Oct. 28, 1941. L. B. BERG 2,260,822

AGITATOR

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Fig. 1

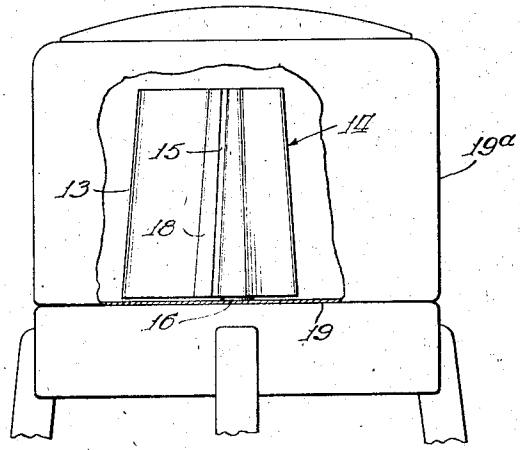


Fig. 4

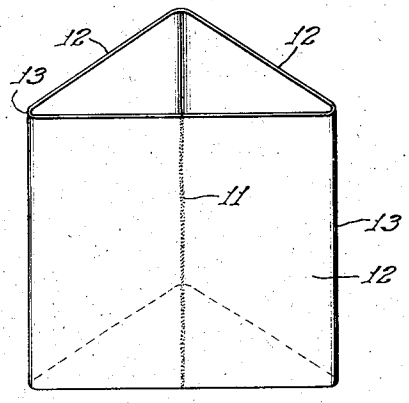


Fig. 2

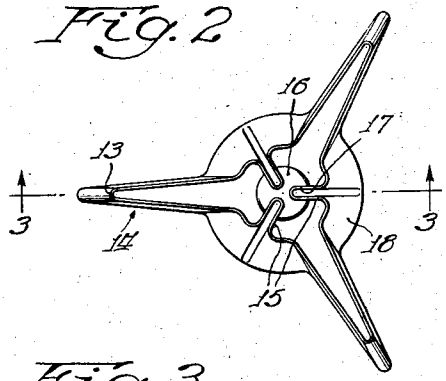


Fig. 5

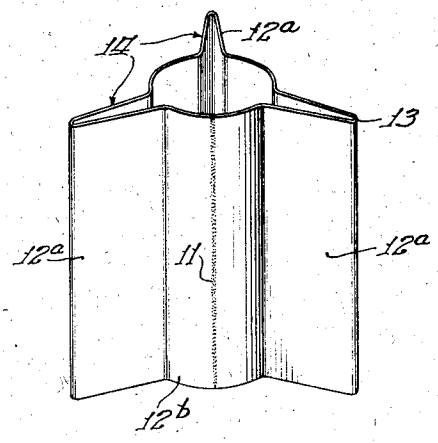
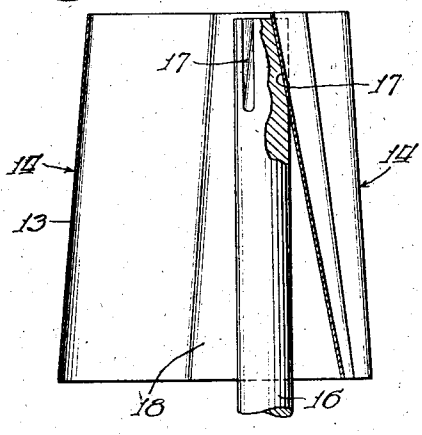


Fig. 3



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Fig. 6

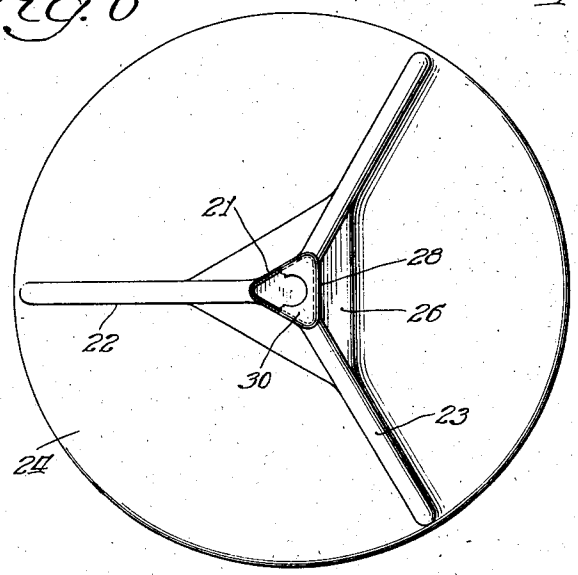


Fig. 9

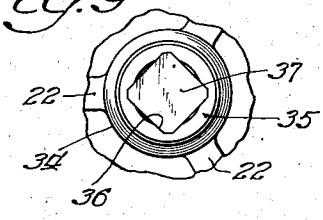


Fig. 10

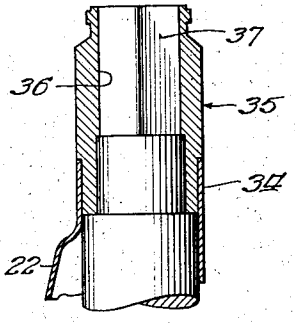


Fig. 7

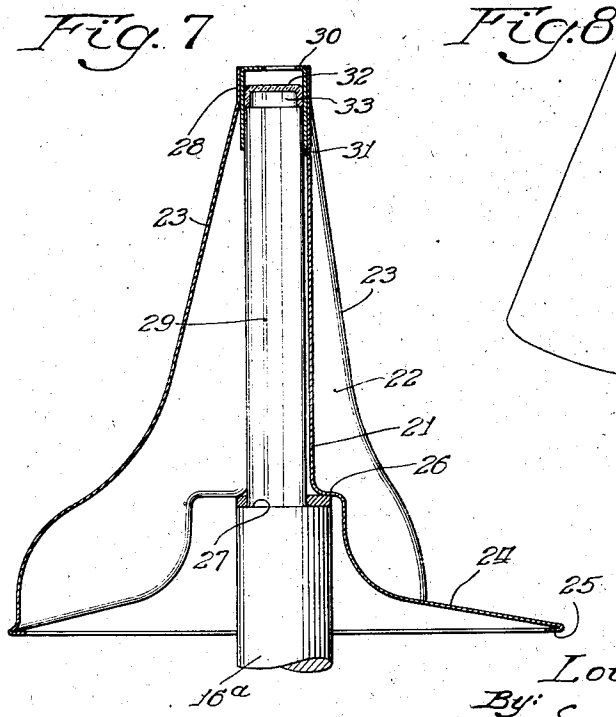
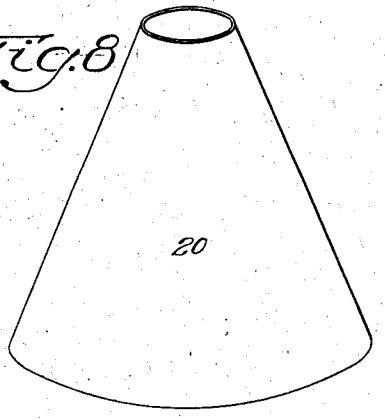


Fig. 8



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UNITED STATES PATENT OFFICE

2,260,822

AGITATOR

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Application October 22, 1938, Serial No. 236,415

2 Claims. (Cl. 68—134)

This invention relates to washing machine agitators, and has as its primary object to provide an agitator of inexpensive construction. To this end, the invention proposes to employ, instead of the conventional aluminum casting, a wholly sheet metal construction.

Another object of the invention is to provide such an agitator which, although of extreme simplicity and low cost in construction, is nevertheless possessed of more than ample sturdiness and durability under the severe conditions of usage to which it must be subjected.

Another object is to provide such an agitator which, in spite of the fact that it is made of sheet metal, has its agitating vanes formed, in the regions which contact the clothes, with smooth broadly rounded edges which cannot injure the clothes.

Another object of the invention is to provide an agitator which may be formed of a sheet of metal stock without wastage.

Another object of the invention is to provide an agitator of sheet metal having splines or keys for securing it to the drive shaft of a washing machine, such splines or keys being formed integrally in the sheet metal of the agitator.

Another object of the invention is to provide an agitator including a hub member for attachment to a drive shaft of a washing machine, a plurality of circumferentially spaced radial vanes, and a downwardly flaring skirt member, all formed integrally of a single body of sheet metal.

Other objects, the advantages and uses of the invention will become apparent after reading the following specification and claims, and after consideration of the drawings forming a part of the specification, wherein:

Fig. 1 is a side elevation of a washing machine embodying the invention, a portion of the side wall of the tub being broken away to illustrate the agitator therein;

Fig. 2 is a plan view of the agitator according to one form which the invention may take;

Fig. 3 is a vertical sectional view of the agitator taken as indicated by the line 3—3 of Fig. 2;

Fig. 4 is a perspective view of the agitator in an initial stage of formation;

Fig. 5 is a perspective view of the agitator in an intermediate stage of formation;

Fig. 6 is a plan view of a modified form of the agitator;

Fig. 7 is a vertical longitudinal sectional view of the agitator shown in Fig. 6;

Fig. 8 is a perspective view of the agitator of Fig. 6, in an initial stage of formation;

Fig. 9 is a plan view of the hub portion of a further modified form of the agitator; and

Fig. 10 is an axial sectional view of the agitator of Fig. 9 and the associated drive shaft.

The agitator shown in Figs. 1 to 5, inclusive, is constructed from a single rectangular strip of sheet metal, such as sheet steel. This strip of metal is bent in any suitable bending die, along lines parallel to its ends, to a prism shape, as shown in Fig. 4, and the ends of the strip are butt-welded together, as at 11, so as to form three sides 12 of uniform shape and dimensions. The sides 12 are joined by integral rounded channels 13 forming the corners of the prism-shaped body.

In the next step of the process, the prism-shaped body is subjected to the action of a suitable forming die which collapses the sides 12 inwardly, so as to form the sides 12*a* of the agitator vanes 14, and so as to form web portions 12*b* joining the side wall 12*a* of each vane 14 to an adjacent side wall 12*a* of an adjacent vane 14. The web portions 12*b* collectively form a roughly cylindrical sleeve which is adapted to be further deformed in the next step of the operation. The vanes 14, in this first forming operation, are given their final cross sectional form.

In the next step of the operation, the agitator is subjected to pressure in another die, which forces the upper regions of the vanes 14 radially inwardly toward each other, until the vanes 14 assume the converging relationship shown in Figs. 1 and 3. During this forming operation, the excess metal which is developed in the upper regions of the web portions 12*b* is pushed radially inwardly toward the axis of the agitator by suitable portions of the die, so as to form smoothly rounded keys 15 for securing the agitator to the drive shaft 16 of the washing machine. The keys 15 are adapted to be received in triangular shaped smoothly rounded key slots 17 formed in the upper end of the shaft 16, as shown. The remainder of the metal of the web portions 12*b* is formed into a trunco-conical skirt member 18.

The upper and lower ends of the agitator remain open. The agitator is arranged and proportioned with respect to the shaft 16 so that its lower end will be spaced just above the bottom 19 of the washing machine 19*a* in which it is installed.

In the form of the invention shown in Figs. 6 and 7 the agitator is constructed by first forming a conical sheet metal body as indicated at 20 in Fig. 8. The body 20 is then subjected to pressure in a suitable die, whereby circumferentially spaced side regions thereof are collapsed

inwardly so as to form the web portions 21, joining together the vanes 22, each of which comprises a pair of spaced side walls, as in the form of the invention previously described, joined by rounded channels 23 forming the edges of the vanes. The web portions 21, at their lower regions, merge into a conical, nearly flat disc-like skirt member 24, the rim of which may be rolled as at 25, so that all surfaces of the agitator in contact with the clothes will be smooth and rounded. Intermediate the skirt 24 and the shaft receiving hub formed by the collective web portion 21 are a series of offset shoulders 26, by means of which the agitator may be supported upon the shoulder 27 of the shaft 16*a*. The upper regions of the web portions 21 merge into a hub 28.

In this form of the invention, the upper end of the shaft 16*a* is formed, above the shoulder 27, with an extension 29, triangular in cross section, which fits in the hub 28, and is drivingly joined thereto at its upper end by means of an insert sleeve 30, which likewise is triangular in cross section. The sleeve 30 is pressed into the hub and located against internal beads 31 formed in the hub. In order to exclude moisture from the interior of the agitator, a cap 32 of rubber or the like may be fitted over a reduced end 33 of the shaft 16*a*, and arranged to fit snugly within the sleeve 30.

The form of the invention shown in Figs. 9 and 10, is substantially the same as that shown in Figs. 6 and 7 with the exception that the hub 34 at its upper end is provided with an insert sleeve 35 which has an opening 36 that does not conform to the shape of the hub 34. This construction may be employed where the drive shaft has an upper end 37 which is, for example, squared. Thus the shaft, instead of being specially constructed to fit the agitator, as in the other forms of the invention, may be a conventional shaft of any type now in use.

The insert 35 in this case, instead of being made of sheet metal, is in the form of a casting having relatively thick walls, as shown. Furthermore, the upper end of the hub 34 may in this case be cylindrical.

It will be observed that in the forms shown in Figs. 1 to 3 inclusive no adaptor is necessary between the drive shaft 16 and the agitator. The driving contact is between tapered slots 17 in shaft 16 and the inwardly projecting flanges in the agitator. The contacting surfaces of the agitator are enameled and if it were not for the smoothly rounded edges, the natural resilience in the spaced wall construction used for the flanges, and the tapered slots, the continuous reversal of torque would soon chip the enamel and render the agitator worthless. The construction illustrated provides a soft drive which protects the enameled finish first of all by causing the agitator to ride up on the slots until the pressure is relieved, and secondly by eliminating all sharp corners in the agitator.

I claim:

1. An enameled washing machine agitator of sheet metal having a constant thickness, said agitator comprising a plurality of vanes each having a pair of walls integrally joined at the outer edge of the vane, a web portion joining the wall of one vane to a wall of an adjacent vane, and a tapered driving key formed in each of said web portions by spaced walls jointed by a smooth curved portion, the web portions between said keys collectively forming a shaft receiving hub.

2. An enameled sheet metal washing machine agitator, the metal of which is of constant thickness, said agitator comprising a plurality of vanes, each having a pair of spaced walls integrally joined at the outer edges of the vane by a smooth curved portion, a web portion joining a wall of one vane to a wall of an adjacent vane, each of said web portions having inwardly projecting spaced walls defining a key having a rounded edge region and a shaft having rounded tapered slots receiving the flanges for driving the agitator, the rounded keys and slots cooperating to form a cushioned drive free from sharp corners which would injure the enameled finish.

LOUIS B. BERG.