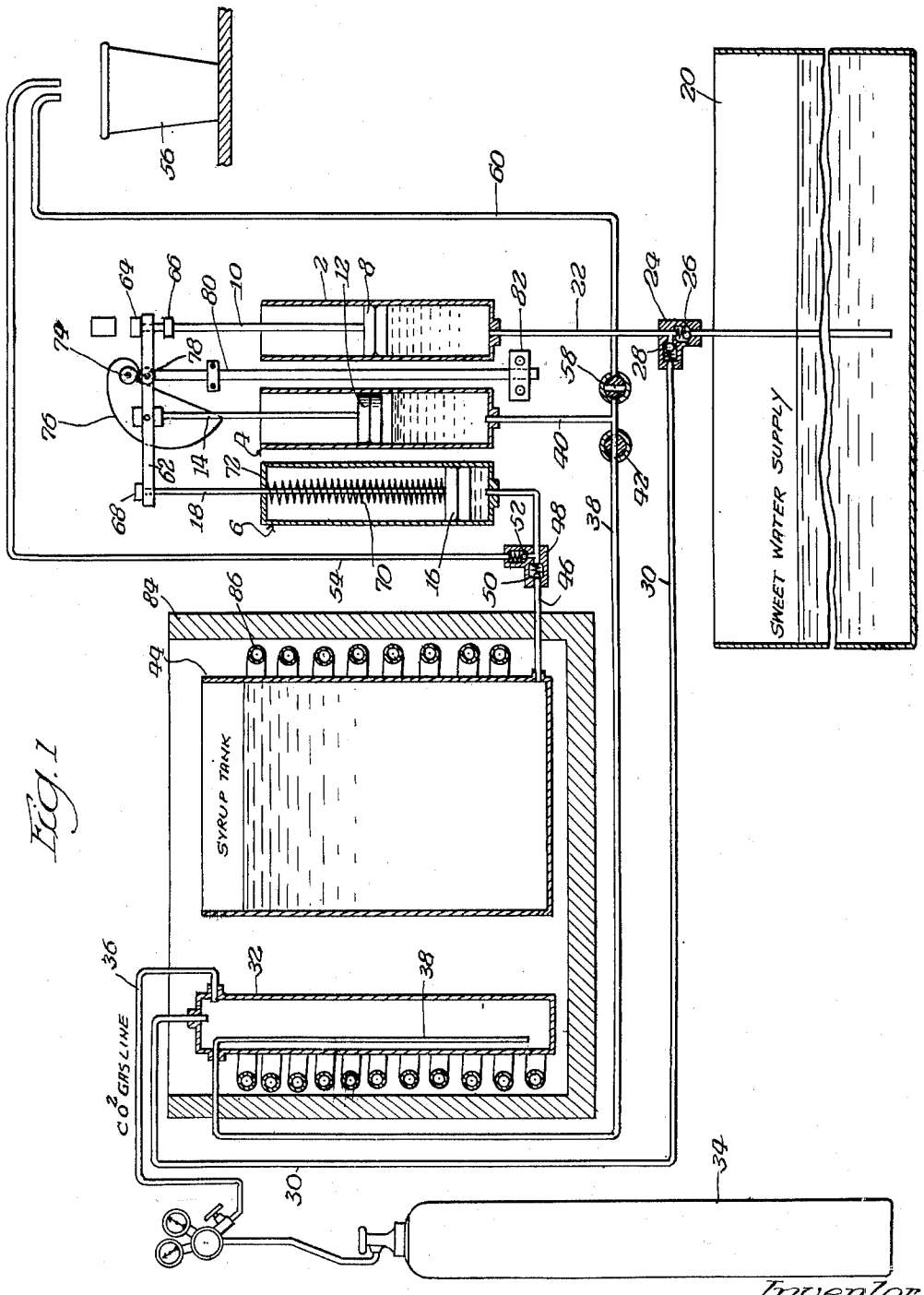


FIG. 1

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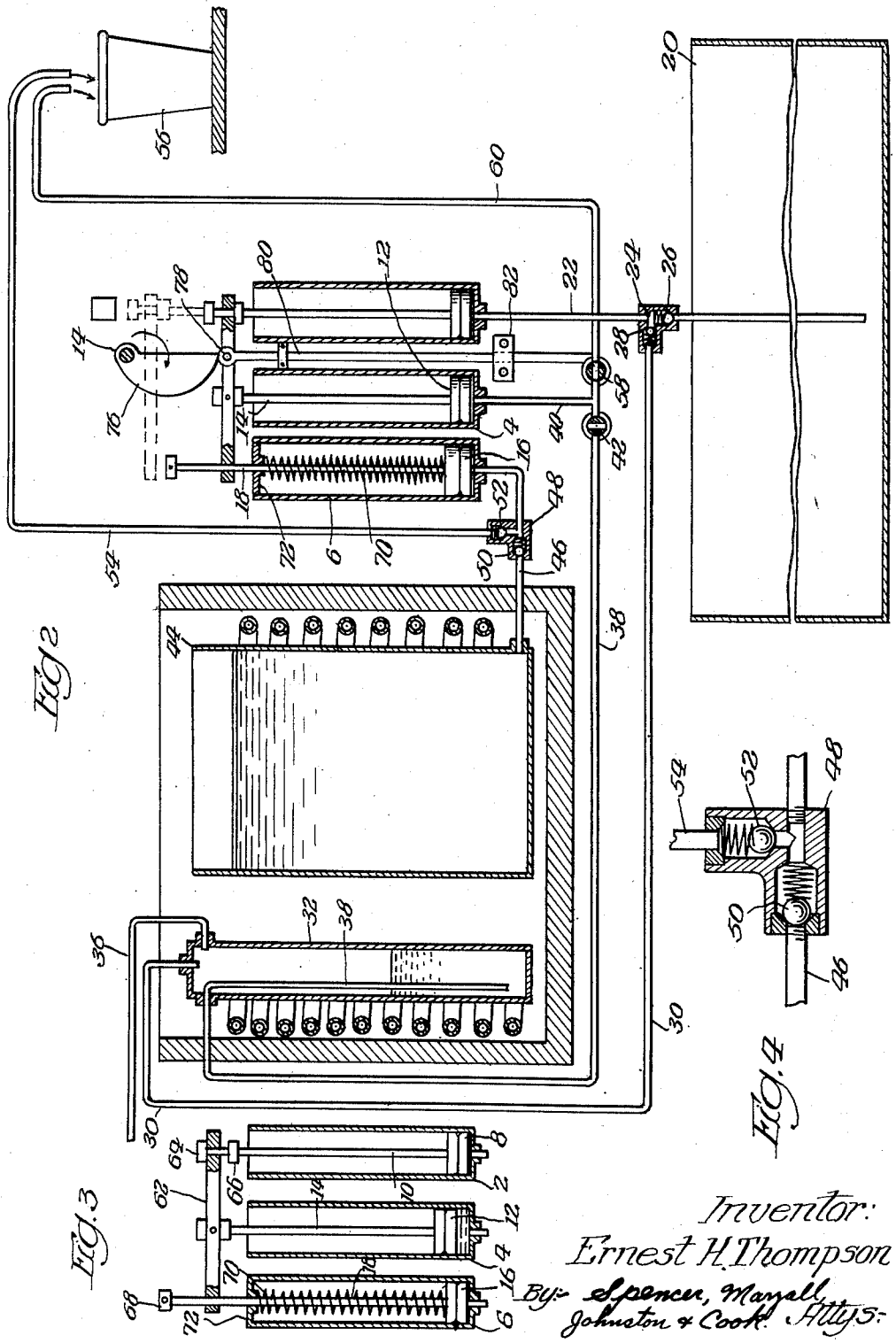


FIG. 2

FIG. 4

FIG. 3

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APPARATUS FOR TREATING AND DISPENSING LIQUIDS

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1 Claim. (Cl. 225—21)

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This invention relates in general to an apparatus for treating and dispensing liquids, and in particular to a beverage dispensing apparatus.

While the invention herein is concerned broadly with an apparatus for imparting a treatment to liquids, such as water, and then dispensing the liquid so treated, the specific application has to do with the dispensing of beverages wherein a liquid such as water may be carbonated, heated or cooled and then mixed with a syrup, if desired, for beverage purposes. The apparatus disclosed herein illustrates one embodiment of the invention and is directed particularly to an apparatus wherein water may be carbonated and then dispensed and mixed with a syrup for making a beverage. The broad term "treating" as used herein indicates some operation to be performed upon the liquid before dispensing, which operation may include the carbonation of the water, the heating thereof or the cooling of such water.

Heretofore it has been common practice in beverage dispensing machines to maintain a body of cooled carbonated water which was mixed in a chamber with the syrup and then dispensed as a beverage. In carrying out the procedure necessary for that type of apparatus the time involved in the mixing and dispensing steps is a vital factor especially in coin-controlled beverage vending machines, and the apparatus of this invention shortens considerably the time necessary for the carbonating and mixing steps, because the carbonation takes place before dispensing each drink, and the syrup and carbonated water are dispensed separately but simultaneously into a receptacle and the mixing takes place therein during the dispensing step. If desired, the syrup may be omitted and the apparatus may then dispense carbonated water. On the other hand, if a hot drink is to be dispensed, the treatment carried out by the apparatus may be the heating of the water or other liquid before dispensing, at which time it may be mixed with other ingredients to produce the final beverage. The treatment may also consist of merely a cooling operation which takes place before the dispensing step.

It is one of the objects of the present invention to provide a novel apparatus for treating and dispensing liquids wherein the treatment may consist of carbonating, heating, cooling and the like.

Another object of the invention is to provide an apparatus for treating and dispensing liquids wherein treated and untreated liquids are transferred to intermediate chambers from which the

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treated liquid is dispensed and the untreated liquid is transferred to a treating chamber.

A further object of the invention is to provide an apparatus for treating and dispensing liquids, where liquid is transferred from a source of supply and treated prior to dispensing.

Still another object is to provide an apparatus wherein liquid is withdrawn from a source of supply, then carbonated, heated or cooled for beverage purposes, and then dispensed.

A still further object is to provide an apparatus wherein treated and untreated liquids are simultaneously drawn into a chamber from which the treated liquid is dispensed at the same time the untreated liquid is transferred to a treating chamber.

Another and more specific object is to provide an apparatus for carbonating and dispensing water wherein carbonated water and sweet water are simultaneously deposited in an intermediate chamber from which the carbonated water is dispensed, while the sweet water is being transferred to a carbonator.

Still another object is to provide an apparatus for dispening beverages wherein syrup, carbonated water and sweet water are all deposited in separate containers from which the syrup and carbonated water are dispensed and mixed to form a beverage, while the sweet water is being transferred to a carbonator in readiness for the next dispensing operation.

Other objects and advantages of the invention will become apparent upon a reading of the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a somewhat diagrammatic side elevation of the apparatus shown immediately prior to the dispensing operation;

Fig. 2 is a similar diagrammatic view of the apparatus at the completion of the dispensing step and showing the parts as they appear normally when the apparatus is not in operation;

Fig. 3 is a view of the pumps showing an intermediate position of the pistons therein; and

Fig. 4 is a fragmentary enlarged vertical section through the check valves.

As mentioned above, the specific form of the invention disclosed herein illustrates an apparatus for the carbonating of water and the dispensing of a beverage formed by the mixing of the carbonated water and a syrup. As used herein the term "sweet water" indicates plain uncarbonated water. Briefly, the invention consists in providing a source of sweet water supply and a chamber wherein the sweet water is transferred

for the treatment thereof, which treatment may consist either of carbonating, heating, cooling and the like. An intermediate transfer station is provided in the apparatus which may consist of a plurality of pumps each including a cylinder and a piston adapted to reciprocate therein. In the normal or static condition of the apparatus all of the pumps are empty and the treating chamber has a quantity of treated liquid therein. The first step in the operation of the apparatus is to open a valve which permits the treated liquid to move into one of the pumps which operates all of the pistons, at which time sweet water is drawn into one cylinder while syrup is drawn into another. At this point, the three cylinders illustrated each contains a quantity of liquid, one being sweet water, one carbonated water and the other syrup. In the next operation, the pistons are moved to eject the liquid from all of the cylinders substantially simultaneously at which time the syrup and carbonated water are dispensed into a receptacle and the sweet water is transferred to the chamber for a treatment such as carbonation.

Referring now more particularly to the drawings, I have illustrated three such pumps wherein the cylinders thereof are indicated by the numerals 2, 4 and 6. It will be evident that if carbonated water or other liquid which has been treated is to be dispensed without the use of syrup, then one of the pumps may be omitted. The cylinder 2 is provided with a reciprocating piston 8 therein which is secured to a piston rod 10 extending upwardly through the open upper end thereof. Likewise, the cylinder 4 is provided with the piston 12 and piston rod 14, while the cylinder 6 has the piston 16 and piston rod 18 located therein.

A source of sweet water supply 20 may be located adjacent the apparatus, or the source may, if desired, constitute the tap of a main water line. In any event, the source of sweet water supply 20 is connected by means of conduit 22 to one end of the cylinder 2, so that as the piston 8 moves in one direction, it will draw a quantity of sweet water into the cylinder. At a suitable location in the conduit 22 a check valve housing 24 is located, having the two check valves 26 and 28 therein at substantially right angles to each other, so that the valve 26 is in the conduit 22 and valve 28 is in a conduit 30. This conduit extends upwardly so that the end thereof leads to the chamber 32 which, in the form of the invention illustrated, constitutes a carbonator.

In the up-stroke of the piston 8, it will be evident that sweet water will be drawn against the pressure of the valve 26 into the cylinder 2 and on the down-stroke of the piston, the sweet water will be ejected through the conduit 22 and against the pressure of the check valve 28. This pressure will maintain the valve 26 in closed position so that the sweet water will be directed through the conduit 30 and into the chamber 32. If this chamber is adapted to carbonate the water thus transferred thereto, any suitable source of carbon dioxide such as the tank 34 may be used which has a line 36 connected from the tank 34 to the chamber 32. This chamber, then, will always be supplied with a quantity of carbon dioxide so that as the sweet water enters the chamber, it will automatically become carbonated.

Another conduit 38 extends downwardly into the chamber 32 and is connected by the conduit 40 to the lower end of the cylinder 4. The conduit 38 is provided with a positive valve 42 which is normally in a closed position, as shown in Fig. 2, but when this valve is opened, the pressure of the gas in the chamber 32 will force the carbonated water upwardly through the conduits 38 and 40 and into the cylinder 4, thus elevating the piston 12.

A source of syrup supply may be in the form of a syrup tank 44 at the lower end of which a conduit 46 is connected to the lower end of the cylinder 6, so that as the piston 16 therein is moved from its normal position shown in Fig. 2 to its elevated position shown in Fig. 1, it will draw a quantity of syrup out of the tank 44 and into the cylinder 6. A check valve housing 48 is located in the conduit 46 and contains the check valves 50 and 52, the valve 50 being in the line 46 and the valve 52 being located in a conduit 54 which leads to a receptacle 56 of any suitable form. The valves 50 and 52 are so arranged that upon upward movement of the piston 16, the syrup will be drawn against the pressure of the valve 50, but when the piston 16 is lowered, the force of the liquid being ejected from the cylinder will maintain the valve 50 closed but will force the valve 52 open so that the syrup will be forced through the conduit 54 and into the receptacle 56.

A second positive valve 58 is located in a conduit 60 which is also connected with the conduit 40 and which contains the carbonated water. After the cylinder 4 has a sufficient quantity of carbonated water therein, the valve 42 will be closed and the valve 58 will be opened (see Fig. 2). Some of the gas will escape from the water in cylinder 4 and provide a pressure head thereon, whereby, upon the opening of valve 58, the gas pressure will force the water outwardly therefrom through the conduits 40 and 60 to thus carry the carbonated water also to the receptacle 56 and permit a lowering of the various pistons. The apparatus is so designed as to permit the carbonated water and syrup both to be dispensed simultaneously so that they will become mixed as they enter the receptacle to form the beverage.

Since it is highly desirable that all of the liquids, both treated and untreated, be transferred simultaneously to the cylinders making up the intermediate transfer station, there must be some means to cause the simultaneous action of the pistons therein. To accomplish this result, I provide a connecting cross bar 62 which is secured directly to the piston rod 14 and extends on either side thereof to embrace the piston rods 10 and 18. At this point it should be brought out that in dispensing beverages into a receptacle capable of receiving a predetermined amount of liquid it is important to remove from the carbonator 32 the same amount of water that has been added to it. That is to say, if, for example, six ounces of water is delivered to the carbonator, it is important that six ounces be removed therefrom. To this end two important details must not be overlooked, first, the tube 38 should be spaced from the bottom of the chamber 32, and second, the piston 12 should be arranged to move upwardly a greater distance than the piston 8. When the gas forces the carbonated liquid out of the chamber 32, it must all be removed therefrom down to the bottom of the tube 38. Initially the liquid level is even with the bottom of the tube, so that when the liquid from the cylinder 2 is transferred to the chamber 38, it will be added to the liquid already there, and when it is removed therefrom, the liquid level will return to its initial position, thus insuring that the same amount of liquid will be removed from the cham-

ber that was added thereto, each time the device cycles.

Furthermore, when the carbonated water enters the cylinder 4, a certain amount of gas will be expelled above the surface thereof, so that provision must be made for this cylinder to receive not only the full amount of water, but also the gas expelled therefrom. This total volume of gas and water will be greater than the original volume of water alone, so it becomes necessary to move the piston 12 upwardly a greater distance than the piston 8, as may be seen in Fig. 1 where all of the pistons are in their uppermost position. To accomplish this result, I provide spaced stop members in the form of upper and lower collars 64 and 66 on the piston rod 10. The lower collar 66 will be contacted by the end of the connecting bar 62 in the downward movement of the piston 12, but when the piston 12 is moved upwardly from its position as shown in Fig. 2, the bar 62 must first traverse the distance between the upper side thereof and the lower side of the collar 64 on the piston rod 10 before the upward movement of the piston 8 begins. Thus it will be seen in Fig. 3 that when the carbonated water moves the piston 12 upwardly it is moved a short distance before the piston 8 begins its upward movement to thus compensate for the greater volume of carbonated water and gas in the cylinder 4 over the volume of sweet water in the cylinder 2.

It will be evident that the volume of syrup necessary in the ordinary mixing of beverages will be considerably less than the volume of carbonated water which is to be mixed therewith. For this reason it is necessary to arrange the piston and piston rod, 16 and 18, in the cylinder 6 so that they will move upwardly a very short distance to draw in a small quantity of syrup from the tank 44. The arrangement by which this is accomplished consists of a single collar 68 secured to the upper end of the piston rod 18 passing through the other end of the bar 62, such bar being freely movable along the length of the piston rod 18 until it reaches the collar 68. It will be noted in Fig. 2 that the bar 62 is in its lowermost position, at which time the piston rod 18 extends upwardly a considerable distance above the bar 62. As this bar moves upwardly when the carbonated water enters the cylinder 4, it will almost reach its extreme upper position before it contacts the collar 68 on the piston rod 18. At this point the final upward movement of the bar 62 will carry with it the piston rod 18 and the piston 16 connected thereto in order to draw a small quantity of syrup into the cylinder 6 from the tank 44. As the bar 62 moves downwardly during ejection of the carbonated water and the sweet water, it will move freely along the piston rod 18 so that additional means must be provided to move the piston 16 downwardly. In order to do this, I provide a coiled compression spring 70 which is located around the piston rod 18 within the cylinder 6 and which bears at one end against a cover plate 72 at the upper end of the cylinder and at its other end against the upper side of the piston 16. It will thus be apparent that as soon as the bar 62 begins its downward movement, the force of the spring 70 will urge the piston 16 downwardly simultaneously with the downward movement of the pistons 8 and 12, thus ejecting all three liquids from their respective cylinders simultaneously.

A main operating shaft 74 is utilized in such a way that one revolution thereof will complete a cycle of the apparatus wherein the liquid is treated and dispensed. To accomplish this result, a cam 76 is secured to the shaft 74 and is adapted to bear against a cam follower 78 mounted on the bar 62 and at the upper end of a reciprocating rod 80. This rod extends downwardly and is suitably supported and guided by means such as a bracket 82 which permits the rod to freely slide in a vertical direction. This rod 80 is shown in its normal lowermost position in Fig. 2 when the cam 76 has the extreme outer point thereof against the cam follower 78. After the valve 42 has been opened, the shaft 74 will begin to rotate and as soon as the outer end of the cam 76 is moved away from the cam follower 78 to its position shown in Fig. 1, the rod 80 will be free to move upwardly and will do so under pressure of the incoming carbonated liquid against the piston 12, carrying with it the bar 62. From the position of the cam 76 shown in Fig. 1, it continues to rotate in a clockwise direction after closing the valve 42 and opening the valve 58, and will begin the downward movement of the bar 62 which carries the various piston rods with it to eject the fluids as explained above.

The chamber 32 and the tank 44 may preferably be located within an enclosure 84 within which cooling coils 86 may be located to cool the syrup and the carbonated water. If the treatment to be imparted to the liquid in the chamber 32 is a cooling or heating operation instead of carbonation, the carbonator may be dispensed with and the cooling coils 86 may function normally to cool the liquid or, heating coils may be substituted therefor to heat the liquid.

The operation of the device is briefly as follows:

From the position of the various parts shown in Fig. 2, the first step is to open the valve 42. This may obviously be done by hand or, if the apparatus is embodied in a machine, any suitable means, mechanical or electrical, can be provided to automatically open this valve. The shaft 74 then begins to rotate and again this rotation may be caused by manual means or, if the apparatus is embodied in a machine, any suitable mechanical or electrical means can be provided to cause such rotation. In any event, after the valve 42 is open and the valve 58 remains closed, upon rotation of the shaft 74 in a clockwise direction, the force behind the carbonated liquid in the chamber 32 will force the liquid through the conduit 38, into the conduit 40 and upwardly into the cylinder 4. This action will cause the piston 12 and its piston rod 14 to move upwardly, thus carrying with it the connecting cross bar 62. The initial movement of these parts position the pistons as shown in Fig. 3, where the piston 12 has moved upwardly a short distance to compensate for the increased volume of the carbonated water. The piston 12 continues to move upwardly and carries with it the connecting bar 62, which elevates the piston 8 upon contacting the collar 64 on the piston rod 10. As the piston 12 reaches the upper limit of its movement, the bar 62 comes into contact with the collar 68 on the piston rod 18, thus elevating the piston 16. Elevation of the piston 8 will draw sweet water from the source of supply into the cylinder 2 and elevation of the piston 16 will draw a predetermined quantity of syrup from the tank 44 into the cylinder 6. When all of the pistons have reached their uppermost position, valve 42 will then be closed, either manually

or by any suitable mechanical or electrical means, and the valve 58 will be opened as shown in Fig. 2. Meanwhile the shaft 74 has continued to rotate, carrying with it the cam 76 so that from the position shown in Fig. 1 the bar 62 will move downwardly and the three pistons, 8, 12 and 16, will also move downwardly as above explained. At this point the sweet water will be transferred from the cylinder 2 into the chamber 32 through the conduits 22 and 30. Simultaneous with this action, the carbonated water will be transferred from the cylinder 4 to the receptacle 56 through the conduits 40 and 60, by reason of the open valve 58. The syrup in the cylinder 6 will also be transferred to the receptacle 56 through the conduits 46 and 54 where it will be mixed with the carbonated water to form the beverage.

From the foregoing it will be evident that I have provided improved means for treatment of a liquid and dispensing the same, particularly for beverage purposes. The apparatus is adapted for manual use or it can be embodied in a machine, either coin-controlled or otherwise, wherein the operation of the shaft 74 and the opening and closing of the valves 42 and 58 may be accomplished by mechanical or electrical means. The principle underlying the invention involves the simultaneous transfer of treated and untreated liquids to an intermediate station from which the treated liquid is dispensed, while the untreated liquid is being transferred to a treating chamber. This action considerably shortens the time necessary for the treating and dispensing of a liquid from other apparatus used heretofore. An added advantage in the mixing of carbonated beverages is present in this device, in that, the conduit 60 will always be free from any liquid after the completion of a cycle. The gas above the liquid in the cylinder 4 will force the liquid outwardly and will follow the liquid to the receptacle, thus completely emptying the conduit through which it passes. It will be obvious that certain changes in the form, construction and arrangement of parts can be made without departing from the spirit of the invention or sacrificing any of the attendant advantages thereof, provided such changes fall within the scope of the appended claim.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

A beverage carbonating and dispensing apparatus, comprising a source of sweet water supply, a source of syrup supply, a carbonator adapted to receive a quantity of sweet water for carbonation, a plurality of cylinders, a reciprocable piston in each cylinder, means connecting at least some of said pistons together whereby substantially simultaneous movement thereof will occur, means to deliver carbonated water from the carbonator to one of said cylinders under pressure whereby to move the piston therein and cause movement of the pistons in the other cylinders connected thereto, the movement of said other pistons acting to draw into the respective cylinders a quantity of syrup from the source of syrup supply and a quantity of sweet water from the source of sweet water supply, and means for moving said pistons in the opposite direction to thereby dispense the syrup and carbonated water into a receptacle for mixing, and to transfer the sweet water to said carbonator for carbonation.

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