March 3, 1959 B. J. DE SIMONE ET AL 2,876,040

SPRAY UNIT ASSEMBLY

Filed Jan. 18, 1957

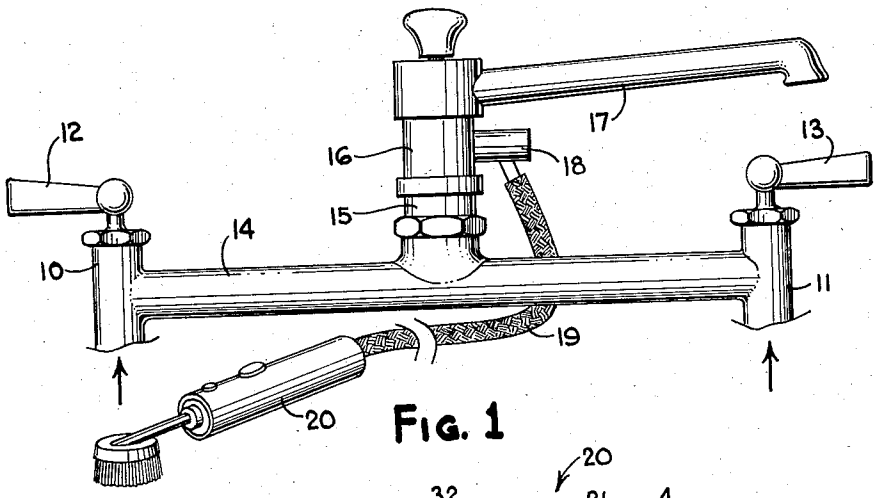


FIG. 1

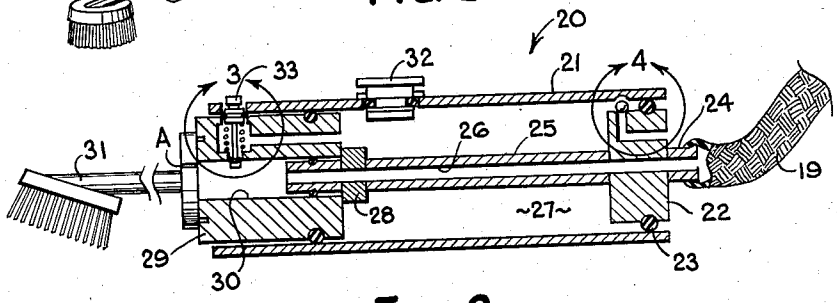


FIG. 2

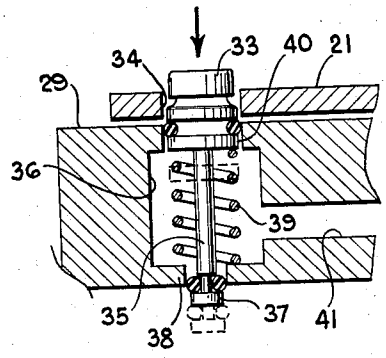


FIG. 3

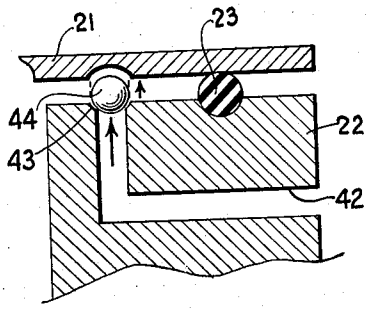


FIG. 4

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United States Patent Office 2,876,040 Patented Mar. 3, 1959

2,876,040

SPRAY UNIT ASSEMBLY

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Application January 18, 1957, Serial No. 634,891

1 Claim. (Cl. 299—84)

This invention relates generally to washing apparatus and more particularly to an improved spray unit for use in combination with a diverter valve assembly in kitchen sink fixtures.

Conventional spray unit assemblies generally comprise a scrubbing element in the form of a brush secured to one end of a handle to which a flexible tube is connected for passing water thereto upon actuation of a diverter valve. Thus, water may be diverted from the conventional spout to the spray unit. A further control means is generally provided for adding detergent or soap to the water from the outlet of the spray unit so that proper washing of dishes and so forth is greatly facilitated. In many prior art devices of this type, the soap or detergent to be mixed with the water is contained in a separate tank or storage unit located under the sink and is fed to the spray unit through an auxiliary tubing or even mixed with the water adjacent the diverter valve so that the mixture is expelled from the brush. Alternatively, some detergent reservoirs are provided in the handle structure of the spray unit. In most of these prior art devices, however, the detergent is subject to the water pressure and thus becomes diluted relatively quickly. Further, consistent and accurate metering of the detergent for a particular rate of water flow is not possible as a result of the gradual dilution of the detergent in the reservoir by the water.

Bearing the above in mind, it is a primary object of the present invention to provide an improved spray unit in which detergent is carried in a reservoir enclosed in the handle itself.

More particularly, it is an object of this invention to provide a spray unit of the above type in which pure detergent is used in the reservoir and this detergent is arranged to be metered into the main water stream upon voluntary actuation of suitable control means on the spray unit.

Still another object is to provide a device of the above type in which the detergent solution is only subject to atmospheric pressure and its dilution in the reservoir proper is avoided.

These and many other important objects and advantages of the present invention are attained by providing a main cylindrical casing section provided with an inlet plug at one end and an outlet plug at the other. The inlet plug includes a central elongated tube coaxially passing within the casing and terminating in the outlet plug whereby the outer surface of the tube defines with the inner surface of the casing an annular reservoir for holding pure detergent. The outlet plug in turn includes a small branch or lateral bore passing through a spring biased control means in the form of a push valve. The outlet of the valve is disposed adjacent the end of the elongated tube within the outlet plug such that operation of the valve results in detergent passing from the reservoir through the lateral passage into the outlet stream by aspiration.

The diameter of the lateral passage and degree of opening of the outlet valve determine the quantity of detergent pulled into the main water stream and thus proper dimensioning of these elements enables the percentage of detergent mixed with the water at the outlet end of the elongated tube to be properly controlled. The inlet plug includes a small lateral passage and check valve to provide an atmospheric vent whereby the detergent is maintained at atmospheric pressure.

A better understanding of this invention will be had by referring to the accompanying drawings illustrating a preferred embodiment thereof and in which:

Figure 1 is an enlarged perspective view of a conventional sink structure in which the spray unit of the present invention is employed;

Figure 2 is a cross sectional elevational view of the spray unit portion of the apparatus illustrated in Figure 1;

Figure 3 is an enlarged cross section of that portion of the spray unit enclosed in the circular arrow 3 of Figure 2; and

Figure 4 is another enlarged cross sectional view of that portion of the spray unit enclosed within the circular arrow 4 of Figure 2.

Referring now to Figure 1, there is illustrated hot and cold water inlet pipes 10 and 11 adapted to be controlled by suitable shut-off valves 12 and 13 respectively. These inlets pass to a common water pipe 14 from which a hot and cold water mixture may pass upwardly into the inlet 15 of a diverter housing unit 16 to either a conventional spout 17, or upon operation of the diverter valve, through a connector 18 and hose 19 to the spray unit 20. The present invention is primarily concerned with the spray unit 20 and, therefore, the other components of the sink structure need not be described in detail.

Referring to Figure 2, the spray unit 20 is illustrated with the outer handle covering omitted to avoid obscuring the drawing, and as shown, includes an elongated cylindrical casing 21. At the inlet end of the casing 21 there is provided an inlet plug 22 suitably sealed with respect to the casing as by an O-ring 23 and provided with a central exterior nipple 24 adapted to connect to the hose 19. The inlet plug 22 also includes an elongated tube portion 25 extending co-axially within the casing 21 and provided with a central longitudinal bore 26. The arrangement is such that the outside of the tube 25 defines with the inside of the cylindrical casing 21 an annular reservoir 27.

The far end of the elongated tube 25 is provided with an enlarged diameter annular flange 28 adapted to seat against the inner end of an outlet plug 29 fitted within the other end of the casing 21. The plug 29 includes an outlet chamber 30 in communication with the central bore 26. From the outlet chamber 30 there is provided a suitable tubular extension member 31 terminating in the washing brush portion of the spray unit as shown. An aeration hole A may also be provided communicating with chamber 30 as shown.

A fill plug 32 may be provided in the casing 21 to enable filling of the annular reservoir 27 with detergent. Further, a control means operable by a button 33, is provided for passing pure detergent within the annular reservoir 27 into the outlet stream of water from the elongated tube 25 to mix therewith in the chamber 30 prior to passing out the end of the brush portion 31. The operation of this detergent control means will be better understood by referring to the enlarged view thereof as shown in Figure 3.

In Figure 3, the control unit button 33 is adapted to be manually pressed into a recess 34 in the casing 21. Button 33 is secured to the upper end of an elongated

valve stem 35 extending radially through the outlet plug 29 to terminate in the central chamber 30. The outlet plug itself includes a small cavity 36 for housing the valve stem 35. A valve head 37 is secured to the end of the valve stem 35 and biased against a valve seat 38 between the cavity 36 and the chamber 30 as by a spring 39 so that depression of the valve stem 35 by the button 33 to the dotted line position serves to place the cavity 36 in communication with the chamber 30. A branch passage 41 permits detergent to pass from the reservoir 27 to the chamber 30 when the valve is opened.

In order to compensate for the reduced pressure in the annular reservoir 27 when detergent passes through the branch passage 41 into the chamber 30, a small atmospheric vent is provided in the inlet plug. The operation of this vent will be clear by referring to Figure 4. As shown, there is provided a lateral bore 42 communicating with the atmosphere and passing in an axial direction through the inlet plug 22 and thence turning at right angles to pass to the outer periphery of the plug in a radial direction. This bore 42 terminates in a valve seat 43 adapted to seat a check ball 44. Detergent is thus blocked from passing from the reservoir 27 to the atmosphere through the passage 42 yet atmospheric pressure may open the valve ball 44 and thus permit detergent to pass into the water stream at the other end of the casing.

The operation of the spray unit of this invention will be evident from the above description. Normally, the control means comprising the valve stem 35 and valve head 37 are biased to closed position such that there is no communication between the detergent reservoir 27 and the normal stream or flow of water through the device. Thus, water passes through the hose 19 at the right hand end of the casing 21 down the central bore 26 into the outlet chamber 30 and the extension 31 to the brush whereby it may be used to spray dishes. When it is desired to add some detergent or soap to this water, the control button 33 may be depressed manually to unseat the valve head 37 from the valve seat 38 as shown in dotted lines in Figure 3. The movement of water through the chamber 30 will, by aspiration, draw in detergent through the lateral passage 41 from the detergent reservoir 27 whereby pure detergent is introduced into the stream of water. Release of the button 33 immediately results in closing of the valve head 37 on the valve seat 38 thereby cutting off communication between the detergent reservoir 27 and the chamber 30 so that pure water again is passed out the outlet 31. As detergent is periodically removed from the reservoir as a result of operation of the button 33, atmospheric pressure is maintained within the reservoir by air entering past the check ball valve 44 through the small lateral passage 42 in the inlet plug 22.

The entire assembly is of simple construction and, therefore, extremely reliable. Further, the detergent reservoir itself is at no time subject to normal water pressure and there is no possibility of the detergent becoming diluted. Therefore, pure detergent may be properly metered into the fluid flow stream under control of the button 33 and efficient utilization of the detergent itself is achieved.

Minor modifications within the scope and spirit of the present invention will occur to those skilled in the art. The spray unit is, therefore, not to be thought of as limited to the specific embodiment set forth for illustrative purposes.

What is claimed is:

In a spray unit assembly adapted to be connected to a source of water, the combination comprising: a cylindrical casing; an inlet plug connecting said source to one end of said casing and including an elongated tube passing co-axially within said casing; an outlet plug disposed on the other end of said casing and including an increased diameter outlet chamber receiving the far end of said elongated tube, the outer surface of said tube defining with the inner surface of said casing an annular reservoir; means for introducing detergent into said reservoir; means in said inlet plug defining a lateral passage extending axially of the plug for a given distance and thence radially to terminate on the outer periphery of said plug within said annular reservoir; a ball check at the end of said passage so that detergent within said annular reservoir is maintained at substantially atmospheric pressure; said outlet plug including a valve stem extending radially thereinto to terminate in said increased diameter outlet chamber in spaced relationship to the outlet end of said outlet tube, said plug including a cavity surrounding said valve stem and a lateral passage connecting said cavity with said reservoir; the common wall between said cavity and said increased diameter outlet chamber having an opening defining a valve seat; and a valve head on said valve stem seated on said valve seat and adapted to open said valve seat upon depression of said valve stem to admit detergent to said increased diameter outlet chamber, whereby detergent flows into said increased diameter outlet chamber at a point spaced from the outlet end of said elongated tube so that said detergent is aspirated from said reservoir by water jetted from the outlet end of said elongated tube into said increased diameter chamber, said detergent being mixed with said water without the development of negative pressures in said increased diameter outlet chamber.

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