

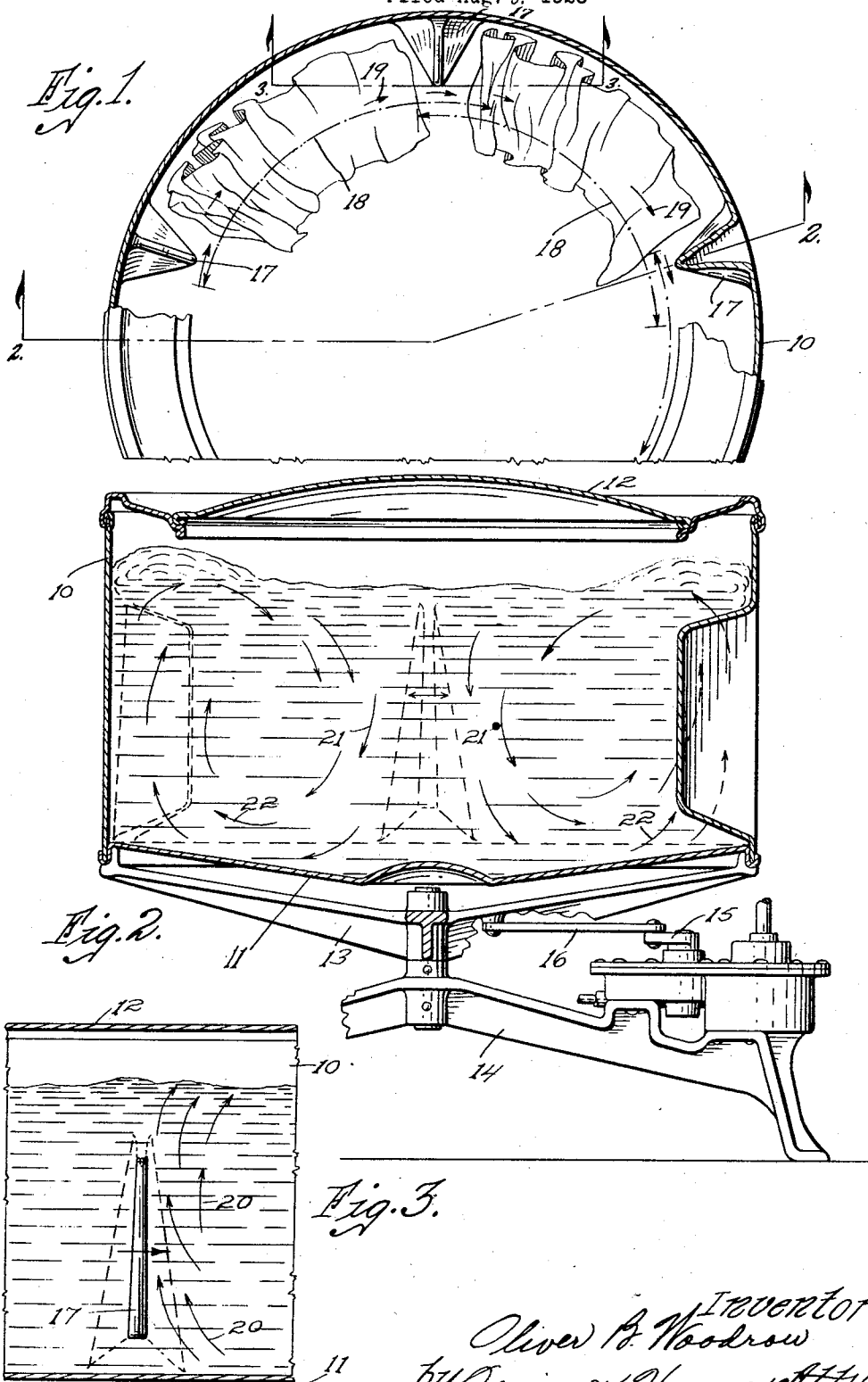
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WASHING MACHINE

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WASHING MACHINE.

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My invention relates to that class of washing machines in which there is provided an upright tub open at its top and means for imparting an oscillatory motion to the tub through an arc of less than a half revolution, and in which there is also provided a series of impeller blades on the interior of the tub movable with it for imparting motion to the water and clothes contained in the tub.

The object of my invention is to provide an improved form of impeller blades for washing machines of the character described, and whereby in use these impeller blades impart to the water and clothes within the tub such relative movements as will result in removing foreign matter from the clothes in a minimum of time, without injury to delicate fabrics being operated upon, and without entangling or twisting various fabrics within the tub, and whereby a washing process may be done in a more convenient, economical and facile manner than has been possible heretofore.

My invention consists in the construction of the impeller blades, and in their arrangement and combination with the tub, 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 top or plan view of a washing machine embodying my invention, a portion of the cover thereof being removed to illustrate the interior construction. In this figure, the fabrics being operated upon are illustrated in position.

Figure 2 shows a vertical, central, sectional view through the washing machine on the line 2—2 of Figure 1; and

Figure 3 shows a detail, vertical, sectional view on the line 3—3 of Figure 1.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate generally a washing machine tub having a bottom 11 and a removable cover 12. This tub is preferably supported upon a base 13 rotatively mounted in a stationary support 14. Mounted upon the stationary support 14 is a crank 15 and a pitman 16 connects the crank with the base 13, whereby upon a rotation of the crank 15 an oscillatory movement is imparted to the tub through an arc of a circle, hereinafter more specifically defined. The parts heretofore described are of the ordinary construction

now in common use. Hence further detailed description is unnecessary.

On the interior of the tub I have provided a series of impeller blades preferably equally spaced apart, and each blade has its base portion fixed in position adjacent to the side walls of the tub. These impellers are indicated generally by the reference numeral 17. The base or outer portion of each impeller is substantially triangular in outline, having a maximum width at its bottom and a minimum width at its top. Its side walls taper also from a maximum at their outer edges to a minimum at their inner edges, as clearly shown in Figure 1. The inner or narrow edge of each impeller is preferably arranged substantially vertically within the tub and the angles of both sides are substantially the same. In the drawings I have shown these impellers as being formed integral with the sides of the tub. I have, however, formed them of independent pieces secured to the tub.

In practical operation with my improved washing machine, and assuming that water and garments are placed within the tub, and that the tub is being oscillated through an arc of a length equal to that of the dotted line 18 in Figure 1, that is to say, with the length of the arc of travel slightly greater than the length of the space between two adjacent impellers, and assuming further that the impellers are spaced equidistance within the tub as shown, then the action of the impellers upon the water is as follows: When the impellers are moved toward the right, as shown by the arrows 19 in Figure 1, then the water adjacent to the right side of each impeller is moved to a certain extent circumferentially of the tub, and the water immediately adjacent to the right side of the impeller blade is moved rapidly upwardly as shown by the arrows 20 in Figure 3, thus throwing portions of the water in the form of jets or sprays upwardly and toward the center of the tub, as shown in Figure 2. This will cause currents of water to pass downwardly through the center of the tub, as shown by the arrows 21 in Figure 2, and when numerous downward currents are set up in the central portion of the tub, obviously they will cause currents to pass outwardly and upwardly as indicated by the arrows 22 in Figure 2, and this action takes place fairly uniformly throughout the entire area of the tub.

One of the important results in connection with this movement of the currents of water is that the currents of water that pass downwardly and outwardly from the center of the tub serve to convey garments from the center of the tub toward the sides thereof. However, the action of the jets of water being thrown upwardly and inwardly from the impellers is such that these jets of water do not carry with them the garments that are adjacent to the sides of the tub, hence during the action of the tub, the garments remain suspended in the water and spaced apart from the center of the tub. In this connection, attention is called to the fact that there is no obstruction in the center of the tub which might in any way tend to prevent this desirable action.

In actual practice I have observed through repeated tests that when, for instance, a single fabric, such as a handkerchief, is placed in a tub containing my improvement, and the tub is operated, the handkerchief will remain for an indefinite period between the particular pair of impellers to which it was first forced by the outwardly moving currents of water; and I have also observed that when the tub is filled with very heavy fabrics, such for instance as gunny sacks, a relatively small space at the center of the tub is left open without any fabric in it, and all of the contents of the tub are arranged between or adjacent to the impellers.

In addition to the foregoing, and in practical use, the impellers impart to the fabric being cleaned another action, to-wit: When an impeller, such for instance as the one shown at the top of Figure 1, is moving toward the right, and the fabric shown in that figure is held toward the outer part of the tub as before described, then this impeller creates a current of water moving circumferentially of the tub toward the right, and this causes that portion of the fabric adjacent to said impeller to be squeezed together, as illustrated in said figure. At the same time another action takes place adjacent to the impeller shown at the right in Figure 1. This impeller, by moving in a direction away from the garment, creates a partial vacuum or a reduced pressure in that part of the tub adjacent to the top side of the impeller at the right in Figure 1, and this causes currents of water to flow toward said impeller, thus opening out that portion of the fabric adjacent to said impeller. In actual practice I have observed that when the impellers are moving toward the right, that portion of the fabric adjacent to the forward side of each impeller is being compressed, while that portion adjacent to the rear side of each impeller is being lengthened out. Then upon a reversal of that movement, a reversal of the action on the fabric takes place, and the part that was previously squeezed together is

opened out, and the part that was previously opened out is squeezed together, and this is done without any actual rubbing action of the impellers upon the fabric. The fabrics at substantially all times are not in actual contact with the impellers, because of the currents of water being moved by the impellers away from them, thus keeping the garments free from rubbing action against the impellers.

I am aware that impellers have been used heretofore consisting of flat blades extended inwardly from the sides of the tub. Such impellers, however, do not have the advantageous functions of my improved impellers, because they tend to throw the water and garments inwardly toward the center of the tub, where they become massed and are not subjected to the alternate squeezing and opening-up action before described.

I am also aware that heretofore impellers have been arranged at different angles relative to a vertical line within the tub, but such impellers do not perform the advantageous function of my improved impellers, because they tend to move the garments circumferentially around the interior of the tub, and also up or down, and do not have the advantageous action of my improved impellers, because they do not perform the function of keeping the fabrics suspended adjacent to the outer part of the tub and away from the center, and they do not alternately compress and extend the fabrics between two adjacent impellers.

I have demonstrated that when the length of the oscillatory stroke of the tub is just slightly greater than the distance between two adjacent impellers, excellent results are produced, but when the oscillatory stroke is made considerably longer than this, the fabrics have a tendency to move from one space between the impellers to other spaces, and during such movement the alternate compression and extension of the fabrics is not so extensive as when the oscillatory stroke is substantially like that illustrated in the drawings. Furthermore, I have demonstrated that when the oscillatory stroke is considerably less in length than the space between two adjacent impellers, then the alternate compression and extension of the garments is less and not so effective in cleaning clothes.

I claim as my invention:

1. In a washing machine, the combination of a substantially upright tub, means for imparting an oscillating rotary movement to the tub; and a series of impellers in substantially upright position adjacent to the interior wall of the tub, the sides of said impellers being tapered from a maximum width at their lower ends to a minimum width at their upper ends, for the purposes stated.

2. In a washing machine, the combination of a substantially upright tub, means for imparting an oscillating rotary movement to the tub, and a series of impellers in substantially upright position adjacent to the interior wall of the tub, the sides of said impellers being tapered from a maximum width at their lower ends to a minimum width at their upper ends, said impellers being also tapered from a maximum width adjacent to the wall of the tub to a minimum width at their inner edges.

3. In a washing machine, the combination of a tub arranged in a substantially vertical position, means for imparting an oscillating rotary movement to the tub, and a series of impellers therein, each formed with two sides widely spaced apart near the bottom of the tub, and being inclined upwardly and toward each other and arranged substantially

equidistant from a vertical line through the center of the impeller.

4. The combination with a tub arranged in an upright position, of a series of impellers spaced substantially equidistant from each other, and each fixed in position adjacent to the upright inner wall of the tub in a substantially vertical position, and each having two sides spaced apart near their lower ends and inclined upwardly and toward each other, said sides also being spaced apart a considerable distance adjacent to the wall of the tub and being inclined toward each other at the inner edge of the impeller, and means for imparting an oscillating rotary movement to the tub of a length somewhat greater than the space between two impellers, for the purposes stated.

OLIVER B. WOODROW.