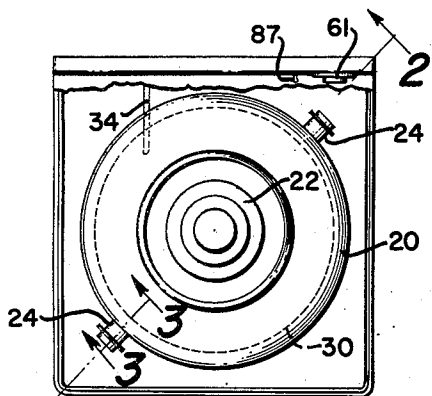


2,906,111

2 Sheets-Sheet 1



2 *Fig. 1*

Fig. 2

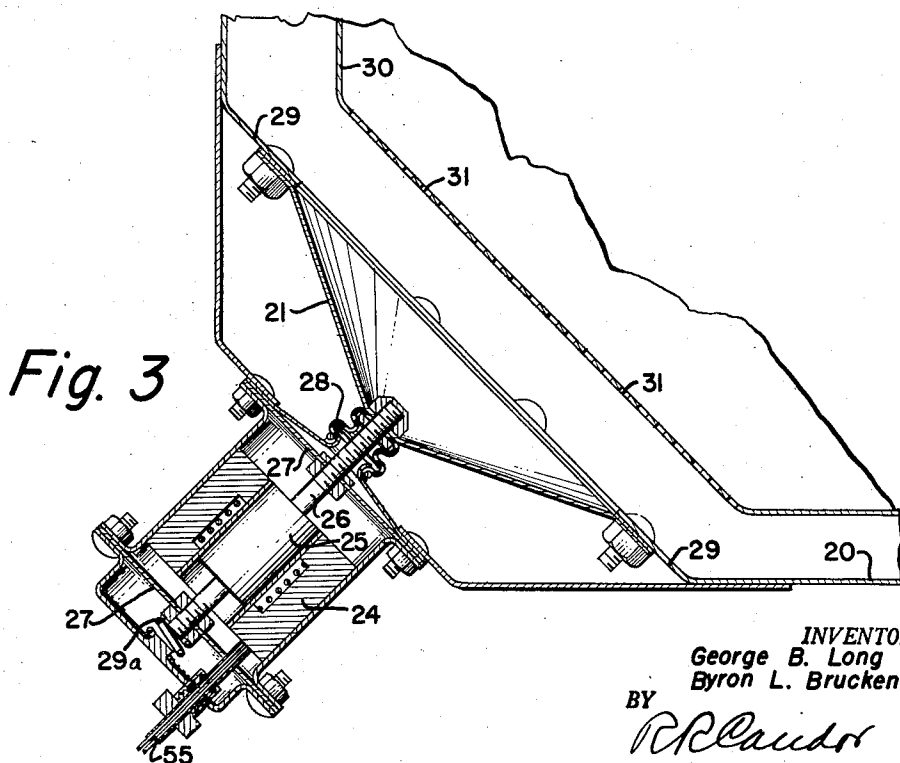
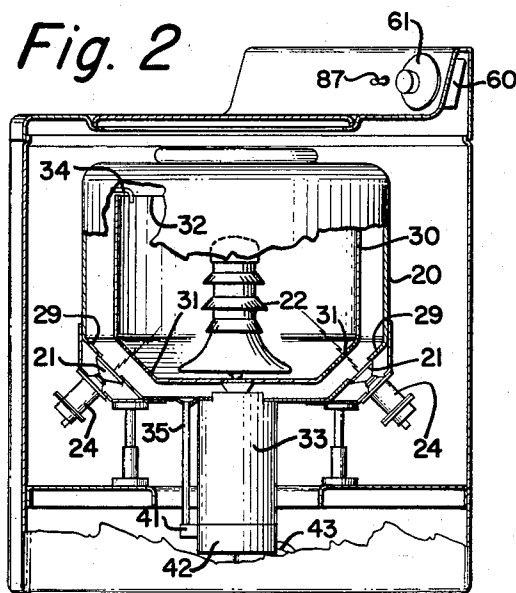


Fig. 3

INVENTORS.
George B. Long &
Byron L. Brucken

BY

R. R. Caudor

Their Attorney

Sept. 29, 1959

G. B. LONG ET AL
WASHING MACHINE

2,906,111

Filed March 5, 1954

2 Sheets-Sheet 2

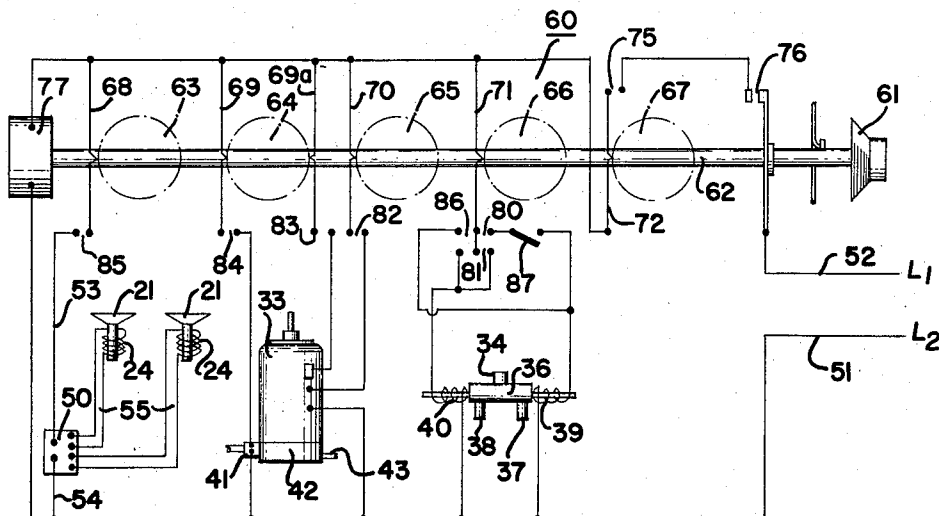
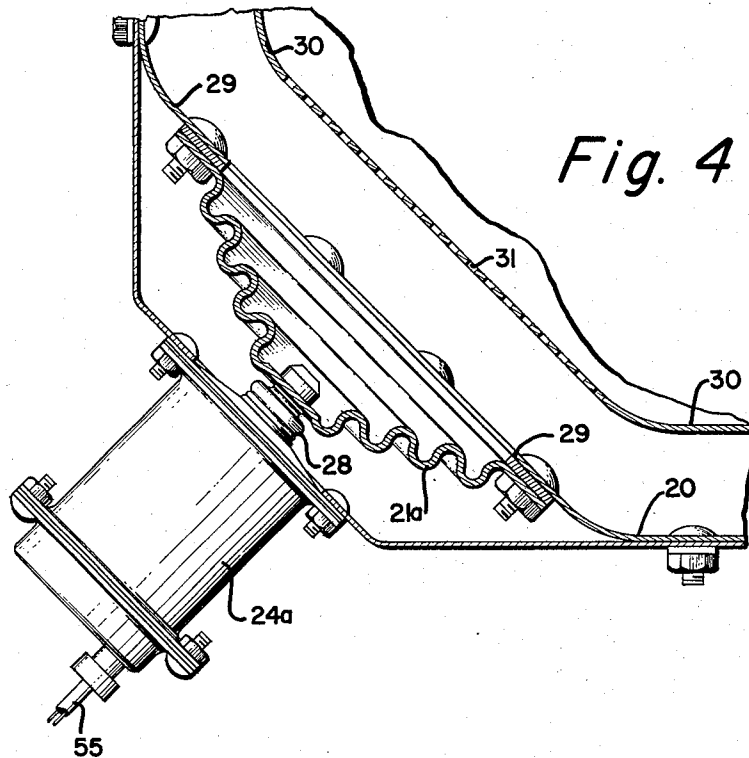


Fig. 5

INVENTORS.
George B. Long &
Byron L. Brucken
BY *R. R. Caudor*
Their Attorney

1

2

2,906,111

WASHING MACHINE

George B. Long and Byron L. Brucken, Dayton, Ohio,
assignors to General Motors Corporation, Detroit,
Mich., a corporation of Delaware

Application March 5, 1954, Serial No. 414,456

1 Claim. (Cl. 68—28)

This invention relates to domestic appliances and more particularly to clothes washing machines.

An object of this invention is to provide a solenoid operated means for a clothes washing machine to produce relatively high frequency vibrations in the clothes and liquid and also to provide slow motion agitation to produce a turn over of the clothes to expose different parts and articles to the high frequency vibrations.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawings:

Figure 1 is a top plan view, partly in section, of a clothes washing machine embodying this invention, with parts shown diagrammatically.

Figure 2 is a vertical cross-section taken along the line 2—2 of Figure 1.

Figure 3 is an enlarged cross-section taken along the line 3—3 of Figure 1.

Figure 4 is a view similar to Figure 3 and showing a modified form; and

Figure 5 is a wiring diagram of the controls for the washing machine shown in Figures 1, 2 and 3.

The stationary tub 20 is provided with one or more solenoid operated means or plungers 21 to produce relatively high frequency vibrations in the liquid and clothes. A slow motion agitator 22 produces a slow turn over or flexing of the clothes to expose different parts or articles to the high frequency vibrations from plunger 21. The plungers 21 are located on the stationary tub 20 in a manner to cause their longitudinal axes to intersect the longitudinal axis of the agitator 22 at a point within the tub 20 (best shown in Figs. 1 and 2). The high frequency vibrations provide a thorough washing action while the slow motion agitation exposes various parts of the clothes to the washing action. The slow motion agitation may be at approximately 200 cycles per minute, while the high frequency vibrations may be at 3,600 per minute, for example.

One or more solenoids 24 vibrate the plunger or plungers 21 through the medium of armature 25 and shaft 26. Diaphragms 27 maintain alignment of the shaft 26. Flexible seal 28 may be provided, if desired, when the washing liquid is permitted to flow to the outer side of plunger 21 through openings in the generally frusto-conical wall 29 of tub 20, not shown. Spring 29a may be provided.

A centrifugal basket 30 is placed in the tub 20 in which the clothes are placed. The basket is provided with perforations 31 through which the high frequency vibrations and liquid may pass. The liquid may also be discharged over the upper lip 32 during centrifugal extraction. The basket 30 may be spun and the agitator 22 actuated by the power unit 33, for example, as disclosed in Clark Patent 2,422,395, June 17, 1947. The agitator 22 may reciprocate vertically or oscillate about a vertical axis, as desired.

A water inlet pipe 34 fills the tub 20 with water and an outlet pipe 35 empties it. Valve 36 controls the flow of liquid into pipe 34 from cold water pipe 37 and hot water pipe 38. Solenoids 39 and 40 control the flow from the pipes 37 and 38 respectively into the pipe 34. The valve 36 is provided with a thermostat and a constant volume control which produces a substantially constant flow of liquid through the pipe 34 independently of variations in pressure in the pipes 37 and 38. Under certain conditions, hot water only is discharged into pipe 34 and tub 20, while a mixture of hot and cold water at proper temperature is provided at other times. The valve 36 may perform the functions of the liquid supply means disclosed in Clark Patent 2,366,236 of January 2, 1945.

The outlet pipe 35 discharges through the solenoid outlet valve 41 which controls the flow of water from the tub 20 into the pump 42, which is rotated by the power unit 33. The pump 42 discharges into hose 43, which is connectable to a drain or the like.

The solenoids 24 may be energized directly from a pulsating or A.C. source of power, such as the usual domestic 110 volt 60 cycle per second A.C. source. Or, if desired, a transformer 50 may be energized from the domestic A.C. source 51, 52 through the wires 53, 54, and the low voltage A.C. from the transformer may be transmitted to the solenoid or solenoids 24 through the wires 55.

Referring to Figure 5, the timer 60 may be of the character described in the patent to Sisson, 2,520,695, of August 29, 1950. The knob 61 controls the shaft 62 in step-by-step rotation and rotates the cams 63 to 67 to move the blades 68 to 72 at proper intervals of time to open and close the contacts controlled thereby. The knob 61 has positions from start to stop, with various intermediate positions, as indicated in the Sisson patent. When the knob is turned to the start position, it closes contacts 75, and when the knob is pushed in it closes contacts 76. This energizes the timer motor 77, which then remains energized throughout all positions until it is stopped when the contacts 75 are opened when the knob 61 reaches the stop position. The motor 77 drives the shaft 62 in step-by-step rotation through the medium of a slip clutch, not shown. At the start position, contacts 80 and 81 are closed, and this energizes the hot water controlling solenoid 40 to introduce hot water into the feed pipe 34 for the correct period of time to fill the tub with hot water. Thereafter, contacts 80, 81 are opened and contacts 82 are closed to energize the power unit 33 for agitation for the desired period of time to wash the clothes.

Simultaneously the contacts 85 are closed to energize the transformer 50 and solenoids 24 to produce high frequency vibration during the washing period. Thereafter, the contacts 83 are closed, while contacts 82 remain closed, to spin the basket 30 centrifugally. Simultaneously, the contacts 84 are closed to open the discharge valve 41 to empty the tub.

The filling, agitation and spin operations can be automatically repeated by the timer one or more times to provide rinsing operations. However, during the filling operation the contacts 86 are closed, rather than the contacts 80 and 81, and this energizes both solenoids 39 and 40 to introduce mixed, or tepid, water for the rinse operations. When the knob 61 reaches "stop," contacts 75 are opened, and all operations are stopped.

If the user desires to have a tepid washing operation at the beginning of the wash cycle, the selector switch 87 may be closed, and this causes both solenoids 39 and 40 to be energized during the first filling operation.

The solenoid 24a of Figure 4 may be used in the washing machine of Figures 1, 2, 3 and 5. All constructions

3

in Figure 4 are the same as in Figure 3 except that plunger 21a is of corrugated material.

The initial wash is performed by placing the clothes and detergent in the tub, after which a fill, agitation and extraction operation is performed. Thereafter, one or more rinsing operations are performed by introducing tepid water, followed by agitation and thereafter by centrifugal extraction simultaneously with a tub emptying operation.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claim which follows.

What is claimed is as follows:

In combination, a clothes washer for utilizing clothes fabric flexation and washing fluid vibration in clothes intersecting relationship for presenting all of said fabric to said vibration comprising, a tub having a stationary vertical side wall, a horizontal bottom wall and a frusto-conical wall interposed between said side and bottom walls; said frusto-conical wall having an opening therein below the normal liquid level of said tub; a support housing overlying said opening outside said tub; a movable

4

container in said tub; said container having a frusto-conical perforated wall portion in juxtaposition to said frusto-conical wall of said tub; a vertically reciprocable agitator in said container for producing a toroidal circulation and a low frequency flexing of said clothes fabric; a reciprocable plunger covering and secured to the periphery of said opening; and a solenoid carried by said support housing and having an armature connected to said plunger for sending vibrations through said clothes and being so oriented that the longitudinal axis of said plunger intersects the longitudinal axis of said agitator at a point within said tub, thereby to cause said vibrations to pass through said clothes at substantially right angles to said fabric as said clothes are toroidally circulated in front of said plunger.

References Cited in the file of this patent

UNITED STATES PATENTS

2,468,550	Fruth	Apr. 26, 1948
2,495,295	Spanier	Jan. 24, 1950
2,534,268	Kahn et al.	Dec. 19, 1950
2,544,867	Wallis et al.	Mar. 13, 1951
2,623,376	Volk et al.	Dec. 30, 1952