A washing machine, which removes offensive odor from laundry without a need to operate wash, rinse and/or dehy-
dration modes, and a method of deodorizing laundry. The washing machine includes a deodorizing tub, into which objects to be deodorized are placed, a duct to communicate with the deodorizing tub and to serve as a passage through which air containing odor particles, which are separated from the objects in the deodorizing tub, passes, and a deodorizing agent spray device to spray a deodorizing agent to separate the odor particles from the air passing through the duct. The method of deodorizing includes the separating odor particles from objects to be deodorized, and removing the separated odor particles by dissolving the separated odor particles in water and then discharging the particles.
WASHING MACHINE AND DEODORIZING METHOD THEREOF

CROSS-REFERENCE TO RELATED APPLICATION


BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a washing machine and a method of deodorizing clothes in the washing machine, and, more particularly, to a deodorizing structure of a washing machine, by which particles that generate offensive odors, such as the smell of food or tobacco, and that permeate clothes are removed without an additional washing operation, as well as a method of deodorizing clothes in the washing machine.

[0004] 2. Description of the Related Art

[0005] A drum-type washing machine obtains washing power by force generated by the free falling of laundry in a rotating drum, and has a long washing time but reduces damage to the laundry and water consumption compared to a conventional pulsator-type washing machine. As a result, drum-type washing machines are increasingly being used now.

[0006] Such a drum-type washing machine has various modes such as wash, rinse, dehydration and dry, and is constructed such that the above modes are selectively combined. In cases in which the conventional washing machine is used to remove offensive odors, such as the smell of food or tobacco, from laundry, the laundry must be washed, thereby causing waste of electricity and water and requiring a long time to wash the laundry.

SUMMARY OF THE INVENTION

[0007] Therefore, an aspect of the invention provides a washing machine, which removes offensive odor from laundry without a need to operate wash, rinse and/or dehydration modes, and a deodorizing method thereof.

[0008] In accordance with one aspect, the present invention provides a washing machine comprising: a deodorizing tub, into which objects to be deodorized are put; a duct to communicate with the deodorizing tub and to serve as a passage of air that contains odor particles that have been separated from the objects in the deodorizing tub; and a deodorizing agent sprayer to spray a deodorizing agent so as to separate the odor particles from the air passing through the duct.

[0009] The deodorizing agent spray device may include a deodorizing agent nozzle to spray the deodorizing agent in a mist form. The washing machine may further comprise an air blast fan to generate power so as to circulate the air in the deodorizing tub into the duct; and a heater to heat the air circulated into the duct. The duct may include a deodorizing duct, in which the deodorizing nozzle is installed, and a blowing duct, in which the air blast fan and the heater are installed. The washing machine may further comprise a water feed nozzle to supply water in mist form to the objects contained in the deodorizing tub.

[0010] In accordance with another aspect, the present invention provides a method of deodorizing clothes in a washing machine comprising: separating odor particles from objects to be deodorized; and removing the separated odor particles by dissolving the separated odor particles in water and then discharging the particles.

[0011] The separating may be achieved by one of supplying hot draft to the objects to be deodorized, applying mechanical impact to the objects to be deodorized, or dissolving the odor particles in moisture in mist form supplied to the objects to be deodorized.

[0012] In the removing, air containing the separated odor particles in a drum may be circulated into a deodorizing duct, and a deodorizing agent nozzle may be operated to spray a deodorizing agent into the deodorizing duct when the air contaminated by the odor particles is circulated into the deodorizing duct.

[0013] The deodorizing method may further comprise circulating the purified air, in the deodorizing duct, that is obtained by separating the odor particles therefrom again into the drum.

[0014] In yet another aspect of the invention, the deodorizing agent containing the separated odor particles may be discharged to the outside of the washing machine through a drain pipe. Lastly, water may be used as the deodorizing agent.

[0015] Additional and/or other aspects and advantages of the invention will be set forth in part in the description which follows, in part, will be obvious from the description, or may be learned by practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0017] FIG. 1 is a perspective view of a washing machine in accordance with an embodiment of the present invention;

[0018] FIG. 2 is a longitudinal-sectional view of the washing machine of FIG. 1; and

[0019] FIG. 3 is a schematic view illustrating a deodorizing operation of the washing machine of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below to explain the present invention by referring to the figures.

[0021] As shown in FIGS. 1 and 2, a washing machine of the present invention comprises a housing 10 to define an external appearance of the washing machine, a door 11, installed on a front surface of the housing 10, which opens
and closes the front surface of the housing 10 so that laundry to be deodorized may be placed into the washing machine therethrough, and an operating unit 12 installed on the front surface of the housing 10 above the door 11 to manipulate the operation of the washing machine.

[0022] A cylindrical drum 20 provided with a top surface that is opened toward the door 11 is placed in the housing 10. The drum 20 serves as a deodorizing tub during a deodorizing process, and has a double structure including a fixed tub 21 and a rotary tub 22. Here, the rotary tub 22 is rotatably installed in the fixed tub 21, and is operated by a driving motor 41 installed on a rear surface of the fixed tub 21. The rotary tub 22 includes a plurality of through holes 22a formed through side and rear surfaces thereof so that the rotary tub 22 communicates with the fixed tub 21 through the through holes 22a, and a plurality of lifter 22b installed on the inner circumference thereof in a longitudinal direction to lift the laundry.

[0023] A water feed pipe 44 to supply water to the inside of the drum 20 is installed above the upper surface of the fixed tub 21. One end of the water feed pipe 44 is connected to the rear surface of the housing 10 to receive water supplied from an external water supply source (not shown), and the other end of the water feed pipe 44 is connected to a detergent container 45 installed in the front surface of the housing 10. A water feed nozzle 46, to spray water to the inside of the rotary tub 22 to supply water having passed through the detergent container 45 to the inside of the drum 20, is connected to the detergent container 45. A drain pipe 42 and a drain pump 43, to discharge the used water to the outside, are installed on the lower part of the fixed tub 21.

[0024] A duct 30 to take air from the inside of the drum 20 and then re-circulate the air into the drum 20 is formed on the outer circumference of the fixed tub 21. The duct 30 is divided into a deodorizing duct 31, which is installed on the rear surface of the fixed tub 21 in a longitudinal direction and communicates with a lower part of the rear surface of the fixed tub 21, and a blowing duct 32, which communicates with the upper end of the deodorizing duct 31, extends along the upper surface of the fixed tub 21, and then communicates with the inside of the drum 20 at the upper part of the front surface of the fixed tub 21.

[0025] A deodorizing agent nozzle 31a, to spray a deodorizing agent in mist form so as to remove particles of offensive odor in air that pass through the deodorizing duct 31, is connected to the deodorizing duct 31. A conventional washing machine that provides a dehydration mode comprises a condensing duct, to condense water in air of high temperature and high humidity emitted from the drum 20 in the dehydration mode, installed on a rear surface of a fixed tub, and a condensation water nozzle to spray water to the air passing through the condensing duct. In an embodiment of the present invention, however, the present invention does not additionally comprise the deodorizing duct 31 and the deodorizing agent nozzle 31a, but may use the conventional condensing duct and condensation water nozzle as the deodorizing duct 31 and deodorizing agent nozzle 31a. As a result, the present invention may produce a deodorizing effect on clothes without any additional element.

[0026] The blowing duct 32 is provided with an air blast fan 32a to generate power so as to circulate air to the insides of the drum 20 and the duct 30, and a heater 32b to heat the air that is introduced into the drum 20.

[0027] A deodorizing method of the washing machine of the present invention will be described with reference to FIG. 3 below.

[0028] Schematically, particles generating offensive odor, such as the smell of food, tobacco, etc., are first separated from objects that are permeated by the offensive odor. Then, the separated odor particles, together with air in the drum 20, are circulated into the deodorizing duct 31 and dissolved in the deodorizing agent. Thereafter, the deodorizing agent containing the odor particles dissolved therein is discharged to the outside of the washing machine.

[0029] Methods to separate the odor particles from the objects to be deodorized are as follows. A first method involves applying mechanical impacts to the objects to be deodorized. According to the first method, when the rotary tub 22 containing the objects is rotated, the odor particles are separated from the objects by mechanical impact, such as frictional force between the objects or between the objects and the rotary tub 22 and impact generated by the falling of the objects in the rotary tub 22. A second method is that heat is applied to the objects to be deodorized. According to the second method, when the heater 32b is operated in conjunction with the operation of the air blast fan 32b, hot draft heated by the heater 32b is supplied to the inside of the drum 20. The hot draft contacts the objects to be deodorized, and induces movement of the odor particles stuck to the objects, so as to separate the odor particles from the objects. A third method is that odor particles permeating the objects to be deodorized are dissolved in water. According to the third method, when a small quantity of water in mist form is supplied to the inside of the drum 20 through the water feed nozzle 46, the odor particles stuck to the objects are dissolved in water and then are vaporized together with the water, whereby being separated from the objects. Combinations of one, two, or all three of the above three methods may be selectively used or combined so as to improve the deodorizing effect. Since the odor particles permeating the objects to be deodorized have different adhesive strengths to the objects based on the type of odor particle, in an embodiment of the invention, the above methods are suitably combined based on the adhesive strengths of the odor particles to the objects.

[0030] The odor particles separated from the objects by the above methods float in the drum 20. In order to prevent the separated odor particles from being re-adhered to the objects, the separated odor particles are discharged to the outside of the drum 20.

[0031] For this reason, when the air blast fan 32a is operated, air containing the odor particles in the drum 20 is circulated into the duct 30. Here, the deodorizing agent nozzle 31a is operated to spray the deodorizing agent into the deodorizing duct 31. Then, the air ascending along the deodorizing duct 31 is mixed with the deodorizing agent and causes friction with the deodorizing agent, so as to allow the odor particles floating in the air to be dissolved in the deodorizing agent. Conventionally known liquid deodorizing agents may be used as the deodorizing agent. In this case, the washing machine requires an additional device to supply the deodorizing agent to the deodorizing agent nozzle 31a.

[0032] However, according to another embodiment of the present invention, water is used as the deodorizing agent,
and the water that is supplied from a conventional water feed device may be sprayed into the deodorizing duct 31 through the deodorizing agent nozzle 31a without any deodorizing agent supply device. Generally, water is a comparatively effective solvent. For example, 53.5 g of ammonia gas may be dissolved in 100 g of water at room temperature. The odor particles in the air are dissolved in water, and are thus separated from the air. The water containing the odor particles is discharged to the outside of the washing machine through the drain pipe 42 and the drain pump 43.

[0033] Although the separation of the odor particles from the objects to be deodorized and the removal of the separated odor particles using the deodorizing agent were sequentially described in the above deodorizing process for convenience, the two operations may be substantially performed simultaneously.

[0034] As is apparent from the above description, the present invention provides a washing machine, which removes particles of offensive odor from objects to be deodorized without a need to operate wash, rinse and/or dehydration modes, and a method of deodorizing clothes, to reduce electricity and water consumption.

[0035] Further, the washing machine and the deodorizing method of the present invention prevent the deformation of laundry generated by the washing.

[0036] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

What is claimed is:

1. A washing machine, comprising:
   a deodorizing tub, into which objects to be deodorized are placed;
   a duct to communicate with the deodorizing tub and to serve as a passage through which air containing odor particles, which are separated from the objects in the deodorizing tub, passes; and
   a deodorizing agent sprayer to spray a deodorizing agent to separate the odor particles from the air passing through the duct.

2. The washing machine according to claim 1, wherein the deodorizing agent sprayer includes a deodorizing agent nozzle to spray the deodorizing agent in mist form.

3. The washing machine according to claim 2, further comprising:
   an air blast fan to generate power so as to circulate the air in the deodorizing tub into the duct; and
   a heater to heat the air circulated into the duct.

4. The washing machine according to claim 3, wherein the duct comprises:
   a deodorizing duct, in which the deodorizing nozzle is installed; and
   a blowing duct, in which the air blast fan and the heater are installed.

5. The washing machine according to claim 3, further comprising a water feed nozzle to supply water in mist form to the objects contained in the deodorizing tub.

6. A method of deodorizing objects in a washing machine comprising:
   separating odor particles from the objects to be deodorized; and
   removing the separated odor particles by dissolving the separated odor particles in water and then discharging the particles.

7. The method according to claim 6, wherein the separating comprises at least one of supplying a hot draft to the objects to be deodorized, applying mechanical impacts to the objects to be deodorized, or dissolving the odor particles in moisture that is supplied to the objects to be deodorized in a mist.

8. The method according to claim 6, wherein in the removing, air containing the separated odor particles in a drum is circulated into a deodorizing duct, and a deodorizing agent nozzle is operated to spray a deodorizing agent into the deodorizing duct when the air contaminated by the odor particles is circulated into the deodorizing duct.

9. The method according to claim 8, further comprising circulating purified air, which is obtained by separating the odor particles therefrom, in the deodorizing duct and again back into the drum.

10. The method according to claim 9, wherein the deodorizing agent containing the separated odor particles is discharged to the outside of the washing machine through a drain pipe.

11. The method according to claim 10, wherein water is used as the deodorizing agent.

12. A washing machine, including a deodorizing tub having a fixed tub and a rotary tub into which objects to be deodorized are placed, comprising:
   a duct to communicate with the fixed tub through which air containing odor particles, which are separated from the objects in the deodorizing tub, passes; and
   a deodorizing agent sprayer to spray a deodorizing agent to separate the odor particles from the air passing through the duct.

13. The washing machine according to claim 12, wherein the duct comprises a deodorizing duct having upper and lower ends, in which the deodorizing nozzle is installed, the deodorizing duct being installed on a rear surface of the fixed tub in a longitudinal direction so as to communicate at a lower end thereof with a lower part of the rear surface of the fixed tub.

14. The washing machine according to claim 13, wherein the duct further comprises a blowing duct, in which the fan and the heater are installed, to communicate with an upper end of the deodorizing duct, to extend along an upper surface of the fixed tub, and to communicate with an interior of the deodorizing tub at an upper part of a front surface thereof.

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