

Dec. 17, 1940.

R. E. BASSETT, JR

2,225,407

WASHING MACHINE

Filed Feb. 14, 1935

5 Sheets-Sheet 1

FIG. 1

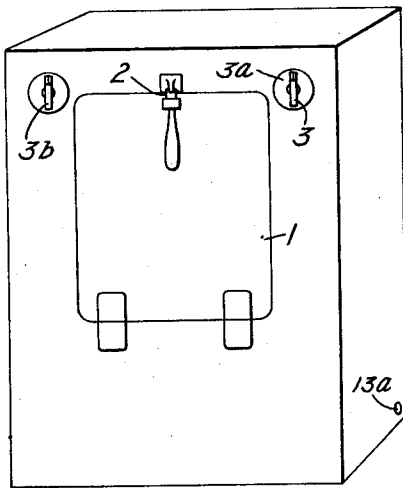


FIG. 2

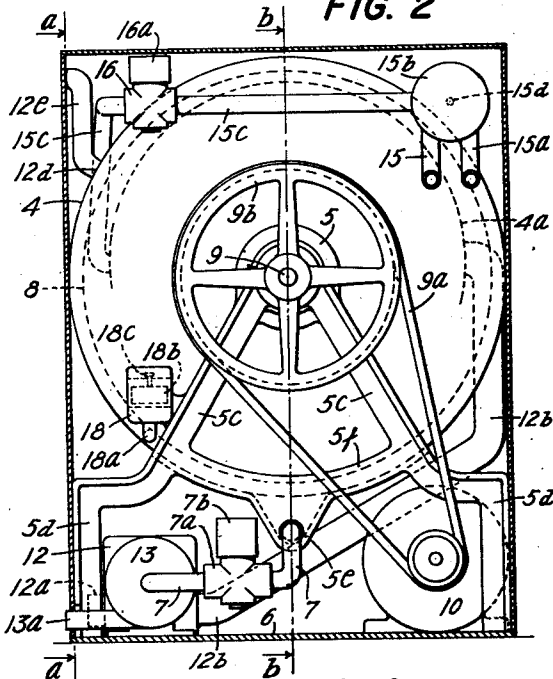


FIG. 3

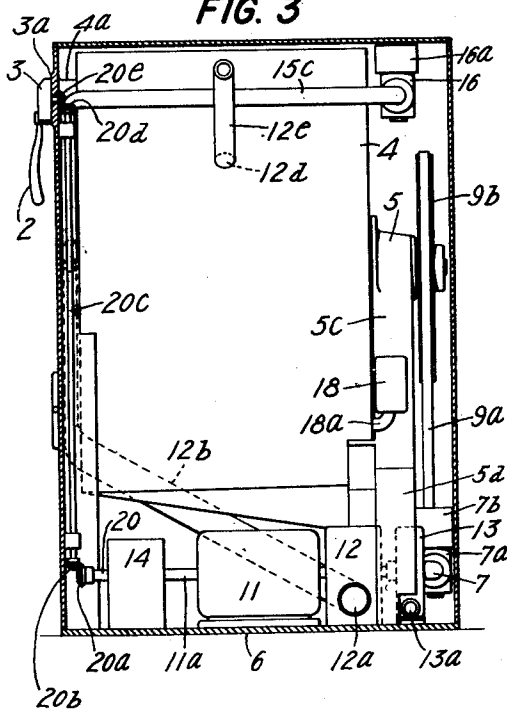
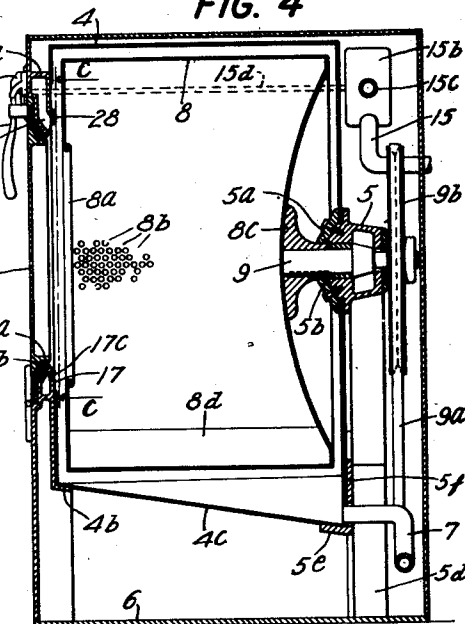


FIG. 4



INVENTOR
Rex Carl Bassett, Jr.
BY
Lawrence K. Sager
his ATTORNEY

Dec. 17, 1940.

R. E. BASSETT, JR

2,225,407

WASHING MACHINE

Filed Feb. 14, 1935

5 Sheets-Sheet 2

FIG. 5

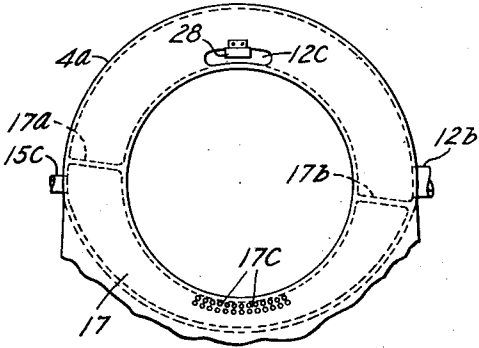


FIG. 6

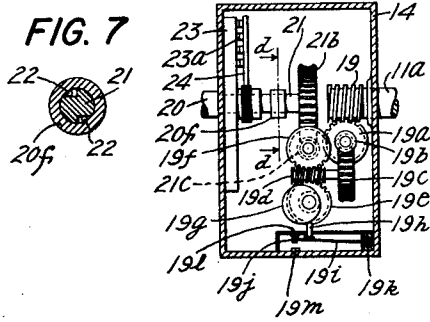
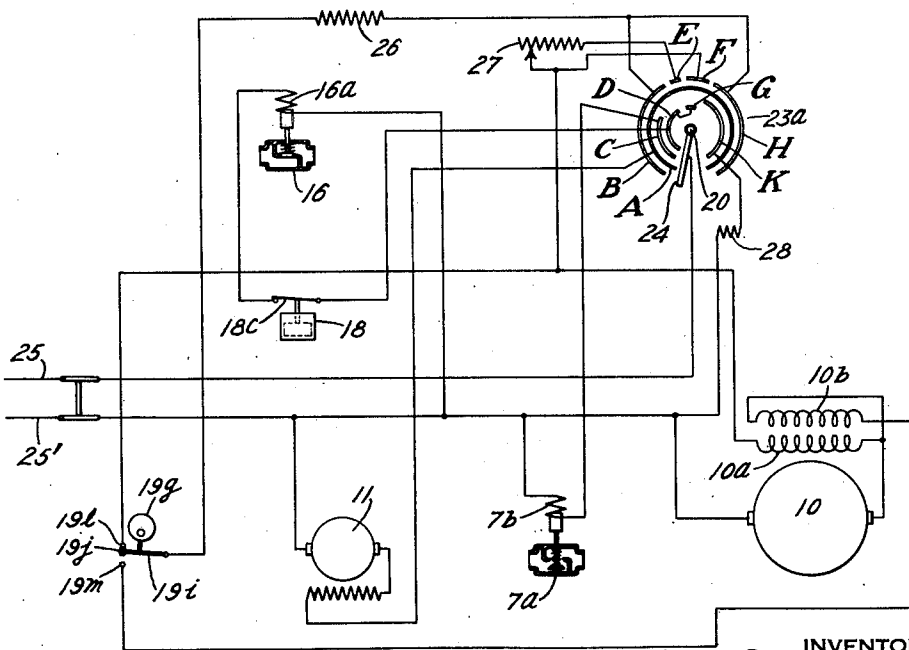


FIG. 8



INVENTOR

Rex Earl Bassett, Jr.

BY

BY
Lawrence K. Sager
his ATTORNEY

ATTORNEY

Dec. 17, 1940.

R. E. BASSETT, JR

2,225,407

WASHING MACHINE

Filed Feb. 14, 1935

5 Sheets-Sheet 3

FIG. 9

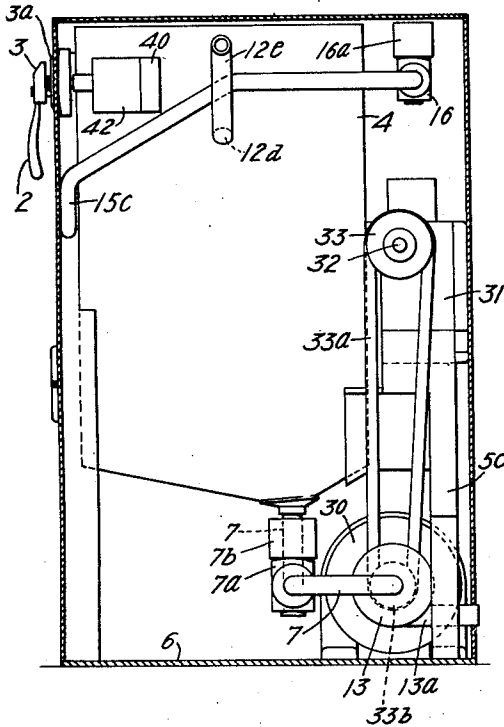


FIG. 10

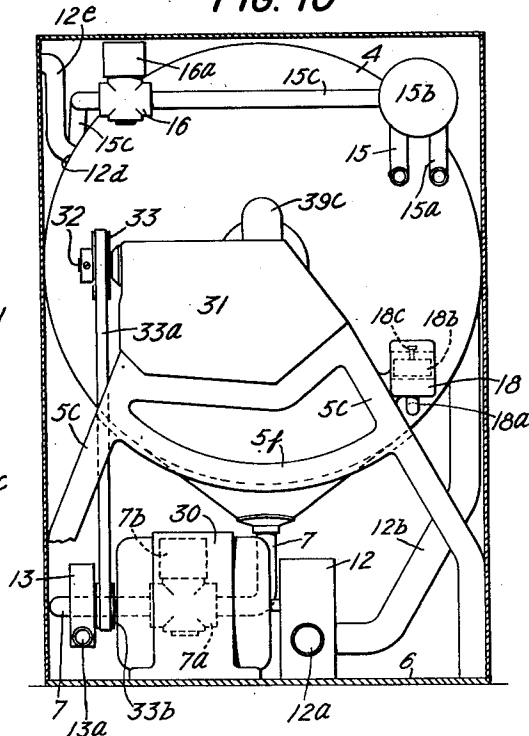
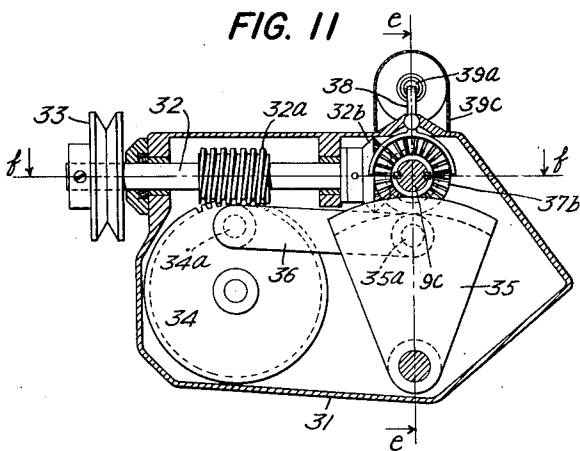


FIG. 11



INVENTOR
Rex Carl Bassett, Jr.
BY
Lawrence K. Sager
his ATTORNEY

Dec. 17, 1940.

R. E. BASSETT, JR

2,225,407

WASHING MACHINE

Filed Feb. 14, 1935

5 Sheets-Sheet 4

FIG. 12

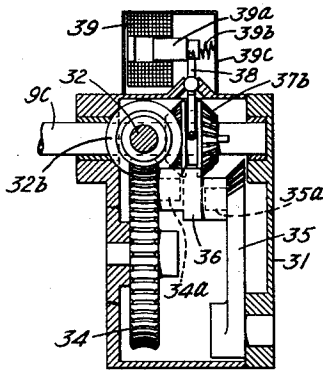


FIG. 13

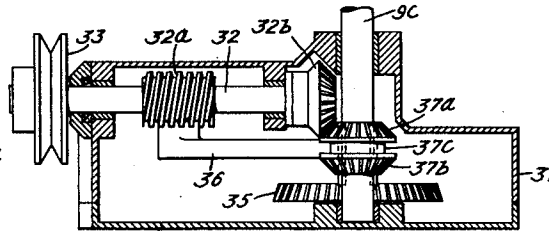


FIG. 14

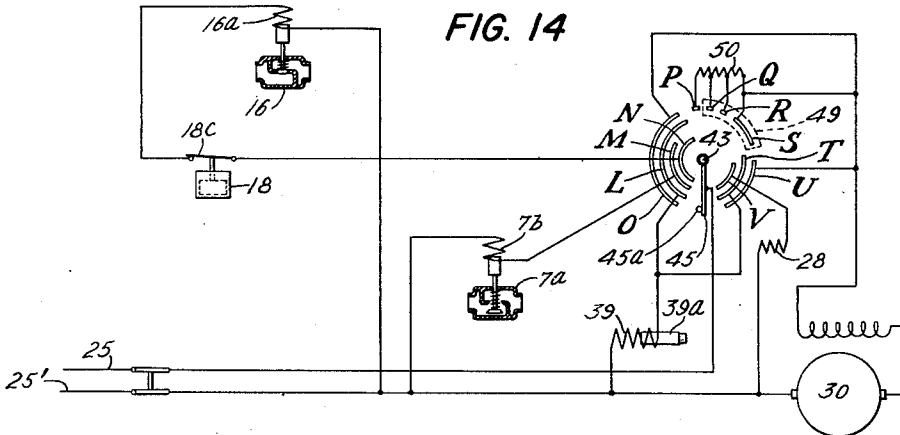


FIG. 15

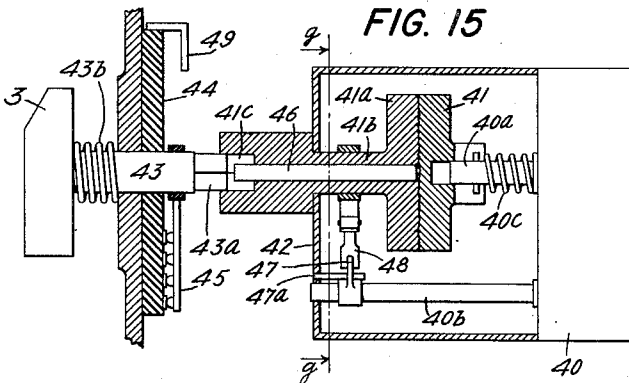
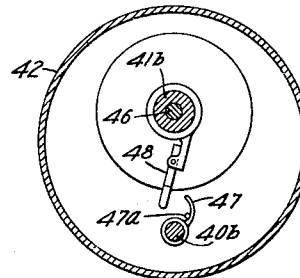


FIG. 16



Rex Carl Bassett, Jr. INVENTOR
BY
Lawrence K. Sager
his ATTORNEY

Dec. 17, 1940.

R. E. BASSETT, JR

2,225,407

WASHING MACHINE

Filed Feb. 14, 1935

5 Sheets-Sheet 5

FIG. 17

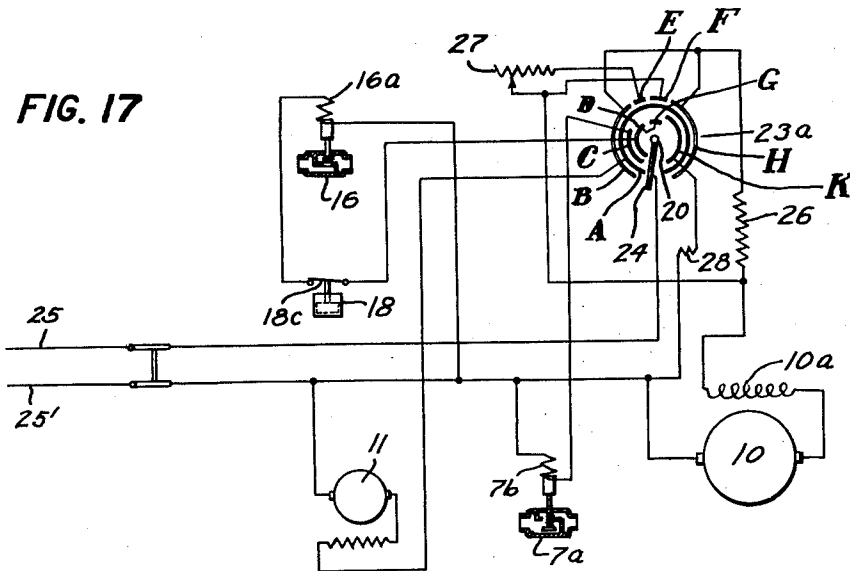
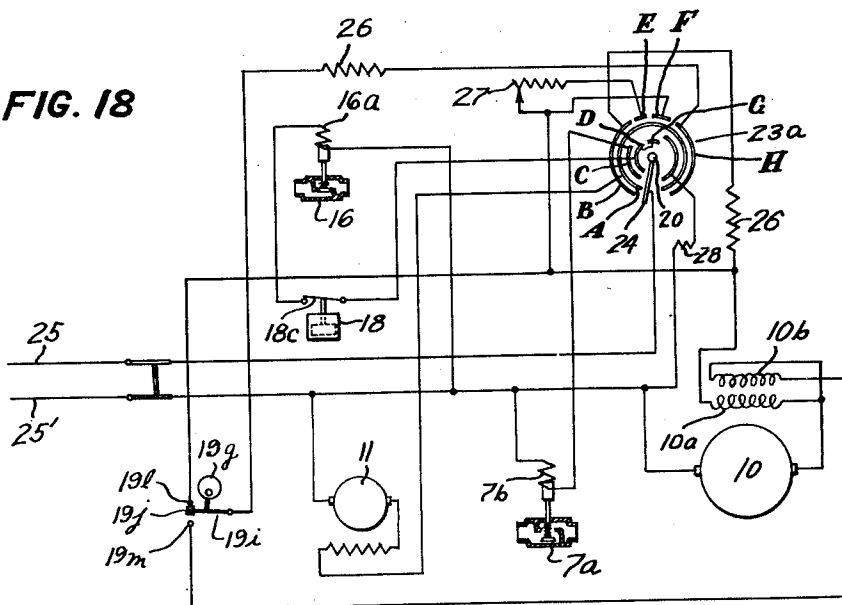


FIG. 18



INVENTOR.

Rex Carl Bassett, Jr.

BY

Williams, Broadbent, McCaleb & Hinkle

ATTORNEYS.

UNITED STATES PATENT OFFICE

2,225,407

WASHING MACHINE

Rex Earl Bassett, Jr., New Rochelle, N. Y., assignor to Laundri-Matic Corporation, a corporation of New York

Application February 14, 1935, Serial No. 6,425

18 Claims. (Cl. 68—12)

This invention particularly relates to textile washing machines, and is applicable to dry cleaning and to other special purposes in some features thereof. It may be made of any desired capacity and is especially advantageous in small sized units for use in small apartments where space occupied, quiet operation and pleasing appearance are important qualities. It is also especially advantageous where the washing, rinsing, extracting and drying are to be accomplished in one machine and without the necessity of any intermediate hand control or of any intermediate handling of the textiles.

One of the main objects is provision of a machine of comparatively small size adapted to be enclosed in a cabinet of a simple and pleasing form which may be directly mounted on the floor or on a low frame. Another object is to give ready accessibility for the insertion and removal of the textiles through a door in the front while leaving the flat top undisturbed and conveniently usable for other purposes. The controls are likewise conveniently mounted and usable at the front of the cabinet. Another important object is to render the machine dependably and safely automatic in the various operations without attention by the user giving efficient washing, rinsing, extracting and drying in one container. Another object is to permit the user to control, when desired, the length of time of any of the automatic operations by mere setting of the control handle. Another object is the automatic distribution in proper balance of the textiles before the container is accelerated to high speed for centrifugally extracting the liquid after rinsing. Another special object is the drying of the textiles to any desired degree by tumbling the textiles so as to be variously exposed in their surfaces to the drying air current, this air current being heated if desired. Another object is the utilization of parts, mainly current articles of manufacture, without the necessity of special design thereby giving low cost of manufacture. Another object is to relate the parts so that they may be readily and conveniently assembled at low cost and easily inspected and conveniently repaired or replaced. Another object is to provide durability and dependability with long continued use. Other objects and advantages will be understood from the following description and accompanying drawings which illustrate preferred embodiments of the invention.

Figure 1 is a perspective view showing the enclosing cabinet and front panel; Fig. 2 is a rear view of the machine with the rear cover plate removed;

Fig. 3 is a section on the line *a— a* of Fig. 2; Fig. 4 is a vertical central section on the line *b— b* of Fig. 2; Fig. 5 is a side view of the liquid and air distributing ring looking outwardly as indicated by the line *c— c* of Fig. 4; Fig. 6 is an enlarged side view of the control mechanism with the enclosing control box in section; Fig. 7 is an enlarged vertical section on the line *d— d* of Fig. 6; Fig. 8 is a diagram showing the electrical connections of the controller and of the controlled devices; Fig. 9 is a side view of a modified form of the machine with the side plate removed; Fig. 10 is a rear view of the modified form shown in Figure 9 with the rear plate removed; Fig. 11 is an enlarged vertical central section of the gear box of Figs. 9 and 10; Fig. 12 is a vertical section of the gear box on the line *e— e* of Fig. 11; Fig. 13 is a horizontal section of the gear box on the line *f— f* of Fig. 11; Fig. 14 is a diagram of the electric controller and electrical connections of the controlled devices; Fig. 15 is a side view, partly in vertical section, of the control device; Fig. 16 is a vertical section on the line *g— g* of Fig. 15; Fig. 17 is a diagram showing the electrical connections of the controller and the controlled devices for rotating the receiver in one direction only at a comparatively slow speed during the washing period and the drying period; and Fig. 18 is a diagram showing the electrical connections of the controller and the controlled devices for rotating the receiver in one direction only at a comparatively slow speed during the washing period and for alternately driving the receiver in opposite directions during the drying period.

Figure 1 shows the enclosing cabinet of the apparatus which is preferably of well finished sheet metal and is of rectangular form having a flat top and sides. The top and sides are preferably individually removable for access to the enclosed apparatus. The front panel has a door hinged at the bottom and opening outwardly which is firmly held in closed position by any suitable form of latching device 2 at the top. This door may be hinged at the side or top if desired. In the upper right hand corner of the front panel is a manually rotatable indicator arm 3 adapted to pass over a dial 3a which is graduated to indicate the different sequential operations as the arm 3 moves over it in a clockwise direction. This arm may be manually moved forwardly by the user in case it is desired to hasten any of the operations or omit any of them, the apparatus then continuing to function automatically from the new setting on. In the upper left hand corner of the front panel is manually rotatable handle 3b

for controlling the temperature of the entering water as may be desired by the user through a three-way valve for regulating the intake from the hot or cold water supply.

Referring to Figs. 2, 3 and 4, a fixed container 4 of cylindrical form is positioned so that its axis is horizontal and is fixed at one end to the rear of the front panel which is formed with rearwardly extending supports 4a and 4b for this purpose. The front end of the container 4 is provided with a large central opening, as indicated in Fig. 4 opposite the door 1 of the front panel. The rear end of the container 4 is closed and has a small central opening which fits over a fixed support 5. It is held in place on the support 5 by a ring 5a which engages the inner portion of the container 4 to clamp it against the part 5 and the ring also has an inwardly extending portion contacting with the part 5 and also clamping a gasket 5b to form a water seal. The support 5 forms part of a bracket support having downwardly extending arms 5c and legs 5d which form supports from the base 6 of the machine. The container 4, at its lower part, has a downwardly extending formed portion 4c which is inclined downwardly toward the rear of the cabinet and is supported, at its lower portion, by a flange 5e extending forwardly from a web 5f extending between the arms 5c of the supporting bracket. A drain pipe 7 enters the lowest end of the container 4 through the web 5f, as shown in Figs. 2 and 4.

Within the fixed container 4 is mounted a receiver 8 of cylindrical form and rotatable on a horizontal axis. It has a central circular opening 8a at the front end opposite the door 1 of the cabinet. The cylindrical portion is perforated by a series of closely placed small openings 8b for permitting the free passage of the liquid from the container 4 to and from the clothes within the receiver 8. Mounted within the cylindrical portion of the receiver are axially extending baffle plates 8d for purposes of agitation during the washing, rinsing and final drying operations. These plates extend inwardly a short distance within the receiver and are preferably three in number equally spaced apart. The rear end of the receiver is entirely closed by the end portion thereof and is deflected inwardly, as shown in Fig. 4, and fixed to a rotatable support 8c which is in turn keyed or otherwise fixed to a rotatable shaft 9. The support 5 not only forms a support for the stationary container 4 but also forms a bearing and support for the shaft 9. The reduced end of the shaft 9 extends rearwardly through the bearing 5 and has fixed thereto the driving pulley 9b. This pulley is driven by a belt 9a from the driving electric motor 10 mounted on the base in the rear left hand corner of the machine, being shown at the right in Fig. 2.

On the base at the right hand side of the machine, as shown in Fig. 3, is mounted another electric motor 11. On its rearwardly extending shaft and driven thereby is mounted the rotatable element of a centrifugal blower 12; and on a further rearward extension of the motor driven shaft is mounted the rotatable element of a centrifugal pump 13. On the forwardly extending shaft of the motor 11 is mounted a driving element serving to actuate the automatic sequence controlling devices contained within the control box 14.

The water supply is derived from two pipes 15 and 15a which extend through the rear plate of the cabinet and are connected, one to a hot

water house supply pipe and the other to a cold water house supply pipe. The two pipes 15 and 15a enter a three-way valve 15b of any usual type, from which extends a delivery pipe 15c across the rear of the machine at the top. From the valve 15b forwardly extends control shaft 15d to the front of the machine, as shown in Fig. 4, which is connected at its front end to the water control handle 3b on the front panel of the machine in the upper left hand corner. Thus by turning the handle 3b the incoming supply of hot or cold water, or both, may be regulated by means of the three-way valve to give any desired temperature of the water entering the machine. In the water supply pipe 15c, which crosses the rear top portion of the machine, is inserted an automatically controlled intake water valve 16, as shown in Fig. 2. This valve is normally closed by spring pressure or gravity and automatically opened by exciting the coil of a solenoid magnet contained within the top portion 16a of the valve. This valve structure may be of any form which normally seeks the closed position and is opened only when its controlling coil is energized. The intake water supply pipe, after passing through the valve 16, extends forwardly and downwardly and is connected at its front end to a hollow ring casting 17 which is formed on the rear of the front panel, as shown in Fig. 4, and is shown more in detail in Fig. 5. This ring casting 17 is concentric with the horizontal axis of the machine and forms a circular entrance to the receiver 8 when the door is opened. The ring 17 is hollow, as shown in Fig. 4, and, as shown in Fig. 5, the hollow opening is partitioned into an upper and lower part by partitions 17a and 17b which are somewhat displaced from the horizontal for convenience of connection to the supply piping. The lower divided portion of the ring serves as the intake and distributor of the water or other cleaning liquid and is perforated at its lower central portion by a series of openings 17c which serve to deliver and spray the water through the opening 8a of the receiver on to the clothes within it. These perforations 17c are likewise shown in Fig. 4. Thus, when the water supply is on, the clothes are quite uniformly sprayed during the initial wetting for washing and also during the rinsing process. The ring 17 has an inclined outer surface, as shown in Fig. 4, and the inner side of the door 1 carries an inwardly extending circular flange 1a which carries a circular gasket 1b which, when the door is closed, engages the inclined front face of the ring 17 and serves to form a seal against leakage of the liquid. This gasket may be of rubber or any suitable yieldable material.

The air supply for drying the clothes is taken from a continuously operating air pump 12, as shown in Fig. 3, coming from an entrance pipe 12a through an opening in the right hand side cover plate near the base of the machine and, after passing through the pump, is forced through an outlet pipe 12b, which extends across the lower portion of the machine and upwardly at the front portion and then into the upper partitioned half of the ring 17, as shown in Fig. 5. The air flow passes through this hollow ring and then out through an elongated opening 12c located at the lower part of the top portion of the ring 17 so as to deliver air downwardly toward the central opening 8a of the receiver, as shown in Fig. 4. An outlet for the air current is provided by a hole 12d at the right hand upper side

portion of the container 4, as shown in Fig. 3, from which hole the pipe 12e leads upwardly and out through a hole at the top of the right hand side plate of the cabinet.

5 The drain pipe 7 from the container 4 passes through an automatically controlled valve 7a, as shown in Fig. 2. This valve is spring pressed to normally assume an open position and is automatically closed by a solenoid magnet contained within the top portion 7b of the valve. This electromagnetic valve may be of any form which is adapted to close when energized and to open when de-energized. The drain pipe 7 continues from this valve and is connected to the 10 intake of the continuously operated pump 13. The outlet 13a of the pump, as shown in Figs. 2 and 3, passes out through an opening in the side plate of the cabinet at the lower right hand corner and is connected to the waste drain of the household.

Mounted on one of the arms 5c of the supporting bracket, is a float switch 18, as shown in Figs. 2 and 3, in the form of a closed box from the bottom of which extends a pipe 18a which 25 connects through an opening in the lower portion of the container 4 with the interior thereof. This is so located that when the water level reaches a predetermined height, the float 18b will rise and force upwardly a switch contact 18c and thereby interrupt the circuit of the electromagnetic valve 16 and permit the closing thereof. Thus the supply of washing liquid can never rise above this predetermined level, even though the control circuit of this valve be controlled tending to open the valve at another 35 control contact of the circuit.

The sequence control mechanism contained within the control box 14 is, as shown in Fig. 6, driven by the shaft 11a of the control motor 11. 40 Within the box on the end of the shaft 11a is a worm 19 driving a worm wheel 19a, the shaft of which carries a worm 19b which in turn drives a worm wheel 19c having a shaft extending at right angles to the shaft of the wheel 19a. It will be understood that the shafts of this driving mechanism are suitably supported in bearings in a manner understood by those skilled in the art, these bearing supports being omitted from Fig. 6 for the sake of clearness. The shaft of the 50 wheel 19c in turn carries a worm 19d which drives a worm wheel 19e as well as an upper worm wheel 19f, these driving wheels having parallel shafts at right angles to the shaft of the worm wheel 19d. The shaft of the wheel 19e carries a fixed eccentric or cam 19g which is adapted to intermittently engage and depress a pin 19h. This pin is fixed at its lower end to a flexible element 19i which carries a contact 19j at its outer end and is fixedly supported at 60 its other end to support 19k. When the pin is not engaged by the cam 19g, the contact 19j makes engagement with an upper fixed contact 19l and when the pin 19h is depressed by the cam, it is caused to engage a fixed contact 19m mounted on the base of the control box. It will, of course, be understood that these engaging contacts are electrically insulated from the rest of the apparatus and that the element 19i is mounted upon an insulating support and that 70 the pin 19h is likewise insulated from the flexible element 19i. Thus by this gear reduction, the eccentric 19g makes one revolution for a very large number of revolutions of the motor shaft 11a; any suitable form of speed reduction mechanism may be used and the reduction propor-

tioned to give the desired ratio of revolutions of the driving shaft to that of the eccentric shaft.

On the opposite side of the control box 14 from the shaft 11a is mounted another shaft 20 shown in alignment with the shaft 11a. The shaft 20 5 extends outwardly and carries at its outer end a bevel gear 20a, as shown in Fig. 3, which in turn meshes with another bevel gear 20b fixed on the lower end of an upwardly extending vertical shaft 20c. This is suitably supported in bearings 10 mounted on the inside of the front panel and carries at its upper end another bevel gear 20d which in turn meshes with a bevel gear 20e on the inner end of a shaft passing through the front panel in the upper right hand corner 15 thereof. On the outer end of this shaft is fixed the indicator arm 3 which indicates, by its movement with reference to the dial 3a, the successive stages of operation and the particular function being performed by the apparatus at any 20 phase of the operating movement. The indicator 3 is controlled to make nearly one complete revolution during the entire series of operations.

Returning to Fig. 6, the shaft 20 extends inwardly through the control box and is connected 25 by a one way acting clutch to another shaft 21. A suitable form of clutch is shown in Fig. 7, wherein balls or rollers 22 are located in cut-away portions on the outside of the shaft 21 and enclosed by a sleeve 20f which is fixed to shaft 20. 30 When the shaft 21 is turned in one direction, that is clockwise, in looking at Fig. 7, shaft 20 will be directly driven thereby. It is likewise evident that when shaft 20 and its sleeve 20f is turned independently of movement of the shaft 35 21 in a clockwise direction, the shaft 21 will not be moved thereby. Thus the shaft 20 may be advanced by the turning of the indicator arm 3 to any position desired on the index dial without turning the shaft 21.

The shaft 21 has fixed to its inner end a worm 40 gear 21b which is driven by a worm 21c on the shaft which carries the worm wheel 19f and which, as above pointed out, is driven by the worm 19d. Thus, in normal operation, the shaft 45 21 is driven by the motor shaft 11a at a great reduction in speed, this reduction being such that the shaft 21 is turned nearly one complete revolution during the complete sequence of the operations of the machine.

The various operations are electrically controlled by means of a sequence controller driven by the shaft 20. This consists of a stationary insulating disc 23 mounted on the wall of the control box 14 and concentric with the shaft 20. 50 The insulating block 23 carries a series of concentric contacts 23a, as shown in Fig. 8. Fixed to the shaft 20, but insulated therefrom, is a contact arm 24 which carries a series of contacts adapted to engage respectively with the contacts 60 23a. The contacts carried by the arm 24 should be individually spring pressed against the contacts 23a so as to insure proper engagement therewith as the arm 24 passes over them and any proper mounting of the movable contacts 65 that will insure connection of them with the contact arm 24 and proper engagement with contacts 23a when the arm passes over them, may be utilized, as will be understood by those skilled in the art. Likewise, instead of making the controller in the form of a disc controller, it may be made in the form of a drum controller having the contacts 23a carried by a drum mounted on the shaft 20 and rotatable therewith while the 70 engaging contacts of arm 24 are fixed in posi- 75

tion, as will be understood by those skilled in the art.

Referring to Fig. 8, the electrical connections of the various parts already described are shown in their relations to the electric controller. The main driving motor 10 is shown in the lower right hand corner of the diagram and is indicated as a series type, or universal motor having an armature with commutator connected in series with one or the other of the reversible field windings 10a and 10b, although any form of reversible motor may be used and controlled to reverse its direction of rotation. The control motor 11, which drives the air pump 12 and water pump 13, as well as driving the controller arm 24, is likewise shown as a series motor, although any suitable form of motor may be used which will give approximately constant speed, operating continuously in one direction. The supply lines 25, 25' are shown at the left of the diagram and pass through a main switch, such as a plug and receptacle, for connecting the supply lines to the apparatus. The reversing switch 19i is shown in the lower left hand corner of the diagram and is biased to have its contact 19j normally engage the upper fixed contact 19l. The eccentric 19g operates to intermittently depress the switch 19i to engage the fixed contact 19m for reversing the direction of rotation of the main driving motor 10, as will hereafter be explained. The float valve 18 controlling the switch 18c is shown connected in series with the winding of the electromagnet 16a controlling the water supply valve 16. The winding of the electromagnet 7b controlling the drain valve 7a is shown connected in series between the supply line 25' and one of the fixed contacts of the controller. A ballast or load resistance 26 is shown connected in series with the switch 19i and in turn is connected to contacts of the controller 23a. It serves to limit the maximum current to a predetermined amount when the motor 10 is reversed. A resistance 27 is connected in series with one of the field windings 10a and with the armature of the motor 10 when the contact arm engages a contact of the controller to which the resistance 27 is connected. This resistance serves as a starting resistance for the main motor when it is to be operated in one direction at high speed and serves to gradually start the motor. When this resistance is cut out of the motor circuit by the controller arm, the motor is brought to high speed. A heating resistance 28 is connected in series between the supply line 25' and one of the contacts of the controller, this resistance being for the purpose of heating the air during the drying operation of the machine and being located in the path of the air as it emerges from the opening 12c as forced by the air pump, as indicated in Fig. 5.

In describing the operation, it may be first assumed that the contact arm 24 of the sequence switch or controller is in the off position, making no contact with the fixed segments of the controller, as indicated in Fig. 8. The indicator arm 3 is then in the vertical position shown in Fig. 1. The door of the front panel is opened and the textiles to be washed are inserted through the opening 8a and placed in the receiver 8. A proper amount of powdered or flaked soap or similar washing material, is thrown over the dry textiles after their insertion. The door 1 of the front panel is then closed. The operator then turns the indicator arm 3 to the right for initiating the operation of the apparatus which then continues

to pass through the different operations in sequence, as automatically carried out by the control devices. The turning of the dial indicator 3 slightly to the right causes, through the bevel gears and shaft 20c, the turning of the shaft 20. This results in the contact arm 24 being moved manually in a clockwise direction to make contact with the strip A of the controller. The contact arm 24 is electrically connected to the supply line 25 and the engagement with contact A closes a circuit to start the control motor 11 as follows: from the arm 24 to contact A and thence to the motor 11 and then to the supply line 25'. This starts the control motor which operates continuously during the entire cycle of movements because the contact strip A is continuous and is the last contact broken when the arm 24 passes off this contact strip, as evident from the controller diagram. As soon as the motor 11 starts, it serves, through the reduction gear already described, to drive the shaft 21 and thereby slowly to move the contact arm 24 over the fixed contacts of the controller. The control motor 11 also serves, during its operation, to drive the drain pump 13 and the air pump 12, insuring the quick emptying of the container 4 at any time the drain valve 7a is open and also serving to pass a continuous flow of air through the receiver, as already described, which becomes effectively utilized in the drying operation. The travel of the contact arm 24 brings the same into engagement with the contact strip B. This closes a circuit through the main driving motor 10 and starts the same in one direction by means of a circuit from the contact arm 24 through the contact strip B, thence through the load resistance 26 to switch 19i to the upper contact 19l and then through the field winding 10a and armature 10 of the motor to the other side of the line. In the meantime, the eccentric 19g of the control box is driven by the motor 11 through the reduction gearing, already described, so that it continuously operates first to force the switch 19i against the contact 19m and then to permit the switch to engage the contact 19l and then to cause it to engage the contact 19m alternately to cause the reversal of the motor 10, as is evident by tracing the circuits. Thus, when the contact 19m is engaged, the current passes from the arm 24 through contact B, load resistance 26, switch 19i, contact 19m and thence through the field winding 10b and motor armature to the other side of the line. This reverses the field of the motor and causes its rotation in an opposite direction from that occurring when the field winding 10a is energized. The reversal of the motor 10 serves, through the driving belt 9a and pulley 9, to reverse the direction of rotation of the receiver 8 for the washing operation. The time of rotation of the eccentric 19g may be made any interval desired but it is preferably geared so that the receiver 8 is turned about one revolution or somewhat more in each direction before reversal.

In addition to engaging the contact B, the arm 24 likewise engages the contact C. This closes a circuit from the line 25 through the arm 24, contact C and winding of the magnet of 7b to the other side of the line. This automatically closes the drain valve 7a. Contact is also made by the arm 24 with the strip D of the controller 70 which closes a circuit from one side of the line, through the float switch 18c and then through the winding of the magnet 16a to the other side of the line. This automatically opens the water supply pipe and permits the entrance of the

washing liquid through the spray holes 17c, the operator having adjusted the handle 3b on the front panel of the cabinet to give a desired temperature of the entering water from the hot or cold water supply by means of the three-way valve 15b. The water continues to rise in the container 4 to a predetermined level at which time the float valve opens the switch 18c and breaks the circuit of the electromagnet of supply valve 16 and permits the same to assume its closed position.

The washing action continues under these conditions for a predetermined time while the arm 24 is slowly travelling over, and in contact with, the four contact strips A, B, C and D. After the washing action has continued a sufficient time to thoroughly wash the textiles, the arm passes off the contact strip C which de-energizes the drain valve and permits it to open and, through the action of the pump 13, the used liquid is rapidly drained from the container 4. The draining of the liquid causes the float valve 18c to close which energizes the circuit of the electromagnet of supply valve 16 and results in a supply of fresh water being sprayed within the receiver through the perforations 17c. In the meantime, while the arm 24 is continuing to travel over the contacts A, B and D, the receiver 8 is being continuously reciprocated and tumbling the textiles therein by the action of the baffles 8d and the continued reversing action. Thus, during this rinsing process, a continuous supply of fresh rinsing water is sprayed upon the textiles while they are variously tumbled and the container 4 is kept empty by the continued action of the pump 12. Thus a thorough and effective rinsing of the textiles takes place.

The rinsing period occurs while the contact arm 24 is travelling from the end of the contact strip C to the ends of the contact strips B and D.

When the arm 24 passes off the contacts B and D, the circuit of the main motor 10 is interrupted and it temporarily ceases to operate and the circuit of the electromagnetic inlet valve is likewise opened permitting this valve to close. The next operation is to extract the surplus water from the textiles by rotating the receiver 8 at high speed in one direction. In accomplishing this result it is vitally important that the textiles be quite evenly distributed circumferentially around the inside of the receiver 8 so that the load producing strain on the receiver 8 is properly balanced. Otherwise the unbalancing will cause a great side strain on the machine, especially at the high speeds, resulting in a pounding and racking effect which might lead to serious damage. It is, therefore, important in the automatic control of the receiver 8 to attain the automatic even distribution of the textiles within the receiver before high speed operation is arrived at. This is accomplished by bringing the speed of the receiver gradually up to high speed. During this gradual increase in speed the textiles which are initially at the bottom of the receiver 8 are gradually carried around and tumbled by the baffles 8d until, as the speed increases, the textiles are gradually and evenly distributed around the interior of the receiver 8 so that, when passing to high speed, no unbalancing exists and the machine operates smoothly at the highest speed for centrifugally extracting the water.

Thus, referring to Fig. 8, the arm 24, after the completion of the washing and rinsing process, next engages the contact E. This closes the circuit of the main motor 10 from the supply

line 25 through arm 24, contact E, resistance 27, field winding 10a and armature 10 to the line 25'. The resistance 27 may be adjusted to give the desired rate of acceleration in speed and, after this has once been determined, the resistance may be fixed. The motor 10 being now operated in one direction continuously and under a much less load than during the washing operation, gradually increases in speed while the arm 24 is passing over the contact E. It then engages the contact F which results in short-circuiting the resistance 27 in the circuit of the motor and permits the motor and receiver 8 to pass to high speed operation for extracting the water. When the arm 24 engages the contact F, it likewise engages the contact G which is electrically connected to contact D and serves to energize the inlet valve for the purpose of a short interval of final rinsing with fresh water. The arm 24 then passes off the contact G while continuing engagement with the contact F for operating the main motor and receiver 8 at high speed for extracting the maximum amount of water centrifugally. This completes the extracting operation.

The contact arm next passes off the contact F for stopping the motor, and after a sufficient time interval permitting the receiver to come to rest, it then engages the contact H to again start the motor. This closes the circuit of the main motor 10 through the load resistance 26 and reversing switch 19i and thus causes the motor 10 and receiver 8 to start and resume the reverse action, the same as took place during the washing operation as previously described. The damp clothes are now tumbled in the receiver 8 by this reverse operation and the continuous air flow through the receiver, as forced by the air pump 12, gives an effective and quick drying operation. The drying is hastened by the electric heater 28 which becomes energized by the arm 24 engaging the contact strip K by a circuit from the arm 24 through contact strip K, heating resistance 28 and thence to the other side of the supply line. The heated air flow soon completes the drying of the clothes during the passage of the arm 24 over the contact strips H and K, after which the main motor and heating resistance circuits are broken by the arm 24 passing off these contact strips. Soon afterward the arm 24 passes off the contact strip A and the circuit of motor 11 is interrupted and the cycle of operations is then completed.

The user then opens the door 1 of the front panel and removes the dry textiles. Thus the soiled textiles or fabrics are introduced into the machine dry, are subjected to a thorough washing, rinsing, extracting and drying operation in sequence and at the completion of the cycle, the textiles are removed from the machine clean and dry.

If, at any time the user desires to hasten any one of the sequential operations, or to pass over them quickly, the operator may turn the indicator arm 3 in a clockwise direction to any part of the dial and then let the machine continue the automatic operation from that point on or until again hastened by the user. In this manual turning of the indicator arm 3, the shaft 20 is turned, as already explained, together with the contact arm 24, the one way clutch, already described, permitting this manual forward adjustment. After such adjustment the control motor 11 takes up the continued movement of the arm 24 as already described.

It is thus apparent that by this improvement, the machine serves to effectively carry out the washing, rinsing, distributing, extracting and drying operations all within a single container and receiver in an automatically controlled series of operations without the use of any auxiliary compartments, tanks or supplementary apparatus. It is conveniently accessible through the front panel door on the front side of the machine for introduction and withdrawal of the fabrics and avoids the necessity of any intermediate handling, splashing or dripping of water or of the washing liquid. It likewise, by its simplicity and utilization of one container and receiver for all purposes, permits the unit to be made of a comparatively small size adapted for use in small apartments while being of ample capacity. The unit is obviously capable of being made in different sizes for fulfilling the requirements of the larger households.

It is evident that the duration of the different periods of the cycle may be changed by lengthening or shortening the contact strips of the electric controller and, if desired, one or more of the sequential operations may be omitted without departing from the scope of the invention, and various changes may obviously be made in the structure and relationship of the various parts of the apparatus.

In case it be desired to soak the fabrics in the machine before washing, the apparatus could be started in the usual way and then stopped at the initiation of the washing period, as by pulling out the plug connection to the house wiring, or otherwise opening the main circuit. In such a case if the house drain is above the drain outlet of the machine, the stopping of the drain pump would avoid emptying the container; and if the house drain is below the drain outlet of the machine, a shut off valve in the drain connection could be manually closed. The soaking could also be accomplished without starting the machine by providing a by-pass having a manual valve, around the automatic valve 16 for filling with washing liquid. Likewise, in case only a comparatively short period of soaking were desired, the controller 23a could be modified by delaying the starting of the motor 10 for permitting a soaking period while the arm 24 slowly traverses the strips A, C and D for some distance before engaging the strip B. This could obviously be accomplished by extending the strips A, C and D some distance in a counterclockwise direction, with reference to Fig. 8, beyond the lower end of strip B which controls the motor 10.

Also although an air blower 12 has been described for maintaining a circulation of air through the receiver 8 for drying the fabrics, this air blower may be omitted in some instances. A sufficient passage of air through the receiver 8 for drying may be obtained by the receiver 8 itself acting as a blower because it acts to pass the air outwardly therethrough and through the fabrics. Thus if an air inlet be provided to permit air to pass into the receiver and an outlet for the air be provided from the container located above the inflowing air, the desired passage of air through the receiver and container for drying may be obtained. The baffles 8d serve to assist the air flow and special fan blades could be attached to the receiver if desired.

Although in the above described machine the receiver 8 is driven alternately in opposite di-

rections during the washing and drying periods, the control could readily be modified to drive the receiver 8 in one direction only at a comparatively slow speed during either one or both of these periods and still obtain satisfactory washing and drying operations. In that case the reversing switch 19i would be unnecessary and the circuit of motor 10 would then pass from contact strips B or H, or both strips, through a suitable resistance such as 26 for maintaining a low speed and then through the motor to the other side of the line, as shown in Figs. 17 and 18. In such a slow speed movement of the receiver 8 in one direction only, the fabrics are carried along by the baffles and then fall or tumble as they approach or arrive at the inside top of the receiver, during either the washing or drying period or both, as desired.

In the remaining figures of the drawings another embodiment of the invention is shown wherein only one electric motor is used which operates continuously in one direction and wherein the time control of the different operations is dependent upon a clock mechanism as another embodiment of the invention, instead of using a control motor with a reduction gear, for this purpose. Likewise, in this further embodiment of the invention, instead of reversing the main motor, a reversing gear is utilized for obtaining the reverse action during the washing operation and during the drying operation.

Thus referring to Figs. 9, 10 and 14, the parts having the same reference characters as already referred to, are similar to those already described. The single driving electric motor 30 is mounted on the base at the rear of the machine and has its axis parallel with the front panel of the cabinet. The shaft of this motor drives the main pump 13 mounted at one side of the motor and the air pump 12 mounted at the other side of the motor. The bottom of the container 4 is converged towards the middle, as indicated in Fig. 9, and the drain connection is connected thereto at its lowest point and passes through the electromagnetically controlled drain valve 7a, normally open, and thence to the pump 13 which delivers to the waste system of the household. The air pump 12 has its inlet through a hole in the rear of the cabinet and an outlet, which is connected by the pipe 12b, preferably of copper and bendable, to the upper half section of the ring 17, the same as described in the former apparatus. The water supply is likewise the same as already described, the supply pipe 15c having located therein the electromagnetically controlled valve 16, normally closed, and the outlet end of the pipe 15c is connected to the lower part of the casting 17 as previously described. As thus far described, the structure is generally similar to that disclosed by Figs. 1 to 8 and similar corresponding parts need not be again particularly described.

The gear drive for controlling the rotation of the receiver 8 is, as shown in Figs. 9 and 10, enclosed within a box 31 mounted at the rear of the machine and is supported by the bracket which likewise serves as the bearing support for the shaft driving the receiver 8 and which also serves to support the rear end of the container 4. The horizontal shaft 32 has an end projecting through the gear box at the right upper corner and carries a pulley 33 which is driven by a belt 33a which in turn is driven by a pulley 33b on the shaft of the motor 30.

Referring to Figs. 11 to 13, the shaft 32 is 75

shown mounted in bearings depending from the top of the gear case and has fixed to it a worm 32a. This worm continuously drives in one direction the worm wheel 34 supported by a stub shaft mounted from the inner front side of the gear case. Pivotally supported on a stub shaft at the bottom of the gear case extending from the outer rear portion of the case is a segmental gear 35 having beveled teeth on the inner upper periphery thereof. A link 36 has offset portions at its outer ends which respectively pivotally engage hubs 34a and 35a on the worm wheel 34 and segmental gear 35. Thus the continuous rotation of the wheel 34 will, through the link 36, rock the segment 35 back and forth on its pivot. On the inner end of the driving shaft 32 is fixed a bevel gear 32b. The shaft 9 which drives the rotatable receiver 8 of the machine is, as shown in Fig. 13, provided with an extension 9c which enters the gear box and is supported in opposite sides thereof. The axis of this shaft is in the horizontal plane of the axis of the driving shaft 32 and carries a double bevel gear 37a and 37b. This double bevel gear is slidably keyed to the shaft 9c and may be moved to cause the bevel portion 37a to engage the bevel gear 32b, or may be moved to cause the bevel gear portion 37b to engage the segmental bevel gear 35. The double bevel gear has a central circular slot 37c. This slot is engaged by the forks of a shifting element 38 which is pivotally mounted above the gear in an upwardly extending portion of the top of the gear case, as shown in Fig. 12. On the top of the gear case is mounted a solenoid magnet having a winding 39 and a plunger 39a, the axis of which is horizontal. The outer end of the plunger is above the shifter 38, the latter being pivotally connected thereto by a pin and slot connection. A tension spring 39b is secured at one end of the enclosing box 39c of the magnet and at its other end to the end of the plunger 39a. The spring thus tends to move the plunger and shifter 38 so that normally the bevel gear portion 37a is in engagement with the gear 32b.

In this modification of the invention instead of using an electric motor driven electric controller as in the embodiment first described, the actuator for the controller is independently driven by a clock mechanism. This driving means may be of any suitable form, such as the usual spring wound clock mechanism with the usual escapement and for present purposes the same should be geared so as to drive the actuated shaft about one revolution during a period of 30 or 40 minutes, which is assumed to be the time necessary for passing through the complete cycle of operations. In Figs. 15 and 16 the clock mechanism is indicated generally by the closed casing 40 from the face of which projects the driven clock mechanism shaft 40a and also below the same projects a shaft 40b which is the shaft for winding the clock mechanism. Slidably mounted on the outer end of the shaft 40a and driven thereby is one element 41 of a disk clutch. The other element 41a of this clutch is secured to a shaft 41b mounted in the enclosing casing 42. The outer end of the shaft 41b is enlarged outside of the casing and has a square central hole 41c in its outer end. The control indicator arm 3 mounted in the upper right hand corner in the front panel of the cabinet, as shown in Fig. 1, is in the present case secured to a shaft 43 which passes through the panel. The inner end 43a of this shaft is squared to slidably engage the

hole 41c. The shaft 43 is slidably mounted in the front panel so that it may be pushed inwardly by the user, a compression spring 43b normally tending to hold the shaft 43 outwardly so that, although still having a driving engagement with the shaft 41b, it is not normally pushed in the full distance within the hole 41c. Mounted upon the inside face of the front panel in a fixed position is an insulating disk 44, the inner face of which carries the concentric contact strips of the controller. The shaft 43 is freely movable through the center of this longitudinally. The shaft 43 drives the insulated contact arm 45 which engages through yieldable movable contacts, the contact strips on the face of the disk 44. A pin 46 is freely movable longitudinally through a central hole in the shaft 41b and likewise freely movable through the clutch element 41a and engages, at its inner end the center of the clutch element 41. The other end of the pin is extended to engage the inner end of the squared portion of the shaft 41a. Around the driving shaft 40a of the clock mechanism is a compression spring 40c which forces the clutch element 41 into engagement with the clutch element 41a under normal operating conditions.

The clock mechanism is manually wound by the operator by turning the indicator arm 3 in a counterclockwise direction which is reverse to the direction of travel of the arm 3 during operating conditions. For this purpose a curved arm 47 is fixed to the winding shaft 40b of the clock mechanism and is engaged at its outer end by an arm 48 fixed to the shaft 41b. It is evident from Fig. 16, that when the arm 48 is turned in a counterclockwise direction, it will turn the arm 47 and its shaft 40b in a clockwise direction and so wind the spring of the clock sufficiently to operate the same an hour or more. The arm 48 is made in two parts, as indicated in Fig. 16, one part being pivotally mounted on the outer end of the inner part so that in case the arm 47 is in the path of the movement of the arm 48, when the latter is turned in a clockwise direction, the pivoted end of the arm 48 will pass over the arm 47. When the arm 48 is moved in a counterclockwise direction, the outer pivoted end of the arm 48 is prevented from rotation on its pivot in the opposite direction and, therefore, is capable of forcing the arm 47 in a direction to wind the clock. It will be understood that the winding shaft 40b of the clock is driven in a counterclockwise direction as the clock unwinds, and a pin 47a fixed on the outer casing of the clock limits the movement of the arm 47 in a counterclockwise direction.

Fixed to the insulating disk 44 is a segment 49 which overhangs certain contacts of the controller, as shown in Fig. 15. This segment permits the contact arm 45 to pass freely under it when normally driven and serves as a protector for insuring proper operation of the contact arm 45 when manually moved by the operator. Thus whenever the operator wishes to turn the dial indicator arm 3 manually, to reverse the same for winding the clock mechanism, or to advance the same during normal operation of the machine, in order to selectively hasten some of the operations, the arm 3 must be pushed inwardly as it cannot be turned against the clock mechanism. When thus pushed in, the pin 46 is moved inwardly and forces the clutch member 41 away from the clutch member 41a against the pressure of the spring 40c. This releases the clock mechanism from the shaft 41b and permits the

operator freely to turn the same in a counter-clockwise direction for starting the automatic operation, or to turn the shaft in a clockwise direction to hasten the normal operations when desired. During this movement the arm 45 can freely pass over the outside of the protective segment 49 but cannot be permitted to engage any of the segments under this shield when released by the operator because the shield will then hold the arm 45 from coming into contact with the contact strips on the insulating disk 44. By further turning the arm 3 and contact arm 45, the operator may move the same past the shield 49 and permit it to engage segments at any other portion of the controller.

The control of the various parts of this form of the invention and the automatic action thereof will be understood by reference to Fig. 14 wherein parts already described are similarly designated. Fig. 14 shows the parts in their inoperative condition. The arm 45 is then in engagement with a pin 45a where it has been forced by the clock in completion of the sequential operations of the machine. After the operator has inserted the textiles within the receiver 8 and sprinkled the same with the washing substance, such as powdered or flaked soap, the dial arm 3 will be pushed inwardly and turned counterclockwise which will push the pin 46 inwardly and unlatch the clutch from the clock mechanism and cause the winding of the clock and bring the arm 45 to engage the other side of the pin 45a. The arm 3 is then released and the closing of the clutch will permit the clock to start driving the contact arm 45 in a clockwise direction. The contact strips of the fixed portion of the controller are represented in Fig. 14 and also in Fig. 8 as viewed from the front of the machine for simplicity of understanding. As the arm 45 moves from the pin 45a in a clockwise direction, it first engages the three inner concentric contact strips L, M and N. The engagement with the strip M closes the circuit from the line 25 through the arm 45 to the strip M and thence through the winding of the electromagnetic drain valve to the other side of the line. This closes the drain valve. The engagement with the contact strip L closes the circuit across the line through the winding 39 of the gear controlling magnet and forces the portion 37b of the bevel gear into engagement with the segmental gear 35. The engagement with the contact N closes a circuit across the line through the float switch 18c and the winding of the water supply valve 16 to permit the spraying of the incoming water over the textiles in the receiver 8. The opening of this circuit by the float switch, at a predetermined level of the washing liquid, will permit the automatic closure of the water supply valve. The engagement of the contact arm 45 with the outer contact strip O closes a circuit from one side of the line through the strip O to the field winding and armature of the motor 30 and to the other side of the line. This starts the electric driving motor 30 which drives the shaft 32 of the gear box and by means of the worm and wheel drive and link 36 causes a reciprocating movement of the segmental gear 35. The gear ratio is such that the receiver 8 will be alternately driven in opposite directions through the segmental gear 35 about one revolution or somewhat more in each direction. This reversing washing action continues while the contact arm 45 continues to travel in a clockwise direction over the contact strips L, M, N

and O. After a suitable washing period, the arm 45 passes off the strip M, at which time the circuit of the winding of the drain valve 7a is broken, permitting the same to open and allowing the drain pump to force the waste water out of the machine.

The lowering of the liquid level in the container 4 soon permits the closure of the float switch 18c which causes the energization of the winding of the inlet valve to admit a supply of fresh water. Thus, while the receiver 8 is continuing to be reversed by the driving gear and tumbling the textiles, the water is sprayed within the receiver to give an effective rinsing of the textiles while the contact arm continues to pass over the contact strips L, N and O. It then passes off the strip O which breaks the circuit of the motor 30 and stops the driving of the receiver 8. The arm next passes off the contact strip N and breaks the circuit of the winding of the inlet valve permitting it to close; and it likewise passes off the strip L and breaks the circuit of the winding 39, permitting the spring 39b to draw the plunger 39a to its initial position and thereby shift the bevel gear portion 37a into engagement with the bevel gear 32b. This completes the rinsing operation. The controller is now in a position to initiate the extraction of the water from the textiles by high speed centrifugal action and in passing to this operation, the receiver 8 must be gradually increased in speed so as to permit the even distribution of the textiles within the receiver 8 to give a proper balancing thereof before passing into the high speed operation of the receiver in one direction of rotation.

For this extracting operation, the arm first engages contact strip P which closes the motor circuit from one side of the line through the resistance 50 and thence through the motor to the other side of the line. This resistance serves to start the motor at slow speed and to give a comparatively slow rotation of the receiver 8 in one direction, the bevel gears 37a and 32b being now in engagement for this purpose. The continued movement of the contact arm 45 causes it to next engage the contact Q which results in somewhat increasing the speed of the motor by cutting out a portion of the starting resistance 50. Further movement of the contact arm results in cutting out another section of this resistance by engagement with the contact strip R. In next engaging the contact strip S, all of the resistance 50 is removed from the circuit of the motor which results in the receiver 8 being driven at a high speed for centrifugally forcing the water from the textiles. This high speed action continues while the contact arm 45 traverses the strip S. During the gradual increase in speed of the receiver 8 and before attaining high speed, the textiles will be evenly distributed around the inside of the receiver 8 as the starting resistance is gradually cut out, thus preventing the possible damaging results and objectionable operation which would accompany high speed operation if the load were unbalanced. Although the resistance 50 is divided into 3 sections, this number may be made more or less depending upon the maximum speed of the machine and other factors of design. Thus, in Fig. 8, only one step of a starting resistance is utilized.

In Fig. 14 the dotted lines enclosing the contact strips Q, R and S indicate the shield 49 previously described in connection with Fig. 15. This shield, as already explained, permits the

contact arm 45 to pass under the same during the normal sequential operation of the apparatus, but when the operator attempts to turn the indicator arm 3, after pushing it inwardly, the shield will not permit the operator to cause the manual engagement of the contact arm 45 with the strips Q, R and S because the arm 45 must be turned beyond the two limits of the shield 49, in one direction or the other, before the contact arm 45 is permitted to engage any of the contact strips. If the operator wishes to hasten or pass over any of the operations of the machine otherwise automatically controlled, the indicator arm 3 may be pushed inwardly and advanced during the normal operation of the machine, to any position and from there continued, but the shield 49 requires the automatic control and proper inclusion of the sections of the resistance 50 in the motor circuit during the gradual increase in speed and equalization of the load when passing to the high speed extracting operation.

After completion of the extraction process, by the contact arm passing off the strip S for stopping the motor 30, and after permitting a sufficient time interval for the receiver 8 to come to rest, the contact arm 45 next engages the contact strip T. This excites the solenoid magnet winding 39 which shifts the double bevel gear so that the portion 37b is moved into engagement with the segmental gear 35. The contact strip U is next engaged by the contact arm which closes the circuit of the electric motor which thereby causes the driving of the receiver 8 in a forward and backward rotation alternately, as already explained with reference to the washing action. The circuit of the heating resistance 28 is also closed at this time by the contact arm engaging the strip V. Thus during the tumbling of the textiles by the forward and backward motion of the receiver 8, the air flow through the receiver, as forced by the pump 12, is caused to pass around the heating resistance 28 giving a warm flow of air through the receiver. Thus the textiles are dried while the contact arm 45 slowly travels over the length of the strips T, U and V. The cycle of operations is completed by the contact arm 45 passing from the ends of the strips U and V, which stops the motor and breaks the circuit through the heating resistance and then passing off the strip T, which opens the circuit of the winding 39 and permits the double gear to be shifted to its normal position by spring 39b into engagement with the bevel gear 32b. The arm 45 then continues its travel, as propelled by the clock mechanism, until it engages the pin 45a, as shown in Fig. 14. The user may then remove the textiles from the receiver 8 after having been washed, rinsed, water extracted therefrom and dried, as automatically controlled and carried out in proper sequence with the duration of each operation designed to give the most effective results. If, at any time, the user wishes to hasten any of these operations, the indicator arm 3 is pushed inwardly and turned in a clockwise direction to any amount desired and then released, at which time the automatic operation will resume its control and continue from that point on, the protective shield 49 preventing, however, any manual control of the contact arm 45 in its successive engagement with the contact strips Q, R and S for the reasons already explained.

Although preferred embodiments of this invention have been described, it will be understood

that various modifications may be made without departing from the scope thereof.

I claim:

1. In a washing and drying machine, in combination, a receiver rotatable on a substantially horizontal axis and which is open at one end for the reception of materials to be washed and which is supported solely by a shaft arranged at its other end and rotatably mounted in a bearing, and belt means acting downwardly on the shaft on the other side of said bearing from said receiver for rotating the receptacle at tumbling speed for washing and at a speed low enough to permit the materials in the receiver to become evenly distributed therein and for thereafter raising the speed high enough for centrifuging, whereby centrifuging takes place without the production of destructive vibration.

2. In a washing and drying machine, in combination, a container, a receiver rotatable in said container on a substantially horizontal axis, water-inlet means for the container including an inlet valve having an electro-magnetic control device, a float switch controlled by the level of the water in the container and connected in series with the inlet valve device, a drain valve having an electro-magnetic control device, an electrically controlled motor provided with means for driving the receiver at tumbling speed and at centrifuging speed, and an automatic electric controller system operating to (1) drive the receiver at a tumbling speed with the drain valve closed and with a circuit closed through the inlet valve device and the float switch to fill the container to a predetermined level and then to wash the materials in the receiver, then (2) to drive the receiver at a tumbling speed with the drain valve open and said circuit closed to rinse the materials, then (3) to open the drain valve and close the inlet valve and drive the receiver at a speed to distribute the materials uniformly therein, and finally (4) to drive the receiver at centrifuging speed with the drain valve open and the inlet valve closed.

3. In a washing and extracting machine, in combination, a container, a receiver rotatable in said container on a substantially horizontal axis, a prime mover for driving the receiver, a transmission driven by the prime mover and driving said receiver and arranged for imparting different speeds of rotation to the receiver for tumbling and for centrifuging, electromagnetic means for shifting the transmission, electromagnetic valves for controlling the flow of water to and from the container, and an electric sequence controller for the prime mover and the valves and the shifting means so constructed and arranged that the valves are opened and closed in timed sequence to supply water to the container for washing and to drain water therefrom for distributing prior to extracting, that the transmission is shifted from one speed for tumbling to another speed for extracting after the supply of water has been terminated and the water has been drained from the container, and that the speed of the receiver as changed after conclusion of the washing is so controlled as to distribute the washed materials evenly in the receiver prior to its operation at extracting speed.

4. In a washing and drying machine, in combination, a receiver rotatable on a substantially horizontal axis, means for driving the receiver, including a transmission for imparting different speeds of rotation to the receiver, and an electrical automatic time and sequence control for

changing the speed of said transmission to cause the receiver to be driven at tumbling speed and then at a proper rate for a predetermined time for even distribution of the materials therein, and finally at centrifuging speed.

5. In a washing and drying machine, having a receiver rotatable at tumbling and centrifuging speeds on a substantially horizontal axis, driving means for rotating said receiver, the combination of means controlling said driving means for effecting rotation of said receiver at said tumbling and centrifuging speeds in sequence, an indicator movable with the control to show the position thereof, and means for maintaining the control ineffective to control said driving means when the indicator is manually moved into centrifuging position, and for rendering it again effective when it has been moved past centrifuging position.

6. In a washing, rinsing and drying machine, in combination, means including a controller for automatically causing the machine to operate through its washing, rinsing and drying stages, an indicator movable with the controller to show the position thereof and the stage of operation being performed, clock mechanism for driving the controller, a spring for driving the clock mechanism in a predetermined direction, a connection between the clock mechanism and the controller and indicator that permits manual movement of the controller in a direction opposite to said predetermined direction by means of the indicator, and means actuated by movement of the indicator in said opposite direction for rewinding the spring, said connection including clutch means permitting the indicator to be advanced manually independently of the clock mechanism to shorten one of said stages.

7. In a washing, distributing, and extracting machine, the combination therewith of a multiple control switch having an off position and movable therefrom through a starting position in a timed cycle to a stopping position for initiating and for determining the successive stages of operation of the machine, an indicator that moves with the control switch to show the position thereof and which is manually movable to set the control switch and which has a shaft connected to the multiple control switch, normally inactive driving mechanism and a shaft driven thereby at reduced speed, means operated by manual movement of the control switch by the indicator from its off position to its starting position to start the driving mechanism, said control switch thereafter being driven by the driving mechanism through its cycle to its stopping position to cause the machine to operate through its successive stages of operation, and a one-way driving connection connecting said shafts and permitting the control switch to be advanced manually by the indicator to shorten the duration of one of said stages.

8. In a washing machine, a control movable from a starting position to a stopping position for determining the successive stages of operation of the machine and including contacts controlling circuits for said machine, an indicator movable with the control to show the position thereof and manually movable to set the control to its starting position, spring-driven mechanism for driving the control means actuated by manual movement of the indicator to starting position for rewinding the spring-driven mechanism, a clutch between the spring-driven mechanism and the contacts disengaged during said rewinding

and means for separating said contacts when the clutch is disengaged for maintaining the control inoperative during said manual movement of the indicator.

9. In a washing machine, in combination, an outer container having an opening in one end, a perforated receiver mounted in the container for rotation on a substantially horizontal axis and having an aperture in one of its axially facing ends substantially the same size as and registering with said opening in the container for the insertion and removal of materials to be washed, liquid introducing means adjacent the opening for forcibly injecting liquid through the aperture in the receiver directly onto the materials therein while the receiver is being rotated to tumble the materials, and means for keeping the outer casing substantially drained, whereby dirt is thoroughly flushed out of the tumbling materials instead of being strained out of the water by them.

10. In a washing machine, in combination, a casing for retaining a liquid detergent, having a lateral aperture, a receptacle mounted in the casing for rotation on a substantially horizontal axis, having an aperture in one of its axially facing ends for registry with the casing aperture, a cabinet surrounding the casing, and having an aperture registering with the casing aperture, around which the wall of the cabinet is secured to the wall of the casing, and a closure for sealing the aperture in the casing and closing the aperture in the cabinet.

11. In a washing machine, in combination, a container for retaining a liquid detergent, having a lateral aperture, a receiver mounted in the casing for rotation on a substantially horizontal axis, having an aperture in one of its axially facing ends for registry with the container aperture, a cabinet surrounding the container, and having an aperture registering with the container aperture, means for securing the registering portions of said cabinet and container walls together, means for injecting liquid into the receiver through said securing means, and closure means permitting injection of liquid into said receiver, for sealing the aperture in the container and closing the aperture in the cabinet.

12. In an automatic washing and drying machine having means for effecting predetermined washing and drying operations, the combination of control means automatically operable to a plurality of positions controlling the washing and drying means for effecting performance of said operations in predetermined sequence, manually operable means associated with said control means for interrupting said sequential performance and for operating said control means to predetermined positions for performance of selected operations, and means preventing operation of said control means by said last mentioned means to other predetermined positions.

13. In an automatic washing, rinsing and extracting machine including means for performing washing, rinsing or drying operations at tumbling speed and an extracting operation at centrifuging speed, the combination of control means for said last mentioned means automatically operable to a plurality of positions for effecting performance of said operations in predetermined sequence, manually operable means for interrupting said sequential performance and for selecting performance of washing, rinsing or drying operations, and means preventing selection of

the extracting operation by said manually operable means.

14. In an automatic washing machine including means having control circuits and arranged for washing and rinsing and drying materials, the combination of a multiple switch device mounted on the front of the machine and controlling the opening and closing of said circuits for predetermining the duration and sequence of the steps of operation of the first means, said switch including a casing containing a shaft and contacts opened and closed by the rotation of said shaft and arranged in said circuits and also containing a motor operating at a substantially uniform speed, and a connection between the motor and shaft including a clutch device so constructed and arranged that the shaft may be advanced manually independently of the motor to shorten the duration of one or more of said steps.

15. An automatic washing machine comprising a container having mounted therein a horizontal baffled perforated rotatable receiver for materials to be washed, inlet and drain valves for said container, multiple speed driving means for the receiver, and control means for automatically opening the inlet valve for a predetermined time and maintaining the drain valve closed and selecting the speed of the driving means to operate the machine according to a predetermined cycle for washing said materials, and then opening the drain valve and rotating the receiver at a speed to distribute the materials substantially symmetrically in the receiver, and then driving the receiver at high speed to centrifuge the materials.

16. An automatic distributing and centrifugal extracting machine for textiles including a cylindrical textile receiver mounted for rotation on a horizontal axis, drive means including an electric motor for rotating the receiver, a sequence switch having one position for causing the drive means to rotate the receiver at a speed for distributing the textiles around the periphery of the receiver, means automatically advancing the sequence switch to a new position, and a circuit controlled by the sequence switch when in its new position for causing the drive means to rotate the receiver at a higher speed for centrifuging.

17. An automatic washing, distributing, and centrifugal extracting machine including a cylindrical textile receiver mounted for rotation on a horizontal axis, drive means including an electric motor for driving the receiver, a sequence switch, a separate power operated driving means for automatically advancing the sequence switch, a circuit controlled by the sequence switch in one position for causing the drive means to operate the receiver at a low speed for washing purposes, a circuit controlled by the sequence switch in a subsequent position for causing the drive means to operate the receiver at a high speed for distributing the textiles around the periphery of the receiver, and a circuit controlled by the sequence switch in its next position for causing the drive means to operate the receiver at a still higher speed for centrifugally extracting washing fluid therefrom.

18. In a combined washing, distributing, and centrifugal extracting machine, a cylindrical textile receiver mounted for washing, distributing, and extracting rotation on a horizontal axis, a washing fluid container for the receiver, an electrically operated discharge valve for the container, drive means including an electric motor for rotating said receiver at washing, distributing, and extracting speeds, an automatically advancing sequence switch, a circuit controlled by the sequence switch in one position for causing the drive means to rotate the receiver at washing speed, means automatically to advance the sequence switch to a subsequent position, circuits controlled by the sequence switch when in the latter position for causing the discharge valve to open to discharge fluid from the container and for causing the drive means to rotate the receiver at an increased speed for distributing the textiles which have been washed around the periphery of the container, means automatically to advance the sequence switch to its next position, and a circuit controlled by the sequence switch when in said next position for causing the drive means to rotate the receiver at still higher speed for centrifugally extracting washing fluid from the textiles which had been previously washed and distributed in the receiver.

REX EARL BASSETT, JR.

CERTIFICATE OF CORRECTION.

Patent No. 2,225,407.

December 17, 1940.

REX EARL BASSETT, JR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, second column, line 39, for the word "main" read --drain--; page 8, second column, line 46, for "arm 5" read --arm 45--; page 9, second column, line 12, claim 1, for "receptacle" read --receiver--; page 11, second column, line 22, claim 18, for the word "received" read --receiver--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of March, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

CERTIFICATE OF CORRECTION.

Patent No. 2,225,407.

December 17, 1940.

REX EARL BASSETT, JR.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, second column, line 39, for the word "main" read --drain--; page 8, second column, line 46, for "arm 5" read --arm 45--; page 9, second column, line 12, claim 1, for "receptacle" read --receiver--; page 11, second column, line 22, claim 18, for the word "received" read --receiver--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of March, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.