Feb. 23, 1937. G. M. GIBSON 2,071,622

WASHING MACHINE

Original Filed May 8, 1931 3 Sheets-Sheet 1

Fig. 1

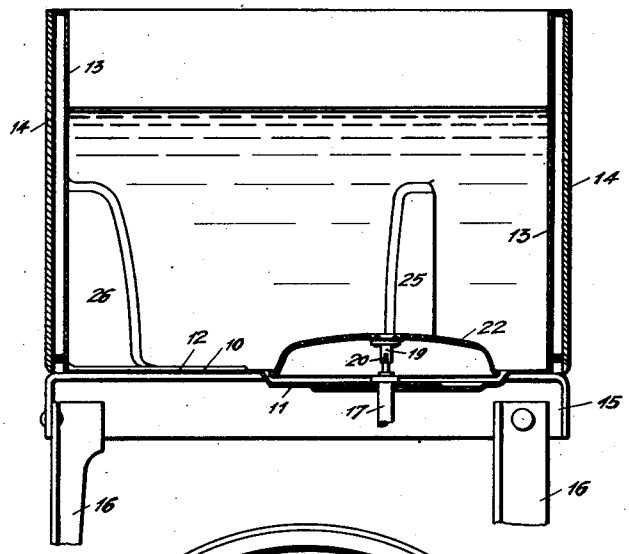
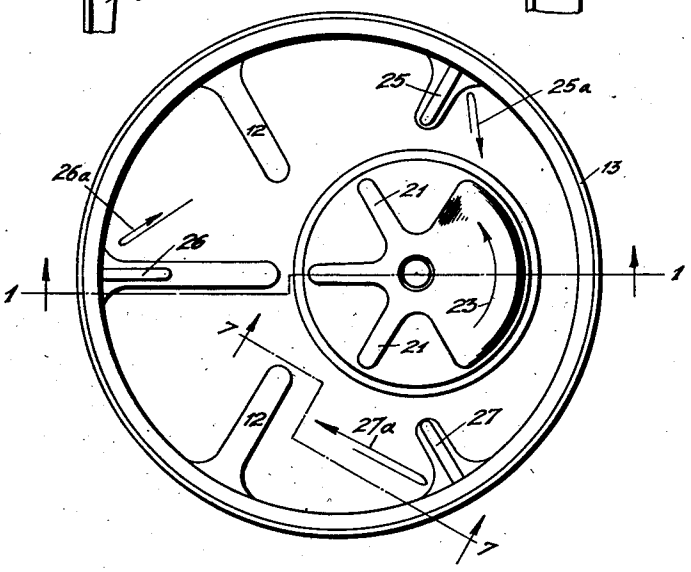


Fig. 2



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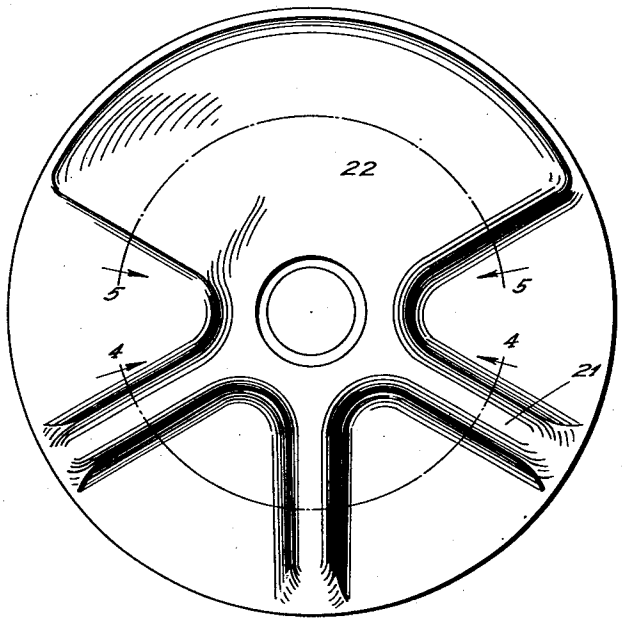


Fig. 3

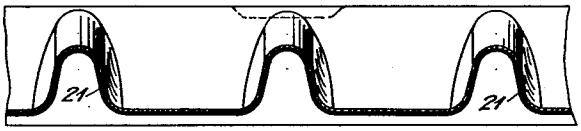


Fig. 4

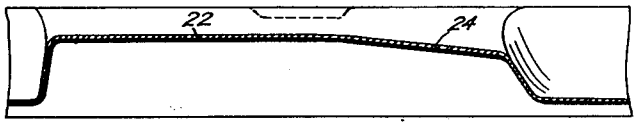


Fig. 5

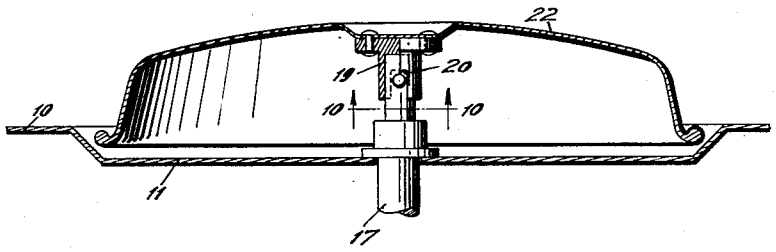
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WASHING MACHINE

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Fig. 6



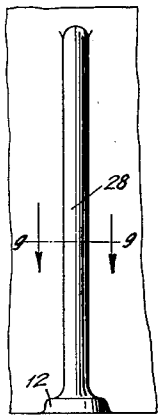


Fig. 8

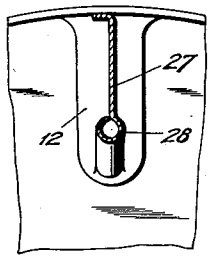


Fig. 9

Fig. 10

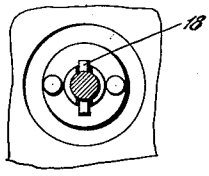


Fig. 7

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UNITED STATES PATENT OFFICE

2,071,622

WASHING MACHINE

George M. Gibson, Davenport, Iowa, assignor to C. E. Butler

Application May 8, 1931, Serial No. 535,852
Renewed August 17, 1936

4 Claims. (Cl. 259—101)

In the art of domestic washing machines the common practice at the present time is to cause agitation of the water and clothes by means of an agitator to which an alternating rotary motion is applied, about three-fourths revolution in one direction and the same amount in the opposite direction. In the art of commercial laundry machines of the type operating on a horizontal axis it is the custom at the present time to give these containers a rotary movement of about two revolutions in one direction, and then exactly the same amount of revolutions in the opposite direction, and this has been found essential to prevent tangling of the clothes.

The disadvantage of the alternating rotary agitators in washing machines has long been recognized. First there must be employed an expensive reversing mechanism, and second, as wear takes place, this reverse mechanism is noisy and tends to impart vibratory shaking movement to the entire washing machine.

The object of my invention is to provide a washing machine having an agitator to which a continuous rotary motion is imparted, thus eliminating all expense for the reversing gear mechanism, and at the same time providing a noiseless and non-agitating or shaking device.

More specifically the object of my invention is to provide a washing machine of the type having a continuously rotating in one direction agitator, which will not produce twisting movements within the container which will cause the clothes being washed to become entangled.

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 shows a vertical, central, sectional view of a washing machine embodying my invention, and taken on the line 1—1 of Figure 2.

Figure 2 shows a top or plan view of same.

Figure 3 shows an enlarged top view of my improved agitator.

Figure 4 shows a vertical sectional view on the line 4—4 of Figure 3, as it would appear if the agitator were cut along the line 4—4 and bent out along a straight line.

Figure 5 shows a similar view on the line 5—5 of Figure 3.

Figure 6 shows an enlarged, vertical, central, sectional view of a portion of the container between the agitator and the shaft coupling for connecting the agitator, taken on the same line as that shown in Figure 1.

Figure 7 shows a vertical, central, sectional view taken on the line 7—7 of Figure 2, and illustrating a portion of the container, one of the baffles and the agitator, to illustrate their relative positions.

Figure 8 shows an inner face view of one of the baffles.

Figure 9 shows a sectional view on the line 9—9 of Figure 8.

Figure 10 shows a sectional view on the line 10—10 of Figure 6.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate generally the bottom of the container, which is preferably provided with a depression 11 to receive the agitator. It is also preferably provided with slightly upraised ribs 12 for strengthening purposes. These ribs are arranged relatively radially.

The side walls of the container are indicated by the numeral 13, and there is preferably an outer wall 14 spaced apart from the side walls of the container. There is also a downwardly extended circular flange 15 supporting the container, and which in turn is fixed to the supporting legs 16.

Said depressed portion 11 is arranged eccentrically in the bottom of the tub, as clearly illustrated in Figure 2, and at the center of this depressed portion is an upright power shaft 17, having at its upper end outwardly projecting lugs 18.

The agitator is provided with a central downwardly extending hub 19, which is formed with slots 20 to receive the lugs 18, so that a rotary movement in one direction imparted to the shaft 17 will impart a corresponding rotary movement in one direction to the agitator.

The agitator proper is preferably made of a single piece of sheet metal and is connected at its central portion to the hub 19. On one side of the agitator there are formed three radially extended upwardly projecting blades 21, equally spaced apart, and the sides of these blades are preferably tapered slightly upwardly and toward each other, as shown in Figure 4.

On the opposite side of the upper surface of the agitator there is a smooth surface 22, and the heighth of this part 22 is substantially the same as the heighth of the tops of the blades 21. The upper portions of both the blades 21 and the smooth surface 22 incline slightly from a central portion outwardly and downwardly as shown in Figure 1.

The agitator moves in the direction of the arrow **23** shown in Figure 2, and the advance portion of the top surface of the smooth portion **22** of the agitator inclines slightly upwardly, as shown in Figure 5 at **24**.

Fixed to the inner surface of the container wall is a series of baffle plates. The first one, indicated by the numeral **25**, is located adjacent to the point where the agitator in its travel commences to move away from that side of the container nearest to the agitator, as shown in Figure 2, and it extends radially into the container and upwardly to a point somewhat spaced below the water level of the container, as indicated in Figure 1. The second baffle plate **26** is similar to the first and is arranged radially on the interior of the container at the side opposite from the side which most nearly approaches the agitator.

The third baffle plate **27** is also radially arranged within the container, and is adjacent to the point where the agitator in its travel approaches the part of the container nearest the agitator.

The particular construction of the baffles is clearly indicated in Figure 9, and it will be seen that it is comprised of a single piece of sheet metal with rounded rib **28** at its outer and upper surface.

The washing machine herein illustrated and described has been subjected to exhaustive tests, and it has been found that its operation is as follows:

When the agitator is being rotated continuously in one direction at the proper speed, the three blades **21** cause a current of water to be moved radially in an outward direction from the center of the agitator. In addition to this there is a minor upward movement imparted to the water due to the inclined sides of the blades **21**, and in addition to this there is a slight tendency to impart to the water engaged by the blades **21** a rotary movement in the direction of travel of the agitator. The said movements, however, imparted to the water in the tub is only a momentary or pulsating impulse, because immediately following the blades **21** is a smooth surface **22**, and this smooth surface does not impart any such movement to the water.

These pulsating currents of water caused by the blades **21** are of sufficient force to set up a current, which will travel to the outer walls of the tub, and then upwardly and then backwardly toward the center of the tub and downwardly, and this downward movement would tend to cause the clothes in the tub to impinge upon the agitator. This is not desirable, and this tendency has been found to be entirely overcome by means of the slightly inclined surface **24** of the smooth surface **22**, as this causes a rather thin film of water to be given an upward movement, so that clothes moving downwardly toward the agitator, that would ordinarily impinge upon the agitator, are carried by this slightly upwardly inclined current in a direction upwardly away from the agitator, so the clothes do not actually impinge on the agitator at any point.

In practice it has been found that material such as cheese cloth without binding on the edges may be placed in the tub and operated for hours without forming any appreviable amount of lint, whereas a similar test with the general class of alternating reciprocating agitators now in use would almost wholly disintegrate the same quantity of material such as cheese cloth.

If, however, the agitator were located centrally within the tub and there were no baffle plates projecting outwardly from the sides of the tub, there would be a spiral movement of the water within the tub, which would objectionably entangle the clothes.

I have found, however, that by locating the agitator eccentrically of the tub, as shown in Figure 1, and by providing the baffle plates **25**, **26** and **27**, this clothes twisting and entangling tendency is substantially overcome as follows:

Assuming that a pulsating outward current of water is thrown from the agitator in the direction toward the baffle **25**, then this current will strike upon the adjacent side of the tub and the adjacent side of the baffle **25**, and will then pass upwardly and be thrown backwardly in the direction of the arrow **25***a* shown in Figure 2.

In view of the fact that there is quite a short distance between the agitator and the baffle **25**, this backward current in the direction of the arrow **25***a* will be relatively strong and obviously is in a direction directly opposed to the spiral movement normally set up by the blades **21**.

When the blades **21** cause a pulsating outward movement of the water in the tub in a direction between the baffles **25** and **26**, then there is the same tendency to form a current upwardly and in the direction of the arrow **26***a*, and then downwardly into the tub. This current, however, is relatively weak on account of the great distance between the agitator and the adjacent side of the tub, and this downwardly moving current, if it did carry the clothes down toward the bottom of the tub, would not bring them into the exact path of travel of the agitator blades.

Then in regard to currents set up by the blades **21** that strike the baffle **27**, such currents are relatively stronger than the ones which strike the baffle **26**, and they will be thrown upwardly and then in the direction of the arrow **27***a* in Figure 2, out of the path of travel of the agitator, and in a direction opposing the circular path of travel of the water normally set up by the blades **21**.

In practice it has been found true that in some instances clothes will pass from the space between the blades **27** and **25** into the space between the blades **25** and **26**, in a direction in which the agitator moves, but it also frequently happens that clothes which are moved in a direction toward the baffle **27** will be thrown by said baffle in the direction of the arrow **27***a*, and back into the space between the baffles **26** and **25**.

The net result of the entire combination of the eccentrically mounted agitator, the blades on one side and the smooth surface on the other for causing pulsating movements, and on account of the eccentrically mounted agitator and the relative positions of the baffles, is that in actual use there are no well defined constant currents moving in any specific direction, but due to the pulsating movements imparted by the blades and smooth surface of the agitator, there is normally imparted to each garment or portions of the garments, first a contracting and then an expanding movement, which will tend to force the currents of water through the garments in a highly efficient manner for cleansing purposes.

Furthermore, in view of the fact that the agitator may be connected directly to a motor or other source of power without any reversing mecha-

nism, it is obvious that the washing machine can be constructed very cheaply, and it is also obvious that on account of the lack of reversing movement applied to the agitator, all of the shocks, jars and vibrations attendant upon the usual washing machine reversing mechanism is absent in this machine, and it is quiet, noiseless and smooth running.

I claim as my invention:

1. In a washing machine, the combination of a tub, a rotatable shaft projected upwardly through the bottom of the tub, an agitator fixed to the shaft and being substantially circular in plan view, one sector of its top surface being substantially flat and smooth and being positioned above the surface of the tub bottom, the remaining sector of the top surface of the agitator being depressed and a series of radial blades positioned on the upper surface of said depressed sector of the agitator, the tops of said blades being in substantially the same horizontal plane as the top surface of said first mentioned sector.

2. In a washing machine, a tub, a rotatable shaft projecting upwardly through the bottom of said tub, an agitator fixed to the shaft and being substantially circular in plan view, said agitator having a radially extending sector-shaped portion, the upper surface of which is flat and smooth and terminates in peripheral downturned parts lying close to the tub bottom, and a depressed portion provided with a plurality of radial blades, the top surfaces of which are substantially coplanar with that of the sector shaped portion.

3. A washing machine comprising a tub, an agitator substantially circular in plan view, the upper surface of which is substantially smooth and the upper surface of the agitator being formed with one or more depressions extending from the circumference of the agitator toward the center thereof, means for supporting the agitator and for continuously rotating it in one direction, said means being so positioned relative to the tub bottom that one point at the circumference of the agitator is close to the side wall of the tub and the diametrically opposite point at the circumference of the agitator is widely spaced apart from the adjacent side wall of the tub.

4. A washing machine comprising a tub, an agitator substantially circular in plan view, the upper surface of which is substantially smooth and the upper surface of the agitator being formed with one or more depressions extending from the circumference of the agitator toward the center thereof, means for supporting the agitator and for continuously rotating it in one direction, said means being so positioned relative to the tub bottom that one point at the circumference of the agitator is close to the side wall of the tub and the diametrically opposite point at the circumference of the agitator is widely spaced apart from the adjacent side wall of the tub, the upper surface of the agitator being positioned a substantial distance above the tub bottom and the bottoms of said depressions being in approximately the same horizontal plane as the tub bottom adjacent that portion thereof not covered by the agitator.

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