

Sept. 28, 1937.

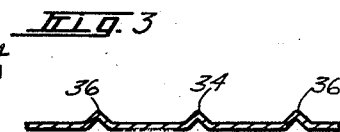
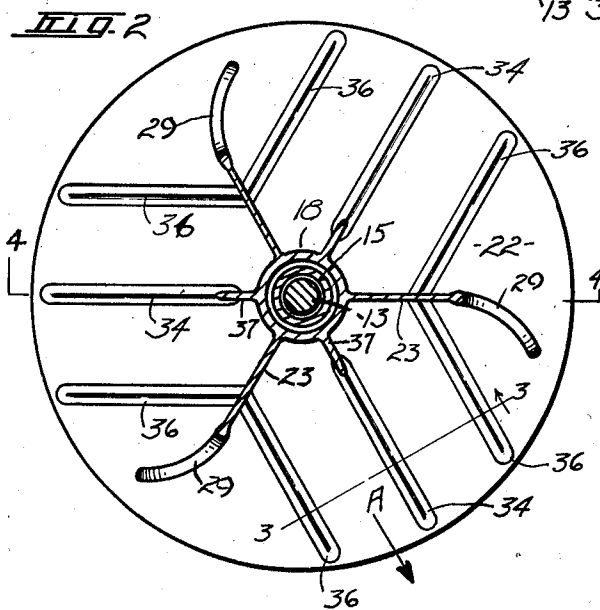
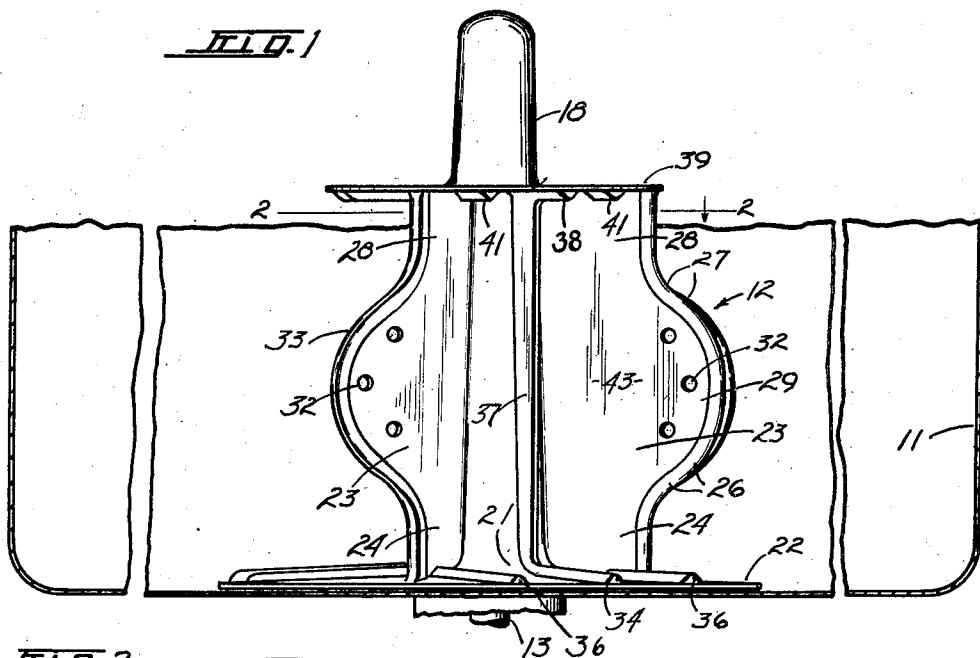
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2,094,559

AGITATOR FOR WASHING MACHINES

Filed Dec. 18, 1935

2 Sheets-Sheet 1



WITNESS

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2 Sheets-Sheet 2

FIG. 4

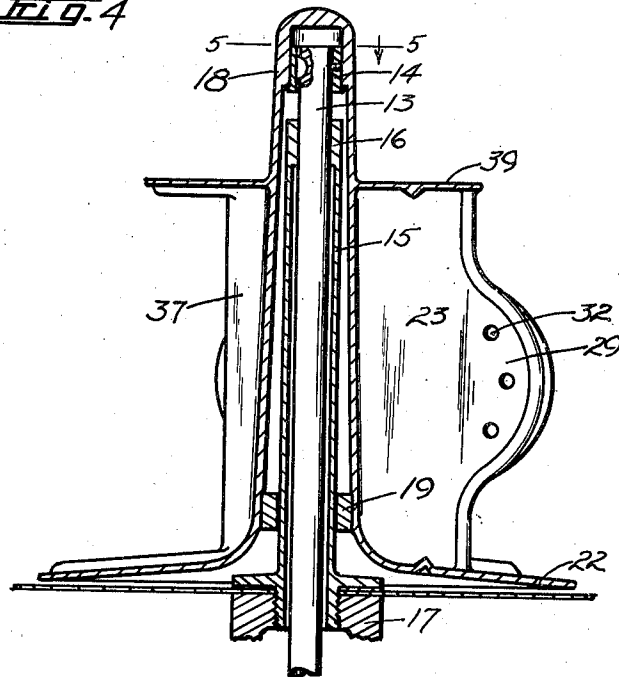


FIG. 5

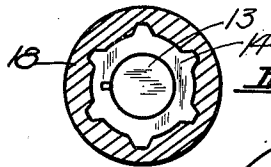


FIG. 7

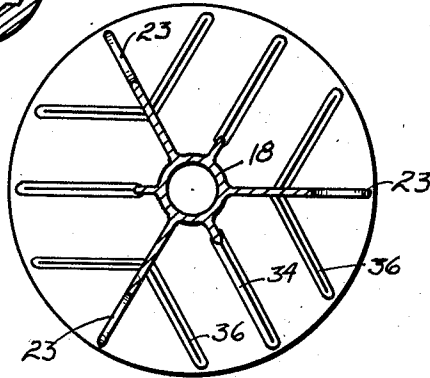
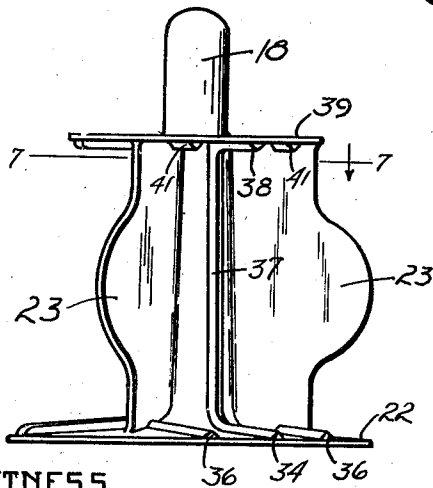


FIG. 6



WITNESS

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## UNITED STATES PATENT OFFICE

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## AGITATOR FOR WASHING MACHINES

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Application December 18, 1935, Serial No. 55,050

11 Claims. (Cl. 259—101)

My invention relates to washing machines and, more particularly, to a novel agitator or dolly therefor.

An object of my invention is to provide an agitator for a washing machine which can be manufactured at a reasonable cost and which is adapted to cleanse the clothes thoroughly and in a minimum length of time.

Another object of my invention is to provide an agitator for a washing machine which is adapted to be mounted for oscillation in a tub or vat containing washing fluid and clothes, the agitator being constructed and arranged so as to effect a thorough washing of the clothes in a minimum length of time.

Another object of my invention is to provide an agitator for a washing machine adapted to be oscillated in a washing vat, the agitator having blades arranged so as to cause a turbulence of the clothes and washing fluid, a thorough intermingling of the clothes and washing fluid and, in the preferred form of the invention, a constant circulation of the clothes and washing fluid around the vat in one direction, whereby new clothes surfaces are constantly being presented to the action of the agitator.

A further object of my invention is to provide a novel agitator for a washing machine which is adapted to oscillate the clothes backward and forward in accordance with the oscillations of the agitator and which, at the same time, causes an inward and outward movement of the clothes from the agitator to the side walls of the vat and then back inwardly to the agitator.

My invention further contemplates the provision of an agitator for a washing machine which is so constructed and arranged as to produce a violent action on the clothes and washing fluid and in which the clothes are carried backward and forward with the agitator and subjected to a whip-lash thread-deforming action, whereby the clothes are thoroughly cleansed.

My invention further contemplates the provision of a washing machine agitator having a plurality of blades extending essentially radially from a central post, the agitator also having a base and a plate at the top of the blades upon both of which are mounted a plurality of scrubbing projections, each of the scrubbing projections being mounted on the base and on the top plate in a manner such that they extend transversely to the prevalent direction of clothes movement and in a direction such that casting of the agitator is facilitated.

Other objects and advantages of my inven-

tion will be more apparent from the following description when taken in connection with the accompanying drawings, in which:

Figure 1 is a view showing the preferred form of my invention, and indicating a washing vat in which the agitator is mounted.

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

Figure 3 is a view taken on the line 3—3 of Figure 2.

Figure 4 is a sectional view of the agitator shown in Figure 1 showing the manner in which the agitator is mounted and driven.

Figure 5 is a view taken on the line 5—5 of Figure 4.

Figure 6 is a view of a modified form of my agitator.

Figure 7 is a view taken on the line 7—7 of Figure 6.

The agitator of my invention is adapted to be mounted in a vat or tub 11 in which the clothes and washing fluid are placed. The washing vat may be of any desired shape, either square or, as shown in the drawings, circular in cross section. The agitator, generally indicated by the numeral 12, is preferably mounted centrally of the vat 11 and is driven by a shaft 13 extending upwardly through the bottom of the vat. The drive shaft 13 may be driven by any suitable mechanism and from any suitable source of power, not necessary to be shown or described herein, since such driving mechanism for oscillating the agitator is well known in the art to which this invention applies. Preferably, the shaft is driven in an oscillatory manner so as to drive the agitator through an arc of 180 degrees, more or less, at a comparatively high rate of speed somewhere between fifty and sixty oscillations per minute.

The upper end of the shaft 13 is fitted with a collar 14 held in position by a set screw. The outer circumference of the collar is splined to receive cooperating splines formed internally of a hollow post 18 which constitutes part of the agitator and is preferably formed integral therewith. A sleeve 15 extends upwardly through the bottom of the vat concentric with the shaft 13 and has a bearing at 16 on the shaft 13. The lower end of the sleeve is flanged where it engages the bottom of the vat, suitable packing being provided to prevent leakage of cleansing fluid around the shaft. The lower end of the shaft is threaded to receive a part of the casing 17 for housing the driving mechanism. Press fitted internally in the hollow bore of the post 18 is a

bearing 19 which has a running fit on the shaft and serves to support the agitator near the bottom thereof.

The agitator itself comprises the central post 18 which extends to the bottom of the vat and is preferably slightly tapered. The central post 18 merges, as indicated at 21, into a base 22. The base 22, while it may slope slightly upward toward the central post, is preferably substantially disk-shaped, as shown in the drawings. The main purpose of the bottom plate, which lies in close proximity to the bottom of the vat, is to prevent clothes from being caught beneath the agitator. The blades 23, preferably three in number, extend radially from the central post and at the bottom, in the region of the numeral 24, are preferably about half the diameter of the base 22. At 26, the outer edges of the blades curve outwardly, and near the top of the agitator, at the point 27, the outer edges of the blades curve inwardly so that the outer edges of the blades, in the region of the numeral 28 near the top of the agitator, are substantially vertically above the outer edges of the bottom portions of the blades. Because of the taper of the central post, the portions 28 of the blades are slightly wider than the portions 24. There are thus formed between the portions 24 and 28 of the blades central blade portions 29 which are of substantially greater width than the bottom and top portions of the blades.

The enlarged portions 29, for a purpose to be described, are preferably curved or bent, as more clearly indicated in Figure 2, in a clockwise direction so that the outer ends of each of the enlarged portions of the blades are advanced in a clockwise direction around the agitator from the radial portions of the blades nearer the central post 18. Each of the curved and enlarged portions of the blades 29 is provided with a plurality of apertures 32, preferably three in number, which are of a size sufficient to cause an appreciable passage of cleansing fluid therethrough when the agitator is oscillated. Each of the blades, at its outer edge 33, is provided with a bead to prevent the formation of a sharp edge which is likely to cause damage to the clothes.

The base of the agitator between adjacent blades is provided with a plurality of scrubbing ribs 34 and 36. The scrubbing ribs 34 and 36 are substantially triangular in cross section and extend only slightly above the base 22 so that while they cause little appreciable agitation of the clothes and cleansing fluid, they do serve, when the agitator is oscillated, to exert a substantial scrubbing effect on the clothes. Between adjacent blades 23 are formed small scrubbing blades 37 which extend outwardly radially from the central post a distance sufficient to exert a substantial scrubbing effect on the clothes. These scrubbing blades may be formed in line with the scrubbing ribs 34 on the base. Beneath a top plate 39, extending over the tops of the blades and preferably formed integral with the agitator, are, between adjacent blades, scrubbing ribs 38 corresponding to the scrubbing ribs 34 on the base. The top plate 39 is somewhat smaller in diameter than the base 22, the outer circumference of the top plate 39 substantially coinciding with the outer edges of the portions 28 of the blades. Beneath the top plate are also formed scrubbing ribs 41 which correspond in size and direction of extension with the scrubbing ribs 36 on the base 22. The purpose of the top plate is to mark the normal water level which is usually

placed at or slightly below the level of the plate. The top plate also serves as a support for the scrubbing ribs and prevents splashing of the cleansing fluid upwardly near the center of the agitator.

It should be particularly noted that while the central scrubbing ribs 34 and 38 extend radially, the scrubbing ribs 36 and 41 extend from the blades 23 in a direction parallel to the scrubbing ribs 34 and 38 respectively, approximately 10° off the radius. It will be further noted that the curvature of the enlarged portions 29 of the blades is such that the outer tips thereof are substantially parallel to the scrubbing ribs 34 and 38. This enables the agitator to be made in a single casting in a sectional mold since it enables one section of the mold between adjacent blades to be withdrawn in the direction, for example, indicated by the arrow A in Figure 2. This is of particular importance in enabling the agitator to be produced at a reasonable cost.

When the agitator is oscillated at a speed and amplitude of oscillation as above stated, the clothes and washing fluid are violently agitated and a substantial turbulence is caused. The clothes and washing fluid are essentially carried backward and forward with the agitator in accordance with the oscillations thereof. During this movement of the clothes, the apertures 32 assist materially in the washing action. The function of the apertures may be illustrated by considering one surface of a single blade, for example, the surface designated by the numeral 43. When the agitator is rotated in a counterclockwise direction, the entire body of clothes tends to move in that direction with the agitator, although lagging somewhat behind the movement thereof. When the agitator is reversed and rotated in a clockwise direction, the cleansing fluid passes through the apertures. The passage of fluid therethrough tends to create a suction on the blade surface in the region of the apertures. This suction causes a particular article of clothing, usually only one end thereof, the inertia of movement of which in a counterclockwise direction has not yet been overcome by the reversal of the agitator, to cling to the blade and be carried along therewith with the intermediate portion of the article trailing. Because the direction of movement of that particular article of clothing has been sharply changed from a counterclockwise to a clockwise direction, the free end thereof is subjected to a snapping or whip-lash action which is of prime importance in causing the thread-deformation so necessary in washing clothes. Reversal of the agitator produces the same action with respect to the opposite surface of the blade. It is preferable to have the apertures only at the outer ends of the blades in order to prevent any tendency for the articles of clothing to be caught near the central post portion of the agitator and remain there for any considerable length of time.

The ribs on the base, central post and top plate of the agitator, cause a substantial scrubbing effect on the clothes, which is of particular importance in securing the desired thread-deforming action on the clothes. Because the agitator moves faster than the main body of clothes, the scrubbing ribs tend to move through the clothes and exert a substantial scrubbing effect thereon during said movement. The direction of this movement, because of the particular location of the ribs, is transverse to the body of clothes.

In the usual agitator having plain radial

blades, the clothes tend to remain substantially in the same relative position in the vat, that is, each article of clothing tends to oscillate with the agitator a distance substantially less than the distance between the extremities of movement of two adjacent blades. In order to insure a constant change of the relative position of the clothes in the vat, the outer extremities of the blades are curved in a clockwise direction, as above described, to cause a resultant circulation of the clothes in a clockwise direction around the vat. While the circulation of the clothes and washing fluid in the clockwise direction is not especially pronounced, it is definitely noticeable and is sufficient to insure the constant presentation of new clothes surfaces to the action of the agitator and to insure that each article of clothing will, at some time during the washing period, be subjected to the scrubbing and thread-deforming action of the agitator.

Possibly because the upper half of each blade is of substantially the same area as the lower half, there is a definite and distinct movement of the clothes outward from the agitator toward the side walls of the vat and then inward again toward the agitator. Also, possibly because the blades are wider at their central portions, the horizontal forces set up by the blades are unequal at different points along the blade and the clothes tend to change their relative level in the vat. For example, a particular article thrust outward by the blades at a level approximately that of the center of the blades tends to return toward the agitator either at a level slightly below or slightly above the center of the blades so that there is a constant change of the level of the clothes with respect to each other.

The agitator of Figures 6 and 7 is somewhat similar to but does not embody all of the improvements of the preferred form shown in Figures 1 to 5, inclusive. In the agitator of Figures 6 and 7, the enlarged portions 29 of the blades 23 are not curved in a clockwise direction but instead the blades are radial throughout. Also, the apertures 32 are omitted. The agitator of this modification is mounted and driven in the same manner as in the preferred form of the invention. When operated, it lacks the resultant one-way rotation of the clothes and washing fluid produced by the agitator of Figures 1 to 5, inclusive, and because of the omission of the apertures on the blades does not produce the whip-lash and thread-deforming action of that structure in as pronounced a degree.

It will be apparent that I have provided a novel agitator for a washing machine and that various modifications and changes may be made in the form and arrangement of the agitator without departing from the spirit of the appended claims.

I claim:

1. An agitator adapted to be mounted for oscillation in a vat containing clothes and washing fluid, said agitator comprising a base; a central post extending upward from the post and a plurality of blades extending radially outward from the post, each of said blades being wider toward the center thereof than at the ends, being curved in horizontal cross section in the same direction at their outer ends, and having a plurality of apertures in the widest portion of the blades.

2. An agitator adapted to be mounted for oscillation in a vat containing clothes and washing fluid, said agitator comprising a base of substantial diameter, a central post extending upwardly from the base, and a plurality of blades

extending radially from the post, each of said blades being comparatively narrow at the top and the bottom and having their outer edges curved outward to form a central portion for the blade which is of substantial width, each of said blades at the central portion being curved in a horizontal plane and said agitator having a plate extending above and covering the tops of the blades.

3. An agitator adapted to be mounted for operation in a vat containing clothes and washing fluid, said agitator comprising a central portion, a plurality of blades extending substantially radially outward with respect to said central portion, each of said blades being wider toward the center thereof than at the ends and having the widest portion thereof curved in horizontal cross section only at the outer end of said widest portion, the direction of curvature of each of the blades being in the same direction.

4. An agitator adapted to be mounted in a vat containing clothes and washing fluid, said agitator comprising a central post and a plurality of blades extending outward from said central post, each of said blades being divided into three sections, a top, a center and a bottom section, said center section being wider than said bottom and top sections and said bottom and top sections being substantially similar in shape, said center section being curved in horizontal cross section only at its outer portion.

5. An agitator adapted to be mounted in a vat containing clothes and washing fluid, said agitator comprising a base, an upstanding central portion and a top plate mounted at the top of said central portion, said plate being of substantial area and serving to mark the normal surface level of washing fluid, a plurality of blades extending outward from said central portion, each of said blades having the top and bottom edge thereof meeting the top plate and the base respectively, each of said blades including a top section, a center section and a bottom section, said center section being of greater width than said top and bottom sections, and said top and bottom sections being of substantially equal area.

6. An agitator adapted to be mounted in a vat containing clothes and washing fluid, said agitator comprising a base, an upstanding central portion and a top plate mounted at the top of said central portion, said plate being of substantial area and serving to mark the normal surface level of washing fluid, a plurality of blades extending outward from said central portion, each of said blades having the top and bottom edge thereof meeting the top plate and the base respectively, each of said blades including a top section, a center section and a bottom section, said center section being of greater width than said top and bottom sections and said center section being curved in horizontal cross section.

7. An agitator adapted to be mounted in a vat containing clothes and washing fluid, said agitator comprising a base, an upstanding central portion and a top plate mounted at the top of said central portion, said plate being of substantial area and serving to mark the normal surface level of washing fluid, a plurality of blades extending outward from said central portion, each of said blades having the top and bottom edge thereof meeting the top plate and the base respectively, each of said blades including a top section, a center section and a bottom section, said center section being of greater width than

said top and bottom sections and having a plurality of apertures therein.

8. An agitator adapted to be mounted in a vat containing clothes and washing fluid, said agitator comprising a base, an upstanding central portion and a top plate mounted at the top of said central portion, said plate being of substantial area and serving to mark the normal surface level of washing fluid, a plurality of blades extending outward from said central portion, each of said blades having the top and bottom edge thereof meeting the top plate and the base respectively, each of said blades including a top section, a center section and a bottom section, said center section being of greater width than said top and bottom sections and said base having a plurality of scrubbing ribs lying between but spaced from adjacent blades.

9. In a machine for washing clothes of the type wherein the clothes to be washed are immersed in a vat containing washing fluid and an agitator, mounted substantially centrally of the vat, is adapted to be oscillated by mechanism located beneath the vat to exert a washing action on the clothes, said agitator comprising the combination of a substantially disk-shaped base, a central post extending vertically upward from the base substantially to the normal surface level of cleansing fluid, a plurality of blades extending substantially radially outward from the post and a top plate at substantially the normal surface level of cleansing fluid, said blades being of appreciable width throughout their height and extending from the base to the top plate, and a plurality of scrubbing ribs on said base between adjacent blades, said scrubbing ribs between adjacent blades being parallel to each other and extending transversely to the direction of clothes movement and being at least as wide and high near the post as near their outer ends.

10. In a machine for washing clothes of the type wherein the clothes to be washed are immersed in a vat containing washing fluid, and an agitator mounted substantially centrally of the vat is adapted to be oscillated by mechanism

located beneath the vat to exert a washing action on the clothes, said agitator comprising the combination of a plurality of blades and a central member with respect to which the blades extend outward, each of said blades having a lower end portion, a middle portion and an upper end portion, said middle portion being substantially twice the width of said end portions and at least part of said middle portion being curved in horizontal cross section whereby the middle portions exert a substantially greater washing action on the clothes than the end portions and the curved portions of the blades cause the clothes and washing fluid to circulate in one resultant circulatory direction around the vat.

11. In a machine for washing clothes of the type wherein the clothes to be washed are immersed in a vat containing washing fluid, and an agitator mounted substantially centrally of the vat is adapted to be oscillated by mechanism located beneath the vat to exert a washing action on the clothes, said agitator comprising a plurality of blades, a central post outward from which the blades extend substantially radially, a base near the bottom of the vat and a top plate adjacent the normal surface level of cleansing fluid, said base and top plate both being substantially perpendicular to the blades and constituting the sole restraining influence to the free movement of the clothes between the blades and between the bottom of the vat and the normal surface level of cleansing fluid, each of said blades having a lower end portion, a middle portion and an upper end portion, said middle portion being substantially twice the width of said end portions and at least part of said middle portion being curved in horizontal cross section whereby the middle portions exert a substantially greater washing action on the clothes than the end portions and the curved portions of the blades cause the clothes and washing fluid to circulate in one resultant circulatory direction around the vat.

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