

[DESCRIPTION]

[Title of the Disclosure]

BREAST PUMP

5 [Technical Field]

The present disclosure relates to a breast pump, and more specifically, to a breast pump that enables hands-free use during the expression of breast milk.

[Background]

10 Currently available breast pumps on the market are either manually powered or electrically powered, depending on the type of power source.

A manually powered breast pump typically includes a suction unit that fits over the breast, a manual pumping unit designed to create air pressure in the suction unit, and a bottle for collecting the milk expressed through the suction unit. With such a breast pump, the user must hold the suction unit or the bottle while operating the manual pumping unit, thus preventing the free use of
15 both hands.

In contrast, an electrically powered breast pump utilizes an electric pump instead of the manual pumping unit, allowing the user to keep one hand free.

However, even with electric-powered breast pumps, the user is still required to hold the suction unit or the bottle with the other hand, which remains inconvenient. In light of this, the
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inventor of the present disclosure has developed a motorized breast pump, in which a contact housing, designed to make tight contact with the breast, is coupled with a storage housing for collecting the expressed milk. This breast pump is designed to be inserted between the breast and a brassiere, as disclosed in KR Application Publication No. 10-2019-0116774. Furthermore, the inclusion of a detachable pump module, which can be removably attached to the storage housing, allows the user to move freely or engage in activities while expressing milk.

[SUMMARY]

An embodiment of the present disclosure provides a breast pump that allows a mother to freely use both hands during the milk expression process and improves the milk expression performance.

A breast pump according to one aspect of the present disclosure may include a contact housing, a storage housing, a flow-separating membrane, and an elastic valve.

The storage housing may include a concave rear surface that closely contacts the mother's breast, a front surface opposite the rear surface, and a protrusion that projects from the center of the front surface and connects to a through-hole provided on the rear surface, thereby providing an inner space.

The storage housing may be coupled to the contact housing to provide a milk storage space on the front surface.

The flow-separating membrane may be configured to generate a negative pressure in the

inner space.

The elastic valve may be configured to open and close a milk discharge hole that is provided in the protrusion to connect the inner space to the milk storage space.

5 The elastic valve may include a first elastic plate, which may be configured with a cantilever form with a first end thereof coupled to the storage housing to cover the milk discharge hole.

According to one embodiment of the present invention, the first elastic plate may include a first surface and a second surface.

10 The first surface may face the milk discharge hole, and the second surface may be opposite the first surface.

A first gap may be provided between the second surface and an inner surface of the storage housing.

According to one embodiment of the present disclosure, the elastic valve may further include a second elastic plate, which may be integrally formed with the first elastic plate.

15 The second elastic plate may be connected to the first end of the first elastic plate to be positioned between the protrusion and the inner surface of the storage housing.

According to one embodiment of the present disclosure, when the storage housing is reattached to the contact housing after having been detached from the contact housing, the second elastic plate may be compressed by the protrusion.

20 According to one embodiment of the present disclosure, the second elastic plate may be

in the form of a cantilever fixed to the first end of the first elastic plate.

According to one embodiment of the present disclosure, the second elastic plate may include a third surface and a fourth surface.

The third surface may face the protrusion, and the fourth surface may be opposite the
5 third surface.

A second gap may be provided between the fourth surface and the inner surface of the storage housing.

According to one embodiment of the present disclosure, when the storage housing is reattached to the contact housing after having been detached from the contact housing, the second
10 elastic plate may be compressed by the protrusion, thereby reducing a distance between the fourth surface and the inner surface of the storage housing.

According to one embodiment of the present disclosure, the storage housing may include a coaming portion.

The flow-separating membrane may be coupled to the coaming portion, and the coaming
15 portion may be pipe-shaped.

According to one embodiment of the present disclosure, the storage housing, the flow-separating membrane, and the elastic valve may be integrally molded, and the flow-separating membrane and the elastic valve may be made of the same material, while being made of a different material than the storage housing.

20 According to one embodiment of the present disclosure, the breast pump may further

include a sealing member.

The sealing member may be coupled along the edge of an outer surface of the storage housing.

The contact housing may further include a ring portion, which may protrude forward
5 from the edge of the front surface.

The sealing member may be disposed between the outer surface of the storage housing and an inner surface of the ring portion.

The storage housing, the flow-separating membrane, the elastic valve, and the sealing member may be integrally molded, and the flow-separating membrane, the elastic valve, and the
10 sealing member may be made of the same material, while being made of a different material than the storage housing.

According to an embodiment of the present disclosure, the mother can freely use both hands during the milk expression process.

Additionally, the milk discharge hole can be more tightly sealed by the elastic valve,
15 which is aligned with the milk discharge hole in the storage housing, thereby improving the milk expression performance.

[Brief Description of the Drawings]

FIG. 1 is a perspective view of a breast pump according to an embodiment of the present
20 disclosure.

FIGS. 2 and 3 are exploded perspective views of the breast pump shown in FIG. 1.

FIG. 4 is a cross-sectional view of the breast pump shown in FIG. 1.

FIG. 5 is an enlarged view of part A in FIG. 4.

FIG. 6 is a front view of the storage housing shown in FIG. 2.

5 FIG. 7 is a view of FIG. 6 with the flow-separating membrane, elastic valve, and sealing member omitted.

FIG. 8 is a view of the storage housing in FIG. 7 from a different angle.

FIG. 9 is a modified example of the cross-sectional view shown in FIG. 4.

FIG. 10 is an enlarged view of part B in FIG. 9.

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[Best Mode for Embodiment of the Disclosure]

Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

The accompanying drawings are not necessarily depicted to scale, and certain
15 components may be exaggerated to aid in understanding the disclosure.

The terms used in the present specification and the claims should not be construed as being limited to their usual or dictionary meanings but should be interpreted in accordance with the meaning and concept consistent with the technical ideas of the present disclosure, as the inventor is entitled to define the terms appropriately to describe his/her invention in the best
20 possible way.

In the present specification, the singular form should be understood to include the plural unless specifically stated otherwise.

Further, when a part is described as "comprising" an element, it implies that the part may include additional elements unless specifically stated otherwise.

5 Moreover, when an element is described as being "on" another element, this may refer to being positioned above or below the element, and it does not necessarily mean that the element is positioned above the other in the gravitational direction.

 Furthermore, when an element is described as being "connected" or "coupled" to another element, this includes both cases where the elements are directly connected or coupled, as well as
10 cases where they are indirectly connected or coupled via another element.

Also, terms like "first" and "second" may be used to describe elements, but such terms are only used to distinguish one element from another and do not limit the nature, sequence, or order of the elements.

 In the present specification, unless otherwise stated, directional terms such as front and
15 rear may be set based on a mother wearing the breast pump. For example, the front surface of an element may refer to the surface that faces the same direction as the mother's view when wearing the breast pump.

 FIG. 1 is a perspective view of a breast pump according to an embodiment of the present disclosure; FIGS. 2 and 3 are exploded perspective views of the breast pump shown in FIG. 1; FIG.
20 4 is a cross-sectional view of the breast pump shown in FIG. 1; and FIG. 5 is an enlarged view of

part A in FIG. 4.

Referring to FIGS. 1 to 5, the breast pump 10 according to an embodiment of the present disclosure may include a contact housing 100, a storage housing 200, a flow-separating membrane 400, and an elastic valve 500, and may further include a sealing member 600.

5 The contact housing 100 is configured to closely contact the breast of the mother and may include a rear surface 101, a front surface 102, and a protrusion 110. The contact housing 100 may further include a funnel portion 120 and/or a ring portion 130.

 The rear surface 101 may be concave in shape to be closely in contact with the breast of the mother, and the front surface 102, which is positioned opposite the rear surface 101, may define
10 a milk storage space S along with an inner surface 201 of the storage housing 200.

 The protrusion 110 may protrude forward from the center of the front surface 102 and may provide a first inner space S1 that is connected to a through-hole 101-1 provided at the center of the rear surface 101.

 Additionally, the protrusion 110 may be provided with a milk discharge hole 112-1 that
15 connects the first inner space S1 to the milk storage space S.

 Thus, breast milk expressed from the mother's breast may first flow into the first inner space S1 and then move to the milk storage space S through the milk discharge hole 112-1.

 For example, the protrusion 110 may include, but not limited to, a protruding body 111 and a milk discharge tube 112.

20 The protruding body 111 may be a portion that provides the first inner space S1 and may

have a pipe-like shape with a closed front end.

The milk discharge tube 112 may be a portion providing the milk discharge hole 112-1 and may extend downward from the front end of the protruding body 111.

However, the present disclosure is not limited to this example, and the milk discharge
5 tube 112 may be omitted, and the milk discharge hole 112-1 may be directly formed at a lower part of the front end of the protruding body 111.

The funnel portion 120 may provide a second inner space S2 that is connected to the first inner space S1.

The funnel portion 120 may be disposed on the protrusion 110 to be coupled to the
10 protrusion 110.

The funnel portion 120 may have, for example, but not limited to, a funnel shape.

The ring portion 130 may extend along the edge of the front surface 102 and may protrude forward from the front surface 102.

The ring portion 130 may have, but not limited to, a complete ring shape, and one or
15 more cutout regions may be provided along the circumferential direction of the ring portion 130.

The storage housing 200 may be coupled to the contact housing 100 to provide the milk storage space S on the front surface 102 of the contact housing 100. The storage housing 200 may have a hemispherical shape so that it can be stably supported by a bra.

The storage housing 200 may have a hemispherical shape so that it can be stably
20 supported by a brassiere.

Therefore, the contact housing 100 may be inserted between the mother's breast and the brassiere in a state coupled with the storage housing 200, and the mother does not need to use her hands to press the contact housing 100 against the breast or to hold the storage housing 200.

The storage housing 200 may be provided with an air passage 301 at a location
5 corresponding to the second inner space S2.

For example, the storage housing 200 may be provided with a coupling hole 210 at a location corresponding to the second inner space S2, and the air passage 301 may be provided on a cover 300 that is detachably coupled to the coupling hole 210.

That is, the breast pump 10 may further include the cover 300 that is detachably coupled
10 to the storage housing 200.

However, the present disclosure is not limited to this example, and the coupling hole 210 and the cover 300 may be omitted, and the air passage 301 may be directly formed in the storage housing 200.

The flow-separating membrane 400 may be configured to generate negative pressure and
15 positive pressure in the first inner space S1.

The flow-separating membrane 400 may be made of a flexible material and may divide the second inner space S2 into a first portion S2-1 and a second portion S2-2. Here, the first portion S2-1 may be a portion connected to the first inner space S1, and the second portion S2-2 may be a portion connected to the air passage 301.

20 Therefore, when air in the second portion S2-2 is discharged to the outside through the

air passage 301, the flow-separating membrane 400 may deform to expand the volume of the first portion S2-1. As a result, negative pressure may be generated in the first inner space S1 connected to the first portion S2-1. As a result, milk may be expressed from the mother's breast, and the expressed milk may flow into the first inner space S1.

5 Moreover, when air is supplied to the second portion S2-2 through the air passage 301, the flow-separating membrane 400 may deform to reduce the volume of the first portion S2-1. As a result, positive pressure may be formed in the first inner space S1 connected to the first portion S2-1. Consequently, the elastic valve 500 may elastically deform, and the milk discharge hole 112-1 may open. As a result, the milk in the first inner space S1 may be discharged into the milk storage
10 space S through the milk discharge hole 112-1.

In the meantime, the supply and discharge of air through the air passage 301 may be performed by a pump module (not shown) that is coupled to the storage housing 200 either directly or through a hose, but the present disclosure is not limited thereto.

The elastic valve 500 may be coupled to the storage housing 200 to close the milk
15 discharge hole 112-1 and, as described above, may open the milk discharge hole 112-1 through elastic deformation.

The elastic valve 500 may include a first elastic plate 510 and may further include a second elastic plate 520 and/or a first support plate 530.

The first elastic plate 510 may have a cantilever shape with a first end 510-1 thereof
20 coupled to the storage housing 200 and may cover the milk discharge hole 112-1.

The first elastic plate 510 may include a first surface 511 and a second surface 512. The first surface 511 may face the milk discharge hole 112-1, and the second surface 512 may be opposite the first surface 511. A first gap G1 may be provided between the second surface 512 and the inner surface 201 of the storage housing 200.

5 Thus, space may be provided for the first elastic plate 510 to deform by bending toward the inner surface 201 of the storage housing 200.

The second elastic plate 520 may be connected to the first end 510-1 of the first elastic plate 510 to be integrally formed with the first elastic plate 510.

10 The second elastic plate 520 may be disposed between the protrusion 110 and the inner surface 201 of the storage housing 200.

The second elastic plate 520 may include a third surface 521 and a fourth surface 522. The third surface 521 may face the protrusion 110, and the fourth surface 522 may be opposite the third surface 521. As a non-limiting example, the fourth surface 522 may be attached to the inner surface 201 of the storage housing 200.

15 Thus, the second elastic plate 520 may be compressed if the third surface 521 of the second elastic plate 520 is pressed by the protrusion 110 of the contact housing 100 when the storage housing 200 is reattached to the contact housing 100 after having been detached from the contact housing 100. As a result, the first elastic plate 510, which is integrally formed with the second elastic plate 520, may closely adhere to the protrusion 110 to seal the milk discharge hole
20 112-1 more securely.

The first support plate 530 may be connected to the first end 510-1 of the first elastic plate 510 to extend in the opposite direction of the second elastic plate 520 and to be attached to the inner surface 201 of the storage housing 200. As a result, the airtightness provided by the first elastic plate 510 may be further enhanced.

5 The sealing member 600 may extend along the edge of an outer surface 202 of the storage housing 200 and may be disposed between the outer surface 202 of the storage housing 200 and an inner surface of the ring portion 130. As a result, the airtightness between the contact housing 100 and the storage housing 200 may be ensured.

 Meanwhile, the contact housing 100 and the storage housing 200 may be provided with
10 an alignment structure so that the milk discharge hole 112-1 and the elastic valve 500 are aligned with each other when the contact housing 100 and the storage housing 200 are coupled with each other.

 For example, during the process of coupling the flow-separating membrane 400 coupled to the storage housing 200 with the funnel portion 120 of the contact housing 100, the milk
15 discharge hole 112-1 and the elastic valve 500 may be aligned with each other.

 In another example, the contact housing 100 may be provided with a first alignment part 140, and the storage housing 200 may be provided with a second alignment part 220 being coupled to the first alignment part 140. The first alignment part 140 may be provided in the form of a through-hole in the ring portion 130, and the second alignment part 220 may be provided in the
20 form of a protrusion on the outer surface 202 of the storage housing 200 so that the second

alignment part 220 may be coupled with the through-hole provided in the ring portion 130. As a result, the milk discharge hole 112-1 and the elastic valve 500 may be aligned with each other while the first alignment part 140 and the second alignment part 220 are coupled with each other. In this example, the first alignment part 140 and the second alignment part 220 may also serve to prevent unintended separation between the contact housing 100 and the storage housing 200. However, the present disclosure is not limited to this, and the first alignment part 140 may be provided in the form of a protrusion, while the second alignment part 220 may be provided in the form of a through-hole.

In the meantime, a bottom surface of the milk discharge tube 112, which defines an exit of the milk discharge hole 112-1, may extend downward in an inclined manner from a front end to a rear end thereof. That is, the angle between the first surface 511 of the first elastic plate 510 and the third surface 521 of the second elastic plate 520 may form an obtuse angle. As a result, the airtightness provided by the first elastic plate 510 may be further enhanced.

FIG. 6 is a front view of the storage housing shown in FIG. 2; FIG. 7 is a view of FIG. 6 with the flow-separating membrane, elastic valve, and sealing member omitted; and FIG. 8 is a view of the storage housing in FIG. 7 from a different angle.

Referring to FIGS. 4 and 6 through 8, the storage housing 200 may be provided with a coaming portion 230, and the flow-separating membrane 400 may be coupled to the coaming portion 230.

The coaming portion 230 may protrude from the inner surface 201 of the storage housing

200 into the milk storage space S.

The coaming portion 230 may have a pipe shape and may define or provide the coupling hole 210.

The flow-separating membrane 400 may be coupled to the coaming portion 230 so as to
5 wrap around a lower edge of the coaming portion 230.

Meanwhile, the storage housing 200, the flow-separating membrane 400, the elastic valve 500, and the sealing member 600 may be integrally molded.

For example, the storage housing 200, the flow-separating membrane 400, the elastic valve 500, and the sealing member 600 may be integrally molded using a two-shot molding
10 technique. In such a case, the flow-separating membrane 400, the elastic valve 500, and the sealing member 600 may be made of the same material, for example, an elastic material such as silicone. On the other hand, the storage housing 200 may be made of a material with greater rigidity than that of the flow-separating membrane 400, the elastic valve 500, and the sealing member 600.

Additionally, the breast pump 10 may further include a strip 700 that connects the elastic
15 valve 500 to the sealing member 600.

The strip 700 may extend from the elastic valve 500 along the inner surface 201 of the storage housing 200 and may be connected to the sealing member 600 through a through-hole 203 provided in the storage housing 200. For example, one end of the strip 700 may be connected to the first support plate 530.

20 The through-hole 203 may be provided to connect the inner surface 201 and the outer

surface 202 of the storage housing 200.

The through-hole 203 may be provided on the sealing member 600 and may be covered by the sealing member 600.

As a result, when the storage housing 200, the flow-separating membrane 400, the elastic valve 500, and the sealing member 600 are integrally molded, the injection of material for forming the elastic valve 500 may be facilitated.

Meanwhile, while the elastic valve 500 is connected to the sealing member 600 via the strip 700, the elastic valve 500 may be separated from and spaced apart from the flow-separating membrane 400. As a result, it is possible to prevent the elastic valve 500 from being misaligned by the flow-separating membrane 400.

FIG. 9 is a modified example of the cross-sectional view shown in FIG. 4, and FIG. 10 is an enlarged view of part B in FIG. 9.

Referring to FIGS. 9 and 10, the second elastic plate 520, which is disposed between the protrusion 110 and the inner surface 201 of the storage housing 200, may be in the form of a cantilever fixed at the first end 510-1 of the first elastic plate 510, and a second gap G2 may be provided between the fourth surface 522 of the second elastic plate 520 and the inner surface 201 of the storage housing 200. Thus, space may be provided for the second elastic plate 520 to deform or move toward the inner surface 201 of the storage housing 200.

According to this modified example, the second elastic plate 520 may deform or move if the third surface 521 of the second elastic plate 520 is pressed by the protrusion 110 of the contact

housing 100 when the storage housing 200 is reattached to the contact housing 100 after having been detached from the contact housing 100.

As a result, the first elastic plate 510, which is integrally formed with the second elastic plate 520, may closely adhere to the protrusion 110 to seal the milk discharge hole 112-1 more
5 securely.

Meanwhile, the elastic valve 500 may further include a second support plate 540. The second support plate 540 may be connected to the first end 510-1 of the first elastic plate 510 and may extend in parallel to the second elastic plate 520. The second support plate 540 may be attached to the inner surface 201 of the storage housing 200. In such a case, the second gap G2
10 may be provided between the fourth surface 522 of the second elastic plate 520 and the second support plate 540. As a result, the airtightness provided by the first elastic plate 510 may be further enhanced.

Hitherto, certain preferred embodiments of the present disclosure have been described above, but these are merely exemplary and are not intended to limit the present disclosure. Those
15 skilled in the art to which the present disclosure pertains may make various modifications and changes to the embodiments by adding, changing, deleting, or adding certain elements, without departing from the scope of the technical ideas of the present disclosure as set forth in the claims, and such modifications and changes should also be regarded as being within the scope of the present disclosure.

[CLAIMS]

[Claim 1]

A breast pump comprising:

a contact housing comprising a rear surface, a front surface, and a protrusion, the rear
5 surface being concave and being in close contact with a mother's breast, the front surface being
opposite the rear surface, the protrusion projecting from a center of the front surface and providing
an inner space connected to a through-hole provided in the rear surface;

a storage housing coupled to the contact housing and providing a milk storage space on
the front surface;

10 a flow-separating membrane configured to form negative pressure in the inner space; and
an elastic valve configured to open and close a milk discharge hole that is provided in the
protrusion to connect the inner space to the milk storage space,

wherein the elastic valve comprises a first elastic plate in the form of a cantilever with a
first end thereof coupled to the storage housing to cover the milk discharge hole.

15 [Claim 2]

The breast pump of claim 1, wherein the first elastic plate comprises a first surface facing
the milk discharge hole and a second surface opposite the first surface, and

wherein a first gap is provided between the second surface and an inner surface of the
20 storage housing.

[Claim 3]

The breast pump of claim 2, wherein the elastic valve further comprises a second elastic plate connected to the first end of the first elastic plate and disposed between the protrusion and the inner surface of the storage housing, the second elastic plate being integrally formed with the first elastic plate.

[Claim 4]

The breast pump of claim 3, wherein the second elastic plate is pressed by the protrusion and compressed when the storage housing is reattached to the contact housing after having been detached from the contact housing.

[Claim 5]

The breast pump of claim 3, wherein the second elastic plate is in the form of a cantilever fixed to the first end of the first elastic plate.

[Claim 6]

The breast pump of claim 5, wherein the second elastic plate comprises a third surface facing the protrusion and a fourth surface opposite the third surface, and

wherein a second gap is provided between the fourth surface and the inner surface of the

storage housing.

[Claim 7]

The breast pump of claim 6, wherein, the second elastic plate is pressed by the protrusion
5 and a distance between the fourth surface and the inner surface of the storage housing is reduced
when the storage housing is reattached to the contact housing after having been detached from the
contact housing.

[Claim 8]

10 The breast pump of claim 1, wherein the storage housing comprises a pipe-shaped
coaming portion to which the flow-separating membrane is coupled.

[Claim 9]

The breast pump of claim 8, wherein the storage housing, the flow-separating membrane,
15 and the elastic valve are integrally molded, and the flow-separating membrane and the elastic valve
are made of the same material but made of a different material than the storage housing.

[Claim 10]

The breast pump of claim 8, further comprising a sealing member coupled along an edge
20 of the outer surface of the storage housing,

wherein the contact housing further comprises a ring portion that protrudes forward from an edge of the front surface,

wherein the sealing member is disposed between the outer surface of the storage housing and an inner surface of the ring portion, and

5 wherein the storage housing, the flow-separating membrane, the elastic valve, and the sealing member are integrally molded, and the flow-separating membrane, the elastic valve, and the sealing member are made of the same material but made of a different material than the storage housing.