June 20, 1950 C. F. ABRESCH 2,512,408

AUTOMATIC WASHING MACHINE

Filed Nov. 15, 1946 3 Sheets-Sheet 1

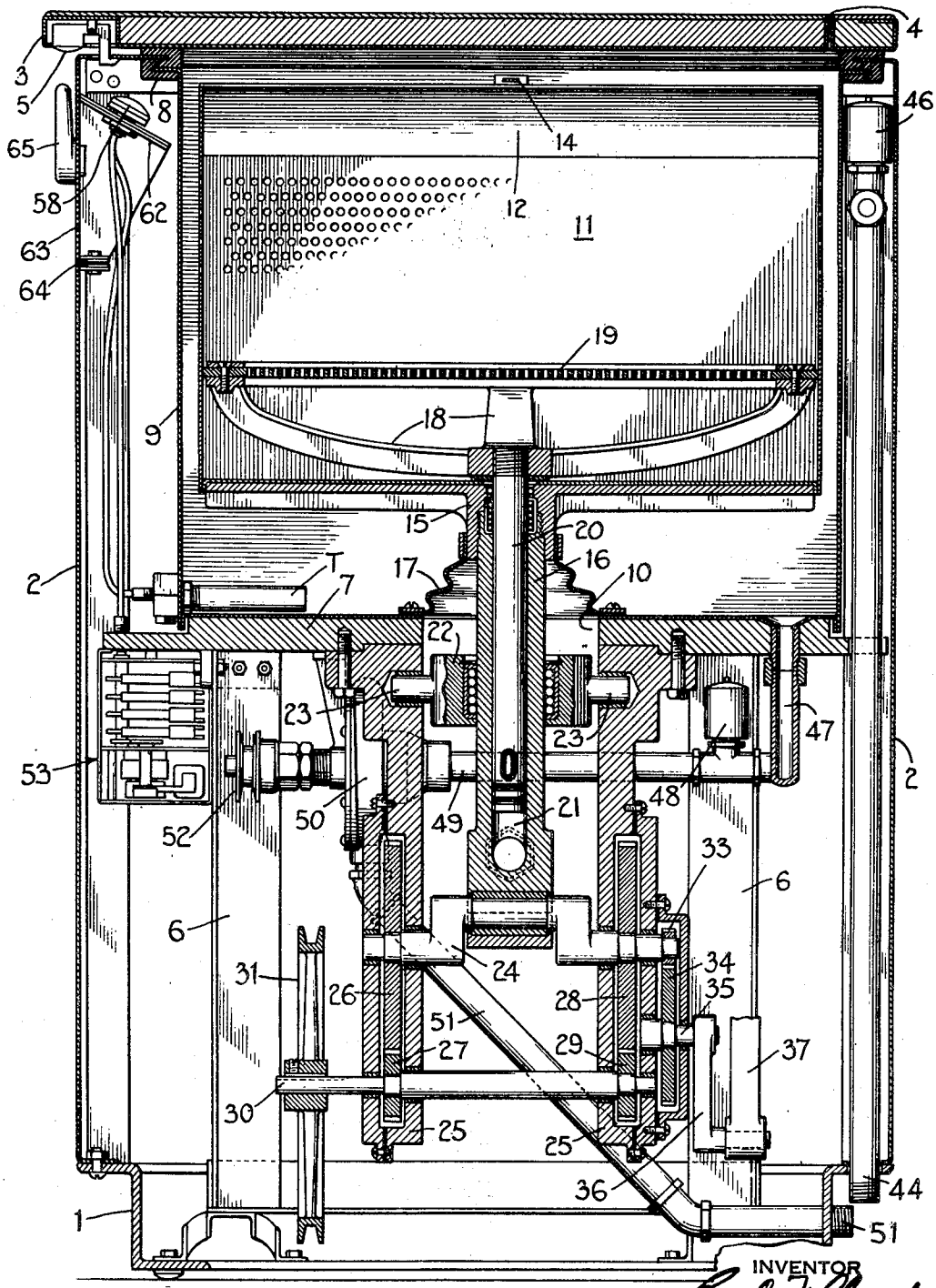


Fig. 1.

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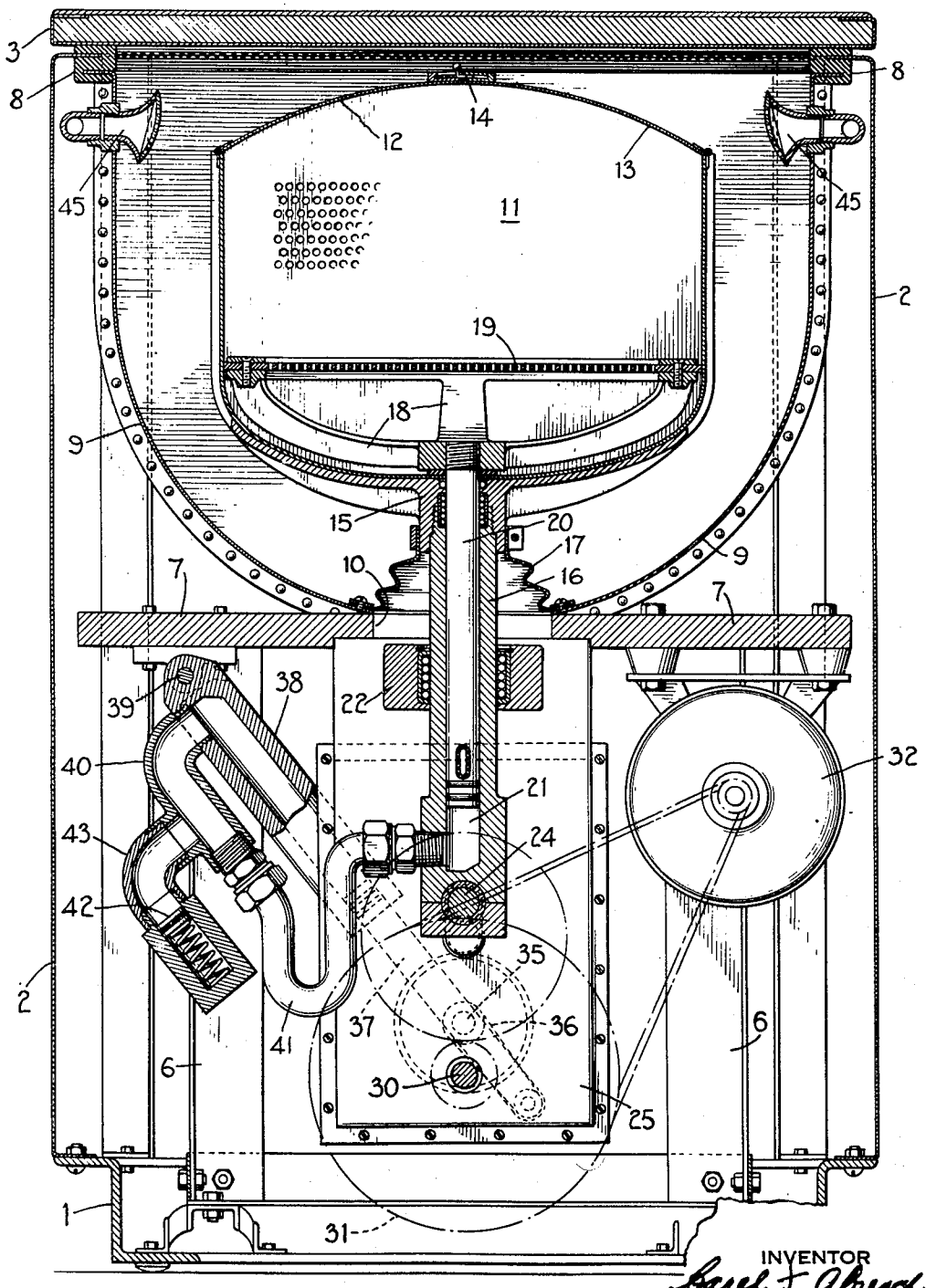


Fig. 2.

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Fig. 3.

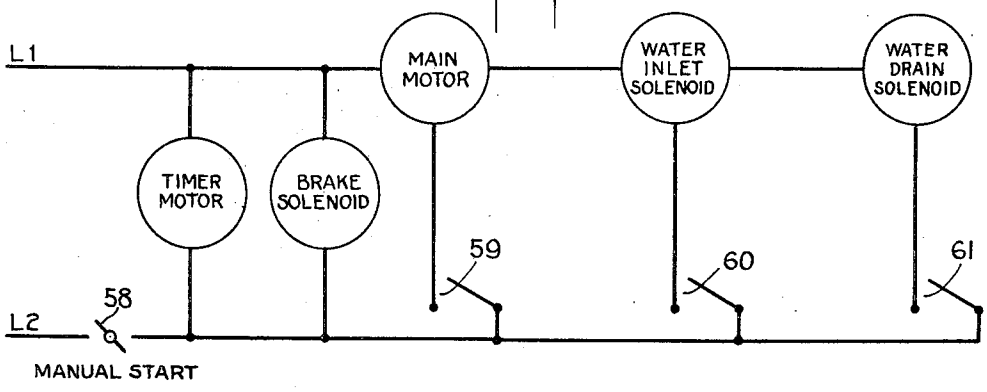


Fig. 4.

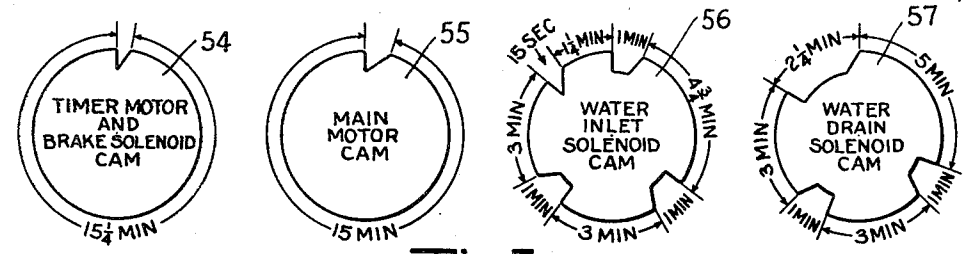
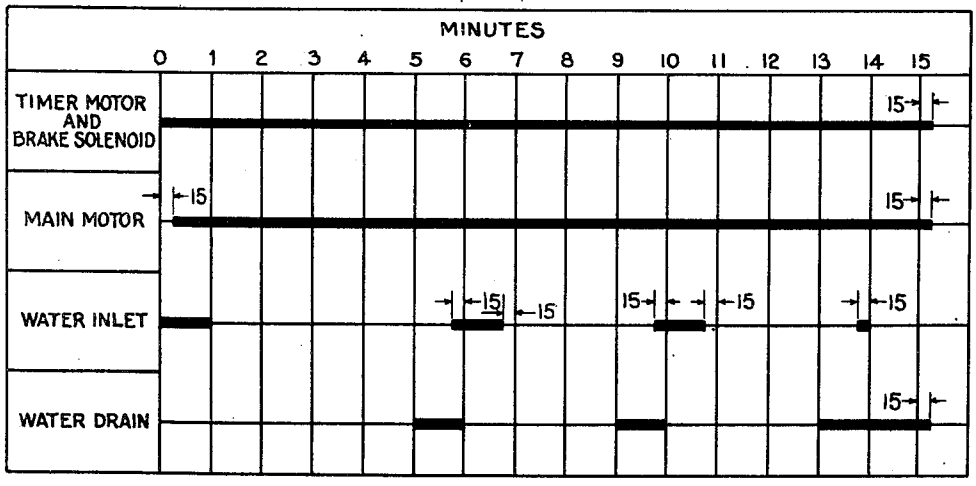


Fig. 5.



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AUTOMATIC WASHING MACHINE

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Application November 15, 1946, Serial No. 710,111

11 Claims. (Cl. 68—21)

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This invention relates to washing machines and is of particular utility as applied to those of the type in which, upon the manipulation of an appropriate control, the machine automatically completes a washing cycle, consisting of washing and rinsing and some form of wringing or rough-drying operation, all without requiring any manual handling of the articles being washed.

One of the primary objects of the invention is a washing machine in which soiled articles are subjected to a particularly effective washing action, which need only be of quite short duration and yet which is not of a character to harm the articles.

A further object is to provide such a motion as is appropriate to be maintained throughout the entire cycle of an automatic machine, thereby simplifying both the mechanism and its controls and also avoiding the greater wear and tear and vibration likely to result from the high speed action which is frequently resorted to throughout at least a part of the cycle, for example, for so-called spin drying.

With the foregoing and other objects in view, as will later appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained will be readily understood.

In the drawings, Fig. 1 is a central, vertical, "front-to-rear" section through the machine (the front of the machine being at the left as viewed in this figure); Fig. 2 is a view of the machine partially in front elevation but largely in central, vertical section; Fig. 3 is a schematic wiring diagram; Fig. 4 is a timer cam diagram and Fig. 5 an over-all timing diagram.

The illustrated machine consists of a base 1, on which is mounted an enclosed cabinet structure 2, appropriately of kitchen-unit height and having a table top cover 3 hinged across the back at 4 and normally held closed by a front latch 5.

At about midway of the height of the cabinet and supported on the base by frame members 6, is a platform 7 on which virtually the entire mechanism of the machine is mounted, the space above the platform being occupied by the wash container and the space below it by the actuating means.

Above the platform, and with its upper periphery surrounded by a rubber gasket adapted for sealing engagement with the cover 3 when the latter is closed, is a wash-water tank 9. The tank is imperforate except for a single, large, central opening in its bottom, registering with an opening 10 in platform 7. As indicated, the tank may be formed of sheet stock and hence fabricated at low cost.

Within the tank is a foraminous clothes basket

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11, which may likewise be formed of sheet stock, suitably perforated. At its top the basket is normally closed by a lid, shown as consisting of the two sections 12, 13 hinged to the basket side walls at their remote edges and latched together at their abutting edges by a spring bolt 14. The basket is supported by a head 15 secured to the upper end of a column 16 which extends down through the platform opening into the lower compartment, a flexible bellows 17 sealing the head 15 to the tank around the opening 10 and thereby completing the bottom closure of the tank. The column 16 forms both a support and an actuating or drive member for the basket.

Mounted within the basket is what for convenience may be termed a washing member, although, as will presently appear, it functions during the rinsing and wringing operations, as well as during the washing stage. In its preferred form, the washing member functions as a plunger which reciprocates relatively to the basket and subjects the wash to an intermittent squeezing action. As illustrated, the washing member comprises a rigid frame 18 which substantially fits the basket and supports a partition element or flexible diaphragm 19 which is perforated and which forms a floor or false bottom for the basket. The diaphragm supporting frame 18 is secured to the top of a piston 20 which operates in a bore 21 formed in column 16.

The use of the designation washing member as applied, in this form, to the diaphragm, is a matter of convenience only and it is not to be inferred that such member is by any means responsible for the entire washing action. On the contrary, while it is preferred to impart motion to the basket in relation to the tank and, continuously and simultaneously, to manipulate the washing member in relation to the basket, the basket motion itself is desirably of such a character as to effect a substantial or the major part of the washing action. It has been found that a particularly effective basket washing action results when the basket is subjected to a more or less rotary motion in a fixed vertical plane, the combined vertical and horizontal movements thus imparted to it bringing about an effective surging action of the water through the clothes and a continual rearrangement of the wash within the basket, thus reorienting the wash not only in relation to the induced water surges but also in relation to the washing member. The supplemental action of the diaphragm or the like is highly desirable, particularly (during the washing stage) as a means of accelerating the removal of the soil-bearing water from the mass in the basket, which is an element of the rapid washing performance of which the machine is capable. However, due to the efficacy of the basket motion itself, the timing of the diaphragm motion may be much slower than that of the basket. A rela-

tively few strokes of the diaphragm, acting continually or as below described in detail, serve the purpose; and it will be understood, therefore, that such actions are within the contemplation of what is for convenience referred to as the simultaneous operation of the basket and the washing member.

For achieving the above-mentioned basket motion the column 16 is supported at at a point intermediate its ends in a gimbal ring guide 22 in which the column is free to reciprocate but by which its motions are otherwise confined to rocking in a fixed vertical plane normal to the axis of the ring trunnions 23. The lower end of column 16 is mounted on a crank shaft 24 which is journaled in brackets 25 depending from platform 7. The crank shaft is shown as being driven at both ends through reduction gears 26, 27 and 28, 29 from a shaft 30 carrying a pulley 31 which may be belt-driven from motor 32 (Fig. 2) suspended from platform 7. Thus, as the crank shaft is rotated, the column 16 is reciprocated lengthwise and also rocked about the axis of trunnions 23 and the basket is likewise oscillated, in more or less circular fashion, in relation to the tank.

The washing member within the tank is shown arranged to be actuated hydraulically, which arrangement is adaptable for continual operation of the plunger under timer control or as may be preferred. As shown in Fig. 1, the righthand end of crank shaft 24 carries a pinion 33 which drives a gear 34 on a shaft 35 to which is secured a crank 36. The latter actuates a plunger on ram 37 which operates in a hydraulic-fluid cylinder 38 which is pivotally suspended from platform 7 as at 39. By means of an elbow fitting 40 and flexible hose connection 41, the interior of cylinder 38 is connected to the lower end of bore 21 of column 16. In view of the fact that diaphragm 19 exerts a squeezing action on the clothes in the basket, it is arranged to be yieldably rather than positively driven; and, to that end, a spring-loaded relief piston 42 is provided, the working face of the piston being exposed to the pressure of the hydraulic fluid in cylinder 38 and elbow 40 through a fitting 43.

While there is nothing critical about the speeds of actuation of the basket and the washing member, it has been found that their combined action promotes a highly effective washing action even at low speed, with the result that vibration and wear and tear on the mechanism can be reduced to a minimum without sacrificing washing efficiency. Thus, for example, with a motor speed of 1725 R. P. M., the crank shaft may be driven at, say, 72 R. P. M. and the shaft 35 (when connected to drive the wash member continuously, as shown) at, say, 18 R. P. M. At such speeds the washing member completes one reciprocation while the basket is completing four oscillations.

A further advantage of the described motions of the basket and washing member is that they are found to be extremely effective for rinsing the wash and also for wringing it. The result of this, of course, is that the drive mechanism can be arranged to operate continuously throughout the entire cycle of washing, rinsing and wringing operations, thereby eliminating the need for any change of basket motion or gear shift for increasing its speed, as is required with certain automatic machines now on the market. By the same token, the only function required of a timer, such as is ordinarily used to control the cycling of the components of automatic washing machines, is, in this preferred form, to control the filling and

emptying of the wash-water tank. The manner of achieving the latter can be variously arranged, as may be convenient, but for purposes of illustration there is shown a water inlet pipe 44 which extends up the rear of the cabinet and is arranged to discharge into tank 9, as by way of nozzles 45, under the control of a solenoid valve 46. A tank drain outlet 47, similarly controlled by a solenoid valve 48, is connected by pipe 49 with the intake side of pump 50 which discharges through outlet pipe 51. The pump shaft may be belt driven by pulley 52 from motor 32. While only a single water inlet pipe 44 is illustrated, it will be understood that the water supply may include both hot and cold water lines and any appropriate form of mixing valve or valves arranged for suitable control, as by a thermostate T in the tank. These elements are well known end, forming no part of the present invention, required no detailed description or illustration.

At 53 is generally indicated a timer, the details of which form no part of the present invention. It will be understood to include a timer motor, as usual, the function of which is to operate a series of cams 54, 55, 56 and 57 (Fig. 4) which time the actuation of the usual brake solenoid (not shown) and of motor 32 and of water inlet and outlet solenoids 46 and 48, respectively. Referring to Fig. 3, it will be understood that when a cycle of the timer is initiated by the manual closure of switch 58, the timer motor and brake solenoid are energized and then the timer, through the respective cams, dictates the closure and opening of the several circuit gaps 59, 60 and 61. As illustrated in Fig. 1, the manual switch 58 is mounted on the normally concealed panel 62 carried by a door 63 hinge mounted at 64 so that it can be swung outwardly to give access to switch 58 upon release of a suitable latch 65.

In Fig. 5 is diagrammatically illustrated the preferred cycle of operations arranged to follow the closure of main switch 58. As indicated in such figure, the timer motor and brake solenoid are immediately energized and continue so energized for the entire cycle, which in this instance covers a period of fifteen minutes and fifteen seconds. Coincidently with the energizing of the timer motor and brake solenoid, the water inlet solenoid 46 is energized and the tank 9 is filled to an appropriate level, this operation consuming one minute. Fifteen seconds after the timer has started, the main motor is energized and it continues to run throughout the entire cycle. As also indicated in Fig. 5 the washing operation is completed at the end of the fifth minute, whereupon the outlet solenoid 48 is energized, the tank drained and thereafter refilled. For the next two and one quarter minutes the clothes are subjected to a rinsing operation, followed by a draining and refilling of the tank and a second rinsing operation. At the end of the thirteenth minute the tank outlet is again opened and it remains open to the end of the cycle. During the period that the drain valve is thus held open, the clothes are subjected to a wringing action by the same oscillating and squeezing motions of the basket and diaphragm as are utilized throughout the washing and rinsing operations, and the clothes are thereby partially dried. As also indicated in Fig. 5, a short final rinse is preferably effected by opening the water inlet valve for fifteen seconds while the wringing operation is in progress.

It will be understood, of course, that the time intervals indicated for the various operations

are subject to variation as may be preferred. It will also be understood that the foregoing description of the details of but one form of the invention is intended to be illustrative only, and that its principles are susceptible of embodiment in various forms within the scope of the following claims:

1. In a washing machine, the combination with a platform, a tank mounted above the platform, said platform and tank having registering openings, a gimbal ring guide carried by the platform, a basket supporting member reciprocable in said guide and extending through said openings above and below the platform, a clothes basket mounted on the upper end of said member, drive means suspended from the platform adapted for oscillating the lower end of said basket supporting member in a fixed vertical plane and, thereby, the basket, a washing member within the basket, and means associated with said drive means for moving said washing member in relation to the basket simultaneously with the oscillation of the basket.

2. In a washing machine having a tank and a perforated clothes basket therein having a lid: the combination of a rigid support within the basket, a perforated diaphragm mounted on the support and constituting a false bottom for the basket, a central column adapted to support the basket, crank means for actuating the column to impart vertical and horizontal motion to the basket in a fixed vertical plane, and drive means within the column for reciprocating the diaphragm support toward and from the basket lid simultaneously with the crank-induced motion of the basket.

3. In a washing machine having a tank and a perforated clothes basket therein having a lid: the combination of a rigid support within the basket, a perforated diaphragm mounted on the support and constituting a false bottom for the basket, a central column adapted to support the basket, drive means for actuating the column to impart an oscillating motion to the basket in a fixed vertical plane, and drive means within the column for reciprocating the diaphragm support toward and from the basket lid simultaneously with the oscillation of the basket.

4. In a washing machine the combination with a tank containing a perforated clothes basket, of a column adapted to support said basket from the underside thereof and having a vertically disposed bore, a plunger mounted in said bore, a washing member mounted within the basket and secured to the upper end of said plunger, a crank adapted to impart motion to the lower end of the column and a guide for the column intermediate the basket and the crank, and means for reciprocating the plunger in said bore relatively to the column coincidently with the oscillation of the basket by the crank.

5. In a washing machine the combination with a tank containing a perforated clothes basket, of a column adapted to support said basket from the underside thereof, a crank adapted to impart motion to the lower end of the column and a guide for the column intermediate the basket and the crank, a washing member mounted within the basket, and means for moving the washing member relatively to the basket coincidently with the oscillation of the basket by the crank.

6. In a washing machine the combination with a tank containing a perforated clothes basket, of a column adapted to support said basket from the underside thereof and having a vertically disposed bore, a plunger mounted in said bore, a washing member mounted within the basket and secured to the upper end of said plunger, and means for coincidently moving the column to oscillate the basket within the tank and reciprocating the plunger within the said bore relatively to the column.

7. In a washing machine the combination with a tank containing a perforated clothes basket, of a hollow central column adapted to support said basket from the underside thereof, a perforated floor member within the basket, a supporting post for the floor member within said column, means for driving said column to move the basket within the tank and means for simultaneously moving said post relatively to the column to move the floor member relatively to the basket.

8. In a washing machine the combination with a tank containing a perforated clothes basket, of a hollow central column adapted to support said basket from the underside thereof, a perforated floor member within the basket, and means for reciprocating said floor member relatively to the basket including a supporting post for the floor member within said column.

9. In a washing machine of the kind including a tank and a perforated clothes basket therein having a lid: the combination of a perforated plunger member reciprocable within the basket toward and from the lid, means for imparting orbital movement to the basket in a fixed vertical plane in relation to the tank, and drive means for simultaneously reciprocating the perforated plunger member in such plane in relation to the basket.

10. In a washing machine of the kind including a tank and a clothes basket therein having a lid: the combination of a plunger member reciprocable within the basket toward and from the lid, means for imparting orbital movement to the basket in a fixed, vertical plane in relation to the tank, and yieldable drive means for simultaneously reciprocating the plunger member in such plane in relation to the basket.

11. In a washing machine of the kind including a tank and a clothes basket therein: the combination of a perforated floor member within the basket, and means for oscillating the basket in an orbital path relation to the tub and reciprocating the floor member in relation to the basket, the said means being adapted to oscillate the basket at a faster rate than the reciprocation of the floor member.

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Certificate of Correction

Patent No. 2,512,408 June 20, 1950

CAREL F. ABRESCH

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 33, for the words "plunger on" read *plunger or*; column 4, line 17, for "thermostate" read *thermostat*; line 18, for "end" read *and*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of August, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.