

Dec. 23, 1952

O. CAMMANN

2,622,926

RANDOM-MOTION SPRAY DEVICE

Filed May 25, 1946

2 SHEETS—SHEET 1

Fig. 1.

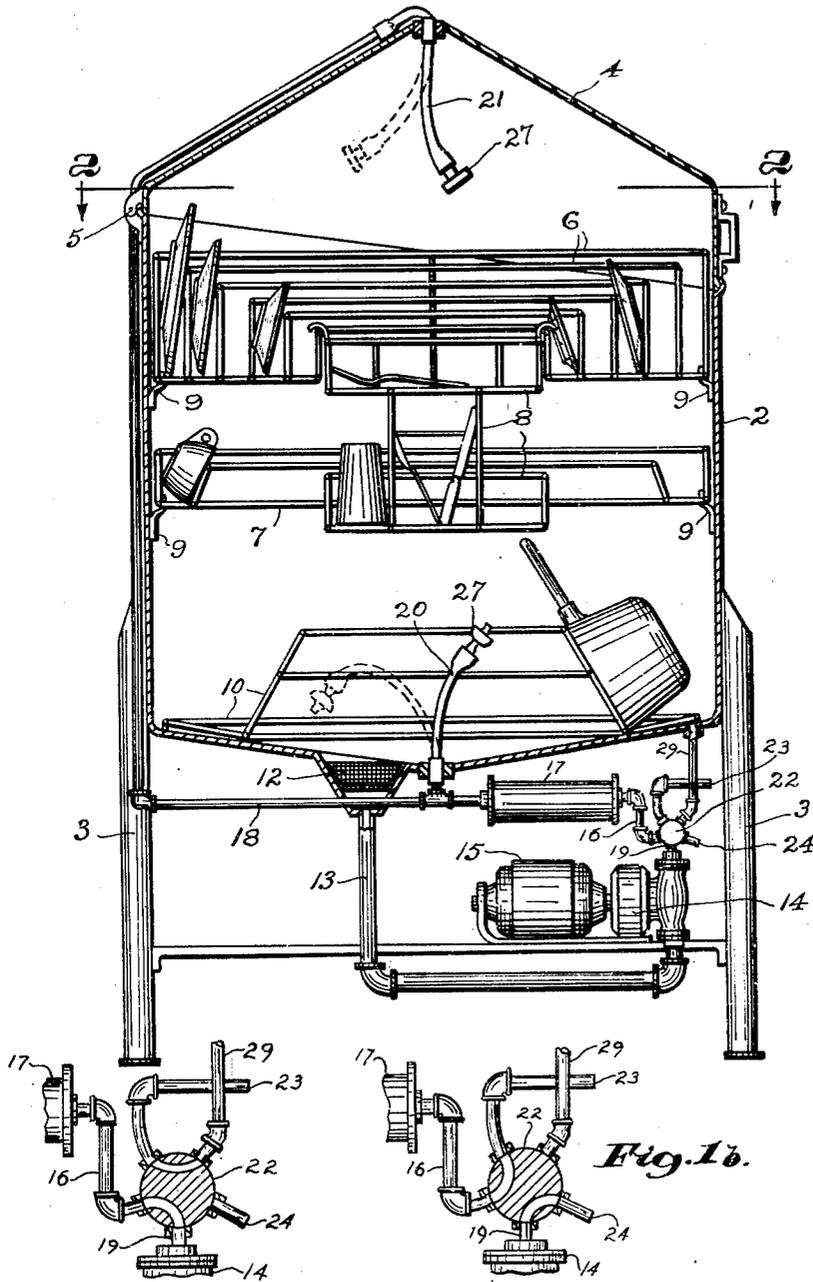


Fig. 1 a.

Fig. 1 b.

Inventor:
Oswald Cammann,
by J. M. Cready,
Attorney.

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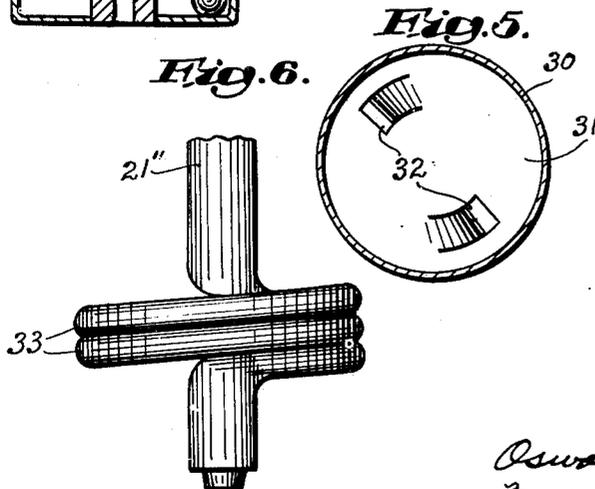
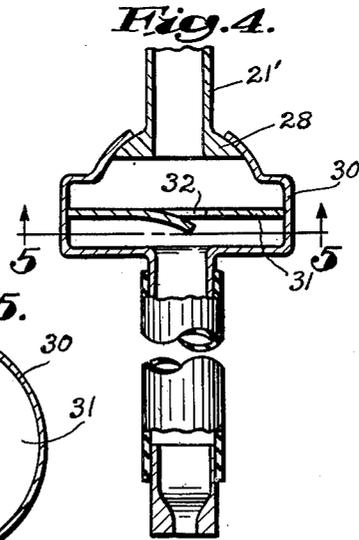
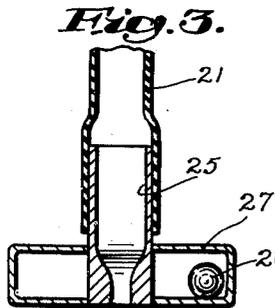
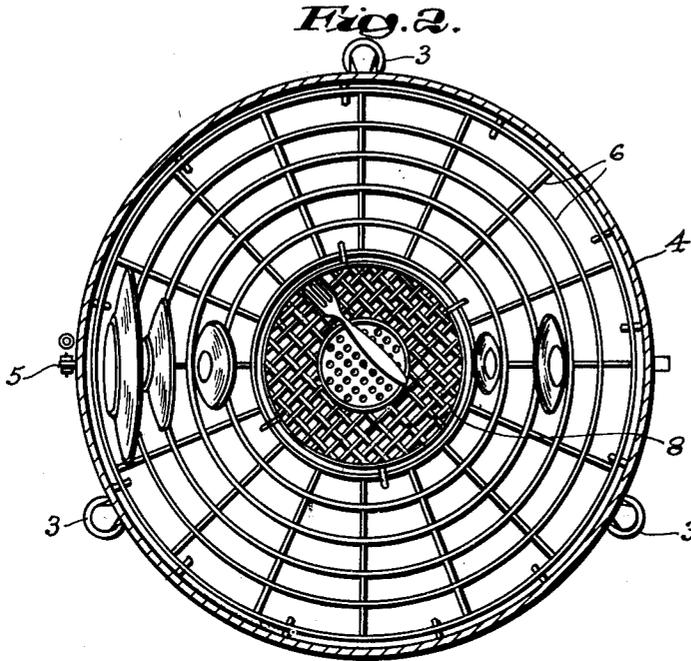
O. CAMMANN

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2 SHEETS—SHEET 2



Inventor:
Oswald Cammann,
by J. H. McCready,
Attorney.

UNITED STATES PATENT OFFICE

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RANDOM-MOTION SPRAY DEVICE

Oswald Cammann, Weston, Mass.

Application May 25, 1946, Serial No. 672,324

4 Claims. (Cl. 299-65)

1

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. 1a and 1b 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

2

steps in the washing operation and, accordingly, provision is made for re-circulating 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. 1a 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. 1b 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 up-stream 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 this 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 different 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 dish-washer. 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 attach-

ment 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.

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

1. A spraying device for directing a spray of liquid in random fashion over a region to be treated, comprising a nozzle, a flexible conduit connected to the nozzle for supplying spraying liquid thereto, the nozzle being supported by the flexible conduit for free swinging movement in random direction, a guideway mounted adjacent the nozzle and having a path extending around the axis of the nozzle, and means disposed within said guideway during nozzle operation for movement around the guideway to produce, as the nozzle swings, lateral displacive forces tending to divert the nozzle from its plane of swing.

2. A spraying device for directing a jet of liquid in random fashion over a region to be treated, comprising a nozzle, a flexible conduit connected to the nozzle for supplying spraying liquid thereto, the nozzle being supported by the conduit for free swinging movement in random direction, a container disposed adjacent the nozzle in a plane substantially normal to the nozzle axis, and a weight within said container free to move therein.

3. A spraying device for directing a jet of liquid in random fashion over a region to be treated, comprising a nozzle, a flexible conduit connected to the nozzle for supplying spraying liquid thereto, the nozzle being supported by the conduit for free swinging movement in random direction, a circular container disposed adjacent the nozzle in a plane substantially normal to the nozzle axis, and a ball weight within and free to roll around said container.

4. A spraying device for directing a spray of liquid in random fashion over a region to be treated, comprising a nozzle, a flexible conduit connected to said nozzle for supplying spraying liquid thereto, said nozzle being supported by said flexible conduit for free swinging movement in random direction, a weight retainer mounted on said nozzle, said retainer describing an orbital path in a plane generally normal to the discharge axis of said nozzle, a weight held by said retainer and constrained thereby to movement in said orbital path to produce lateral displacive forces tending to divert the nozzle from its plane of swing.

OSWALD CAMMANN.

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The following references are of record in the file of this patent:

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