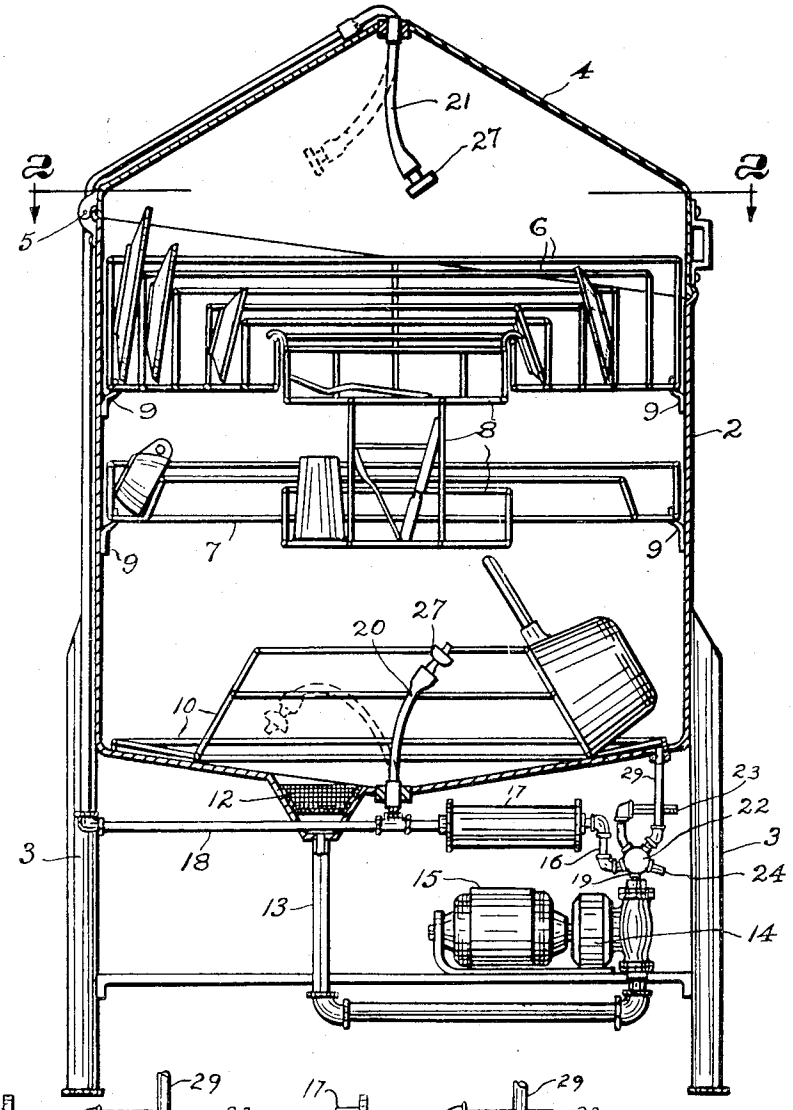
June 12, 1956 O. CAMMANN 2,750,229

RANDOM-MOTION SPRAY DEVICE

Original Filed May 25, 1946 2 Sheets-Sheet 1

Fig. 1.



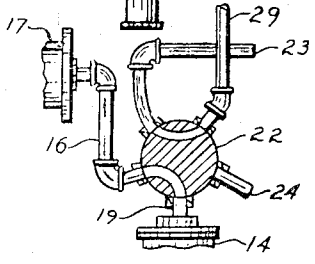


Fig. 1a.

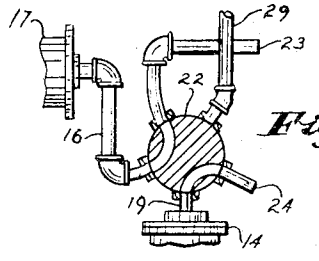


Fig. 1b.

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Fig. 2.

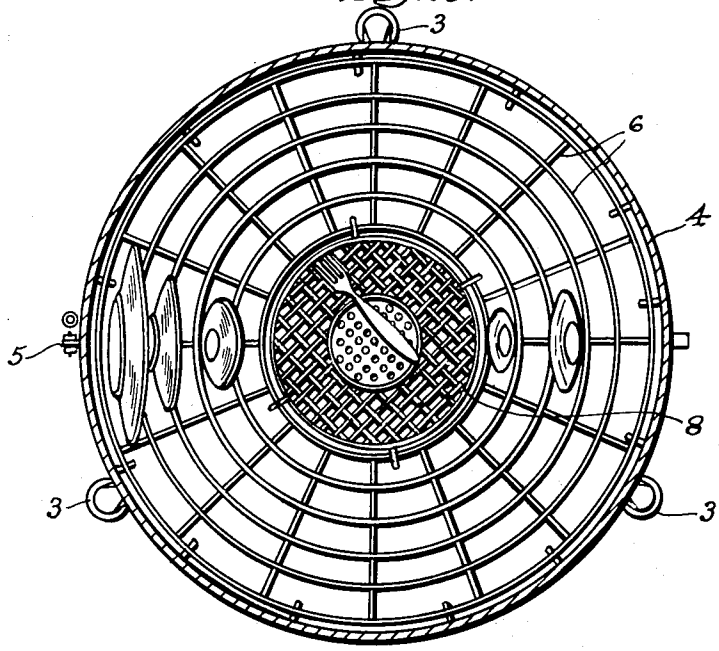


Fig. 3.

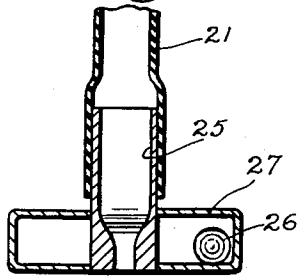


Fig. 4.

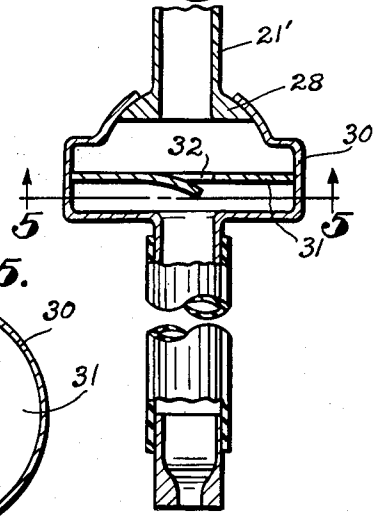


Fig. 5.

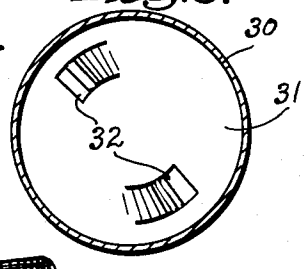
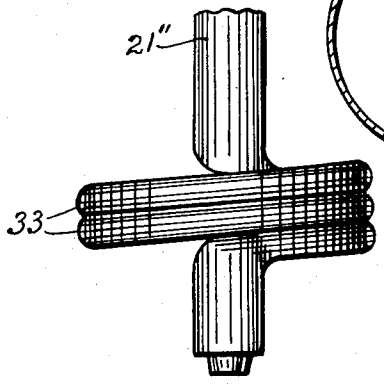


Fig. 6.



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RANDOM-MOTION SPRAY DEVICE

Oswald Cammann, Weston, Mass.

Original application May 25, 1946, Serial No. 672,324, now Patent No. 2,622,926, dated December 23, 1952. Divided and this application November 29, 1952, Serial No. 323,317

2 Claims. (Cl. 299—65)

This invention relates to dish-washing machines of the type intended more especially for domestic use.

In my earlier Patent No. 1,928,683, I have disclosed a dish-washing machine of this type which, in general organization, has proved very useful, but the distribution of the water or washing solution, simply by means of a suspended length of hose, has not been satisfactory. It is the chief object of the present invention to remedy this difficulty while still retaining the simplicity, economy of manufacture, and other advantages of the original construction.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Fig. 1 is a vertical, sectional view, somewhat diagrammatic in character, of a dish-washing machine embodying the present invention;

Fig. 2 is a horizontal, sectional view taken approximately on the line **2—2**, Fig. 1;

Fig. 3 is a vertical, sectional view of a nozzle and a novel form of actuating mechanism for it, embodying features of the present invention;

Fig. 4 is a similar view of another nozzle and hose end construction which may be substituted for that shown in Fig. 3;

Fig. 5 is a horizontal, sectional view on the line **5—5**, Fig. 4;

Fig. 6 is a side elevation of still another novel form of hose end construction; and

Figs. 1*a* and 1*b* are diagrammatic views showing different positions of the control valve.

Referring first to Figs. 1 and 2, the washing machine there shown comprises an upright tank **2** supported on legs **3**, and equipped with a cover **4** hinged at **5**. Mounted inside the tank are several wire rack structures including an upper rack **6** adapted to contain the larger dishes, a smaller intermediate rack **7**, and a third rack **8**. The two racks **6** and **7** are removably supported on ears or small brackets **9** welded or riveted to the inner side of the tank, but the middle rack **8**, which is designed to hold knives, forks, spoons, and other small articles, is hooked over the inner margin of the upper rack **6** so that it can readily be inserted and removed. Another rack **10** simply rests on the bottom of the tank and is designed to hold cooking dishes.

The machine is intended to operate with separate batches of water suited to the different steps in the washing operation and, accordingly, provision is made for recirculating the water. As shown, the water or washing solution drains from the tank **2** through a removable strainer **12** into the pipe **13** leading to the intake of a centrifugal pump **14** driven by an electric motor **15**. This water is discharged by the pump through the valve **22** and pipe **16**, flows through an electric heater **17** into the distributing pipe **18** which supplies both the hose **20** in the bottom of the tank and, also, another hose **21** in the

top of the tank. The rate at which the water is circulated is controlled by the design of the machine and the capacity of the pump.

At the beginning of the washing operation the tank is filled to the desired level by adjusting the valve **22** to the position shown in Fig. 1*a* where water from the hot water supply system is led in through the nipple **23** and is discharged through the pipe **29** into the tank **2** to fill it to the desired level. This supply later is shut off by a valve (not shown) and at the conclusion of the washing operation, or at any other time when it is desired to drain off the water, the valve **22** is adjusted into the position shown in Fig. 1*b* where it causes the water drawn from the tank and discharged by the pump to flow through the pipe **24** leading to the drain.

The problem with which this invention is primarily concerned is that of producing a random motion of the free lengths of hose **20** and **21** in such a manner that a thorough distribution of the washing solution and rinse water over all of the dishes will be achieved automatically.

Fig. 3 illustrates one arrangement provided by this invention to accomplish this object. As there shown, the hose **21** is connected to a nozzle or end member **25** which may be of any suitable shape or, in fact, may be a part of the hose itself. The unique feature of this construction is that it includes a ball **26** enclosed in and free to roll within an annular container **27** fastened securely to, or made integral with, the member **25**.

When the machine is being used and water is flowing through the hose **21**, the hose and nozzle develop a swinging motion due to the reaction of the discharge, as disclosed in my prior Patent No. 1,928,683. Rolling about the container as a result of this swinging movement, the ball **26** exerts an eccentrically directed force on the nozzle or hose end, which force shifts constantly in its relation to the nozzle and thereby produces an unpredictable or random swinging movement of the nozzle. Because the relation of the eccentrically directed force does shift constantly, the desired distribution of the washing or rinse water over the dishes is realized, and that result is produced entirely automatically.

The same result may be produced in a considerable number of other ways. For example, Fig. 4 shows another embodiment of the invention in which the hose or supply pipe **21'** is provided with an enlargement **28**, the upper surface of which has the shape of a section of a sphere. Resting on this enlargement is a receptacle **30** of circular cross-sectional form having a transverse partition **31** dividing it into upper and lower chambers. One or more apertures **32**, each provided with an inclined upper surface, are formed through this partition so that the water entering the receptacle flows downward into the lower chamber in contact with these inclined surfaces and, in so doing, produces a rotative movement of the entire receptacle, thus swinging the lower end portion of the hose into different angular relationships to the section upstream from it. This action cooperates with the rotative motion to distribute the water in the desired manner. In this case the pressure of the water inside the receptacle **30** will exert sufficient pressure on the parts **28** and **30** to keep the spherical joint between them tight.

A similar result may be achieved by utilizing the principle on which a gyroscope operates. If a gyroscope is suspended from the fixed end of the axle so that it may swing freely and the wheel rotates, the free end of the axle will not swing simply in a single plane, but successive swings will take place in diffferent vertical planes. This phenomenon is referred to as "precession" and it may be utilized in this machine by coiling a portion of the hose, as shown at **33**, Fig. 6, in a plane transverse to its axis, or a coiled section of metal tubing may be connected into the hose above its extreme end.

When a stream of water flows through this coiled section in passage to the nozzle, the mass of water moving in a generally circular path has an effect akin to that of a rotating flywheel, and gives rise, as the nozzle swings, to a precessive or laterally acting force on the coil and on the nozzle associated therewith. The result is to cause the nozzle to deviate from any particular path of swing, into which it might tend to settle, and instead to cause the nozzle continually to take up new paths of swing, in much the same fashion as brought about by the rolling ball of the first described embodiment. This arrangement produces a good distribution of the water without the use of parts (other than the water) movable relatively to the hose itself.

It has been found in the actual use of these hose constructions, and others which have been devised embodying the same principles, that they completely overcome the difficulties experienced with my earlier form of dishwasher. Also, the same construction may be used with the hose **20** at the bottom of the washer. In both locations the hose is attached securely to the portion of the tank through which it passes, this point of attachment acting as a pivot or fulcrum determining the axis around which the gyratory or rotative movement of the free portion of the hose takes place. Or, the attachment may be made by means of a ball pipe joint anchored in the casing. In some cases, also, where the water pressure is excessive, it may be necessary to use a pressure-regulating valve in the pipe connections leading to the nipple **23**.

From what has been said above it will be evident that the invention may be embodied in other forms than that shown without departing from the spirit or scope thereof.

The present application is a division of my copending application Serial Number 672,324 filed May 25, 1946, now Patent No. 2,622,926, dated December 23, 1952.

Having thus described my invention, what I desire to claim as new is:

1. A spraying device for directing a concentrated jet of liquid in random fashion over a region to be treated by impact of the liquid jet, comprising a short flexible conduit, a fixed support for one end of the conduit adjacent the region to be treated by the jet, circular liquid-conveying means in communication with and carried by the free outer end of the flexible conduit, said liquid-conveying means having a circular passage within which liquid from the conduit is directed in a circular path about an axis corresponding to the axis of the free end of the flexible conduit, a nozzle having a discharge passage for discharging a liquid jet concentrated in a narrow angle, the nozzle being connected to the circular liquid-conveying means by a straight section aligned with the axis of nozzle discharge and substantially normal to the plane of rotation of the liquid within the liquid conveying means, the nozzle and said liquid-conveying means being supported by the flexible conduit for random swinging movement by reaction of the jet discharge and gyroscopic precessive force of the rotating liquid within the circular passage.

2. A spraying device for directing a concentrated jet of liquid in random fashion over a region to be treated by impact of the liquid jet, comprising a short flexible conduit, a fixed support for one end of the conduit adjacent the region to be treated, a section of conduit fixed in a coil and carried by the free outer end of the flexible conduit in communication therewith, said section of conduit being coiled about an axis corresponding to the axis of the free outer end of the flexible conduit, a nozzle having a discharge passage for discharging a liquid jet concentrated in a narrow angle, the nozzle being connected to the coiled conduit by a straight section aligned with the axis of nozzle discharge, the nozzle and coiled conduit section being supported by the flexible conduit for random swinging movement by reaction of the jet discharge and gyroscopic precessive force of the rotating liquid mass within the coiled conduit.

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