

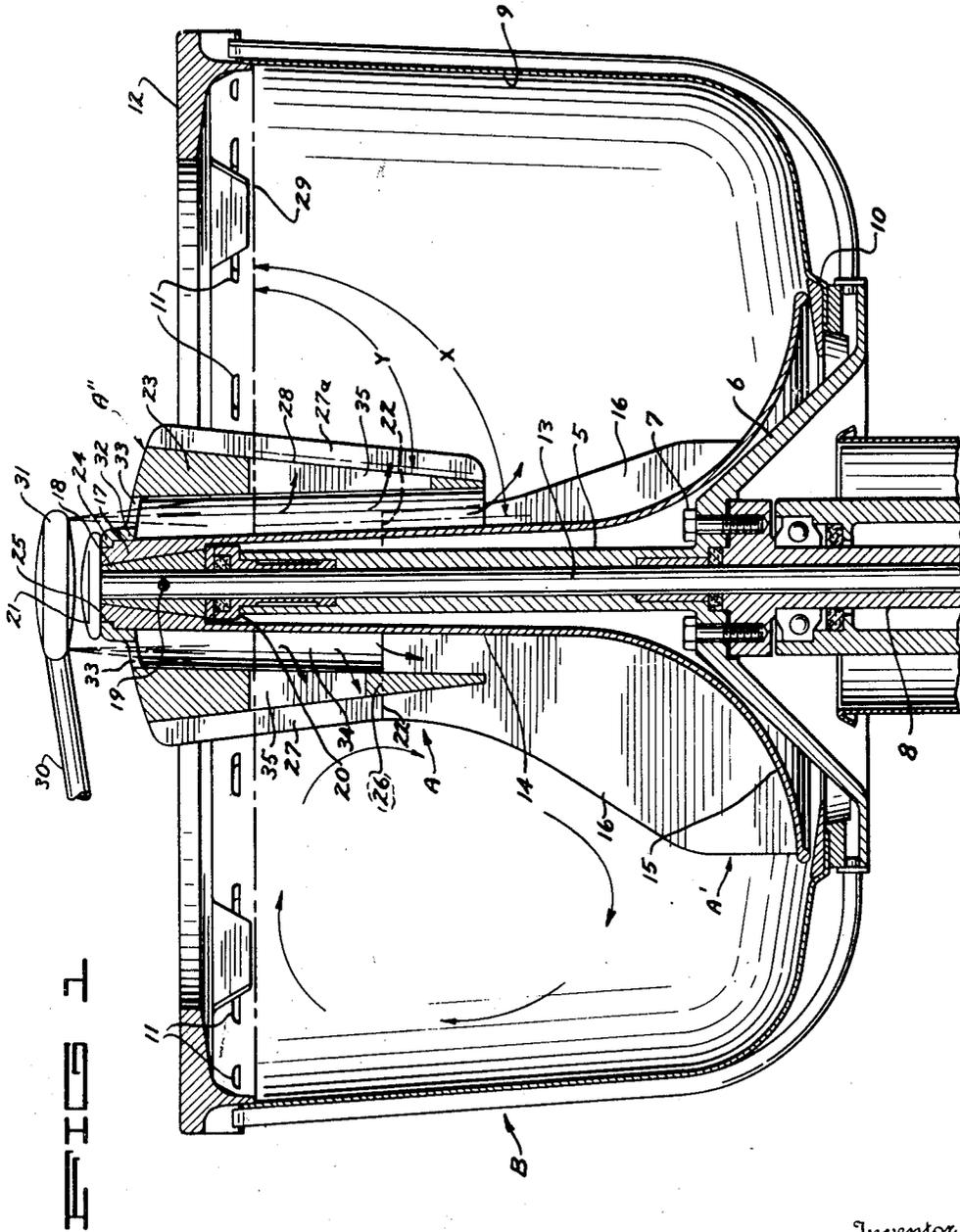
April 4, 1950

G. P. CASTNER  
WASHING MACHINE AGITATOR

2,502,702

Filed Sept. 27, 1946

2 Sheets-Sheet 1



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FIG 2

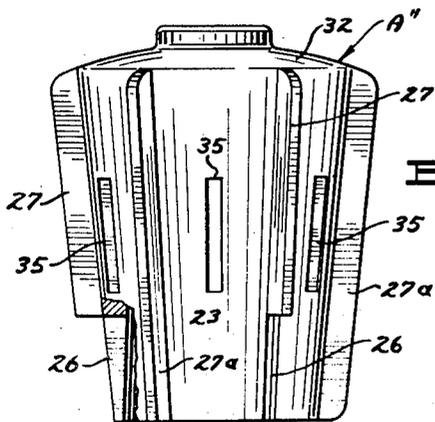
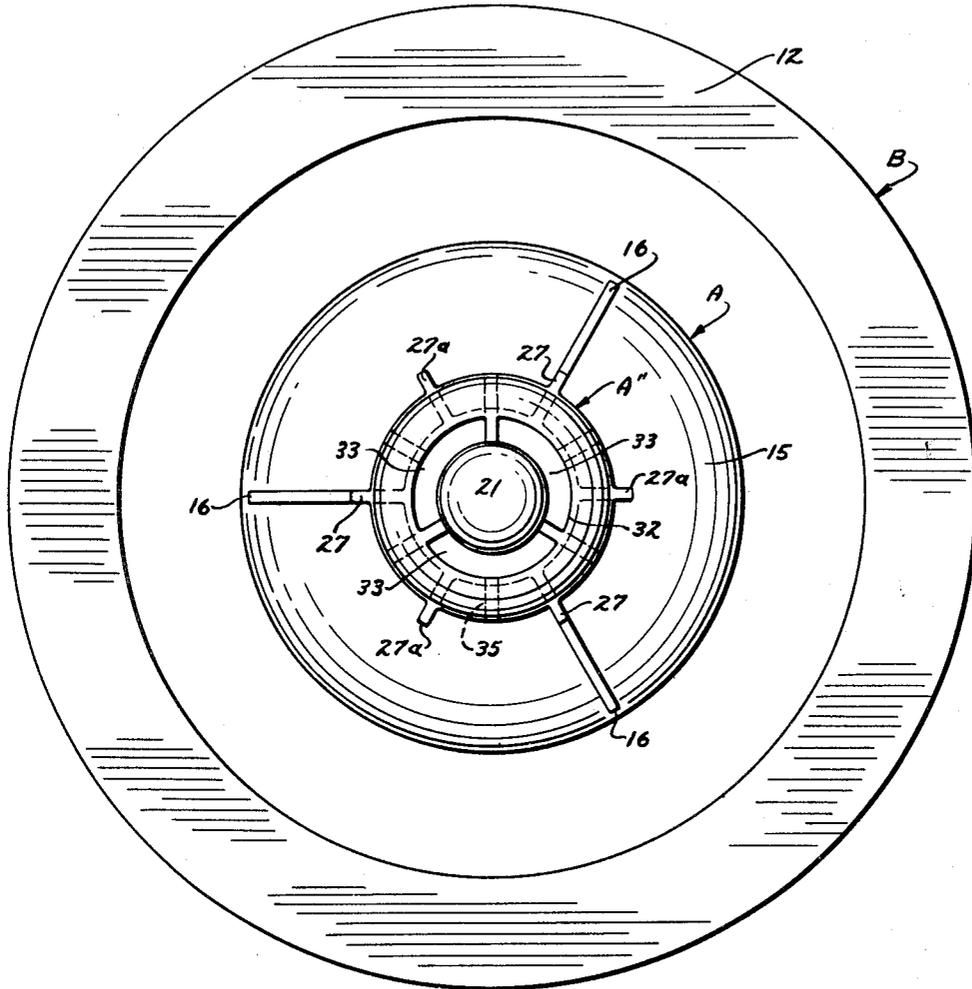


FIG 3

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# UNITED STATES PATENT OFFICE

2,502,702

## WASHING MACHINE AGITATOR

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Application September 27, 1946, Serial No. 699,624

1 Claim. (Cl. 68—134)

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This invention relates to improvements in agitators for washing machines.

The primary object of the invention is to provide an agitator unit or mechanism, particularly for domestic, clothes washing machines, by means of which an increased and more effective washing action is obtainable upon the clothes as contrasted to the more usual agitators, and the washing operation is in general greatly facilitated. Another object is to provide an agitator so shaped and constructed that the clothes at and near the level of the washing liquid are rubbed and flagged about to increase the washing action, and are guided and urged down readily into the undertow formed by the agitator vanes operating below the surface. Still another object is to provide an agitator so shaped and arranged that it will largely overcome the "water-wings" effect noted particularly in automatic washing machines, caused by air becoming trapped in the wet cloth materials. Unless these water-wings or bubbles are quickly dissipated the clothes become tangled and the operation is materially interfered with, and it is found that the agitator of my invention advantageously fulfills this need. Still a further object is to provide an agitator which permits the wash and rinse water to be introduced at the center and led to a point below the normal clothes and water level before dispersal preventing splashing and assuring maximum evenness of the water distribution to the clothes.

These and other important objects and advantages of my invention will be made apparent in the course of the following specification, reference being had therein to the accompanying drawing wherein:

Fig. 1 is a vertical irregular cross sectional view through the clothes receptacle or tub of an automatic washing machine, and showing therein an agitator assembly according to my invention.

Figure 2 is a top plan view of the assembly of Fig. 1.

Fig. 3 is an elevational view, partially broken away and in section, of the top unit or portion of the agitator, alone.

For purposes of illustration I have shown my improved agitator unit in connection with the tub or clothes receptacle of the automatic washing machine disclosed in detail in the copending application of Arthur D. Lund and myself, filed August 14, 1946, Serial No. 690,532. Being concerned here with improvements in the agitator mechanism or unit only, I do not, of course, limit myself as to details of the tub and other operating parts of the machine as a whole.

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Referring now more particularly and by reference characters to the drawing A designates generally the agitator and B the tub or clothes receptacle centrally within which the agitator is oscillatably mounted. The receptacle B comprises an axial sleeve 5 terminating at its lower end in a conical portion 6 which is secured by bolts 7 atop a tubular, rotatable spindle 8 forming a central part of the machine. The annular, but slightly downwardly tapering, receptacle wall 9 has a central, lower flange 10 which is secured in water-tight relation to the outer edge of the conical part 6. The arrangement is such that the entire receptacle B may be spun, for centrifugally extracting the water from the clothes, by rotation of the spindle 8, and the water is allowed to escape through openings 11 in the wall 9 formed below a balancing ring 12 secured around the upper end of the receptacle, while the clothes are held against escaping by the inturned flange of said ring, clearly appearing in Fig. 1.

Rotatably mounted up through the spindle 8 is an agitator drive shaft 13 and mounted thereon is the agitator A. The shaft 13 is oscillated, by means not here shown, during the washing operation in the usual manner. The agitator as here shown comprises separate, and separable, upper and lower parts A' and A'' but it is to be understood that it may be made in one piece if so desired.

The lower part A' of the agitator comprises an upright, upwardly tapering tubular stem or center post 14 flared out at its bottom to form a skirt 15 and having integral, radial and upright vanes or blades 16. The shape is thus such that the agitator will operate nicely over the conical part 6 of the receptacle B. The upper end of the stem 14 has a hub 17 the center of which is upwardly tapered and non-circular to non-rotatably seat over a similarly and complementarily shaped plug 18 secured by a pin 19 upon the upper end of the shaft 13. A flanged bushing 20 is placed between the plug 18 and the upper end of the spindle 8 and serves as a bearing between the shaft and the spindle. The agitator is held down to place by a cap 21 having a threaded shank screwed into the upper end of the shaft 13, and the agitator may, of course, be removed by merely unscrewing this cap.

It may here be noted that in the conventional agitator the lower part A' just described comprises the entire agitator unit with the exception that the vanes 16, instead of terminating well below the upper end of the stem 14 in hori-

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zontal, square cut upper ends 22 as they do here (Fig. 1), extend further up the stem but taper or decrease in width so that the upper end of the agitator becomes quite small in diameter and tapers upwardly, as is well known. This if found, however, to be a disadvantage, as will presently appear, and which is completely overcome by the upper end formation of the agitator next to be described.

The upper part A', forming the upper end formation just referred to, comprises a hollow cap member or body portion member 23 which is adapted to loosely fit downwardly over the upper end of the stem 14 and is held thereon, by an inwardly turned rim 24 which fits an annular groove 25 formed for its accommodation in the upper edge of the hub 17 and is held in said groove by the aforesaid cap 21. The lower edge of the cap 23 further has downwardly opening vertical notches 26 adapted to seat over and straddle the upper ends 22 of the vanes 16 and the cap is thus supported to oscillate as a unit with the lower part A' of the agitator as will be readily apparent.

The cap 23 is also provided with radial agitating or rubbing vanes or ribs 27, equal in number to and registering with the aforesaid vanes 16, and the width of these vanes 27 is such that the outer edges of the vanes 16—27 stand flush with each other. The vanes 27, of course, will terminate at lower ends at the level of the upper ends of the notches 26. Also provided on the cap member, intermediate the vanes 27, are similar radial vanes or ribs 27<sup>a</sup> but which extend down to the lower end of the cap and so will engage the clothes between the vanes 16.

When positioned atop the lower part of the agitator this upper part A' forms a cap-like enclosure or head for the small, tapering upper end of the stem 14 and the cap 23, as will be readily evident, is comparatively large in diameter. Furthermore the outer peripheral surface 28 of the cap member, instead of tapering upwardly as does the upper part of the usual agitator, tapers in the opposite direction so that it grows larger toward its upper end. This has an important effect. In the washing operation the clothes and liquid are given a toroidal circulatory movement, as indicated by the arrows to the left in Fig. 1, such that at and near the water level, indicated at 29, the clothes move inwardly and then are drawn downwardly by the undertow formed near the center of the machine by the usual action of the vanes 16. In the usual agitator with upwardly tapering upper end the clothes tend to jam around the agitator due to the fact that the included angle between the agitator stem and water line 29 is necessarily acute, or less than a right angle. On the other hand, the included angle between the peripheral surface 28 of my agitator cap or head portion and the water line 29 is greater than a right angle, as indicated at Y in Fig. 1, and the clothes are guided nicely inward and downward into the undertow without any tendency to clog at this point in their travel. The inwardly, downwardly sloping surface 28 further extends well below the water line and below the tops of the vanes 16 to facilitate this action.

In the type of washing machine here shown the water or cleansing and rinsing liquid is admitted to the receptacle A by a pipe 30 leading from a suitable supply (not shown) inwardly above the receptacle and terminating in a spray head 31 which it supports immediately over the center of the agitator. The spray head 31 has

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a circular row of openings in its underside through which the liquid may fall in sprays as clearly shown, and the top 32 of the agitator cap 23 has openings 33 downwardly through which the liquid may pass into the interior of the agitator. The inner diameter of the cap member is such that a substantial annular space 34 is formed and the liquid passes down into this space from which it then flows outward into the clothes through slots or other suitable openings 35 formed through the wall of the cap between the vanes 27—27<sup>a</sup>, as well as from the open lower end of the cap as in the co-pending application previously identified.

In the operation of the agitator the vanes 27 and 27<sup>a</sup> have a pronounced rubbing effect on the clothes to substantially augment the washing operation as a whole and in addition this results in what may be called a "flagging" of the clothes at and near the surface. The latter is of advantage too in that it levels out the load and keeps the washing level quite smooth and even, and permits the escape openings 11 to be located a very short distance above the water level to facilitate extraction. In fact, there is provided a three-way washing action by the flagging of the clothes, the rubbing of the vanes 27—27<sup>a</sup> as the clothes work downward about the agitator and, of course, the normal washing action of the vanes 16.

The large diameter of the upper cap or head part of the agitator also is found to aid materially in overcoming the water-wings effect so commonly noted in automatic washers, particularly when the rinse water is introduced. Closely woven fabric materials, such as sheets, and particularly when wet, have a tendency to trap air and the material then stands up above the water surface so that these bubble-like formations hold the clothes at the top of the water while others are turning below and twisting and tangling inevitably results. Apparently due to the high peripheral velocity of the large upper end of my agitator, and the difference in the velocities of the outer edges of the ribs 27—27<sup>a</sup> and the cap surface 28 the agitator is found to have a pronounced tendency to push and pull these bubble-like portions of the clothes about from different angles and quickly allow the trapped air to escape, and the clothes to be digested into the remainder of the wash. It is found that this agitator enables the machine to handle a substantially larger load of clothing than others of comparative size but with the conventional agitator.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claim. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

A washing machine agitator unit having a tubular member extending downwardly into an outwardly flared skirt, the upper end of the agitator unit including a sleeve like element that is mounted in spaced concentric position about the upper end of the tubular central portion and having an outer surface that tapers downwardly toward the skirt, radial vanes extending outwardly from the skirt portion of the tubular member and upwardly along said outer surface of the sleeve like element, the outer edges of said vanes converging inwardly and upwardly toward said sleeve like element and thence out-

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wardly in substantial parallelism with the outer tapered surface of said element.

GEORGE P. CASTNER.

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