

Nov. 18, 1947.

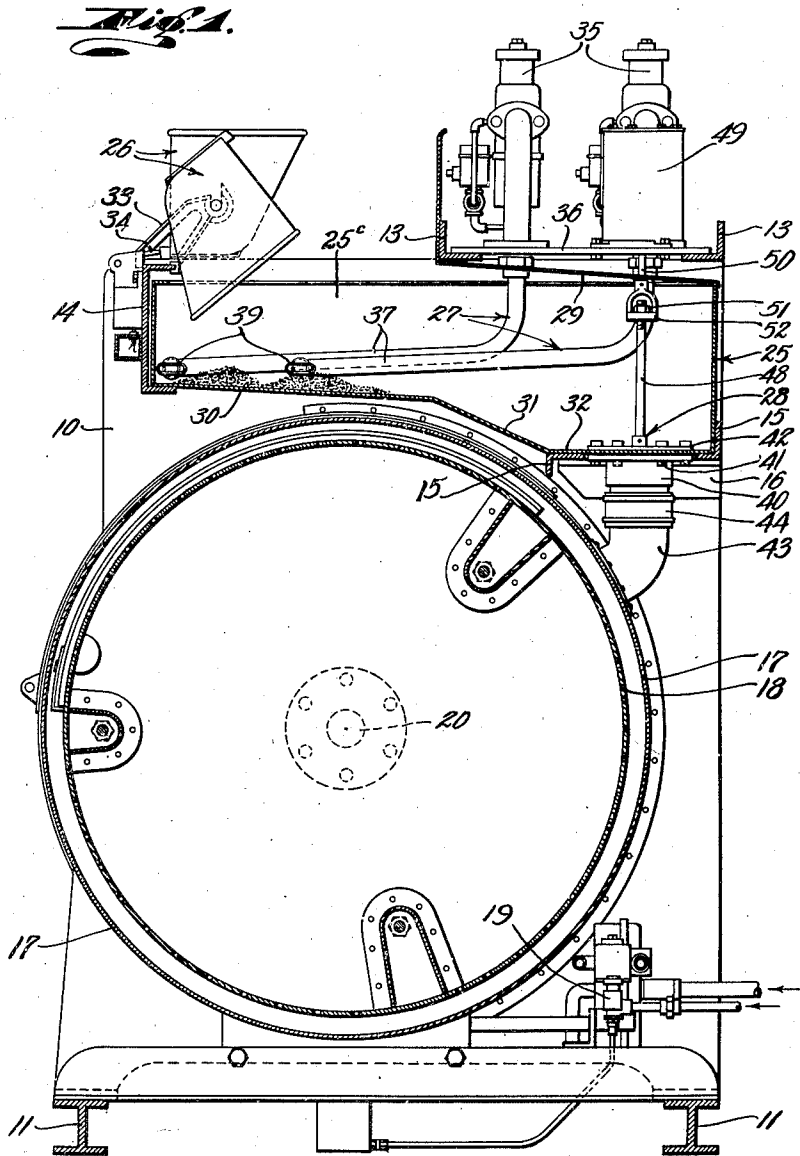
L. M. HARVEY

2,431,040

WASHING MACHINE HAVING PREMIXING MEANS

Filed Aug. 12, 1944

4 Sheets-Sheet 1



Inventor
LEO M. HARVEY

By *W. H. H. H. H.*
His Attorney

Nov. 18, 1947.

L. M. HARVEY

2,431,040

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Fig. 2.

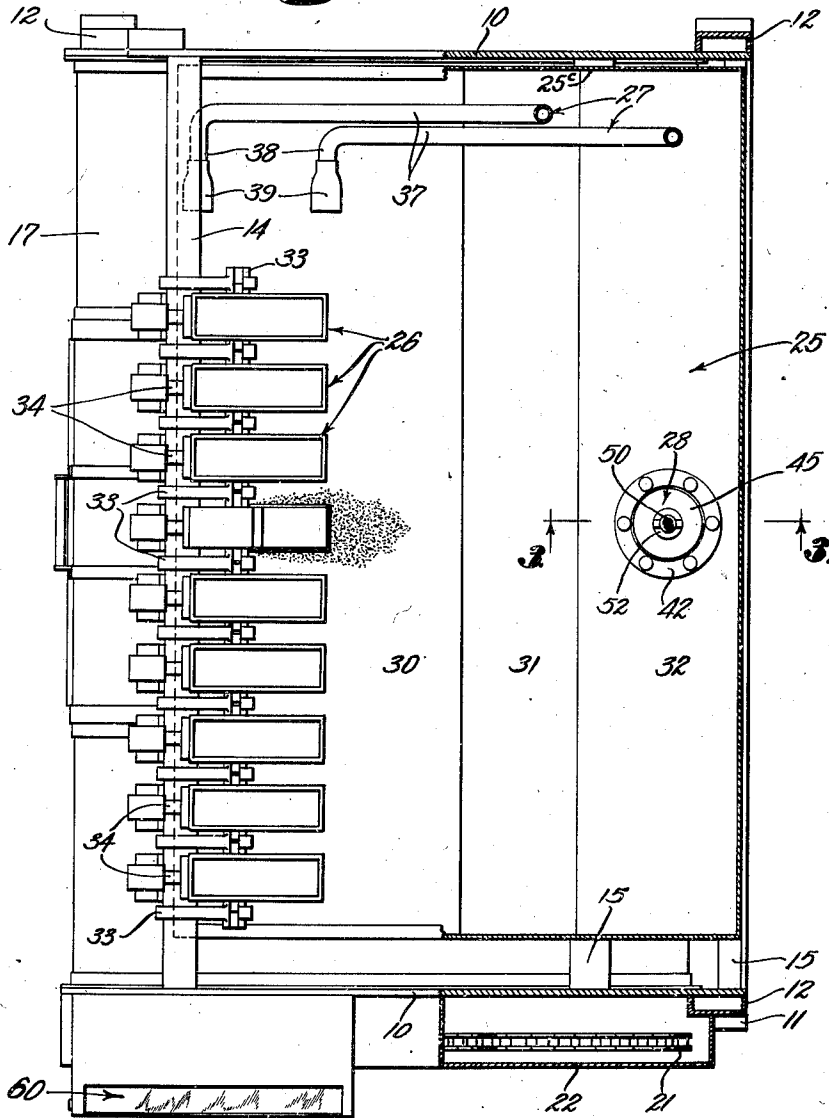
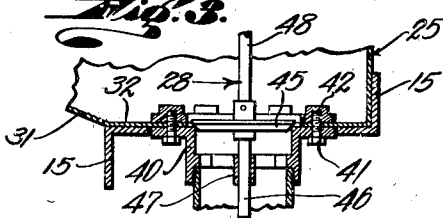


Fig. 3.



Inventor
 LEO M. HARVEY
 By *W. H. H. H. H.*
 His Attorney

Nov. 18, 1947.

L. M. HARVEY

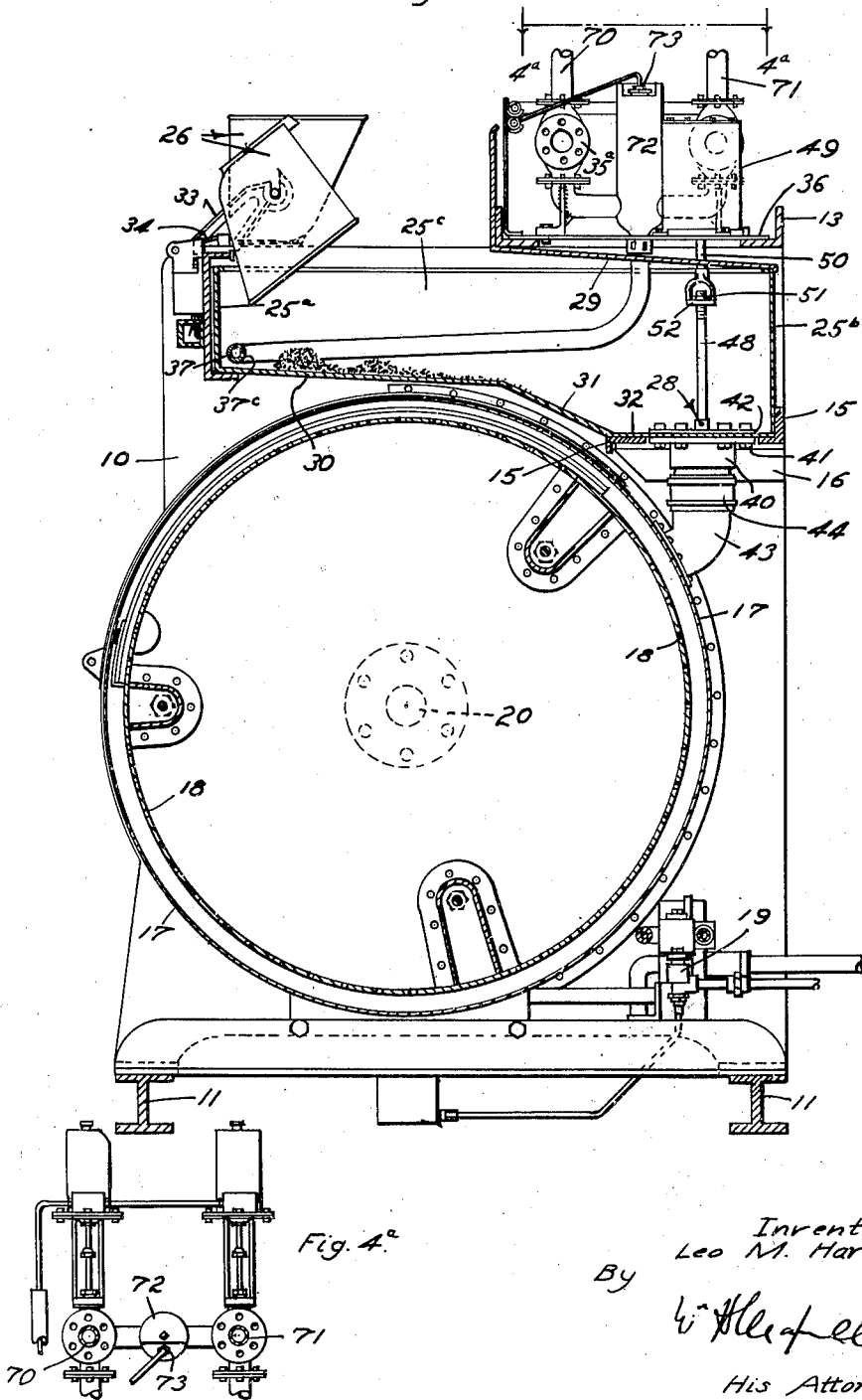
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WASHING MACHINE HAVING PREMIXING MEANS

Filed Aug. 12, 1944

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Fig. 4.



Inventor
Leo M. Harvey
By *W. H. Hefner*
His Attorney

Nov. 18, 1947.

L. M. HARVEY

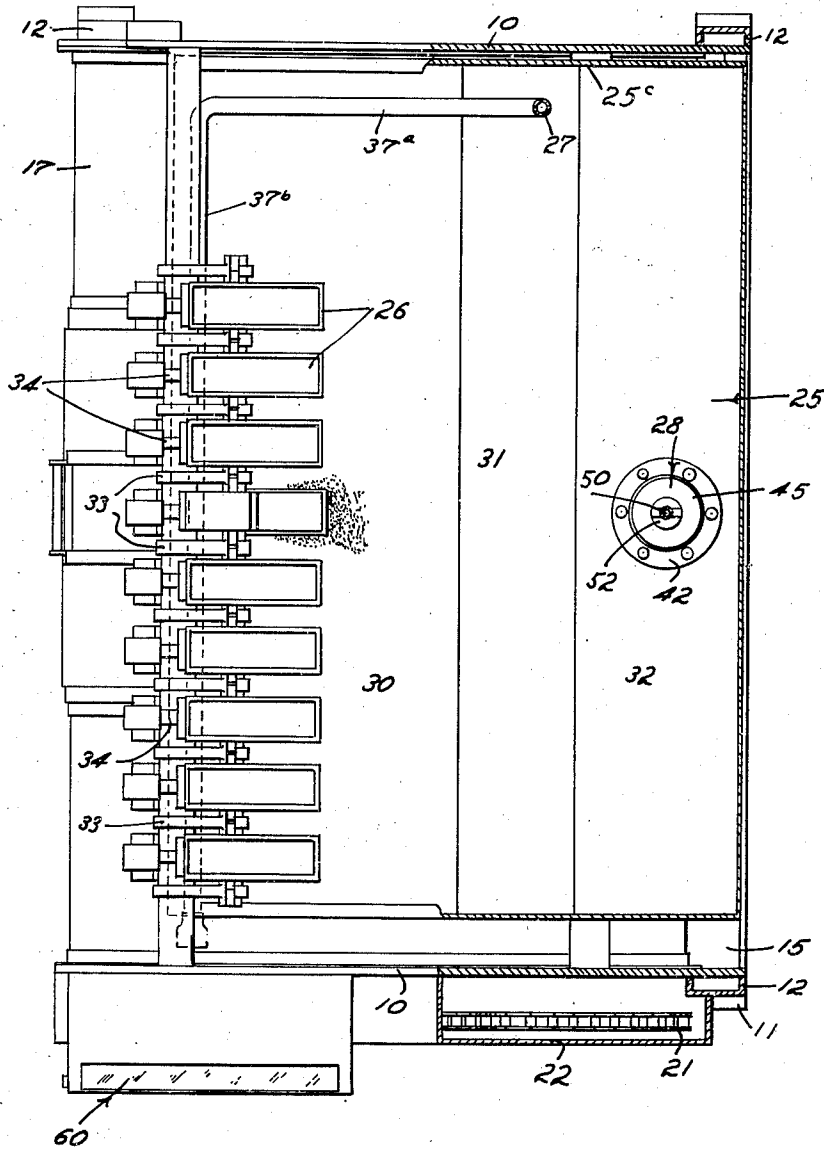
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WASHING MACHINE HAVING PREMIXING MEANS

Filed Aug. 12, 1944

4 Sheets-Sheet 4

Fig. 5.



Inventor
Leo M. Harvey
By *V. H. Haffell*
His Attorney

UNITED STATES PATENT OFFICE

2,431,040

WASHING MACHINE HAVING PREMIXING MEANS

Leo M. Harvey, Los Angeles, Calif.

Application August 12, 1944, Serial No. 549,154

10 Claims. (Cl. 68—17)

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This invention relates to washing machines and has particular reference to commercial washing machines having premixing means. A general object of this invention is to provide practical and particularly effective material mixing means for commercial washing machines.

This application is filed as a continuation, in part, of my application Serial No. 415,907, entitled "Washing machine having premixing means," filed October 21, 1941, which application was a division of application Serial No. 352,582, filed August 14, 1940, entitled "Washing machine," which application matured into Patent No. 2,323,993 on July 13, 1943.

In operating commercial washing machines it is necessary to supply the detergents, sours, bleaches, bluing, etc. to the washing shell as the cyclic washing operations are successively performed. Difficulty is encountered in thoroughly mixing these washing materials with the water and if the mix is not complete the clothes or goods being washed may be injured.

The desirability of obtaining an effective mixture of the washing materials and the water employed in washing has been long recognized and various attempts have been made to provide an effective solution. In this connection troughs have been provided and the materials have been discharged into the troughs to be washed to an outlet at one end by a stream of water introduced to the other end. In other cases tanks have been provided to contain a body of water and the materials have been introduced into the tanks and water has been introduced into the lower portions of the tanks at submerged points in an attempt to create agitation that would result in an intimate mixture.

In practice means or elements such as I have outlined are not always altogether satisfactory or sufficiently effective for various reasons. For example, they generally lack the desired speed or rapidity of operation, or they are not altogether dependable in obtaining complete premixing.

An object of this invention is to provide a washing machine embodying novel and highly efficient means for thoroughly mixing the washing materials such as the detergents, sours, bleaches, bluing, etc., with the water to be employed in washing preliminary to introduction into the washing shell thus avoiding possible injury to clothes or materials being washed.

Another object of this invention is to provide a washing machine in which the delivery of the washing materials and the water supply are so related to the tank in which the mixture occurs

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as to cause thorough and rapid mixing or dissolving of the materials preliminary to discharge into the washing shell.

Another object of the invention is to provide a washing machine employing a premixing tank, means for selectively and successively delivering the required detergents, sours, bleaches, bluing, etc., to the tank as the cyclic washing operations progress, and novel means for supplying hot and cold water to the tank to put such materials into solution or to produce a homogeneous mixture preliminary to introduction into the washing shell.

Another object of the invention is to provide improvements in the formation of a premixing tank so that washing materials can be discharged into a tank to be thoroughly and cleanly flushed from the point where they are deposited and yet are incorporated in a substantial volume or body of water preliminary to being discharged into the washing shell.

Another object of the invention is to provide improvements in the arrangement and cooperative relationship of a washing shell, a premixing tank, and the containers for washing materials. By my present invention I provide a unique, compact and highly efficient structural arrangement whereby the structure has a minimum height, the material containers are at the front of the structure where they are readily accessible and the premix of washing materials and water is discharged into the mixing shell in a most advantageous manner.

The various objects and features of my invention will be fully understood from the following detailed description of typical preferred forms and applications of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a vertical detailed transverse sectional view of a washing machine embodying the invention showing one material container in the discharging position. Fig. 2 is a top plan view of the washing machine with the upper rear portion thereof appearing in horizontal cross section. Fig. 3 is an enlarged vertical detailed sectional view of the discharge valve, that is, of the valve controlling the delivery of the contents of the premixing tank to the washing shell. Fig. 4 is a view similar to Fig. 1, showing another form of construction embodying the invention. Fig. 4^a is a plan view of a part of the structure shown in Fig. 4, being a view taken as indicated by line 4^a—4^a, on Fig. 4, and Fig. 5 is a view similar to Fig. 2 showing the second form of the invention.

The machine shown in Figs. 1 to 3, inclusive, includes, generally, a frame which carries or supports the other essential elements. The frame as shown in the drawings involves two spaced upright end members supported on horizontal runners or base beams 11. The end frame members 10 are reinforced at their corners by vertical post members 12. A pair of horizontally spaced beams or angle irons 13 extend between and connect the upper edge portions of the end members 10 at what may be termed the rear portion of the machine. A front frame member 14 preferably in the form of a channel extends between and connects the end members 10 at the forward upper portion of the frame structure and is located so that its web is vertically disposed and faces forward while its flanges face toward the rear of the machine. A pair of spaced angle members 15 is spaced below the members 13 at the rear portion of the machine and extends between and connects the end frame members 10. The members 15 are shown joined to the members 10 by cleats 16. The various elements of the frame may be joined in any suitable manner, as by riveting, welding, bolting, or a combination of such means.

A washing shell 17 is fixed in the frame structure. The shell is horizontally disposed and is a hollow cylindrical member having its ends fixed to the end members 10 of the frame. The shell 17 houses the rotatable washing cylinder 18 and serves to receive and contain the water or washing mixtures, etc. A drain valve (not shown) governs the discharge of fluids from the shell 17 and may be controlled by a remotely governed fluid pressure mechanism 19. A drain valve and its control mechanism form the subject of application Serial No. 411,051, filed September 16, 1941, now Patent No. 2,382,562, entitled "Drain valves for washing machines and the like." The cylinder 18 is supported for rotation by end trunnions 20 and is rotated or driven by a chain drive 21 enclosed in a suitable housing 22 at one end of the machine. The shell 17 and the cylinder 18 have openings for admitting and removing clothes or materials to be washed and these openings are closed by suitable doors.

The structure provided by the present invention comprises, generally, a premixing tank 25, a plurality of containers 26 provided to handle washing materials such as washing compounds, bleaches, sours, bluing, etc., and operable to discharge such materials into the tank 25, means 27 for supplying water to the tank 25 operable to sweep or flush the materials deposited in the tank from the points at which they are deposited so that they produce uniform solutions or homogeneous mixtures in the tank, and valved means 28 for connecting the premixing tank 25 with the washing shell 17.

The tank 25 is provided to receive the materials from the containers 26 and also the water delivered by means 27 and serves as a temporary container for the materials and the water, or as a premixing chamber in which the materials and water are brought into intimate contact and are thoroughly mixed preliminary to being discharged into the washing shell. It is to be understood that various materials, either liquids or solids, may be handled by the containers 26. When I employ the term washing material I mean to include any materials such as may be handled by containers 26 or such as may be employed in the apparatus of the present invention. The tank 25 which I will term a premixing tank is

arranged and supported above the shell 17, preferably immediately above the shell, and is so formed and shaped that fluids from it can be effectively delivered to the shell through a very short connection supplied by the means 28. The arrangement is such that the fluids in the premixing tank flow to the shell by gravity.

The premixing tank, as formed by the present invention, is an elongate structure, preferably a rectangular tank, located immediately above the shell 17 and offset somewhat rearward of the central axis of the machine. The longitudinal axis of the premixing tank extends parallel with that of the shell 17 and, in practice, the tank may extend to points close to or adjacent the end members 10 of the frame. In the preferred construction the forward end portion of the tank 25 is supported on or by the frame member 14 while the rear portion of the tank which is considerably lower than the forward portion is supported on the horizontal frame members 15 which are spaced below the frame members 13.

A feature of the structure provided by the invention is the formation of the tank so that it is shallow where the washing materials are deposited but has considerable depth at the point where the outlet is located. In the preferred arrangement the tank is shallow at one longitudinal edge portion and is deep at the other or opposite longitudinal edge portion. Where the tank is arranged parallel with the shell 17 I prefer to dispose the parts and relate the tank to the shell so that the shallow portion of the tank is at the forward portion of the machine while the deep portion of the tank is at the rear of the machine. In the construction illustrated the forward side wall 25^a of the tank is considerably shorter in vertical extent than the rear side wall 25^b, the difference in vertical extent of the front and rear side walls being due to the difference in depth of the tank at the two sides. The ends of the tank are closed by suitable end walls 25^c while the bottom of the tank is closed by bottom plates or sections 30, 31 and 32 which, in general, define an inclined or downwardly and rearwardly pitched bottom for the tank extending from the lower edge of the front side wall 25^a to the lower edge of the rear side wall 25^b.

The bottom of the tank 25 is of special construction or formation to assure complete flushing or washing away of material deposited by the containers 26. The several portions 30, 31 and 32 of the bottom extend lengthwise of the tank, the portion 30 being located at the forward portion of the tank and being a flat plate of substantial width pitched to extend rearward and somewhat downward from the point where it joins the front side wall 25^a. The portion 32 of the bottom is located at the lowermost point or part of the tank 25 and may be a flat plate extending lengthwise of the tank between its ends and projecting forward from the lower edge of the rear wall 25^b. In the preferred arrangement the rear portion 32 of the bottom is substantially horizontal and the parts are proportioned and related so that the rear portion 32 is located a substantial distance below the forward portion 30. The intermediate bottom portion 31 is a plate-like part joining the portions 30 and 32 and pitches downwardly and rearwardly at an angle considerably greater than that at which the forward portion 30 is pitched.

The forward portion 30 of the bottom is of sufficient width so that it serves to receive the ma-

materials discharged by the containers 26 while the portions 31 and 32 are pitched so that fluid deposited on the bottom portion 30 will readily flow rearward into the deep end of the tank to enter or become part of the body of material contained in the rear portion of the tank.

In practice it is highly desirable to limit the vertical extent of a machine such as I have provided and it is likewise highly desirable to provide a short, direct connection between the premixing tank and the washing shell so that the transfer from the premixing tank to the washing shell can be done quickly.

In accordance with the structural arrangement that I have provided the tank structure that I have described is located immediately above the shell 17 so that the forward bottom section 30 of the tank is adjacent or immediately above the central portion of the shell 17 while the portion 31 of the bottom extends downward and rearward conforming, generally, to the contour of the shell at the rear portion thereof. This brings the rear bottom portion 32 of the tank to the rear of the machine so that the deep portion of the tank is at the rear of the machine and so that the means 28 is established by a very short, simply formed, fluid connection.

The containers 26 are provided to hold the various materials to be employed in the cyclic washing operations, for example one container may contain a detergent, another a bleach, another a sour, another bluing, etc. In accordance with the invention the containers are supported and operate to dump or discharge their contents directly into the shallow portion of the tank, that is, onto the forward bottom portion 30 or into the tank adjacent the forward side wall 25^a.

In the particular construction illustrated the containers are arranged side by side in a row or series extending parallel to and located immediately above the forward side wall 25^a of the tank 25. The containers are shown supported by brackets 33 carried by the frame member 14 which supports the forward edge portion of the tank.

Solenoid controlled latches 34 are provided to initially or normally hold the containers in their upright positions. The containers are formed and supported to be normally held in an upright position and so that they operate by gravity to empty or discharge their contents upon the latches being released. In Fig. 1 of the drawings I show the manner in which the containers 26 discharge into the forward or shallow portion of the tank so their contents are delivered onto the bottom portion 30. Fig. 2 illustrates the manner in which the containers 26 are arranged in a series lengthwise of the forward side portion of the tank. It is to be understood that the containers 26 are individually controlled. In practice the containers are preferably such that they can be readily removed from the machine for refilling. The particular containers illustrated and their controls are more fully described and are claimed in my co-pending application Serial No. 352,586, entitled "Material dispensing means," filed August 14, 1940, which has matured into Patent No. 2,339,396, issued January 18, 1944.

The means 27 shown in Figs. 1 and 2 of the drawings to supply water to the tank supplies both hot and cold water and serves to flush or sweep the materials deposited by the containers from the forward shallow portion of the tank to

the rear deep portion thereof, and causes violent agitation of the liquid in the deep portion of the tank, in fact throughout the tank, so that there is an intimate and thorough mixing of the washing materials in and with the water. In this particular form of the invention hot and cold water pipes (not shown) extend to the washing machine and are controlled by valves 35. The valves are of a type to be subject to remote control and are preferably of the character described and claimed in my co-pending application Serial No. 352,585, entitled "Valve mechanism," filed August 14, 1940, which has matured into Patent No. 2,312,815, issued March 2, 1943.

The valves 35 are shown supported on a base plate 36 carried by the frame members 13. The structure just described is preferably shielded or protected by an apron 29. Individual discharge lines 37 extend from the valves 35 to the mixing tank 25 to deliver water to the tank in the manner prescribed by my invention. Where the water is delivered by individual lines 37 as I am now describing, these lines or pipes 37 extend downwardly from the valves 35 and then forward and downward to a point in the forward portion of the tank and immediately above the forward portion 30 of the tank bottom.

In the particular case illustrated in Figs. 1 and 2 the pipes 37 are located adjacent one end 25^c of the tank and at their discharge ends, where they are in the forward or shallow portion of the tank and are immediately above the forward bottom portion so that they turn to face toward the other end of the tank and are provided with nozzles 39. I have shown the two nozzles located a short distance apart but both confined, generally, to one upper forward corner of the tank so that when both valves are open the nozzles have a combined action or, in effect, establish a broad sweeping stream of water that flows across the forward or shallow edge portion of the tank. It is to be understood, of course, that the valves may be operated individually, in which case but one single stream will flow across the shallow part of the tank rather than a composite stream formed between two nozzles.

Due to the direction in which the nozzles are faced and to the pitch of the bottom of the tank, the flow from the upper forward corner where the nozzles 39 are located will be lengthwise of the tank to reach the various points at which material may have been discharged from the containers 26 and will be lateral of the tank in order to sweep or flush the materials down into the deep portion of the tank. In this particular form of the invention the water discharge from the nozzles has a compound direction of flow, that is, both the lengthwise as well as transverse flow, and the flow is such as to finally and completely flush all of the material from the bottom 30 into the deep end of the tank.

It will be understood that the stream or streams issuing from the nozzles 39 will cause violent agitation or circulation of water not only in the shallow part of the tank or over the bottom portion 30 but also throughout the entire tank so that there is effective mixing in the body of water that accumulates or which is established in the deep portion of the tank. The combined longitudinal and transverse flow established by the nozzles 39 may cause a general circular motion of the liquid in the tank, which motion is highly effective in causing intimate mixture of the materials. The pipes and nozzles being located at one

end of the tank and being adjacent the end wall and being disposed as they are, leave the tank free of obstructions so that the liquid in the tank is free to circulate and cause intimate mixture of the materials.

The means 28 connecting the premixing tank 25 with the shell 17 delivers the washing mixture directly from the tank 25 to the shell 17. The means 28 as shown involves a tubular valve seat fitting 40 secured to the underside of the bottom portion 32 as by screws 41. The screws are shown threaded into a ring 42 arranged on the upper side of the bottom portion 32. A simple elbow fitting 43, large in diameter but short in length, has its lower or discharge end fixed to the upper rear wall portion of the shell 17 while its upper end is connected to the fitting 40 by a flexible sleeve 44 or the like.

The means 28 further involves a valve 45 adapted to seal downward against a seat formed on the fitting 40. The valve 45 has a depending stem 46 slidably guided by a web 47 provided in the fitting 40. A stem 48 extends upward from the valve through the premixing tank 25. In the particular case shown the valve 45 is electrically controlled or operated.

A solenoid coil 49 is mounted on the base 36 and has a downwardly projecting operating rod 50 which passes through openings in the base 36 and the shield 29. A stirrup 51 is fixed to the operating rod 50 and engages upwardly against a nut 52 on the valve stem 48. Upon energization of the coil 49 the rod 50 moves upwardly and the valve 45 is open.

In carrying out the cyclic washing operations the rotation of the cylinder 19 and the operation of the latches 34, the operation of the valves 35, the operation of the coil 49 and the operation of the drain valve 19 are all governed by a timer or control mechanism. Insofar as the present invention is concerned, this timer may be of any selected type. In the drawings I have indicated a control mechanism or timer 60 of the type described and claimed in my co-pending application Serial No. 352,584, filed August 14, 1940, entitled "Control means for washing machines and the like," which has matured into Patent No. 2,306,056, issued December 22, 1942.

Assuming that the cylinder 18 is in operation or is to be put in operation one or both of the valves is operated to supply water to the tank. The valve or valves 35 are opened for a given period to supply a predetermined quantity of water to the tank 25 for the given washing operation. One of the latches 34, or in some cases more than one of the latches 34, may be released to allow its container to spill its contents into the premixing tank. This operation of the container or containers may occur either before or during the discharge of the water into the tank. A container 26 may carry a given quantity of the desired washing material and the amounts discharged relative to the delivery of the water may depend somewhat upon the character of the material being handled. The water under pressure, either hot water or cold water, or both, discharged as above described, jets or sprays across the shallow portion of the tank, flushing or sweeping the washing material therefrom either by the longitudinal flow or the transverse flow, or by both, so that the washing materials and the discharged water establish an intimate mixture in the deep portion of the tank.

It will be apparent that the general action of the water combined with the pitch of the bot-

tom of the tank results in effective mixing. Further, as has been pointed out in the form of the invention being described, the nozzle or nozzles 39 being disposed in one upper or shallow corner of the tank impart a circular motion to the entire body of water that builds up or accumulates in the tank thus materially facilitating the mixture. So long as either one of the valves is open the water in the tank will be kept in generally circular motion and there will be violent disturbance in the shallow portion of the tank where the washing materials have been deposited, causing those materials to be swept away for intimate mixture into the body of liquid built up or accumulating in the deep portion of the tank. When a given quantity of water has been supplied to the tank the valve or valves, as the case may be, are closed.

The premixing operation, as above described, may take place while the cylinder 18 is in operation performing a given washing operation. When the said given washing operation is completed the drain valve (not shown) is opened by operation of the control 19 so that the liquid is drained from the shell 17. At the completion of a given draining period the control 19 operates to close the control valve, whereupon the solenoid 49 is operated to open the valve 45. This allows the washing mixture to discharge from the tank 25 into the shell 17. In this way a given quantity of thoroughly mixed washing liquid or mixture is delivered to the shell 17 for the next washing operation. When the tank 25 is empty the coil 49 is controlled or operated to close the valve 45. The actuations of the valves 35, latches 34, control 19 and coil 49 are caused by the operation of the timer 60 or an equivalent timing or operating mechanism.

The above described operations are repeated for the various washing operations desired, that is, a given quantity of water at the desired temperature is supplied to the premixing tank 25 and one or more containers 46 is operated to discharge its contents into the tank 25 with the incoming water, these operations usually occurring while the cylinder 18 is in operation carrying on a washing operation with a washing mixing previously derived from the mixing tank.

In the form of the invention shown in Figs. 4, 4^a, and 5 the hot and cold water instead of being delivered to the mixing tank through separate conduits or pipes is delivered to a manifold where the water is mixed and the contents of the manifold passes to the tank through a single conduit. This single conduit may discharge into the tank at the point and in the general manner hereinabove described. However, in this second form of the invention the single delivery pipe instead of having a short nozzle has an extension running parallel with the pipe adjacent its front side wall 25^a. This extension has discharge openings spaced along its length so that water is delivered or discharged at various points along the shallow part of the tank.

The hot and cold water delivered by supply lines 70 and 71, respectively, are controlled by valves 35^a. The valves 35^a deliver or discharge the water into a common header or receiver 72 where the water mixes. The receiver may be provided with a control thermostat 73 which may be part of an automatic thermostatic control for the apparatus.

The receiver 72 has a single outlet or delivery pipe 37^a extending downwardly and then forward inside the tank 25 adjacent one end 25^b.

to a point at one shallow corner of the tank. At that point or shallow corner of the tank the pipe 37^a is turned to extend lengthwise of the tank along the shallow portion or immediately adjacent the forward side wall 25^a. The pipe 37^a instead of terminating at the said corner of the tank to discharge a single stream in the general manner hereinabove described has a portion 37^b extending lengthwise of the tank throughout the entire length of the series of containers 26.

The extension 37^b is, in effect, a distributing nozzle and has a plurality of discharge openings 37^c spaced along its length to discharge streams of water across the forward bottom portion 30 of the tank. These streams may be directed rearwardly in the tank so that they wash the materials deposited from the containers rearward in the tank to enter the deep part of the tank to there finally and completely mix with the water in the tank. It will be understood that when the water is delivered at a suitable pressure the streams issuing from the jet or nozzle openings 37^c will effectively sweep the entire surface of the bottom portion 30 of the tank, or, in other words, will completely remove the deposited material in the shallow portion of the tank so that the body of liquid that builds up or accumulates in the deep portion of the tank is in the nature of a complete or intimate mixture ready for passage to the shell 17.

The numerous jets of water discharged across the shallow portion of the tank cause a general agitation or movement of the liquid in the tank. By providing a plurality of jet openings 37^c along the length of the extension or nozzle 37^b jets occur in the shallow part of the tank in the immediate vicinity of the several containers 26 so that there is a specific jet action to disperse or dislodge the materials deposited by the several containers. Through the arrangement just described the jets are more intimately associated with the containers and it is not necessary to rely upon circulation from a single jet throughout the entire length of the tank in order to reach material deposited by a container at a point remote from the nozzle.

It will be understood that the form of the invention shown in Figs. 4, 4^a and 5 will operate generally in the same manner as the form first described except for the variation in the manner in which the water acts on the material deposited by the containers 26.

Having described only typical preferred forms and applications of my invention I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. In a washing machine, a washing shell, a mixing tank having sides and a substantially flat bottom, means for discharging liquid from the tank at a point adjacent one side into the shell, means for discharging material into the tank adjacent the opposite side of the tank, and means for jetting water across the bottom of the tank from the said opposite side so such material is swept from the bottom to mix with the water for discharge from the first mentioned means, the means for discharging material and the means for jetting water being related so the material is discharged toward the bottom of the tank in the path of the water.

2. In a washing machine, a washing shell, a

substantially rectangular mixing tank having vertical sides and having a pitched bottom so the tank is shallow at one side and deep at the opposite side, means for discharging liquid from the deep side of the tank directly into the shell, means for jetting water across the bottom at the shallow side of the tank, and means for discharging material into the tank at the shallow side so it falls into the path of the water to be swept from the bottom by the water so a mixture of water and such material accumulates at the deep side of the tank.

3. In a washing machine, an elongate washing shell, a substantially rectangular mixing tank the major portion of which is disposed above the shell, the tank being parallel with the shell and having vertical sides and having a pitched bottom located over the shell so the tank is shallow at one side and deep at the opposite side, means for discharging liquid from the deep side of the tank into the shell, means for jetting water across the bottom at the shallow side of the tank, and means for discharging material into the tank at the shallow side and in the path of the jet of water so the water sweeps such material from the bottom of the tank so a mixture of water and such material accumulates at the deep side of the tank.

4. In a washing machine, an elongate washing shell, a substantially rectangular mixing tank having its major portion disposed above the shell, the tank having vertical front and rear sides and having a pitched bottom so the tank is shallow at the forward side of the shell and deep at the rear side of the shell, the bottom of the tank extending downward and rearward around the shell from the forward portion of the shell to the rear thereof, means for discharging liquid from the deep rear portion of the tank into the shell, means for discharging material into the tank at the shallow forward portion thereof including an elongate series of individually operable containers at and parallel to the front side of the tank and shell, and means for jetting water across the bottom at the shallow forward portion of the tank to strike such material and sweep it from the bottom so a mixture of water and such material accumulates at the deep rear portion of the tank.

5. In a washing machine, a washing shell, a substantially rectangular mixing tank having vertical sides and having a pitched bottom so the tank is shallow at one side and deep at the opposite side, means for discharging liquid from the deep side of the tank into the shell, means for discharging material into the tank at the shallow side, and means for jetting water across the bottom at the shallow side of the tank to strike the material discharged into the tank and sweep such material from the shallow portion of the tank so a mixture of water and such material accumulates at the deep side of the tank, the bottom having a slightly inclined portion at the shallow side of the tank, a horizontal portion at the deep side of the tank, and a steeply inclined portion between the other portions.

6. In a washing machine, a washing shell, a rectangular mixing tank having vertical sides and having a pitched bottom so the tank is shallow at one side and deep at the opposite side, means for discharging liquid from the deep side of the tank into the shell, means for discharging material into the tank at the shallow side, and means for jetting water against the material discharged into the tank and across the bottom at

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the shallow side of the tank to sweep such material therefrom so a mixture of water and such material accumulates at the deep side of the tank including a water supply pipe entering the tank adjacent one end and discharging at one corner of the tank adjacent the bottom.

7. In a washing machine, a washing shell, a rectangular mixing tank having vertical sides and having a pitched bottom so the tank is shallow at one side and deep at the opposite side, means for discharging liquid from the deep side of the tank into the shell, means for discharging material into the tank at the shallow side, and means for jetting water across the bottom at the shallow side of the tank to impinge upon the material where it is discharged into the tank to sweep such material therefrom so a mixture of water and such material accumulates at the deep side of the tank including a water supply pipe entering the tank adjacent one end and discharging at spaced points along the shallow side of the tank adjacent the bottom.

8. In a washing machine, a washing shell, a rectangular mixing tank having vertical sides and having a pitched bottom so the tank is shallow at one side and deep at the opposite side, means for discharging liquid from the deep side of the tank into the shell, means for discharging material into the tank at the shallow side, and means for jetting water across the bottom at the shallow side of the tank to impinge upon the material where it is discharged into the tank so such material is swept from such point so a mixture of water and such material accumulates at the deep side of the tank including water supply means entering the tank adjacent one end and discharging from spaced points at one corner of the tank adjacent the bottom of the tank.

9. In a washing machine, a washing shell, a mixing tank above the shell and having a low bottom portion at one side and a sloping bottom wall portion at the other side sloping downwardly toward said low portion, means for discharging material into that part of the tank having the sloping bottom wall portion, means for supplying

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water to the tank comprising a nozzle directing a stream of water across said sloping wall portion in a direction transverse of its inclination to a point where it impinges upon the material discharged into the tank to flush said material away and cause the material to be mixed with the water in the tank, and means communicating with said low bottom portion for conducting the water mixture from the tank to the shell.

10. In a washing machine, a washing shell, a mixing tank above the shell and having a sloping bottom wall portion, means for supplying water to the tank comprising a hot water line and a cold water line, and a nozzle on each of said lines, the two nozzles being confined to a single corner portion of the tank and each being adapted to direct a stream of water across said wall portion in a direction transverse of the slope of said wall portion, a row of containers arranged to discharge materials into the tank, said row extending lengthwise of the tank and being positioned to discharge into that portion of the tank having the sloping bottom wall and across which said streams are directed, and valved means for conducting the water and materials from the tank to the container.

LEO M. HARVEY.

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FOREIGN PATENTS

Number	Country	Date
517,670	Great Britain	Feb. 6, 1940
299,411	Great Britain	1928