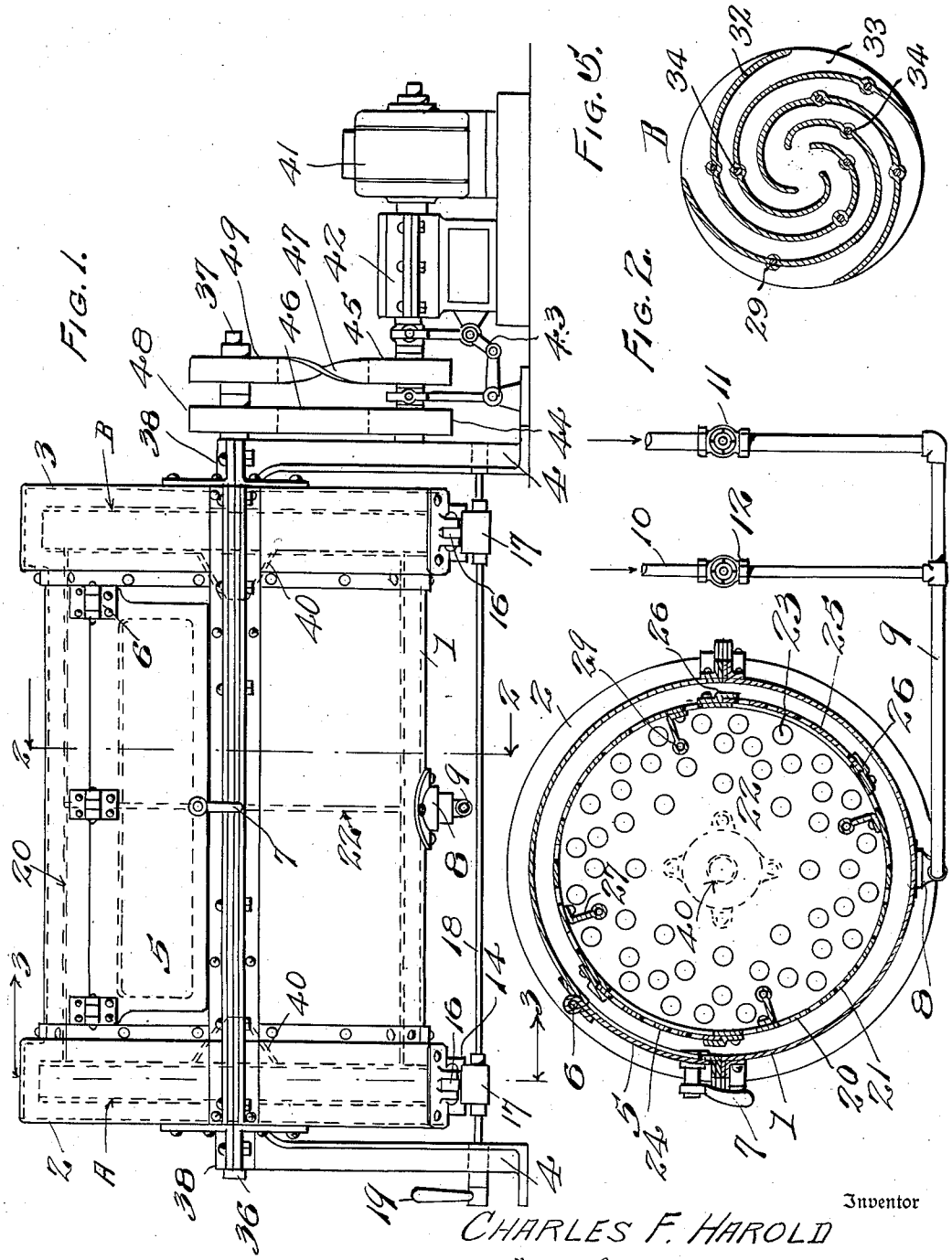
Sept. 8, 1931. C. F. HAROLD 1,822,215

CLOTHES WASHING MACHINE

Filed Oct. 1, 1929 2 Sheets-Sheet 1



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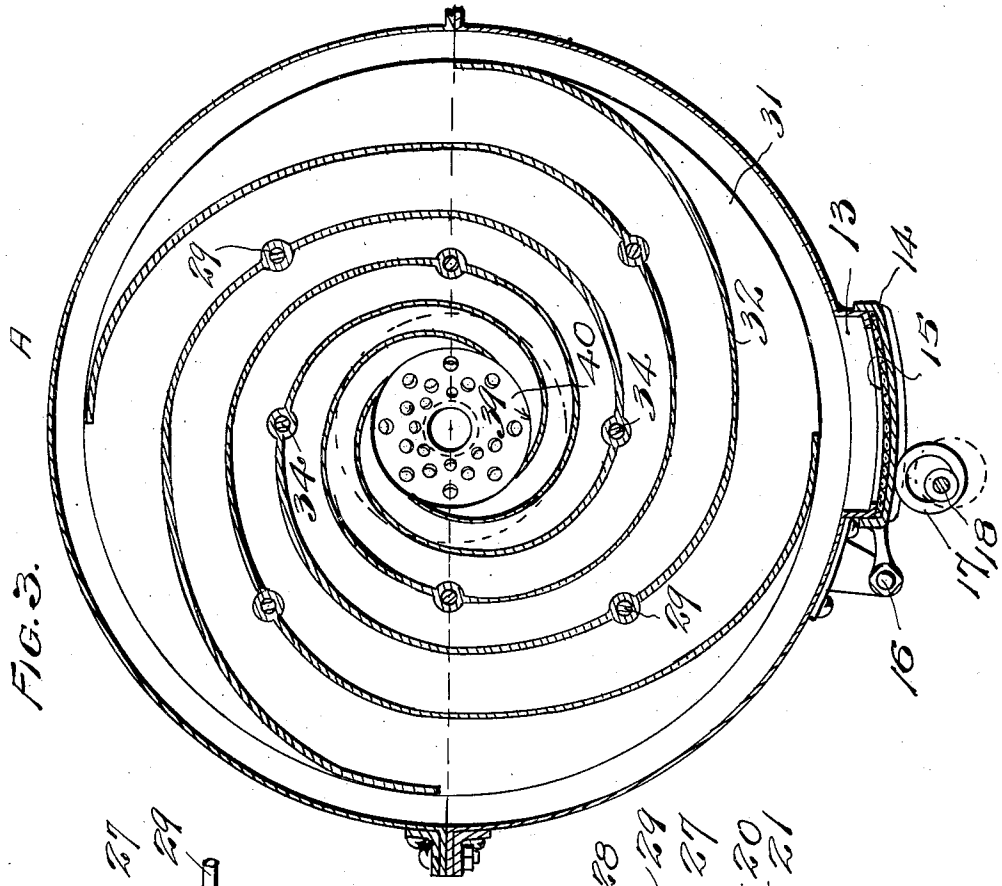


FIG. 3.

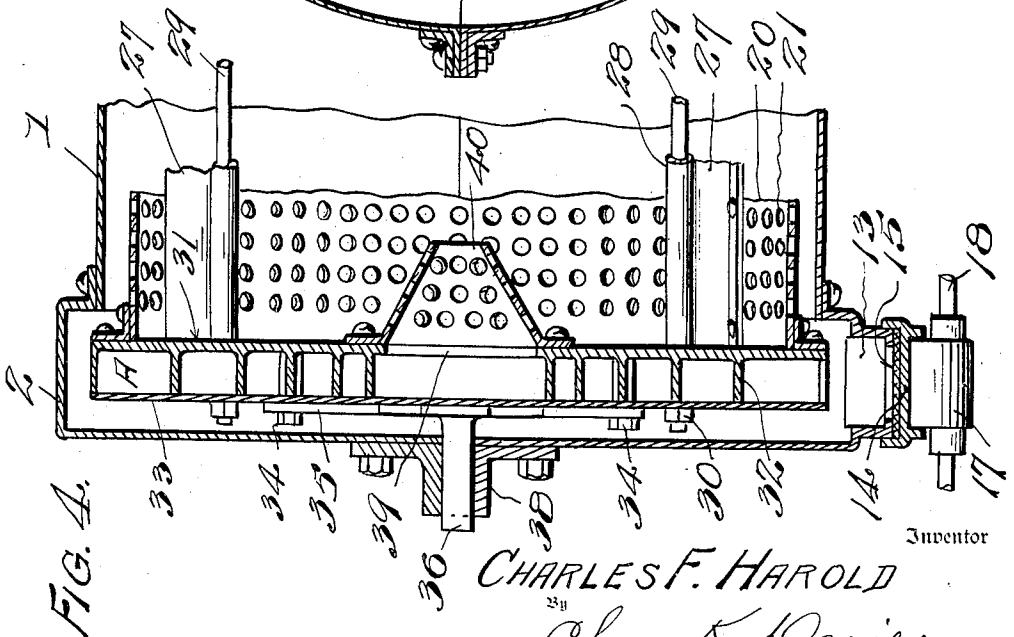


FIG. 4.

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UNITED STATES PATENT OFFICE

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CLOTHES WASHING MACHINE

Application filed October 1, 1929. Serial No. 396,532.

My present invention relates to improvements in clothes washing machines of the power operated, rotary-oscillating type, including a horizontal, imperforate stationary exterior housing or casing, and an inner rotary-oscillating, perforated or reticulated cylinder or basket in which the clothes are carried as the cylinder revolves on its horizontal axis. The primary object of my invention is the provision of means for circulating the wash solution or liquid detergent so that it is evenly and uniformly distributed throughout the area of the clothes holder or cylinder in order that the clothes may quickly and thoroughly be cleansed. In carrying out my invention a circulation of the liquid detergent or wash solution is accomplished by means of duplex pumps that deliver the detergent at opposite ends of the cylinder along its axial line, and the detergent is cast by centrifugal action through the perforated cylinder as it revolves, for washing or cleansing the garments within the cylinder. In this manner a continuous movement of the wash solution is accomplished and the clothes are more quickly and thoroughly cleansed than by the bath or submersion method, and economy in the use of both chemicals and water is effected.

The circulation of the wash solution or liquid detergent is maintained by the use of duplex rotary pumps of the Archimedes type fashioned at the opposite ends of the clothes cylinder or rotary holder, and as the latter is alternately revolved in opposite directions the duplex pumps alternately operate to convey the wash solution and deliver the solution along the axial line of and within the cylinder. The invention consists in certain novel combinations and arrangements of parts for accomplishing the above mentioned purposes, as will hereinafter be more fully pointed out and claimed. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to one mode I have thus far devised for the practical application of the principles of my invention. It will be understood however that changes and alterations may be made and are contemplated in the exemplified structure, within the scope of my claims, without departing from the principles of my invention.

Figure 1 is a view in side elevation of a washing machine showing a physical embodiment of my invention. Figure 2 is a transverse sectional view at line 2—2 of Figure 1, illustrating the connections for steam and water to the interior of the machine. Figure 3 is a sectional detail view of one, of the duplex rotary pumps, as at line 3—3 of Figure 1. Figure 4 is a longitudinal sectional view at one end of the washing machine. Figure 5 is a view on a reduced scale showing the arrangement of the pump-vanes at the right end of the machine in Figure 1.

In the general assembly view of Figure 1 where a physical embodiment of the invention is illustrated, I employ an outer casing or cylindrical housing 1 which is fashioned with enlarged heads as 2 and 3, and supported in suitable manner by the legs or end frames 4, 4. The housing or casing is preferably fashioned of two semi-cylindrical sections that are bolted together and reinforced along their horizontal edges, after the interior parts of the machine have been assembled. This sectional construction of the housing permits access to be had to the interior of the machine when necessary or desirable for repairs or for replacement of parts.

A door 5 is provided to permit access to the interior of the housing or casing, said door being hinged as shown at 6, and equipped with a suitable latch-handle 7 for use in opening and closing the door and for latching it when the clothes have been placed in the machine and the latter is ready for operation.

At the bottom center of the casing an inlet 8 is provided, and a water pipe 9 and steam pipe 10 supply the liquid detergent at this point to the interior of the casing. The detergent is supplied at a suitable temperature, as at boiling point, and the quantity of liquid detergent and steam supplied to the housing

are controlled by means of the respective hand valves indicated at 11 and 12.

The two end-heads of the casing are equipped with devices for draining the interior of the machine and disposing of the liquid detergent when desired or necessary. In Figures 3 and 4 it will be seen that the bottom portions of the heads are fashioned with sumps 13, and a flap valve 14, having a rubber lining 15, is hinged to the housing at 16 adjacent the sump. The valves are held closed by means of a pair of eccentrics, as 17 mounted on a rod or shaft 18 that extends longitudinally of the machine and is journaled to rock in suitable bearings mounted on the frames. A handle or lever 19 is shown in Figure 1 by means of which the eccentrics may be turned to permit the valves to open by gravity, and of course the handle is turned to cause the eccentrics to close the valves when the machine is to be operated.

Within the casing is journaled a rotary carrier 20, which is of cylindrical shape and perforated as at 21. This rotary carrier or cylinder is arranged concentrically within the casing or housing and is of such diameter as to provide an annular chamber within the housing and exterior of the cylinder or carrier through which the detergent flows towards the enlarged heads at the ends of the housing. At approximately the longitudinal center of the cylinder or carrier a transverse partition 22 is fixed, and the partition of separator plate divides the interior of the cylinder into two compartments for the reception of the clothes or other commodities to be washed. The partition is fashioned with perforations or holes 23 which permit a supply of the washing solution or detergent to pass from one compartment to another for the purpose of equalizing the supply in the rotary cylinder.

The two compartments are designed of course to receive the clothes to be washed, and in Figure 2 it will be seen that I provide two sliding doors 24 and 25 to give access to the interior of the carrier or cylinder. The doors are symmetrically arranged at opposite points of the carrier or cylinder to balance the latter and they register with the door of the housing as indicated. These sliding doors are of well known type and they slide longitudinally of the cylinder in the ways furnished by the grooved cleats 26. Preferably the sliding doors are perforated similar to the walls of the cylinder to permit flow of the liquid detergent therethrough.

The clothes are agitated, as the carrier or cylinder is revolved, by means of longitudinally extending strips 27 secured on the inner face of the cylinder at spaced intervals, and the free edges of these strips or ribs are fashioned as sleeves or ferrules 28 in which are enclosed tie rods or bolts 29 that extend through the central partition and through the two pump heads A and B at the ends of the rotary cylinder. The ends of the tie bolts project through the pump heads and these ends are threaded to receive the clamp nuts 30 by means of which the parts of the rotary carrier, including the pump heads, are tied together.

The rotary pump heads A and B form rigid, enlarged, ends of the cylinder, of duplex construction, and embody rotary pumps of the Archimedes type which pumps are alternately used as the cylinder revolves first in one direction and then in the opposite direction, to convey the wash solution to the interior of the wash cylinder as the latter rotates or revolves on its horizontal axis. While pump A is working, pump B is idle, and vice versa, the pumps being used to maintain a continuous circulation of the wash solution as the latter is cast through the perforated cylinder by centrifugal action.

The pumps may be constructed in any suitable manner, but as here shown that each comprise an inner plate 31 having spiral convolutions or vanes 32 integral therewith and projecting laterally therefrom, and also an outer plate 33 spaced from the inner plate.

The plates of the pumps are tied together rigid with each other and rigidly with the cylinder by means of the longitudinal tie bolts 29 and clamp nuts 30, and also by means of additional bolts 34 that pass through spider-heads 35 secured against the outer faces of the outer plates 33. These spider heads have laterally extending stud shafts 36 and 37 projecting therefrom and the shafts are journaled in bearings 38 at the opposite ends of the cylinder or housing 1, through the ends 2 and 3 of the housing as indicated.

The spiral vanes 29 form pump passages, extending in opposite directions in the two pump heads A and B, and the passages (here shown as four, in number) have wide mouths at the outer peripheries of the pumps, and converge towards the lateral discharge port 39 at the center of the inner plate 31 of the pump. A discharge nozzle 40 of frustoconical form is secured over the discharge port to deliver the wash solution or liquid detergent along the axial line of the rotary cylinder.

Any suitable operating means, that is reversible, may be employed to revolve the cylinder, alternately, in opposite directions and the number of revolutions imparted to the cylinder before reversal may be varied to suit different conditions.

In Figure 1 I have illustrated a belt drive mechanism for the machine, with conventional type of reversing means, but it will be understood that any other suitable means may be employed for operating the machine. An electric motor 41 is indicated in Figure 1 with reduction gears in the case 42, and a

reversing mechanism is indicated at 43 for driving the two pulleys 44 and 45 over which pass the belts 46 and 47, the latter being crossed to transmit power in direction the reverse of the belt 46. These belts pass around driven pulleys 48 and 49 on the stud shaft 37 of the cylinder, and of course the sets of pulleys and their belts are utilized alternately for rotating the shaft 37 and its cylinder in opposite directions.

As before stated, I have illustrated and described one exemplification of my invention, but changes as to materials used, sizes and shapes of parts, and the details of construction and operation of the machine may be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The combination with a housing having enlarged end-heads and means for introducing a liquid detergent to the housing, and valve-controlled drain openings in said heads, of a rotary-oscillating, perforated carrier having a transverse partition and mounted in the housing, said carrier having enlarged pump-heads in said end-heads, and an oppositely working pump in each of said pump-heads for alternately conveying the detergent from said end-heads to the interior of the carrier.

2. The combination with an outer cylindrical casing having enlarged end-heads and means for introducing a liquid detergent to the interior of the casing, and valve-controlled drain openings in said heads, of a rotary-oscillating perforated cylinder having a transverse partition and journaled in said end-heads, said perforated cylinder having circular pump-heads in the end-heads, spirally arranged vanes in said pump heads forming oppositely working rotary pumps, each of said pumps having a discharge port at opposite ends of the perforated cylinder, and an inwardly projecting nozzle about each of said ports and located in the axial line of the perforated cylinder.

3. The combination in a washing machine with an exterior housing having enlarged end heads, of an inner, perforated, rotary oscillating carrier and operating means for the carrier, means for introducing a liquid detergent to the interior of the housing, an enlarged pump head mounted on each end of the carrier and located in an end head, said pumps each having an axial port to the interior of the carrier, and said pump heads having conveying members for oppositely conveying a liquid detergent therethrough.

4. The combination in a washing machine with an exterior housing and means for introducing a liquid detergent thereto, of a rotary, oscillating perforated carrier supported in the housing and operating means for the carrier, a pump head mounted on and closing each end of the carrier, said pump heads each having an axial port communicating with the interior of the carrier, spiral vanes in said heads forming oppositely working pumps, and an inwardly projecting discharge nozzle on each pump head about the ports.

In testimony whereof I affix my signature.

CHARLES F. HAROLD.