The invention relates to a drum baffle and a washing machine having the same. The drum baffle includes a sheath and a bottom plate. The sheath and the bottom plate form a cavity having a hollow structure. The drum baffle is made by injection molding using one or more polymer adsorption materials, which may be used as a washing medium. The cavity of the drum baffle is internally filled with solid particles. The drum baffle includes a plurality of holes defined for communicating with the cavity of the drum baffle and an inner space of the inner drum of the washing machine to allow washing water to flow through. The drum baffle assists laundry to be rolled inside the inner drum, where the drum baffle and the solid particles inside adsorb and absorb soil in the laundry so as to achieve better washing results.
WASHING MACHINE DRUM BAFFLE AND WASHING MACHINE THEREWITH

CROSS-REFERENCE TO RELATED APPLICATIONS


FIELD OF THE INVENTION

[0002] The present invention relates to home appliances, and in particular, to a drum baffle disposed on an inner drum of a washing machine and washing machines having the drum baffle.

BACKGROUND OF THE INVENTION

[0003] The background description provided herein is for the purpose of generally presenting the context of the present invention. The subject matter discussed in the background of the invention section should not be assumed to be prior art merely as a result of its mention in the background of the invention section. Similarly, a problem mentioned in the background of the invention section or associated with the subject matter of the background of the invention section should not be assumed to have been previously recognized in the prior art. The subject matter in the background of the invention section merely represents different approaches, which in and of themselves may also be inventions. Work of the presently named inventors, to the extent it is described in the background of the invention section, as well as aspects of the description that may not otherwise qualify as prior art at the time of filing, are neither expressly nor implicitly admitted as prior art against the present invention.

[0004] Conventional washing machine uses water as a washing medium. Water and detergent are added into the washing machine to wash the laundry, and dirty water is discharged from the washing machine when washing is completed. Additional water may be added into the washing machine to wash or rinse the laundry. Water is discharged again once the washing and rinsing processes are completed. These processes use large amounts of water. The detergents contain many chemical substances harmful to the environment. Not only each washing process takes a long time to complete, but also the washing process consumes large amounts of energy and water.

[0005] Improvements have been made to overcome the disadvantages of the conventional washing machine. Solid particles specially made of polymer materials are used as a washing medium. Soil on laundry is adsorbed and absorbed through friction between the solid particles and the laundry and the soil is removed. More than 80% of water can be saved using such washing method. Moreover, the solid particle washing media can be recycled, and reused. The solid particle washing media have a long service life, will not require replenishment, and are safe and environment-friendly.

[0006] For a front loading drum washing machine using the solid particle washing method, a storage tank for the solid particles is disposed in the washing machine. Before the washing starts, the solid particles are placed into an inner drum of a washing machine from the storage tank. During the washing, the solid particles make full contact with the laundry. When the washing process ends, it may take a long time to separate the laundry from the solid particles, and completely recycle the solid particles back to the storage tank.

[0007] Separating and recycling of the solid particles from the laundry is a difficult and complicated process. Currently, holes for loading the solid particles are formed on an outer drum of a washing machine. The loading holes are connected to the storage tank of the solid particles. When the washing machine starts to recycle the solid particles, an inner drum rotates in a very high speed, and the solid particles are moved from the solid particle loading holes to the storage tank by using a centrifugal force. Usually takes a long time, and even so, it still can’t completely separate the solid particles due to wrapping and intertwining of laundry. If the solid particles are to be dewatered, more solid particles are loaded and recycled. This solid particle recycling process is very complicated and time consuming. Moreover, such a method requires a particle recycling and storage apparatus, and further increases the size, the weight, and manufacturing cost of the washing machine.

[0008] Therefore, a heretofore unaddressed need exists in the art to address the aforementioned deficiencies and inadequacies.

SUMMARY OF THE INVENTION

[0009] One of the objectives of the present invention is to provide a drum baffle and a washing machine having the same, which does not require particle separation, so as to solve the foregoing problems and disadvantages, simplify a laundry process, and shorten laundry washing cycle.

[0010] In one aspect, the present invention relates to a drum baffle for a washing machine. The drum baffle is disposed on an inner wall of an inner drum of the washing machine, and includes a sheath and a bottom plate. The sheath and the bottom plate form a hollow structure having a cavity and a plurality of holes defined thereon. The plurality of holes is adapted to communicate the cavity with an inner space of the inner drum of the washing machine to allow washing water to flow through. The cavity is internally filled with solid particles as a washing medium. In one embodiment, the solid particles are made of one or more polymer adsorption materials.

[0011] In one embodiment, the drum baffle is made by injection molding of one or more polymer adsorption materials that are used as the washing medium.

[0012] In one embodiment, the sheath comprises two end walls, two side walls connected between the two end walls, and a top wall connected between the two end walls and between the two side walls. In one embodiment, the plurality of holes is defined at least on the top wall of the sheath.

[0013] In one embodiment, the bottom plate is detachably or rotateably-openably connected to a bottom of the sheath. In one embodiment, the plurality of holes is defined on the bottom plate.

[0014] In one embodiment, a side edge extends from each of two bottom sides of the drum baffle and includes one or more mounting holes for fastening the drum baffle onto the inner wall of the inner drum of the washing machine.
In one embodiment, the drum baffle further comprises one or more reinforcement bars for strengthening and supporting the drum baffle.

In one embodiment, the drum baffle may also comprise a plurality of protrusions formed outwardly on an outer surface of the sheath, where the plurality of protrusions is integrally formed on the sheath.

In another aspect, the present invention relates to a drum baffle disposed on an inner wall of an inner drum of a washing machine. The drum baffle comprises a structure being made by injection molding of one or more polymer adsorption materials that are used as a washing medium.

In one embodiment, the structure is a hollow structure.

In one embodiment, the hollow structure comprises a sheath having two end walls, two side walls connected between the two end walls, and a top wall connected between the two end walls and between the two side walls. In one embodiment, a plurality of holes is defined at least on the top wall of the sheath for allowing washing water to flow through.

In one embodiment, a side edge extends from each of two bottom sides of the structure and includes one or more mounting holes for fastening the structure onto the inner wall of the inner drum of the washing machine.

In one embodiment, the drum baffle further comprises one or more reinforcement bars disposed inside the hollow structure for strengthening and supporting the drum baffle.

In one embodiment, the drum baffle may also comprise a plurality of protrusions formed outwardly on an outer surface of the structure. In one embodiment, the plurality of protrusions is integrally formed on the structure.

In certain aspects, the present invention relates to a washing machine. The washing machine includes an inner drum having an inner wall; and one or more drum baffles disposed on the inner wall of the inner drum. Each drum baffle is formed as above.

During washing and rinsing processes, separating and recycling the solid particles from the laundry are not required, so that the washing time is shortened, the washing and rinsing processes are simplified, and the water consumption is greatly reduced. Moreover, the washing machine having the drum baffles does not need a particle recycling and storage apparatus so that the structure of the washing machine according to the invention is simple, whereby the overall weight is reduced, and the manufacturing cost is therefore decreased.

These and other aspects of the present invention will become apparent from the following description of the preferred embodiment taken in conjunction with the following drawings, although variations and modifications therein may be affected without departing from the spirit and scope of the novel concepts of the invention.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings illustrate one or more embodiments of the invention and together with the written description, serve to explain the principles of the invention. Wherever possible, the same reference numbers are used throughout the drawings to refer to the same or like elements of an embodiment.

**FIG. 1A** is a partial schematic structural diagram of a front loading drum washing machine according to one embodiment of the present invention.

**FIG. 2** is a front schematic structural view of a drum baffle according to one embodiment of the present invention.

**FIG. 3A** is a rear schematic structural view of the drum baffle according to one embodiment of the present invention.

**FIG. 3B** is a rear schematic structural view of the drum baffle according to another embodiment of the present invention.

**FIG. 4A** is a front schematic structural view of a drum baffle according to one embodiment of the present invention.

**FIG. 4B** is a front schematic structural view of a drum baffle according to another embodiment of the present invention.

**FIG. 5** is a side schematic structural view of a drum baffle according to certain embodiments of the present invention.

**DETAILED DESCRIPTION OF THE INVENTION**

The invention will now be described more fully hereininafter with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like reference numerals refer to like elements throughout.

It will be understood that when an element is referred to as being “on” another element, it can be directly on the other element or intervening elements may be present therebetween. In contrast, when an element is referred to as being “directly on” another element, there are no intervening elements present. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items.

It will be understood that, although the terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another element, component, region, layer or section. Thus, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section without departing from the teachings of the invention.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms “a,” “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises” and/or “comprising,” or “includes” and/or “including” or “has” and/or “having” when used herein, specify the presence of stated features, regions, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, regions, integers, steps, operations, elements, components, and/or groups thereof.
Furthermore, relative terms, such as “lower” or “bottom”, “upper” or “top,” and “front” or “back” may be used herein to describe one element’s relationship to another element as illustrated in the Figures. It will be understood that relative terms are intended to encompass different orientations of the device in addition to the orientation depicted in the Figures. For example, if the device in one of the figures is turned over, elements described as being on the “lower” side of other elements would then be oriented on “upper” sides of the other elements. The exemplary term “lower,” can therefore, encompasses both an orientation of “lower” and “upper,” depending of the particular orientation of the figure. Similarly, if the device in one of the figures is turned over, elements described as “below” or “beneath” other elements would then be oriented “above” the other elements. The exemplary terms “below” or “beneath” can, therefore, encompass both an orientation of above and below.

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and the present disclosure, and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

As used herein, “around”, “about” or “approximately” shall generally mean within 20 percent, preferably within 10 percent, and more preferably within 5 percent of a given value or range. Numerical quantities given herein are approximate, meaning that the term “around”, “about” or “approximately” can be inferred if not expressly stated.

The description will be made as to the embodiments of the invention in conjunction with the accompanying drawings in FIGS. 1-5. In accordance with the purposes of this invention, as embodied and broadly described herein, this invention, in certain aspects, relates to a drum baffle for a washing machine, and washing machines having the drum baffle.

Referring now to FIG. 1A, a partial schematic structural diagram of a washing machine is shown according to one embodiment of the present invention. The washing machine includes a housing (not shown in the FIG. 1A), an outer drum 1, and an inner drum 2. The outer drum 1 is used for holding water and the inner drum 2 is used for washing laundry. The outer drum 1 and an inner drum 2 are disposed in the housing. The outer drum 1 is fixed and does not rotate. The inner drum 2 is disposed inside the outer drum 1, and driven by a driving apparatus to rotate. The inner drum 2 operably rotates around a horizontal axle that is parallel to the ground. A plurality of water supply openings (not shown in FIG. 1A) for supplying washing water to the inner drum 2 is evenly distributed on a drum wall of the inner drum 2. The shape of the water supply openings may include round, square, rectangular, polygonal, or the like.

The washing machine has at least one water inlet (not shown in the FIG. 1A) in an upper part of the outer drum 1 for supplying water into the washing machine for washing and rinsing processes. The washing water enters the outer drum 1 through the water inlet and enters the inner drum 2 through the water supply openings. The washing machine has a water discharge outlet (not shown in the FIG. 1A) in a lower part of the outer drum 1 for discharging waste water.

Further, the washing machine includes a plurality of drum baffles 4 spaced-apart disposed on the inner wall of the inner drum 2. In this exemplary embodiment shown in FIG. 1A, each drum baffle 4 includes a structure being made by injection molding of one or more polymer adsorption materials that are used as a washing medium. In other words, each drum baffle 4 itself is used as the washing medium in this embodiment.

In an embodiment, as shown in FIGS. 1B, for example, each drum baffle 4 has a structure that is a hollow structure. The hollow structure is internally filled with solid particles 3 as the washing medium.

In certain embodiments, each drum baffle 4 includes a sheet 6 and a bottom plate 10. The sheet 6 and the bottom plate 10 are connected to form the hollow structure having the cavity. The cavity is internally filled with solid particles 3 as the washing medium.

In certain embodiments, the drum baffle 4 is made by injection molding of one or more polymer adsorption materials that are also used as the washing medium. The drum baffle 4 also includes a plurality of holes 11 for communicating with the cavity of the drum baffle 4 and an inner space of an inner drum 2 of the washing machine to allow washing water to flow through.

In certain embodiments, a number of drum baffles 4 are space-evenly disposed on the inner wall of the inner drum 2 along a circumferential direction of the inner wall of the inner drum 2. The drum baffles 4 are disposed parallel to an axial direction of the inner drum 2. Each drum baffle 4 is formed of a hollow structure by injection molding of one or more polymer adsorption materials as the washing medium. In addition, each drum baffle 4 has a cavity filled with high molecular polymer washing particles 3. The high molecular polymer washing particles 3 (or solid particles 3) are also used as the washing medium.

In certain embodiments, the high molecular polymer washing particles 3 is formed of a material including polypropylene (PP), polyethylene (PE), polystyrene (PS), polyvinyl chloride (PVC), ethylene vinyl acetate (EVA), or the like. In other embodiments, the high molecular polymer washing particles are formed of a material that is a mixture of more than one foregoing materials. The material contains hydrophilic and lipophilic ingredients and further contains an ingredient of a surfactant, and has a strong capability of adsorbing soil. When used in a process of contacting with laundry 5 and water, these solid particles 3 have the abilities of adsorbing soil and removing stains. In certain embodiments, the solid particles 3 are made of one or more polymer adsorption materials.

The more drum baffles 4 the washing machine has, the higher the drum baffles 4 are, the larger the contact area of the drum baffles 4 is between the solid particles 3, the water and the laundry 5, and the more adsorption. On the other hand, if one has more and higher drum baffles 4, these drum baffles 4 take precious space inside the inner drum 2, and it has smaller effective volume of the inner drum 2 of the washing machine. However, if one has very small number of the drum baffles 4, the ability to adsorb soil from the laundry 5 dramatically reduced. Therefore, in certain embodiments, three to five drum baffles 4 may be used. In this exemplary embodiments shown in FIGS. 1A and 2D, five drum baffles 4 are disposed inside the inner drum 2.

Referring now to FIGS. 2A, 3A and 3B, a front view and two rear views of a drum baffle 4 are shown, respectively,
according to certain embodiments of the present invention. The drum baffle 4 includes a sheath 6 on the top and a bottom plate 10 at the bottom. The sheath 6 is formed by two side walls 7, two end walls 8, and a top wall 9. The two side walls 7, the two end walls 8, the top wall 9, and the bottom plate 10 jointly form a hollow structure of the drum baffle 4, thereby defining a cavity therein. The high molecular polymer washing particles, or solid particles 3 are enclosed in the cavity of the drum baffle 4. The drum baffles 4 and the solid particles 3 are detachable as a whole making daily maintenance easier and more convenient. The transitions among the side walls 7, the end walls 8, and the top wall 9 are seamless and smooth. The two side walls 7 use an arc design, forming a streamlined shape. The two side walls 7 have a centrosymmetric structure. Such a design makes rolling of the laundry 5 in the inner drum 2 much easier and gentler, and improves the washing efficiency.

In certain embodiments, a large number of water holes 11 are disposed on the top wall 9 of the sheath 6, as shown in FIG. 3, and on the bottom plate 10, so that the washing water can freely flow through the inner drum 2 and the drum baffle 4. The water holes 11 have a diameter that is less than the smallest diameter of the solid particles 3 such that the solid particles 3 are retained inside the cavity during the washing and rinsing processes, and washing water can flow through freely. The bottom plate 10 is of a flat plate structure, the inner wall of the inner drum 2 is of an arc structure, and a certain gap exists between the bottom plate 10 and the inner wall of the inner drum 2. Such a gap facilitates the flow of the washing water, and drainage of the washing water. In one embodiment, the bottom plate 10 is detachably connected to a bottom of the sheath 6 in an open manner. In another embodiment, the bottom plate 10 is rotatable-openably connected to a bottom of the sheath 6.

As shown in FIG. 3B, certain reinforcement bars 15 are disposed inside each of the drum baffles 4 for supporting the side walls 7, the end walls 8, and the top wall 9. The reinforcement bars 15 are disposed in a crisscross manner in the drum baffle 4, to enhance the overall strength of the drum baffle 4.

In certain embodiments, also as shown in FIGS. 2, 3A, and 3B, a side edge 13 extends on each side of the drum baffle 4 from the bottom of the two side walls 7 of the sheath 6. The side edge 13 is used to mount the drum baffle 4 onto the inner wall of the inner drum 2. The drum baffle 4 includes two mounting holes 14 on each side edge 13. A fastener such as a screw is used to mount the drum baffle 4 onto the inner wall of the inner drum 2 pass through the mounting hole 14. Such a structure allows the drum baffle 4 to be removed, replaced, and cleaned.

In the washing or rinsing process, the washing water and laundry 5 in the inner drum 2 continuously contact with the drum baffle 4 and perform adsorption. The washing water in the inner drum 2 also flows through the water holes 11 to enter the drum baffle 4, so that the washing water makes contact with the solid particles 3 in the drum baffle 4. The polymer material used to manufacture the drum baffle 4 and the solid particles 3 adsorb and absorb the soil on the laundry 5, and purify the washing water by adsorbing and absorbing the soil from the washing water. The washing water after adsorption by the solid particles 3 is then discharged from the drum baffle 4 by passing through the water holes 11, thereby effectively improving the purity of the washing water or rinsing water in a process in which the washing water or the rinsing water contacts with the laundry 5, and greatly improving the washing efficiency. In addition, replenishing and recycling solid particles 3 are not necessary, washing cycle is shortened, and large quantity of washing water is saved.

Referring back to FIG. 1B, when the drum baffle 4 is at position A, the washing water in the inner drum 2 passes through the water holes 11 to enter the drum baffle 4, and the solid particles 3 are immersed in the washing water. As the inner drum 2 rotates, when the drum baffle 4 rotates to a position B, the solid particles 3 may store a part of the washing water, and the solid particles 3 absorb soil. When the drum baffle 4 continues to rotate to a position C, purer washing water after adsorption flows through the water holes 11 on the top wall 9 and the bottom plate 10 to flow back to the laundry 5 to be washed, and this process is repeated, as the inner drum 2 rotates.

Recycling of the polymer adsorption material effectively improves the purity of the washing water or the rinsing water in the process as the washing water or the rinsing water makes direct contact with the laundry 5, and greatly improves the laundry cleaning efficiency. Moreover, because the solid particles 3 are always remained in the drum baffles 4, replenishing and recycling solid particles 3 are not necessary, washing cycle is shortened, and large quantity of washing water is saved. In addition, in the process of washing and rinsing, the laundry 5 and the solid particles 3 are always separated, which effectively solves the problem of separating the solid particles 3 from the laundry 5, and further shortens the washing cycle.

When the laundry 5 is washed and rinsed, the laundry 5 is dewatered through a dewatering process. In the dewatering process, the inner drum 2 rotates at a high speed, and drives the drum baffle 4 and the solid particles 3 in the drum baffle 4 rotate at the same high speed to discharge soil attached to surfaces of the drum baffle 4 and the solid particles 3 out of the washing machine with the washing water through the high-speed centrifugal force and to recover the adsorption capability of the polymer material of the drum baffle 4 and the solid particles 3. This recovery process is very simple, straightforward and convenient.

The water holes 11 are only disposed on the top wall 9 and the bottom plate 10 of the drum baffles 4. This design not only simplifies the washing process and reduces processing difficulties, but also appropriately increases a time period when the washing water remains in the drum baffles 4, facilitates contact of the solid particles 3 and the drum baffles 4 with the washing water, and makes the solid particles 3 adsorb soil in the water better and more efficiently.

In order to maintain high cleaning efficiency, once the solid particles 3 are used for a period of time, the solid particles 3 need to be removed from the drum baffles 4, and either to be replaced or to be cleaned. In order to replace the solid particles 3, the bottom plate 10 are made to be of a detachable structure. In one embodiment, the bottom plate 10 is fixed and connected to the bottom of the sheath 6 using one or more screws. In another embodiment, the bottom plate 10 is fixed and connected to the bottom of the sheath 6 through one or more clamps. Alternatively, in one embodiment, a side edge 13 of the bottom plate 10 is connected to the bottom of the sheath 6 using a hinge, and the bottom plate 10 may be rotated to open the drum baffle 4 on one side. In another embodiment, the other side is fixed to and connected to the sheath 6 through a clamp.
The following describes in detail a washing method using the foregoing drum washing machine with reference to FIG. 1. In certain embodiments, the washing method includes the following steps:

Step 1: placing soiled laundry to be washed into the inner drum of the washing machine, turning on the water inlet on the upper part of the outer drum, and injecting water into the outer drum. The washing water and detergent are mixed and the mixture of the washing water and the detergent enters the outer drum, and flows through the water holes into the inner drum. Then the mixture of the washing water and the detergent are fully mixed in the inner drum with the laundry. In this process, only a proper amount of water and detergent need to be added and the laundry is fully immersed by the water.

Once the washing water immerses the laundry, the laundry should stay in the water to be soaked for a certain period of time, so that the washing water and the laundry are fully soaked to achieve better washing results.

Step 2: driving the inner drum to rotate by using a driving apparatus. In certain embodiments, the inner drum rotates clockwise a certain period of time, stops, and rotates counterclockwise for a certain period of time. The drum baffles on the inner wall of the inner drum circulate in the same manner as the inner drum rotates. The laundry continuously rolls in the inner drum through the actions of the drum baffles. Meanwhile, the drum baffle and the solid particles with adsorption performance continuously absorb soil from the laundry and the washing water.

When the drum baffle is at position A, the washing water in the inner drum flows through the water holes to enter the drum baffle at position A, and the solid particles inside the cavity of the drum baffle are immersed in the washing water. As the inner drum rotates and reaches position B, the solid particles retain a portion of the washing water such that the solid particles continue to absorb soil from the washing water. When the drum baffle rotates to position C, the washing water after adsorption flows through the water holes on the top wall and the bottom plate, back to the laundry in the inner drum.

In one embodiment, an optimal result can be achieved when a rotating speed of the inner drum is between 100-200 rotations per minute (r/min).

Step 3: discharging the washing water after the washing cycle is completed through a water discharge outlet (not shown in FIG. 1) on the lower part of the outer drum.

Step 4: rotating the inner drum at a high speed to take the excessive water out of the laundry (dewatering) and the drum baffle in the inner drum, to recover the adsorption capability of the solid particles used to manufacture the drum baffle and the solid particles, to collect and store the washing water in the inner drum, and to discharge the washing water from the water discharge outlet on the lower part of the outer drum.

In this step, the inner drum rotates at a rotating speed in a range of about 100 to 1000 r/min. The dewatering rotation speed of the inner drum is generally higher than the rotation speed of the inner drum during the washing cycle.

Step 5: injecting a proper amount of clean water into the outer drum through the water inlet again to rinse the laundry once the soiled washing water is drained through the water discharge outlet. After this rinsing, the foregoing dewatering process is repeated to remove the excessive washing water from the laundry. The cleaned laundry is taken out of the washing machine for drying after the rinsing and dewatering processes.

In certain embodiments, as shown in FIGS. 4B and 5, the drum baffle includes a plurality of protrusions on an outer surface of the sheath. The protrusions are evenly distributed on outer surfaces of the side walls, the end walls, and the side edges of the drum baffle. The plurality of protrusions is made of an integrally formed structure. The plurality of protrusions is also made of one or more of the foregoing polymer materials. The protrusions may take the shapes of a semi-circular, semi-elliptical, or similar.

The projections not only enlarge the contact area of the polymer material with adsorption performance and laundry with water, but also increase the friction between the protrusions and the laundry such that soil on the laundry is removed easily. The addition of the plurality of protrusions improves the adsorption performance of the drum baffle and achieves better washing results.

In another aspect, the present invention relates to a washing machine. In certain embodiments, the washing machine has one or more drum baffles disposed on an inner wall of an inner drum of the washing machine. Each of the drum baffles has a sheath and a bottom plate. The sheath and the bottom plate are connected to form a hollow structure having a cavity. The drum baffle is made by injection molding of one or more polymer adsorption materials, which itself is used as a washing medium. In addition, the cavity of the drum baffle is internally filled with solid particles as the washing medium. The drum baffle also includes a plurality of holes for communicating with the cavity of the drum baffle and an inner space of an inner drum of the washing machine to allow washing water to flow through.

In certain embodiments, one or more drum baffles are disposed on an inner wall of the inner drum of the washing machine. The sheath of the drum baffle has two side walls, two end walls, and a top wall. The water holes are disposed at least on the top wall of the sheath. The water holes may also be disposed on the bottom plate of the drum baffle. In one embodiment, the bottom plate is detachably connected to a bottom of the sheath in an opened manner. In another embodiment, the bottom plate is rotatably-openably connected to a bottom of the sheath.

In certain embodiments, the drum baffle further has one or more reinforcement bars for strengthening and supporting the drum baffle. A side edge extends from each bottom side of the drum baffle. The side edge includes one or more mounting holes for fastening the drum baffle onto the inner wall of the inner drum of the washing machine. The drum baffle further includes a plurality of protrusions on an outer surface of the sheath of the drum baffle. These protrusions may be integrally formed on the sheath.

In certain embodiments, the solid particles are made of one or more polymer adsorption materials, used as the washing medium.

According to the invention, the washing machine having the drum baffles does not need a particle recycling and storage apparatus. Thus, the structure of the washing machine is simple; the overall weight is reduced; and the manufacturing cost is decreased. Further, during washing and rinsing
processes, separating and recycling the solid particles from the laundry are not required, so that the washing time is shortened, the washing and rinsing processes are simplified, and the water consumption is greatly reduced.

The foregoing description of the exemplary embodiments of the invention has been presented only for the purposes of illustration and description and is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many modifications and variations are possible in light of the above teaching. Although not explicitly described in the present invention, other embodiments within the scope of the invention and defined by the claims may be obtained by combining, modifying or changing the exemplary embodiments as described in the present invention.

The exemplary embodiments were chosen and described in order to explain the principles of the invention and their practical application so as to activate others skilled in the art to utilize the invention and various exemplary embodiments and with various modifications as are suited to the particular use contemplated. Alternative embodiments will become apparent to those skilled in the art to which the invention pertains without departing from its spirit and scope.

Accordingly, the scope of the invention is defined by the appended claims rather than the foregoing description and the exemplary embodiments described therein.

What is claimed is:

1. A drum baffle disposed on an inner wall of an inner drum of a washing machine, comprising:
   - a sheath; and
   - a bottom plate,
   wherein the sheath and the bottom plate form a hollow structure having a cavity and a plurality of holes defined therein, the cavity is internally filled with solid particles as a washing medium, and the plurality of holes is adapted to communicate the cavity with an inner space of the inner drum of the washing machine to allow washing water to flow through.

2. The drum baffle according to claim 1, being made by injection molding of one or more polymer adsorption materials that are used as the washing medium.

3. The drum baffle according to claim 1, wherein the sheath comprises two end walls, two side walls connected between the two end walls, and a top wall connected between the two end walls and between the two side walls.

4. The drum baffle according to claim 3, wherein the plurality of holes is defined at least on the top wall of the sheath.

5. The drum baffle according to claim 3, wherein the bottom plate is detachably or rotatable-openably connected to a bottom of the sheath.

6. The drum baffle according to claim 1, wherein the plurality of holes is defined on the bottom plate.

7. The drum baffle according to claim 1, further comprising one or more reinforcement bars for strengthening and supporting the drum baffle.

8. The drum baffle according to claim 1, wherein a side edge extends from each of two bottom sides of the drum baffle and includes one or more mounting holes for fastening the drum baffle onto the inner wall of the inner drum of the washing machine.

9. The drum baffle according to claim 1, further comprising a plurality of protrusions formed outwardly on an outer surface of the sheath, wherein the plurality of protrusions is integrally formed on the sheath.

10. The drum baffle according to claim 1, wherein the solid particles are made of one or more polymer adsorption materials.

11. A washing machine, comprising:
   - an inner drum having an inner wall; and
   - one or more drum baffles disposed on the inner wall of the inner drum, each drum baffle being recited in claim 1.

12. A drum baffle disposed on an inner wall of an inner drum of a washing machine, comprising:
   - a structure being made by injection molding of one or more polymer adsorption materials that are used as a washing medium.

13. The drum baffle according to claim 12, wherein the structure is a hollow structure.

14. The drum baffle according to claim 13, wherein the hollow structure comprises a sheath having two end walls, two side walls connected between the two end walls, and a top wall connected between the two end walls and between the two side walls.

15. The drum baffle according to claim 14, wherein a plurality of holes is defined at least on the top wall of the sheath for allowing washing water to flow through.

16. The drum baffle according to claim 13, further comprising one or more reinforcement bars disposed inside the hollow structure for strengthening and supporting the drum baffle.

17. The drum baffle according to claim 12, wherein a side edge extends from each of two bottom sides of the structure and includes one or more mounting holes for fastening the structure onto the inner wall of the inner drum of the washing machine.

18. The drum baffle according to claim 12, further comprising a plurality of protrusions formed outwardly on an outer surface of the structure.

19. The drum baffle according to claim 18, wherein the plurality of protrusions is integrally formed on the structure.

20. A washing machine, comprising:
   - an inner drum having an inner wall; and
   - one or more drum baffles disposed on the inner wall of the inner drum, each drum baffle being recited in claim 12.

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