

Description

Field of the Invention

The present invention relates generally to a system for diluting concentrated liquid products and for dispensing the mixed solution, and more particularly to a system which employs an aspirator to proportionally mix a liquid with water.

Background of the Invention

In janitorial settings which require a significant amount and number of specialized cleaning solutions, the liquid cleaning products are purchased on a concentrated basis, and then are diluted to the proper strength at the site where they will be used. This type of general system is employed by a wide variety of users, e.g., hotels, hospitals, restaurants, etc. Several dispensing systems have been developed for mixing and diluting the concentrated cleaning product. The dispensers usually feature at least some of the following components: a container for the concentrated cleaning product, a storage container for the diluted cleaning product, a method to dose concentrate into the storage container, and a water supply line to dilute the concentrate.

The dispensing systems vary widely in terms of their complexity. That is, the method of dilution may be rather simple and manual in nature, but may require a great deal of operator experience. On the other hand, the dispensing system may be quite complex, requiring several mechanical devices to dilute the concentrates. Such complex systems are often necessary where different cleaning products and different dilution ratios are utilized for different cleaning applications. These dispensing systems typically require several separate water lines, each water line corresponding to a different type of cleaning concentrate. The provision of multiple water lines increases the cost of installation. The requirement of multiple water lines also greatly limits the locations at which the dispensing system can be placed, and such a system is not portable. Accordingly, large containers such as mop buckets and auto scrubbers must be filled and taken to the point of usage by the janitorial personnel.

With one such system, a cabinet is mounted proximate the concentrated liquids and the water source. This cabinet contains a multiplicity of aspirators, backflow preventers and valves for dilution of the concentrates, the number of such devices depending upon the predetermined number established by the cabinet's manufacturer. However, such a system can be relatively complex, inflexible and expensive, especially in situations where only

one concentrated liquid is utilized.

The cost of these conventional dispensing stations is relatively high, because of their complexity and because backflow preventers are generally required for each water connection by applicable plumbing codes. Pressure regulators may also be necessary to control use solution concentrations within an acceptable range. Other necessary flow control devices add to the cost of conventional dispensing systems; for example, a pickup probe and foot valve must be employed in order to withdraw the concentrate from a rigid container.

An aspirator is employed with some dispensing systems to withdraw the concentrated cleaning solution from its container. With conventional systems, each water line requires a separate aspirator, and the aspirators are located in a variety of places, such as mounted to the concentrate container or mounted upon the wall adjacent to the dispensing station. These locations of the aspirator add to the complexity and space requirements of the dispensing system.

The prior art, reflected by U.S. Patent No. 2,716,507, to Graves teaches a dispensing device in which each concentrate inlet line is permanently attached to a separate aspirator and dispensing device. The dispenser is actuated by pushing a handle which controls a flow valve. French Patent No. 1 139 021 discloses a spray gun in fluid communication with a diluent supply hose, and features a rigid outlet tube.

Another area in which liquid aspirators are commonly employed is the application of diluted solutions to lawns or garden foliage. These diluted solutions contain chemicals such as pesticides, fungicides, herbicides and fertilizers. Typically, sprayers of this type are attached to a garden hose, and the pressure of the water delivered to the hose is used to create a vacuum that causes a chemical solution in the sprayer to be aspirated into the water in order to provide a diluted solution that is subsequently sprayed.

Sprayers of this type include a venturi chamber in which water from the garden hose is mixed with undiluted chemical solution from the sprayer's chemical solution container. In principle, as water passes through the venturi chamber, a syphoning or vacuum action is created by virtue of the velocity of the water passing through the chamber, to draw chemical from the container and into the venturi chamber for dilution with water from the garden hose. Many garden sprayers of this type have a fixed dilution ratio, although some sprayers allow for multiple dilution ratios but are typically of more complex construction, more expensive, and more difficult to use.

Besides their complexity, another drawback of many conventional dispensing systems is that the

dilution of the concentrated chemical is inaccurate, resulting in a cleaning product having either too high or too low of a concentration. Many systems have no way of controlling and checking the dilution, so that inaccurate mixing by the janitorial personnel often occurs. Using too much concentrated liquid cleaner is wasteful, unnecessary, and expensive. Over-use of these products also hampers thorough rinsing and leaves messy residues. On the other hand, utilization of too little cleaning concentrate in the use solution will not clean adequately.

The present invention solves these and many other problems associated with currently available dispensing systems.

Summary of the Invention

The present invention is a solution proportioning and dispensing system. The proportioning and dispensing system has a spray gun to which the water supply hose and concentrate supply tube are attached. The spray gun has a valve and proportioning means therein, such as an aspirator. In a preferred embodiment, a backflow preventer is incorporated into the spray gun, but it is not a necessary element of the invention. Different types of concentrated chemical may be interconnected to the spray gun by means of a releasable connector means. The spray gun also has a rigid delivery tube for dispensing of the diluted solution into a relatively large container. Preferably, the delivery tube is removable, so as to expose a nozzle which is attachable to an inlet port of an intermediatesized storage container.

According to another aspect of the second embodiment's invention, there is disclosed a method for dispensing and handling liquid solutions, in which a concentrate pickup tube is attached to the spray gun; the spray gun's outlet end is positioned into a storage container; and the water control valve is opened so as to draw the concentrate chemical into the spray gun via the pickup tube.

An advantage of the present invention is that it results in cost savings for the user. Because the system is simpler in design, its cost is lower than conventional dispensers. In addition, the inventive dispensing system needs only a single water line and backflow preventer which further reduces the cost of installation. Whereas conventional dispensing systems are quite complex and expensive, the simplicity of the present invention enables it to be low in cost and affordable for even small house-keeping and food service operations. The present invention operates on water power alone, and does not require electrical connections. The various fittings, tubes, and valves are readily accessible and can be repaired easily by any necessary tighten-

ing, repair, or replacement measures.

Furthermore, the proportioning system of the present invention is very easy to use. The user can fill either large containers, such as mop buckets, or small containers, such as five gallon jugs, by positioning the spray gun proximate the desired storage container. The filling of the container is a one-handed operation, since the user need only depress the spray gun's water activation lever so as to activate water flow and dispense the use solution. In contrast, prior art systems are typically two-handed operations, with one hand on the water control device and the other hand controlling the output hose.

The present invention also provides considerable flexibility by allowing the user to mix and dispense several different types of cleaning products. The invention can be used for any number of chemical solutions, because the system is completely modular. The supply lines for the various concentrated cleaning products can be connected and disconnected easily, and only a single water line is needed. The modular aspect of the present invention allows the system to be appropriate for a user who has only a single concentrated product to be diluted, as well as multiple products. With the prior art systems, the number of cleaning compositions which could be dispensed is limited to the number of water lines or to a predetermined number of control valves provided in the dispenser. In contrast, the present invention can be utilized with an unlimited number of products by simply providing additional product pickup assemblies.

Another advantageous feature of the present invention is that it is economical. Only a single aspirator, backflow preventer and valve assembly are required, regardless of the number of different concentrated products. This feature allows a cost savings by greatly simplifying and reducing the plumbing requirements.

Another advantageous feature of the present invention is that the certain components of the dispensing system are color-coded and/or labeled to correspond with the particular cleaning product being utilized. This minimizes the chance of contamination and minimizes the likelihood that a particular cleaning product will be used at an improper dilution ratio, thus enhancing the effectiveness of the cleaning product. This feature also results in a cost savings for the user, in that waste of the cleaning product is eliminated when the proper dilution ratio is maintained. The present invention also is safe for the operator, because it minimizes any contact with the concentrated cleaning product.

The dispensing system is also advantageous in that it is able to deliver the cleaning and sanitation products in exact use concentrations. The metering devices contained within the dispensing system

assure that the proper dilution ratio is set, thereby obviating the tendency of some janitorial personnel to over-use the product. The use concentrations can be controlled to the precise number of ounces per gallon or parts per million required. This accurate dispensing eliminates product over-use, waste and spilling.

Yet another feature of the system is that it is portable enough to be set up in various locations. Because the sizes of the various components are relatively small, because only a single water line is needed, and because the system is modular, it can be set up close to the point of usage, thereby saving time and effort for the janitorial personnel. The apparatus may be mounted upon a transportable cart assembly so that it is readily portable. The quick connect water assembly requires no plumbing hook-up, and can be used at any sink or faucet. With the prior art systems, a plumbing hook-up was required, which restricted the location at which the system could be utilized.

For a better understanding of the invention, and of the advantages obtained by its use, reference should be made to the drawings and accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

Brief Description of the Drawings

In the Drawings, which form a part of the instant specification and are to be read therewith, an optimum embodiment of the invention is shown, and, in the various views, like numerals are employed to indicate like parts:

Figure 1 is a perspective view of the proportioning and dispensing system of the present invention;

Figure 2 is a perspective view of the system shown in Figure 1, with the spray gun assembly in position for the filling of relatively compact jugs;

Figure 3 is a perspective view of the system illustrated in Figures 1 and 2 with the spray gun assembly in position to fill relatively large containers;

Figure 4 is a perspective view of the spray gun for the system illustrated in Figures 1-3;

Figure 5 is a side view, partially in cross-section, of the spray gun illustrated in Figure 4;

Figure 6 is a perspective view of the cart utilized with the system illustrated in Figures 1-3;

Figure 7 is a perspective view of the product use container;

Figure 8 is a perspective view of a rack for use with the system illustrated in Figures 1-3;

Figure 9 is a perspective view of the rack illustrated in Figure 8 with the product containers

and spray gun mounted therein; and

Figure 10 is an enlarged, exploded view of the connection between the spray gun and the pick-up tube.

Detailed Description of the Preferred Embodiments

The proportioning and dispensing system of the present invention is illustrated in Figures 1-10. As illustrated in Figures 1 and 6, the system 100 has a rack or cart 112. There are one or more concentrate containers 113 which are preferably mounted upon the bottom shelf 101 of the rack 112. The rack 112 also has a top shelf 102, upon which are supported a plurality of jugs 111 and spray bottles 103. The rack's front panel 108 has a plurality of apertures 116 for passage of the various pickup tubes 114, and has a drip tray 202. In the preferred embodiment, the pickup tubes 114 are substantially hidden from view by the rack's front panel 108.

The containers 111, 103 are suitable for storage of the diluted cleaning product. Each jug 111 has an upper handle 105, a cap 106, and a spigot 117. Preferably, the cap 106 has an umbrella check valve for venting of air from the jug 111. Those skilled in the art will recognize that other structures, such as a porous membrane, could also be used to perform this function. An optional outlet tube 104 may be attached to the spigot 117. The tube 104 is sized and configured to correspond to the height of the spray bottle 103, so that the bottom of the tube 104 extends to the bottom of the spray bottle 103 to minimize foaming when the spray bottle 103 is filled from the contents of the jug 111.

Concentrate containers or concentrate packaging 113 are illustrated in Figures 1-3 and Figure 8. The concentrate packaging 113 may be either collapsible and contained within a rigid box, or may themselves have rigid walls. In the preferred embodiment, the container 113 is approximately 12 inches by 12 inches by 6 inches. Each product use container 113 has a pickup tube 114 which extends into the bottom of the container 113. The rack 112 has a front panel 108 having a plurality of apertures 116 through which the pickup tubes 114 may pass. The front panel 108 holds tubes for easy identification and convenience. The lower end of each pickup tube 114 has a check valve (not shown) within the product container 113, such as an umbrella check valve.

There are identification means on the corresponding components of the system. Preferably, the labels on the concentrate packaging 113, the aperture in the front panel 108, the storage jugs 111, and the spray bottles 103 all are color-coded and/or have corresponding labels.

The upper end of each pickup tube 114 terminates in a quick-connect mechanism 115, and preferably has an integrated position activated or quick disconnect valve (not shown). In this manner, the pickup tube 114 is completely closed by having a valve at each end. This allows the pickup tube 114 to be disconnected without spillage of any solution. As shown in Figure 8, the pickup tube 114 is provided with a suitable metering tip 201. The blend ratio, or proportion of chemical to water, is set by flow metering means, such as interchangeable metering tips 201. The metering tip 201 is held within the pickup tube's inlet port by a friction fit, and different sized orifices of the metering tips 201 allow for different flow rates of the concentrate. Each metering tip 201 is sized and configured to correspond to a particular proportion ratio. The metering tips 201 are cylindrical in shape and approximately three-eighths of an inch in length, with the tip's internal diameter being governed by the desired flow rate. The metering tip's diameter may be as small as approximately 0.01 inch, with larger diameters corresponding to higher flow rates. The highest flow rate is achieved when no metering tip 201 at all is present in the pickup tube's inlet port. The chemical to water ratio for janitorial applications typically has a range of 0.25-15%, with the ratio depending upon the size of the metering tip, the viscosity of the chemical concentrate, and the water pressure.

In the preferred embodiment, the different sized metering tips have different colors and are visible to the user, so that the flow rate can be easily monitored and adjusted. This enables the user to readily determine what the dilution ratio is. Different dilution ratios are sometimes needed for different applications, e.g., one application might require a 1% solution, whereas another application may require a 10% solution of the same product. Alternatively, an adjustable metering screw may be utilized to enable the proportion ratio to be adjusted.

Examples of the types of concentrated cleaning solutions which may be utilized with the proportioning and dispensing system are: multi-purpose cleaners, e.g. for walls, windows, tile and hard surfaces; germicidal detergents for disinfecting and sanitizing; floor care products; and specialty products for special cleaning needs. However, it is to be understood that the present invention is not to be limited for use only with cleaning products, but can be utilized to store and dispense any type of solution.

As shown in Figures 1-3, the proportioning and dispensing system 100 features a spray gun assembly 150. The spray gun means 150 has a rigid outlet member 153, which is preferably removable from the spray gun 150. The spray gun 150 is

attached to a water supply hose 154 which is interconnected to a suitable water source (not shown). The spray gun assembly 150 is illustrated in Figure 1 as being in its stored position in which the spray gun 150 hangs within a holster, which is preferably a sloped trough 205 positioned behind an aperture 107 formed within the front panel 108.

The proportioning and dispensing system 100 has the ability to fill either relatively compact containers 111, as illustrated in Figure 2; or relatively large containers 60, as illustrated in Figure 3. When a jug 111 is being filled, the discharge tube 153 is removed from the spray gun assembly 150, the delivery tube 153 is removed, and the spray gun's nozzle tip 180 is interconnected to an inlet port 119 of the jug 111. In the preferred embodiment, this is accomplished by means of a friction fit between the spray gun's nozzle tip 180 and the inlet port 119. For other applications, the spray gun assembly 150 and delivery tube 153 may be positioned within a mop bucket 160 or other relatively large container for the dispensing of the diluted solution, as shown in Figure 7.

The jug's inlet port 119 is formed within an entrance port member 120 proximate the upper surface of the jug 111. The cylindrical member 120 has a downward slope for drainage of solution into the jug 111. The entrance port 120 has a hinged cap 121 which is closed when the spray gun assembly 150 is not attached thereto, although the caps 121 are illustrated in the open position in Figures 1-3 for purposes of illustration.

Figures 4 and 5 illustrate the spray gun 150. The spray gun 150 has a handle 151 and a barrel portion 152. The rigid outlet tube 153 is removably interconnected to the barrel 152. The end of the handle 151 is attached to a water supply conduit 154, and the water enters the handle assembly as shown by the arrow 155. The end of the handle 151 may be provided with a filter or strainer (not shown) to prevent large particles of foreign matter from entering the sprayer 150. The handle 151 is shaped with contours 156 for the user's fingers.

The spray gun 150 has a water control valve or shut-off valve 166. Preferably, the valve 166 is contained within a handle portion 151 of the water supply assembly. The valve 66 is opened by lowering a lever as the user grasps the handle portion 151. The lever is spring-loaded so that it is biased in a manner such that the valve 166 is normally closed. The barrel portion of the water supply assembly is interconnected to the handle portion by means of a threaded connection and a gasket. To initiate water flow, the lever 157 is pivoted to the handle's casing at 158 and bears against a cap 173 threaded on the outer end of the valve stem 159, so that by manually pressing on the lever 157, the valve 166 will be removed from its valve seat (not

shown) to permit the flow of water. A stop (not shown) of suitable shape may be interposed to prevent the valve from closing, or the operator may hold down on the lever 157 during the entire time while dispensing is desired. Various other constructions may be employed for controlling the water flow and for withdrawing of the concentrate from the container 113.

In the preferred embodiment, the barrel housing 152 has a cylindrical portion 160 and a frustoconical portion 161. Mounted upon the cylindrical portion 160 is a connector 170 for the concentrate's pickup tube 114. The outlet end of the frustoconical portion 161 terminates in the outlet tube 153, and the outlet tube 153 is preferably removable from the rest of the spray gun assembly. The tube 153 is attached to the spray gun assembly 150 by a friction fit or a bayonet-type connection. The outlet tube 153 allows for a flow rate of approximately three to four gallons per minute. Alternatively, a restricting orifice (not shown) could be attached to the spray gun assembly to form a sprayer which would dispense the solution at a higher pressure.

As shown in Figure 5, the spray gun 150 has a venturi body 163 within it, the venturi body 163 having a passageway 164 extending through it. The venturi body 163 has a nozzle tip 180 which is sized and configured to correspond with the inlet ports 119 on each jug 111. This attachment to an inlet port 119 is accomplished by means of a frictional fit or other connector mechanism which allows for quick release.

Municipal codes generally require a backflow preventer in systems such as the present invention. The backflow preventer may be remote to the system or incorporated therein. In a preferred embodiment, a backflow preventer 165 is disposed in the spray gun's passage within the cylindrical housing 160. The backflow preventer device mounts completely within the spray gun assembly 150. The backflow preventer 165 may be an atmospheric vacuum breaker or a dual check valve with intermediate vacuum breaker and relief vent. The vacuum breaker 165 prevents flow of concentrated chemical into the water hose 154 if a sudden drop in the hose water pressure should occur. In the absence of this anti-siphon device 165, transitory forces caused by aspiration, siphoning, etc., might draw some of the liquid concentrate back through the hose 154 where it might possibly pollute the water supply.

Proximate the backflow preventer 165 is an aspirator means 167, which may take many forms. A product inlet channel 168 terminates at the aspirator 167, thereby allowing the concentrated cleaning product to be drawn into the spray assembly 150 when water flows therethrough. In this

embodiment, a venturi throat 175 is provided in the conduit 169 between the backflow preventer 165 and aspirator 167, for drawing the liquid concentrate from the product container 113 up through the flexible pickup tubing 114 by suction. The concentrate channel 168 has a concentrate suction port, which communicates with passage 175. Downstream from the constricted passage 175 is a larger straight passage 218, a diffuser passage 164, a straight passage 172, and a relatively large passage 173 formed in the extension member 153. The diffuser passage widens at approximately a ten degree included angle. The constricted passage 175 is approximately 0.15 inches in diameter, and the downstream passage 218 is approximately 0.187 inches in diameter.

The product pickup tube is in fluid communication with the spray gun's channel 168 via the quick-connect mechanism 170. The connector end of the pickup tube 114 snaps into the connector 170, and can be released by depression of a button 171. The connector 170 is attached to the spray gun 150 through a threaded member 184. As illustrated in Figure 10, the quick-connect mechanism 170 consists of a female member 181 extending through the wall 160 of the spray gun 150, and a male member 182 on the connector 183 of the product pickup tube 114. The male member 182 preferably includes a valve (not shown). The pickup tube connector 183 has a ribbed member 207 over which the end of the pickup tube 114 is secured. In the preferred embodiment, a valve (not shown) is integrated into the housing of the male member 182 to minimize spillage. The female member 181 has a lock ring 208 which snaps onto an annular ring 211 in the male member. A release button 171 is provided on the female member 181 to allow for disconnection. The lock ring 208 is spring-biased into a locked position. When the members 181, 182 are brought into engagement, a flange 209 on the male member 182 pushes against a pin 210 on the female member 181 which causes movement of the lock ring 208 into engagement with the male member's annular ring 211. Depression of the button 171 moves the lock ring 208 out of engagement, to release the connection.

Figure 6 illustrates a preferred embodiment of the rack 112. Preferably, the rack is rather compact in size; i.e., approximately thirty inches in length and fourteen inches wide. In the preferred embodiment, the rack's shelves and front panel are made from vacuum-formed plastic. The rack 112 has an upper shelf 102, bottom shelf 101, and front panel 108. The cart 112 is supported by four legs 194. The upper shelf 102 has recessed portions which may be utilized for supporting the jugs 111, with contoured side walls 190 and notches 211 for stable positioning of the jugs 111. In addition, the

upper shelf 102 may be provided with a recessed portion 191 which may accommodate spray bottles or other items.

The front panel 108 has a plurality of apertures 116 for the product pickup tubes 114 and a holster aperture 107 for the spray gun 150. The holster 205 is sized and configured to accommodate the spray gun barrel and outlet tube 153. In addition, the front panel 108 contains a portion for attachment of a suitable label 192. The front panel 108 also contains a horizontal drip tray portion 202 for catching any drips which may occur when spray bottles are filled from the jugs 111.

Figure 7 illustrates a concentrate solution container 113. The container 113 has rigid walls 195, within which is the concentrated solution. The concentrated solution may be held within a flexible bladder bag (not shown) inside the container 113. An aperture 215 in the top wall 216 of the container 113 permits passage of the pickup tube 114. Alternatively, the container 113 may have an aperture and fitting in a side wall near the bottom (not shown). With this design, the pickup tube 114 extends up the side of the container 113.

Figures 8 and 9 illustrate a portable rack 196 which may be utilized with the second embodiment's system. The rack 196 is sized and configured to accommodate two of the concentrate storage containers 113. The rack 196 contains rings 197 which serve as a holder for the spray gun 150. Preferably, there is also a drip cup 216 on the rack 196.

The rack 196 is preferably made of wire and has a plurality of parallel members 198 which form a support floor for the containers 113. The rack 196 may have outwardly slanting members 217, which provide clearance between the rack 196 and container 113 in the event the pickup tube 114 extends up the outside of the container 113 as described above. The rack 196 also has hooks 199 for mounting of the rack 196 upon a wall, if desired. The rack 196 may be provided with wheels (not shown) to facilitate portability. The rack 196 is suitable for situations in which the user is to fill relatively large containers such as mop buckets 60, and the rack 196 allows the user to transport the dispensing system near the point of usage, at which point the water supply hose may be connected to the nearest faucet or other water supply mechanism. The rack 196 preferably supports the containers 113 slightly above floor level by support members 200 to keep the containers 113 dry.

In operation, the user attaches the desired product pickup tube 114 to the spray gun assembly 150 by means of the quick-release connectors 170 and 183. If dispensing into a large container such as a mop bucket 160 is desired, the rigid delivery tube 153 is attached to the spray gun

assembly 150 and directed into the mop bucket 160. Water flow is initiated by opening of the water control valve 166. The concentrate and water pass through the aspirator 167, and the rate of concentrate flow is controlled by a metering tip 201 in the pickup tube 114. When the container 160 has been filled to a desired level, the water supply is disconnected and the container 160 can be moved to a remote location.

To utilize the proportioning and dispensing system to fill the jugs 111, the delivery tube 153 is removed, so as to expose the venturi body 163. The nozzle tip 180 is inserted into the jug's inlet port 119, and water flow is initiated as described above. When the jug 111 has been filled to a desired level, the water valve 166 is closed, and the jug 111 may be moved to a remote location. The jug 111 may also be utilized to fill spray bottles 103. In addition, a portable cart 196 may be used for moving more than one concentrate container 113 and the spray gun assembly 150 to a remote location.

Claims

1. A system for diluting and dispensing a chemical, comprising a diluent supply hose (154) for carrying a diluent, and at least two concentrate containers (113) each containing concentrated chemical and positioned on a shelf (112), the system being characterized by:
 - (a) spray gun means (150) attached to and in fluid communication with the diluent supply hose (154), the gun means (150) including proportioning means which comprises an aspirator (167), a backflow preventer (165), and a valve (166) for controlling flow of diluent, the valve (166) being controlled by an actuator (76) operably attached to the gun means (150), the gun means (150) further including a releasable quick connector means (170) for connecting and disconnecting a concentrate supply tube (114);
 - (b) one end of a concentrate supply tube (114) extending into each of the concentrate containers (113); and
 - (c) the shelf (112) including a holder (205) sized and configured to accommodate the gun means (150).
2. A system as claimed in claim 1, which includes a storage container (111) positioned upon the shelf, the storage container having an inlet port (119).
3. A system as claimed in claim 2, in which the gun means (150) includes a nozzle (180) sized and configured to correspond to the inlet port

upper shelf 102 may be provided with a recessed portion 191 which may accommodate spray bottles or other items.

The front panel 108 has a plurality of apertures 116 for the product pickup tubes 114 and a holster aperture 107 for the spray gun 150. The holster 205 is sized and configured to accommodate the spray gun barrel and outlet tube 153. In addition, the front panel 108 contains a portion for attachment of a suitable label 192. The front panel 108 also contains a horizontal drip tray portion 202 for catching any drips which may occur when spray bottles are filled from the jugs 111.

Figure 7 illustrates a concentrate solution container 113. The container 113 has rigid walls 195, within which is the concentrated solution. The concentrated solution may be held within a flexible bladder bag (not shown) inside the container 113. An aperture 215 in the top wall 216 of the container 113 permits passage of the pickup tube 114. Alternatively, the container 113 may have an aperture and fitting in a side wall near the bottom (not shown). With this design, the pickup tube 114 extends up the side of the container 113.

Figures 8 and 9 illustrate a portable rack 196 which may be utilized with the second embodiment's system. The rack 196 is sized and configured to accommodate two of the concentrate storage containers 113. The rack 196 contains rings 197 which serve as a holder for the spray gun 150. Preferably, there is also a drip cup 216 on the rack 196.

The rack 196 is preferably made of wire and has a plurality of parallel members 198 which form a support floor for the containers 113. The rack 196 may have outwardly slanting members 217, which provide clearance between the rack 196 and container 113 in the event the pickup tube 114 extends up the outside of the container 113 as described above. The rack 196 also has hooks 199 for mounting of the rack 196 upon a wall, if desired. The rack 196 may be provided with wheels (not shown) to facilitate portability. The rack 196 is suitable for situations in which the user is to fill relatively large containers such as mop buckets 60, and the rack 196 allows the user to transport the dispensing system near the point of usage, at which point the water supply hose may be connected to the nearest faucet or other water supply mechanism. The rack 196 preferably supports the containers 113 slightly above floor level by support members 200 to keep the containers 113 dry.

In operation, the user attaches the desired product pickup tube 114 to the spray gun assembly 150 by means of the quick-release connectors 170 and 183. If dispensing into a large container such as a mop bucket 160 is desired, the rigid delivery tube 153 is attached to the spray gun

assembly 150 and directed into the mop bucket 160. Water flow is initiated by opening of the water control valve 166. The concentrate and water pass through the aspirator 167, and the rate of concentrate flow is controlled by a metering tip 201 in the pickup tube 114. When the container 160 has been filled to a desired level, the water supply is disconnected and the container 160 can be moved to a remote location.

To utilize the proportioning and dispensing system to fill the jugs 111, the delivery tube 153 is removed, so as to expose the venturi body 163. The nozzle tip 180 is inserted into the jug's inlet port 119, and water flow is initiated as described above. When the jug 111 has been filled to a desired level, the water valve 166 is closed, and the jug 111 may be moved to a remote location. The jug 111 may also be utilized to fill spray bottles 103. In addition, a portable cart 196 may be used for moving more than one concentrate container 113 and the spray gun assembly 150 to a remote location.

Claims

1. A system for diluting and dispensing a chemical, comprising a diluent supply hose (154) for carrying a diluent, and at least two concentrate containers (113) each containing concentrated chemical and positioned on a shelf (112), the system being characterized by:
 - (a) spray gun means (150) attached to and in fluid communication with the diluent supply hose (154), the gun means (150) including proportioning means which comprises an aspirator (167), a backflow preventer (165), and a valve (166) for controlling flow of diluent, the valve (166) being controlled by an actuator (76) operably attached to the gun means (150), the gun means (150) further including a releasable quick connector means (170) for connecting and disconnecting a concentrate supply tube (114);
 - (b) one end of a concentrate supply tube (114) extending into each of the concentrate containers (113); and
 - (c) the shelf (112) including a holder (205) sized and configured to accommodate the gun means (150).
2. A system as claimed in claim 1, which includes a storage container (111) positioned upon the shelf, the storage container having an inlet port (119).
3. A system as claimed in claim 2, in which the gun means (150) includes a nozzle (180) sized and configured to correspond to the inlet port



(119) of the storage container.

4. A system for proportioning and dispensing a chemical, comprising a liquid diluent supply hose (154) for carrying water, and at least two concentrate storage containers (113) for storing concentrated chemicals, each of the storage containers (113) having a pickup tube (114) extending therefrom, the concentrate storage containers (113) being supported upon a shelf (112), the system being characterized by:

(a) dispensing spray gun means (150) having a first liquid diluent inlet end and a second outlet end, the dispensing gun means (150) including a valve (166) for controlling liquid diluent flow which is controlled by an actuator (76), operably attached to the dispensing gun means (150), the dispensing gun means (150) further including:

- an aspirator (167) within the dispensing gun (150),
- a releasable connector means (170) for the pickup tube (114),
- a removable delivery tube (153), and
- a gun nozzle (180),

the dispensing gun (150) means being mountable on the shelf (112);

(b) the liquid diluent supply hose (154) being connected to the first liquid diluent inlet end; and

(c) a drum (60) for storing diluted chemical, the delivery tube (153) being insertable within the drum (60) for dispensing of the diluted chemical.

5. A system as claimed in Claim 4, which includes a plurality of storage jug containers (111) for storing diluted chemical, each of the jug containers (111) having an inlet port (119) sized and configured to correspond to the gun nozzle (180) for dispensing of the diluted chemical, the jug containers (111) being supported upon the shelf (112) while the diluted chemical is being dispensed therein.
6. A system as claimed in any one of claims 2 to 5, in which the shelf (112) comprises a shelf (102) which includes contoured ridges (190) to conform with the size and configuration of the storage container(s) (111).
7. A system as claimed in claim 6, in which the shelf means (112) includes a holster (107) sized and configured to accommodate the gun means.
8. A system as claimed in any one of claims 1 to 7, in which the shelf (112) includes a front

panel having a plurality of apertures (116), each of the apertures (116) corresponding to a concentrate supply tube (114) and being sided and configured for passage of the concentrate supply tube (114) therethrough.

9. A system as claimed in claim 8, in which a concentrate container (113), a storage container (111), and the front panel (108) of the shelf have corresponding identification means.

10. A system as claimed in any one of claims 1 to 9, in which the gun means includes a rigid delivery tube (153).

11. A system as claimed in claim 10, in which the delivery tube (153) is removable from the gun means (150).

12. A system as claimed in any one of claims 1 to 11, in which the concentrate supply tube (114) includes metering means (82).

13. A system as claimed in claim 12, in which the metering means comprises a metering tip (82), said metering tip being colour-coded to correspond to a particular dilution ratio.

14. A method for dispensing and handling liquid solutions using a system as claimed in any one of claims 1 to 13, comprising the steps of;

(a) removing a spray gun (150) from a holder (205) on a shelf (112);

(b) interconnecting a first concentrate pickup tube (114) to the gun (150) with a quick connect means (170), the gun (150) being in fluid communication with a diluent supply and having a diluent control valve (166) with an aspirator therein;

(c) positioning an outlet end (153) of the gun (150) into a container (60);

(d) opening the diluent control valve (166) by pressing an actuator (76) connected to the gun (150), thereby drawing a concentrated chemical into the gun (150) via the pickup tube (114) and dispensing the liquid solution into the container (60); and

(e) disconnecting the first concentrate pickup tube (114) from the gun (150), and connecting a second concentrate pickup tube (114) to the gun (150).

15. A method as claimed in claim 14, which includes the step of transporting the shelf (112) to a location close to the point of usage.



Patentansprüche

1. Ein System zum Verdünnen und Abgeben einer Chemikalie mit einem Verdünnungsmittelzuführschlauch (154) zum Zuführen eines Verdünnungsmittels und wenigstens zwei Konzentratbehältern (113), wobei jeder Konzentratbehälter konzentrierte Chemikalien enthält und auf einem Regal (112) angeordnet ist, gekennzeichnet durch,
 - (a) eine mit dem Verdünnungsmittelzuführschlauch (154) verbundene und in Fluidkommunikation stehende Sprühpistoleinrichtung (150), die eine Dosiereinrichtung umfaßt, welche eine Ansaugvorrichtung (167), eine Rückflußschutzeinrichtung (165) und ein Ventil (166) zum Kontrollieren des Verdünnungsmittelflusses umfaßt, das durch ein betätigbar an der Pistoleinrichtung (150) befestigtes Betätigungsorgan (76) gesteuert wird, wobei die Pistoleinrichtung (150) ferner eine schnell lösbare Verbindungseinrichtung (170) zum Verbinden und Abkuppeln eines Konzentratzuführschlauchs (114) umfaßt, wobei
 - (b) sich ein Ende eines Konzentratzuführschlauchs (114) in jeden der Konzentratbehälter (113) erstreckt und
 - (c) das Regal (112) einen Halter (205) umfaßt, der derart dimensioniert und konfiguriert ist, daß er die Pistoleinrichtung (150) aufnimmt.
2. Ein System nach Anspruch 1, das einen auf dem Regal angeordneten Vorratsbehälter (111) umfaßt, der einen Einlaßanschluß (119) aufweist.
3. Ein System nach Anspruch 2, in welchem die Pistoleinrichtung (150) eine Düse (180) umfaßt, die derart dimensioniert und konfiguriert ist, daß sie dem Einlaßanschluß (119) des Vorratsbehälters entspricht.
4. Ein System zum Dosieren und Abgeben einer Chemikalie mit einem Zuführschlauch (154) für flüssiges Verdünnungsmittel zum Zuführen von Wasser und wenigstens zwei Konzentratvorratsbehältern (113) zum Speichern von konzentrierten Chemikalien, wobei jeder Vorratsbehälter (113) einen sich daraus erstreckenden Ansaugschlauch (114) aufweist und wobei die Konzentratvorratsbehälter (113) von dem Regal (112) getragen werden, gekennzeichnet durch,
 - (a) eine Abgabesprühpistoleinrichtung (150) mit einem ersten Einlaßende für flüssiges Verdünnungsmittel und einem zweiten Auslaßende, die ein Ventil (166) zum Steu-
- ern des Durchflusses des flüssigen Verdünnungsmittels aufweist, welches von einem Betätigungsorgan (76) gesteuert wird, das betätigbar an der Abgabepistoleinrichtung (150) befestigt ist, wobei die Abgabepistoleinrichtung (150) ferner umfaßt:
 - eine Saugvorrichtung (167) in der Abgabepistole (150),
 - eine lösbare Verbindungseinrichtung (170) für den Ansaugschlauch (114),
 - ein abnehmbares Zuführrohr (153) und
 - eine Pistolendüse (180),
 wobei die Abgabepistoleinrichtung (150) an dem Regal (112) befestigbar ist,
 - (b) wobei der Zuführschlauch (154) für flüssiges Verdünnungsmittel mit dem ersten Einlaßende für flüssiges Verdünnungsmittel verbunden ist und
 - (c) einen Kanister (60) zum Speichern einer verdünnten Chemikalie, wobei das Zuführrohr (153) in den Kanister zum Abgeben der verdünnten Chemikalie einsetzbar ist.
5. Ein System nach Anspruch 4, das eine Vielzahl von Vorratskanisterbehältern (111) zum Speichern einer verdünnten Chemikalie umfaßt, welche jeweils einen Einlaßanschluß (119) aufweisen, der derart dimensioniert und konfiguriert ist, daß er der Pistolendüse (180) zum Abgeben der verdünnten Chemikalie entspricht, wobei die Kanisterbehälter (111) von dem Regal (112) getragen werden, während die verdünnte Chemikalie darin abgegeben wird.
6. Ein System nach einem der Ansprüche 2 bis 5, in welchem das Regal (112) ein Regal (102) aufweist, welches profilierte Ränder (190) umfaßt, die der Größe und der Anordnung der Vorratsbehälter oder des Vorratsbehälters (111) entsprechen.
7. Ein System nach Anspruch 6, in welchem die Regaleinrichtung (112) einen Pistolenthalter (107) umfaßt, der derart dimensioniert und konfiguriert ist, daß er die Pistoleinrichtung aufnimmt.
8. Ein System nach einem der Ansprüche 1 bis 7, in welchem das Regal (112) eine Frontplatte mit einer Vielzahl von Öffnungen (116) umfaßt, wobei jede Öffnung (116) einem Konzentratzuführschlauch (114) entspricht und zum Durchführen des Konzentratzuführschlauchs dadurch dimensioniert und konfiguriert ist.



9. Ein System nach Anspruch 8, in welchem ein Konzentratsbehälter (113), ein Vorratsbehälter (111) und die Frontplatte (108) des Regals entsprechende Identifikationseinrichtungen haben.
10. Ein System nach einem der Ansprüche 1 bis 9, in welchem die Pistoleneinrichtung ein festes Zuführrohr (153) umfaßt.
11. Ein System nach Anspruch 10, in welchem das Zuführrohr von der Pistoleneinrichtung (150) abnehmbar ist.
12. Ein System nach einem der Ansprüche 1 bis 11, in welchem der Konzentratzuführschlauch (114) eine Abmeßeinrichtung (82) umfaßt.
13. Ein System nach Anspruch 12, in welchem die Abmeßeinrichtung eine Abmeßdüse (82) aufweist, wobei die Abmeßdüse entsprechend den einzelnen Verdünnungsverhältnissen farbcodiert ist.
14. Ein Verfahren zum Abgeben und Handhaben von flüssigen Lösungen unter Verwendung eines Systems nach einem der Ansprüche 1 bis 13 mit folgenden Schritten:
 - (a) Entfernen einer Sprühpistole (150) von dem Halter (205) an dem Regal (112),
 - (b) Verbinden eines ersten Konzentratan- saugschlauchs (114) mit einer Pistole mittels einer Schnellverschlußeinrichtung (170), wobei die Pistole (150) in Fluidverbindung mit einer Verdünnungsmittelversorgung steht und ein Verdünnungsmittelkontrollventil (166) mit einer darin befindlichen Saugvorrichtung aufweist,
 - (c) Positionieren eines Auslaßendes (153) der Pistole (150) in dem Behälter (60),
 - (d) Öffnen des Lösungsmittelkontrollventils (166) durch Drücken eines mit der Pistole verbundenen Betätigungsorgans (76), wodurch eine konzentrierte Chemikalie über den Ansaugschlauch (114) in die Pistole (150) gezogen wird und Abgeben der flüssigen Lösung in den Behälter (60) und
 - (e) Lösen des ersten Konzentratan- saugschlauchs (114) von der Pistole (150) und Anschließen eines zweiten Konzentratan- saugschlauchs (114) an die Pistole (150).
15. Ein Verfahren nach Anspruch 14, welches den Schritt des Transportierens des Regals (112) an eine Stelle in der Nähe des Einsatzortes umfaßt.

Revendications

1. Système pour diluer et distribuer un produit chimique, comprenant un tuyau (154) d'alimentation en diluant pour transporter ce diluant, et au moins deux conteneurs (113) de concentré, contenant chacun un produit chimique concentré, placés sur une étagère (112), le système étant caractérisé par :
 - (a) des moyens (150) formant pistolet pulvérisateur fixés à et en communication fluide avec le tuyau (154) d'alimentation en diluant, ces moyens (150) formant pistolet comprenant un aspirateur (167), un dispositif anti-retour (165) et une vanne (166) destinée à contrôler le débit du diluant, cette vanne (166) étant commandée par un actionneur (76) fixé de manière fonctionnelle aux moyens (150) formant pistolet, ces moyens (150) comprenant en outre des moyens (170) de connexion rapide pour connecter et déconnecter un tube (114) d'alimentation en concentré ;
 - (b) une extrémité du tube (114) d'alimentation en concentré s'étendant dans chacun des conteneurs (113) ; et
 - (c) l'étagère (112) comprenant un support (205) proportionné et configuré pour recevoir les moyens (150) formant pistolet.
2. Système selon la revendication 1, qui comprend un conteneur (111) de stockage placé sur l'étagère, le conteneur de stockage ayant un orifice d'admission (119).
3. Système selon la revendication 2, dans lequel les moyens (150) formant pistolet comprennent une buse (180) proportionnée et configurée pour correspondre à l'orifice d'admission (119) du conteneur de stockage.
4. Système pour doser et distribuer un produit chimique, comprenant un tuyau (154) d'alimentation en diluant liquide destiné à transporter de l'eau, et au moins deux conteneurs (113) de stockage de concentré pour stocker des produits chimiques concentrés, chacun des conteneurs (113) de stockage ayant un tube preneur (114) s'étendant depuis celui-ci, les conteneurs (113) de stockage de concentré étant portés sur une étagère (112), le système étant caractérisé par :
 - (a) des moyens (150) distributeurs formant pistolet pulvérisateur, ayant une extrémité d'admission de diluant liquide et une deuxième extrémité de décharge, les moyens (150) formant pistolet distributeur comprenant une vanne (166) pour contrôler



le débit de diluant liquide, commandée par un actionneur (76) fixé de manière fonctionnelle aux moyens (150) formant pistolet distributeur, ces moyens (150) comprenant en outre :

- un aspirateur (167) à l'intérieur du pistolet (150) distributeur,
- des moyens (170) formant connecteur, pouvant être débloqués, pour le tube preneur (114),
- un tube distributeur (153) amovible, et
- une buse (180) de pistolet ;

les moyens (150) formant pistolet distributeur pouvant être montés sur l'étagère (112) ;

(b) le tuyau (154) d'alimentation en diluant liquide étant connecté à la première extrémité d'admission de diluant liquide ; et

(c) un tambour (60) pour stocker le produit chimique dilué, le tube (153) distributeur pouvant être inséré à l'intérieur du tambour (60) pour distribuer le produit chimique.

5. Système selon la revendication 4, qui comprend une pluralité de conteneurs (111) de stockage formant pot, ayant un orifice d'admission (119) proportionné et configuré pour correspondre à la buse (180) de pistolet pour distribuer le produit chimique dilué, les conteneurs (111) formant pot étant portés sur l'étagère (112), le produit chimique étant distribué dans ceux-ci. 25
6. Système selon l'une quelconque des revendications 2 à 5, dans lequel l'étagère (112) comprend une étagère (102) qui comprend des arêtes (190), modelées pour s'ajuster à la dimension et à la configuration du ou des conteneur(s) (111) de stockage. 30 35
7. Système selon la revendication 6, dans lequel les moyens (112) formant étagère comprennent un orifice (107), proportionné et configuré pour recevoir les moyens formant pistolet. 40
8. Système selon l'une quelconque des revendications 1 à 7, dans lequel l'étagère (112) comprend un panneau avant ayant une pluralité d'ouvertures (116), chacune de ces ouvertures (116) correspondant à un tube (114) d'alimentation en concentré et étant proportionnée et configurée pour le passage de ce tube (114) à travers celles-ci. 45
9. Système selon la revendication 8, dans lequel un conteneur (113) de concentré, un conteneur (111) de stockage, et le panneau avant (108) de l'étagère ont des moyens d'identification 50 55

correspondants.

10. Système selon l'une quelconque des revendications 1 à 9, dans lequel les moyens formant pistolet comprennent un tube distributeur (153) rigide. 5
11. Système selon la revendication 10, dans lequel le tube distributeur (153) peut être retiré des moyens (150) formant pistolet. 10
12. Système selon l'une quelconque des revendications 1 à 11, dans lequel le tube (114) d'alimentation en concentré comprend des moyens doseurs (82). 15
13. Système selon la revendication 12, dans lequel les moyens de dosage comprennent un verseur doseur (82), ledit verseur doseur étant codé au moyen de couleurs pour correspondre à un taux de dilution particulier. 20
14. Procédé pour distribuer et manipuler des solutions liquides utilisant un système selon l'une quelconque des revendications 1 à 13, comprenant les étapes consistant à : 25
 - (a) retirer un pistolet pulvérisateur (150) d'un support (205) sur une étagère (112) ;
 - (b) interconnecter un premier tube preneur (114) de concentré au tube (150), avec des moyens (170) de connexion rapide, le pistolet (150) étant en communication fluidique avec une alimentation en diluant et ayant une vanne (166) de contrôle de diluant, avec un aspirateur à l'intérieur de celle-ci ;
 - (c) placer une extrémité de décharge (153) du pistolet (150) dans un conteneur (60) ;
 - (d) ouvrir la vanne (166) de contrôle de diluant en pressant un actionneur (76) connecté au pistolet (150), d'où l'entraînement d'un produit chimique concentré dans le pistolet (150) par l'intermédiaire du tube preneur (114) et la distribution de la solution liquide dans le conteneur (60) ; et
 - (e) déconnecter le tube preneur (114) de concentré du pistolet (150), et connecter un deuxième tube preneur (114) à ce pistolet (150). 30 35 40 45
15. Procédé selon la revendication 14, qui comprend l'étape de transport de l'étagère (112) à un emplacement, à proximité du point d'utilisation. 50

