June 27, 1944. R. E. BASSETT, JR 2,352,362

LAUNDRY MACHINE

Filed April 4, 1938 4 Sheets-Sheet 1

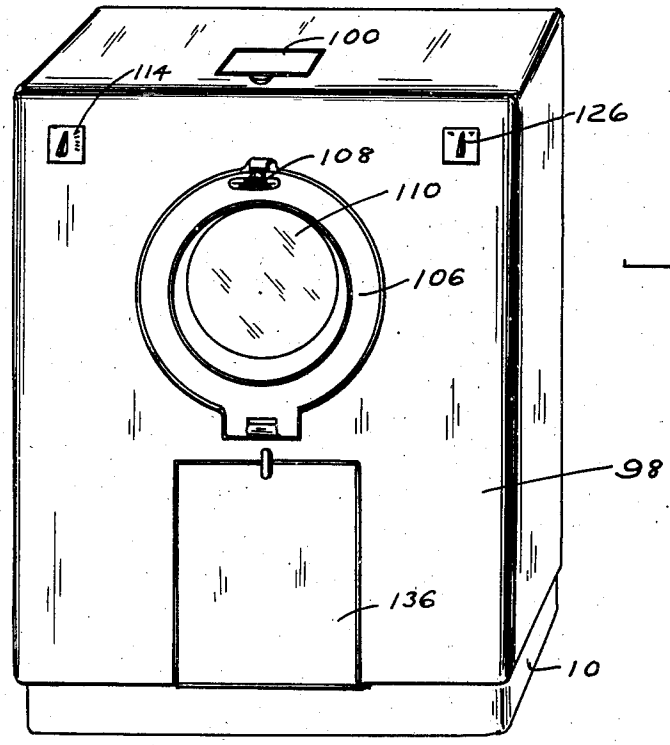
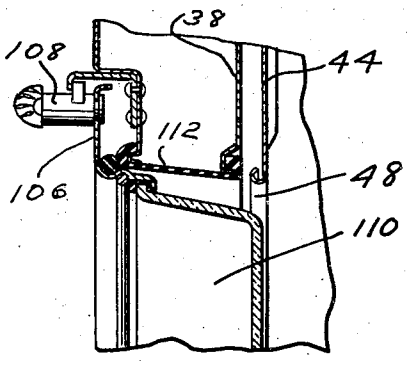


FIG. 1



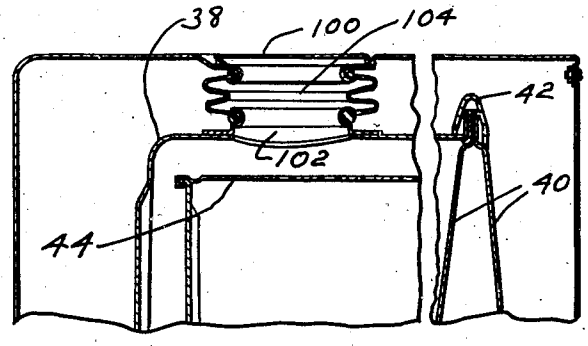


FIG. 4

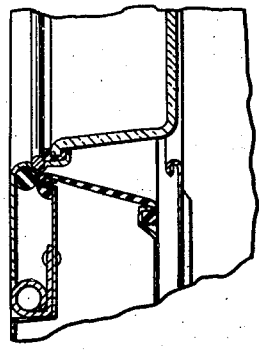


FIG. 3

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LAUNDRY MACHINE

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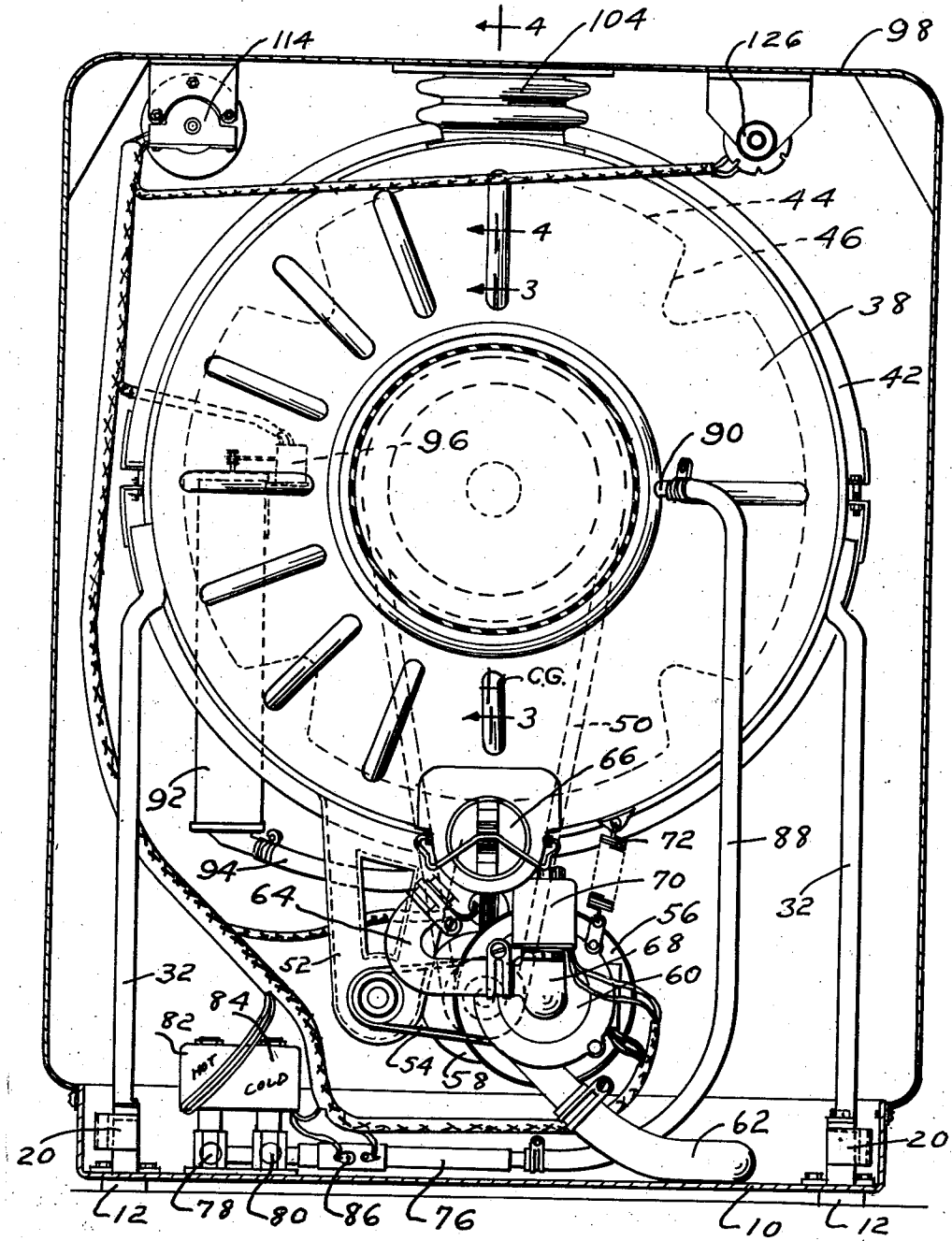


FIG. 2

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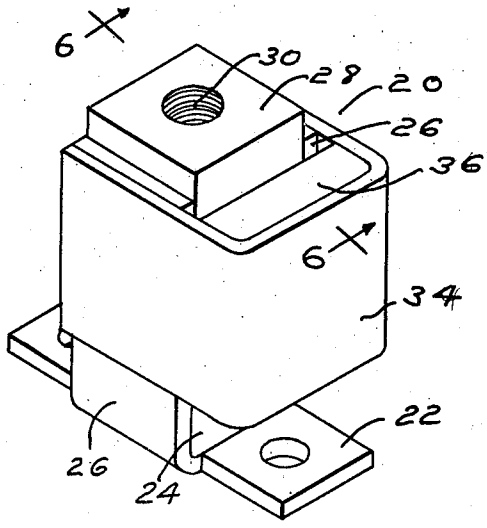


FIG. 5

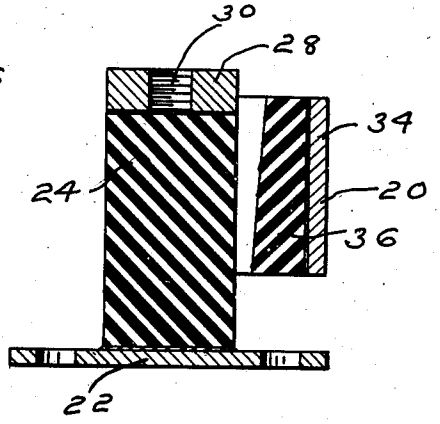


FIG. 6

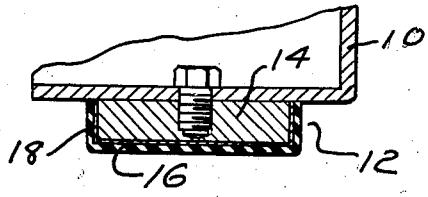


FIG. 7

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LAUNDRY MACHINE

Filed April 4, 1938 4 Sheets-Sheet 4

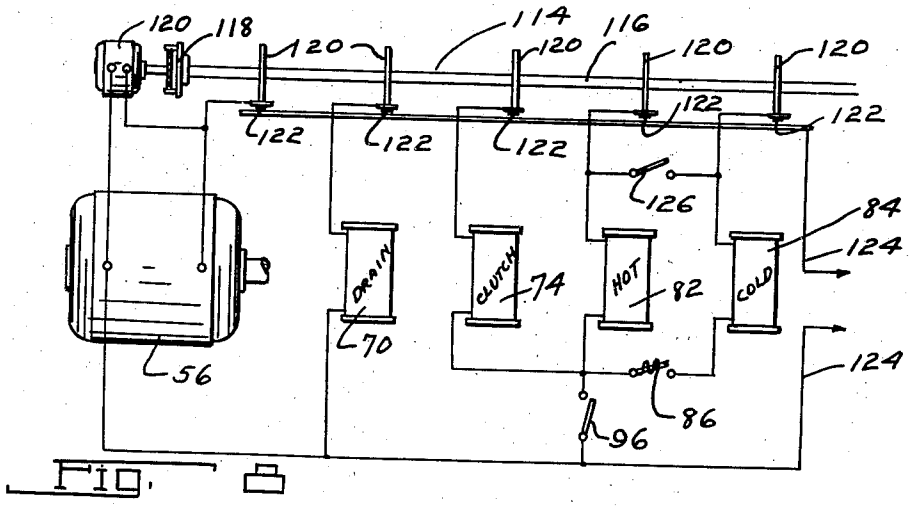


FIG. 1

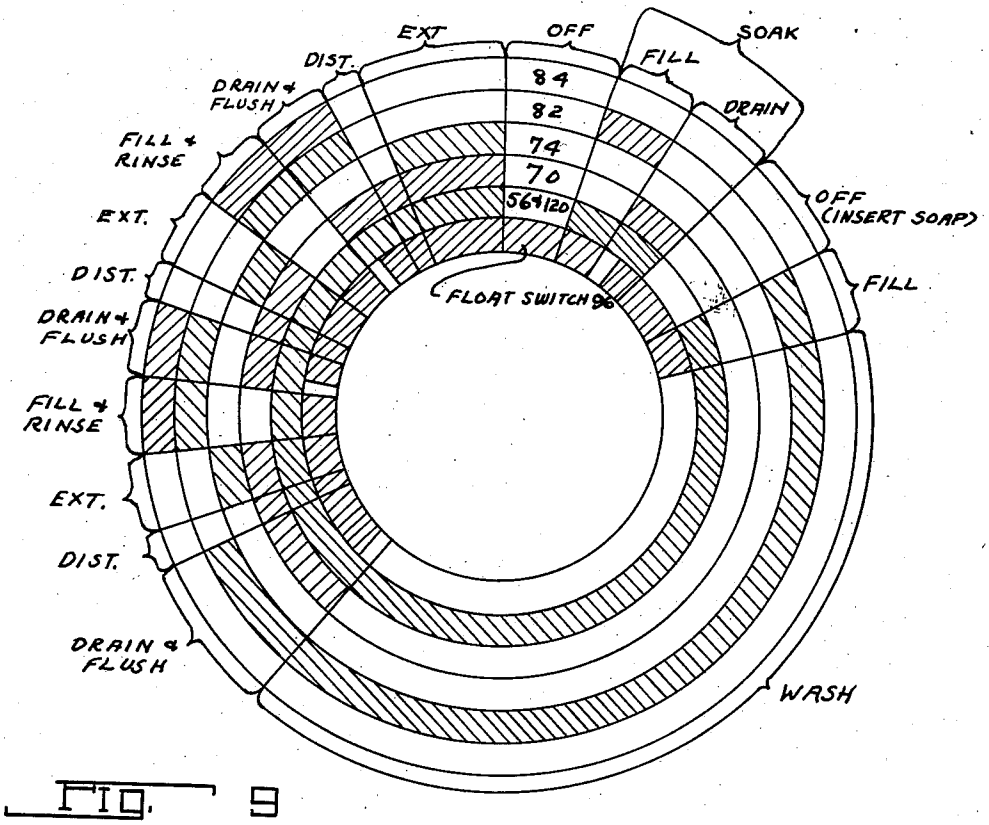


FIG. 9

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2,352,362

UNITED STATES PATENT OFFICE

2,352,362

LAUNDRY MACHINE

Rex Earl Bassett, Jr., South Bend, Ind., assignor, by mesne assignments, to American Machine and Metals, Inc., East Moline, Ill., a corporation of Delaware

Application April 4, 1938, Serial No. 199,808

10 Claims. (Cl. 68—24)

This invention relates to laundry machines, and is illustrated as embodied in a machine for washing and rinsing and drying clothes in an automatic cycle.

An object of the invention is to provide such a machine which does not have to be bolted down, and in which vibrations due to the impossibility of perfectly balancing the load are taken care of without substantial effect on the machine support or on the machine cabinet. This is of special importance in a machine which at one step of its cycle is driven at high speed to dry the clothes centrifugally.

In one desirable arrangement this object is attained by yieldingly mounting a unit which includes all the movable machine parts, and which in the illustrated machine includes a horizontal tub and a clothes container in the tub having a drive shaft at one end and a motor and a multiple-speed gearing driven by the motor and driving the shaft. Preferably there are drain and inlet connections to this unit which have flexible sections so that they do not interfere with the movement of the unit.

Various important features of novelty relate to the construction and arrangement of the yielding mountings, and especially an arrangement by which the above-described unit is suspended from them by connecting them to the tub above the center of gravity of the unit, and to the connection of the movable unit to a stationary cabinet which incloses it.

The above and other objects and features of the invention will be apparent from the following description of the illustrative embodiments shown in the accompanying drawings, in which:

Figure 1 is a perspective view of my novel machine;

Figure 2 is a sectional view taken just inside the front wall of the cabinet of the machine of Figure 1;

Figure 3 is a partial section on the line 3—3 of Figure 2 showing details of the clothes door construction;

Figure 4 is a partial section on the line 4—4 of Figure 2 showing details of the soap door construction;

Figure 5 is a perspective view of the novel rubber mounting device;

Figure 6 is a sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a fragmentary sectional view showing details of the construction of the feet on which the machine rests;

Figure 8 is a wiring diagram of the machine; and

Figure 9 is a schematic diagram of the operating cycle of the machine.

The machines shown in the drawings are in many respects similar in construction to those fully described, and claimed in a prior joint application of John W. Chamberlin and myself No. 129,429, filed March 6, 1937, matured into Patent No. 2,165,884 on July 11, 1939, and in Dodge application No. 129,412, filed on the same date, matured into Patent No. 2,173,603 on September 19, 1939, and operate automatically according to the same cycle.

In the embodiment of Figures 1–7 the machine includes a support such as a drawn steel peripherally-flanged base 10 provided with feet 12 resting on the floor. As shown in Figure 7, the feet preferably consist of blocks 14 secured to the base 10 and provided with a coating 16, of brass or the like, to which is vulcanized or otherwise secured a coating or facing 18 of rubber, which frictionally engages the floor.

Just above the feet 12 are novel yielding mounting devices 20, which may be of the form shown in detail in Figures 5 and 6. In the particular form shown in those figures, each of these devices includes a base plate 22 adapted to be bolted to the base 10, and to the upper face of which is vulcanized or otherwise bonded a block 24 of soft rubber material, of the type known as sponge rubber or in some other form which will sustain a considerable load but which offers little resistance to transverse deflection.

The base plate 22 is shown formed with front and back flanges 26 embracing the rubber block between them and to which the rubber is preferably vulcanized or otherwise bonded. The upper face of the block 24 has vulcanized thereto a top plate 28 formed with a tapped opening 30 to receive a fastening securing on the mounting a relatively long generally-vertical resilient arm such as a stamping 32 (Figure 2). In view of the resiliency of the arms 32, they offer little resistance to right and left transverse movements of the operating unit but substantially limit these movements to horizontal motion. This gives the operating unit substantially the movement of an inverted pendulum, and since the right and left transverse forces follow one another much more rapidly than the natural period of the inverted pendulum, they tend to neutralize one another and to limit the lateral movement of the unit to a small amplitude.

In order to limit horizontal right and left move-

ments, each mounting is provided with a bumper, for example a horizontal U-shaped member 34 having its ends spot-welded to the flanges 26 and having vulcanized to its central section a bumper block 36 of soft rubber. The block 36 is normally spaced from the block 24, and has its face curved to engage the entire upper side of block 36 when flexed to the extreme limit it is desired to permit.

The upper ends of the arms 32 are offset slightly toward the center of the machine, and are secured firmly in any desired manner to the sides of a generally cylindrical tub 38 arranged with its axis substantially horizontal. The tub shown is of the construction described in detail, and claimed, in the above-identified Dodge application. As best shown in Figures 3 and 4, it is generally cylindrical in shape, with its axis arranged horizontally, and with an opening in its front wall. The rear wall consists of two concave disks 40 peripherally secured together, and secured to a flange at the edge of the tub stamping, by a channel-shaped clamp ring 42.

Within the tub 38 is arranged a perforated cylindrical clothes container 44, formed with ribs or baffles 46 and formed with an opening 48 (Figure 3) in its front face for the insertion and removal of the clothes. As described in the above-identified Dodge application the container 44 has its rear wall provided with a drive shaft journaled in bearings carried by the disks 40 and provided with a pulley driven by a belt 50.

Welded or otherwise secured to the bottom of the tub 38, and projecting downwardly therefrom, are brackets 52, to which are pivoted horizontal arms 54 carrying a drive unit consisting of an electric motor 56 and a two-speed transmission 58 driving the belt 50. In the arrangement shown, the motor 56 also drives a rotary pump 60 connected by a suitable flexible conduit 62 to the usual drain connections, and which applies a constant suction to a flexible drain connection 64 from a drain or screened sump 66 at the bottom of the tub. The drain is controlled by a valve 68 operated by a solenoid 70. The weight of the drive unit keeps the belt 50 tight at all times; if the tension on the belt is too great, part of the weight may be taken by springs 72. The speed of the transmission 58 is changed from low to high or vice versa by energizing or de-energizing a solenoid 74 (Figure 8).

Hot and cold water for washing is supplied to a mixing chamber 76 through hot and cold water inlet valves 78 and 80 controlled by solenoids 82 and 84. As hereinafter explained, a thermostatic switch 86, subject to the temperature of the water in the mixing chamber, is connected in series with the cold water solenoid 84. A flexible conduit 88 connects the mixing chamber 76 with an inlet nozzle 90 discharging into the tub 38 at the periphery of the clothes door described below.

A float chamber 92, secured to the back of the tub 38, is connected to the lower part of the tub by a conduit 94 and contains a suitable float connected to a float switch 96 which is connected in series with both inlet solenoids 82 and 84, as shown in Figure 8; this float mechanism closes both inlet valves whenever the water in the tub reaches a predetermined level. If preferred, the conduit 94 may be flexible, so as to enable relative movement between the tub and the float chamber.

The mechanism described above is inclosed in a housing comprising top and side and rear and front panels which are secured together (and some of which may if desired be integral with each other), and which are mounted on the base 10, to form a cabinet 98 for the machine.

The top of the cabinet is formed with an opening, provided with a soap door 100 (Figures 1 and 4), and the margin of this opening is connected to a flange 102 about a corresponding opening in the tub 38 by a tubular flexible member such as a corrugated rubber boot or bellows 104. The front walls of the clothes container 44 and of the tub 38 and of the cabinet 98 are formed as shown in Figure 3 with three registering openings, for the introduction and withdrawal of the work to be washed. The cabinet is provided with a door 106, hinged at the bottom and having a latch 108 at the top, and which is arranged to seal the cabinet opening and to close the major part of the openings in the tub and the clothes container. This door is provided with a dished central portion 110 of glass, offset inwardly substantially into the plane of the front wall of the clothes container 44, and which serves to hold the clothes in the container during the operation of the machine.

A flexible tubular member such as a rubber boot or bellows 112 is formed to be snapped over the edges of the openings in the cabinet and the tub. This boot slopes downwardly at the bottom, so that it drains back into the tub.

The cycle of the machine is shown diagrammatically in Figure 9. The machine is controlled automatically to give this cycle by a cyclic switch 114, the operation of which is shown diagrammatically in the wiring diagram of Figure 8. This switch includes a cam-shaft 116, driven through a one-way clutch and reduction gearing 118 by a small constant-speed motor 120 of the type used in electric clocks.

The cam-shaft 116 (which, because of the one-way clutch in the drive, can when desired be advanced manually to shorten the cycle) is provided with suitable cams 120 opening and closing contacts or spring switches 122 which control parallel circuits between the power lines 124.

The motors 56 and 120 are controlled by one switch 122, and are on throughout the cycle. The second switch 122 controls the drain valve solenoid 70. The solenoids 74, 82, and 84, are in parallel with each other, but all three are in series with the float switch 96, so that the water supply is cut off when the float is in its upper position, and so that the transmission cannot go into high speed when there is water in the tub. A manually-operable switch 126 is provided so that when it is closed the cold water inlet will always be open, under the control of the thermostatic switch 86, whenever the hot water inlet is ready. This insures against the water being too hot for woolens and the like.

Figure 9 shows a series of circles, each corresponding to one of the switches 122, and the inner one corresponding to the float switch, and indicating just when the various switches open and close throughout the cycle. In the particular cycle illustrated, after the clothes are in the machine and the door 106 closed the camshaft is advanced manually from "off" to "fill" to start the machine. The machine then fills with hot water (or with mixed water if the switch 126 is closed), to soak the clothes, then drains the excess water away, and comes to rest until the operator starts it again. The operator then again advances the camshaft from "off" to "fill," and then adds soap through the door 100, watch-

ing through the glass 110 to see when a proper suds has formed.

The rest of the cycle is entirely automatic. The clothes are washed in the manner fully described in a prior joint patent of John W. Chamberlin and myself No. 2,165,884, the dirty wash water is then drained out and rinse water injected, the clothes are then allowed to tumble at low speed without water until uniformly distributed in the clothes container, and the container is then rotated at high speed long enough to extract most of the rinse water centrifugally. This is followed by another filling and rinsing, followed by a flush rinse with both the drain and inlet open, a second distribution, and an extraction period, and these steps may if desired be repeated as shown to give another rinse and a final relatively long period of centrifugal extraction, after which the machine stops automatically ready for removal of the dry clothes.

The cabinet 98 may have, below the door 106, another door 136 (Figure 1) affording ready access to the drain, the motor, etc.

In the operation of the machine, the yielding devices which support the main operating unit are especially effective during the extraction stages of the cycle, as perfect distribution of the load of course cannot be secured and the load is always at least slightly off center. The off-center loading gives rise to a force which is taken by the floor as to downward components, and by the weight of the main operating unit as to upward components. This weight is great enough so that even with maximum off-center loading the machine never tends to leave the floor.

The mountings 20 offer very little resistance to right and left transverse movements of the operating unit, but practically prevent any forward or backward movements, and also limit the right and left movements to rectilinear movement and entirely prevent any horizontal gyratory motion. The right and left transverse movements follow each other in such rapid succession that, due to the inertia of the operating unit and its load, they balance each other out.

While two illustrative embodiments have been described in detail, it is not the intention to limit the scope of the invention to those particular embodiments, or otherwise than by the terms of the appended claims.

I claim:

1. A laundry machine including a support, a generally cylindrical tub with its axis substantially horizontal and a container movably mounted in the tub and a motor and multiple-speed gearing driven by the motor and driving the container and all of which are secured together in a unit, a drain conduit leading from the tub and having a flexible section so that it does not interfere with movement of said unit, an inlet conduit discharging into the tub and having a flexible section so that it does not interfere with the movement of the unit, and means for mounting said unit on the support including laterally yielding devices having connections secured to said unit above its center of gravity and transmitting vertical components of said movements of the unit to said support so that the unit may move in a horizontal plane in the manner of an inverted pendulum against the yielding resistance of said devices but is prevented from gyrating.

2. A laundry machine comprising an operating unit which includes a generally cylindrical tub having a generally horizontal axis and a washing container movably mounted in the tub together with a motor and transmission means which drive the container and which are mounted on the bottom of the tub and weight the same to give the unit as a whole a relatively low center of gravity, and yielding supports engaging the tub on its opposite sides in a substantially horizontally horizontal plane and which permit the operating unit to move horizontally relatively freely against a yielding resistance while supporting it vertically to form in effect a pendulum movable approximately in a horizontal plane.

3. A laundry machine including a support, a generally cylindrical tub with its axis substantially horizontal and a container movably mounted in the tub and a motor and a multiple-speed gearing driven by the motor and driving the container and all of which are secured together in a unit, and yielding means for mounting said unit on the support and for transmitting vertical components of said movements of the unit to said support, said yielding means including blocks of rubber material carried by the support and relatively long generally-vertical laterally flexible arms mounted on said blocks and secured at their upper ends to said tub above the center of gravity of said unit, so that the unit may move in a horizontal plane against the lateral yielding resistance of said arms.

4. A laundry machine comprising a tub and a motor drive mechanism and cleaning means in the tub driven by the motor drive mechanism, all secured together in a unit, a support, means for yieldingly mounting the unit on said support, a cabinet mounted on the support and inclosing said unit, said tub and said cabinet having alined top openings and the cabinet having a door for its openings, and a flexible tubular member connecting said openings.

5. A laundry machine comprising a tub and a motor drive mechanism and cleaning means in the tub driven by the motor drive mechanism, all secured together in a unit, a support, means for yieldingly mounting the unit on said support, a cabinet mounted on the support and inclosing said unit, said tub having an opening in one end and said cabinet having an opening in its side opposite the tub opening and provided with a door, and a flexible tubular member connecting said openings.

6. A laundry machine comprising a tub and a motor drive mechanism and cleaning means in the tub driven by the motor drive mechanism, all secured together in a unit, a support, means for yieldingly mounting the unit on said support, a cabinet mounted on the support and inclosing said unit, said tub having an opening in one end and said cabinet having an opening in its side opposite the tub opening and provided with a door, and a flexible tubular member connecting said openings, the bottom of said member being inclined downwardly into the tub to drain back into the tub.

7. A laundry machine comprising a horizontal tub, washing mechanism in the tub and drive means for the washing mechanism, all secured together in a unit, and a support for the unit comprising elongated generally vertical flexible arms secured at their upper ends to the unit above the center of gravity of the unit so that the unit may move in a horizontal plane against the yielding resistance of said arms.

8. In washing apparatus, the combination of a casing structure, a container for fluid disposed within the casing structure, said casing and container having respective registering access open-

ings formed therein, means for agitating the fluid within the container, means for flexibly supporting the container within the casing structure, and a wall member extending between the container and the casing and disposed peripherally of said access openings, said wall member permitting relative movement between the container and the casing structure.

9. In apparatus for washing fabrics or the like, the combination of a casing structure, a tub for fluid disposed within the casing structure, said casing and tub having respective registering access openings formed therein, a basket for the fabrics rotatably disposed within the tub, a driving mechanism for the basket and carried by the tub whereby the tub, basket and driving mechanism define a unit structure, means for flexibly supporting the unit structure within the casing, and a wall member extending between the tub and the casing and disposed peripherally of said access openings, said wall member permitting relative movement between the hub and casing.

10. The combination as claimed in claim 9 wherein said wall member is formed of flexible material secured to the casing structure and the tub.

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