April 8, 1941. G. W. DUNHAM 2,237,813

WASHING MACHINE

Filed July 8, 1937 2 Sheets-Sheet 1

Fig. 1.

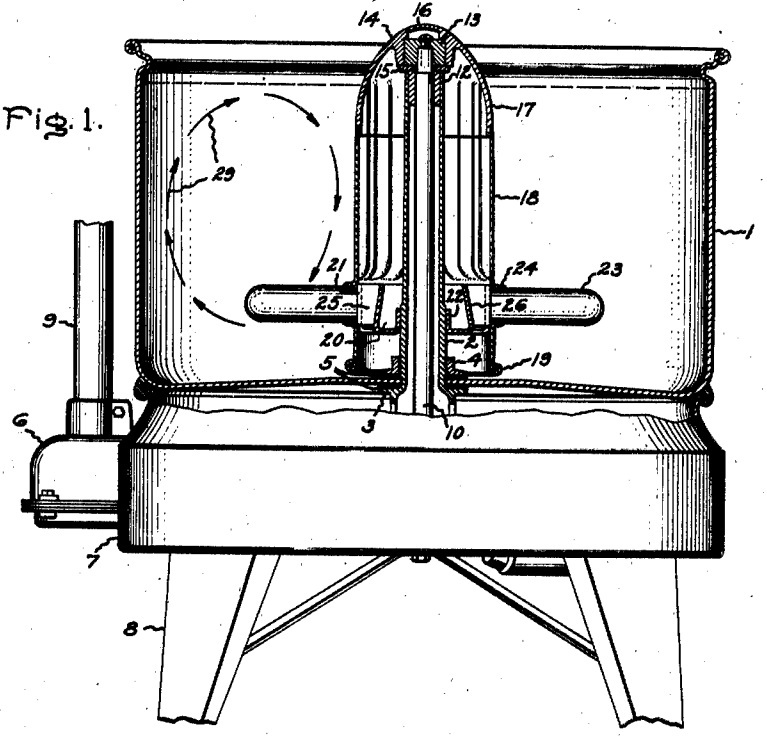


Fig. 2.

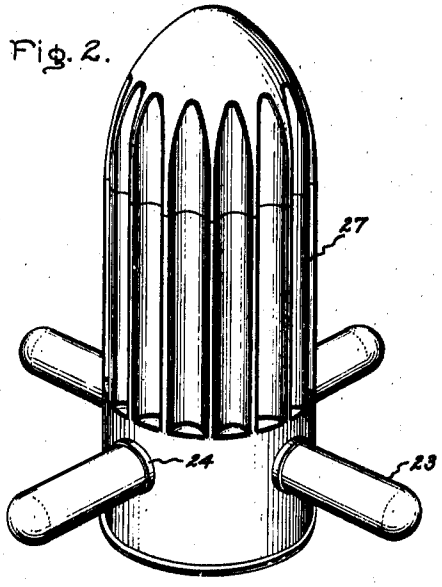
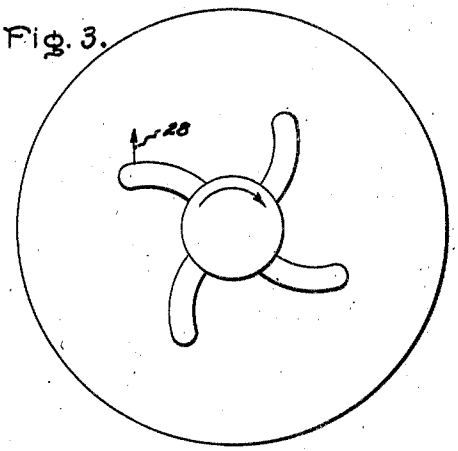


Fig. 3.



Inventor:
George W. Dunham,
by Harry E. Dunham
His Attorney.

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Fig. 4.

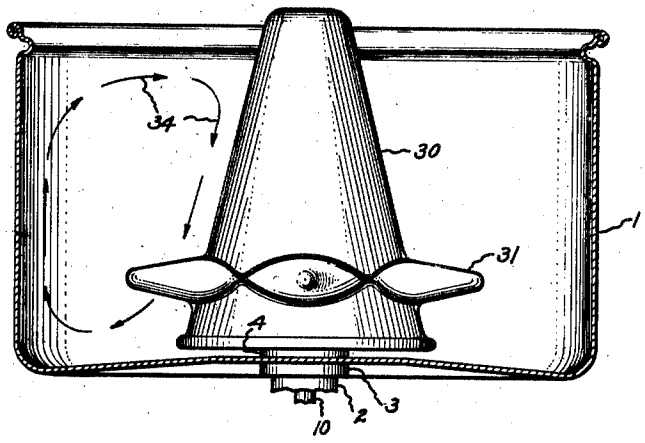
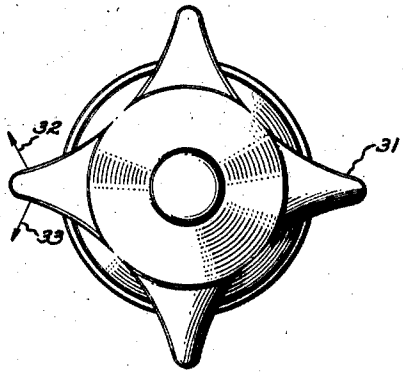


Fig. 5.



Inventor:
George W. Dunham,
by Harry E. Dunham
His Attorney.

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WASHING MACHINE

George W. Dunham, Westport, Conn., assignor to General Electric Company, a corporation of New York

Application July 8, 1937, Serial No. 152,556

4 Claims. (Cl. 68—136)

The present invention relates to domestic washing machines of the type in which washing is effected by the oscillatory movement of a peg type dolly mounted within the tub.

The dollies of the peg type which have been previously used in washing machines have failed to do uniform washing due to the fact that the clothes were caught and held on the pegs. It was, therefore, necessary to manually redistribute the clothes several times during each washing operation.

The object of my invention is to provide an improved dolly of the peg type which causes a continuous circulation of the clothes so that all parts of the clothes are brought into contact with the dolly and uniform washing is obtained.

For a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto.

In the accompanying drawings, Figure 1 is a fragmentary elevation, partially in section, of a washing machine having a dolly embodying my invention; Fig. 2 is a perspective view of the dolly; Fig. 3 is a diagrammatic view illustrating the action of the dolly; Fig. 4 is a fragmentary elevation of a washing machine equipped with a modified form of the dolly; and Fig. 5 is a top plan view of the modified dolly.

Referring to the drawings, the tub 1 is supported at the center by a tubular post 2 projecting through a central opening in the bottom of the tub. The tub rests on a flange 3 on the post and is clamped between the flange and a nut 4 threaded on the post. Suitable gaskets 5 are arranged between the tub and the flange and between the tub and the nut. The lower end of the post 2 is fixed in any suitable manner (not shown) to the top of a gear casing 6. The gear casing is supported by a cylindrical skirt 7 which is provided with supporting legs 8. The gear casing projects outside the skirt 7 and from the projecting end of the gear casing extends a tubular post 9 at the upper end of which a wringer may be mounted. A vertical shaft for driving the wringer extends through the tubular post 9 and is rotated by suitable gearing contained within the gear casing. Such gearing is well known and is therefore not illustrated.

The post 2 extends upwardly into the tub above the normal water level, indicated by broken lines in Fig. 1. A vertical shaft 10 extends upwardly through the post and is journaled at the upper end in a bearing 12 carried by the post. Fixed to the upper end of the shaft is a nut 13 which fits into a complementary socket in the hub 14 of the dolly thereby forming a driving connection between the shaft and the dolly. The shaft is supported by a thrust washer 15 between the nut 13 and the upper end of the post 2. The hub 14 is a casting having a rounded upper end 16 and cylindrical side walls 17 depending below the upper end of the post 2. The hub prevents leakage of water between the post and the shaft 10. During washing, the shaft 10 is oscillated through an angle of about 220° at a rate of the order of 60 times a minute by gearing contained within the gear casing 6. Such gearing is well known and is therefore not illustrated. Fixed to the lower end of the walls 17 is a sheet metal cylinder 18 the lower end of which is closely adjacent the bottom of the tub. The cylinder is provided with a rolled lower edge 19. Within the lower end of the cylinder 18 is a cup-shaped member 20 having its outer walls 21 fixed to the inside of the cylinder and having upturned cylindrical walls 22 at the center bearing on the post 2 and guiding the oscillatory movement of the dolly. Projecting outwardly from the lower end of the cylinder 18 are four equally spaced cylindrical pegs 23 of rubber or other similar flexible and resilient material. The pegs project through openings in the cylinder and are partially supported therein by cylindrical flanges 24. The portions 25 of the pegs within the cylinder are square and butt against tabs 26 struck out of the side walls 21 of the cup-shaped member 20. The sides of the openings provided by the tabs 26 engage the sides of the portions 25 of the pegs and prevent turning of the pegs. The pegs are shown projecting horizontally from the cylinder but satisfactory results will be obtained if the pegs are inclined upward or downward from the horizontal. On the cylinder 18 and the depending walls 17 of the hub 14 are vertical extending corrugations 27 which have a rubbing or scrubbing action on the clothes during the oscillation of the dolly.

When no clothes are in the tub the oscillation of the dolly produces substantially no circulation of water. Slight water currents are set up by the corrugations 27 but these currents are not of appreciable magnitude. The pegs 23, being round, are streamlined in the sense that they have substantially no effect on the water. The operation of the dolly is, therefore, substantially different from that of agitators having blades which produce violent water currents.

When clothes are placed in the tub the pegs 23

engage and forcibly oscillate the clothes. Due to the resistance offered by the water to the forcible oscillation of the clothes, the pegs are deflected rearwardly with respect to the direction of rotation as shown diagrammatically in Fig. 3. Since the pegs are supported only at their inner ends the rearward deflection of the pegs increases toward the outer ends. The leading edges of the pegs are therefore inclined rearward with respect to the direction of rotation at a rate which increases toward the outer ends of the pegs. In other words the leading edges of the pegs have a curvature which increases toward the outer ends of the pegs. When the direction of rotation of the dolly is reversed, the deflection of the pegs reverses, the leading edges having the same curvature with respect to the direction of rotation. the trailing edges of the pegs do not forcibly engage the clothes and the shape of the trailing edges is therefore of less importance. The leading edges of the pegs exert a force on the clothes at right angles to the surface thereof forcing the clothes outward in the direction indicated generally by the arrow 28. When the dolly reverses its direction of rotation the pegs 23 deflect in the opposite direction, forcibly oscillating the clothes and forcing the clothes outward. The side walls of the tub deflect the clothes upward. The outward movement of the clothes adjacent the bottom of the tub produces suction at the center which draws the clothes downward around the cylindrical body portion 18 of the dolly. During this downward movement the clothes are subjected to a rubbing action by the corrugations 27. The operation of the dolly therefore produces a mechanical circulation of the clothes outward adjacent the bottom of the tub, upward along the side walls of the tub and downward at the center of the tub. This circulation is indicated diagrammatically in Fig. 1 by the arrows 29.

The washing action of the dolly is due mainly to the forcible distortion and oscillation of the clothes produced by engagement with the pegs 23. The clothes being moved by the pegs are positively distorted causing the weave and the fibers of the woven threads to open and close so freeing the dirt confined therein. The clothes are also subjected to a rubbing action due to the contact with the pegs and also to contact with adjacent clothes on all sides. The clothes are also violently moved with respect to the water so that all exposed dirt is flushed off.

In Figs. 4 and 5 is shown a washing machine having a modified form of dolly using rigid instead of flexible pegs. This dolly has a conical body portion 30 which is mounted on the upper end of the oscillating shaft 10 and driven in the same manner as shown in Fig. 1. The conical surface of the body portion 30 assists in directing the downward movement of the clothes. The relatively large diameter prevents tangling of the clothes at the center of the tub. Projecting from the lower end of the body portion 30 are four rigid pegs 31. These pegs are flattened in a horizontal direction and the upper and lower surfaces thereof are curved as shown in Fig. 4 to provide a stream-lined transverse section so that the pegs have substantially no effect in producing water currents. The greatest width of the pegs is adjacent the surfaces of the body portion 30, the width of the pegs gradually decreasing toward the outer ends. In so far as the action of the pegs on the clothes is concerned, the leading edges of the pegs, that is, the edges which are forcibly moving the clothes, are inclined rearwardly with respect to the direction of rotation of the dolly and therefore exert an outward force on the clothes moving the clothes outward adjacent the bottom of the tub.

The operation of the dolly is substantially the same as that of the dolly shown in Figs. 1 to 3, inclusive. During the oscillation of the dolly the leading edges of the pegs engage the clothes and forcibly move the clothes circumferentially and at the same time force the clothes outward toward the side walls of the tub as indicated by the arrows 32 and 33 in Fig. 5 after which the clothes are deflected upward by the side walls of the tub. The arrow 32 shows the direction of movement when the dolly is moving in a clockwise direction and the arrow 33 shows the direction of movement when the dolly is moving in a counter-clockwise direction. The outward movement of the clothes produces a suction at the center which causes the clothes to move downward around the body portion 30. If desired, the body portion 30 may be provided with corrugations or other rubbing projections which will increase the washing action. The resultant circulation of the clothes is therefore outward along the bottom of the tub, upward along the side walls of the tub and downward at the center of the tub as shown by arrows 34 in Fig. 4. As in the previously described construction, the circulation of the clothes is due to the forces exerted on the clothes by the pegs. The flattened or stream lined section of the pegs produces more intimate contact of the clothes with the pegs which increases the effectiveness of the washing by increasing the area of contact between the pegs and the clothes. The more intimate contact between the clothes and the pegs also causes a more positive oscillation of the clothes increasing the washing action due to the distortion of the fabric and to rubbing of the clothes in contact with the peg against adjacent clothes.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a washing machine, a tub, a dolly at the center of the tub arranged for oscillation about a vertical axis, said dolly having a few long spaced radial pegs rigidly secured thereto and projecting horizontally from the dolly in the lower part of the tub only, said pegs being so constructed and arranged throughout the major portion of their length as to present to the clothes in contact therewith rearwardly inclined leading edges as regards the direction of rotation of the dolly said pegs being of stream-lined transverse section whereby substantially no circulation of water is produced by the pegs, the rearward inclination and radial extent of said pegs being sufficient to cause the clothes in contact therewith to be forced outward toward the sides of the tub with sufficient momentum so that the clothes circulate upward along the sides of the tub and downward at the center of the tub.

2. In a washing machine, a tub, a dolly at the center of the tub arranged for oscillation about a vertical axis, said dolly having a few long spaced radial pegs rigidly secured thereto and projecting horizontally from the dolly in the lower part of the tub only, said pegs being flexible and resilient so that the force exerted thereon by the clothes causes the free ends thereof to deflect rearwardly with respect to the direction of rotation of the dolly and said pegs having a radial

extent sufficient to cause the clothes in contact therewith to be forced radially outward toward the sides of the tube with sufficient momentum so that the clothes circulate upward along the sides of the tub and downward at the center of the tub.

3. In a washing machine, a tub, a dolly at the center of the tub arranged for oscillation about a vertical axis, said dolly having a few long spaced radial pegs projecting horizontally from the dolly in the lower part of the tub, said pegs being of flattened section in generally horizontal planes, the leading edges of the pegs being inclined rearwardly with respect to the direction of rotation of the dolly and having a radial extent sufficient to cause the clothes in contact therewith to be forced radially outward toward the sides of the tub with sufficient momentum so that the clothes circulate upward along the sides of the tub and downward at the center of the tub.

4. In a washing machine, a tub, a dolly having a vertical body portion at the center of the tub extending from the bottom of the tub to substantially the water level in the tub and arranged for oscillation about a vertical axis, a few long spaced radial pegs projecting horizontally from said body portion in the lower part of the tub, said pegs being of flattened section in generally horizontal planes and the leading edges of the pegs being inclined rearwardly with respect to the direction of rotation of the dolly and having a radial extent sufficient to cause the clothes in contact therewith to be forced radially toward the sides of the tub with a momentum sufficient so that the clothes circulate upward along the sides of the tub and downward at the center of the tub.

GEORGE W. DUNHAM.