Oct. 25, 1932. W. E. SHARP 1,884,893

WASHING MACHINE

Filed Nov. 24, 1928 2 Sheets-Sheet 1

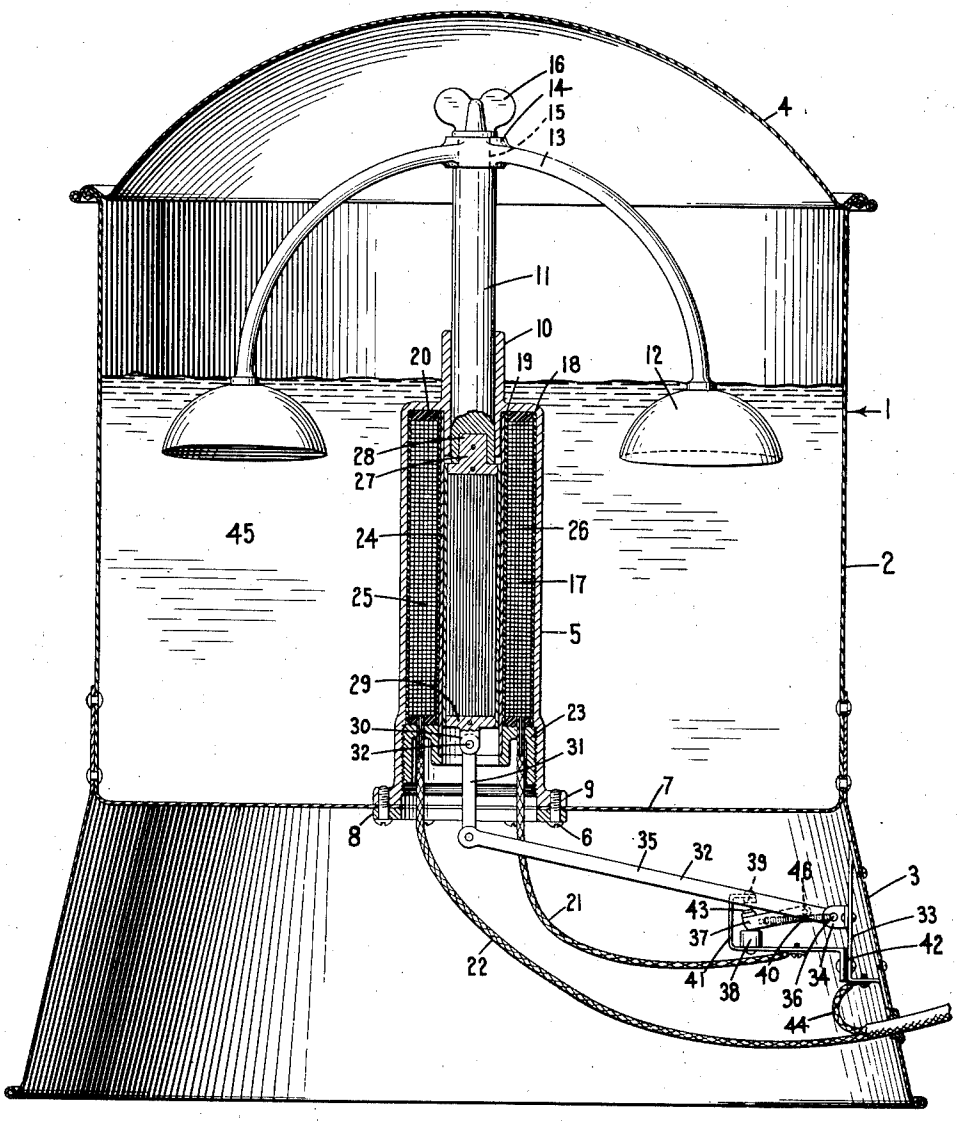


FIG. 1

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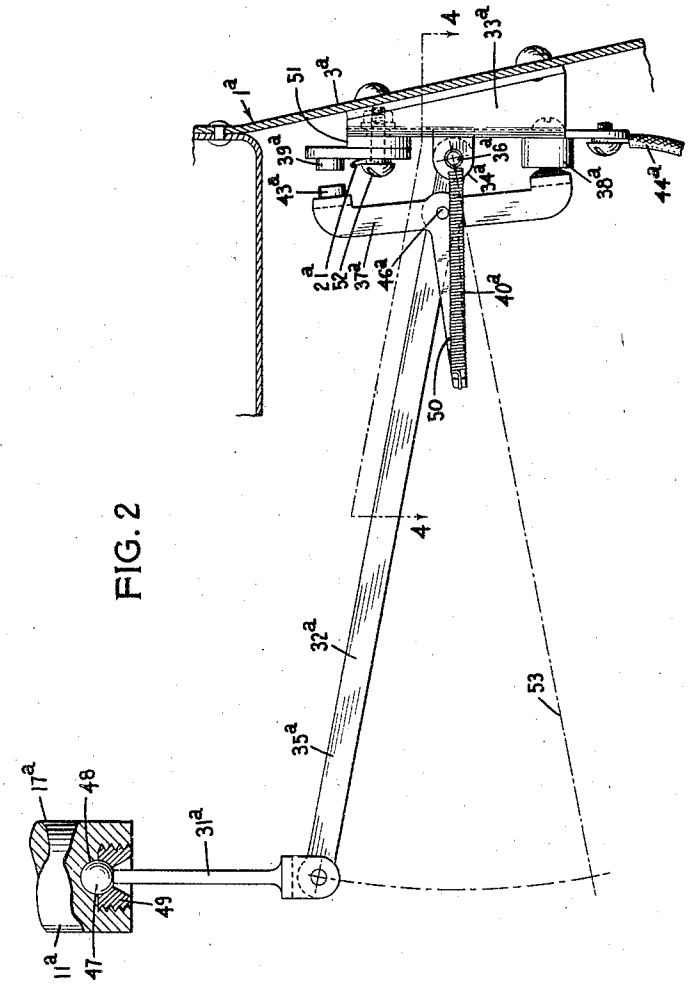


FIG. 2

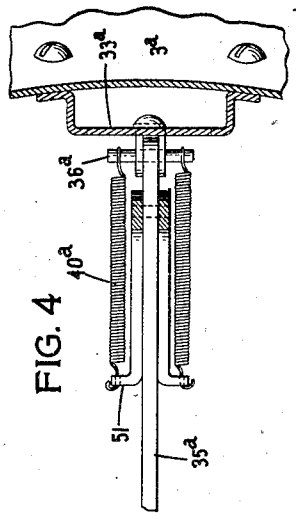


FIG. 4

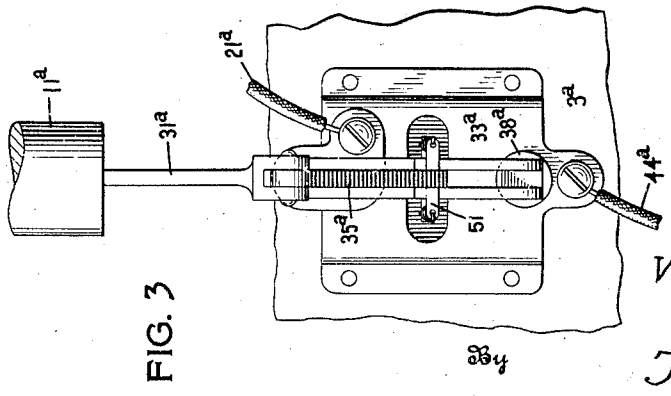


FIG. 3

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UNITED STATES PATENT OFFICE

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WASHING MACHINE

Application filed November 24, 1928. Serial No. 321,707.

This invention relates to washing machines and more particularly to a type of washer which may be made small for nursery or upstairs use.

The principal object of my invention, generally considered, is to provide a washing machine involving a container adapted to hold water and articles to be washed, a plunger mounted for up and down movement therein with agitating means preferably connected to the top thereof and means surrounding said plunger for intermittently automatically raising it and allowing it to fall, said agitating means being preferably set at an angle and swivelled to the top of the plunger so that it slowly rotates as the plunger is reciprocated.

Another object of my invention is to provide a washing machine of the pounder type involving a vertically reciprocating plunger, a pair of pounders or vacuum cups swivelled to the top thereof and a solenoid surrounding said plunger and normally covered or partly covered by the wash water, for preventing overheating of the solenoid while maintaining or tending to maintain the temperature of the wash water, for intermittently raising it and allowing it to fall by gravity, said plunger being connected to switch means for breaking the circuit to the solenoid when the plunger is raised the desired amount and closing said circuit when the plunger has dropped by gravity to a predetermined extent.

A further object of my inventnion is to provide a small washer, for nursery or upstairs use, very simply constructed as a container enclosing a reciprocating plunger with pounders or vacuum cups to the top thereof, and a solenoid surrounding said plunger to lift it and thereby operate a switch to break the circuit through the solenoid allowing the plunger and attached parts to drop or be drawn down by mechanical means and agitate the water in the container.

Other objects and advantages of the invention relating to the particular arrangement and construction of the various parts will become apparent as the description proceeds.

Referring to the drawings illustrating my invention, the scope whereof is defined by the appended claims.

Figure 1 is a vertical sectional view of one embodiment of my washing machine.

Figure 2 is a fragmentary sectional view of the washing machine shown in Figure 1 with a modified operating toggle switch.

Figure 3 is a view of the toggle switch at right angles to that shown in Figure 2.

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 2, looking in the direction of the arrows.

Referring to the drawings in detail, like parts being designated by like reference characters, and first considering the embodiment of my invention illustrated in Figure 1, there is shown a washing machine 1 comprising a water container 2, a base 3, and a cover 4, said parts being preferably constructed of sheet metal. Attached to the bottom or floor of the container 2 is a housing 5 which is desirably formed as a casting, and connected to the floor or bottom of the container 2 by a plurality of screws 6 holding the sheet metal floor or bottom 7 of the container between a ring or annular member 8, and the flanged portion 9 on the housing.

Said housing 5 is provided with a reduced section 10 adjacent the upper end in which loosely fits a rod or plunger 11 on the top of which is preferably swivelled a pair of pounders or vacuum cups 12 connected by a preferably curved cross arm 13. Said cross arm 13 may have a central hub 14 through which passes a reduced extension 15 on the plunger 11, whereby said cross arm and vacuum cups are permitted to rotate as the plunger reciprocates up and down. A thumb nut 16 may be threaded to the top of the extension 15 to hold the hub 14 in place, while at the same time not binding it to prevent rotation. In order to induce rotation, the vacuum cups 12 are preferably set at a slight angle as illustrated, so that the reciprocating motion of the plunger induces a slow rotation of the cups and connecting arm.

Enclosed in the housing 5 is a solenoid 17 which is desirably constructed of enameled wire of a size and number of turns in accordance with the electrical energy available and

the power desired to be applied to the plunger. Said solenoid is effectively insulated from the housing in any desired manner as by means of mica cylinders 18 and 19 closed at the ends by fiber rings 20, through the lower one of which pass the lead-in wires 21 and 22 for delivering electrical energy to the solenoid. The lower opening in the housing 5, after application of the solenoid 17, is preferably closed by means of a bushing 23 threaded thereinto, which bushing also desirably holds a sleeve 24 which forms the inner lining or protective means for the solenoid 17, the upper end of said sleeve preferably fitting around a cylindrical downward extension of the upper portion 10 of the housing.

The plunger 11 may be desirably made of aluminum or other non-rusting and non-magnetic material and is provided with a magnetic extension 25 in order to adapt it for operation by the solenoid as a core therein. Said extension may be a solid rod of soft iron but is desirably formed of Swedish iron wire enclosed in a metal sleeve or cylinder 26. Said cylinder 26 is closed at its upper end by a metal plug 27 which is desirably formed with an extension 28 fitting in a corresponding aperture in the lower end of the rod or plunger 11 and connected to said rod and said sleeve in any desired manner as by means of pins or rivets, as illustrated. A lower plug 29 desirably closes the lower end of the hollow cylinder or sleeve 24 in the same way and said plug is desirably formed with a pair of lugs 30 receiving therebetween a link 31 and connected therewith as by means of a pin or rivet 32. The link 31 functions to operate the toggle switch 32, and passes through the ring 8 and a corresponding opening in the bottom of the container 2.

The operating switch 32 is preferably pivotally connected to a bracket 33 fastened to the inner surface of the base 3 of the washing machine. For that purpose, a pair of clips or lugs 34 may serve for mounting the outer end of the lever 35 received therebetween as by means of a pivot pin 36. Pivoted to said lever 35 is a switch member proper 37, adapted to oscillate between a fiber or other non-conducting stop 38 and a contact 39 and held against one or the other of said members by means of a coil spring 40. Said stop and contact members are desirably mounted on a bracket 41 connected to the bracket 33, but insulated therefrom as by means of a fiber washer 42. One of the lead-in wires 21 is connected to the bracket 41 so that when the switch is closed, the current passes through said wire, bracket 41, contact 39, contact 43 of switch 37, lever 35, clips 34, bracket 33, and lead-in wire extension 44.

The operation of my improved washing machine is as follows. The container 2 is filled with wash water 45 containing any articles desired to be washed, said water being at the level desired, in accordance with the character of the articles to be washed. If I consider the operation of the device from the position illustrated in Figure 1, it will be seen that the contact between 39 and 43 is broken, the switch 37 being pulled against the fiber stop 38 or the spring 40. If the plunger or ram 11 with its connected magnetic core 25 and hollow semi-spherical vacuum cups and connecting arms falls by gravity, a point will be reached when the lever 35 is moved to a position lower than the switch 37 so that the spring 43 pulls the switch upward instead of downward, and causes contact to be made between the contact tips 39 and 43 causing electrical energy from a connected source to flow to the solenoid from the lead-in wires 21, 22 and 44. This causes the downward movement of the plunger to be arrested, and said plunger and connected parts to be raised by the magnetic attraction between the solenoid 17 and the core 25. This raising occurs until the pin 46 connecting the switch 37 to the lever 35 passes above the center line of the spring 40, as illustrated in Figure 1, when said spring pulls the switch downward against the stop 38 causing the upward movement of the plunger and vacuum cups to be arrested and permitting them to again drop by gravity.

The spring 40 causes the points 43 and 39 to be quickly drawn apart, thereby eliminating most of the arcing. On account of the angularity of the cups 12, as illustrated, with respect to the plunger 11, said cups tend to revolve gradually about the plunger 11 as said plunger reciprocates, thereby efficiently agitating all the wash water and clothing or the like in the container 2.

Referring now to the embodiment of my invention illustrated in Figures 2, 3 and 4, a modified form of toggle switch 32^a is shown pivotally mounted on a bracket 33^a connected to the base 3^a of the washing machine 1^a as in the previous embodiment. Said switch comprises a lever 35^a pivoted between lugs 34^a, extending from the bracket 33^a, as by means of a pin 36^a. The other end of the lever 35^a is pivoted to the lower end of a connecting link 31^a, the upper end of which is preferably formed as a ball 47 mounted in a socket 48 in the lower end of the core portion 17^a or magnetic extension on the plunger 11^a of the machine. In the present embodiment it will be seen that instead of forming the core or magnetic extension as a tube filled with soft iron wire, I may form it as a solid rod 17^a. The socket 48 is desirably closed by means of a bushing 49 threaded into the member 17^a as illustrated, thereby providing for universal movement between the connecting rod 31^a and the plunger 11^a or magnetic extension thereof.

The switch proper 37^a, in the present embodiment, is formed generally T shape with

the stem or upright 50 of the T connected to a pair of coil springs 40ª, which springs extend between outer extensions 51 on the switch and corresponding extensions on the pivot pin 36ª. The ends of said spring may fit in corresponding notches in the pin 36ª and thereby retain it in place. The upper arm of the switch carries a contact tip 43ª, and the bracket 33ª carries a cooperating contact tip 39ª on a plate 51 which is insulated from the bracket 33ª. The lower arm of the switch 50 is adapted to engage a fiber or other insulating stop 38ª. The lead-in wire 44ª is connected to the bracket 33ª, and the lead-in wire 21ª is connected to the plate 51 as by means of a screw 52 insulated from the bracket 33ª.

The operation of the toggle switch is as follows. As the plunger 11ª falls by gravity, the lever 35ª is moved from the upper position illustrated to that indicated by dot and dash lines 53, thereby bringing the pin 46ª connecting the switch 37ª to said lever to a point below the center line of the springs 40ª causing said springs to draw the arm 50 and contact tip 43ª to tip 39ª, thus completing the electrical circuit from 44ª through 33ª, 34ª, 35ª, 37ª, 43ª, 39ª, 51 and 21ª to the solenoid in the machine, and causing said solenoid to be energized and raise the plunger 11ª until the lever 35ª reaches the position illustrated by full lines causing the springs to act to draw the switch 37ª downward to the position illustrated, breaking the contact, deenergizing the solenoid and permitting the ram and vacuum cups to again fall, whereby the operation is repeated.

From the foregoing description of my invention, it will be seen that I have devised a washing machine which is adapted to be economically manufactured in small sizes, thereby making it useful for upstairs or nursery washing. It will also be apparent that my machine involves few and simple parts adapted for ready manufacture, while at the same time, a machine is provided which is efficient in its operation and automatic in its action. Although I have shown the plunger as operated downwardly by gravity, it will be understood that I do not wish to be limited to this manner of operation, as if desired, I may employ springs to supplement the action of gravity. It will also be understood that it is within the scope of my invention to reverse the operation of the plunger and vacuum cups, that is, the solenoid may operate to depress or pull down the plunger until the switch breaks the electrical contact and allows springs to raise said plunger. By having the solenoid and its housing 5 surrounded by the wash water 45, overheating thereof is prevented, even after long operation, while at the same time the temperature of the wash water is maintained by heat dissipated from the solenoid.

Having now described my invention, I claim:

1. A washing machine comprising a container, a plunger mounted for up and down movement therein, agitating means connected to the upper end of said plunger, an operating solenoid surrounding said plunger, a lever pivoted to said container, a link connecting the free end of said lever to said plunger, and a switch pivoted to said lever, whereby when said plunger falls by gravity, the switch is closed causing the solenoid to be energized to raise said plunger, and when said plunger is raised, said switch is opened resulting in deenergization of said solenoid and release of said plunger to again fall by gravity.

2. A washing machine comprising a container, a housing mounted on the lower wall of said container, a solenoid enclosed in said housing, a plunger with a magnetizable portion mounted for reciprocation in said housing, with said magnetizable portion surrounded by said solenoid, a cross arm mounted adjacent the top of said plunger, a pair of vacuum cups mounted on the ends of said cross arm for agitating water in the container, a link connected to the lower end of said plunger with its lower end connected in turn to a switch for controlling the flow of current to said solenoid, whereby said plunger and vacuum cups are alternately raised and lowered for agitating the water in the container.

3. A washing machine comprising a container adapted to hold wash water, a housing mounted on the floor of said container, a solenoid enclosed in said housing, a plunger with a lower magnetizable portion received in said housing and solenoid, a cross arm mounted for rotation adjacent the top of said plunger, vacuum cups mounted on the ends of said cross arm for contacting and agitating the water in said container, and a switch connected to said plunger, whereby it is closed when said plunger is at one end of its up and down travel and open at the other end of said travel for controlling the flow of current to said solenoid, said vacuum cups being angularly disposed with respect to the axis of the plunger, whereby they and the connecting cross arm revolve about the plunger upon reciprocation thereof.

4. A washing machine comprising a container adapted to hold wash water and articles to be washed, a housing mounted on the floor of said container, a solenoid enclosed in said housing, a plunger with a lower magnetizable portion received in said housing and solenoid, agitating means connected to said plunger, and a switch operated by movement of said plunger in said solenoid to control the operation of said solenoid and cause up and down movement of said plunger, said housing and enclosed solenoid being normally covered

by the wash water, whereby overheating of the solenoid is prevented and the wash water is kept warm by heat conducted from the solenoid through the housing.

5. A washing machine comprising a container, a housing mounted on the lower wall of said container, a solenoid enclosed in said housing, a plunger with a magnetizable portion mounted for reciprocation in said housing, said magnetizable portion being surrounded by said solenoid, a link connected to the lower end of said plunger, a lever pivotally mounted with respect to the casing, means movably connecting the lower end of said link and the free end of said lever, an oscillating member pivotally mounted on said lever intermediate the ends thereof and formed with oppositely disposed arms for alternately making and breaking an electrical circuit through the solenoid, a third arm angularly disposed with respect to the other arms, and spring means connected thereto whereby when the lever is adjacent one end of its travel the spring moves the oscillating element to close the circuit and when the lever is adjacent the other end of its travel the spring moves the element to break the circuit.

6. A washing machine comprising a container, a housing mounted on the floor of said container, a solenoid enclosed in said housing, a plunger with a lower magnetizable portion enclosed in said housing and solenoid, a lever pivotally mounted with respect to said container, means connecting the free end of said lever with the plunger, an oscillating member pivotally mounted on said lever and adapted to move so as to alternately make and break the circuit through the solenoid, and spring means controlling said oscillating member so that when the plunger is adjacent one end of its travel the oscillating member is drawn in one direction to make an electrical contact, and when the plunger is adjacent the other end of its travel the oscillating member is drawn in the other direction to break said contact and open the circuit through the solenoid.

In testimony whereof I affix my signature.

WILLIAM E. SHARP.