Nov. 25, 1930. G. M. GIBSON 1,782,684

WASHING MACHINE

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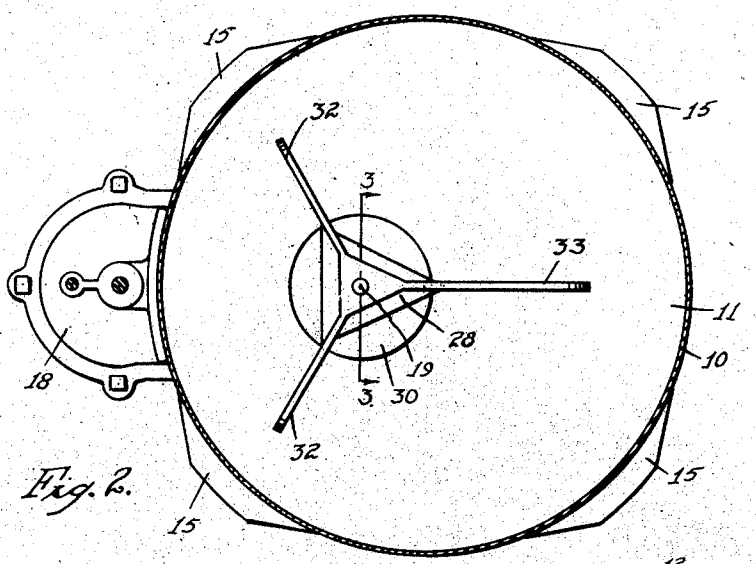


Fig. 2.

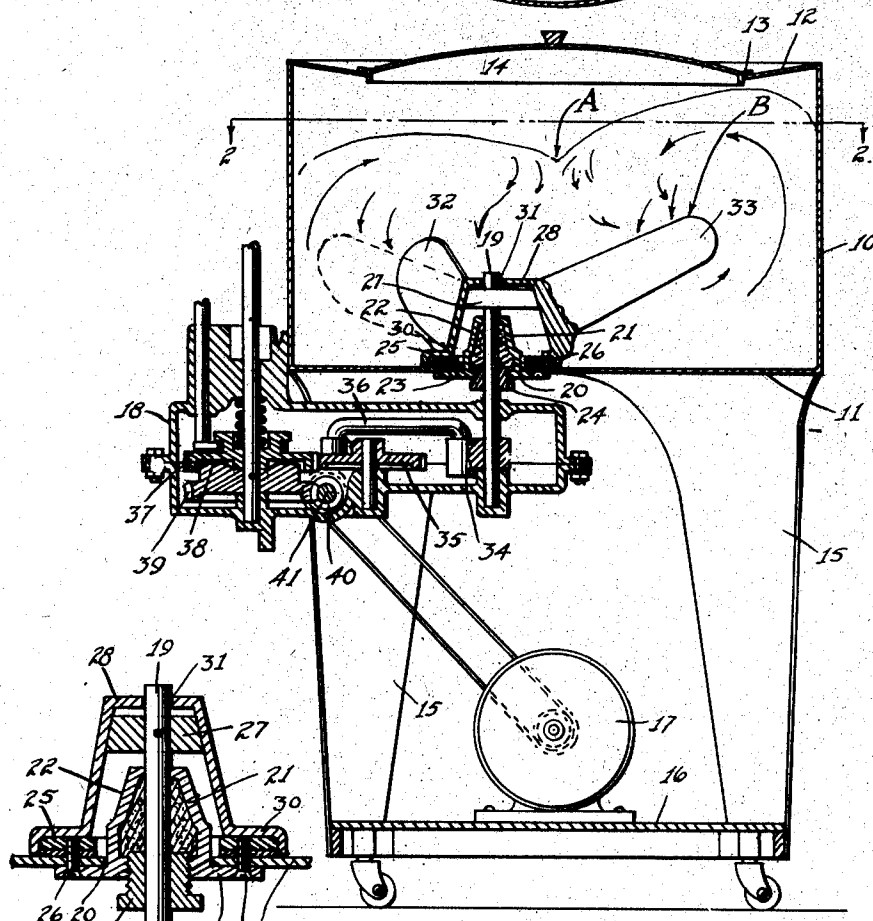


Fig. 1.

Fig. 3.

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UNITED STATES PATENT OFFICE

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WASHING MACHINE

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This invention relates to washing machines of that type having an agitator shaft projecting upwardly through the bottom of the tub and provided with an agitator on its upper end and within said tub and adapted to operate adjacent to the bottom of the tub.

In this type of washing machine the natural tendency of the clothes being washed is to gather and bunch in the center of the tub above the agitator, and they often become tangled in the agitator, causing the clothes to become tangled and hard to remove. In washing machines of this type the agitator is usually provided with a large hub flange or disk which is set in a recess in the bottom of the tub. This is an expensive construction and is undesirable on account of dirt and lint collecting in the recess, and considerable difficulty is experienced in packing the agitator shaft.

It is therefore the object of my invention to provide a washing machine of simple, durable and inexpensive construction of the type employing a reciprocating rotary agitator located near the bottom of the tub, said agitator being located and constructed so that an increased agitation of the clothes is made possible, and at the same time causing them to be separated and distributed quite uniformly within the water in the tub, and eliminating to a large extent the tendency of the clothes to collect or bunch at the center of the tub.

A further object is to provide in a washing machine of the type above described an improved agitator whereby the tendency of the clothes to collect or twist about the agitator is reduced.

A further object is to provide in a washing machine of the type above described, improved means for detachably and operatively connecting the agitator with the agitator shaft.

A further object is to provide improved means for packing the agitator shaft.

A further object is to provide an agitator so constructed that it may be used in connection with a flat bottom washing machine.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a vertical sectional view.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1.

Figure 3 is an enlarged detail sectional view taken on the line 3—3 of Figure 2.

My improved washing machine comprises a tub 10, preferably of cylindrical formation, and having a bottom 11 and a top 12. The top is provided with an opening 13 through which the clothes are placed in the washing machine. A cover 14 is provided for said opening.

The tub 10 is supported by suitable legs 15, the lower ends of which are secured to a horizontal platform 16 on which an electric motor 17 is mounted. The gear casing 18 is secured beneath the bottom of the tub and provided with a vertically arranged agitator shaft 19 which extends upwardly through the bottom of the tub.

The bottom of the tub 11 is provided with an opening 20 placed a considerable distance from the center of the bottom of the tub, and provided with a packing gland 21 through which the shaft 19 extends. Said gland comprises a conical shell 22 which projects upwardly into the washing machine tub, and has a flange 23 at its lower end. A screw threaded plug or bushing 24 is provided for increasing the pressure on the packing within the gland 21. The packing chamber is comparatively large to hold a large amount of packing material, thereby providing means whereby a water tight joint will be insured without excessive pressure on the packing material. The conical shaped member extends upwardly into the tub a considerable distance which helps to decrease the water pressure on the packing.

An annular plate 25 is secured to the upper surface of the bottom 11 and surrounding the opening 20. Said annular plate, the bottom 11 and the flange 23 are secured together by means of bolts or rivets 26. The upper and outer corner of the plate 25 is rounded as clearly illustrated in Figure 3.

The upper end of the shaft 19 is provided with a triangularly shaped block 27 fixed to said shaft a slight distance below the upper end, and is designed to support and operate the agitator 28, which comprises a hollow hub portion 29 which has the form of a truncated, three-sided prism, the lower end of which terminates in a flange or disk 30 designed to be supported above the plate 25, and has its outer edge turned downwardly over the edge of said plate.

The upper end of the hub 29 is provided with an opening 31 for receiving the upper end of the shaft 19, while the hub 29 is designed to rest on the block 27 which provides means for imparting motion to said hub, and at the same time permits the hub to be easily and quickly removed by simply grasping and elevating the same.

The corners of the hub 29 are provided with agitator blades 32 and 33, the blades 32 being of the same length, while the blade 33 is considerably longer. The blades 32 are considerably wider vertically than the blade 33, and the blade 33 is set at a nearer vertical angle than the blades 32. The lower edge of the blade 33 is cut away so that there is a greater distance between the lower edge of the blade 33 and the bottom of the tub than the distance between the lower edge of the blades 32 and the bottom of the tub.

It will be seen that the agitator is supported eccentrically within the tub with the blades 32 supported in the smaller space between the the shaft and the side of the tub, while the blade 33 is supported in the larger space, as clearly shown in Figure 2, when the agitator is in the position of its half stroke.

The shaft 19 is actuated by means of an arm 34 securred to the lower end of said shaft, and operatively connected with a crank gear 35 by means of a link 36. Said gear 35 is actuated through a gear 37, the clutch device 38 and a worm gear 39, said gear 39 being operated by a worm 40 supported on the shaft 41, which in turn is actated by means of a belt 42 driven by the motor 17. By this arrangement it will be seen that an oscillatory rotary movement will be imparted to the agitator as the motor 17 is operated.

The height of the agitator is usually about half the depth of the tub, and the tub is filled with water with the water line slightly over three-fourths the distance from the top to the bottom. The agitator is operated comparatively rapidly, about seventy-seven strokes per minute, which produces a large amount of agitation in the water, the water being so agitated as to cause the clothes to be distributed quite uniformly throughout the tub.

It will readily be seen that as the agitator is oscillated, the water will have a tendency to move radially outwardly from the ends of the blades, causing a partial vacuum to be created near the center of the agitator, which causes the clothes to move toward the center of the agitator. This causes a large amount of difficulty when the agitator shaft is placed in alinement with the vertical center of the tub. The clothes usually collect and tangle about the agitator.

This difficulty is largely overcome with my device by placing the center of the agitator shaft to one side of the tub and providing short blades 32 and a longer blade 33 mounted as above described.

In operating the machine with comparatively few or no clothes in the water, a whirlpool will be established at the point "A", which is the vertical center of the tub. In this respect my agitator operates substantially the same as if the agitator were placed in the vertical center line.

On account of the blade 33 being longer than the blades 32 it will readily be seen that the outer end of the blade 33 travels through a longer circumferential path than the ends of the blades 32, and at a higher circumferential velocity, which results in a vacuum being created at the back side of the blade 33 near its outer end, or at the point "B". This is due to the fact that the outer end of the blade 33 has a tendency to move the water at a higher velocity than the blades 32.

The natural tendency of the water is to move outwardly along the bottom of the tub and upwardly along its vertical sides and inwardly over the top, thence downwardly at the point "A" causing the whirlpool above referred to.

On account of the agitator having a tendency to create a vacuum above the center of the hub 29, and on account of the outer end of the blade 33 having a tendency to create a vacuum back of the outer end of the blade, it will be seen that two separate vacuum points are thus established and clothes moving into the whirlpool "A" will be separated and spread as they travel to the two vacuum centers, part of the clothes moving toward the point "B", while the other part moves toward the center of the agitator. This results in the clothes being distributed quite uniformly and evenly through the tub, and at the same time are continuously moved about.

Because of the oscillatory movement of the agitator, the cycle of operation above described is not continuous, but the clothes move in a more or less intermittent manner and are oscillated in a horizontal plane as well as travel in paths established in a vertical and radial plane.

On account of the outer end of the blade 33 being higher than the outer ends of the blades 32, the tendency toward the water in the bottom of the tub to synchronously follow the oscillatory movement of the blades 32 is largely eliminated, due to the fact that the

outer end of the blade is operating in a plane above the plane in which the blades 32 operate, and due to the fact that the movement of the water from the outer end of the blade 33 is at a higher velocity than the water from the blades 32, which causes a large amount of vertical agitation and a more rapid changing of the water between the top and bottom of the tub.

In operation, the top surface of the water is usually in the form of three waves, one above and ahead of each of the blades. The water ahead of the blade 33 is at a higher elevation than that above the blades 32, in the manner as illustrated in Figure 1.

By this arrangement, the clothes are not only agitated in a horizontal oscillatory path, but they are also agitated in a vertical oscillatory path.

The tendency of the outer end of the blade 33 to create a vacuum of a comparatively high degree, greatly assists in preventing the bunching of the clothes at the center of the agitator by forming outward currents of water from the center of the agitator to the ends of the blades, the radial velocity of which is in excess of the radial velocity from the blades 32.

It will readily be seen that if a portion of the clothes are separated and moved to the outer end of the blade 33, then the other portion will be moved to the outer end of the blades 32, instead of bunching and collecting in the center of the top of the agitator, which has heretofore resulted when the agitator is located in the center of the tub with the blades of uniform length and width.

By providing the annular plate 25 and turning the outer end of the plate downwardly over the edge of the plate, I have provided an agitator which may be placed above a flat bottom tub without any danger of the clothes gathering or becoming entangled between the bottom of the tub and the agitator, and without having to form a depression in the bottom of the tub to receive the flange, as has heretofore been the practice.

By this construction, I am enabled to form a hub flange of comparatively small diameter instead of making the flange of a diameter substantially equal to twice the length of the blades.

By providing the triangularly shaped block 27 and inclining the walls of the hub 29, I have provided means whereby the agitator may be easily and quickly removed or replaced without the use of set screws or the like, and at the same time firmly and rigidly supports the agitator in position.

On account of the blade 33 being longer than the blades 32, it will readily be seen that it is necessary to place the agitator in proper relation with the shaft 19. This I have accomplished by mounting the block 27 slightly off of its center on the shaft 19, and making the said block 27 with two of its faces larger than its third face, and forming the hub 29 to fit the same.

Thus it will be seen that I have provided a washing machine of simple, durable and inexpensive construction, which is capable of rapidly washing the clothes, on account of excessive agitation produced in the water, and on account of its ability to separate the clothes and distribute them throughout the tub, so that a maximum amount of water will at all times be forced and circulated through the clothes.

I claim as my invention:

1. A washing machine comprising a tub, an agitator adapted to oscillate above a vertical axis mounted eccentrically within said tub, said agitator comprising a hub portion having radial upright blades, one of said blades being longer than the others, and means for imparting oscillatory rotary movement to said agitator.

2. In combination, a washing machine, a tub, a vertical agitator shaft mounted eccentrically within said tub, an agitator having a comparatively large hub portion detachably and operatively connected to the upper end of said shaft, said hub having radial upright blades, one of which is narrower and longer than the others and designed to oscillate in a larger space between the sides of said tub and said hub portion, and means for imparting rotary oscillatory movement to said shaft.

3. In a washing machine, an agitator provided with a hub portion having the form of a hollow, three-sided truncated prism, the vertical corners of said prism terminating in radial agitator blades.

4. In a washing machine, an agitator provided with a hub portion having the form of a hollow, three-sided truncated prism, the vertical corners of said prism terminating in radial agitator blades, one of said blades being longer than the others with its outer end designed to operate in a horizontal plane above the upper ends of the other blades.

5. In a washing machine, an agitator provided with a hub portion having the form of a hollow, three-sided truncated prism, the vertical corners of said prism terminating in radial agitator blades, the lower end of said hub portion terminating in a disk or flange having its peripheral edge bent downwardly to form an annular flange.

6. In combination, a washing machine tub having a bottom and sides, the bottom being provided with an eccentrically arranged opening, an annular plate on the upper face of said bottom surrounding said opening, a packing gland supported within said opening, an oscillatory shaft supported in said packing gland having one end extending up into said washing machine, the upper end of said shaft being provided with a triangularly shaped

block having the form of a truncated prism, an agitator hub having the form of a hollow truncated prism designed to be supported over said block, the lower end of said hub portion terminating in a flange or disk having its peripheral edge turned downwardly over the edge of said annular plate, the vertical corners of said agitator terminating in radial blades.

7. In combination, a washing machine tub having a bottom and sides, the bottom being provided with an eccentrically arranged opening, an annular plate on the upper face of said bottom surrounding said opening, a packing gland supported within said opening, an oscillatory shaft supported in said packing gland having one end extending up into said washing machine, the upper end of said shaft being provided with a triangularly shaped block having the form of a truncated prism, an agitator hub having the form of a hollow truncated prism designed to be supported over said block, the lower end of said hub portion terminating in a flange or disk having its peripheral edge turned downwardly over the edge of said annular plate, the vertical corners of said agitator terminating in radial blades, one of said blades being longer and of a higher elevation than the others.

8. A washing machine comprising a tub, an agitator adapted to oscillate about a vertical axis mounted eccentrically within said tub, said agitator comprising a hub portion having radial upright blades, the area of the active faces of some of said blades being greater than the area of the others, and means for imparting oscillatory rotary movement to said agitator.

9. In combination, a washing machine tub having a bottom and sides, the bottom being provided with an eccentrically arranged opening, an annular plate on the upper face of said bottom surrounding said opening, a packing gland supported within said opening, an oscillator shaft supported in said packing gland having one end extending up into said washing machine, the upper end of said shaft being provided with a triangularly shaped block having the form of a truncated prism, an agitator hub having the form of a hollow truncated prism designed to be supported over said block, the lower end of said hub portion terminating in a flange or disk having its peripheral edge turned downwardly over the edge of said annular plate, the vertical corners of said agitator terminating in radial blades.

10. In combination, a washing machine tub having a bottom and sides, the bottom being provided with an eccentrically arranged opening, an annular plate over the upper face of said bottom surrounding said opening, a packing gland supported within said opening, an oscillatory shaft supported in said packing gland having one end extending upwardly into said washing machine, an agitator hub supported on the upper end of said shaft, the lower end of said hub terminating in a flange or disk having its peripheral edge turned downwardly over the edge of said annular plate.

11. In combination, a washing machine tub having a bottom and sides, the bottom being provided with an eccentrically arranged opening, an annular plate over the upper face of said bottom surrounding said opening, a packing gland supported within said opening, an oscillatory shaft supported in said packing gland having one end extending downwardly into said washing machine, an agitator hub supported on the upper end of said shaft, the lower end of said hub terminating in a flange or disk having its peripheral edge turned downwardly over the edge of said annular plate, said agitator having radial blades, some of which have greater area than the others, and means for imparting oscillatory rotary movement to said shaft.

12. In combination, a washing machine tub having a bottom and sides, the bottom being provided with an opening, an annular plate over the upper surface of said bottom surrounding said opening, a packing gland supported within said opening, an oscillatory shaft supported in said packing gland having one end extending upwardly into said washing machine, and an agitator hub supported on the upper end of said shaft, the lower end of said hub terminating in a flange or disk having its peripheral edge turned downwardly over the edge of said annular plate.

13. In combination, a washing machine tub having a comparatively thin bottom and an opening therein, an annular flange adjacent to one side of said bottom and surrounding said opening, a packing gland supported within said opening having a flange to engage the other side of said bottom, an annular packing between one of said flanges and said bottom, bolts for securing said flanges, packing and bottom members together, and an oscillatory shaft supported in said packing gland having one end extending upwardly into said washing machine.

Des Moines, Iowa, July 13, 1928.

GEORGE M. GIBSON.