Aug. 20, 1940. T. J. LITLE, JR 2,212,373

AGITATOR FOR WASHING MACHINES

Filed Nov. 1, 1937 2 Sheets-Sheet 1

FIG. 1.

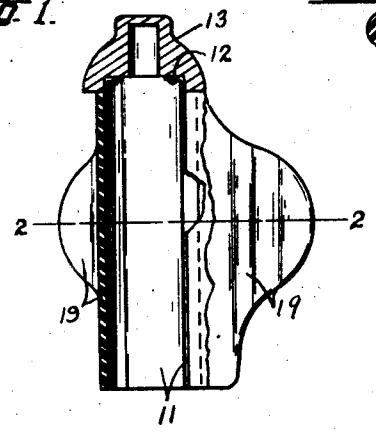


FIG. 2.

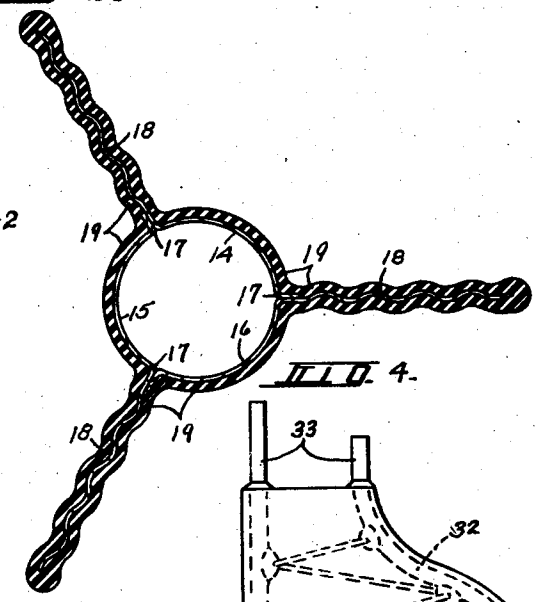


FIG. 3.

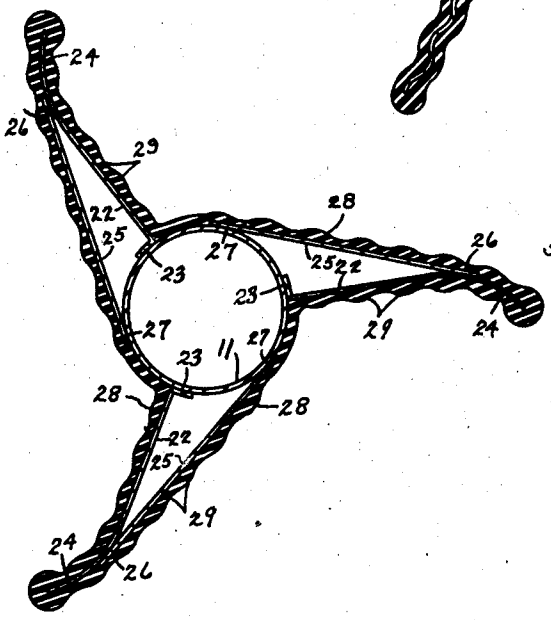


FIG. 4.

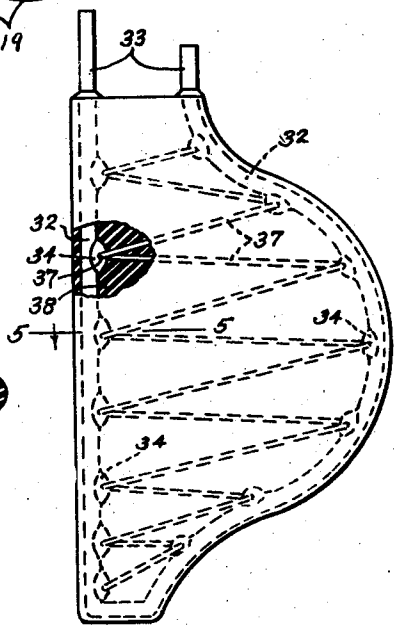


FIG. 5.

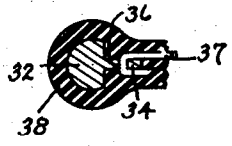
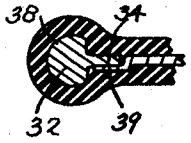


FIG. 6.



INVENTOR
THOMAS J. LITLE, JR.

BY
Simonton & Thomson
ATTORNEYS

Aug. 20, 1940. T. J. LITLE, JR 2,212,373

AGITATOR FOR WASHING MACHINES

Filed Nov. 1, 1937 2 Sheets-Sheet 2

FIG. 9.

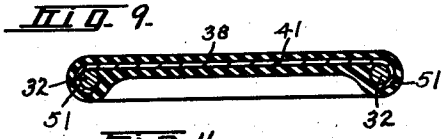


FIG. 10.

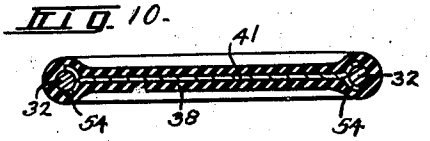


FIG. 11.

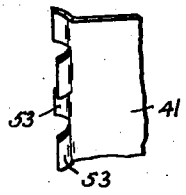


FIG. 7.

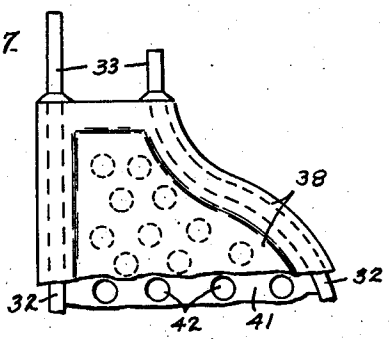


FIG. 8.

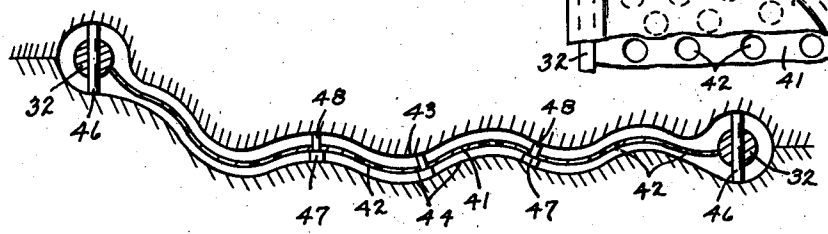


FIG. 12.

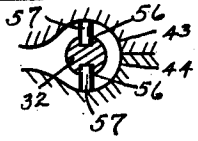


FIG. 13.



FIG. 14.

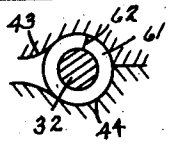
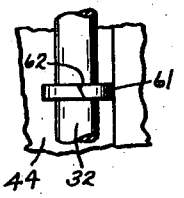


FIG. 15.



INVENTOR
THOMAS J. LITLE, JR.

BY
Simonton & Thomson
ATTORNEYS

Patented Aug. 20, 1940 2,212,373

UNITED STATES PATENT OFFICE

2,212,373

AGITATOR FOR WASHING MACHINES

Thomas J. Litle, Jr., Syracuse, N. Y., assignor to Easy Washing Machine Corporation, Syracuse, N. Y., a corporation of Delaware

Application November 1, 1937, Serial No. 172,124

1 Claim. (Cl. 68—134)

My invention relates to washing machines and more particularly to a novel washing machine agitator construction of the general type shown in my copending applications Serial Nos. 137,999, filed April 20, 1937, and 167,795, filed October 7, 1937.

The agitating element or dolly, as it is sometimes called, of a washing machine, has been commonly in the commercial art made of alloys of aluminum. Attempts have been made to use other less expensive metals and suitably treat them against the corrosive action of the washing fluid, but these have generally not been successful. The commercial art has, almost without exception, employed relatively expensive aluminum alloys.

Aluminum, although it is the best material now known, has numerous disadvantages. Because it is rather soft, means are usually employed to harden the surface of the aluminum casting. One of these methods is called "anodizing," which is an electrolytic process of providing the casting with a hard and resistant surface. This process of treatment, while it effectively makes the agitator more resistant to the corrosive action of the washing fluid, and more resistant to wear, provides the agitator with an abrasive surface which has a deleterious abrasive action on the clothes being washed. Moreover, the surface of the agitator, primarily due to corrosion, becomes pitted in use which increases the abrasive action of the agitator.

A further serious disadvantage of the use of aluminum is the fact that it is rather expensive, particularly at the present time, its cost having more than tripled in the past three years. In addition, after long use the blades become thin and worn as a result of the continued action of the blades upon the clothes being washed, and the corrosive action of the washing fluid. Moreover, the blades present a harsh, metallic surface to the clothes which has injurious effects upon them. The clothes are struck by the rigid non-yielding blades of the agitator, and this, together with the cutting action of the relatively sharp edges of the blades causes considerable wear on the clothes. This excessive wear on the clothes is evidenced by the lint appearing on the bottom of the vat after the washing action of the usual agitator is completed and the clothes have been removed from the vat. I have found that the foregoing objections to an aluminum alloy agitator may be largely eliminated by the method and means of my invention.

An object of my invention is to provide an agitator for a washing machine which may be manufactured at a reasonable cost.

Another object of my invention is to provide an agitator made of such materials that the agitator when operated in a vat containing clothes and washing fluid presents a smooth non-abrasive surface to the clothes which is long-wearing and which does not become rough or pitted in use.

My invention further contemplates the provision of an agitator which may be made of inexpensive materials, as compared to the aluminum die-castings now commonly employed in the manufacture of washing machine agitators, and which may be fabricated at a small cost.

More specifically, my invention contemplates improvements in agitator constructions of the general type disclosed in the above mentioned copending applications, wherein means are provided for reenforcing the blades of the agitators of said applications without increasing the cost of fabrication appreciably and while still enabling the use of inexpensive materials.

Other objects and advantages of my invention will be more apparent from the following description when taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical view, partly in section, showing an embodiment of my invention.

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

Figure 3 is a view similar to that of Figure 2, showing a modification of the agiator of Figures 1 and 2.

Figure 4 is a view showing another embodiment of my invention.

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

Figure 6 is a view similar to that of Figure 5 showing the method of attaching a metal plate as the blade reenforcing element to the main supporting rods of the agitator.

Figure 7 is a view showing another embodiment of my invention.

Figure 8 is a sectional view of the agitator of Figure 7 and illustrating the method by which the supporting rods and the reenforcing plate are centered in the mold during the molding operation.

Figure 9 is a view showing one method by which the reenforcing plate of the agitator of Figure 7 may be operatively secured to the supporting rods.

Figure 10 is a view similar to Figure 9 showing another way in which the supporting plate of

the agitator of Figure 7 may be operatively secured to the supporting rods.

Figure 11 is a perspective view of a portion of the reenforcing plate of the structure of Figure 10.

Figure 12 shows an alternative way in which the supporting rods of the structure of Figure 8 may be centered in the mold.

Figure 13 is a view similar to Figure 12 showing another alternative way in which the supporting rod may be formed in the mold.

Figure 14 is a view showing still another way in which the supporting rods of the structure of Figure 8 may be centered in the mold.

Figure 15 is a top plan of the structure of Figure 14 with one-half of the mold removed.

As shown in the above mentioned copending applications, the agitator of my invention is adapted to be mounted in a vat or tub in which washing fluid and the clothes to be washed are placed. Since the vat and the manner in which the agitator is driven do not constitute a part of my present invention, it is sufficient to state that the agitator is mounted in the vat and driven generally in the manner described in the above mentioned copending applications.

In one embodiment of my invention illustrated in Figures 1 and 2, a tube or column 11 of relatively thin sheet metal is provided. The tube has an inwardly turned flange, as indicated at 12, which is secured to a cap 13 into which the drive shaft (not shown) extends. The tube is preferably formed in three parts 14, 15 and 16, the vertical ends of which are bent outward and the three parts welded into an integral unit, as indicated at 17. One vertical end of each section of the tube is extended outward radially from the axis of the tube to form an agitator blade reenforcing plate 18. Preferably, the reenforcing plate 18 is corrugated as shown in the drawings. The tube 11, together with the corrugated reenforcing plates 18, form a frame upon which may be molded preferably a rubber coating, although other suitable moldable material may be used, to provide a continuous rubber surface for the entire agitator, as indicated at 19. Preferably, steel is used for the frame in this and other modifications to be described, in which case the steel should be first brass coated or otherwise treated to cause the rubber to adhere to the steel. The agitator thus formed is light, is made of inexpensive materials since the tube 11 and the corrugated blades may be made of sheet metal, and is cheap to fabricate. The blades of the agitator, while relatively stiff, due to the sheet metal reenforcement, exert a soft yielding action on the clothes by reason of the fact that the blades present a resilient rubbery surface to the clothes.

In the alternative form of the agitator of my invention shown in Figure 3, the tube 11 is made in one piece to which is welded blade reenforcing plates 22, as indicated at 23. The outer ends of the blade reenforcing plates 22 are curved outward, as indicated at 24. At the point of tangency of the curved portion of each of the plates 22, as indicated at 26, a second blade reenforcing plate 25 is welded which extends inward to the tube 11 and is welded at the point of tangency to the tube, as indicated at 27. On the sheet metal form thus provided, there may be molded a preferably rubber surface coating 28, although other moldable materials may be used. Preferably, the mold is provided with corrugations so that the blade surface is corrugated, as indicated at 29. Due to the curvature of the portions 24 of the reenforcing plates 22, the outer ends of the blades are hooked so that when the agitator is oscillated in a vat containing clothes and washing fluid, the clothes tend to flow in one circulatory direction around the vat. For convenience in molding the agitator, a three-part mold should be used as described in Geldhof Patent No. 2,094,559 issued September 28, 1937.

In the modification shown in Figure 4 of the drawings, the blade is formed by bending a metal rod 32 to form a skeletal frame in the manner described in the above mentioned copending applications. The metal rod may be supported by locking the ends 33 thereof in a hub or cap, as described in said applications, after the metal rod has been bent to the desired shape. The metal of the rod, at its inner edges, is upset at spaced points to form ears or anchoring projections 34. Apertures 36, as indicated in Figure 5, may then be provided in the ears for the reception of relatively small gauge steel wire 37 which is laced back and forth between the sides of the skeletal frame formed by the rods 32. A semi-mesh structure supported by the skeletal frame is thus formed, over the whole of which may be molded preferably rubber or other suitable moldable material, as indicated at 38. The agitator blade thus formed may be fabricated at a very reasonable cost and while the surface of the rubber is soft and pliant and does not exert a harsh action on the clothes at the same time, due to the relatively stiff skeletal frame and the cross lacing of wire, the blade surface is relatively stiff and non-yielding.

In Figure 7, I have shown a modification of the structure shown in Figure 4 wherein, instead of providing a lacing of wire, a reenforcing plate 41 is used. The reenforcing plate is preferably apertured, as indicated at 42, so that the rubber extends through the apertures on opposite sides of the reenforcing plate, the whole being thereby bonded together into an integral unit. The plate may be spot welded to ears 34 formed on the supporting rods as indicated at 39 in Figure 6.

However, welding the plate to ears formed on the supporting rods is unnecessary. In Figure 8, I have indicated the method by which the blade may be made and the method by which the plate and the rods 32 may be centered in the mold. The two halves of the mold are designated by the numerals 43 and 44. The metal rods 32 are centered in the mold by drilling holes through the rods at several points, and extending through the apertures rubber spacing pins 46 which project an equal distance on opposite sides of the rod. The plate 41 may be placed loosely in the mold and spaced therein by means of rubber plugs 47 which extend through apertures formed in the metal plate and engage the opposite side of the mold as indicated at 48. After the parts are centered and in position and the mold closed, the rubber may be poured in the mold and cured under heat and pressure. The blades may be molded by placing a sheet of semi-cured rubber in the mold, then placing the metal rod and perforated reenforcing sheet in the mold, and then placing a second sheet of semi-cured rubber over them. The molding may then be closed and heat applied and the rubber cured under pressure.

While in the above described construction, the reenforcing plate is not rigidly secured to the metal rods, after the rubber has been molded around the frame formed by the metal rods and the reenforcing plate, an integral rubber blade unit is formed which presents a resilient pliant

surface to the clothes but which is at the same time relatively stiff and rigid.

If desired, as indicated in Figures 9 and 10, the plate 41 need not be apertured and, as shown in those figures, the plate may be operatively secured to or braced against the rod by turning the ends of the plate around the rod, as indicated at 51 in Figure 9. In Figure 11, I have shown a perspective view of a portion of the reenforcing plate used in the blade structure of Figure 10, wherein the plate is slitted to form wings 53 which are then bent alternately in opposite sides of the center line so that the plate may be locked in position against the rods, as shown at 54 in Figure 10.

In Figure 12, I have shown an alternative way of centering the metal rods in the mold which consists of boring slightly into the rod at various points, as indicated at 56, from each side thereof and inserting in the apertures thus formed rubber plugs 57 which engage the sides of the mold and space the rod therefrom. Instead of the structure shown in Figure 12, canvas buttons 58 may be cemented to the surface of the rods on opposite sides thereof at various points along the rod to center the rod.

I have shown in Figure 14 another means of spacing or centering the rods in the mold. Packing rings 61, split at 62, may be slipped over the metal rod before it is placed in the mold. The packing rings should be spaced at at least three points on the rod. The packing rings may be of any suitable material as rubber or felt.

It will be apparent that I have provided an agitator blade which may be made of inexpensive materials, which may be fabricated at a small cost and which at the same time provides an outer surface which is of pliant resilient character and adapted to exert a soft yielding action on the clothes. At the same time, I have provided a blade which is relatively stiff and non-yielding.

While I have shown various modifications of my invention and have indicated various ways in which the blade may be molded, it will be apparent that other modifications and arrangements will occur to those skilled in the art, and I desire to include these within the scope of my invention as set forth in the appended claim.

I claim:

An agitator adapted to be mounted in a vat containing clothes and washing fluid, said agitator comprising a rod of metal bent to form a skeletal frame, a web of resilient material molded on said frame, and a reenforcing plate having perforations therein and being corrugated, said plate being embedded in said web and substantially closing the open space encompassed by said skeletal frame.

THOMAS J. LITLE, JR.