

WASHING MACHINE

BACKGROUND

1. Technical Field

5 [0001] The present disclosure relates to a washing machine including a lid disposed for an opening through which the laundry is put in and taken out.

2. Description of the Related Art

[0002] Patent Literature 1 discloses a washing machine configured to prevent a loud
10 impulsive sound from being made when a lid is closed. The washing machine includes, in the upper part thereof: a laundry-inlet-and-outlet opening; a lid having an end portion pivotally supported on a periphery portion of the laundry-inlet-and-outlet opening to be rotatable in the vertical direction and configured to open and close the laundry-inlet-and-outlet opening by the rotation; and a buffer member disposed around the entire periphery
15 of a bottom face of the lid configured to come into contact with the periphery of the laundry-inlet-and-outlet opening when the lid is closed.

Citation List

[0003] Patent Literature 1: Japanese Unexamined Patent Application Publication No.
20 2000-167290

SUMMARY

[0004] The present disclosure provides a washing machine capable of substantially preventing a loss of appearance quality in a contact unit of a main body even when a buffer
25 member of a lid is in contact with the main body for relatively long hours and thereby the lid adheres to the contact unit of the main body.

[0005] The washing machine according to the present disclosure includes: a main body including an opening allowing the laundry to be put in and taken out therethrough; and a lid configured to open and close the opening. The lid is pivotally supported by the main
30 body and includes a buffer member configured to absorb an impact caused when the lid is closed and comes into contact with the main body. A contact unit of the main body with which the buffer member comes into contact has the shape of a projection so that an area of contact between the contact unit and the buffer member is smaller than an area of contact obtained when the buffer member comes into contact with a flat face of the main

body.

[0006] The washing machine according to the present disclosure is capable of substantially preventing a loss of appearance quality in the contact unit of the main body even when the buffer member of the lid is in contact with the main body for relatively long

5 hours and thereby adheres to the contact unit of the main body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is a perspective view of the appearance of a washing machine in Embodiment 1 in a state in which a lid of the washing machine is closed.

10 FIG. 2 is a perspective view of the appearance of the washing machine in Embodiment 1 in a state in which the lid of the washing machine is open.

FIG. 3 is a perspective view of a buffer member of the lid of the washing machine in Embodiment 1.

15 FIG. 4A is a vertical cross-sectional view of a first example of a contact unit provided in an upper frame of the washing machine in Embodiment 1.

FIG. 4B is a vertical cross-sectional view of a second example of the contact unit provided in the upper frame of the washing machine in Embodiment 1.

FIG. 5 is a perspective view of the contact unit provided in the upper frame of the washing machine in Embodiment 1.

20 FIG. 6 is a principal part cross-sectional view illustrating a state in which the lid of the washing machine in Embodiment 1 is closed.

DETAILED DESCRIPTIONS

[0008] (Underlying Knowledge Forming Basis of the Present Disclosure)

25 At the time when the inventors came up with the present disclosure, a state had arisen in which, due to relatively long hours of contact between an elastic buffer member mounted on a lid and an upper frame, the buffer member began to melt with heat or the like or the buffer member and the upper frame rubbed against each other, whereby the buffer member adhered to a contact unit of the upper frame. Furthermore, in particular, in

30 the case where the upper frame and the buffer member were different in color, color staining stood out to cause a loss of appearance quality. Then, a measure in which the upper frame and the buffer member were similarly colored can be devised, but, the upper frame and the buffer member are different in material, that is, the buffer member is formed of rubber meanwhile the upper frame is formed of resin, and therefore, because of a

difference in the level of light reflection or the like, a user mistakenly believes that some foreign substances adhere, which results in a loss of appearance quality. Alternatively, it can be devised so that the buffer member and the upper frame are formed of a material with high abrasion resistance or a material with deterioration resistance, but, both the materials causes a considerable increase in cost. Therefore, the inventors found a problem of how to substantially prevent a loss of appearance quality in the contact unit of the top frame even when the buffer member adheres to the upper frame. To solve the problem, the inventors accomplished configurations about the subject matters of the present disclosure.

[0009] Therefore, the present disclosure provides a washing machine having a smaller area of contact between a buffer member and a contact unit of an upper frame and thereby being capable of substantially preventing a loss of appearance quality. In the case where the buffer member and the contact unit of the upper frame are different in color, the washing machine according to the present disclosure makes color staining inconspicuous to substantially prevent loss of appearance quality. Furthermore, in the case where the buffer member and the contact unit of the upper frame are similarly colored, the washing machine according to the present disclosure makes inconspicuous the adhesion of a foreign substance to the contact unit of the upper frame to substantially prevent a loss of appearance quality.

[0010] Hereinafter, an embodiment will be described in detail with reference to the drawings. Descriptions that are more detailed than necessary may, however, be omitted. For example, detailed descriptions on already well-known matters and overlapping descriptions on substantially the same configurations may be omitted. This is for avoiding unnecessary redundancy of the following descriptions and facilitating understanding by those skilled in the art.

[0011] Note that the accompanying drawings and the following descriptions are provided to help those skilled in the art fully understand the present disclosure, and do not intend to restrict the subject matters of the present disclosure.

[0012] (Embodiment 1)

Hereinafter, Embodiment 1 will be described using FIG. 1 to FIG. 6.

[0013] [1-1. Configuration]

[1-1-1. Configuration of Washing Machine]

First, the configuration of washing machine 10 according to Embodiment 1 will be described using FIG. 1 and FIG. 2. FIG. 1 is a perspective view of the appearance of washing machine 10 in a state in which lid 5 of washing machine 10 is closed. FIG. 2 is a

perspective view of the appearance of washing machine 10 in a state in which lid 5 of washing machine 10 is opened.

[0014] Note that, hereinafter, in a state in which washing machine 10 is installed as illustrated in FIG. 1, a side closer to contact unit 8 (see FIG. 2) may be sometimes referred to as the front side, and a side closer to operation display 4 may be sometimes referred to as a rear side. Furthermore, a vertical direction in a state in which washing machine 10 is installed as illustrated in FIG. 1 may be sometimes referred to as top-and-bottom direction.

[0015] As illustrated in FIG. 1 and FIG. 2, washing machine 10 includes main body 1 and lid 5. In washing machine 10, washing tub 3 configured to be loaded with the laundry such as clothes is provided inside main body 1. In the upper part of main body 1, upper frame 2 is provided as a part of main body 1. In upper frame 2, opening 2a allowing the laundry to be put in and taken out therethrough is formed so as to correspond to an opening of washing machine tub 3, and lid 5 configured to cover opening 2a is disposed. In other words, main body 1 includes opening 2a allowing the laundry to be put in and taken out therethrough, and lid 5 is configured to open and closes opening 2a. Operation display 4 is disposed behind lid 5. A controller (not illustrated) configured to control the operation of washing machine 10 is accommodated in operation display 4. Note that the controller includes a computer system including a processor and a memory. When the processor executes a program stored in the memory, the computer system functions as a controller.

Herein, the program to be executed by the processor is beforehand stored in the memory of the computer system, but may be stored in a non-transitory recording medium, such as a memory card, and provided, or may be provided via a telecommunication line, such as the Internet.

[0016] In FIG. 2, lid 5 is pivotally supported by upper frame 2 so as to be openable and closable about rotation shaft 6 serving as a pivot. Lid 5 includes buffer members 7 respectively disposed at two points at an edge of lid 5 in the back face of lid 5 and configured to absorb an impact caused by contact with upper frame 2 when lid 5 is closed. That is, lid 5 is pivotally supported by main body 1 and includes buffer members 7 configured to absorb an impact caused by contact with main body 1 when lid 5 is closed. Upper frame 2 includes contact units 8 disposed respectively at two points and configured to be brought into contact with buffer members 7 when lid 5 is closed.

[0017] [1-1-2. Configuration of Buffer Member and Contact Unit]

Next, the configurations of buffer member 7 and contact unit 8 having the shape of a projection will be described using FIG. 3 to FIG. 6. FIG. 3 is a perspective view of

buffer member 7 belonging to lid 5 of washing machine 10. FIG. 4A is a vertical cross-sectional view of a first example of contact unit 8 and FIG. 4B is a vertical cross-sectional view of a second example of contact unit 8. FIG. 5 is a perspective view of contact unit 8. FIG. 6 is a principal part cross-sectional view illustrating a state in which lid 5 of washing machine 10 is closed. Note that each of FIG. 4A and FIG. 4B illustrates an example of one of projections constituting contact unit 8 illustrated in FIG. 5

[0018] Buffer member 7 has a shape illustrated in FIG. 3 and includes contact face 7a serving as a bottom face, having a round shape, and curving outward. Buffer member 7 further includes locking unit 7b in the upper part thereof, whereby, once buffer member 7 is inserted into a hole provided in the back face of lid 5, buffer member 7 is prevented from coming out of lid 5. A material used for buffer member 7 is not particularly limited as long as the material is a rubber-based material, and examples thereof include ethylene propylene diene monomer (EPDM) rubber. Furthermore, typical examples of the color of buffer member 7 include white, black, and beige. Note that, in the present embodiment, buffer member 7 and contact unit 8 are different in color.

[0019] Contact unit 8 of upper frame 2 of main body 1 to be brought into contact with buffer member 7 has the shape of a round projection so that an area of contact between contact unit 8 and contact face 7a of buffer member 7 is smaller than an area of contact obtained when contact face 7a of buffer member 7 comes into contact with flat face 2b from a direction vertical to flat face 2b. In other words, although described in detail below, contact unit 8 is such that a portion (hereinafter, referred to as "upper portion") to be brought into contact with contact face 7a of buffer member 7 has the shape of a round and, on the whole, contact unit 8 has the shape of a hemispherical projection. A material used for contact unit 8 is not particularly limited, but is typically polypropylene (PP).

[0020] As a first example, contact unit 8 may have the shape of a hemispherical projection as illustrated in FIG. 4A, in other words, the shape of a projection having a hemispherical cross section. Alternatively, as a second example, contact unit 8 may have the shape of a projection as illustrated in FIG. 4B, the projection having a mountain-shaped cross section having a hemispherical upper part and a spreading base. In particular, like the second example in FIG. 4B, the projection may be formed in such a manner that not only the upper part of the projection is rounded, but also the base of the projection is also rounded and smoothly continuous with flat face 2b of upper frame 2. That is, contact unit 8 may have the shape of a projection having a face smoothly continuous with flat face 2b. Note that, in both examples illustrated in FIG. 4A and FIG. 4B, the projection is formed to

have a round upper part. When, like the shape of the projection illustrated in FIG. 4B, the joint between the faces is smooth enough not to be identified, dirt is less prone to collecting on the joint, compared with the case of the shape of the hemispherical projection illustrated in FIG. 4A, whereby a loss of appearance quality can be substantially prevented.

[0021] Note that one projection of contact unit 8 is beneficially provided to each of two buffer members 7, but, in the present embodiment, contact unit 8 has the shape of not one projection but a plurality of projections as illustrated in FIG. 5 and FIG. 6. Specifically, contact unit 8 has the shape of projections corresponding to the shape of contact face 7a of buffer member 7, in other words, the round shape of contact face 7a of buffer member 7.

More specifically, contact unit 8 has the shape of a plurality of projections including one projection and six projections, the six projections being disposed in the circumference of a circle centering on the center of the one projection. This form is configured such that circles having the same diameter are arranged geometrically, whereby the form has a well-balanced design and can be adopted without incompatibility.

[0022] Furthermore, if the tip of the projection of contact unit 8 is too sharp, impact absorption performance decreases or deformation of contact face 7a of buffer member 7 is larger. Furthermore, it is supposed that, when a user touches the projection having a sharp tip, the user is sometimes injured, and therefore, the projection is beneficially formed to be appropriately rounded, for example, hemispherical.

[0023] [1-2. Operation]

[1-2-1. Operation of Washing Machine]

The operation and action of washing machine 10 configured as described above will be described below.

[0024] The washing operation of washing machine 10 is the same as those of common washing machines. That is, a user opens lid 5, puts the laundry into washing tub 3 through opening 2a, pours a detergent into a detergent case (not illustrated), and closes lid 5. Then, the user turns the power on, sets a washing course by using operation display 4, and starts an operation. In the washing course, basically, a washing step, a rinsing step, and a spin-drying step are performed in this order.

[0025] Upon starting the operation, the washing step is performed in such a manner that washing water containing the detergent is supplied into washing tub 3 and a pulsator (not illustrated) rotates to perform stirring washing for the laundry. When the washing step is completed, the rinsing step is performed in such a manner that dirty washing water is discharged and tap water is supplied to rinse the laundry. When the rinsing step is

completed, the spin-drying step is performed in such a manner that post-rinse water is discharged and washing tub 3 rotates at high speed, whereby water contained in the laundry is separated by centrifuging to perform spin-drying. When the spin-drying step is completed, the washing operation is finished and washing machine 10 is automatically turned off.

[0026] [1-2-2. Buffering Operation in Closing of Lid]

During the use of washing machine 10, when a user puts the laundry into washing tub 3 to perform the washing operation or a user finishes using washing machine 10, the user closes lid 5 as illustrated in FIG. 1. At this time, buffer member 7 disposed on the back side of lid 5 collides against contact unit 8 disposed in upper frame 2 in front of opening 2a to reduce an impact caused by the closing of lid 5. Then, as illustrated in FIG. 6, during the operation of washing machine 10 or until the user uses washing machine 10 next time, lid 5 is in the closed state and consequently a state in which most of the weight of lid 5 is applied onto buffer member 7 is continued.

[0027] Thus, during the operation of washing machine 10 or until the user uses washing machine 10 next time, lid 5 is in the closed state and consequently buffer member 7 and contact unit 8 of upper frame 2 is in contact with each other for relatively long hours. Furthermore, buffer member 7 is temporarily deformed by an impact caused when lid 5 is closed. However, once buffer member 7 returns to the usual contact state, buffer member 7 becomes in contact only with the upper part of contact unit 8, and consequently an area of contact between buffer member 7 and contact unit 8 becomes very small.

[0028] When such collision and relatively long hours of contact continuously occur, contact unit 8 is stained with the color of buffer member 7. Note that, even when contact unit 8 is stained with the color of buffer member 7, only the upper parts of the projections constituting contact unit 8 are stained, and hence the stained area is very small. In other words, the total area of the upper parts of the projections is smaller than a contact area in the case where buffer member 7 (contact face 7a) comes into contact with flat face 2b from a direction vertical to flat face 2b. Thus, the color-staining can be made inconspicuous, so that a loss of appearance quality can be substantially prevented.

[0029] In the present embodiment, contact unit 8 is formed of a predetermined arrangement of the projections. Thus, shadows are produced by the projections. The shadows visually reduce color-staining.

[0030] Furthermore, since contact unit 8 has the shape of projections, buffer member 7 can be supported at a plurality of points, whereby the deformation of buffer member 7 due

to a concentrated load on one point of contact face 7a of buffer member 7 can be substantially prevented.

[0031] Note that buffer member 7 is not necessarily required to be supported at a plurality of points at the same time. However, even if lid 5 is slightly out of position due to attachment failure or dimension error of lid 5 when lid 5 is closed, any of the projections is brought into contact with buffer member 7, so that lid 5 can be supported.

[0032] [1-3. Effects]

As described above, in the present embodiment, washing machine 10 includes: upper frame 2 of main body 1, upper frame 2 including opening 2a allowing the laundry to be put in and taken out therethrough; and lid 5 configured to open and close opening 2a. Lid 5 is pivotally supported by upper frame 2 and includes buffer member 7 configured to absorb an impact caused by contact with upper frame 2 when lid 5 is closed. Furthermore, contact unit 8 of upper frame 2, contact unit 8 being configured to be brought into contact with buffer member 7, has the shape of a projection so that an area of contact between contact unit 8 and buffer member 7 is smaller than an area of contact obtained when buffer member 7 comes into contact with flat face 2b of upper frame 2.

[0033] With this configuration, in washing machine 10, the area of contact between buffer member 7 of lid 5 and contact unit 8 of upper frame 2 can be made smaller. Thus, in washing machine 10, even when buffer member 7 adheres to contact unit 8 of upper frame 2 due to relatively long hours of contact between buffer member 7 and upper frame 2, an area of a portion to which buffer member 7 adheres can be made smaller. Thus, washing machine 10 is capable of making color-staining of upper frame 2 inconspicuous and thereby substantially preventing a loss of appearance quality.

[0034] Furthermore, in washing machine 10 according to the present embodiment, contact unit 8 has the shape of a hemispherical projection. Thus, a decrease in impact absorption performance due to larger deformation of contact face 7a of buffer member 7 can be prevented and a user is prevented from being injured when the user touches contact unit 8.

[0035] Furthermore, in washing machine 10 according to the present embodiment, contact unit 8 has the shape of a plurality of projections. Thus, shadows produced by the projections visually reduces color-staining. Furthermore, contact unit 8 supports buffer member 7 at a plurality of points, whereby washing machine 10 can substantially prevent the deformation of buffer member 7 due to a concentrated load on one point of contact face 7a of buffer member 7. Furthermore, in washing machine 10, even if lid 5 is slightly out of

position when lid 5 is closed, any of the projections is brought into contact with buffer member 7, whereby lid 5 can be supported.

[0036] Furthermore, in washing machine 10 according to the present embodiment, contact unit 8 has the shape of a plurality of projections corresponding to the shape of contact face 7a of buffer member 7. Thus, the projections are arranged to be well-balanced in terms of design, and furthermore, even if lid 5 is slightly out of position when lid 5 is closed, any of the projections is brought into contact with buffer member 7, whereby lid 5 can be supported.

[0037] Furthermore, in washing machine 10 according to the present embodiment, contact unit 8 has the shape of a plurality of projections including one projection and six projections, the six projections being disposed in the circumference of a circle centering on the center of the one projection. This shape is configured by the geometric arrangement of circles having the same diameter, so that the shape is well-balanced in terms of design and can be adopted without incompatibility.

[0038] Furthermore, in washing machine 10 according to the present embodiment, contact unit 8 has the shape of a projection having a face smoothly continuous with flat face 2b. Thus, the faces are continuous smoothly enough that the joint between the faces cannot be identified, whereby dirt is less prone to collecting on the joint and consequently a loss of appearance quality can be substantially prevented.

[0039] (Other Embodiments)

Embodiment 1 was described above as an illustrative example of the technology disclosed in the present application. However, the technology in the present disclosure is not limited to the embodiment, but is applicable to embodiments in which modifications, substitutions, additions, omissions, or the likes are made. In addition, constituents described in Embodiment 1 can be combined to provide a new embodiment.

[0040] Hereinafter, other embodiments will be described.

[0041] In Embodiment 1, as for contact unit 8 provided in upper frame 2, a hemispherical projection having a round upper part and the arrangement of a plurality of the hemispherical projections were described. However, the shape of the contact unit in the present disclosure is not limited to the above-described shape. For example, the upper part of the contact unit in the present disclosure may have the shape of a rounded polygon, such as a rounded quadrangle. Alternatively, the contact unit in the present disclosure may have the shape of a belt-like projection having a rounded upper part or may have the arrangement of a plurality of the belt-like projections. Alternatively, the contact unit in the

present disclosure may have the shape of a plurality of projections including one hemispherical projection and a plurality of projections disposed annularly around the one hemispherical projection. In any of the above-mentioned embodiments, an area of contact between buffer member 7 and contact unit 8 is beneficially smaller than an area of contact
5 obtained in the conventional case where faces simply come into contact with each other, whereby color-staining, if any, is more inconspicuous.

[0042] In Embodiment 1, a top-loading washing machine was described as an example of the washing machine according to the present disclosure. The washing machine according to the present disclosure is beneficially any washing machine capable of washing the
10 laundry such as clothes with cold water. Therefore, the washing machine according to the present disclosure is not limited to a top-loading washing machine. However, when a top-loading washing machine is used as the washing machine according to the present disclosure, lid 5 comes into contact with upper frame 2 under its own weight when lid 5 is closed, whereby contact unit 8 is more easily stained with the color of buffer member 7,
15 and therefore the effect of reducing color-staining is more easily produced. Furthermore, in a top-loading washing machine, also in the case where buffer member 7 and contact unit 8 are similarly colored, color-staining of contact unit 8 is more easily caused, and hence, the effect of reducing color-staining is more easily produced. Alternatively, the washing machine in the present disclosure may be a front-loading washing machine. When a front-
20 loading washing machine is used as the washing machine according to the present disclosure, opening 2a configured to allow the laundry to be put in and taken out therethrough can be provided on a side face, and thereby the design flexibility for the washing machine can be enhanced.

[0043] Note that the above-described embodiments are merely for exemplifying the
25 technology of the present disclosure, and therefore, the embodiments may be subjected to various modifications, substitutions, additions, omissions, or the likes within the scope of the claims and their equivalents.

INDUSTRIAL APPLICABILITY

[0044] The present disclosure is applicable to a washing machine including a lid on an
30 opening through which the laundry is put in and taken out. For example, the present disclosure is applicable to a top-loading washing, a front-loading washing machine and the like.

REFERENCE MARKS IN THE DRAWINGS

5	[0045]	1...main body
		2...upper frame
		2a...opening
		2b...flat face
		3...washing tub
		4...operation display
10		5...lid
		6...rotation shaft
		7...buffer member
		7a...contact face
		7b...locking unit
		8...contact unit
		10...washing machine

WHAT IS CLAIMED IS:

1. A washing machine, comprising:

a main body including an opening, the opening allowing laundry to be put in and
5 taken out of the main body through the opening; and

a lid configured to open and close the opening,

wherein the lid is pivotally supported by the main body and includes a buffer
member, the buffer member being configured to absorb an impact caused by contact with
the main body when the lid is closed, and

10 wherein a contact unit of the main body, the contact unit being configured to be
brought into contact with the buffer member, has a shape of a projection, whereby an area
of contact between the contact unit and the buffer member is smaller than an area of
contact obtained when the buffer member comes into contact with a flat face of the main
body.

15 2. The washing machine according to claim 1,

wherein the contact unit has a shape of a hemispherical projection.

3. The washing machine according to claim 1 or 2,

20 wherein the contact unit has a shape of a plurality of projections.

4. The washing machine according to any one of claims 1 to 3,

wherein the contact unit has a shape of a projection corresponding to a shape of a
contact face of the buffer member.

25 5. The washing machine according to claim 3,

wherein the contact unit has the shape of the projections, the projections including
one projection and six projections, the six projections being disposed in a circumference of
a circle centering on a center of the one projection.

30 6. The washing machine according to any one of claims 1 to 5,

wherein the contact unit has a shape of a projection having a face smoothly
continuous with a face of the main body.