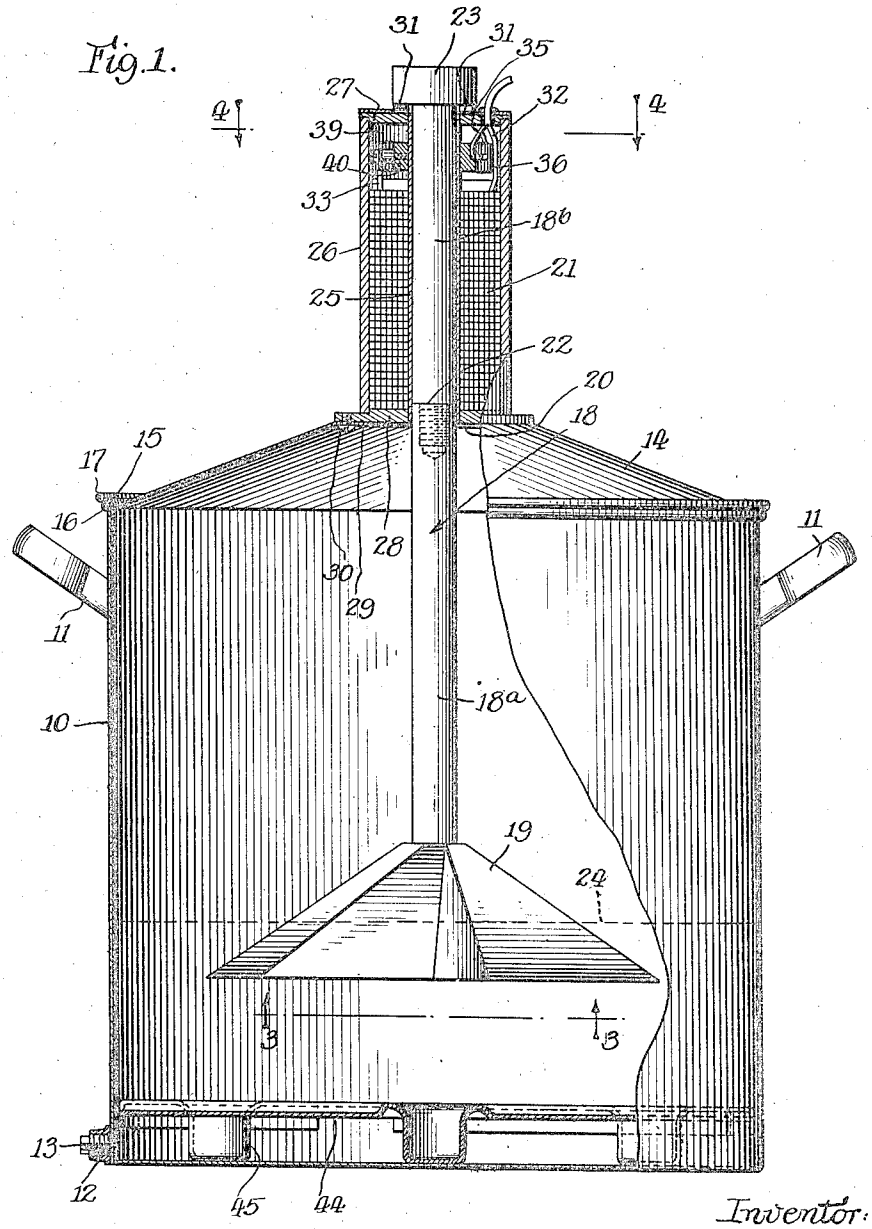
Sept. 23, 1930. I. H. WILSEY 1,776,405

LAUNDRY MACHINE

Filed May 11, 1928 3 Sheets-Sheet 1

Fig. 1.



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LAUNDRY MACHINE

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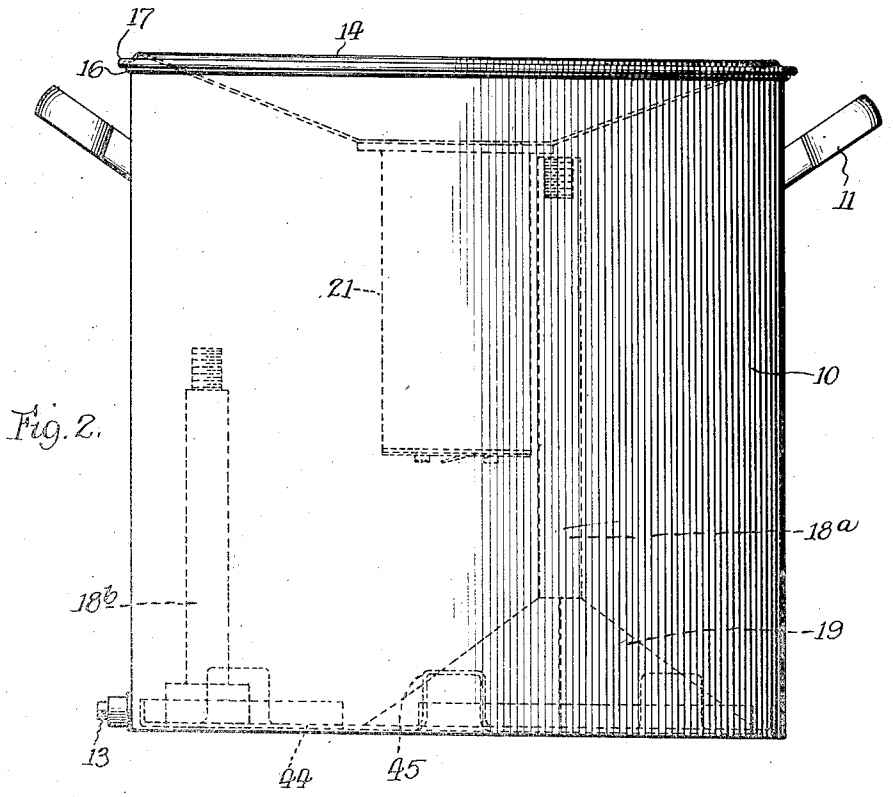


Fig. 2.

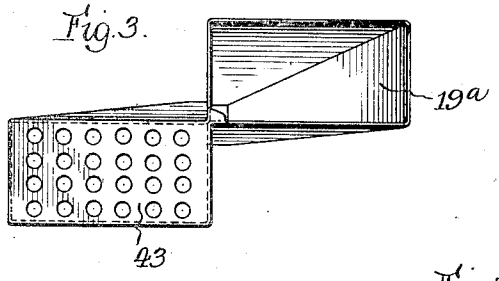


Fig. 3.

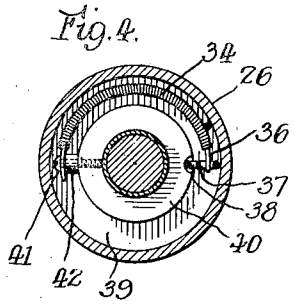


Fig. 4.

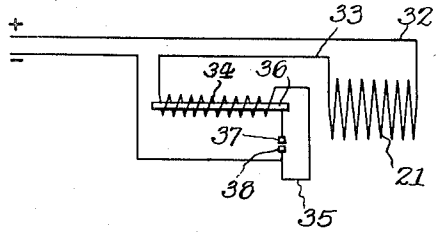


Fig. 5.

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LAUNDRY MACHINE

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Fig. 7.

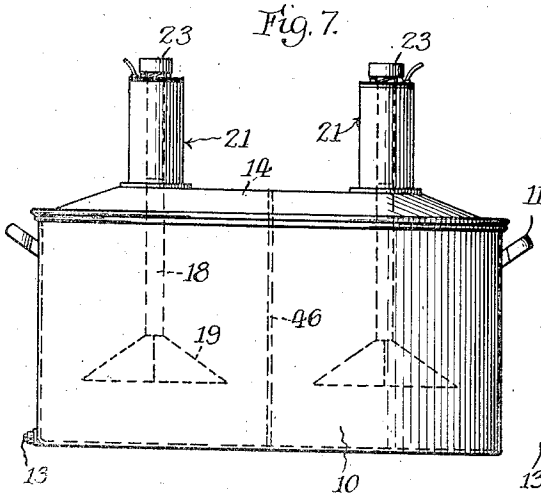


Fig. 10.

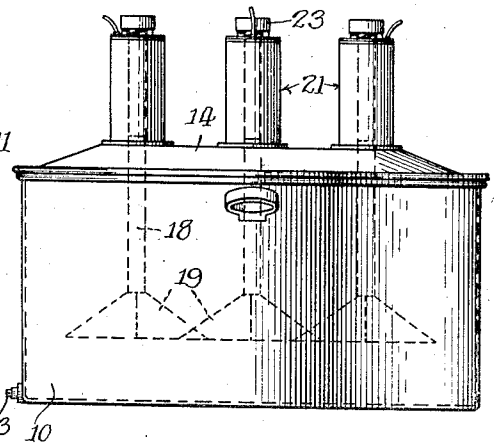


Fig. 11.

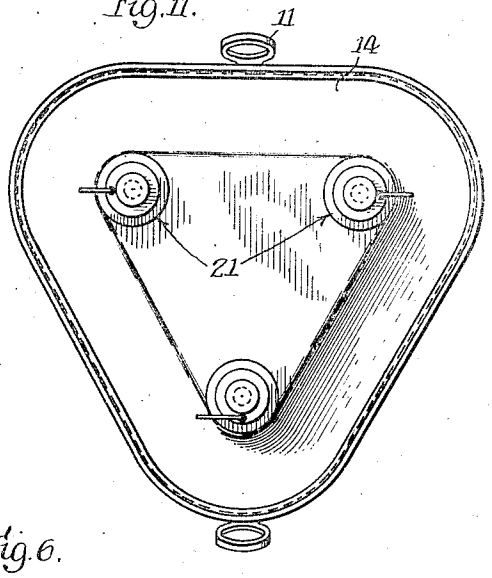


Fig. 8.

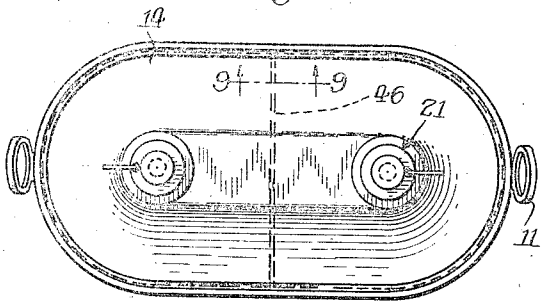


Fig. 9.

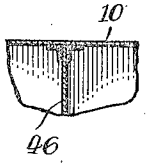
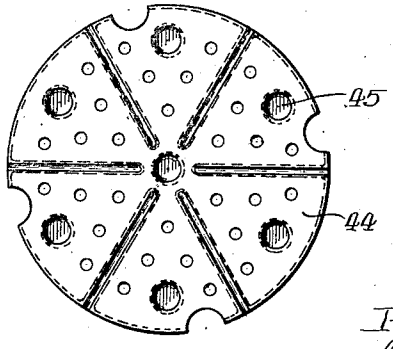


Fig. 6.



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Patented Sept. 23, 1930

1,776,405

UNITED STATES PATENT OFFICE

IRVEN H. WILSEY, OF CHICAGO, ILLINOIS

LAUNDRY MACHINE

Application filed May 11, 1928. Serial No. 276,861.

The present invention relates to improvements in laundry machines, and has particular reference to a new and improved washing machine adapted to be operated by electric power.

Various general objects of the invention reside in the provision of a novel washing machine which is simple, inexpensive, compact and light in construction, which can be made small in size, which is quiet in operation, and which washes thoroughly, gently and efficiently.

Another object resides in the provision of a new and improved washing machine having no gears, belts, or revolving members for operating the agitator.

A further object is to provide a new and improved washing machine which can be assembled and disassembled with ease, which can be arranged in a compact form when disassembled so as to require a small storage space, and which is convenient to handle.

Another object of the present invention resides in the provision of a new and improved washing machine in which the operating mechanism for the agitator requires no lubrication, and has no oil or grease present which might come in contact with the clothes.

An important object of the present invention resides in the provision of electromagnetic means for automatically operating the agitator.

Washing machines comprise many different types of agitators. Thus, the agitator may comprise a rocking tub, reciprocating paddles, or a vacuum cup. The purpose of the agitator is to disturb and move the water and clothes in relation to each other.

Another important object of the present invention resides in the provision in a washing machine of a new and improved agitator comprising a plunger which will float magnetically, which will rotate automatically so as to set up disturbing eddy currents and reach all of the clothes, and which will reciprocate without necessarily reaching its limit of movement into the clothes before starting on the return stroke.

An important object resides in the provision of a solenoid with the plunger as the core, and means for automatically and periodically exciting the solenoid sufficiently to actuate the plunger, and thereby the agitator.

A more specific object resides in the provision of means for varying the current flow through the solenoid so as to periodically strengthen the magnetic field sufficiently to raise the plunger against the force of gravity, said means being unaffected by the position of the plunger.

Still another object resides in utilizing the heat generated in the solenoid to heat the water in the washing machine.

A further object is to provide an agitator which tends to impart a rotational force to the actuating plunger through contact with the water so that after a number of reciprocations the agitator will have turned one complete revolution, thereby reaching all of the clothes.

Another object resides in the provision of a plurality of independent agitating units, for example two or three, arranged in the washing machine to create opposing eddy currents thereby resulting in unusual turbulence and agitation.

A further object resides in the provision in a laundry machine of the foregoing character of means for draining off water from the clothes in the machine, and an agitator adapted to coact with said means to pound the clothes so as to remove water therefrom.

Other objects and advantages of the invention will become apparent as the description proceeds.

In the accompanying drawings, Figure 1 is an elevational view, partially sectioned in a vertical plane, of a laundry machine embodying the features of my invention.

Fig. 2 is a side elevational view of the machine disassembled and packed for storage.

Fig. 3 is a bottom view of the agitator taken along line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken along line 4—4 of Fig. 1.

Fig. 5 is a diagrammatic representation of the electric circuits for the solenoid.

Fig. 6 is a plan view of the false bottom for the machine.

Fig. 7 is a side elevational view on a reduced

scale of a laundry machine having two agitating units.

Fig. 8 is a plan view of the machine shown in Fig. 7.

Fig. 9 is a fragmentary sectional view taken along line 9—9 of Fig. 8.

Fig. 10 is a side elevational view on a reduced scale of a laundry machine having three agitating units.

Fig. 11 is a plan view of the machine shown in Fig. 10.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring to the exemplary embodiment of the invention illustrated in the drawings, 10 represents a body of suitable construction. The body may be of any suitable size, but is particularly adapted for small sizes, and may be of any suitable shape. Thus, the shape of the body 10 in Fig. 1 is cylindrical, in Fig. 8 is oblong, and in Fig. 11 is triangular. The body 10 may be made of any suitable material, and preferably is a light and rugged pail, can or container, made of metal. Suitable side handles 11 are provided on the sides of the body for convenience in handling same. Formed in the side of the body near the bottom is a suitable drain opening 12 which may be closed by a removable plug 13.

The container 10 is provided with a suitable cover 14, and in the present instance this cover is stamped or bulged outwardly at a slight taper, and has a rim 15 adapted to rest on the upper peripheral edge of the container. To provide rigidity and strength, the upper peripheral edge of the container 10 and the outer periphery of the rim 15 are curled to form suitable beads 16 and 17 respectively. While any suitable means may be provided for fastening the cover 14 securely to the container 10, preferably the cover merely rests in place, weight being relied on to hold the parts in place. It will be evident, from a comparison of Figs. 1 and 2, that the cover 14 may be inverted to project into the container when the machine is not in use so as to conserve storage space.

Suitable means is provided for agitating the water and the clothes. This means may comprise one or more independent agitating units, and each unit may comprise an agitator of any suitable type. Thus, I have shown a single agitating unit in Fig. 1, two agitating units in Fig. 7, and three agitating units in Fig. 10. Preferably, these units are alike in construction, and hence only the single unit in Fig. 1 will be specifically described.

In the present instance, the agitating unit of Fig. 1 is of the reciprocating plunger type comprising a plunger rod 18 extending into the container 10 and having a suitable agitator 19 on one end. Preferably, the rod 18 is vertically disposed, projecting outwardly through an opening 20 in the center of the cover 14, and the agitator 19 is of the vacuum cup type.

Means is provided for automatically reciprocating the rod 18 and the agitator 19. This means embodies a device adapted to actuate the rod 18 through electromagnetic force. This force may be applied to actuate the rod 18 in both directions, but preferably is applied only to actuate the rod upwardly, gravity being relied on to lower the rod.

In the present instance, this electromagnetic means comprises a suitable coil of wire 21, commonly known as a solenoid, disposed about and having a close relative sliding fit with the rod 18. The rod 18 is provided in lower and upper sections 18^a and 18^b which may be secured together in any suitable manner, and which in the present instance are threaded together as indicated at 22 to form a unitary member. The lower section 18^a is made of any suitable magnetic material, such as iron, and in effect constitutes the core of the solenoid 21. The upper section 18^b of the plunger rod 18 is made of suitable non-magnetic material, such as aluminum, and constitutes a support and guide for the lower section 18^a. Secured to the outer end of the upper section 18^b is a knob 23 adapted to limit the downward movement of the agitator. The parts are so proportioned that, with the agitator in its lowermost position, the upper end of the lower section 18^a will still project a short distance into the lower end of the solenoid 21 so that the core is never out of the field of magnetic flux. Preferably, in its uppermost position, the agitator will be above a suitable water level, as indicated at 24, so as to entrap air on the downward stroke.

The solenoid 21, may be of any suitable construction, and may be wound in any suitable manner. In the present instance, the coil is wound on an inner spool 25 which slidably embraces the rod 18. Housing the coil is a suitable cylindrical casing 26 closed at its ends by upper and lower end plates 27 and 28. The plate 28 rests on and is secured to a flange 29 on the cover 14 about the opening 20, by any suitable means, such as screws 30. Preferably, the plate 27 is provided with a suitable cushion for the knob 23, as for example a plurality of peripherally spaced spring tongues 31 struck up therefrom. The solenoid winding thus is completely enclosed and protected from water, dirt and other injurious substances.

Any suitable means may be provided for varying or controlling the excitation of the solenoid 21. In the present instance, the solenoid winding is connected in a circuit (see Fig. 5) as follows: from the positive main through a wire 32, the winding 21, a wire 33, a resistance winding 34, and a wire 35 to the negative main. The resistance winding 34 serves to prevent the solenoid from becoming excited sufficiently to raise the rod 18. To automatically and periodically shunt the winding 34, a temperature responsive switch subject to the heat from the winding 34 is provided. This switch comprises a bi-metallic thermostatic strip 36 connected at one end to the wire 33, and carrying a movable contact 37 on its other end. To subject the strip 36 to the heat generated in the wiring 34, the latter is wound about the strip. The contact 37 is adapted to make and break contact with a fixed contact 38 in the wire 35.

When the contacts 37 and 38 are closed, the wire 33 will be connected to the wire 35 by the strip 36, as well as the winding 34, and a heavy current will flow through the solenoid winding 21, thereby highly energizing the latter to raise the rod 18. During this period very little heat is generated in the winding 34 so that the strip 36 will cool gradually until it opens the contacts 37 and 38. The flow of current is then restricted by the winding 34 so that the winding 21 is deenergized sufficiently to cause the rod 18 to drop under the influence of gravity. During this period, the winding 34 heats the strip 36 to again close the contacts 37 and 38, whereupon the foregoing cycle of operations is repeated.

It will be evident that there is no mechanical connection between the rod 18 and the switch, that the switch is fool proof, and that the operation of the switch is not dependent on the position of the rod. Thus, the rod 18 need not reach the limit of its downward movement to initiate the upward return movement.

The thermostatic switch for the solenoid may take any physical form, and may be housed in any suitable manner. In the present instance, the upper end of the casing 26 provides a closed annular space 39. Secured to the spool 25 in this space is an annular insulating ring or collar 40. One end of the thermostatic strip 36 is rigidly secured to one side of the ring 40 by means of a screw 41 and a spacer 42. The contact 38 is secured to the opposite side of the ring 41, and the strip 36 is curved about the ring to position the contact 37 over the contact 38. This curved construction of the strip serves to save space and to permit an unusually large movement within a limited space. It will be evident that all the electrical parts are sealed so that there is no danger of short circuiting or injuring the operator.

The vacuum cup 19 preferably is long and narrow in construction, and comprises two opposite and off-set arms 19^a opening downwardly. The bottom of the cup 19 may be closed by a suitable apertured plate 43. The sides of the arms 19^a are laterally inclined so as to exert a peripheral thrust when the cup is raised. It will be evident that the rod 18 floats in the solenoid 21. If the rod 18 is cylindrical, as in Fig. 1, the peripheral thrust of the cup 19 will slowly rotate same so that in a number of reciprocations, the cup will make a complete revolution, thereby reaching all of the clothes. If the rod is not round, as, for example, where it is square to permit a practical laminated construction for improving the magnetic lifting effort, it will be held against rotation, and the thrust of the cup 19 will be imparted to the water and clothes in the container 10. On the downward movement of the rod 18, very little peripheral thrust will be exerted, since the air entrapped in the cup will prevent the water from acting fully against the under surfaces of the inclined sides of the cup.

Preferably, any heat generated in the solenoid winding 21 is utilized to heat the water in the container 10. To this end, the rod 18, the cup 19, and the spool 25 are made of heat conducting material so that this heat will be transmitted through the rod and the cup to the water. As a result, the temperature of the water will not drop so fast as ordinarily, if at all, during the washing operation, and hence the washing efficiency will be improved.

Means is provided for rinsing and draining the clothes in the container 10. Preferably, this means comprises a perforated or apertured false bottom 44 having projections 45 struck out from one surface to constitute legs for spacing the false bottom from the true bottom of the container 10.

The wash-water and rinsing water will run through the false bottom 44, and can be withdrawn freely through the drain 12. When draining the clothes, the cup 19 may be used as a pounder to drive out the water, the operation of the cup being substantially the same as in the washing operation.

Referring particularly to Fig. 2, it will be evident that the laundry machine may be readily disassembled, and that the only storage space required is that of the container 10. Thus, the sections 18^a and 18^b of the rod 18 may be separated, and the rod removed from the solenoid 21. The false bottom 44 may be inverted, and the section 18^b and the section 18^a with the cup 19 set thereon. The cover 14 may then be inverted with the solenoid 21 projecting downwardly into the container 10.

The capacity of the laundry machine may be varied by varying the sizes of the parts. The capacity may also be varied by varying

the number of agitating units. Without regard to size, the agitation and turbulence created in the washing operation may be increased by increasing the number of agitating units.

In Figs. 7 and 8 is shown a laundry machine comprising two agitating units; and in Figs. 10 and 11 is shown a machine comprising three agitating units. These units are spaced sufficiently so that the circles of revolution of the cups 19 do not overlap, the three units being arranged in triangular relation. To accommodate the agitating units, the container 10 for the two units is oblong in shape, and the container for the three units is triangular in shape. In the twin unit machine, a partition plate 46 may be removably mounted between the units so as to provide a smaller machine at either end for a small washing.

Where a plurality of agitating units is employed, an unusual agitating effect is obtained. Each unit operates independently, and hence the units tend to create opposing eddy currents and to break up any swirling action of the water which might result from the regular operation of any one unit. Operation of the units need not be synchronous, or at the same speed, and the irregularity will improve the agitation.

It will be evident that I have provided a laundry machine which is simple and inexpensive in construction, which is quiet and efficient in operation, and which produces an unusual agitation without injury to the clothes. The machine is adapted for a large variety of sizes, and particularly for small sizes, such as are to be desired in small apartments. When not in use, the machine can be disassembled and stored away in a very small space. All of the parts are sealed and protected so that there is no danger of deterioration or burning out due to the splashing of water or the presence of dirt or grit, and there is no chance of injury or annoyance to the operator through electric shocks. Since the agitator has a free floating action without mechanical connection to any actuating part, no gears, belts or revolving drive members are provided, and no lubrication is necessary. The machine will not clog or jam, and washes gently but thoroughly.

I claim as my invention:

1. A laundry machine comprising, in combination, a container, a solenoid on said container, an agitator in said container having a vertical member of magnetic material extending into the lower end of said solenoid, a member of non-magnetic material extending into the upper end of said solenoid and being operatively connected to the upper end of said first mentioned member, means on said last mentioned member adapted to engage the upper end of said solenoid to limit the downward movement of said first mentioned member, cushion means for absorbing the impact between said last mentioned means and said solenoid, and means for periodically energizing said solenoid sufficiently to raise said agitator and then deenergizing said solenoid to permit said agitator to drop.

2. A laundry machine having, in combination, a container, a solenoid, an agitator having a member extending into one end of said solenoid and constituting a core therefor, said member being freely slidable in said solenoid, and temperature responsive means for automatically and periodically energizing and deenergizing said solenoid to actuate said agitator.

3. A laundry machine having, in combination, a container, a solenoid on said container, an agitator in said container having a vertical member of magnetic material extending into the lower end of said solenoid, a member of non-magnetic material extending into the upper end of said solenoid and being operatively connected to the upper end of said first mentioned member, means on said last mentioned member for limiting the downward movement of said first mentioned member, and means for periodically energizing said solenoid sufficiently to raise said agitator and then deenergizing said solenoid to permit said agitator to drop.

4. A laundry machine having, in combination, a container, a solenoid, a member extending slidably into said solenoid and constituting a core therefor, means automatically operable to periodically energize and deenergize said solenoid, said means being operable independently of said member, and an agitator operatively connected to said member in said container.

5. A laundry machine having, in combination, a container, a solenoid rigidly mounted on said container and disposed vertically, an agitator in said container, said agitator having a rod extending slidably and rotatably into said solenoid, and means automatically operable to vary periodically the excitation of said solenoid to effect reciprocation of said rod.

6. A laundry machine having, in combination, a container, a solenoid on said container and disposed vertically, an agitator in said container, said agitator having a rod extending into the lower end of said solenoid and constituting a magnetic core therefor, and means for periodically exciting said solenoid to raise said rod by magnetic pull and then to permit said rod to drop by force of gravity.

7. A laundry machine having, in combination, a container, a solenoid on said container and disposed vertically, an agitator in said container, said agitator having a rod extending into the lower end of said solenoid and constituting a magnetic core therefor, means for periodically exciting said solenoid to raise

said rod by magnetic pull and then to permit said rod to drop by force of gravity, and means for limiting the downward movement of said agitator so as to retain said rod within the normal field of magnetic flux of said solenoid.

8. A laundry machine having, in combination, a container, a solenoid on said container and disposed vertically, an agitator in said container, said agitator having a plunger extending into said solenoid, and means for periodically varying the excitation of said solenoid to effect axial movement of said rod, said agitator having a cup with inclined sides adapted to impart a relative peripheral turning force between said cup and water in the container upon axial movement of said rod.

9. A laundry machine having, in combination, a container, a solenoid on said container and disposed vertically, an agitator in said container, said agitator having a plunger extending freely into the lower end of said solenoid and constituting a magnetic core therefor, and means for periodically exciting said solenoid to raise said rod by magnetic pull, said means having no mechanical connection with said plunger.

10. A laundry machine having, in combination, a container, a solenoid having an enclosing casing on said container and disposed vertically, an agitator in said container, a plunger operatively connected to said agitator and having a magnetic part extending into the normal end field of magnetic flux of said solenoid, means for periodically energizing the solenoid to raise said plunger by magnetic pull, said means being enclosed in said casing, and means operatively connected to said plunger and adapted to engage said casing on the downward movement of said plunger to limit said movement to a range within said field of flux.

11. A laundry machine having, in combination, a container, an agitator in said container, electromagnetic means, means operatively connected to said agitator and disposed in the normal field of flux of said electromagnetic means, and means for varying the excitation of said electromagnetic means to actuate said agitator.

12. A laundry machine having, in combination, a container, an agitator in said container, a solenoid, a part of said agitator being disposed in the field of flux of said solenoid and constituting a magnetic core therefor, and means automatically operable to vary the excitation of said solenoid to actuate said agitator.

13. A laundry machine having, in combination, a container, an agitator in said container, a solenoid, means operatively connected to the agitator and disposed in the field of flux of said solenoid, and means for automatically and periodically varying the excitation of said solenoid to actuate said first mentioned means and thereby said agitator.

14. A laundry machine having, in combination, a container, a solenoid, an agitator in said container having a rod extending into said solenoid and constituting a core therefor, and means for periodically exciting said solenoid to actuate said core.

15. A laundry machine comprising, in combination, a container, and a plurality of agitating units arranged in spaced relation in said container, each agitating unit comprising a solenoid, an agitator having a part extending into one end of said solenoid and constituting the core therefor, and means for periodically energizing and deenergizing said solenoid, said units being operable independently so as to create opposing forces in the water.

16. A laundry machine having, in combination, a container, a false bottom in said container, a drain in said container below said false bottom, a solenoid on said container, an actuator having a part adapted to be subjected to the magnetic pull of said solenoid, and means for periodically energizing and deenergizing said solenoid for reciprocating said agitator toward and from said false bottom.

17. A laundry machine having, in combination, a container, a cover mounted on said container, said cover being reversible, a solenoid mounted on said cover and being vertically disposed, said solenoid being adapted to project into said container when said cover is inverted, and an agitator in said container, said agitator having a sectioned plunger extending through said solenoid, the inner section being magnetic, and the outer section being non-magnetic and serving to hold said inner section in the normal field of flux, said agitator when dissassembled being adapted to be stored in said container with said solenoid.

18. A laundry machine having, in combination, a container, and a plurality of agitating units arranged in spaced relation in said container, each agitating unit comprising a solenoid, an agitator having inclined vanes adapted to impart a rotational force thereto upon movement through the water, and having a part extending slidably and rotatably into said solenoid and constituting the core therefor, and means for periodically energizing and deenergizing said solenoid, said units being operable independently so as to create opposing currents in the water.

19. A laundry machine having, in combination, a container, a cover mounted on said container, said cover being reversible, a solenoid mounted on said cover and being vertically disposed, said solenoid being adapted to project into said container when said cover is inverted, and an agitator in said container, said agitator having a sectioned plunger ex-

tending through said solenoid, and being capable of being disassembled from said solenoid and stored in said container.

20. A laundry machine having, in combination, a container, and a plurality of agitating units arranged in spaced relation in said container, each agitating unit comprising a solenoid, an agitator having a part extending into one end of said solenoid and constituting the core therefor, and means for periodically energizing and deenergizing said solenoid, said units being operable independently so as to create opposing forces in the water, and a removable partition in said container between said units.

21. A laundry machine having, in combination, a container adapted to contain water and electrical agitating means extending into said container and formed of heat conducting material, part of the sensible heat of said electrical means being adapted to be given up to the water in the container.

22. A washing machine having, in combination, a container adapted to contain water, agitating means in said container, and a single heat generating and operating means connected to said agitating means, the connection and said agitating means being formed of heat conducting material.

23. A washing machine having, in combination, a container, a reversible cover on said container, an agitator in said container, and means mounted on said cover for actuating said agitator, said actuating means being arranged to occupy the space within the container when said cover is reversed.

24. Agitating mechanism of the class described comprising, in combination, a solenoid, a reciprocatory core therein, agitating means actuated by said core, and means for automatically and intermittently energizing said solenoid to effect reciprocation of said core.

25. Agitating mechanism of the class described comprising, in combination, a solenoid, a core therein, agitating means operable by said core, and a thermostatically actuated switch controlling the circuit to said solenoid for automatically and intermittently energizing said solenoid to effect reciprocation of said core.

26. A laundry machine comprising, in combination, a container, a removable cover thereon, an agitator in said container, a solenoid mounted on said cover, a core for said solenoid connected to actuate said agitator, and means for automatically and intermittently energizing said solenoid to raise said core and then release the core to the action of gravity.

27. A laundry machine having, in combination, a container, electromagnetic means for agitating the contents of the container, said means being formed of heat conducting material adapted to be in contact with the contents to permit a heat exchange therebetween.

28. A laundry machine having, in combination, a container, a solenoid, an actuator in said container having a rod extending into said solenoid and constituting a core therefor, and means for periodically exciting said solenoid to actuate said core, said actuator and said rod being made of heat conducting material to dissipate the heat generated in said solenoid.

29. A laundry machine comprising, in combination, a container, an agitator in said container having an operating vertical member, and automatic means for periodically lifting said member from any variable position or height.

30. A laundry machine comprising, in combination, a container, a reciprocatory agitator in said container, and automatic means for reciprocating said agitator, said means permitting the path of reciprocation to vary automatically.

31. A laundry machine comprising, in combination, a container, a reciprocatory agitator in said container, and automatic actuating means for said agitator, said agitator and said means having a free connection permitting relative rotation, said agitator being formed with inclined surfaces tending upon reciprocation through coaction with the contents of said container to impart a rotative force to said agitator.

32. A laundry machine comprising, in combination, a container, a reciprocatory agitator in said container, and automatic means having a floating connection with said agitator for periodically imparting power impulses to said agitator tending to reciprocate the latter without regard to the position of reciprocation of the latter.

33. A laundry machine comprising, in combination, a container, a reciprocatory agitator in said container, and a solenoid actuator for imparting an impositive reciprocation to said agitator.

In testimony whereof, I have hereunto affixed my signature.

IRVEN H. WILSEY.