Feb. 11, 1941. N. W. HALSEY ET AL 2,231,211

DETERGENT DISPENSER FOR WASHING MACHINES

Filed Oct. 3, 1938

Fig. 1

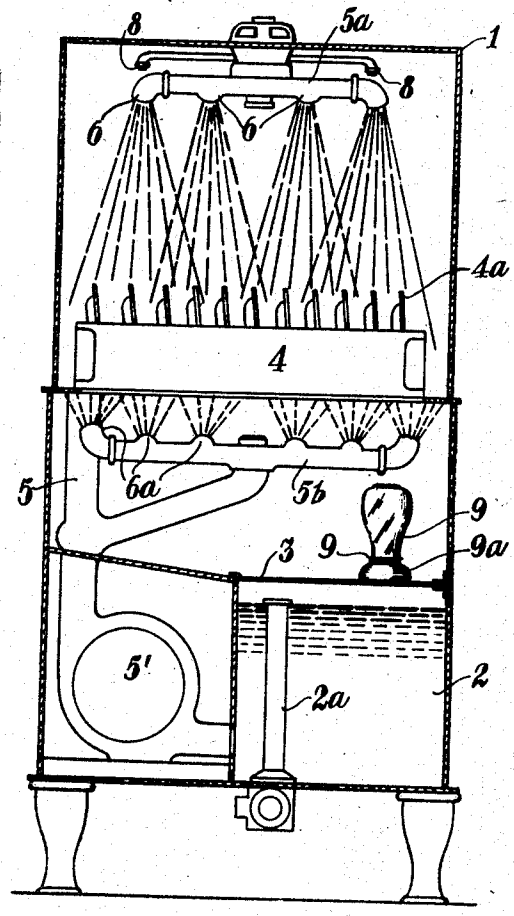


Fig. 2

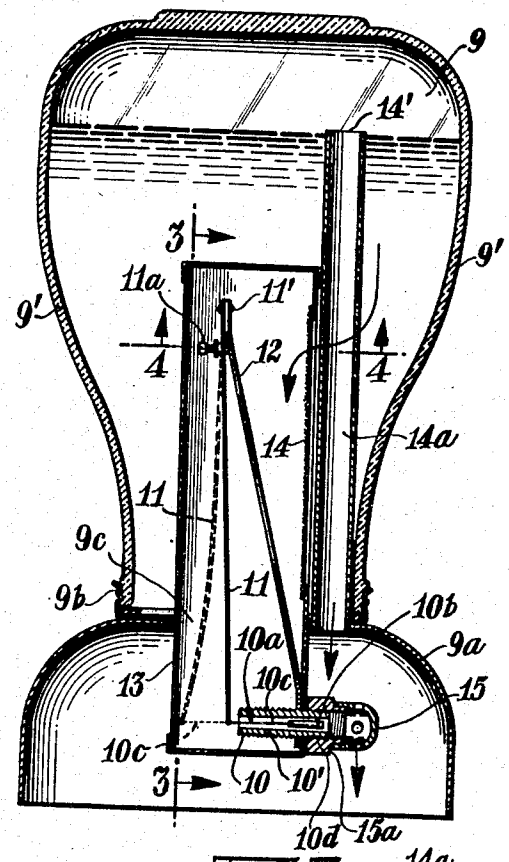


Fig. 3

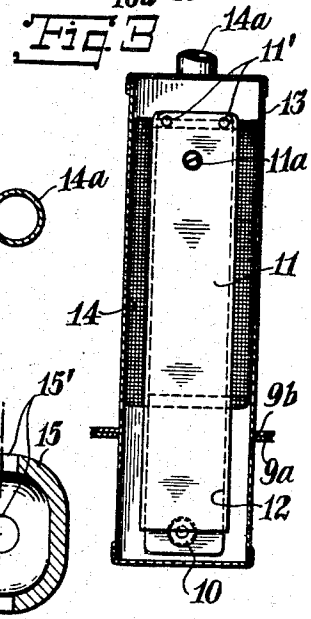


Fig. 6

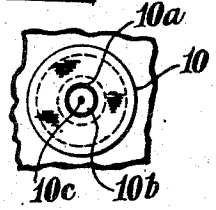


Fig. 7

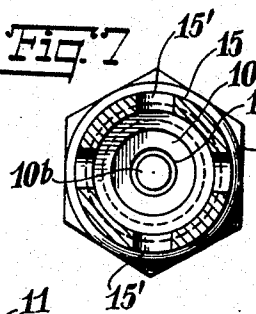
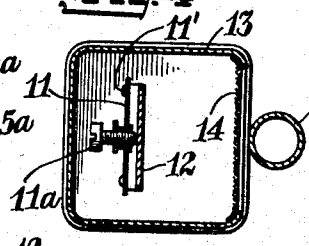


Fig. 4



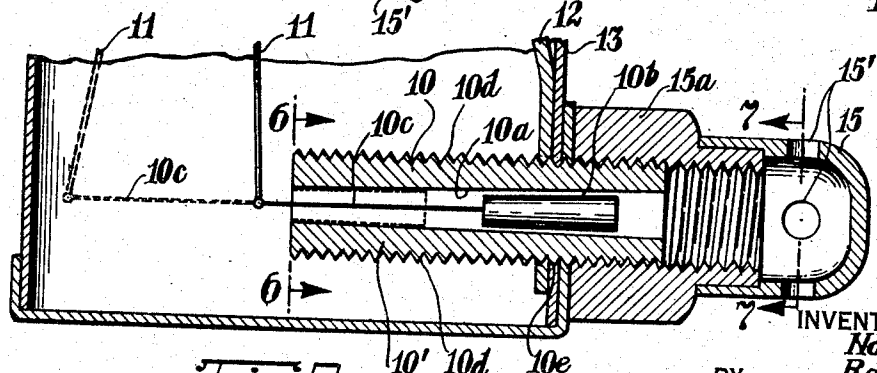
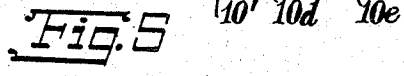


Fig. 5



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DETERGENT DISPENSER FOR WASHING MACHINES

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Application October 3, 1938, Serial No. 232,982

8 Claims. (Cl. 137—68)

This invention relates to improvements in detergent dispensers for washing machines and relates more particularly to dispensers for liquid-detergents.

In application Serial No. 231,498, filed by Norman W. Halsey, one of the applicants herein, there is disclosed a dispensing device for washing machines and particularly for dishwashing machines which is adapted to automatically dispense to the wash water in such machines a liquid detergent as distinguished from a solution of powdered material which device embodies a quick-feeding or charging means whereby a relatively large initial charge of liquid-detergent will be supplied to the wash water of the washing machine so soon as the washing operation begins whereby the large volume of water in the tank of the washing machine will be immediately brought up to efficient working strength combined with automatic slow-feeding means for liquid-detergent which will slowly, and as the work progresses, charge the wash water in relatively small amount to compensate for the loss of strength due either to the work performed or to dilutions of such water by fresh water rinses and thus to provide means for dispensing liquid detergent in proper quantities or amounts to keep the initially charged water at all times during the operation of the machine at an efficient strength and to avoid waste and guessing as to the necessary initial charge as well as to the necessary compensating charge.

The dispenser of the aforesaid prior application has a dispensing aperture of fixed area and while dispensing devices of the type above specified operate efficiently in machines where the temperature is low or moderate we have found that when the temperature within a dispensing device of the type specified reaches a degree of heat over 125° F. the liquid soap begins to lose its normal viscosity and to thin out and that thereafter, during further increases in temperature within the dishwashing machine and dispensing device, the said liquid soap progressively, in accordance with the increase in such temperature, loses further viscosity with a progressive increase in fluidity and consequently progressively greater amounts of liquid soap will flow through a given aperture of fixed area (such as embodied in the dispenser hereinabove referred to) within a given unit of time and, in accordance with our present invention, we overcome this difficulty by utilizing, at the dispensing outlet, a thermostatically-controlled valve by which the orifice through which the liquid soap is dispensed will be decreased progressively with the progressive increase in temperature so that a substantially similar amount or quantity of liquid soap will be dispensed through the dispensing outlet at all times irrespective of the increase or decrease in the temperature at which the dispenser is compelled to operate within the dishwashing machine.

Another object of our invention is to provide a device of the character specified which will be simple and inexpensive and composed of few parts and which will provide for an initial quickly fed quantity or charge for the wash-water and thereafter will enable a slow feed at any suitable rate per unit of time to be dispensed through a thermostatically-controlled dispensing outlet.

Another object of our invention is, in a device of the character above described, to utilize at the dispensing outlet, a valve body having a tapered bore in combination with a tapered valve member positioned axially within said tapered bore to provide, between said bore and valve member, an annular or ring-shaped dispensing outlet, said valve member being movable by a thermostatically-controlled member axially within said bore into varying positions therein to progressively increase or decrease the area of said annular dispensing outlet.

Another object of our invention is to utilize, in a device of the character specified, a temperature-sensitive member formed of a material having a relatively wide range of warping movement under heat and which will have a progressive movement which increases in extent in substantial uniformity with increases in temperature. For this purpose, we immerse within the liquid soap a bimetal strip of suitable length fixed at one end and free at the other end to permit the entire thermostatically-controlled movement of the strip to be transferred to the said free end, and in the preferred embodiment of our invention, we connect by a suitable flexible connection the free end of said strip to the apical end of the valve member so that the latter will be movable by the bimetal strip from a relatively open position when positioned at the wider outlet end of the valve bore to a very fine and almost closed dispensing outlet when moved to the inner narrower end of the valve bore.

Another object of our invention is to provide a valve body which is adjustable in relation to the path of the thermostatically-controlled movement of the valve member within the said bore whereby accurate adjustment of the initial area of the bore is provided for in order to adjust the

rate of feed and to permit a given number of drops to pass through such bore in a given unit of time, such as a minute.

Another object of our invention is to utilize, in combination with a thermostatically-controlled member in a dispensing device of the character specified, a filter chamber having a filtering element through which the liquid soap is compelled to pass before reaching the thermostatically-controlled dispensing outlet.

Still another object of our invention is, in a device of the character specified, to utilize a downwardly tapered container, preferably comprising a bottle, so that the pressure of the head of liquid within the dispenser will be equalized during the dispensing operation, irrespective of the quantity of liquid within the same.

Still another object of our invention is to provide means for initially adjusting the starting position of the temperature-sensitive member whereby the initial position of the valve member within the bore of the valve body may be adjusted to provide for a given number of drops per minute at the beginning of the operation and also to adjust the extent or range of movement of the thermostatically-controlled elements.

With these and other objects in view, the invention comprises the combination of members and arrangement of parts so combined as to coact and co-operate with each other in the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawing, in which:

Fig. 1 is a view in vertical section of a dishwashing machine of the spray type within which my preferred form of automatic dispenser is placed in operative position;

Fig. 2 is a view in vertical section showing the liquid detergent dispenser in dispensing position;

Fig. 3 is a vertical section on the line 3—3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a transverse section on the line 4—4 of Fig. 2, looking in the direction of the arrows;

Fig. 5 is an enlarged fragmentary section of the lower end of the filter chamber and thermostatically-controlled dispensing valve;

Fig. 6 is a section on the line 6—6 of Fig. 5, looking in the direction of the arrows;

Fig. 7 is a section on the line 7—7 of Fig. 5, looking in the direction of the arrows.

Referring now to the drawing which illustrates a preferred embodiment of our invention, 1 indicates the outer casing of the dishwashing machine of spray type which is provided at its lower end with a wash tank 2, above which is supported a strainer 3 and a dish rack 4, in which rack dishes are suitably stacked for washing. Within the casing 1 is provided a supply pipe 5 connected to a pump 5' which is in turn connected to the wash tank 2. Suitably mounted within the machine and connected to the supply pipe 5 are the usual revolvably mounted laterally extending arms 5a, 5b, on which are mounted upper and lower wash nozzles 6, 6a respectively, which nozzles are designed to spray or diffuse water on, against and between dishes 4a in the rack 4. This sprayed or diffused water finally falls down through the strainer or sieve 3 and into the tank 2, after which such wash-water is pumped by the pump 5' upwardly through the upright pipe 5 and nozzles 6, 6a, so as to produce a continuous circulation and distribution or diffusion of the wash water into contact with the dishes. After initial washing of the dishes by such wash-water, the dishes are usually sprayed through rinsing nozzles 8. The addition of this rinsing water to the wash-water in the tank maintains the wash-water in proper freshened condition for use, and the surplus water and grease pass out of the tank 2 through a suitable overflow pipe 2a. The foregoing is a description of one form of a washing machine of the spray type and, standing by itself alone, constitutes no part of our invention.

In many types of dishwashing machines of the character hereinabove specified, the wash-water is frequently heated so that temperatures within the dispensing device soon after the washing operation is started, range from 120° F. to 212° F. and consequently, in cases where it is desired to feed a liquid detergent to the wash water as, for example, in the aforesaid application Serial No. 231,498, of Norman W. Halsey, the viscosity of the liquid detergent will change or vary in accordance with the variation in the degree of temperature conveyed to said liquid detergent by the heat within the said washing machine. Consequently, unless the area of the dispensing outlet is decreased in proportion to the increase in temperature within the machine and vice versa, it will be impossible to feed the liquid detergent to the wash-water of machines using hot water at a fixed rate or in substantially equal amounts during the dispensing operation because when the viscosity is decreased a greater amount of the more fluid detergent will pass through a fixed outlet aperture and the supply of detergent to the wash-water would thus be progressively increased in accordance with the increase in temperature. An overfeeding during hot periods with a consequent loss of material thus results.

One of the features of this invention is to overcome this difficulty by providing a dispenser 9 having thermostatically-controlled means for varying the area of the dispensing outlet aperture in accordance with the variation of temperature transmitted to the liquid detergent within the machine, and with this end in view we utilize a valve 10 having an outlet which is variable in area, and we regulate or control the outlet area of said valve 10 by a thermostatic device comprising a heat-sensitive member 11 composed of a suitably mounted strip of bimetal immersed in the liquid detergent. We preferably employ bimetal because of its wide range of warping-movement. As illustrated, the bimetal strip 11 is mounted vertically within the container and is secured or fastened at its upper end to a fixed supporting member 12 while its opposite end is free to move in accordance with the warpage of the material under the influence of heat. In this way, we are enabled to provide a relatively wide range of warping movement and furthermore the specific material has a progressive movement which increases in extent in substantial uniformity with the increase in temperature.

As illustrated, our dispenser 9 comprises a glass liquid container or jar 9' and a metallic base 9a within which the glass portion 9' is adapted to seat and be fastened. In the simplified structure illustrated, the glass container 9' comprises a bottle which is inverted and fastened to the base through an inverted and screw-threaded jar cover 9b which is secured to the top of the semi-spherical base member 9a by soldering, welding or in any other suitable man-

ner. The semi-spherical base member 9a has an opening which communicates with the container 9' through an opening 9c in the inverted jar cover 9b and base member 9a, a valve housing 13 being mounted in said base member 9a and communicating internally with the opening 9c so that liquid from the container will pass into said valve housing 13. As illustrated, the thermostatically-controlled valve 10 is mounted in the lower end of said valve housing 13 and the bimetal strip 11 is fastened by rivet 11' at its upper end to the supporting member 12 which is fastened at its lower end to a wall of the valve housing 13. In the preferred embodiment of our invention the housing 13 is extended upwardly vertically within the glass jar 9' and is provided at one side with a screen 14 so as to provide, within the container, a filter chamber adapted to filter the liquid detergent as it passes from the glass jar 9' into the valve housing 13.

In accordance with the preferred form of our invention, valve 10 comprises a valve body or casing 10' having an elongated tapered bore 10a within which is slidably mounted to move axially a tapered valve member or plug 10b preferably of less length than the bore 10a of the valve body 10'. The valve member or plug 10b is, as shown, moved within the bore 10a by the heat sensitive member 11 through a connecting rod 10c flexibly connected at its outer end with the free end of the heat sensitive member 11.

It is desirable to enable adjustment of the position of the valve body or casing 10' in relation to the path of movement of the plug 10b in order to enable adjustment of the outlet area of the valve at the start of operation thereof and thus providing for the rate at which the liquid detergent will be dispensed during the dispensing operation of the device and with this end in view, the outer periphery of the valve body 10' is provided with a screw-thread 10d and threaded into a tapped opening 10e in the wall of the valve housing 13. Obviously, by screwing the valve body 10' inwardly or outwardly, adjustment may be made between the path of travel of the plug 10b and the bore 10a within said valve body 10'. It will be understood that the rate of feed may thus be adjusted.

It is, as above indicated, desirable that the rate of feed be uniform at varying degrees of temperature and it will be understood that this result, though it may be accomplished in some measure by any heat sensitive or thermostat device, the applicants' specific combination of valve and heat sensitive member enables such uniformity of the feed of liquid detergent in a more efficient manner and with this end in view the bore 10a of the valve member is tapered from one end to the other to provide an elongated bore, within which a similarly tapered valve member or plug is adapted to move axially.

In accordance with this preferred form of our invention, the valve bore is preferably at least double the length of the tapered valve or plug and the forward part of the bore of the valve body has a taper substantially similar to the taper of the shorter valve while the rear portion of said bore preferably is provided with a greater taper. By the use of these tapered cooperating members, we are enabled to accurately compensate for changes due to increase in heat in the viscosity or fluidity of liquid detergent which becomes more and more liquid as the heat therein increases.

Also with a view to increased accuracy toward the provision of a uniform flow at all temperatures, we provide for adjustment of the movement of the heat sensitive member by an adjusting screw 11a mounted therein and bearing against the supporting member 12, so that said heat sensitive member and the valve member or plug moved thereby will accurately co-operate with the tapered bore of the valve body or casing.

Because the pressure at the valve orifice and hence the rate of flow of the dispensed liquid is affected by the change in hydrostatic head of the liquid above the orifice a tapered container is used, the taper being downward. Hence the larger part of the liquid charge is dispensed with a relatively small change in head.

In devices of the character under consideration, it is desirable that an initial charge of detergent material be quickly or immediately fed to the wash-water at the start of operation in order to immediately bring such wash-water to effective cleaning strength and for this purpose we provide our container with a quick feed pipe 14a communicating at its lower end with the open base portion and having its upper end 14' positioned at such height below the top of the container as to permit a predetermined quantity of the liquid within the container to immediately pass through the pipe 14a. This pipe is sufficiently large to permit the entrance of air as well as discharge of material therethrough and after such discharge will continue to act as a vent tube between the open base member 9a and the upper part of the container.

In operation the container is inverted and filled with liquid detergent and if it is desired to charge the wash-water with an initial supply of such material the container is completely filled. The base member is then inverted and screwed on to the container. The parts are then turned back to initial position whereupon the device is ready for use and may be inserted into the machine on the strainer or in any other suitable place within the machine.

As illustrated, a guard member comprising a hood portion 15 having outlet apertures 15' and a threaded nut 15a is threaded on the outlet end of the dispensing valve to serve as a guard therefor.

Having described our invention, we claim:

1. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, and heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid and to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means.

2. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, and heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to

compensate for changes of viscosity of said liquid and to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means, said container comprising an inverted glass jar of downwardly tapered conformation.

3. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid and to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means, said valve comprising a valve body having an elongated bore of a given cross-section and tapered from the outer end toward the inner end thereof, and a valve member of similar cross-sectional conformation movable axially therein.

4. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid and to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means, said heat sensitive means comprising a strip of bimetal fixed at one end to a suitable support and having its opposite end free and operatively connected to said valve.

5. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid and to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means, said valve comprising a valve body having an elongated bore tapered from the outer end toward the inner end thereof, a valve member movable axially therein also tapered in the same direction as said bore, and said heat sensitive means comprising a strip of bimetal fixed at one end to a suitable support and having its opposite end free and operatively connected to said valve.

6. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid and to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means, said valve comprising a valve body having an elongated bore tapered from the outer end toward the inner end thereof, a valve member movable axially therein also tapered in the same direction as said bore, and means for adjusting the mounted position of the valve body within the container to permit variation of the rate of feed of the liquid detergent.

7. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, heat sensitive means connected with said valve and operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid to vary the area of the dispensing outlet through said valve in accordance with the heat transmitted to said heat sensitive means, said heat sensitive means comprising a strip of bimetal fixed at one end to a suitable support and having its opposite end free and operatively connected to said valve, and means for adjusting the extent of movement of said heat sensitive means to cooperate with said valve in varying the rate of feed of the liquid detergent.

8. A liquid detergent dispenser for washing machines comprising a liquid container, a valve-housing arranged within said container, adapted to be immersed in liquid contained therein and having an opening communicating with said container, a valve in said housing provided with a dispensing outlet, heat sensitive means operable by the heat of the liquid in said housing and container to compensate for changes of viscosity of said liquid and comprising a strip of bimetal fixed at one end to a suitable support and having its opposite end free and a connection between said valve and bimetal strip having a flexible joint.

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