SELF-CONTAINED AGITATOR FOR WASHING CLOTHES

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Fig. 7

Fig. 8

Fig. 9

Fig. 10

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SELF-CONTAINED AGITATOR FOR WASHING CLOTHES

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11 Claims. (Cl. 68—131)

1 The present invention relates to improvements in washing machines.

One of the objects of the present invention is to provide a washing machine which is especially adapted for light duty requirements, as, for example, in small homes and apartments where considerations of need, cost or appropriate floor space render undesirable or preclude the use of a conventional full-size washing machine, and which, to this end, is relatively small in size, light in weight and readily portable.

Another object is to provide a washing machine which consists of a self-contained power-operated agitator unit adapted to be operatively suspended in any suitable and conveniently available container serving as the tub for the wash goods and water.

A further object is to provide a portable clothes washing unit having an agitator head on one end, and housing an operating mechanism which is fully enclosed out of contact with the wash water, and which serves to impart a gyratory or vibratory motion to the head.

Another object is to provide a portable and fully self-contained clothes washing unit in which the operating mechanism for imparting the agitating motion is selectively adjustable to produce and vary the amplitudes of component vibrations of said motion both horizontally and vertically.

A further object is to provide a clothes washing unit of the foregoing character which is simple and inexpensive in construction, and efficient and reliable in operation.

Other objects and advantages will become apparent as the description proceeds.

Referring more particularly to the drawings,

Figure 1 is a perspective view illustrating a washing machine or unit, embodying the features of the present invention, operatively immersed in a conventional stationary laundry tub.

Fig. 2 is an enlarged perspective view of the unit.

Fig. 3 is a fragmentary plan view, on a still larger scale and partially in horizontal section, of the unit.

Fig. 4 is a fragmentary longitudinal sectional view of the unit in a vertical plane.

Figs. 5, 6 and 7 are fragmentary sectional views taken respectively along lines 5—5, 6—6 and 7—7 of Fig. 4.

Fig. 8 is a perspective view of two vibration producing elements forming part of the operating mechanism within the unit, and shown in one extreme position of relative adjustment to obtain maximum vibration in a longitudinal or vertical direction.

Fig. 9 is a view similar to Fig. 8, but showing the elements in the other extreme position of relative adjustment to obtain minimum vibration vertically.

Fig. 10 is a fragmentary detail sectional view taken along line 10—10 of Fig. 5, and illustrating a clutch in the drive to one of the vibration producing elements.

Referring more particularly to the drawings, the washing machine or unit, constituting the exemplary embodiment of the invention, comprises generally an elongated rigid housing 11, preferably of metal, which is adapted to be operatively suspended in a generally vertical position, with the lower end immered in a suitable container 12 for the clothes to be washed and the wash water. The container 12 may be of any suitable character, conveniently at hand, and in the present instance is shown as a conventional laundry tub. The lower end portion of the external housing 11 is considerably enlarged to constitute a casing 13, preferably square in horizontal section, for enclosing and operatively supporting a motion producing mechanism. The upper end portion 14 of the housing 11 projects vertically from approximately the center of the casing 13, and at the top supports a suitable electric drive motor 15 connected therethrough to the motion producing mechanism. A sheathing or jacket 16 of water impervious material, such as rubber, externally encloses and conforms closely in shape to the housing 11, except for the extreme upper end of the latter which is left exposed to afford a rigid mounting for the motor 15, and which normally does not come into contact with the wash water. In any event, the motor 15 serves to close the upper end of the housing 11 so that the washing machine constitutes a fully self-contained portable agitator unit, with the operating mechanism enclosed and sealed therein, and substantially the entire exterior of the housing 11 is protected against contact with the wash water.

The unit is adapted to be operatively suspended in any suitable manner. In the present instance, the top of the motor 15 is provided with an eye 17 adapted to be engaged with a hook 18 on the lower end of a coiled suspension spring 19 anchored to an overhead bracket 20. The electric cord 21 of the motor 15 may extend upwardly along the spring 19 and thence to a suitable electric outlet plug (not shown). With the unit thus suspended, the enlarged lower end is adapt-
ed to be immersed in the wash water to the desired depth, and, by reason of the motion producing mechanism therein, constitutes a self-actuated washing agitator. The efficiency of agitation is improved by reason of the non-circular shape of the casing 15 and surrounding rubber sheathing 16, and may be further enhanced by providing concave circular recesses 22 in the sides and bottom of the latter.

Within the broad aspects of the invention, the motion producing mechanism enclosed within the casing 13 is provided with any suitable character capable of creating an efficient washing action. In general, the mechanism is adapted to create a gyratory motion with superimposed vibrations both vertically and horizontally, and is adjustable to vary the intensity and character of the motion as desired to satisfy different washing requirements. In the preferred form and very advantageously, the mechanism is arranged to produce the desired motion through the action of at least one and preferably a plurality of revolving eccentric weights. Thus, two similar eccentric weights 23 and 24 are mounted in axially spaced relation for free rotation respectively on opposite ends of a non-rotary supporting shaft 25 extending transversely, i.e. horizontally, through the casing 13. The extreme ends of the shaft 25 extend into and are supported in tubular bosses 26 on the interior of the two opposite side walls of the casing 13. Each of the weights 23 and 24 has a hub 27 engaging the shaft 25, and a diametrically opposite radial arm 28 formed with a bifurcation or slot 29. An idler wheel or anti-friction roller 30 is journaled in the arm 28 within the slot 29, and is disposed in rolling engagement with the periphery of the shaft 25 opposite to the mass of the weight.

Suitable provision is made for revolving the weights 23 and 24 jointly through a drive from the motor 16. In the present instance, a drive sleeve 33, which serves also as a spacer sleeve, is rotatably disposed on the shaft 25 between the hubs 27 of the weights 23 and 24. One end of the sleeve 33 is positively keyed through interfitting radial ribs and grooves 32 to the hub 27 of the weight 24. The other end of the sleeve 33 extends into an annular coaxial flange 33 on the inner face of the hub 27 of the weight 23. A collar hub 34, with a peripheral groove 35, is slidably keyed to this end of the sleeve 33, and is formed on the outer side with a series of radial grooves 36 adapted for intermeshing engagement with complemental lugs 37 formed in the end face of the flange 33. A coiled compression spring 38 normally tends to urge the collar 34 into driving engagement with the hub 27 of the weight 23 so that it will be revolved in unison with the weight 23.

The drive transmission comprises a pinion 39 coaxial and rigid with the sleeve 30. The pinion meshes with a worm 40 on a vertical shaft 41 which is journaled at the upper end in a bearing block 42 integral with a transverse wall 43 between the casing 13 and neck 14 of the housing 11. The lower end of the shaft 41 is journaled in needle bearings 44 and axially supported by an end thrust bearing 45 within a bearing bracket 46 secured to one side wall of the casing 13. Speed-change gears 47 and 48 connect the shaft 41 to a stub shaft 49 journaled in and extending centrally through the bearing block 42. A collar 50 secured to the upper end of the shaft 49 above the wall 43 serves to maintain the shaft 49 in position. An intermediate shaft 51 extending axially through the neck portion 14 of the housing 11 has a separable drive connection at the lower end with the shaft 49, and is coupled at the upper end to the shaft 25 of the motor 16 and remotely connected at all times to drive the sleeve 30.

The revolving weights 23 and 24 are of substantial mass, and serve to impart a pronounced gyratory motion to the agitator head, with lateral and longitudinal vibratory components. The longitudinal or vertical component of vibration is subject to control by adjusting the angular phase relation between the weights 23 and 24. Thus, through the medium of the clutch collar 54, the rotor or eccentric weight 23 may be disengaged so as to permit rotary adjustment thereon, as desired, of different angular positions relative to the sleeve 30. Fig. 8 illustrates the weights 23 and 24 disposed at the same side of the axis to produce maximum vibration. Fig. 9 shows the weights offset 180° from each other so that their action is substantially similar to that obtained with the intermediate positions of relative phase adjustment between these limits which would result in proportional variations in the vertical component of vibration. In general, the motion produced by the revolving weights is complex in nature, but subject to modification as to intensity and character. While it is difficult specifically to define the various orbits of movement, it appears that when the weights are adjusted to coincide as shown in Fig. 8, maximum vibration or gyration vertically in a generally circular orbit is obtained. The upper intermediate positions of relative phase adjustment between these limits would result in proportional variations in the vertical component of vibration. In general, the motion produced by the revolving weights is complex in nature, but subject to modification as to intensity and character. When the weights are adjusted 180° out of phase as shown in Fig. 9, the vertical component is eliminated or substantially reduced, but, due to the axial spacing of the weights, an enhanced horizontal oscillatory motion is obtained.

Any suitable control means may be provided for actuating the clutch collar 34. In the present instance, the collar 34 is engaged by a swinging yoke 53 pinned to a rock shaft 54 and confined vertically between two spaced bearing legs 55 through which the shaft extends. The upper end of the shaft 54 projects into the wall 43, and has an axially separable drive connection with an aligned shaft 56 extending through and journaled in a bearing lug 57 at the top of the neck portion 14 of the housing 11. An oscillable hand lever 58 confined within a slot 59 in the collar 34 is pinned to the shaft 56, and is adapted to be held releasably by a spring detent 60 in different selective positions of adjustment respectively to maintain the collar shaft 34 in open position or closed position. Preferably, though not essentially, a third eccentric weight or rotor 61 is supported in the casing 13 for rotary drive about a vertical axis to augment the amplitude of horizontal vibration of the agitator head. Moreover, particularly, the weight has a slot 62 receiving the shaft 41, and is keyed to the latter for rotation therewith by a pin 63 extending longitudinally of the slot. A coiled compression spring 64 is confined on the pin 63 between a stop nut 65 and the shaft 41 opposite the eccentric mass, and tends to reduce the radial projection of the weight in opposition to centrifugal force.

To facilitate assembly, the lower end of the casing 13 is closed by a removable plate 66. This permits the elements of the motion producing mechanism to be inserted through and assembled from the bottom of the casing 13 before the plate 66 is secured in position. Necessary assemblies...
in the neck portion 14 may be effected through the open upper end before the motor 15 is bolted in position. After completion of the assembly, the rubber sheathing 16 is placed and if necessary vulcanized about the housing 11.

To facilitate handling of the washing unit, a hand wheel 67 is secured to the upper end. In the form shown, the wheel 67 comprises a circular rim 67' located concentrically about the motor 15, and rigidly connected by downwardly inclined arms 67” to a circular mounting ring 68 of reduced diameter. The rim 68 is seated in a peripheral groove 69 formed in a thickened rim 70 on the extreme upper end of the rubber casing 16.

While the invention has been disclosed in a unitary structure especially adapted for washing clothes it will be appreciated that the unit in the form shown or with slight alterations or modifications may be utilized for numerous other purposes where mixing or stirring of liquid or viscous materials is desired. Thus the unit may be used to advantage in mixing chemical ingredients.

I claim as my invention:
1. A self-contained agitator unit comprising, in combination, an elongated housing adapted to be operatively suspended in a vertical position and having an upper neck portion and a lower head portion constituting an agitator, two axially spaced eccentric weights mounted in a vertically aligned manner in the head portion for unidirectional revolution about a common transverse axis, and drive means for revolving said weights in unison, said weights being adjustable to permit adjustment of the angular phase relation between said weights, whereby said weights may be disposed selectively at the same side or at opposite sides of the axis of revolution.

2. A self-contained agitator unit comprising, in combination an elongated housing adapted to be operatively suspended in a vertical position and having an upper neck portion and an enlarged lower head portion constituting an agitator, a transverse shaft fixed in said head portion, an eccentric weight revolvable on said shaft, an electric drive motor on the upper end of said neck portion, and a drive gear transmission and clutch means for connecting said head portion for said weight and connected through said neck to said motor and a second eccentric weight mounted in said head portion for revolution about an axis extending longitudinally of said unit and connected for drive to said transmission.

3. A self-contained agitator unit adapted for washing clothes, said unit comprising, in combination, an elongated housing having a neck portion at one end and a head portion at the other end constituting an agitator, a transverse shaft fixed in said head portion, an eccentric weight revolvable on said shaft, an electric drive motor on the upper end of said neck portion, a drive gear transmission and clutch means for connecting said head portion for said weight and connected through said neck to said motor and a second eccentric weight mounted in said head portion for revolution about an axis extending longitudinally of said unit and connected for drive to said transmission and clutch means for disconnecting one of said weights from said transmission.

4. A self-contained agitator unit adapted for washing clothes, said unit comprising, in combination, an elongated housing having a neck portion at one end and an enlarged head portion at the other end constituting an agitator, a transverse shaft fixed in said head portion, an eccentric weight revolvable on said shaft, a power drive means for revolving said weights in unison about said axis, and a clutch interposed in said means for connecting or interrupting the drive to one of said weights.

5. A self-contained agitator unit adapted for washing clothes, said unit comprising, in combination, an elongated housing having a neck portion at one end and a lower head portion constituting an agitator, a transverse shaft fixed in said head portion, an eccentric weight revolvable on said shaft, an idler wheel mounted in said neck opposite the eccentric mass, and disposed in a rolling engagement with said shaft, and power drive means for revolving said weight.

6. A self-contained agitator unit adapted for washing clothes, said unit comprising, in combination, an elongated housing adapted to be operatedly suspended in a vertical position and having an upper neck portion and a lower head portion constituting an agitator, a transverse shaft fixed in said head portion substantially perpendicular to the long axis of the housing, an eccentric weight revolvable on said shaft, an electric drive motor on the upper end of said neck portion, a drive gear transmission within said head portion for said weight and connected through said neck to said motor, and a casing of water impervious material enclosing said head portion, said head portion and casing being square in transverse shape, and said casing being formed externally in various faces with recesses defining washing edges.

7. A self-contained agitator unit adapted for washing clothes, said unit comprising, in combination, an elongated housing having a neck portion at one end and an enlarged head portion at the other end constituting an agitator, a transverse shaft fixed in said head portion, an eccentric weight revolvable on said shaft, an electric drive motor on the end of said neck portion, and a drive gear transmission and clutch means for connecting said head portion for said weight and connected through said neck to said motor and a second eccentric weight mounted in said head portion for revolution about an axis extending longitudinally of said unit and connected for drive to said transmission.
embracing the motor end portion of said sheathing.

10. A self-contained agitator unit comprising, in combination, an elongated housing, two axially spaced eccentric weights mounted in the lower end portion of said housing for revolution about a common transverse axis, and power means for driving said weights in unison, said means being adjustable to permit adjustment of the angular phase relation between said weights, whereby said weights may be disposed selectively at the same side or at opposite sides of the axis of revolution.

11. A self-contained agitator unit comprising, in combination, an elongated housing adapted to be operatively suspended from the upper end in a generally vertical position and with the lower end free for lateral and vertical movement, a transverse shaft fixed in the lower end portion of said housing, an eccentric weight revolvable on said shaft, an idler wheel mounted within said weight opposite the eccentric mass and disposed in rolling engagement with said shaft, and power drive means for revolving said weight.

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