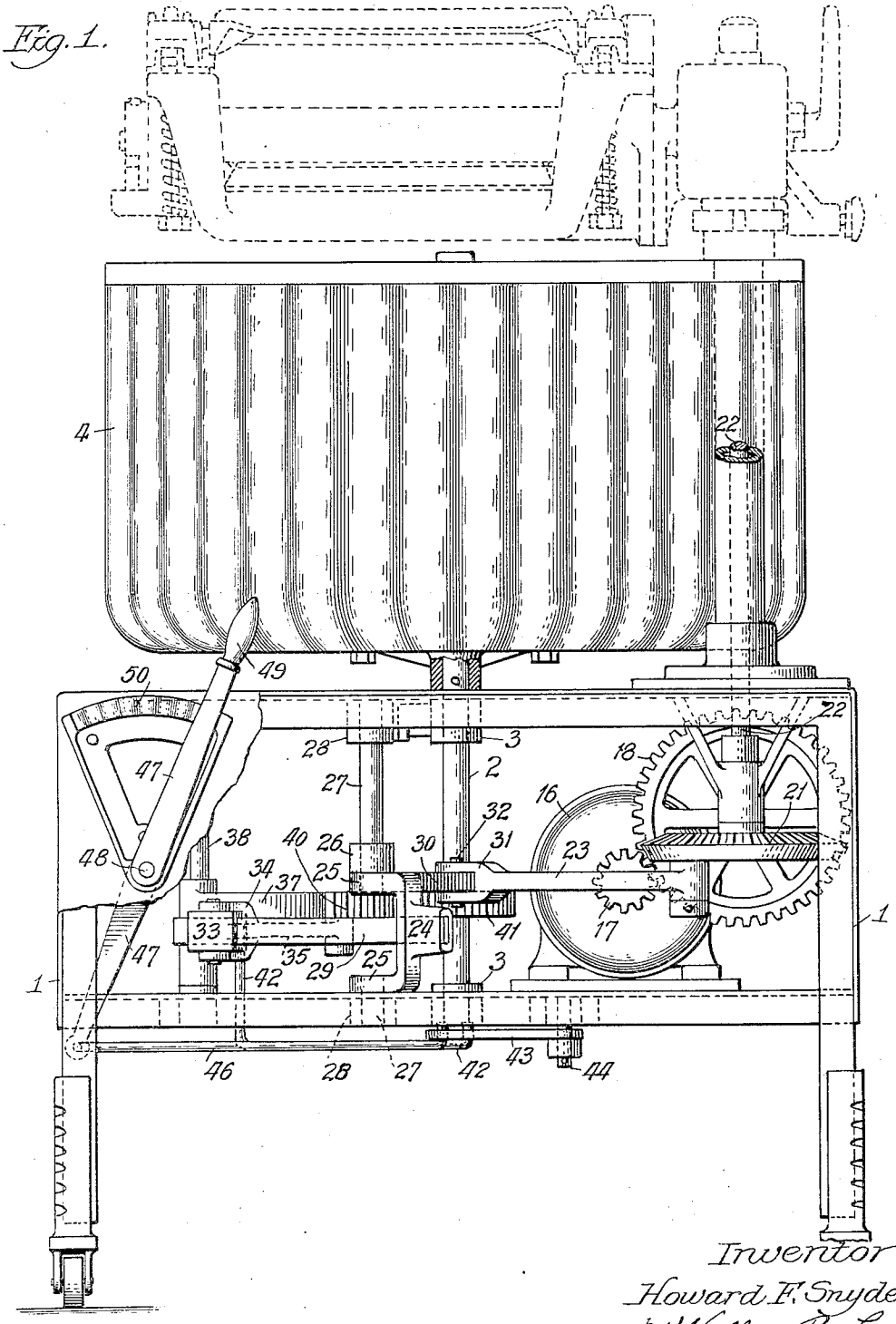
Feb. 21, 1933. H. F. SNYDER 1,898,221

WASHING APPARATUS

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Fig. 1.



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WASHING APPARATUS

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Fig. 2.

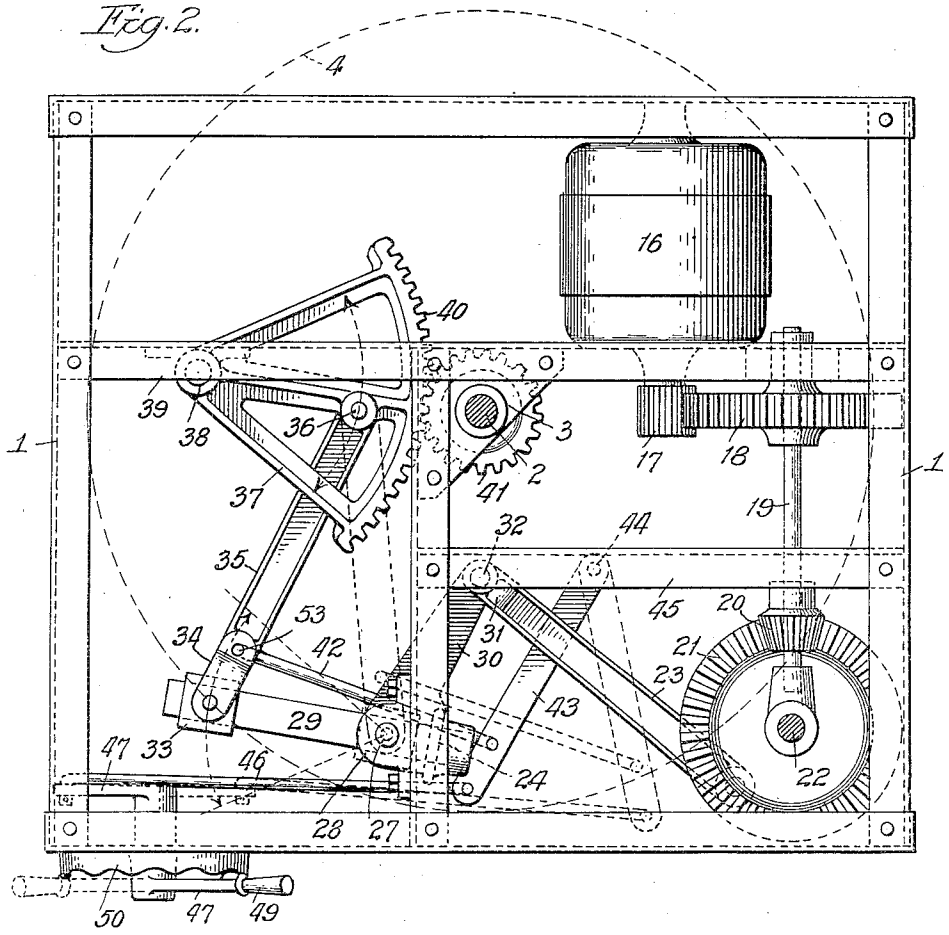


Fig. 3.

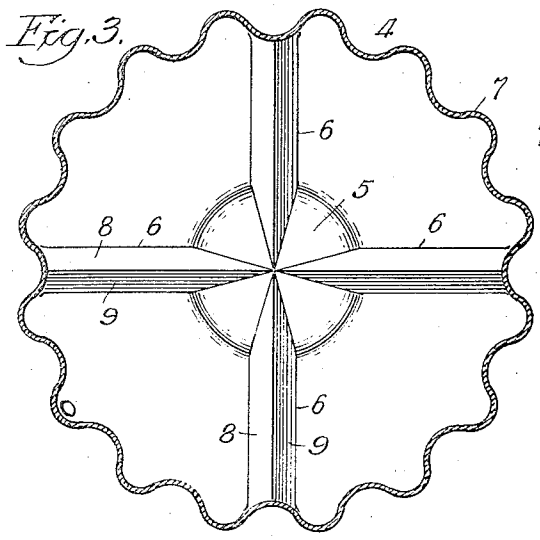
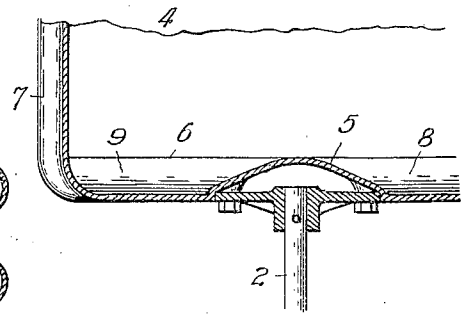


Fig. 4.



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WASHING APPARATUS

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Fig. 5.

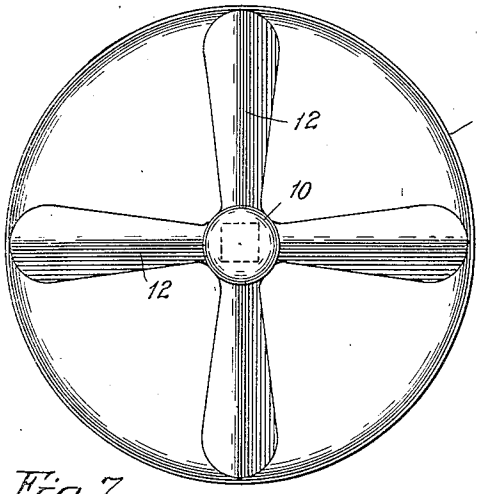


Fig. 6.

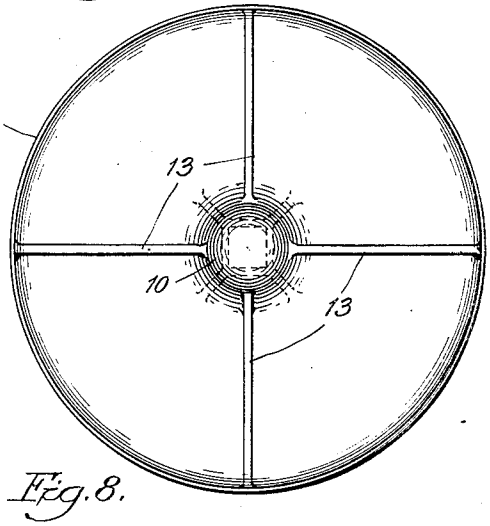


Fig. 7.

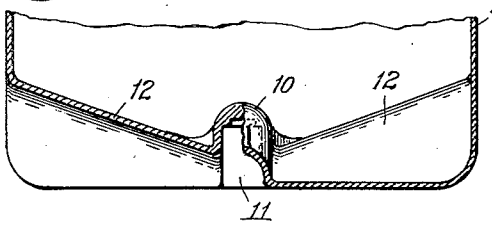


Fig. 8.

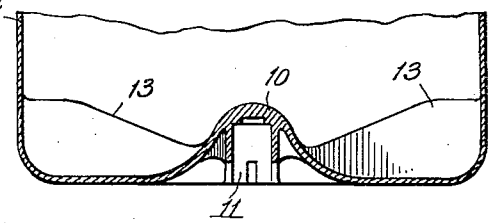


Fig. 10.

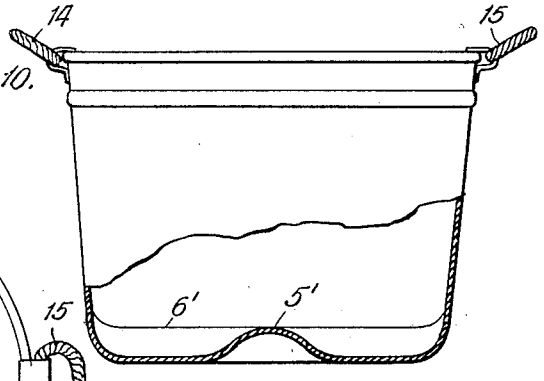
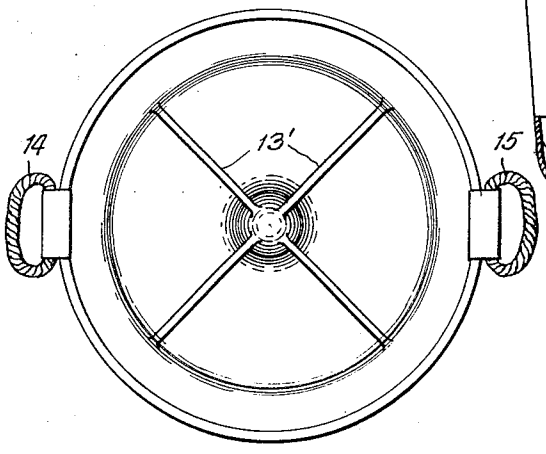


Fig. 9.



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UNITED STATES PATENT OFFICE

HOWARD F. SNYDER, OF NEWTON, IOWA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE MAYTAG COMPANY, OF NEWTON, IOWA, A CORPORATION OF DELAWARE

WASHING APPARATUS

Application filed June 26, 1925. Serial No. 39,871.

This invention relates to washing machines of the alternately rotatable liquid impelling type.

One of the objects of my invention is to provide an alternately rotatable tub having liquid impelling members which are constructed and arranged to cause the washing liquid to flow in gyratory paths moving in a general direction from the central axis of rotation outwardly and upwardly and thence downwardly toward the central axis of rotation in continuous tortuous paths, reversing in general directional movements to correspond with the alternate rotations of the tub.

Still another object of this invention resides in the novel construction of an alternately rotatable tub provided with liquid impelling blades radially upstanding from the bottom of the tub and merging into the side walls in such a manner that the maximum liquid impelling surface of the blades is disposed substantially at the outer portion of the tub whereby the maximum effective gyratory movement of the washing liquid is secured.

Yet another object of this invention resides in providing the bottom of the tub with a centrally raised portion substantially free of liquid impelling projections and in providing the tub bottom about said centrally raised portion with radially disposed blades extending to the tub wall and preferably integral with the bottom of the tub, whereby the maximum liquid impelling effect is secured.

Another object of the invention resides in providing a hand oscillatable tub formed on its bottom with my novel liquid impelling blades.

Still another object of my invention resides in the mechanism for securing a variable alternate rotation of the liquid impelling means about a vertical axis and especially in the improved details of construction of the automatic mechanism for securing variations in the oscillations of the vertically disposed shaft which drives the liquid impelling member.

Yet another object of my invention resides in the manner of attaching the upper end of the vertical power driven shaft of the washing machine to the exterior wall of the tub bottom so that the liquid impelling mechanism of the tub is automatically operated from the drive shaft; and especially in the manner of forming the inner wall of the tub bottom with integral liquid impelling means and the outer face of the tub bottom with an integral socket or means for attaching, preferably detachably, the vertical power driven shaft. In this manner the tub is provided with power driven liquid impelling means from the vertical shaft without the necessity of having the shaft pass through the bottom walls of the tub with the customary problem of eliminating the possible leakage of water therethrough. Furthermore in the construction illustrated the tub may quickly be lifted or detached from the power shaft without removing any parts.

These and other objects of the invention will be apparent from a perusal of the following specification when taken in connection with the accompanying drawings wherein:

Figure 1 is a side view in perspective of my improved washing machine.

Figure 2 is a top view of the driving mechanism with the tub removed.

Figures 3 and 4 are sectional views of one form of my tub with the improved liquid impelling members therein.

Figures 5 and 6 are plan views of further modifications of my invention.

Figures 7 and 8 are sectional views thereof.

Figures 9 and 10 are views of an improved form of an oscillatable washing machine tub.

Referring now to the invention in detail, the invention comprises, in one form, a support 1 upon which the automatically operated liquid impelling member is mounted for alternate rotation about a vertical shaft 2. This shaft has suitable bearings 3 in the support 1. While any suitable type of automatic mechanism for rotating this shaft 2 first in one direction and then in the other may be utilized, I prefer to effect these alternate rotations by

means of the mechanism hereinafter to be described.

In general, my invention resides in providing the upper end of the shaft 2 with liquid impelling means, in one form of the invention illustrated as a tub 4 and rigidly mounted thereon so that the tub is adapted to be alternately rotated about its central vertical axis. It will be noted that the side walls merge into the bottom portion by a downwardly and inwardly extended portion as clearly shown in Figures 1, 4, 7, 8 and 10. And one of the important features of this invention resides in providing this tub with liquid impelling members constructed and arranged to cooperate with said downwardly and inwardly extended portions of the tub, so that when the tub is oscillated the cleansing liquid and the fabrics therein will be caused to flow in gyratory paths outwardly from the central axis of rotation and upwardly in a general direction, then across the top of the tub and down substantially centrally of the tub toward the bottom thereof, in a succession of closed tortuous paths moving around the tub first in one direction and then in the other to correspond with the alternate rotations of the tub. The bottom of the tub is formed substantially free from liquid impelling projections at its central axial zone, and is provided with a plurality of preferably radially disposed liquid impelling blades or projections which extend from said central zone outwardly and merge into the side walls of the tub. In the general arrangement, these blades are so disposed with relation to the central zone and the bottom and side walls of the tub, that the maximum liquid impelling surface of the blades is disposed at their outer ends substantially at the junction with the side walls and near the junction. Various arrangements of this blade construction may be utilized. It will be observed that the side wall of the tub is joined to the bottom by a downwardly and inwardly inclined portion, as clearly shown in Figures 1, 4, 7, 8 and 10.

In Figures 3 and 4 of the drawings the bottom of the tub is shown as provided with a centrally disposed upstanding dome 5 arranged immediately over the shaft 2 which is rigidly connected to the tub. The blades 6 are symmetrically arranged about the bottom of the tub and radiate from the central axis, extending outwardly and merging into the side walls 7 of the tub. These side walls 7 are preferably of sinuous formation so as to provide effective rubbing surfaces for the fabrics to be washed. It will be noted that the blades 6 where they meet the centrally raised portion 5 form a central zone which is substantially free of liquid impelling means. This is due to the fact that the raised portion 5 tapers upwardly to meet the upper edges of the blade. Surrounding this centrally raised portion, the blades extend outwardly in radial formation and provide from the central zone outwardly to the outer walls of the tub the liquid impelling surface. By locating the full height of the blades nearest the outer tub wall the maximum impelling force of the blades is secured. The blades 6 are preferably formed with sloping sides 8 and 9. Other arrangements of blades are disclosed in Figures 5, 6, 7 and 8 of the drawings. In these modifications, the bottom of the tub 4 is provided with a central, integral upstanding dome 10 which is formed on its under side with a shaft engaging socket 11 in its under side for detachable engagement with the upper angularly shaped end of the drive shaft 2 so that the tub can be quickly removed from the drive shaft. It will be noticed that in forming the socket 11 for the drive shaft, I provide it with angularly disposed walls to receive a correspondingly shaped end of the drive shaft for detachability of the tub and shaft, and further that the under side of the tub bottom at this socket is provided with ribs which lie alternately with the position of the impeller blades 13 disposed on the inner surface of the tub bottom. This provides a very rugged construction. In Figures 5 and 7 these blades 12 are disclosed as integrally formed with the bottom of the tub and tapered upwardly from the central dome outwardly to the outer wall of the tub, the intermediate portions or the base of the tub between these blades being substantially flat as illustrated at the right of Figure 7. In Figures 6 and 8 another form of the blade construction is disclosed. In this modification the blades are disclosed as radially arranged upstanding fins 13 which do not project laterally so as to form downwardly and laterally sloping faces as in Figures 5 and 7 and also in Figure 3 of the drawings. In Figures 6 and 8 the blades are also made integral with the bottom of the tub. And their maximum liquid impelling surface is disposed at their outer ends.

Another feature of my invention resides in providing a manually oscillatable tub which is provided at its upper periphery at opposite points with handles 14 and 15 which may be grasped by the operator so that the tub can be quickly moved first in one direction and then in the other so as to produce the gyratory movement of the liquid to correspond to the reversals in direction of the washing fluid. The blades on the bottom of the tub are formed just like the blades heretofore described. These manually operable tubs may be provided with connections on their under surfaces for permitting them to be detachably connected to the dome shaft 2 if desired.

Another feature of my invention resides in the mechanism for automatically oscillating the liquid impelling member secured to the

radially disposed shaft 2. This mechanism is constructed and arranged so that a variable oscillation may be imparted to this shaft 2 whereby a gentle or violent oscillation may be imparted to the liquid impelling member and whereby if desired, the liquid impelling member will be brought to rest while the prime mover therefor continues to operate.

And while in the present invention the liquid impelling member is disclosed as a tub 4, it is understood that a dolly mounted on the end of shaft 2 may be used in place of the oscillatable tub.

In the preferred form of my improved driving mechanism for alternately rotating or oscillating the liquid impelling member as above described comprises a prime mover 16, in the present instance an electric motor, suitably mounted on the support 1. This motor is provided with a gear 17 meshing with a larger gear 18 on a shaft 19 having bearings in the support 1. This shaft is provided on its end with a bevel gear 20 gearing with a horizontally disposed bevel gear 21 mounted on a vertically disposed shaft 22 journalled in the frame 1. Shaft 22 is adapted to drive the usual wringer mechanism which forms no part of the present invention. The horizontal bevel gear 21 is provided with a crank arm 23 which is adapted to be oscillated in a horizontal plane. And the outer end of this crank arm 23 connects to an oscillatable member which will now be described.

This oscillatable member has a portion in the form of a yoke 24 having the furcations 25 spaced apart. These furcations are formed with outward extending bearings 26 adapted to receive shafts 27 journaled in bearings 28 carried by the frame of the support 1. The rear portion of the yoke 24 is provided with a rod 29 which projects forwardly and between the furcations 25. This rod 29 is of considerable length. One of the furcations 25 of this yoke shaped member is provided with an integral arm 30 which connects with a yoke 31 formed on the outer end of the link 23 and is pivoted thereto by means of a pivot pin 32 so that when the link 23 is oscillated this connection will cause the oscillation of the yoke 24 about its pivotal axis and this movement in turn will cause the oscillation of the rod 29 which is integrally formed with the yoke 24. The maximum positions of oscillation of this rod 29 are illustrated in dotted lines in Figure 2 of the drawings.

This rod 29 is provided with a member connected thereto but adapted to be shifted longitudinally of the rod from a point coincident with the axis of rotation of the yoke 24 to the outer end of the rod 29. In the present instance this member consists of a recessed or hollow block 33 which surrounds and is slidable along the rod 29 from one end to the other. This block 33 is provided with a yoke 34 in the form of spaced links to the outer end of which is pivoted a link 35 pivotally connecting as at 36 to a geared sector 37 pivotally mounted as at 38 on a cross bar 39 of the support. The teeth 40 of this sector in turn mesh with a pinion 41 rigid with the shaft 2.

Means is provided for shifting block 33 longitudinally of rod 29. This means comprises a rod 42 pivotally connected as at 53 to link 35 or yoke 34. The outer end of this rod 42 connects to a lever 43 pivotally mounted as at 44 to a cross bar 45 of the support. The outer end of this link 43 is pivotally connected to a rod 46 which in turn connects with a lever 47 pivoted as at 48 to the side of the machine. The upper end of this lever is provided with a handle 49 and a clutch member which is adapted to engage in a notch segment 50 in the side of the machine so that when the lever is shifted it will remain in adjusted position.

In operation, when the lever is pulled to the dotted, line position shown in Figure 2 the link 43 will be moved to its dotted line position and the rod 42 likewise to its dotted line position which will swing link 35 to the right to cause the block 33 to be moved to a point between the furcations 25 and coincident with the axis of the yoke 24 which is in line with the center of rotation of the shaft 27. And since this is the center of oscillation of the yoke 24, no movement of oscillation will be communicated to the block 33 even while the rod 29 is being oscillated by means of the arm 30 and link 23 driven from the prime mover. In this position no movement will be communicated to the sector 40 and to the shaft 2 so that the tub will remain at rest even while the prime mover is still in motion. If now the lever 47 is thrown to the full line position the block 33 will be moved in the opposite direction to a point adjacent the end of the rod 29 and the maximum oscillation will be imparted to the sector 40 and to the washing machine tub which will be violently rotated first in one direction and then in the other. It must be manifest that any degree of movement can be secured between maximum oscillation and no movement by adjusting the position of the lever 47. It will also be evident that this variable throw or oscillation of the tub is secured without the intervention of a clutch or the like and that the tub can be thrown into operation very gently and the maximum oscillation secured without any jerking or without the use of cushioning springs.

Having thus described my invention, what I claim is:

1. A washing machine tub having the inner face of its bottom formed with a central upstanding dome with liquid impelling ribs radiating in spaced relation therefrom, the exterior face of said bottom being formed with a socket for a power shaft and having

ribs radiating therefrom, said latter ribs alternating with those on the inner face of the bottom.

2. In a washing machine, a tub having its bottom wall provided with a centrally disposed upwardly projecting dome formed integrally therewith, ribs on said bottom wall extending radially outward from said dome, and a shaft having one end inserted into said dome from a position beneath the tub so as to rotatably support said tub.

3. In a washing machine, a tub having its bottom wall provided with a centrally disposed upwardly projecting dome formed integrally therewith, blades on said bottom wall extending radially outward from said dome, a shaft having one end inserted into said dome from a position beneath the tub so as to rotatably support said tub, and reenforcing ribs within said dome alternating in position with respect to said blades.

4. In a washing machine, a tub having a centrally disposed upwardly projecting dome provided with internal reenforcing means, ribs on said bottom wall extending radially outward and upward from said dome, and a shaft having one end inserted within said dome so as to rotatably support said tub.

5. In a washing machine, a tub having a centrally disposed upwardly projecting dome formed integrally therewith, and provided with an internal shaft receiving socket of angular cross section, said dome being provided with internal reenforcing ribs.

6. In a washing machine, a tub, the bottom of which is provided with a centrally disposed upwardly-extended dome-like portion having a shaft engaging socket in its underside, and ribs upstanding from said bottom wall and extending radially outward and upward from said dome-like portion, with their maximum height contiguous to the side walls.

7. In a washing machine, a tub provided with side walls and a bottom portion, said side walls merging into the bottom portion by a downwardly and inwardly extended portion, agitator means consisting of blades attached to and extending upwardly a substantial distance from said bottom portion, and with respect to length providing for relative spacing as between the center and circumference of the tub, the top edges of said blades extending from the central portion of the tub directly to and intersecting with the side walls of the tub, said tub having an unbaffled interior surface except at said bottom portion, and being free of other agitating means above the plane of said blades and means for oscillating the tub about its vertical axis.

8. In a washing machine, a vertically disposed tub comprising a bottom portion and approximately vertical side walls joined in a manner to permit uninterrupted outward and upward movement of the water during the washing action, a plurality of horizontal, radially disposed agitating blades extending upwardly from the bottom of the tub, the top edges of said blades being extended radially from the central portion of the tub and having their outer ends intersecting with the side walls, the internal space surrounded by the sides of the tub being free of other agitating means, and power means for rotatively reciprocating the tub.

9. In a washing machine, a tub constructed with approximately vertical side walls and a bottom wall, said side walls gradually merging with the bottom wall by a downwardly and inwardly curved portion, a plurality of radially disposed agitating blades having their top edges spaced a substantial distance from the bottom of the tub, said top edges extending radially from the central portion of the tub directly to and intersecting with said side walls, and power means for oscillating said tub.

10. In a washing machine, a tub comprising a bottom portion, approximately vertical side walls and a downwardly and inwardly inclined connection between the side walls and the bottom portion, a baffle centrally located in the tub and projecting upwardly therefrom, a plurality of radially disposed agitating blades upstanding a substantial distance from the bottom of the tub and connected thereto, the top edges of said blades extending from the vicinity of the baffle directly to and intersecting with the side walls of the tub, and power means for oscillating said tub.

In witness whereof, I hereunto subscribe my name to this specification.

HOWARD F. SNYDER.