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(54) **DISPENSER FOR SOLID BLOCK DETERGENT COMPOSITIONS.**

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Description

This invention relates to a dispenser for solid block detergent compositions which comprise a housing configured for fixed mounting to a solid surface, said housing defining a substantially enclosed inner cavity and an access port and a discharge port opening into said cavity, a detergent agent containing holder for holding and maintaining in position a solid block of detergent agent, so as to expose for use at least one surface of said block to said cavity, and furthermore spray-forming nozzle means mounted to extend into said cavity for directing a pressurized spray of liquid at the entire exposed surface of said detergent block such that the hydraulic action of said nozzle directed spray disolves a portion of said detergent block forming a concentrated detergent solution for passage through said discharge port, which is disposed adjacent the lower portion of the cavity. More particularly, this invention relates to a detergent dispenser which converts solid block-type detergent compositions into concentrated detergent solution, which is particularly useful for institutional dishwashing and fabric washing machines.

Automated institutional and industrial spray washing machines are generally configured to embody at least one wash tank or reservoir for maintaining a readily available supply of detergent solution for use by the washing machine. During operation, the washing machine repeatedly drawns upon or reuses the detergent solution within the wash tank reservoir, over a period of time (e.g. such as over an entire day), until it is replenished by a fresh solution. During normal usage a part or all of the rinse water is diverted to the wash tank reservoir and a certain amount of the detergent solution is drained off via a stand pipe (for example, in warewashing applications, with food particles and grease), to keep the remaining solution as clean as possible. The proper reservoir solution level may also be maintained by adding water to the reservoir, which reduces or dilutes the detergent concentration of the reservoir solution. Accordingly, to maintain the reservoir solution at the desired detergent concentration level required for proper cleaning, concentrated detergent solution is periodically added to the reservoir by auxiliary detergent dispenser apparatus.

In commercial institutional and industrial washing applications, it is advantageous, from time, cost and safety considerations for operators to be required to only periodically charge the washing machine (or its detergent dispenser) with its required detergent—say, for example, only once during the normal working day. Accordingly, the detergent dispenser apparatus used for replenishing the wash tank solution have typically been designed to hold sizable amounts of detergent, and for automatic or semi-automatic operation. Such use of automated detergent dispensers eliminates the need of constant operator attention to the status of the reservoir solution, minimizes operator errors due to operator misjudgment in timing or in the amount of detergent to be added to the reservoir, and provides greater accuracy in maintaining the actual concentration level of the detergent solution within the reservoir.

The supplying or replenishing of concentrated detergent solution to the wash tank reservoir may be performed on a "demand" basis, whereby the detergent concentration level within the wash tank reservoirs monitored by a conductivity cell which typically forms part of an electrical bridge or sensor circuit connected to control the emissions of concentrated detergent solution from the detergent dispenser. Alternatively, the dispenser may be hydraulically linked to the wash tank, for example, by a by-pass line from the rinse line of the washer apparatus; with such a by-pass line, each time a rinse cycle of the washing apparatus is executed, the detergent dispenser is activated, dispensing to the wash tank reservoir an amount of concentrated detergent solution in pre-determined proportion to the volume of rinse water used. Since the rinse water is generally diverted to the wash tank, the combined effects of dilution by the rinse water and enrichment by the concentrated detergent solution typically maintains the desired detergent concentration. Alternatively a by-pass from the wash pump manifold may also be connected to the dispenser, for example, when the "demand" basis is employed.

Such solid detergent dispensers of the prior art have used a number of different techniques for converting solid detergent into concentrated detergent solution. The majority of such devices have been designed to convert solid detergent from its "powdered" form. The modes of operation of such dispensers depends somewhat upon the type of washing apparatus with which such dispensers are used, and upon the volume of washing performed by the wash machine apparatus over any given period of time. For example, in large, heavy washing commercial applications, the detergent dispenser may be remotely located (usually in a different physical location) from the washing apparatus and may be configured to convey the solid detergent directly from its shipping container (see for example U.S. Patent 3,595,438, issued July 27, 1971 to Daley, et al and 4,020,865, issued May 3, 1977 to Moffat et al). Dispensers of the type usually have self-contained reservoirs for maintaining a supply of concentrated detergent solution produced thereby, and a pump for transferring on demand the concentrated detergent solution to the primary wash tank reservoir of the washing apparatus proper. For lower volume commercial washing applications, it is more advantageous to use smaller detergent dispensers

configured for mounting to or directly adjacent a washing machine proper. Such dispensers hold relatively smaller amounts of detergent, but offer the flexibility of being immediately accessible for loading by an operator of the washing apparatus, and are thus generally more versatile in their application, than are the larger remotely located dispensers, (see for example, U.S. Patent 4,063,663, issued December 20, 1977 to Larson et al). These dispensers are generally loaded from the top, and directly supply the adjacent washing apparatus reservoir with their produced detergent solution by gravity feed, thus eliminating the need and expense for pumps, whole providing an added dimension of reliability. It will be understood that the below-described prior art techniques used for converting solid detergent to concentrated liquid detergent, apply both to the large, remotely located, self-contained reservoir dispensers as well as to the smaller, wall or wash machine mounted, direct gravity feed types of dispensers.

One detergent dispenser technique for converting powdered detergent, is the so-called "water-in-reservoir" type. In the water-in-reservoir dispenser, the powdered detergent is completely submerged under an aqueous solution in a holding tank or pot of the dispenser. A standpipe, usually located near the center of the dispenser tank, maintains a constant water/-solution level within the dispenser tank. As water is added to the dispenser tank, a concentrated, saturated detergent solution or slurry is formed by the swirling action or agitation of the powdered detergent by the injected water. The added water also causes a portion of the saturated solution in the pot to flow into the standpipe, which is connected to supply the wash tank reservoir of the washing apparatus. Since the powdered detergent is always saturated in the water-in-reservoir type of dispenser, the concentration level of the detergent solution produced by such a dispenser over a period of time can significantly vary as the detergent within the dispenser pot is diluted. Further, such techniques are not practical for use with powdered detergents containing active chlorine, since most of the chlorine contained in such detergents is quickly lost through decomposition once the detergent is wetted. Further, there may be safety hazards involved with use of such dispensers if the operator does not carefully follow directions when charging the dispenser. Charging or recharging of such dispensers requires an operator to pour powdered detergent directly into the standing water of the dispenser tank or pot. If highly caustic containing detergent compounds are added too rapidly or in excessive quantities to the dispenser pot, the heat of hydration may cause the solution to boil and spatter. Since the water-in-reservoir type of dispensers are typically mounted above the washing apparatus, at eye level or higher with respect to the operator, such boiling and spattering may pose a danger of caustic splash or spray to the eyes or face of the operator.

Another technique for converting powder detergent into concentrated liquid detergent, involves the technique of placing the powdered detergent over an inverted curved (usually conically or hemispherically shaped) screen having a mesh size smaller than the powdered detergent particles supported thereby. That powdered detergent which directly overlies the support screen is dissolved as needed, by a fine mist spray from a nozzle disposed below the screen. The concentrated detergent solution formed by the spray falls by gravity into an underlying reservoir, or is directed by a conduit to the wash tank reservoir of the washing apparatus. This technique solves many of the practical and safety problems associated with the water-in-reservoir type of dispenser, since the entire charge of powdered detergent is not wetted, since the solution produced is of more uniform concentration, and since an operator loading the detergent into the dispenser is not subjected to boil-over or spattering of highly caustic detergent solution. Examples of such detergent dispensers used in high-volume applications, wherein the dispenser is generally remotely located from the washing machine apparatus, and wherein the powdered detergent is converted directly from its shipping container, can be found in U.S. Patents 3,545,438, issued July 27, 1971 (Daley) and 4,020,865, issued May 3, 1977 (Moffat et al). An example of such a detergent dispenser for smaller volume applications, wherein the dispenser is mounted to or adjacent the washing machine apparatus is found in U.S. Patent 4,063,663, issued December 20, 1977 (Larson et al).

While the powdered detergent dispensers such as described by the Daley, Moffat and Larson patents have represented significant contributions to the art of detergent dispensing, the use of solid detergent in powdered form has a number of drawbacks in commercial applications. Due to increased sanitary standards and demands for shorter wash times, recently developed powdered detergents have relatively more complex detergent compositions that are more hazardous to the user, less stable and more difficult to dissolve in a satisfactorily uniform manner. Powdered detergents dissolve generally readily because of their high specific surface areas. However, when such powdered detergents include a mixture of a number of components having relatively different dissolving times, such detergents are susceptible to differential solubility problems in automatic detergent dispensers, depending upon the rate of dispensing or the residence (dwell) time of contact between the detergent powder and the dissolving liquid. Those particles having the greatest rate of solubility as well as the greatest specific surface tend to

dissolve first, whereas those having the least specific surface and/or the lowest solubility rate tend to dissolve relatively slower. Another problem with powdered detergents relates to possible incompatibility of those constituent components or particles required in the make-up of the detergent so as to perform the required washing function. This problem is particularly acute with those detergents required to contain an active chlorine source and an organic defoamer. The problem associated with such detergents is that there is a substantial loss of available chlorine from such detergents in a relatively short period of time, due to the instability of the chlorine component. The chlorine instability problem is even more acute with high alkalinity powdered detergents because many defoamers and chlorine-containing components are not stable in the presence of highly alkyline chemicals such as sodium hydroxide.

Another problem inherent with powdered detergent, if its components are of different particle sizes and densities, is segregation of those constituents particles during manufacturing, shipping and handling. Even when uniform distribution can be achieved during manufacture, subsequent shipping and handling may cause segregation, leading to non-uniformity in the composition of the detergent when it is withdrawn from the container. Besides the inherent "physical" problems associated with powdered detergents, they are also subject to user misuse and possible abuse, due to user inefficiency, carelessness, or negligence. For example, due to their powdered form, such detergents are often misused for purposes for which they were not designed, and in applications wherein they may present safety problems to the user. Another disadvantage of powdered detergents when handled in bulk form is that they are quite susceptible to spillage onto the floor, on the washing machine, etc. by the user. Also, as previously mentioned with respect to the water-in-reservoir type of dispenser, if such powdered detergents are added too quickly or in excessive quantities to the reservoir tank of such dispensers, they may present safety hazards to the user due to boil-over and spattering.

Another form of solid detergent is the "briquette" form, comprising pre-shaped briquettes of solid detergent. Dispensing systems for dissolving detergent briquettes are known in the art. See, for example, U.S. Patent Nos. 2,382,163, 2,382,164 and 2,382,165 all issued August 14, 1945 to MacMahon, and U.S. Patent No. 2,412,819, issued December 17, 1946 to MacMahon. In those priort art systems, the detergent briquettes are dispensed from a modified water-in-reservoir pot-shaped dispenser wherein a number of the briquettes are held in a mesh basket forming a slot across the diameter of the pot. A stream of water directed against the lowermost briquette, in combination with the swirling action of water engaging the submerged portion of the lowermost briquettes provides the dissolving action. The primary advantage of using detergent briquettes in such dispensers is that the user can visually determine when the detergent dispenser reservoir needs a replenishing charge of detergent. As with the water-in-reservoir type of dispenser, however, water is left standing in the reservoir, and a portion of the briquettes are submerged within that water. Accordingly, where there are incompatible components within the detergent briquettes, there can be undesirable interaction therebetween. Further, if the detergent contains a defoamer, that defoamer tends to float to the top of the reservoir during periods of inactivity, forming a slag at the water surface. For these and other reasons, the briquette detergent approach has not attained that degree of commercial success in the conventional institutional and industrial washing machine art as has the powdered detergent dispensing approach.

For dispensing solid block soap a dispenser with the features of the first paragraph of this specification and the pre-characterizing part of claim 1 is known from FR—A—389 523. The soap block is placed in a casing having a water-permeable bottom directly above a spray-forming nozzle which sprays water into the casing to dissolve the soap block placed therein. To place a soap block in the casing the cover thereof has to be removed and the block has to be touched by hand which is not acceptable in the block comprises of detergent compositions of highly caustic kind since in this event the operator handling the block can be injured by the caustic detergent. Furthermore, the concentration of the dissolved soap is not constant but varies and becomes more diluted as the soap block dissolves, since the surface area of the soap block being acted on by the impinging water decreases as the block is used up.

The present invention is intended to remedy the above mentioned disadvantages of the prior art dispensers. It solves the problem how to design a dispenser for solid block detergent compositions which can easily and safely be handled and which supplies a detergent solution of constant concentration until the detergent composition is exhausted.

The advantages offered by the invention are mainly that a concentrated detergent solution for use by washing machines (either of the type remotely located or the type located on or immediately adjacent the dispenser) is provided by proportionately dissolving as needed, solid block-type detergent compositions such as solid-cast detergents, detergent cakes and other solid detergents having significant geometric volume.

The dispenser of the present invention provides a simple, efficient, non-hazardous and reliable technique for producing highly concentrated detergent solution either on a demand

basis or by the hydraulically linked by-pass method. The concentrated detergent solution produced by the dispenser of this invention is substantially uniform throughout the conversion of the entire block of solid detergent, and the detergent charge can be rapidly and safely replaced by the user.

The dispenser of the present invention includes a housing member suitable for a fixed mounting to a solid surface, such that the housing member maintains a pre-determined position with respect to the mounting surface. For instance the housing is configured for mounting to a vertical wall; however, the housing could equally well be configured for mounting to fixed surfaces of other shapes and angular attitudes. The detergent dispenser of the invention could be mounted directly to a washing apparatus to which the concentrated detegent solution is to be supplied, adjacent to such washing apparatus, or at a position remote from such washing apparatus.

The dispenser housing defines an inner cavity and access and discharge ports opening into the inner cavity. The access port is of suitable configuration for accepting a cartridge containing solid block detergent into the inner cavity, in a manner such that at least one surface of the block detergent is exposed and substantially enclosed within the cavity. The discharge port may be of any size and configuration suitable for providing a passageway through which the concentrated detergent solution produced by the dispenser can leave the inner cavity, for subsequent use by a washing machine. Such discharge port may open directly into an underlying collector or reservoir of the dispenser, into a wash tank reservoir of a washing machine, into a fluid-flow conduit, or into other appropriate means, for transportably carrying the concentrated detergent solution produced by the dispenser.

Nozzle means are mounted to extend into the housing cavity for directing a pressurized spray of pre-determined pattern and direction into the cavity, for dissolving the solid block detergent in the cavity by hydraulic and erosive action of the spray pattern upon the exposed surface of the block detergent.

A cartridge containing a charge of solid block detergent is introduced into the cavity of the dispenser housing through its access port. The cartridge positions and retainably holds the received block detergent in fixed position within the cavity, to position the exposed surface of the block detergent in cooperative predetermined alignment with the nozzle means, such that the spray pattern from the nozzle means impinges generally uniformly upon substantially the entire exposed surface of the held block detergent. One embodiment of the invention includes safety switch means for blocking fluid flow to the nozzle means whenever the solid block detergent cartridge is not properly disposed in its pre-determined fixed position within the housing cavity.

The solid block detergent charge is retainably held by a cartridge, which holds a geometrically shaped volume of the solid block detergent so as to expose at least one surface thereof. The cartridge is configured for insertion into the access port of the housing. The retaining means is disposed to accept the cartridge and to releasably maintain the cartridge in fixed position relative thereto such that the exposed surface of the held block detergent lies substantially enclosed within the cavity and in fixed pre-determined position with respect to the nozzle means. In a preferred embodiment of the invention, substantially the entire detergent holding portion of the cartridge is configured for insertion within the inner cavity of the housing; however, other cartridges could be configured according to the principles of this invention, wherein a portion of the cartridge lies outside of the housing, for example, in a manner such that the cartridge itself forms a part of the housing which defines the inner cavity.

The cartridge may include a disposable receptacle member for retainably holding the solid block detergent. The disposable cartridge is particularly useful when the dispenser is used with solid detergent compositions of the cast type, wherein the disposable cartridge receptacle may comprise the actual mold in which the cast detergent is manufactured.

Alternatively, where insertable detergent cartridges are used, that cartridge may be reusable. In such instances, the detergent cartridge would be configured to retainably accept and hold at least one charge of solid block detergent, and such that a spent or depleted detergent charge could be readily replaced by a fresh charge when desired or required.

The invention applies both to dispenser configurations wherein the nozzle spray is directed toward the exposed detergent surface from a position below the exposed surface as well as to configurations wherein the spray is directed from a position above the exposed detergent surface. In a preferred embodiment of the invention, the nozzle means is generally disposed above the exposed detergent surface and such that the longitudinal spray axis of the nozzle means is generally at a right angle to the general plane of the exposed detergent surface. In the preferred embodiment of the invention, the exposed detergent surface is maintained at a predetermined fixed angle within the cavity, between 10 degrees and 90 degrees with the horizonal, such that the spray from the nozzle means dissolves the solid detergent both by hydraulic action through direct impingement upon the surface and by erosive action of the converted spray liquid which cascades by gravity down the exposed detergent surface.

It will be understood that many configurations of the cartridge for the solid block detergent can be designed within the scope of this

invention. In a dispenser wherein the nozzle means is disposed below the exposed detergent surface, the cartridge preferably would include a screen mesh member mounted below the solid detergent block either for supportably holding the block detergent, or for preventing particles thereof from falling into the underlying collection reservoir for the concentrated detergent solution.

One embodiment of the cartridge includes a mesh member overlying the exposed surface of the detergent block, to prevent solid particles of the retainably held detergent block from passing directly to the discharge port of the cavity. A preferred configuration of such an insertable cartridge comprises a plurality of receptacles for retainably holding a plurality of different blocks of solid detergent compositions. Such plurality of receptacles may be configured and sized to hold incompatible detergent compositions, whereby the pressurized spray of the nozzle means simultaneously dissolves the solid detergent compositions from each of the plurality of receptacles in desired proportions, depending upon the relative sizes of the receptacles and the particular compositions of the solid detergents held respectively thereby.

While the present invention will be described in combination with a particular configuration of the dispenser housing and the cartridge for the solid detergent, it will be understood that other configurations could be designed within the scope of this invention as defined by the appended claims. Further, while the preferred embodiment of the invention will be described with respect to cartridges which expose only one surface per retainably held piece of solid block detergent, the principles of this invention can be extended to dispenser configurations wherein multiple surfaces of retainably held solid detergent block are simultaneously exposed to spray patterns from appropriate nozzle means. Further, while the present invention will be described with reference to a preferred embodiment thereof, wherein a particular orientation of the exposed surface of the retainably held block detergent is illustrated, the principles of this invention extend beyond such illustrations of the preferred embodiment, and are limited only by the claims annexed hereto. Similarly, while specific safety feature circuits and techniques will be described with respect to the preferred embodiments of this invention, other safety control means and techniques could equally well be devised within the scope of this invention, which would render the dispenser non-hazardous to an operator or user of the device.

Various advantages and features of novelty which characterize the invention are pointed out with particularity in the claims, annexed hereto and forming a part hereof. However, for a better understanding of the invention and its advantages obtained by its use, reference should be had to be Drawing which forms a further part hereof and to the accompanying descriptive matter in which there are illustrated and described several embodiments of the invention.

Referring to the Drawing, where like numerals represent like parts throughout the several views:

Figure 1 is a view in perspective of a solid detergent dispenser constructed according to the principles of this invention;

Figure 2 is an exploded view in perspective of one embodiment of the cartridge-type receptacle member for holding a charge of solid block detergent, and disclosed in Figure 1;

Figure 3 is a view in perspective of a second embodiment of the cartridge-type receptacle member for holding a charge of solid block detergent, and disclosed in Figure 1;

Figure 4 is a view in top plan of the solid detergent dispenser disclosed in Figure 1;

Figure 5 is a view in front elevation with portions thereof broken away, of the solid detergent dispenser disclosed in Figure 1;

Figure 6 is a view in bottom plan of the solid detergent dispenser disclosed in Figure 1;

Figure 7 is a view in side elevation of the solid detergent dispenser disclosed in Figure 1;

Figure 8 is a sectional view of the solid detergent dispenser disclosed in Figure 5, taken generally along the Line 8—8 thereof;

Figure 9 is a diagrammetic view illustrating one embodiment of a safety control mechanism for controlling the nozzle spray of the solid detergent dispenser of this invention; and

Figure 10 is a fragmentary view of a portion of the solid detergent dispenser disclosed in Figure 8, illustrating an alternate embodiment of the nature of the solid-detergent charge held by the cartridge.

Referring to the Figures, there is generally disclosed a detergent dispenser 20 for solid detergent compositions of the block-type, generally constructed according to the principles of this invention. That embodiment of the dispenser 20 illustrated in the Figures is one of the type suitable for servicing relatively smaller wash applications, wherein the detergent dispenser is generally mounted directly to the washing machine or immediately adjacent thereto, such that the concentrated detergent solution formed by the dispenser will flow by gravity into the wash tank of the washing machine proper (not illustrated). It will be understood that the particular embodiment described in the Figures, represents only one of many possible embodiments and applications for the invention and that the invention is not limited to those embodiments herein disclosed.

The dispenser 20 has a housing portion 21, constructed of any suitable material capable of withstanding exposure to highly caustic detergent solutions, and is preferably configured of stainless steel or molded plastic material. The housing 21 has a generally planar

back wall 21a suitable for direct engagement with and mounting to a vertical mounting surface or wall 15 (Fig. 7). The back wall 21a includes a plurality of mounting slots 22 formed therethrough, to enable fixed mounting of the housing 21 to a solid vertical surface such as a vertical wall of a washing machine or a vertical wall disposed adjacent a washing machine. It will be understood that the housing 21 could be configured for mounting to any solid surface, and is not limited to mounting to a vertical, or even to a planar surface.

The housing 21 defines a substantially enclosed inner cavity 30. For ease of reference and distinguishing the various portions of the inner housing cavity 30, referring to Fig. 8, the upper portion of the inner cavity will be referred to as the spray region 30a of the cavity, and the lower portion of the inner cavity 30 will be referred to as the collector region 30b thereof.

The upper portion of the housing 21 defines a mouth or access port 32 opening into the inner cavity 30, and a discharge port 34 (Figs. 5 and 6) opening into the inner cavity 30 and forming a passageway through the housing 21 for concentrated detergent solution collected or accumulated within the lower portion of the inner cavity 30 of the housing 21. The housing 21 has a hose clamp extension 35 configured around the discharge port 34, having a plurality of annular ribs configured for engaging the inner walls of a connecting conduit or hose(not illustrated), for directing fluid flow from the discharge port 34. While a specific configuration of the discharge port 34 is illustrated in the embodiment of the invention disclosed in the Figures, it will be understood that other configurations of the discharge port are possible depending upon the overall configuration of the dispenser 20. For example, in a dispenser configuration wherein the dispenser proper includes an underlying reservoir for collecting the concentrated detergent solution formed by the dispenser, the entire bottom portion of the inner cavity 30 may comprise the discharge port 34, which would directly open into the underlying reservoir of such a dispenser apparatus, (see for example such an outlet port configuration as illustrated in U.S. Patent 4,020,865, issued May 3, 1977 to Moffat et al). Similarly, as hereinafter described in more detail, the access port 32 can assume many varied configurations, and need not necessarily be disposed so as to open into the upper portion of the inner cavity 30. For example, in a bottom loading dispenser, the access port may be located at the bottom of the dispenser housing, and may also comprise the outlet port of such a dispenser.

An upper front wall 21b of the housing 21 projects downwardly from the access port 32 at an inclined angle to the horizontal. In the embodiment of the invention illustrated in the Figures, the upper front wall 21b forms an angle of approximately 60 degrees with the horizontal. The upper front wall 21b terminates at and is continuous with a first lower wall 21c of the housing 21, which is also slightly inclined with respect to the horizontal and lies in a plane generally parallel to that of the upper front wall 21b. The lower front wall 21d terminates at and is continuous with a bottom wall 21e of the housing, through which the discharge port 34 is formed. In the Figures, the bottom wall 21e is generally planar, however the bottom wall 21e could assume many different configurations (such as ramp-shaped or funnel-shaped), and is generally configured so as to direct liquids accumulated within the lower collector region 30c of the housing to the discharge port 34.

The back wall 21a extends between the bottom wall 21e and an upper wall, generally designated at 21f, which extends to and defines one edge of the access port 32. When viewed in cross-section as in Fig. 8, that region of the inner cavity 30 generally located between the upper front wall 21b, the first lower wall 21c and the back wall 21a and the upper wall 21f comprises the upper spray region 30a; whereas that region of the inner cavity 30 generally located between the lower front wall 21d and the back wall 21a, and extending down to the bottom wall 21e generally comprises the collector region 30b.

The housing 21 further has a pair of oppositely disposed side walls 21g generally vertically extending between the bottom upper wall 21e and the upper wall 21f, and laterally extending between the back wall 21a and the frontwall 21b, the first lower wall 21c and the lower front wall 21d. The side walls 21g are each configured to define a flange or land region 24 extending into the inner cavity 30 in generally parallel spaced relationship to one another and being generally co-planar with one another so as to lie in a plane generally parallel to that of the upper front wall 21b. The land regions 24 are disposed to extend from the access port 32 downwardly to the bottom wall 21e, and cooperatively form with the front wall 21b oppositely disposed channels or races within the inner cavity 30 for slidably retainably engaging a cartridge 40.

One embodiment of a cartridge 40 suitable for removable insertion within the access port 32 of the dispenser 21 is illustrated in more detail in Fig. 2. Referring to Fig. 2, the cartridge 40 is basically a receptacle or container-shaped member suitable for retainably holding in fixed position relative thereto a block of solid detergent composition. As referred to herein, the term "solid block" detergent composition refers to any geometric volume or mass of solid detergent regardless of the method in which such detergent is manufactured, such as a cast detergent, a cake detergent, and agglomerate-type detergent, or other types of solid detergents having substantial volume or mass (as distinguished from solid "powdered" or "liquid" detergents). The cartridge 40 generally com-

prises a bottom surface 41, a lower peripheral side wall portion 42, an intermediate ledge region 43 and an upper peripheral side wall portion 44. While the cartridge 40 may assume any geometric configuration suitable for exposing at least one broad surface of a solid block detergent composition retainably held thereby, the particular configuration of the cartridge illustrated in Fig. 2 is of a generally rectangular shape. The lower peripheral side wall portions 42 extend between the bottom surface 41 and the intermediate ledge region 43, with all except one surface of the lower peripheral side walls (that surface designated as 42a) being disposed generally perpendicular to the bottom surface 41. The non-perpendicular lower peripheral side wall portion 42a is configured to define an angle with the bottom surface 41 corresponding to the included angle defined between the upper front wall 21b and the first lower wall 21c of the dispenser housing 21 (see Fig. 8). The intermediate ledge region 43 of the cartridge 40 lies in a plane generally parallel to the bottom surface 41. The upper peripheral side wall portion 44 projects upwardly from the intermediate ledge region 43, with the walls on three sides thereof lying generally perpendicular thereto. The fourth side of the upper peripheral side wall 44a forms an included angle with the general plane of the intermediate ledge region 43 substantially equal to that of the included angle formed between the lower front wall 21d and the bottom wall 21e of the dispenser housing 21 (see Fig. 8).

The 43a portion of the intermediate ledge region is disposed between the lower and upper peripheral side wall portions 44a and 44 respectively, and is somewhat wider (as measured between corresponding upper and lower peripheral side wall portions) than the width of the intermediate ledge region 43 of the other portions of the cartridge 40. A plurality of raised land areas or mounting surfaces 45 project upwardly from the intermediate ledge region 43a, the upper surfaces respectively thereof lying generally in a common plane.

The lower peripheral side walls 42 and 42a cooperatively define with the bottom surface 41 a first receptacle-shaped container 46 for retainably holding a geometrically shaped volume or mass of solid block detergent composition 100 (see Fig. 8). In the preferred embodiment of the invention, the first receptacle-shaped container 46 of the cartridge 40 retainably holds a solid "cast" detergent composition which is poured directly into the receptacle-shaped container portion 46 of the cartridge 40, the container portion 46 physically forms the mold in which the solid cast detergent 100 is manufactured. The retainably held charge of solid detergent 100 within the container portion 46 of the cartridge 40 defines a broad, generally planar upper surface 100a lying generally in the same plane as the intermediate ledge region 43, or slightly therebelow. The upper detergent surface 100a is disposed for exposure to spray from a nozzle means, hereinafter described in more detail.

The elongated intermediate ledge region 43a defines the bottom surface of a second receptacle-shaped container, generally designed at 47 (see Figs. 2 and 8). A screen or mesh member 50 is configured for mounting to the intermediate ledge region 43 (other than at the extended intermediate ledge region portion 43a) and to the raised mounting surfaces 45, in spaced relationship to the underlying extended intermediate ledge region 43a, so as to overlie respectively the first and second receptacle-shaped container region 46 and 47. The screen member 50 has a first generally planar portion 50a, (Fig. 2) a second generally planar portion 50b and an interconnecting wall portion 50c. The first screen portion 50a is sized to fit between the opposing upper peripheral side walls 44 and is configured for mounting to the three contiguous portions of the intermediate ledge regions 43, exclusive of ledge region 43a, for substantially overlying the first receptacle-shaped container portion 46 of the cartridge 40. The second portion 50b of the screen member 50 lies in a plane generally parallel to and spaced above that of the first screen portion 50a, and is configured for mounting to the plurality of raised mounting surfaces 45 so as to substantially overlie the extended intermediate ledge region 43a and the second receptacle-shaped container region 47 of the cartridge 40. The interconnecting wall portion 50c of the screen member 50 forms included angles with the first and second 50a and 50b portions of the screen member 50, substantially the same as those included angles which the lower peripheral side wall portion 42a forms with the bottom surface 41 and with the intermediate ledge region 43a of the cartridge 40. When mounted to the cartridge 40, the interconnecting wall portion 50c of the screen member 50 forms included angles with the first and second 50a ahd 50b portions of the screen member 50, substantially the same as those included angles which the lower peripheral side wall portion 42a forms with the bottom surface 41 and with the intermediate ledge region 43a of the cartridge 40. When mounted to the cartridge 40, the interconnecting wall portion 50c of the screen member 50 lies generally coplanar with the lower peripheral side wall portion 42a, and operatively forms an extension thereof, to define with the extended intermediate ledge region 43a and the upper peripheral side wall portion 44a and those oppositely disposed portions of the upper peripheral side wall 44 lying contiguous with the extended intermediate ledge region 43a, the second receptacle-shaped container 47.

The cartridge 40 may be constructed of any suitable material that is capable of withstanding exposure to highly caustic detergent

solutions, and is preferably configured or molded plastic material such as polyethylene or polypropylene. The cartridge can be supplied with solid block detergent and sold as an article of commerce, wherein the entire cartridge 40 or portions thereof can be discarded after the detergent charge retainably held thereby has been exhausted. When the cartridge is a disposable item, the screen member 50 would be permanently welded or bonded to the intermediate ledge region 43 and the plurality of raised land areas 45.

Alternatively, the cartridge 40 could be a reusable item, possibly constructed of stainless steel, wherein the screen member 50 could be detachably secured to the underlying cartridge 40 so as to enable re-charging of the solid block detergent retainably held by the various receptacles of the cartridge. The screen member 50 may be of any suitable material capable of withstanding exposure to highly caustic detergent solutions, and is in the preferred embodiment, preferably constructed of a plastic material. The mesh size of the screen member 50 is configured so as to be small enough to prevent solid particles of the solid block detergent held by the receptacle-shaped containers of the cartridges 40 from passing therethrough, yet must be large enough so as to permit relatively unobstructed passage therethrough of a pressurized spray pattern directed at the underlying exposed surfaces of the solid block detergent. In general, the mesh size of the screen member 50 should be no larger than the largest dimension of the discharge port 34, so as to prevent any solid chunks or pieces of the solid block detergent which would pass therethrough, from clogging the free flow of concentrated detergent solution through the discharge port 34.

The first receptacle-shaped container 46 of the cartridge 40 is configured to hold the primary solid detergent composition used in the cleaning operation. The preferred usage of the first receptacle-shaped container 46 would be for retainably holding a solid "cast" block detergent; however, other forms of solid block-type detergent could be retainably held by the first receptacle-shaped container 46. The second receptacle-shaped container 47 is configured for retainably holding a long narrow block of a second solid block detergent composition 102 (see Fig. 10) or a plurality of pillow-shaped pieces, briquettes, tablets or pellets of a second solid detergent composition, such as a chlorine source (e.g. calcium hypochlorite) or a defoamer detergent composition. The briquette or tablet form of the second detergent composition retainably held by the second receptacle-shaped container 47, is illustrated at 103 in Fig. 8.

While the cartridge 40 illustrated in Figs. 2 and 8 includes two receptacle-shaped containers for separately holding two different solid block-type detergent compositions, the cartridge 40 need not necessarily contain a plurality of separably distinct receptacles. For example, the cartridge could comprise a single receptacle-shaped container for retainably holding a single mass or block of solid detergent composition which detergent composition could be uniform or could contain "cores" or "pockets" or entire sections of different detergent compositions such as chlorine sources, defoamers, etc. Alternatively, the receptacle 40 could be modified to include more than two receptacle-shaped containers, as indicated in Fig. 3, wherein the first receptacle-shaped container 46 is partitioned by means of a dividing wall 48, to define a pair of receptacle-shaped containers 46a and 46b for retainably holding two distinct masses or geometrically shaped volumes of solid block detergent compositions.

It will be understood that many configurations of a solid block detergent composition holding cartridge can be configured within the scope of this invention as defined in the claims, the cartridge 40 being only one possible configuration for such a retaining cartridge. Even within the concept of using the cartridge 40, many such shapes and configurations of such a cartridge are possible. While in the preferred embodiment, a generally rectangular shape of the receptacle-shaped containers of the cartridge 40 has been disclosed, other geometric configurations and shapes such as cylindrical, triangular, various polygon-shapes and numerous other regular or irregular shapes could be employed. Further, while the broad exposed surface 100a of the retainably held solid block detergent mass 100 is disclosed as a generally planar surface, other configurations and shapes of such surface are possible, for example, but not limited to concave convex, spherical, pyramidical, conical, etc. shapes. Further, while the exposed detergent surface 100a is generally illustrated as lying co-extensive with the outer peripheral boundaries of the cartridge 40 (e.g. generally co-planar with the intermediate ledge region 43 thereof), the cartridge retaining the solid block detergent need not necessarily engage the solid block detergent on all but one side thereof. The primary consideration is that the cartridge actually retainably holds and maintains the position of the solid block detergent relative thereto, such that the exposed surface or surfaces thereof, wherever they may be, are maintained in predetermined fixed positions relative to the projected spray pattern or patterns from a nozzle means, hereinafter described in more detail.

In the preferred embodiment of the detergent dispenser disclosed in the Figures, the height and width of the cartridge 40 are sized for cooperative insertion within the access port 32 of the housing 21, as illustrated in Fig. 1. The lower portions of the intermediate ledge regions 43, which lie on oppositely disposed sides of the cartridge 40 are configured to slidably engage and be directed by the land or

flange portions 24 of the sidewalls 21g of the housing 21, such that the flange portions 24 of the side walls 21g cooperatively guide the cartridge 40 from its receipt through the access port 34 into a fixed pre-determined position with respect to the housing, (as indicated in Fig. 8). When inserted into the access port of the dispenser (see Figs. 1 and 8), the cartridge 40 lowers under the force of gravity and is directed by the guiding flanges 24 into the inner cavity 30, until the lower peripheral side wall portion 42a comes into resting engagement with the first lower wall 21c of the housing 21. When disposed in such fixed, pre-determined resting position, the upper peripheral side wall portion 44a located at the "top" portion of the positioned cartridge 40 cooperatively engages the side wall flanges 24 and the upper wall 21f of the housing 21 for preventing liquid spray out from the upper spray region 30a of the inner cavity 30 through the access port 32.

That portion of the upper peripheral side wall 44 oppositely disposed from the side wall portion 44a defines a semi-circular projection 44b comprising a "handle", allowing an index or middle finger to be inserted in the hollow of such handle to permit ease of holding and removal of the cartridge 40 from the dispenser housing 21.

Referring to Figs. 8 and 1, a conduit member 60 is secured to the upper wall 21f of the housing 21 and projects therethrough into the upper spray region 30a of the inner cavity 30. A spray-forming nozzle 61 is threaded or otherwise properly secured to that end of the conduit 60 extending into the inner cavity 30 and is disposed therein, so as to project a spray pattern of pre-determined shape at substantially the entire respective exposed solid, detergent block surfaces of the detergent within the various receptacle members of the cartridge 40. The nozzle 61 is oriented, relative to the "fixed" position of the cartridge 40 within the inner cavity 30, such that the longitudinal spray axis 62 from the nozzle is disposed generally perpendicular to the broad exposed upper surface 100a of the solid block detergent volume 100. The spray nozzle 61 may be of any suitable configuration and construction for projecting a pressurized spray of aqueous liquid (preferably water) received through the conduit 60, in a pre-determined pattern, configured to directly impinge upon substantially the entire exposed surfaces of the solid block detergent retainably held by the cartridge 40. In that embodiment of the invention disclosed in the Figures, the particular spray nozzle produces a "square" spray pattern (as viewed in a plane generally perpendicular to the longitudinal spray axis 62) for directing the spray pattern ejected therefrom at substantially the entire exposed surface 100a as well as at the exposed surface or surfaces of the solid block detergent retainably held by the second receptacle-shaped container 47. The water supply conduit 60 passes through a siphon breaker 63 and is connected, in operation, to a suitable pressurized source of water, generally ranging between 5 and 70 psi. A safety valve 64 preferably as a solenoid valve, may also be inserted between the nozzle 61 and the pressurized water source for selectively blocking the flow of water through the conduit 60 to the nozzle 61 (see Fig. 9).

A safety switch configuration is mounted within the housing 21 for sensing the operative position of the cartridge 40 within the inner cavity 30. In the embodiment of the invention illustrated in the Figures, the safety mechanism comprises a reed switch 70 mounted in a fixed position within the collector region 30b of the inner cavity 30 by means of a mounting bracket 71 (see Fig. 8). The upper peripheral side wall portion 44a of the cartridge 40 contains an encapsulated magnet 72. The position of the magnet and the reed switch 70 are relatively disposed with respect to one another, such that the reed switch 70 is activated by the magnetic flux of the magnet 72 only when the cartridge 40 has been fully accepted into the inner cavity 30 of the dispenser 21 in its pre-determined fixed position (as illustrated Fig. 8), whereby the access port 32 of the housing 21 is substantially closed by the positioned cartridge member 40. Referring to Fig. 9, the reed switch 70 is activated by the magnet 72, so as to energize the solenoid valve 64 by means of the signal flow path 73 (and by any appropriate circuit means, not illustrated in the Figures) to "open" the valve 64, thus permitting pressurized fluid flow to the nozzle 61 only when the cartridge 40 is positioned in its predetermined fixed position within the inner cavity 30 of the housing 21. As the magnet 72 is withdrawn out of activating proximity with the reed switch 70, the reed switch changes its energization state, providing an appropriate energizing (or de-energizing) signal to the valve 64, to block pressurized fluid flow through the conduit 60 to the nozzle 61.

While a specific safety control switching arrangement has been illustrated for selectively blocking the pressurized fluid flow to the nozzle 61, it will be understood that many possible configurations of such safety switching mechanism can be devised, which fall within the scope of this invention. For example, mechanical switching configurations such as micro-switches could be employed, as well as optical sensors, mercury switching sensors, or purely mechanical linkage detection and valve activating means. Further, since the primary object of such safety control means is to prevent accidental spray discharge from the nozzle 61 out of the access port 32, the relative positioning of such switch detection means can readily be varied by those skilled in the art to achieve the intended purpose therefor.

Operation of the preferred embodiment

Operation of the solid detergent dispenser of this invention is relatively simple and is briefly described below. In the preferred embodiment of the invention, illustrated in Figs. 4 through 9, the cartridge 40 retainably holds the charge of solid block detergent, and is configured as a disposable item such that once the charge of solid detergent contained thereby is depleted by the spray action within the dispenser, the cartridge itself is rapidly removed from the housing and discarded. In the preferred embodiment, the volume of solid block detergent 100 retainably held by the first receptacle-shaped container 46 comprises a volume of solid cast block detergent which has been formed during manufacture thereof directly into the first receptacle-shaped container 46, or can be cut from a larger block of such solid detergent to fit the retaining shape of the first receptacle-shaped container 46. The volume of solid block detergent 100 comprises the primary detergent composition (generally highly alkaline) required for cleaning operations within the washing machine which the detergent dispenser 20 is servicing.

The second receptacle-shaped container 47 contains a relatively smaller charge of solid block detergent composition formed into tablets or pellets. In a preferred warewashing application for the detergent dispenser 20 (i.e. dishwashing usage), the solid block detergent tablets 103 are comprised of calcium hyprochlorite, or other active chlorine sources, and provide a source of chlorine when subjected to contact with an aqueous solution. The pellets or tablets 103 could also contain or be replaced by a defoamer detergent composition. Alternatively, both the chlorine and/or the defoamer compositions, if desired; could be included within the larger solid detergent block 100; could be mixed with one another in tablet form in the second receptacle-shaped container 47; could be formed as isolated inserts or cores within the larger solid detergent block 100; or could be formed as separate solid blocks either within the first or the second receptacle-shaped containers 46 and 47 respectively. In general, the density and composition of the solid detergent compositions contained within a single cartridge 40 are selected, and the relative solid detergent blocks are sized with respect to one another such that the proper desired mixture results therefrom when the nozzle spray is directed upon the exposed surfaces thereof. The physical make-up of the respective solid detergent blocks is also designed such that the dissolution rates thereof are somewhat uniform with respect to their respective volumes, such that all receptacles of the cartridge 40 are depleted generally uniformly.

Charging the dispenser 20 with a cartridge 40 is a simple and relatively fool-proof technique. An operator grasps the loaded cartridge 40 by means of the handle 44b and merely aligns the forward end thereof (i.e. the 44a, 43a and 42a portion) with the access port 32 of the dispenser 21 and drops the cartridge 40 into the access port 32, as indicated in the Figures. The land or flange regions 24 of the side walls 21g of the dispenser 21 automatically cooperatively engage the corresponding intermediate ledge regions 43 of the cartridge 40, to slidably guide and position the cartridge 40 within the inner cavity 30 of the dispenser 21, such that the broad upper surface 100a of the solid detergent block 100 comes to rest when the cartridge 40 is fully inserted within the housing 21, at predetermined fixed position relative to the overlying nozzle 61.

If an operator should inadvertently place the cartridge 40 into the access port 32 either in upside down or backwards manner, the unique configuration of the cartridge 40 will not cooperatively engage the guiding flange portions 24 of the side walls 21g of the dispenser 21, thus preventing the cartridge 40 from proceeding downwardly to its predetermined resting position within the cavity 30.

As the cartridge 40 comes to rest in its predetermined fixed position within the inner cavity 30 of the housing 21, the magnet 72 comes into cooperative activating position with respect to the reed switch 70 enabling the solenoid valve 64 to open the fluid flow path through conduit 60 to the spray nozzle 61. Should the cartridge 40 be inadvertently placed upside down into the access port, or be placed backwards therein, the magnet 72 would not come into the activating or "safe" proximity range of the reed switch 70, which would cause the reed switch 70 and associated circuitry connected therewith (not illustrated), to energize the solenoid valve 64 so as to block fluid flow through conduit 60 to the nozzle 61. Therefore, unless and until the cartridge 40 is fully inserted, in proper direction and orientation, within the inner cavity of the housing 21, spray through the nozzle 61 will be blocked, thus preventing potentially hazardous spray out of the access port 32. It will be noted that once the cartridge 40 is fully inserted within the housing 21 in its predetermined fixed resting position, the cartridge 40 prevents hazardous spray from the nozzle 61 out of the access port 32 by substantially closing the access port, with its upper and lower peripheral side wall portions 44 and 42 and its intermediate ledge region 43.

Once the cartridge 40 is properly inserted at its fixed pre-determined position within the inner cavity 30, the masses or volumes of solid detergent blocks retainably held by the various receptacles within the cartridge 40 are dissolved at a pre-determined rate, by the pressurized spray from the nozzle 61. A pressurized source of water is provided to the nozzle 61 as commanded by appropriate control means within the washing machine proper which the detergent dispenser services. For example, if a "demand" system is being used, an electronic control network such as

described in U.S. Patent No. 3,680,070 to Nystuen could be used to selectively provide pressurized water to the nozzle 61. Alternatively, the hydraulic by-pass method, as previously described, could be employed, as well as any other appropriate control mechanism.

Once pressurized fluid flow is applied to the nozzle 61, the nozzle generates a pressurized spray pattern of pre-determined configuration, which is uniformly directed across substantially the entire upper exposed surface 100a of the solid detergent block 100, as well as against the exposed surfaces of the solid detergent block materials 102 or 103 contained within the second receptacle-shaped container 47. The spray pattern passes through the mesh of the screen member 50 and impinges directly upon the exposed surfaces of the retainably held solid detergent blocks, dissolving by means of the hydraulic action of the spray itself, a portion of the solid detergent blocks, at their respective exposed surfaces. After striking the exposed surface 100a of the detergent block 100, the spray (now converted into a liquid), flows by gravity down the exposed surface 100a, dissolving by erosive action, further detergent at the exposed upper surface 100a. Upon reaching the interconnecting wall portion 50c of the screen member 50, the concentrated liquid solution cascades over and through the solid detergent chlorine-source or defoamer pellets or tablets 103 held within the second receptacle-shaped container 47, to release a predetermined proportionate amount of chlorine or defoamer components therefrom—all of which passes in solution as concentrated detergent solution to the lower collector region 30b of the dispenser 21. The "collected" concentrated detergent solution passes by gravity through the discharge port 34 and hose clamp extension 35 into appropriate conduit means or directly into an underlying wash tank reservoir for subsequent use by a washing machine. Besides the erosive action of solution passing from the upper exposed surface 100a of the detergent mass 100, the volume of solid detergent contained within the second receptacle-shaped container 47 is further directly dissolved by hydraulic action from the spray projected from the nozzle 61.

While the invention applies to dispenser configurations wherein the nozzle 61 is mounted below the exposed detergent surface, it is generally preferable to position the nozzle 61 in a position overlying the solid detergent block to be dissolved, and to place the exposed surface or surfaces of the solid block detergent at an angle with respect to the horizontal (preferably between 10° and 90°), to supplement the hydraulic dissolution with the erosive dissolution caused by the solution flowing down the exposed surface(s). In the preferred embodiment of the invention disclosed in the Figures, it has been found that an inclination of the exposed detergent surface 100a of approximately 60° with the horizontal provides adequate dwell time for the downwardly flowing water, while maintaining a sufficiently small response time for the dispenser (i.e. that elapsed time after which the pressurized spray is projected from the nozzle 61 to the time in which the majority of the concentrated detergent solution produced thereby passes in solution out of the discharge port 34).

The first lower wall 21c of the dispenser housing 21, as well as the upper and lower peripheral side wall portions 44a and 42a of the cartridge 40 are inclined slightly with respect to the horizontal (when the dispenser and enclosed cartridge 40 are mounted in operative position), to insure drainage of any liquid solutions (either the projected spray or resultant concentrated detergent solution) therefrom. Any liquid coming in contact with these surfaces is directed toward the collector region 30b of the cavity 30.

Whenever the charge of solid detergent contained within the various receptacles of the cartridge 40 are depleted, the cartridge is rapidly replaced by slidably removing the spent cartridge from the inner cavity 30, through the access port 32, and simply replacing the spent cartridge with a fully charged cartridge 40. As previously discussed, the disposable cartridge which could be physically re-charged before replacement thereof into the housing 21. In such a reusable cartridge application, it would be desirable to wrap the highly caustic detergent block being placed within the cartridge with a water soluable covering such as polyvinyl-alcohol to protect the hands of the person handling the solid detergent block used to charge the cartridge.

While the cartridge 40 disclosed in the Figures illustrates a cartridge which is completely insertable within the inner cavity 30 of the housing 21, other dispenser housing configurations could be employed within the scope of this invention, wherein the access port 32 would comprise a void or hole within one or more walls of the housing 21 and wherein the cartridge would be configured as an integral part of the housing proper, such that the cartridge 40 itself, when properly positioned in its pre-determined fixed resting position, prevents hazardous spray from the nozzle 61 out of the access port 32. It is also possible to configure such dispensing systems wherein the access and discharge ports 32 and 34 respectively could in fact comprise the same openings, for example in a "bottom loading" dispenser. It will also be understood and will be apparent to those skilled in the art that while the preferred embodiment of the invention has been generally described in reference to spray washing machines, the concept is equally adaptable to soaker-type machines as well as fabric washing machines.

From the foregoing description, it will be appreciated that the present invention solves

many of the problems or deficiencies with prior art detergent dispensers. The dispenser of this invention is particularly suitable for efficiently and safely dispensing generally incompatible detergent compositions in a manner that provides uniformity in detergent concentration over the entire charge of detergent held by the dispenser. Usage of solid detergent in the block form eliminates or minimizes the handling, segregation, misuse, safety and other problems associated with the use and dispensing of liquid detergents and solid detergents in powdered form. The replaceable and disposable cartridge techniques of loading the dispenser further simplifies its use and provides an added dimension of safety.

Other modifications of the invention will be apparent to those skilled in the art in light of the foregoing description. This description is intended to provide specific examples of individual embodiments clearly disclosed in the present invention. Accordingly, the invention is not limited to the described embodiments, or to the use of specific elements therein. All alternative modifications and variations of the present invention which fall within the scope of the appended claims are covered.

Claims

1. A dispenser (20) for solid block detergent compositions, comprising

a) a housing (21) configured for fixed mounting to a solid surface (15), said housing defining a substantially enclosed inner cavity (30) and an access port (32) and a discharge port (34) opening into said cavity;

b) a detergent agent containing holder for holding and maintaining in position a solid block (100) of detergent agent, so as to expose for use at least one surface (100a) of said block to said cavity (30)

c) spray-forming nozzle means (61) mounted to extend into said cavity (30) for directing a pressurized spray of liquid at the entire exposed surface (100a) of said detergent block (100) such that the hydraulic action of said nozzle directed spray dissolves a portion of said detergent block (100) forming a concentrated detergent solution for passage through said discharge port (34), which is disposed adjacent the lower portion of the cavity, characterized in that the detergent agent containing holder is cartridge (40) open at one side and having holding means (41, 42) for fixedly containing said detergent block (100) which is geometrically shaped like the interior of said cartridge, and that positioning means (21b, 21c, 21d, 21g and 24) are provided for releasably holding said cartridge (40) when it has been slid into position to obscure the access port to prevent liquid from the nozzle means leaving the cavity via the access port.

2. The dispenser as recited in claims 1, characterized in that the plane containing the access port is parallel to the longitudinal spray axis (62) of the nozzle means (61).

3. The dispenser (20) as recited in claim 1, characterized in that said cartridge positioning means includes a guide (24) within said housing (21) for guiding said cartridge (40).

4. The dispenser (20) as recited in any one of claims 1 to 3, characterized in that said cartridge (40) comprises a receptacle-shaped container (46) configured to retainably hold the volume of said detergent block (100), and that the guide (24) is configured to cooperatively slidably engage said receptacle-shaped container (46) for guiding said container into the position to obscure said access port (32).

5. The dispenser (20) as recited in any one of claims 1 to 4, characterized in that said access port (32) opens into the upper portion (30a) of said cavity (30), and that said guide (24) slidably directs the cartridge (40) downwards into the position to obscure the access port.

6. The dispenser (20) as recited in claim 4, characterized in that said detergent block (100) has a peripheral shape substantially the same as that of the receptacle-shaped container (46).

7. The dispenser (20) as recited in any one of claims 1 to 6, characterized in that at least a portion of said detergent block (100) is of the solid cast detergent type, and that at least a portion of said receptacle-shaped container (46) comprises a mold (41, 42, 42a) which was used to form said cast detergent block so that said mold (41, 42, 42a) surrounds and is in contact with said cast detergent block on all surfaces except said exposed surface (100a) thereof.

8. The dispenser (20) as recited in any one of claims 1 to 7, characterized in that said receptacle-shaped container (46) comprises a plurality of distinct chambers (46a, 46b) each suitable for retainably holding and maintaining in fixed position relative thereto a geometrically shaped detergent block (100) so as to expose one surface of said detergent block, wherein said nozzle means (61) simultaneously directs said pressurized spray at substantially the entire said exposed surfaces of each of said respective volumes of said detergent block.

9. The dispenser (20) as recited in any one of claims 1 to 8, characterized in that said cartridge (40) includes an additional receptacle-shaped container (47) suitable for retainably holding at least one further three-dimensional detergent block (102, 103) comprising a source of available chlorine or a defoamer.

10. The dispenser (20) a recited in claim 9, characterized in that said additional receptacle-shaped container (47) is operatively disposed at a position relatively lower than the of said receptacle-shaped container (46) for the detergent block (100) and that said first (46) and said second (47) receptacle-shaped containers are contiguous with one another and are separated by a porous wall member (50c)

which enables generally unimpeded fluid flow therethrough.

11. The dispenser (20) as recited in any one of claims 1 to 10, characterized in that said receptacle-shaped cartridge (40) is a removably disposable item.

12. The dispenser (20) as recited in any one of claims 1 to 11, characterized in that for preventing liquid accumulation in said receptacle-shaped containers (46 and 47) they comprise an inclined wall member (42a, 44a) such that when said cartridge (40) is operatively disposed in its predetermined position within said housing (21), said wall member defines a fluid flow path from the lowermost portions of said receptacle-shaped containers into said inner cavity (30) of said housing.

13. The dispenser (20) as recited in any one of claims 1 to 12, characterized by a closure cooperatively disposed with respect to said housing (21) for substantially closing said access port (32) to prevent spray therethrough from said inner cavity (30) and that said cartridge (40) is configured to cooperatively matingly engage said housing (21) at said access port (32) thereof, such that when said cartridge is disposed in fixed predetermined position with respect to said housing, said cartridge effectively blocks spray through said access port (32) from said inner cavity (30).

14. The dispenser (20) are recited in any one of claims 1 to 13, characterized in that a valve (64) is provided cooperatively connected with said nozzle means (61) for selectively blocking pressurized fluid flow to said nozzle means (61) in response to received energization commands, and a safety switch (70, 72, 73) cooperatively connected with said valve for sensing the closure status of said access port (32) and for providing said energization commands to said valve in response thereto so as to direct said valve to block fluid flow to said nozzle means (61) whenever said access port (32) is open to said inner cavity (30).

Patentansprüche

1. Verteiler (20) für in fester Blockform vorliegendes Reinigungsmittel, der folgendes enthält:

a) ein Gehäuse (21), das so ausgelegt ist, dass es an einer festen Falche (15) befestigt werden kann, und das einen weitgehend geschlossenen Innenraum (30) umfasst, sowie eine Einlassöffung (32) und eine Auslassöffnung (34), die sich in den Innenraum öffnet;

b) eine Halterung für Reinigungsmittel, die einen festen Block (100) eines Reinigungsmittels hält und positioniert, so dass zum Verbrauch mindestens eine Fläche (100a) dieses Blockes gegen den Inneraum (30) gerichtet ist;

c) eine Sprüchüse (61), die so montiert ist, dass sie sich in den Inneraum (30) erstreckt, um einen Druckstrahl einer Flüssigkeit gegen die gesamte freiliegende Fläche (100a) des in fester Blockform vorliegenden Reinigungsmittels (100) zu richten, so dass durch die hydraulische Wirkung der darauf errichteten Sprühdüse einen Teil des Reinigungsmittelblockes (100) auflöst, um eine konzentrierte Reinigungsmittellösung zu bilden, die durch die Auslassöffnung (34) fliesst, die am unteren Ende des Innenraumes angeordnet ist, dadurch gekennzeichnet, dass die das Reinigungsmittel enthaltende Halterung eine an einem Ende offene Kartusche (40) ist, die Halterungsvorrichtungen (41, 42) enthält, um den Reinigungsmittelblock (100) fest zu halten, der geometrisch wie das Innere der Kartusche geformt ist, und dass Positionierungsvorrichtungen (21b, 21c, 21d, 21g und 24) vorgesehen sind, um die Kartusche (40) lösliche zu halten, wenn sie in Stellung geschoben ist, um die Einlassöffnung zu verdecken, damit verhindert wird, dass Flüssigkeit aus der Düse den Innerraum über die Einlassöffnung verlässt.

2. Verteiler nach Anspruch 1, dadurch gekennzeichnet, dass die die Einlassöffnung enthaltende Ebene parallel zur Längsachse (62) der Sprühdüse (61) verläuft.

3. Verteiler (20) nach Anspruch 1, dadurch gekennzeichnet, dass die Positioniervorrichtung der Kartusche eine Führung (24) innerhalb des gehäuses (21) enthält, um die Kartusche (40) zu führen.

4. Verteiler (20) nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass die Kartusche (40) eine Aufnahmebehälter (46) enthält, der so ausgelegt ist, dass er das Volumen des Reinigunsmittelblockes (100) festhält, und dass die Führung (24) so ausgelegt ist, dass sie im Betrieb den Aufnahmebehälter (46) gleitend ergreift, um diesen Behälter in Stellung zu bringen, damit der die Einlassöffnung (32) abdeckt.

5. Verteiler (20) nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass sich die Einlassöffnung (32) in den oberen Teil (30a) des Innenraumes (30) öffnet, und dass die Führung (24) die Kartusche (40) gleitend nach unten in Stellung gebracht wird, um die Einlassöffnung zu überdecken.

6. Verteiler (20) nach Anspruch 4, dadurch gekennzeichnet, dass der Reinigunsmittelblock (100) eine periphere Form aufweist, die in wesentlichen die gleiche ist, wie die des Aufnahmebegälters (46).

7. Verteiler (20) nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, dass mindestens ein Teil des Reinigungsmittelblockes (100) vom Typ eines fest gegossenen Reinigungsmittels ist, und dass mindestens ein Teil des Aufnahmehehälters (46) eine Gussform (41, 42, 42a) enthält, die verwendet wurde, um das in fester Blockform vorliegende Reinigungsmittel zu formen, wobei diese Gussform (41, 42, 42a) den gegossenen Reinigungsmittelblock umgibt und an allen Flächen berührt, ausgenommen die freiliegende Fläche (100a).

8. Verteiler (20) nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, dass der Aufnahmebehälter (46) eine Vielzahl von getrennten Kammern (46a, 46b) aufweist, die jeweils geeigent sind, in fester Stellung dazu einen geometrisch geformten. Reinigungsmittelblock (100) zu halten und eine Fläche dieses Reinigungsmittelblockes freizulegen, während gleichzeitig die Sprühdüse (61) den Druckstrahl auf weitgehend die gesamte freiliegende Fläche auf die jeweiligen Volumen des Reinigungsmittelblockes zu richten.

9. Verteiler (20) nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, dass die Kartusche (40) einen zusätzlichen Aufnahmebehälter (47) enthält, der geeignet ist, mindestens einen weiteren dreidimensionalen Reinigungsmittelblock (102, 103) aufzunehmen, der Chlor oder ein Antischäummittel enthält.

10. Verteiler nach Anspruch 9, dadurch gekennzeichnet, dass der zusätzliche Aufnahmebehälter (47) im Betrieb in einer Stellung angeordnet ist, die relativ niedriger angeordnet ist, als die des Aufnahmebehälters (46) für den Reinigungsmittelblock (100) und dass der erste (46) und zweite (47) Aufnahmebehälter zueinander benachbart liegen und durch eine poröse Wande (50c) voneinander getrennt sind, die im allgemeinen einen ungehinderten Fluss dadurch ermöglicht.

11. Verteiler (20) nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, dass die behälterförmige Kartusche (40) auswechselbar ist.

12. Verteiler (20) nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, dass zur Vermeidung einer Ansammlung von Flüssigkeit in den Behältern (46 und 47) diese eine geneigt Wand (42a, 44a) aufweisen, so dass wenn die Kartusche (40) betriebsbereit in ihrer vorbestimmten Stellung in dem Gehäuse (21) angeordnet ist, diese Wande einen Flüssigkeitspfad vom untersten Teil der Behälter in den Innenraum (30) dieses Gehäuses bildet.

13. Verteiler (20) nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, dass ein Verschluss mit dem gehäuse (21) in Eingriff steht, um die Einlassöffnung (32) weitgehend zu verschliessen, um ein Sprühen aus dem Innenraum (30) dadurch zu vermeiden, und dass die Kartusche (40) so ausgebildet ist, dass sie mit dem Gehäuse (21) an seiner Einlassöffnung (32) in Eingriff steht, so dass, wenn sich die Kartusche in fester vorbestimmter Stellung in Bezug auf das Gehäuse befindet, diese Kartusche wirksam ein Sprühen durch die Einlassöffnung (32) von dem Innenraum (30) unterbindet.

14. Verteiler (20) nach einem der Ansprüche 1 bis 13, dadurch gekennzeichnet, dass ein Ventil (64) mit der Sprühdüse (61) in Eingriff steht, um wahlweise den Druckstrahl zu der Sprühdüse (61) als Antwort auf erhalten Steuerbefehle zu unterbinden, und dass ein Sicherheitsschalter (70, 72, 73) mit diesem Ventil verbunden ist, um den geschlossenen Zustand der Einlassöffnung (32) zu erfassen und em diese Steuerbefahle an dieses Ventil als antwort darauf zu leiten, so dass dieses Ventil einen Fluidfluss zu dieser Sprühdüse (61) unterbindet, sobald die Einlassöffnung (32) zu dem Innenraum (30) offen ist.

Revendications

1. Distributeur (20) de détergent en bloc solide, comprenant

a) un boîtier (21) conçu pour être fixé à une surface solide (15), ce boîtier renfermant une cavité intérieure (30) essentiellement fermée, une ouverture daccès (32) ainsi qu'une ouverture de décharge (34) s'ouvrant dans ladite cavité;

b) un support de détergent pour supporter et maintenir en position un bloc solide (100) de détergent pour en exposer pour utilisation une surface (100a) dudit bloc à ladite cavité (30);

c) un pulvérisateur (61) monté de telle manière qu'il s'étend dans la cavité (30) pour diriger un jet pressurisé sur toute la surface xposée (100a) du bloc de détergent (100) afin que par l'action hydraulique du jet dirigé par le pulvérisateur sur une partie du block de détergent (100) soit dissoute pour former une solution concentrée de détergent s'écoulant par l'ouverture de décharge (34) disposée au droit de la partie inférieure de la cavité, caractérisé en ce que le support du détergent est une cartouche (40) ouverte sur un côté, en comprenant des moyens d'attache (41, 42) pour tenir le block de détergent (100) dont la géométrie épouse l'intérieur de ladite cartouche, et que des moyens de positionnement (21b, 21c, 21d, 21g et 24) sont prévus pur supporter la cartouche (40) de manière détachable lorsqu'elle a été glissée en position pour masquer l'ouverture d'accès afin d'empêcher le liquide provenant du pulvérisateur à quitter la cavitepar l'intermédiaire de l'ouverture d'accès.

2. Distributeur suivant la revendication 1, caractérisé en ce que le plan comprenant l'ouverture d'accès est parallèle à l'axe longitudinal de pulvérisation (62) du pulvérisateur (61).

3. Distributeur (20) suivant la revendication 1, caractérisé en ce que les moyens de positionnement de la cartouche comprennent un guidage (24) dans le boîtier (21) pour guider ladite cartouche (40).

4. Distributeur (20) suivant l'une des revendications 1 à 3, caractérisé en ce que la cartouche comprend un conteneur sous forme de réceptacle pour retenir le volume du bloc de détergent (100), et que le guidage est configuré pour s'engager de manière glissante dans le conteneur (46) afin de la guider dans une position masquant l'ouverture d'accès (32).

5. Distributeur (20) suivant l'une des revendications 1 à 4, caractérisé en ce que l'ouverture d'accès (32) s'ouvre dans la partie

supérieure (30a) de la cavité (30) et que le guidage (24) glisse la cartouche (40) vers le bas dans la position masquant l'ouverture d'accès.

6 Distributeur (20) suivant la revendication 4, caractérisé en ce que la périphérie du block de détergent (100) est essentiellement la même que celle du conteneur en forme de réceptacle (46).

7. Distributeur (20) suivant l'une des revendications 1 à 6, caracterisé en ce que au moins une partie du block du détergent (100) est du type moulé solide et que au moins une partie du conteneur sous forme de réceptacle (46) comprend un moule (41, 42, 42a) utilisé pour former le block de détergent afin que ce moule (41, 42, 42a) contourne et contacte le bloc de détergent sur toutes les faces à l'exception de la surface exposée (100a).

8. Distributeur (20) suivant l'une des revendications 1 à 7, caractérisé en ce que le conteneur sous forme de réceptacle (46) comprend une pluralité de chambres distinctes (46a, 46b), chacune appropriée pour retenir et maintenir en position fixe par rapport à ces dernières un vloc de détergent (100) de forme géométrique afin d'exposer une des surfaces du bloc de détergent pendent que simultanément le pulvérisateur (61) dirige le jet pressurisé sur essentiellement toute la surface exposée de chacun des volumes respectifs du bloc de détergent.

9. Distributeur (20) suivant l'une des revendications 1 à 8, caractérise en ce que la cartouche (40) comprend un conteneur sous forme de réceptacle (47) supplémentaire approprié pour retenir au moins un bloc de détergent tridimensionnel (102, 103) supplémentaire comprenant une source de chlorure ou un antimoussant.

10. Distributeur (20) suivant la revendication 9, caractérisé en ce que ledit conteneur sous forme de réceptacle (47) supplémentaire est disposé à une position relativement plus basse que le conteneur sous forme de récaptacle (46) comprenant le bloc de détergent (100) et que le premier et deuxième conteneurs sous forme de réceptacles (46, 47) sont disposés de manière contigue l'un par rapport à l'autre et séparés par une cloison poreuse (50c) permettant un flux de liquide libre à travers cette dernière.

11. Distributeur (20) suivant l'une des revendications 1 à 10, caractérisé en ce que la cartouche (40) est un dispositif détachable.

12. Distributeur (20) suivant l'une des revendications 1 à 11, caractérisé en ce que pour empêcher une accumulation de liquide dans les conteneurs sous forme de réceptacle (46, 47) ces derniers comprennent une cloison inclinée (42a, 44a) afin que, lorsque la cartouche (40) est disposée dans sa position prédéterminiée dans la boîtier (21), cette cloison définisse un passage de fluide entre les parties inférieures des conteneurs sous forme de réceptacle et la cavité (30) du boîtier.

13. Distributeur (20) suivant l'une des revendications 1 à 12, caracterisé en ce qu'une fermeture coopérant avec la boîtier (21) pour fermer l'ouverture d'accès (32) empêche à travers cette dernière une pulvérisation provenant de la cavité intérieure (30), et que la cartouche (40) est conçue telle qu'elle s'adpate à l'ouverture d'accès (32) du boîtier (21) afin que, lorsque cette cartouche est disposée en position prédéterminée fixe par rapport à ce boîtier, cette cartouche bloque effectivement une pluvérisation à travers cette ouverture d'accès (32) provenant de la cavité intérieure (30).

14. Distributeur (20) suivant l'une des revendications 1 à 13, caractérisé en ce qu'une valve (64) coopère avec le pulvérisateur (61) afin de bloquer alternativement le flux de fluide pressurisé vers ce pulvérisateur (61) en réponse à des ordres énergétiques, et qu'un connecteur de sûreté (70, 72, 73) coopère avec ladite valve pour détecter l'état de fermeture de cette ouverture d'accès (32) et pour envoyer les ordres énergétiques à cette valve en réponse à cette information afin de diriger ladite valve pour bloquer un flux de fluide an pulvérisateur (61) chaque fois que cette ouverture d'accès (32) est ouverte vers la cavité intérieure (30).

FIG. 1

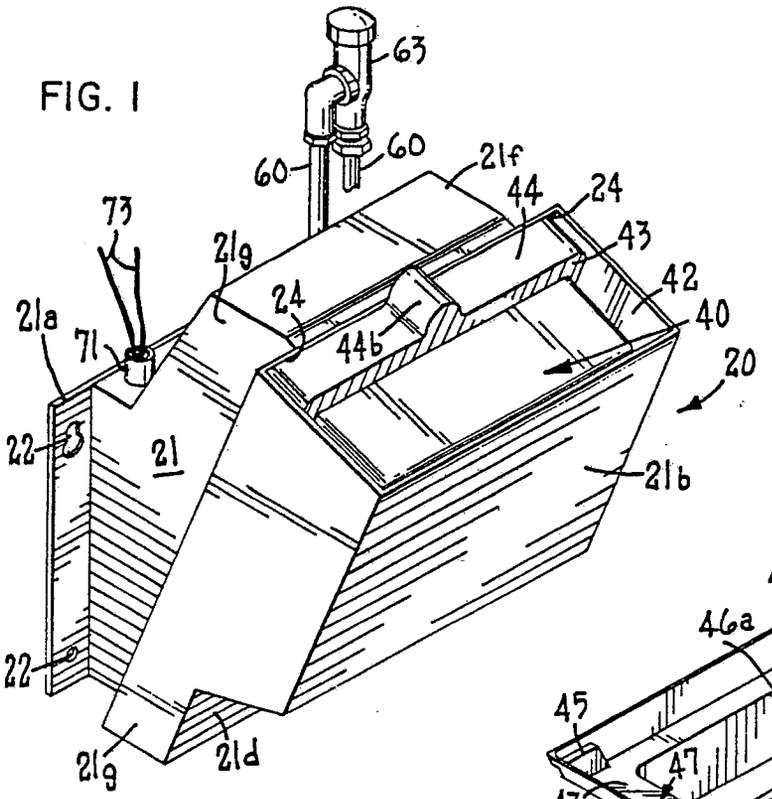
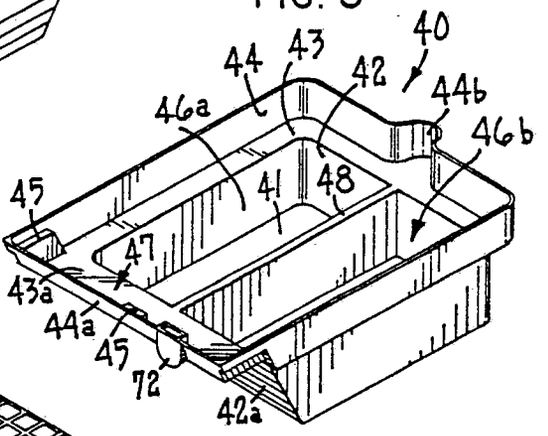


FIG. 3



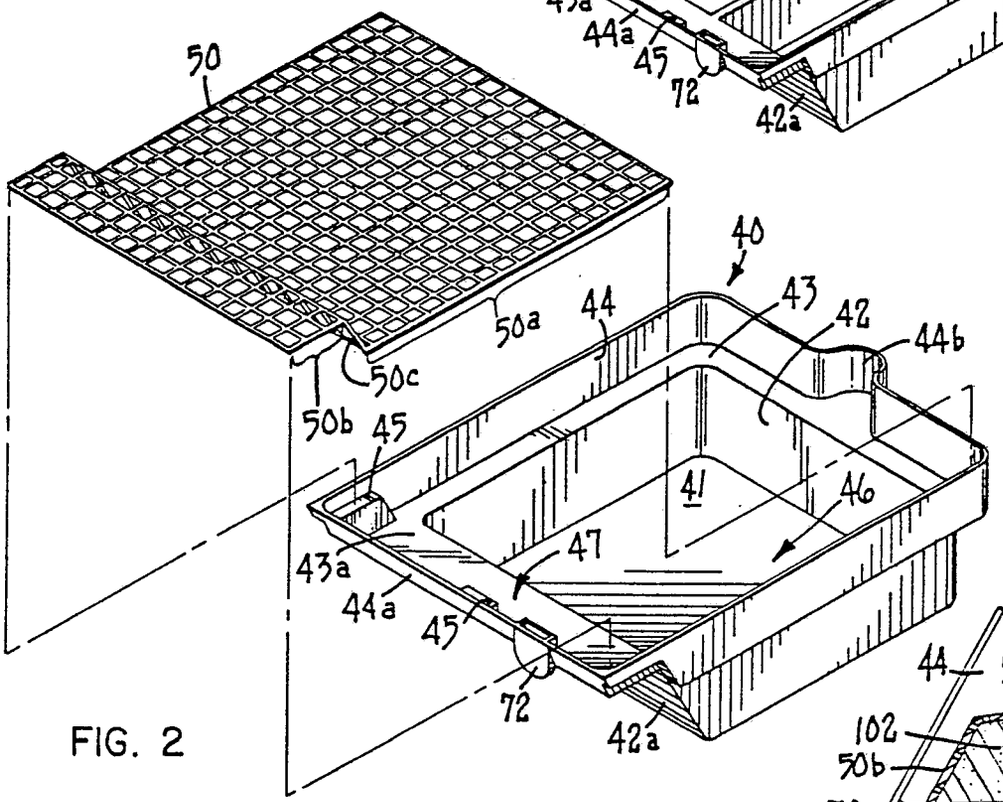


FIG. 2

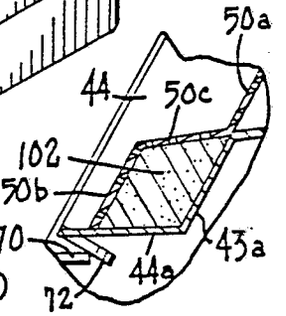


FIG. 10

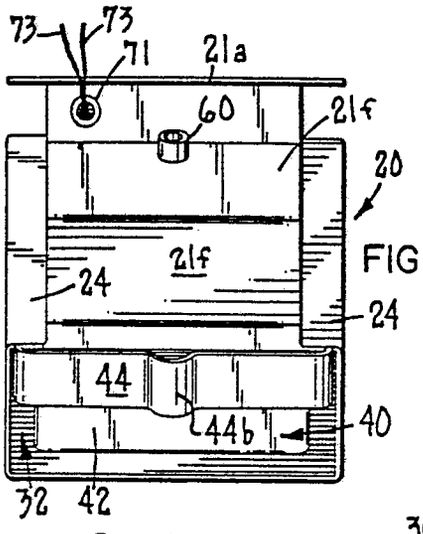


FIG. 4

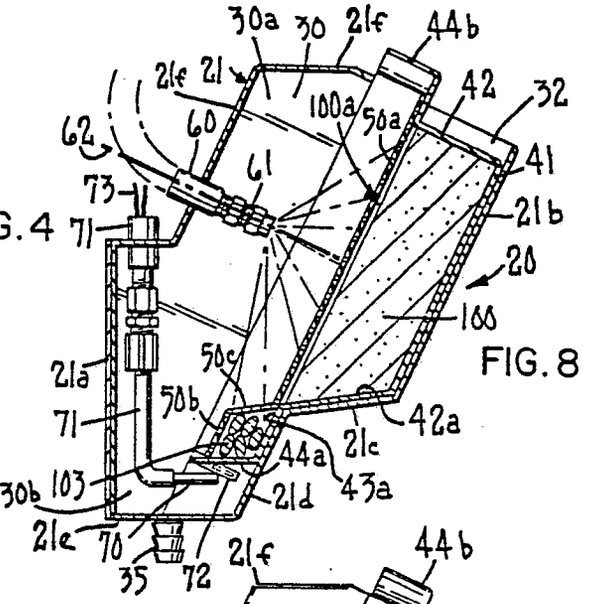


FIG. 8

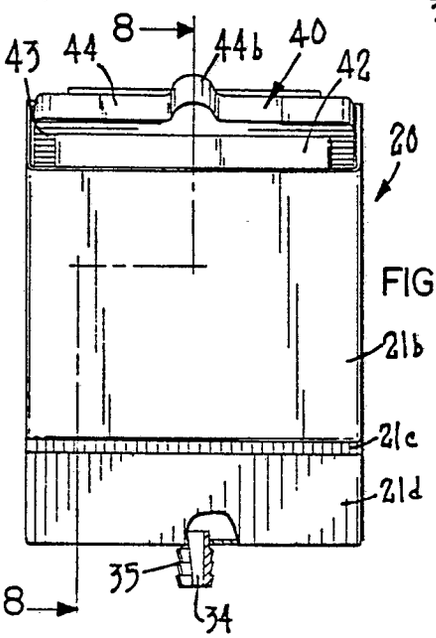


FIG. 5

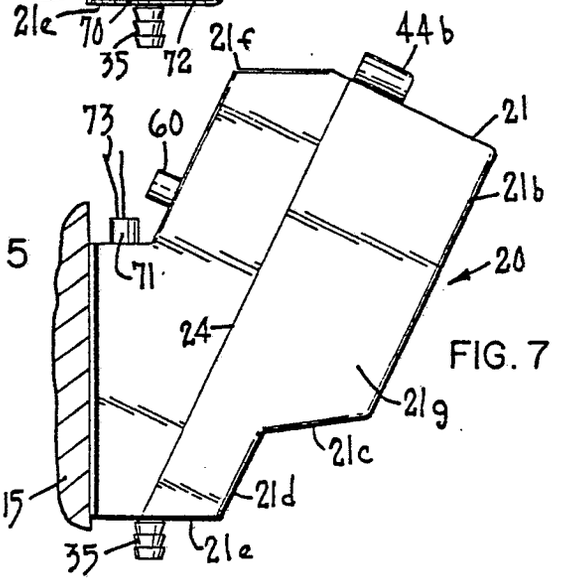


FIG. 7

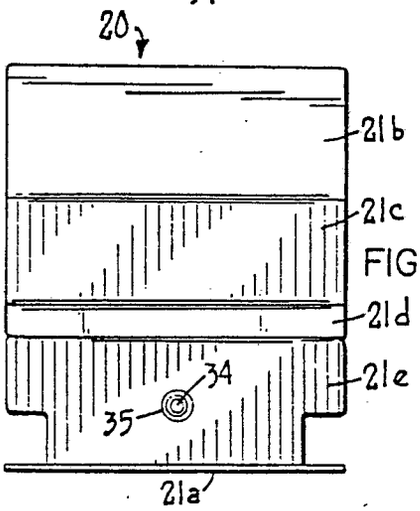


FIG. 6

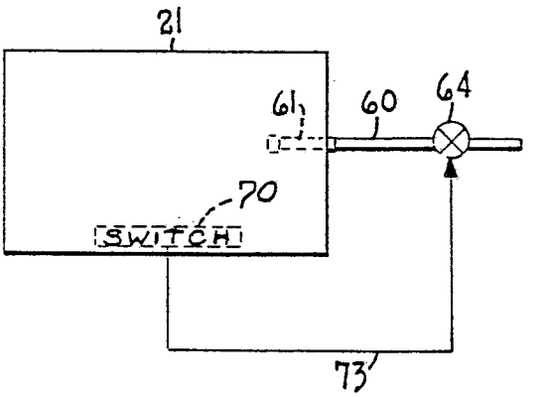


FIG. 9