PORTABLE CLOTHES WASHER

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ABSTRACT
The present invention discloses a portable clothes washer by integrating a wash component with a control component while eliminating the tub body. The present invention is less costly, and is compact, convenient for users to put into a traveling bag, and can be widely used in service sites like hotels.
PORTABLE CLOTHES WASHER
CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority of Chinese Patent Application No. 200520054965.5 filed on Feb. 19, 2005, entitled “Portable Clothes Washer” which is incorporated herein by reference for all purposes.

TECHNICAL FIELD

[0002] The present invention relates to a clothes-washing apparatus, and more particularly, to a portable clothes washer.

BACKGROUND OF THE INVENTION

[0003] Generally, clothes-washing apparatus in the present market include domestic or commercial clothes-washing machines, which are bulky and not portable. A portable clothes-washing apparatus is present in the market for people who travel for business or pleasure, e.g. a portable impeller-type clothes-washing machine including a wash tub assembly and a bottom assembly, wherein said wash tub assembly includes a handle, a top cover, a tub body and an impeller; said bottom assembly includes a base, a motor, a retarder and a controller. As compared to traditional clothes-washing machines, said portable impeller-type clothes-washing machine has following advantages: 1. The wash tub assembly is much smaller in size; 2. When not in use, the bottom assembly can be put into the tub body so as to save the occupied space. With this type of clothes-washing machine, to wash clothes of 0.5 Kg, a 300 mm high tub body with 200-300 mm diameter is needed; such a large tub body is still too big and not convenient to be carried for outgoing. Meanwhile, said clothes-washing machine implements clothes washing only by the rotation of the impeller, which is unitary in washing modes.

[0004] It is undue wasteful to use the present domestic or commercial clothes-washing machines in some cases, e.g., for people putting up in a hotel who have little clothes to be washed, or for people staying at home who need to specifically wash a few clothes (e.g. socks). Therefore, in the present hotels, a washstand or a bathtub is usually provided, but a clothes-washing machine is not provided in each room, and it is not convenient to wash clothes for the guests.

SUMMARY OF THE INVENTION

[0005] The object of the present invention is to provide a compact and less costly portable clothes washer by integrating a wash component with a control component while eliminating the tub body, so as to overcome the above-mentioned shortcomings of the prior clothes-washing machines.

[0006] A portable clothes washer according to the present invention, comprises a control component, a wash component, a shell for carrying said control component and said wash component; wherein said control component is electrically connected with said wash component, so that said wash component can be operated by controlling said control component; and wherein said wash component can produce mechanical rotations or physical vibrations, by which said wash component impacts on a wash medium outside said shell so as to implement a function of washing clothes.

[0007] Wherein said wash medium may be a liquid.

[0008] Wherein said wash component is an ultrasonic generator or a mechanical agitator or the combination of both.

[0009] Wherein said ultrasonic generator includes a vibration plate and an ultrasonic transducer.

[0010] Wherein said mechanical agitator includes a driving device and an impeller, said driving device is disposed inside said shell, said impeller is disposed outside said shell.

[0011] Wherein said portable clothes washer further comprises a clamp for clamping onto external upholsters.

[0012] Wherein said shell is designed into an elongated stick, with the wash component disposed at one end of the shell, and the opposite end of the shell is designed into a shape convenient for hand-holding or is equipped with a handle.

[0013] Wherein said wash component and said control component may be disposed inside different shells respectively, so as to form a wash part and a control part which are detachably connected, and when they are mechanically connected, said wash part and said control part are also electrically connected.

[0014] Wherein said portable clothes washer may include one control part and more than one wash parts, and each of said wash parts may be detachably connected with said control part, and they are also electrically connected when they are mechanically connected.

[0015] In use of the present invention, clothes to be washed are put into a cleaning solvent, such as water or other solutions, in an external washstand or bathtub, when necessary a strong sterilization detergent may be further added to said cleaning solvent, and the wash component disposed at the end of the shell is immersed into the cleaning solvent, so as to wash clothes. Moreover, a clamp may be installed on the shell when necessary, so that the whole clothes washer may be clamped onto external washing receptacles or other upholsters, e.g. a tap.

[0016] Since the bulky tub body of the prior clothes-washing machine is eliminated, the portable clothes washer of the present invention is less costly, and is compact and convenient for users to put into a traveling bag. Moreover, since a washing receptacle, like a washstand or a bathtub, is provided in service sites like hotels, the portable clothes washer of the present invention can be widely used.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a schematic view of the portable clothes washer according to embodiment 1 of the present invention;

[0018] FIG. 2 is a schematic view of the portable clothes washer according to embodiment 2 of the present invention;

[0019] FIG. 3 is a schematic view of the portable clothes washer according to embodiment 3 of the present invention;

[0020] FIG. 4-1 is a schematic view of the control part of the portable clothes washer according to embodiment 4 of the present invention;

[0021] FIG. 4-2 is a schematic view of a wash part of the portable clothes washer according to embodiment 4 of the present invention;
FIG. 4-3 is a schematic view of another wash part of the portable clothes washer according to embodiment 4 of the present invention;

FIG. 4-4 is a schematic view of another wash part of the portable clothes washer according to embodiment 4 of the present invention;

FIG. 5 is a schematic view of the portable clothes washer according to embodiment 5 of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiment 1

In this embodiment, a portable clothes washer adopts ultrasonic technology and makes use of cavitation effect of high frequency mechanical oscillations so as to implement the function of washing clothes. Wherein the wash component is constructed by a vibration plate 101 and an ultrasonic transducer 102.

As shown in FIG. 1, the clothes washer is in the shape of a stick, comprising a vibration plate 101, an ultrasonic transducer 102, a shell 103, a controller 104, a switch 105 of the controller 104, and a clamp 106. Wherein the vibration plate 101 is installed at one end of the shell 103, the ultrasonic transducer 102 is fixed with the vibration plate 101, the ultrasonic transducer 102 is electrically connected with the controller 104, the controller 104 is disposed inside the shell 103, and the switch 105 is installed on the outer wall of the shell 103. The other end of the shell 103, which is opposite to the end where the vibration plate 101 is located, is designed with a neck for hand-holding. The clamp 106 may be clamped onto the shell 103 when necessary. The numerals 107 and 108 in FIG. 1 refer to the locations for hand-holding and clamping respectively.

Furthermore, the portable clothes washer may be provided with accessories such as a strong sterilization detergent.

The working principle of this embodiment is as follows:

The portable clothes washer removes the dirt by “cavitation effect” of ultrasonic wave. The so-called “cavitation effect” is formed as follows: the high frequency oscillation signals emitted from an ultrasonic generator are converted into high frequency mechanical oscillations by a transducer and propagate to the wash medium, namely the cleaning solvent; the ultrasonic wave radiates forwards sparsely and densely alternately in the liquid, and makes the liquid to flow so as to form thousands of tiny bubbles, which are formed and grow up in the region of negative pressure, and collapse rapidly in the region of positive pressure.

In this embodiment, the controller 104 is started by turning on the switch 105, high frequency oscillation signals are produced by the controller 104, then the signals are converted into high frequency mechanical oscillations by the transducer 102, and the vibration plate 101 vibrates as well because the transducer 102 and the vibration plate 101 are fixed together. When the vibration plate 101 moves forward, the cleaning solvent, e.g. water, is pushed forward; on the other hand, when the vibration plate 101 moves backward, the water cannot catch up with the moving velocity of the vibration plate, and a gap is formed between the water and the vibration plate, so that many bubbles will be produced during vibration. These cavitation formed bubbles propagate in the water along the vibration direction, and an instant high pressure of over 1000 atmospheric pressure will be formed when the bubbles collapse; the process of continuously producing instant high pressure is like that a series of “explosions” impact on the clothes uninterruptedly, which makes the dirt striped from the surface and cracks of the clothes so as to implement the function of washing clothes. Meanwhile, the cleaning solvent itself impacts on the dirt as well because the cleaning solvent also vibrates ultrasonically.

Since it will be tiring for holding the stick-shaped clothes washer for a long time, the clamp 106 may be put on in case of long-time washing, then the clothes washer may be directly clamped to an external washing receptacle or a rigid object nearby, e.g. a tap, and the user only needs to operate the switch of the clothes washer without holding the clothes washer.

If the strong sterilization detergent is added into the cleaning solvent additionally, the ultrasonic wave will facilitate the chemical dissolution of the dirt by the sterilization detergent, by way of combining the physical effect of the ultrasonic oscillation with the chemical effect of sterilization detergent, the washing process will be sped up greatly.

Embodiment 2

A portable clothes washer of this embodiment is shown in FIG. 2. As compared to embodiment 1, the difference is that, in this embodiment, the wash component adopts an impeller driven by a motor. The details are as follows:

The portable clothes washer of this embodiment comprises an impeller 201, a retarder 202, a motor 203, a shell 204, a controller 205, a switch 206 of the controller 205, and a clamp 207. Wherein the switch 206 is installed on the outer wall of the shell 204, the rotation direction and intermittent of the motor 203 is controlled by the controller 205, the output speed from the motor 203 is reduced by the retarder 202, and the rotation speed of the impeller 201 is lower. The impeller 201 is installed at one end of and outside the shell 204, and in turn in the shell 204 are disposed the retarder 202, the motor 203 and the controller 205. Similarly to that in embodiment 1, the other end of the shell 204, opposite to the location where the impeller 201 is located, is designed with a neck for hand-holding. The clamp 207 may be clamped onto the shell 203 when necessary. The numerals 208 and 209 in FIG. 2 refer to the locations for hand-holding and clamping respectively.

Said impeller 201 is situated outside the shell 204, and comprises a cover and a rotary wheel, wherein said rotary wheel having one or more vanes. Said rotary wheel and vanes are in direct contact with cleaning solvent for washing clothes.

The working principle of this embodiment is as follows:

The impeller 201 is driven to rotate by the motor 203, so that the cleaning detergent can be dissolved adequately to effect the function of washing, the details are as follows:
The controller 205 is switched on by the switch 206. When the controller 205 works, the motor 203 is driven to rotate at a high speed, including a positive rotating, a reversal rotating and intermittently. The output speed from the motor 203 is reduced by the retarder 202, and the impeller 201 is driven to rotate at a lower speed, implementing a repeated motion cycle including positive rotation, intermitent, reversal rotation, intermittent. The cleaning process is as follows: the impeller 201 drives the clothes to rotate, and the dirt is wiped off the clothes by the centrifugal force produced; meanwhile the rotation of the clothes makes the dirt and the cleaning detergent to contact more quickly and thoroughly so that the chemical effect of the cleaning detergent is enforced and the dirt will be better dissolved.

The operation method of the clamp 207 is the same as that in embodiment 1.

Embodiment 3

A portable clothes washer of this embodiment is shown in FIG. 3. As compared to embodiment 1 and embodiment 2, the difference is that, in this embodiment, the wash component is a combination of the ultrasonic washing means and the impeller washing means, which are integrated into the same shell; so that, different washing modes can be chosen according to specific conditions, which is more convenient for users. The details are as follows:

The portable clothes washer of this embodiment comprises a shell 301; an impeller washing means including a motor switch 302, a motor controller 303, a motor 304, a retarder 305, an impeller 306; and an ultrasonic washing means including a transducer switch 307, a transducer controller 308, an ultrasonic transducer 309, a vibration plate 310; and a clamp 311. Wherein the structure and working principle of the ultrasonic washing means and the impeller washing means are the same as those in embodiment 1 and embodiment 2 respectively. The difference is that, in this embodiment, the two different washing means are integrated into a same shell 301, and the vibration plate 310 and impeller 306 are placed at the same end of the shell 301.

Similarly, the other end of the shell 301, opposite to the location where the vibration plate 310 and the impeller 306 are located, is designed with a neck for hand-holding. The clamp 311 may be clamped onto the shell 301 when necessary. The numerals 312 and 313 in FIG. 3 refer to the locations for hand-holding and clamping respectively.

The working principle of this embodiment is as follows:

With two separate switches, the clothes can be washed either using one of these two different washing means or both of them. The washing process is the same as that in embodiment 1 or embodiment 2 if only one of these washing means is used. If the two washing means are used simultaneously, the rotation of the impeller 306 will reinforce the washing effect of the ultrasonic wave, in addition to the specific washing effect of each of the two washing means. Since there is an optimum range for the effect of cavitation bubbles formed by high frequency mechanical oscillations produced by an ultrasonic wave, if these bubbles are too far from the vibration plate 310, the effect of "bombing" formed by bubbles collapsing will damp, while the impeller 306 will bring different clothes within the optimum range of the vibration plate 310 when it rotates, and different parts of clothes can be impacted by the ultrasonic vibration, so that the dirt drops easily to attain a better washing effect. Double washing mode is more suitable and has better effect in case there are more clothes and there is a bigger washing receptacle.

The operation method of the clamp 311 is the same as that in embodiment 1.

Embodiment 4

A portable clothes washer of this embodiment is shown in FIGS. 4-1, 4-2, 4-3, 4-4. As compared to embodiment 1, embodiment 2 and embodiment 3, the difference is that, in this embodiment, the control component and wash component are disposed in two separate shells respectively, and the two parts are detachably connected and can be replaced easily. The details are as follows:

The portable clothes washer of this embodiment comprises a control part and three interchangeable wash parts.

As shown in FIG. 4-1, the control part comprises a shell, a clamp 405, a mode selection switch 406, an electric socket 416, a controller 407 for an ultrasonic wave washing component and a controller 408 for an impeller type washing component, wherein the two controllers 407 and 408 can be selected to be switched on by the mode selection switch 406, including only ultrasonic wave mode, only impeller mode, and ultrasonic wave plus impeller mode. The electric socket 416 is disposed at one end of the shell, and the opposite end of the shell is designed with a neck for hand-holding. The clamp 405 may be clamped onto the shell when necessary. The numerals 414 and 415 in FIG. 4-1 refer to the locations for hand-holding and clamping respectively.

As shown in FIG. 4-2, a wash part includes a shell, an electric connector 4216, an ultrasonic transducer 4209 and a vibration plate 4210. As shown in FIG. 4-3, another wash part includes a shell, an electric connector 4316, a motor 4311, a retarder 4312 and an impeller 4313. As shown in FIG. 4-4, another wash part includes a shell, an electric connector 4416, an ultrasonic transducer 4409 and a vibration plate 4410, a motor 4411, a retarder 4412 and an impeller 4413.

Each of the electric connectors of different wash parts is engageable with the electric socket 416 of the control part, so that the control part can be engaged with one of the wash parts in use, and the different wash parts are interchangeable and can be replaced according to desire.

The working principle is as follows:

In use, choose a suitable wash part, and connect it with the control part. When the wash part of FIG. 4-2 is assembled with the control part, a portable clothes washer as that in embodiment 1 is formed. When the wash part of FIG. 4-3 is assembled with the control part, a portable clothes washer as that in embodiment 2 is formed. When the wash part of FIG. 4-4 is assembled with the control part, a portable clothes washer as that in embodiment 3 is formed. Choose an appropriate mode by the mode selection switch 406, then the portable clothes washer will work as in embodiments 1, 2 and 3 respectively.
According to demands of different users and taking into consideration of the cost, the portable clothes washer may include only one or more than one wash parts as shown in FIGS. 4-2, FIG. 4-3, FIG. 4-4.

Since this embodiment adopts a detachable structure, the portable clothes washer is further shortened and more convenient for carrying.

Embodiment 5

A portable clothes washer of this embodiment is shown in FIG. 5. As compared to embodiment 1, the difference is that, in this embodiment, a sucking disc is adopted instead of the clamp.

In use, the portable clothes washer can be fixed to a washstand or a bathtub by the sucking disc.

The above description is for the purpose of illustration and is not intended to limit the invention specifically to those embodiments. Rather, the invention is intended to cover all that is included within the spirit and scope of the invention, including variations, modifications, additions, alternatives and the like made by one having ordinary skill in the art.

What is claimed is:

1. A portable clothes washer comprising a control component, a wash component, a shell for carrying said control component and said wash component; wherein said control component is electrically connected with said wash component, so that said wash component can be operated by controlling said control component; and wherein said wash component can produce mechanical rotations or physical vibrations, by which said wash component impacts on a wash medium outside said shell so as to implement a function of washing clothes.

2. A portable clothes washer according to claim 1, characterized in that said wash medium may be a liquid.

3. A portable clothes washer according to claim 1, characterized in that said wash component is an ultrasonic generator or a mechanical agitator or the combination of both.

4. A portable clothes washer according to claim 3, characterized in that, said ultrasonic generator includes a vibration plate and an ultrasonic transducer, said vibration plate and said ultrasonic transducer are disposed inside said shell.

5. A portable clothes washer according to claim 3, characterized in that said mechanical agitator includes a motor and an impeller, said motor is disposed inside said shell, said impeller is disposed outside said shell.

6. A portable clothes washer according to claim 1, characterized in that, said portable clothes washer further comprises a clamp for clamping onto external upholsters.

7. A portable clothes washer according to claim 1, characterized in that said shell is designed into an elongated stick, with said wash component disposed at one end of said shell, and the opposite end of the shell is designed into a shape convenient for hand-holding or is equipped with a handle.

8. A portable clothes washer according to claim 1, characterized in that said wash component and said control component are disposed inside different shells respectively, so as to form a wash part and a control part which are detachably connected, and when they are mechanically connected, said wash part and said control part are also electrically connected.

9. A portable clothes washer according to claim 8, characterized in that said portable clothes washer includes one control part and more than one wash parts, and each of said wash parts may be detachably connected with said control part, and they are also electrically connected when they are mechanically connected.