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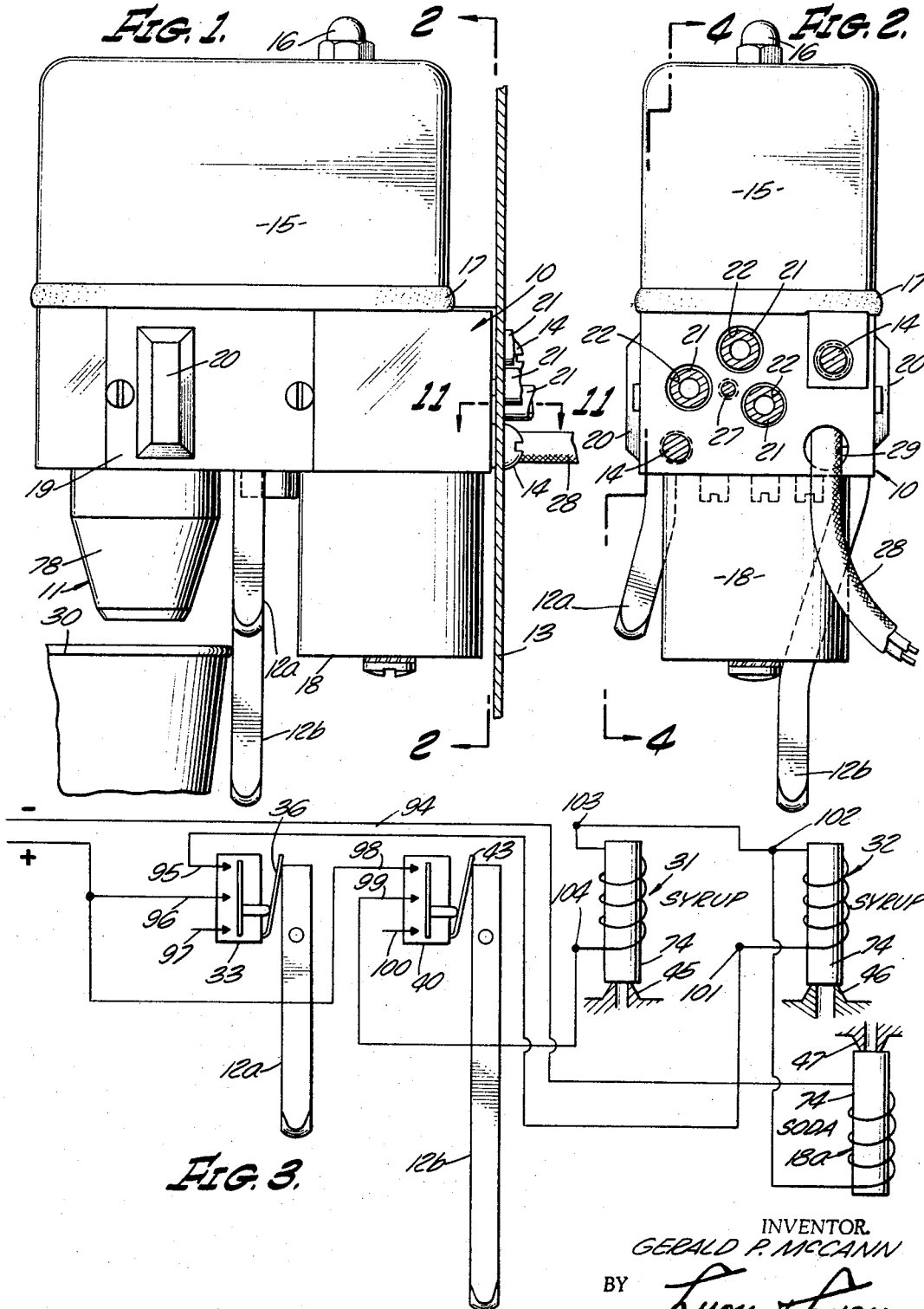
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3,396,871

BEVERAGE DISPENSING UNIT

Filed July 15, 1966

3 Sheets-Sheet 1



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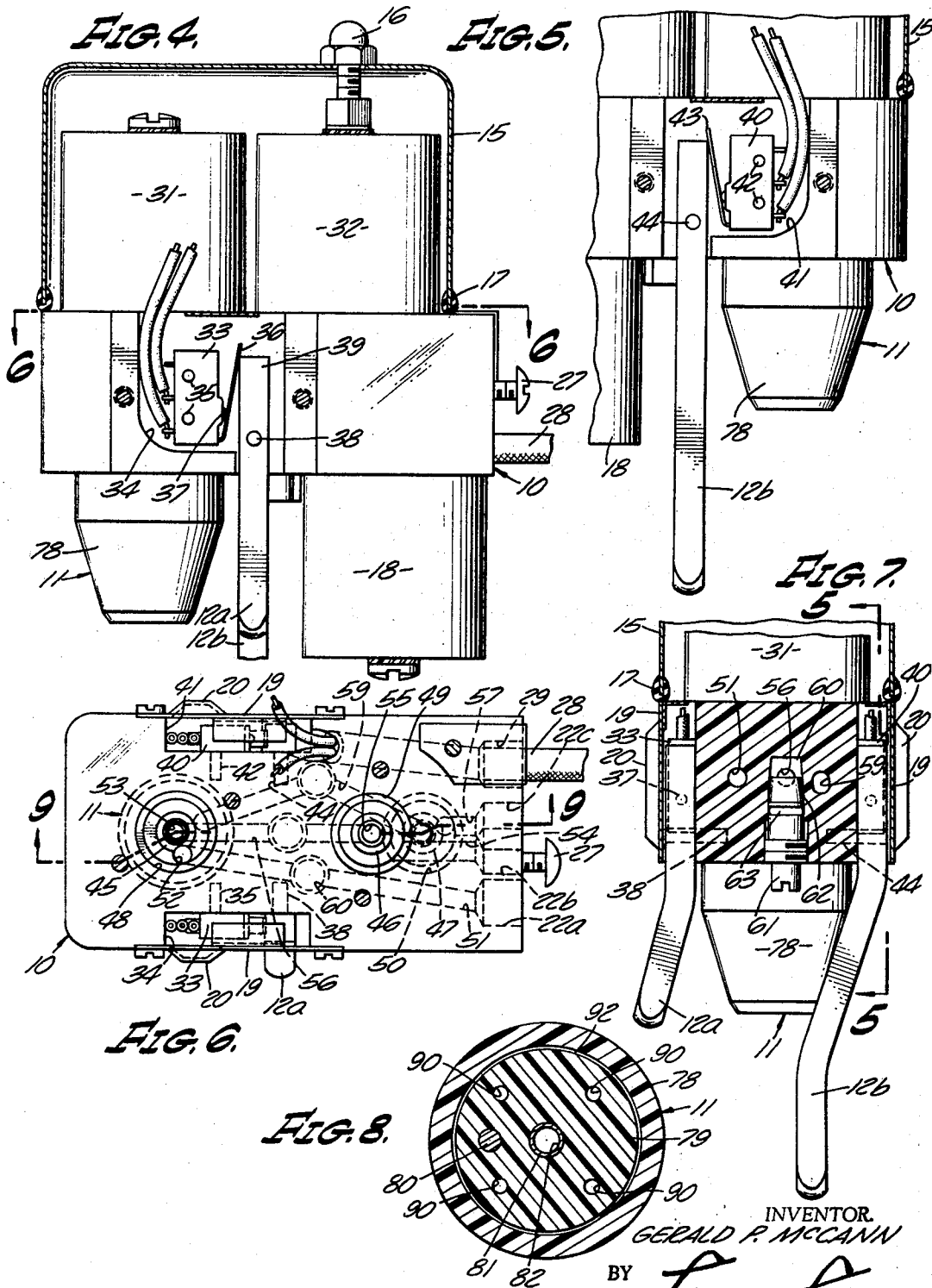
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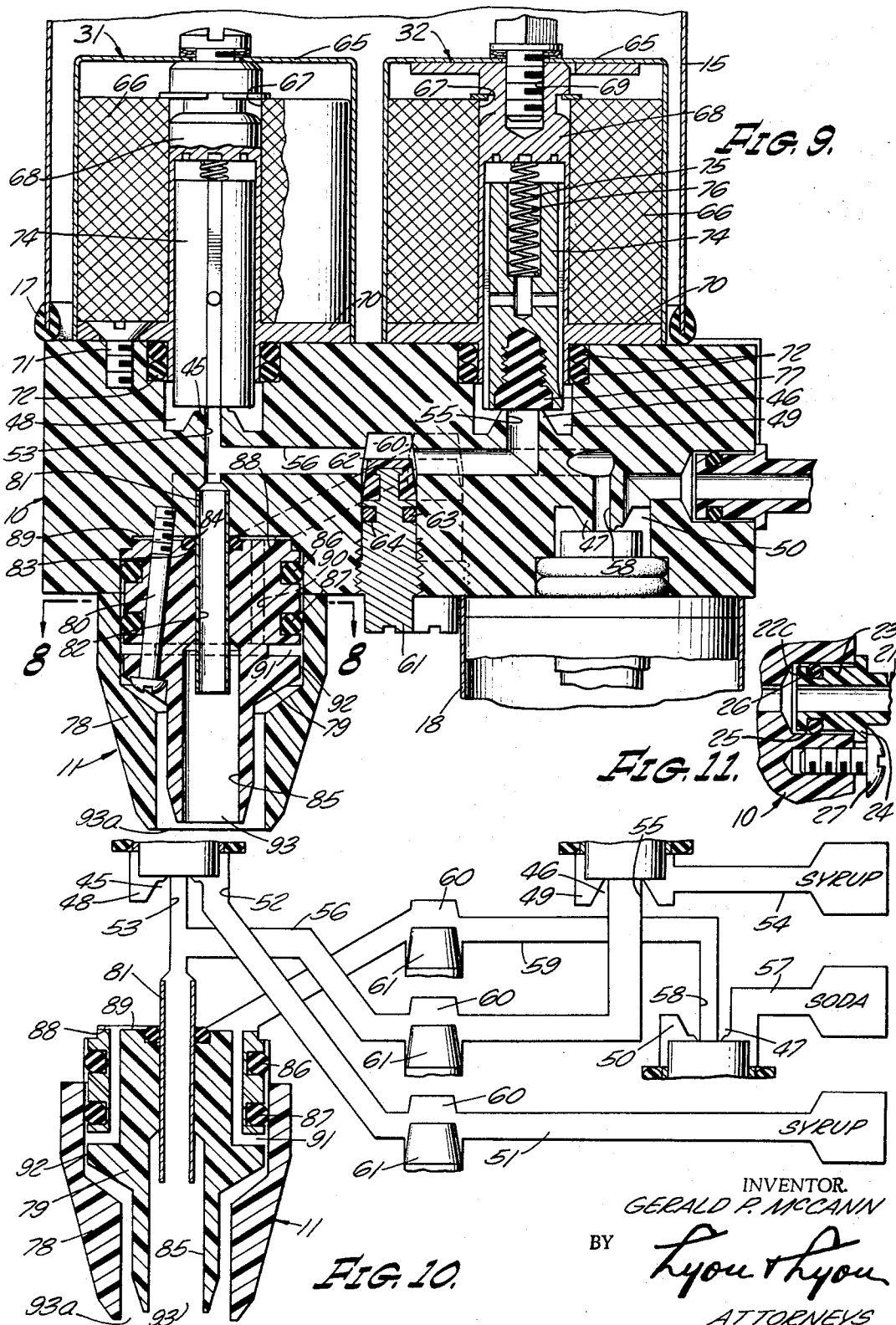
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3 Sheets-Sheet 3



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BEVERAGE DISPENSING UNIT

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ABSTRACT OF THE DISCLOSURE

A beverage dispensing and mixing unit having a plurality of valve means adapted to be connected to separate liquid reservoirs whereby the valves can be actuated a number of ways in order to dispense more than one mixture from the unit. The body of the unit contains the valve means and has the fluid passages formed integrally with the body so as to facilitate assembly and prevent leaks. The unit also includes a diffuser nozzle of a design that permits the mixing of various combinations of beverages without intermixing flavors.

The present invention generally relates to valves used for dispensing certain types of beverages. Particularly, this invention provides a dispensing valve of the type wherein beverages, in syrup form, are combined or mixed with still or carbonated water, or both, at or near the diffuser nozzle. A novel feature of this device is the provision of a number of automatically actuated valves in a single dispenser unit by which a number of mixing schemes may be executed to dispense a variety of beverages from a single dispenser without further adjustment or connection being made. In addition, a novel form of diffuser nozzle is provided which more efficiently mixes the ingredients as they are dispensed.

It is an object of the present invention to provide a dispenser with which a variety of combinations of ingredients may be made and dispensed automatically.

It is a further object of the present invention to provide a dispenser unit having two or more electrically actuated valves which can be operated in various combinations to mix and dispense a variety of different beverages automatically.

It is also an object of this invention to provide an improved form of diffuser nozzle for a dispenser unit which operates to more efficiently intermix the ingredients as they are being dispensed.

A more specific object of the present invention is to provide a single dispenser unit having two or more valves, in which the dispenser body is constructed of a single piece wherein the valves and fluid passages have been integrally formed in said body, thereby eliminating complicated tubing and connections and preventing most sources of leakage.

Further objects and advantages will become apparent upon reading the following description together with the accompanying drawings in which:

FIGURE 1 is a side elevation of the dispenser unit shown mounted to a wall panel with a container placed below the nozzle.

FIGURE 2 is a rear elevation taken along line 2-2 of FIGURE 1.

FIGURE 3 is a schematic diagram of one method of electrically connecting the valves in the present invention.

FIGURE 4 is a side elevation similar to FIGURE 1, partially in section, taken along line 4-4 of FIGURE 2.

FIGURE 5 is a partial, sectional side elevation of the opposite side from that shown in FIGURE 4 taken along line 5-5 of FIGURE 7.

FIGURE 6 is a top view of the dispenser body taken

along line 6-6 of FIGURE 4, showing the internal fluid passages therein.

FIGURE 7 is a partial, sectional rear-end view taken substantially through the center of the dispenser body.

FIGURE 8 is a sectional plan view of the diffuser nozzle taken along line 8-8 of FIGURE 9.

FIGURE 9 is an enlarged sectional side view taken along line 9-9 of FIGURE 6.

FIGURE 10 is a diagrammatic view of the fluid passages, valves and diffuser nozzle.

FIGURE 11 is a sectional detailed view taken along line 11-11 of FIGURE 1 showing a means for retaining the fluid supply conduits in the dispenser body.

The dispenser consists of a unit body 10 having a nozzle outlet generally denoted 11 with one or more actuating levers 12, and body 10 is adapted to be mounted to a stand or wall panel 13 by means of screws 14. Above the unit body 10 there is a substantially rectangular housing 15 secured to said body 10 by fastener 16, and housing 15 has a rubber gasket 17 mounted upon the lower periphery thereof to form a sealing relationship with the upper side of unit body 10. Mounted below the body 10 is a cylindrical housing 18 in which is contained the lower valve actuating device which will be more clearly described later. Cover plates 19 are mounted on each side of body 10 and have an elongated protruding portion 20 designed to provide clearance for the microswitches mounted inside plates 19.

As shown in FIGURE 1, three liquid conduits 21 are shown entering the rear of unit body 10 through the wall section 13. In order to retain each of these three conduits 21 in the body 10, an enlarged inlet aperture 22 is drilled in the rear of body 10 adapted to receive a flanged coupling member 23 connected to the end of the conduits 21. Coupling member 23 is provided with an annular flange 24 adapted to bear against the outer periphery of aperture 22. In order to provide an improved seal, an annular groove 25 is cut near the end of coupling member 23 and O-ring 26 is inserted therein. A retaining screw 27 is threaded directly into the rear of body 10 whereby the head of screw 27 will overlap the annular flange 24 thereby retaining the coupling member 23 tightly in the aperture 22. As shown in FIGURE 2, the three apertures 22 provided for the introduction of three types of fluid into the dispenser unit body 10, are so positioned that the head of retaining screw 27 can retain each of the coupling members 23 in its respective aperture by overlapping a portion of each of the annular flanges 24 thereof. By this means, a single fastener can be used to keep all three fluid conduits in their proper place.

As shown in FIGURES 1, 2 and 4, an electrical conduit 28 enters the unit body 10 through aperture 29 to provide power to actuate the solenoid valves. A cup or glass 30 is shown below the outlet nozzle 11 in FIGURE 1 and the edge of this cup 30 is shown bearing against one of the actuating lever arms 12. By forcing one or the other of these lever arms 12 backward, the valves in the dispenser unit are actuated dispensing one or more of the fluids, depending upon the configuration of the electrical connection already made.

In FIGURE 4, the upper housing 15 is cut away exposing the two solenoid coils 31 and 32. In addition, the cover plate 19 is removed exposing the microswitch 33 mounted in the cavity 34 in the side of unit body 10, and retained in position by a pair of horizontally extending pins 35 which extend through openings in the body of microswitch 33. Switch 33 has an outwardly extending switchblade 36 attached at its lower end to the body of switch 33 and adapted to contact the switch button 37. The short actuating lever 12a is pivotally mounted on a horizontal shaft 38 so that its upper end 39 comes in contact with switchblade 36. Thus, when the lower end of

actuating lever 12a is pushed rearwardly, the upper portion 39 will coact with switchblade 36 to actuate micro-switch 33.

As seen in FIGURE 5, the other side of the dispenser unit is likewise provided with a microswitch 40 mounted in the cavity 41 of unit body 10. Switch 40 is mounted on a pair of horizontally extending pins 42 and has an upwardly extending switchblade 43. The longer of the actuating levers designated 12b is mounted in this cavity 41 and pivots about the pin 44 so as to coact with switchblade 43 in order to actuate switch 40 in the manner similar to that already described.

Referring now to FIGURE 6, the dispenser body 10 is constructed from a single piece of material, here shown as plastic. The upper housing 15 is shown removed as well as the solenoid coil units 31 and 32, exposing the two upper valve seats 45 and 46, shown in full lines, and the lower valve seat 47 shown in dotted lines. These three valve seats 45, 46 and 47 are perhaps more clearly shown in FIGURE 9 and are surrounded each by a valve chamber 48, 49 and 50 respectively. A first fluid passage 51 extends from the first aperture 22a to the valve chamber 48 and communicates with said valve chamber by the final upwardly extending portion 52 of the passage 51. For the purposes of clarity, the section view in FIGURE 9 eliminates fluid passage 51, but it may be seen as diagrammatically represented in FIGURE 10. Valve seat 45 has a vertical bore 53 providing a passage down into the dispensing nozzle 11.

A second fluid passage 54 extends from aperture 22b into valve chamber 49. Valve seat 46 likewise has a vertical bore 55 in the center thereof which extends partially downward in the body 10 and then joining a secondary passage 56 which extends longitudinally to a point where it joins the vertical bore 53 and thus communicates with the dispensing nozzle 11. In a similar manner, third fluid passage 57 communicates the aperture 22c with valve chamber 50, and the valve seat 47 in valve chamber 50 has an axial bore 58 therein extending vertically and then connecting to a secondary transverse passage 59 which likewise terminates in the diffuser portion of nozzle 11. The latter two fluid passageways can be seen in the sectional view of FIGURE 9.

Each of the fluid passages 51, 56 and 59 is provided midway along its length with a restricting valve chamber 60, one of which will be described herein as representative. Chamber 60 has a substantially frusto-conical configuration and is provided with a metering slug 61 which is threaded in the body 10. The upper portion 62 of metering slug 61 is formed of an inert material such as nylon and has the same frusto-conical configuration as the chamber 60. An O-ring 63 is mounted in annular groove 64 in order to prevent leakage of fluid past the metering slug 61. Thus, each of the metering slugs 61 may be adjusted to control the amount of fluid which flows in each of the passages, and in fact, one or more passages may be temporarily closed off for certain types of beverage dispensing.

As shown in FIGURE 9, each of the solenoid operated valve units consists of a cylindrical housing 65 surrounding the solenoid coil 66 which is also cylindrical in shape and has an axial bore 67. A central solenoid element 68 extends through the bore 67 and is provided with a tapped hole 69 in its upper end by which the housing 65 can be securely mounted over the solenoid coil 66. Solenoid element 68 has an integrally formed annular flange 70 which provides a means for mounting the solenoid unit to the unit body 10. As shown with respect to the solenoid unit 31, for example, a screw 71 extends through the flange 70 and into the body 10. The lower portion of solenoid element 68 extends into the interior of a valve chamber and is provided with resilient sealing members, herein shown as two O-rings 72, which form a fluid-tight seal between flange 70, element 68 and body 10. Element 68 has a central axial bore 73 extending substantially the

entire length thereof and is adapted to receive the movable valve element 74. A return spring 75 is inserted in a bore 76 of valve element 74 and bears against the upper portion of element 68, thereby normally forcing valve element 74 downward against its valve seat such as 46. In order to provide a better seal at the valve seat 46, valve element 74 may be provided with a resilient insert plug 77. This plug 77 is removable and can be exchanged for a plug of new material. This obviates the difficulty encountered in using resilient sealing members for types of beverages which may cause gradual deterioration of such materials, particularly rubber products. The operation and construction of each of the solenoid operated valves is substantially the same and therefore the above description of the one valve is deemed fully explanatory for each of them.

It may be noted that the fluid passage 55 appears in the drawing to be of a greater diameter than the other fluid passages shown. The reason for this is that in some particular instances, a greater supply of one particular type of fluid may be desired in such proportions that the metering slugs 61 will not be able to adjust for such a proportion without severely restricting the flow in the remaining passages.

The construction and configuration of the diffusing nozzle 11 is shown in FIGURES 8, 9 and 10. Nozzle 11 consists generally of two primary elements, an outer cone 78 and an inner diffuser element 79. Diffuser element 79 is securely attached to body 10 by a screw 80. Element 79 has an axial bore having a different diameter in the upper portion than in the lower portion. The downward extending fluid passage 53 is enlarged and provided with a sleeved insert 81 which is seated in this enlarged portion of passage 53 and extends outward a considerable distance from body 10. The upper bore 82 in diffuser 79 is of such diameter to receive sleeve 81 in a close fitting relationship. Bore 82 is provided with an annular recess 83 near the top thereof, and receives an O-ring sealing member 84. The lower bore 85 of diffuser 79 is somewhat larger than the diameter of sleeve 81, and sleeve 81 extends for some distance into this larger bore chamber.

The upper portion of diffuser 79 thus fits into a circular cavity formed in the underside of body 10 and is provided with two annular grooves extending around its upper portion having O-ring sealing members 86 and 87 positioned therein. The O-ring 86 forms a sealing relationship between diffuser 79 and body 10. O-ring 87 forms a sealing relationship between diffuser 79 and the outer cone 78.

It will be noted that the annular recess 83 is sufficiently shallow so that the O-ring 84 seated therein forms a seal between diffuser element 79, sleeve 81, and body 10. Thus, O-ring 84 biases diffuser 79 slightly down and away from the upper end 88 of the cavity formed in body 10, and a flat annular space 89 is thereby formed between the surface 88 and the top surface of diffuser 79. The fluid passages 56 and 59 open into this annular space 89. A plurality of fluid passages 90 are provided through the body of diffuser 79, and FIGURE 8 shows four such passages 90. These passages communicate with an annular space 91 formed in the body of diffuser 79 thus by-passing the outer seals provided by O-rings 86 and 87. An annular passage 92 is formed between the outer diameter of the diffuser 79 and the inner diameter of the cone 78 leading from space 91 and downward toward the discharge aperture 93 of diffuser bore 85 forming a discharge aperture 93a which is concentric with aperture 93 but which is formed somewhat below aperture 93.

Three fluids can thus be mixed and dispensed in the diffuser nozzle 11 as follows: When all three valves are opened, fluid in passage 51, 52 passes valve 45 and travels down the passage 53 into the central bore 85 of diffuser 79 and thence out the discharge aperture 93 thereof. Similarly, fluid in passage 55, 56 passed by valve 46 will

enter passage 53 and travel downward toward the discharge 93. Fluid in passage 58, 59 will be introduced into the annular space 89 above diffuser 79 where it will pass downward through the vertical passages 90 into annular space 91 through the annular passageway 92 forming a complete cylindrical flow at the aperture 93a concentric with the aperture 93 so that the latter fluid will mix with the fluids flowing down passageway 85. The flow of fluid at aperture 93a past aperture 93 will create a partial vacuum in passage 85 assuring that substantially all of the fluids therein will be discharged. Such a "cleaning" operation is of particular importance when the device is used to dispense carbonated drinks wherein the fluid or fluids emitted from passage 53 are relatively viscous syrups which would otherwise tend to collect in passage 85. The projection of sleeve 81 into passage 85 beyond the end thereof also aids in preventing the accumulation of syrup in the passage and permits some mixing to take place in passage 85 as well. Mixing with carbonated water emitted from aperture 93a will occur primarily after the fluids have left the nozzle. As mentioned earlier, each of the metering slugs 61 can be adjusted individually to proportion the ingredients in a desired manner.

One of the important advantages of the present design is the great flexibility which can be obtained with the above-described solenoid operated valves. By the use of the microswitches 33 and 40 connected in various configurations, a variety of mixes can be obtained by actuating one or the other of said microswitches, or both of them simultaneously. FIGURE 3 shows a preferred method of connecting the switches 33 and 40 to a source of electrical potential. The solenoids 31 and 32 are shown wired in parallel with the solenoid 18a in series therewith, wherein the negative lead 94 connects to one terminal of solenoid 18a and the other terminal of solenoid 18a connects to terminals 102 and 103 of solenoids 31 and 32 to cause each of the valve elements 74 thereof to move away from the valve seat when energized. Microswitches 33 and 40 are each shown of the three terminal type, switch 33 having terminals 95, 96, and 97 and switch 40 having terminals 98, 99, and 100. Terminals 96 and 98 are both connected to the source of positive potential. Terminal 95 is connected to terminal 101 of solenoid 32. Terminals 97 and 100 are not in use in their configuration. Terminal 99 is connected to terminal 104 of solenoid 31.

With the circuit as described, the actuation of lever arm 12b will open valves 18a and 31 to dispense the two fluids connected thereto. Actuation of the other lever 12a opens valves 18a and 32 to dispense the two liquids introduced thereto. In this configuration if both lever arms are depressed, all three fluids could be dispensed at the same time. By way of example, the type of liquids introduced at each valve is indicated in FIGURE 3 as two types of syrup and soda. Thus, when lever arm 12b is actuated, the unit will dispense a mixture of syrup and soda resulting in one carbonated beverage. On the other hand, when lever arm 12a is actuated, the unit will dispense a mixture of the other syrup and soda, resulting in another carbonated beverage. If both levers were depressed, there would be dispensed a carbonated beverage having both syrup flavors.

In alternative forms, various changes can be made in the circuit connections of the solenoids to the switches in order to achieve different mixing sequences. For example, two of the solenoids could be connected in parallel to terminals 97 and 98 of switches 33 and 40, and the third solenoid connected to terminal 95. Then when lever arm 12a is depressed, all three solenoids would be actuated. Depression of lever arm 12b would actuate only two solenoids. This type of connection may be desired where a certain beverage is desired having either a high or low carbonation. In such an instance, the three fluids would include syrup, carbonated water and still water, the latter being controlled by the third solenoid. The above-

mentioned types of liquid introduced at each valve is by way of example and it is to be understood that additions, substitutions and variations could be made without departing from the scope of the present invention. The degree of carbonation is easily adjusted by the use of the appropriate metering screw 61. In addition, for a dispenser unit already wired in a certain configuration, it is understood that one or more of the metering screws 61 can be closed to change the type of beverage dispensed without rewiring the circuit. It will be equally obvious that changes can be made in the fluid passages to adapt the dispensing unit to various purposes. For example, the passage 55, 56 could be connected to the annular space 89 above the diffuser 79 which would achieve some degree of predischARGE mixing with the fluid from passage 59.

Thus, the present invention provides a versatile, multi-valve dispenser unit easily adaptable to a large number of uses to dispense a variety of types of mixed beverages. In addition, the present invention has provided an integrally constructed dispenser body which can be quickly and inexpensively manufactured. The present invention also provides an improved type of diffuser nozzle which more adequately and completely mixes the various fluids dispensed.

While particular embodiments of the present invention have been shown and described herein, it will be obvious that changes and modifications may be made and it is the object of the appended claims to cover all such changes and modifications as fall within the true scope and spirit of this invention.

I claim:

1. A beverage dispensing unit, comprising, a one-piece body portion having three fluid passages therein; valve means situated in each of said fluid passages, each of said valve means including a valve seat integrally formed in said body portion, a movable valve element adapted to coact with said valve seat and being normally in engagement therewith, and a solenoid unit operably connected with said valve element for opening said valve; a nozzle mounted upon said body portion; each fluid passage having an external aperture adapted to be connected to an external fluid supply, each fluid passage communicating its external aperture with one of said valve means and with said nozzle; and means for electrically actuating said solenoid units, said actuating means comprising two depending lever arms pivotally mounted upon said body with the lower free end of each of said lever arms terminating adjacent said nozzle for depression by a beverage receiving container disposed below said nozzle, two microswitches mounted upon said body and each positioned so as to be actuated by depressing one of said lever arms, said lever arms being manually movable independently of each other, and means for coupling said microswitches to an external source of power and to said solenoid units for actuating said solenoid units only for as long as the lever arm of the corresponding microswitch is held depressed and arranged in such a manner that a combination of at least one pair of said valve means will be actuated only while one of said lever arms is held depressed and a combination of at least another pair of said valve means will be actuated only while the other one of said lever arms is held depressed, one valve means of each of said combinations being common to both of said combinations.

2. A device of the type described in claim 1 in which said nozzle comprises an outer cone and a tapered diffuser element coaxially mounted, each having an aperture in the lower end thereof, said diffuser element having an axial bore connected with at least one of said fluid passages, spacing means on said diffuser element adapted to form an annular space between the top of said element and said dispenser body, another of said fluid passages communicating with said annular space; means for forming a seal between said diffuser element and said outer cone, an annular groove formed in said diffuser element below said sealing means, a plurality of vertical fluid

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passages connecting said annular space with said annular groove, the outer periphery of said diffuser element spaced from the inner wall of said cone below said annular groove to form a cylindrical fluid passage about the tapered portion of said diffuser element communicating with the apertures in said diffuser element and said outer cone.

3. A beverage dispensing unit according to claim 1 wherein each of said solenoid units is positioned around the respective moveable valve element, said nozzle comprises a diffuser element having an axial bore and a cone surrounds said diffuser element, one of said fluid passages is connected with the axial bore of said diffuser element, and one of said microswitches is operably connected with all three of said solenoid units, whereby all three of said valve means will be simultaneously actuated only while the lever arm associated with said one microswitch is held depressed.

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4. A beverage dispensing unit according to claim 1 wherein all three of said valve means will be simultaneously actuated only while both of said lever arms are held depressed at the same time.

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