United States Patent

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[72] Inventors **Richard D. Law**
2291 Youngfield St.;
Robert E. Eckels, 2101 Youngfield St.,
Golden, Colo. 80401

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[54] **GAS-PRESSURIZED WASHING DEVICE**
7 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **128/66,** 128/225
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[50] **Field of Search** 128/62, 66, 224, 225

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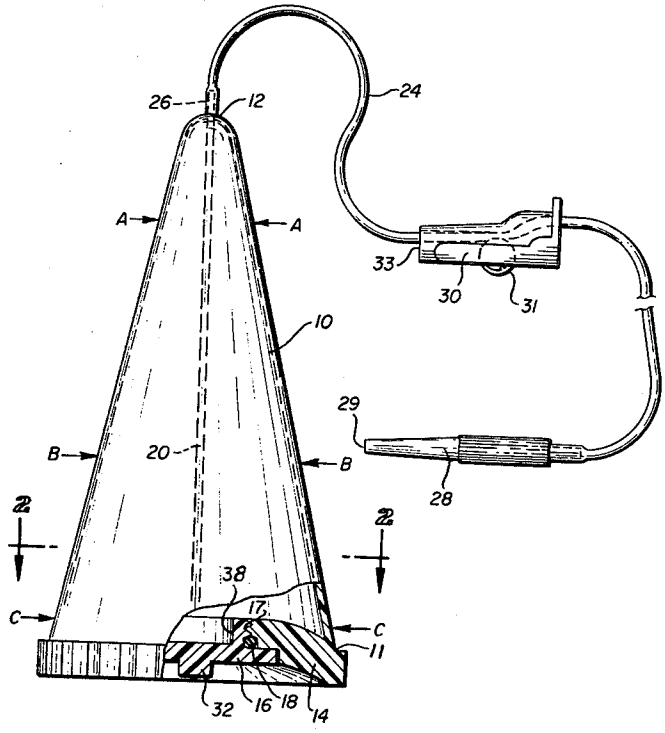
Primary Examiner—L. W. Trapp
Attorney—Richard D. Law

ABSTRACT: An aqueous solution cleaning or washing device, using effervescent salts to generate delivery gas pressure, includes a conical chamber having its side subtending an angle of 30 to 75° exposing minimum liquid surface area at maximum fill to maximum area at minimum fill to contained gas under pressure, provides an essentially uniform delivery pressure throughout the discharge of solution from the unit. The device issues a pulsing jet of solution providing a cleaning unit for use on teeth and gums, for medicinal irrigation, a medicinal douch, etc.



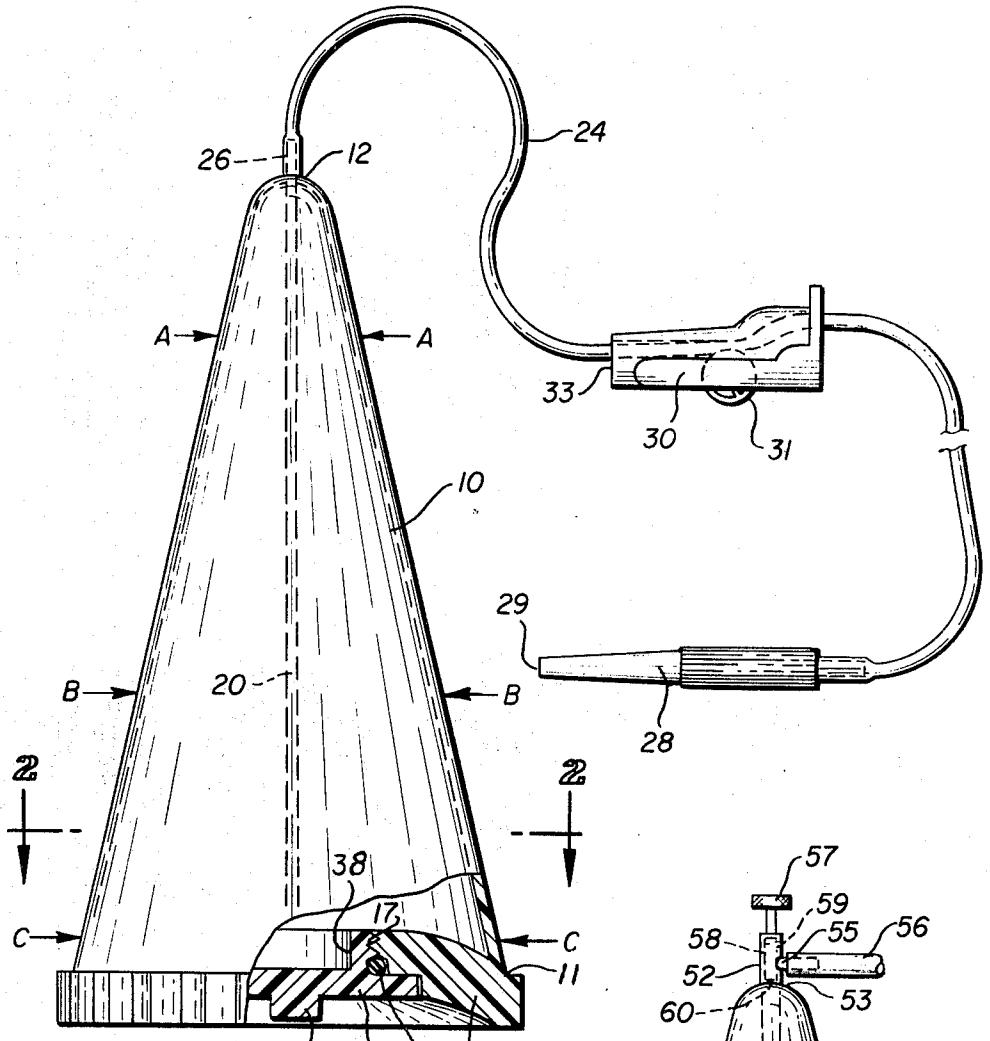


Fig_1

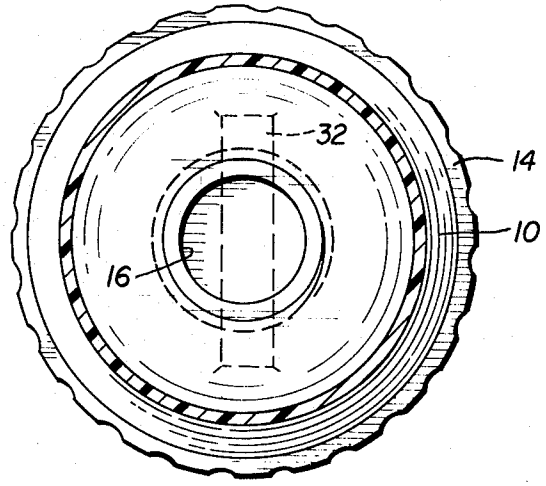


Fig_2

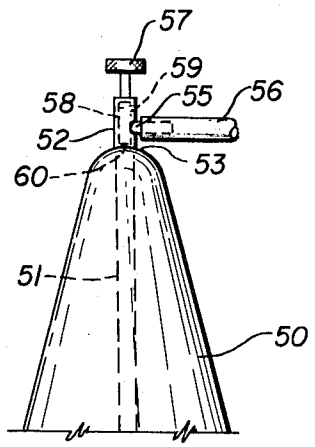


Fig_3

INVENTORS.
RICHARD D. LAW
ROBERT E. ECKELS
BY
Richard D. Law
ATTORNEY

GAS-PRESSURIZED WASHING DEVICE

A number of washing, irrigating or cleansing devices have been proposed in a prior art where a stream of water under pressure is injected into a body cavity. For example, one very popular tooth-cleaning unit uses an electric motor-driven pump which withdraws water from a reservoir and injects it through a flexible tube and a nozzle for rinsing the mouth, teeth and gums. Also, various types of douching devices are available, and the two major types include (1) a flexible bag, with a tube, which is held above the point of use to permit gravity to inject water into a body cavity, (2) a rubber bulb where the user squeezes the bulb to inject water into a body cavity. The electrical unit, obviously, has a substantial disadvantage that since it must be used around water the danger of electrical shock is ever present. The gravity flow device does not provide sufficient pressure for many types of washing. The squeeze bulb is too awkward for use and, further, provides only a small amount of water for rinsing.

According to the present invention, there is provided a washing, rinsing or cleansing unit which includes a conical reservoir arranged to deliver solution under gas pressure through an outlet tube and nozzle. For delivery of solution the unit is turned with the apex of the cone in uppermost position so that maximum pressure of the gas on the liquid surface is exerted against a minimum area, and as the level of the solution in the container decreases, the surface area of the solution increases to compensate for the loss of gas pressure above the solution (due to increasing volume for the gas) thereby providing a relatively constant delivery pressure of solution. In one form, a tablet of effervescent salts is utilized for producing the gas pressure, the salts being dissolved in water to generate carbon dioxide. A flexible tube with a jet nozzle provides means for the delivery of solution to a desired location.

Included among the objects and advantages of the present invention is a gas pressure washing or cleaning device for delivery of a solution under pressure to a place of use.

Another object of the invention is to provide a gas pressure washing or cleaning unit which provides a relatively constant delivery pressure from maximum to minimum liquid fill of solution in the unit.

A further object of the invention is to provide a conically-shaped receptacle which exposes a minimum surface area solution at maximum liquid fill to a gas atmosphere over the solution to a maximum surface area exposed to a gas atmosphere at minimum liquid fill.

Another object to the invention is to provide a gas-pressured washing or cleaning device utilizing an effervescent salt for producing gas pressure for delivery of solution from a container and including a means for addition of medicament, flavor or the like in the effervescent salt.

These and other objects and advantages of the invention may be readily ascertained by referring to the following description and appended illustrations in which:

FIG. 1 is a side elevational view, partially cut away, of a gas pressure washing device according to the invention;

FIG. 2 is a top plan, sectional view of the device of FIG. 1 taken along section line 2–2; and

FIG. 3 is a detailed view of a modified form of valve for the device of the invention.

In the device selected for illustration in the drawings, dish-shaped a conical container **10** includes an apex **12** and a dish-shaped base closure **14** at the large end **11** of the conical container. A removable closure member **16** is arranged in the dish-shaped member **14** and it is provided with an seal **18** for temporarily sealing closure member. An internal tube **20** extends through the apex **12** to a point adjacent the dish-shaped member **14**, and a flexible resilient tube **24** is attached to the end **26** of the end of tube **20** which extends outside of the chamber container **10**. The tube **24** terminates in a nozzle **28**, which provides a jet flow of solution through a small opening **29** from the container. A tube-closing device **30** is mounted on the tube and provides means for closing or opening the tube **24**, explained below. The closure **16** is provided with a recess **38** for holding an effervescent tablet, and a finger grip **32** is provided for loosening and tightening the closure in the end dish-shaped member **14**. The closure **16** is shown with a threaded connection, by means of a thread **17** between the closure and the end member **14**, however, this may be any conventional type of connection means for a cap or closure on another body.

The unit is preferrably made of plastic by injection molding or the like, and the side of the conical member subtends an angle of from 30° to 75°. The angle shown is about 50°. The smaller the angle, the higher and thinner the conical member must be to provide the same quantity of solution. Conversely the larger the angle the more squat the cone becomes.

The device is used by inverting the same with the apex **12** in the down position. In this position, the cap **16** is removed and the unit is filled with water to a point slightly below the inside bottom of the closure enclosure **14**. An effervescent tablet is then pressed into the cavity **30**, and the closure **16** is replaced and tightened to seal. Preferrably, the closure control **30** for the tube is moved to the closed position, as by moving the wheel **31** towards the end **33** where the tube is squeezed tightly shut. The unit is then turned right side up and set on the sink or lavatory where it is to be used. After a moment or so, to permit the tablets to completely dissolve and effervesce, the valve or control is opened by rolling the wheel **31** towards the end opposite end **33** to open the tube and permit the solution to issue from the nozzle **28**. When the device is used as a tooth washer the effervescent tablet may contain soap, flourine salts, mild abrasives, oral antiseptics, flavoring and the like, all of which should dissolve in the solution for use, except for the abrasive. The effervescent tablets release carbon dioxide, some of which dissolves in the solution and some of which goes into the atmosphere above the solution, providing a pressure for forcing the solution from the container. As the solution is forced from the container through the tube to the delivery nozzle, some of the dissolved gases are released initiating a pulsing action. This pulsing and further gas release from the solution as it is imposed on its target developes an added cleaning action in addition to the force of the solution against the target.

As liquid is forced from the device, the volume above the liquid increases; the volume of gas increases and the pressure of the gas decreases. As the pressure on the liquid surface decreases, dissolved gas to come out of the solution thereby aiding somewhat the gas drive. However, as the liquid volume decreases, the surface of the fluid in contact with the gas increases, thereby compensating for the decrease of pressure of the gas, and providing a relatively uniform liquid delivery pressure from maximum fill to minimum fill of liquid.

In one size, which is very effective for cleaning teeth, a container approximately 6 inches in height with a 3 inch base provides between 6 ½ to 7 ounces of water. A smaller size providing 3 to 4 ounces of water is very effective for irrigating nasal cavities and oral cavities. A larger size providing from 16 to 32 ounces may be effective for vaginal douche. The amount of effervescent salts in the tablet for each size of device would, of course, be controlled to provide the pressure most effective for the particular washing job. Obviously, considerably more salt is required for the larger size than for the smaller irrigating size.

The conical design provides for a small area of surface of liquid in contact with the gaseous atmosphere at maximum liquid fill and a larger area of surface exposed to gas pressure at minimum liquid fill. For example, with the dental size having a 6-inch height cone with a 3-inch base and at approximately maximum liquid fill the surface area of solution in contact with the gas atmosphere (at point *a* slightly less than an inch from the apex **12**) is about 0.44 square inches. As the solution is withdrawn from the container the surface, of course, descends, and, for example, at point *b* the surface area is about 1.75 square inches. At point *c* the surface area of the solution is about 3.93 square inches. Thus, it is apparent that

as the solution is withdrawn from the container, the surface area increases and the volume of the gas increases, but the increase in surface area compensates for the reduction of the gas pressure thereby providing a relatively constant pressure of solution exhausting from the jet nozzle.

In the modification illustrated in FIG. 3, a conical container 50 is provided with an interior tube 51 (which is equivalent to the tube 20) extending internally thereof, with its end adjacent the bottom of the container. The tube terminates in a valve 52 externally and above the apex 53 of the conical-shaped container. The valve includes a side arm 55 to which is attached a flexible resilient tube 56. A plunger 57 is connected with a cup-shaped cylinder 58 internally of the valve 52. The cup is provided with an outlet 59, which is positioned normally above the outlet of the tube 55. The inlet to the cup-shaped cylinder 60 provides access to the inside of the tube 51. On depressing the plunger 57, the outlet 59 is brought into register with the opening of the tube 55 and the solution under pressure is forced out through the tube 56. This device takes place of the closure device of that illustrated in FIG. 1.

As pointed out above, various types of inclusions may be provided for the effervescent salt tablets to provide a cleaning or scrubbing action as may be desired. The gas provides a pulsation of the issuing solution to provide a further cleaning action. In the larger size, the tablet should incorporate suitable feminine hygiene formulations. This unit, also, provides a pulsating action, as opposed to common devices which do not give a variable pressure or impact delivery. Also, of particular value is that effervescent salts provide a pH of slightly higher than 7 (alkaline) which will neutralize any acid inclusions in the cavity being cleansed. For teeth, this helps prevent caries. It is, also, possible to include acidic substances to provide a lower pH if desired.

While the invention has been illustrated by reference to particular embodiments, there is no intent to limit the spirit or scope of the same to the precise details so set forth except as defined in the following claims.

We claim:

1. A gas-pressurized liquid washing device comprising a conical container having a side which subtends an angle of from 30 to 75°, a closed apex, and a supporting base member having an opening arranged to hold said container with its apex in uppermost position; and a closure releaseably closing and sealing said opening in said base against internal pressure, and a recess in said closure for holding an effervescent tablet; a flexible tube with a nozzle at its outlet communicating with said container; means connecting the interior of said container adjacent the base portion thereof with said flexible tube for withdrawing solution from said container when supported on its base, whereby maximum gas pressure is exerted on minimum liquid surface area at maximum liquid fill and minimum gas pressure is exerted on maximum liquid surface area at minimum liquid fill for effecting essentially uniform liquid delivery pressure; and means for opening and closing said tube.

2. A gas-pressurized liquid washing device according to claim 1 wherein said side subtends an angle of 50°.

3. A gas-pressurized liquid washing device according to claim 1 wherein said means for opening and closing said tube is a member for pinching said tube shut and releasing the same.

4. A gas-pressurized liquid washing device according to claim 1 wherein said means for opening and closing said tube is a valve mounted on said apex and said flexible tube is attached to said valve.

5. A gas-pressurized liquid washing device according to claim 1 wherein said means connecting said container interior with said flexible tube is a length of tubing extending through wall of said container at said apex and extending internally to a position adjacent the base of said container.

6. A gas-pressurized liquid washing device according to claim 1 wherein said recess is arranged to hold an effervescent tablet therein during insertion of the closure into said opening.

7. A gas-pressurized liquid washing device according to claim 1 wherein said supporting base member closes a right base of said conical container and is recessed toward said container providing a relatively large supporting surface for said container, with said closure being recessed below said supporting surface.