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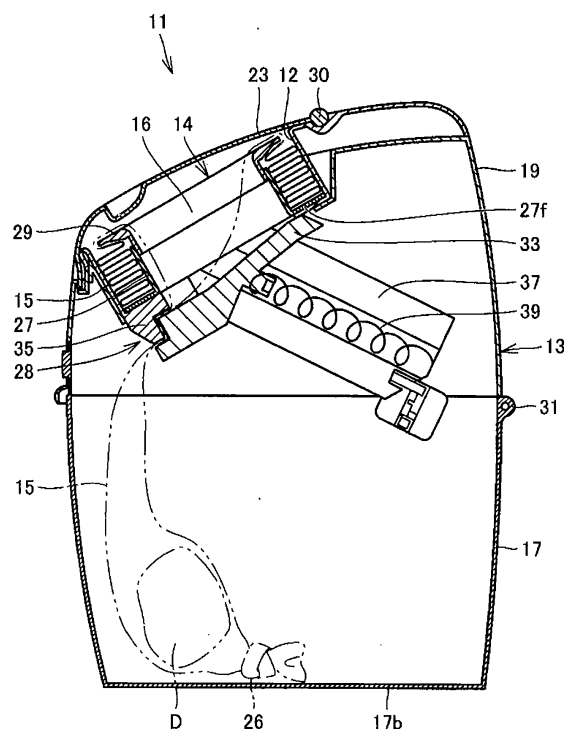
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(54) **Waste disposal apparatus**

(57) A waste disposal apparatus 11 includes an open/close sealing mechanism 28 that nips a film 15 at a position between a film accommodating portion 14 and a waste accommodating main body 13 to seal a space below the nipped part of the film 15 from a space above the nipped part of the film 15. The sealing mechanism 28 has a sealing door 33 capable of being opened and closed, and a sealing door receiving portion 35. Film nipping portions of the sealing door 33 and the sealing door receiving portion 35 include concavo-convex shapes that bend a vertical intermediate portion of a film portion to be nipped, laterally with respect to an imaginary straight line that connects upper and lower ends of the film portion to be nipped.

FIG. 2



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to waste disposal apparatuses for disposing of waste materials such as soiled diapers.

Description of the Background Art

[0002] Japanese Patent Publication Nos. H01-226601, 2009-96642, and H07-330103 of unexamined applications disclose techniques of waste disposal apparatuses having a high odor-sealing capability and being capable of successively disposing of waste materials, which relate to waste disposal apparatuses for disposing of waste materials having unpleasant odors, such as soiled diapers.

[0003] Fig. 23 shows a waste disposal apparatus described in Japanese Patent Publication Nos. H01-226601 and 2009-96642 of unexamined applications. This waste disposal apparatus includes a cylindrical film 101 having its one end closed, a tubular guide 102 for inserting the film 101 therethrough and accommodating the film 101 therein, and a twisting unit 103 for manually turning the tubular guide 102 to twist the film 101.

[0004] In this waste disposal apparatus, the closed end of the film 101 inserted through the tubular guide 102 is pulled out, and is pushed coaxially downward through the tubular guide 102 to form a waste accommodating space. After placing a waste material into the waste accommodating space, the tubular guide 102 is turned by the twisting unit 103 to form a twisted closed portion 104 in the film 101 between the waste material and the tubular guide 102.

[0005] This twisted closed portion 104 of the film 101 forms the bottom of a waste accommodating space for the subsequent disposal of a waste material, and also block passing of odors, namely leakage of odors from the waste material to the outside. This structure enables waste materials to be sequentially placed in the film 101, and also is effective in sealing odors of waste materials.

[0006] Fig. 24 shows a waste disposal apparatus of the type described in Japanese Patent Publication No. H07-330103 of unexamined applications. This waste disposal apparatus has a waste accommodating main body 105 having an opening facing upward, a lid 106 that closes the opening, a flexible film 107 for accommodating waste materials 110 that are placed in the waste accommodating main body 105, and a closing mechanism 108 for nipping the film 107 at a position between the waste accommodating main body 105 and the opening thereof.

[0007] The closing mechanism 108 has a pair of bar-shaped nipping members 109. When disposing of a waste material 110, the closing mechanism 108 is

opened to place the waste material 110 into the waste accommodating main body 105. After the waste material is placed in the waste accommodating main body 105, the bar-shaped nipping members 109 nip the film 107 to seal the waste material 110 from the outside. This closing mechanism 108 serves to block passing of odors, namely leakage of odors from the waste material 110 to the outside.

10 SUMMARY OF THE INVENTION

[0008] However, the waste disposal apparatuses described in Japanese Patent Publication Nos. H01-226601 and 2009-96642 of unexamined applications do not have a sufficient odor-sealing capability. That is, in these waste disposal apparatuses, a major element that seals odors of waste materials is the twisted closed portion 104 of the film 101, and thus a fine linear airflow path necessarily remains along the central axis of the twist, which causes leakage of odors.

[0009] The twist of the film 101 gradually loosens with time due to a restoring force of the film 101 or the like. This expands the remaining airflow path, which further reduces the odor-sealing capability. Moreover, such a twisted closed portion 104 of the film 101 is formed upon each disposal of a waste material, which reduces the maximum amount of waste that can be accommodated in the waste disposal apparatus.

[0010] The waste disposal apparatus described in Japanese Patent Publication No. H07-330103 of unexamined applications also does not have a sufficient odor-sealing capability. That is, in this waste disposal apparatus, odors of waste materials are sealed by nipping the film 107 by the pair of bar-shaped nipping members 109 of the closing mechanism 108. Thus, the contact shape, which is formed between the film 107 and the bar-shaped nipping members 109 by nipping the film 107 by the pair of bar-shaped nipping members 109, is not a plane but a line. This results in an insufficient odor-sealing capability between the waste materials 110 accommodated below the closing mechanism 108, and the opening above the closing mechanism 108.

[0011] It is an object of the present invention to solve the above problems and to provide a waste disposal apparatus having a high odor-sealing capability, for disposing of waste materials such as soiled diapers.

[0012] A waste disposal apparatus according to the present invention includes: a film accommodating portion, which has a tubular core that forms a waste inlet at its upper end, and which accommodates a film, which is compressed into a cylindrical shape, so as to surround the tubular core; a waste accommodating main body, which has the film accommodating portion positioned in an upper part thereof, and which receives a waste material placed in the film pulled out into the waste inlet, together with the film; and an open/close sealing mechanism that nips the film at a position between the film accommodating portion and the waste accommodating

main body to seal a space below the nipped part of the film from a space above the nipped part of the film. The sealing mechanism has a sealing door capable of being opened and closed, and a sealing door receiving portion that, together with the sealing door, nips the film when the sealing door is at a closed position, and film nipping portions of the sealing door and the sealing door receiving portion include concavo-convex shapes that bend a vertical intermediate portion of a film portion to be nipped, laterally with respect to an imaginary straight line that connects upper and lower ends of the film portion to be nipped.

[0013] According to the present invention, sealing the waste material placed in the film from the waste inlet is implemented by nipping of the film by the sealing door and the sealing door receiving portion. Moreover, since the film is nipped by the concavo-convex shapes of the sealing door and the sealing door receiving portion, the film is not bent linearly but laterally with respect to the imaginary straight line. Thus, the film is subjected to a high tension at the bent portions. Such a tension narrows a remaining airflow path, whereby a capability of blocking passing of odors, namely an odor-sealing capability, can be increased. Moreover, the film need not be twisted upon every disposal of a waste material, which can avoid the disadvantage that the maximum amount of waste that can be accommodated in the waste disposal apparatus is reduced by the twists of the film.

[0014] As a preferred embodiment, each of the concavo-convex shapes of the sealing door and the sealing door receiving portion, which engage with each other when the sealing door is closed, is formed by a plurality of surfaces.

[0015] According to this embodiment, the number of bent portions of the film nipping portion is increased, and thus the number of points at which the tension is applied to the film is increased. This further increases the odor-sealing capability. Note that the concavo-convex shapes may be formed by a flat surface or a curved surface.

[0016] As a preferred embodiment, at least two of the plurality of surfaces of each of the concavo-convex shapes are connected together substantially at a right angle to form an angled portion.

[0017] According to this embodiment, the film is bent substantially at right angles at least at one position when nipped by the sealing door and the sealing door receiving portion. The film is subjected to a high tension at this substantially right angled bent portion, which narrows the remaining airflow path, whereby the odor-sealing capability can further be increased. Moreover, a substantially L-shape of the portion that is bent substantially at right angles is not complex, and thus is easy to form when mass producing the sealing door and the sealing door receiving portion by a die molding method. Thus, the waste disposal apparatus of the present invention is advantageous in terms of mass production of products.

[0018] As a preferred embodiment, the concavo-convex shape of the sealing door is formed in a front end of

the sealing door, and the sealing door is pivotally supported at its rear end by the waste accommodating main body or the sealing door receiving portion.

[0019] According to this embodiment, the opening/closing operation of the sealing door is implemented by pivoting of the sealing door. This makes it easier for the user to open the sealing door when pushing the waste material into the waste accommodating main body.

[0020] As a preferred embodiment, the sealing mechanism may further include an elastic member that biases the sealing door in a closing direction.

[0021] According to this embodiment, a film nipping force can be increased, which can further increase the odor-sealing capability.

[0022] As a preferred embodiment, the elastic member is a single elastic material capable of extending and contracting in its extending direction, and both ends of the elastic material are coupled with right and left side edges of the sealing door receiving portion, and a central region of the elastic member extends along a lower surface of the sealing door.

[0023] According to this embodiment, the elastic member for biasing the sealing door in the closing direction can be implemented only by a single elastic material.

Moreover, since only one elastic material is used to apply an elastic force to the lower surface of the sealing door to bias the sealing door in the closing direction, the sealing door can be laterally substantially equally biased.

[0024] As a preferred embodiment, the sealing door includes, in its lower surface, an elastic member guide for holding the central region of the elastic member.

[0025] According to this embodiment, the elastic member, which is provided along the lower surface of the sealing door, is stably fixed to a predetermined position in the lower surface of the sealing door by the elastic member guide. Thus, the sealing door can be stably biased in the closing direction by the elastic member.

[0026] As a preferred embodiment, the sealing mechanism further includes: a left elastic member cover, which has its upper end latched by a left side edge of the sealing door receiving portion, and its lower end latched by a left side edge of the sealing door, and accommodates a left end of the elastic member; and a right elastic member cover, which has its upper end latched by a right side edge of the sealing door receiving portion, and its lower end latched by a right side edge of the sealing door, and accommodates a right end of the elastic member. These elastic member covers follow opening/closing movement of the sealing door while being kept latched by the left and right side edges of the sealing door.

[0027] According to this embodiment, the elastic member, which is located on both side edges of the sealing door and the sealing door receiving portion, is always covered by the elastic member covers regardless of the opening/closing operation of the sealing door. This can prevent the film containing the waste material from being torn by being caught by the elastic member. Moreover, both ends of the elastic member can be held by the elastic

member covers. This can prevent the elastic member from coming off from the sealing door even if the sealing door is not provided with the elastic member guide.

[0028] As a preferred embodiment, the film accommodating portion is supported by the waste accommodating main body so that an axis of the tubular core is tilted at a predetermined angle.

[0029] According to this embodiment, mothers can easily insert the waste material through the waste inlet without standing up after changing diapers in a sitting posture.

[0030] As a preferred embodiment, a lower end of the film accommodating portion, which surrounds a lower end of the tubular core, is tilted and supported at the predetermined angle so that a front end side of the lower end of the film accommodating portion is located at a vertically lower position, and a rear end side of the lower end thereof is located at a vertically higher position, and the concavo-convex shape of the sealing door receiving portion is located near a lowest position of the lower end of the film accommodating portion.

[0031] According to this embodiment, the film, which is accommodated in the film accommodating portion so as to be able to be pulled out from the waste inlet, passes vertically downward through the tubular core supported in the tilted state, and is accommodated together with the waste material in the waste accommodating main body. The film is pulled vertically downward by the weight of the waste material placed in the film. Provided that L_0 represents a diameter of the waste inlet, and θ_0 represents a tilt angle of the waste inlet with respect to the horizontal direction, the film is naturally drawn toward the lowest position of the lower end of the tilted tubular core at least by a distance $L_0 (1 - \cos\theta_0)$ due to the gravity and the tilt of the tubular core. Moreover, the sealing mechanism is positioned so that the film is nipped at a position near the lowest position of the lower end of the tubular core to which the film is naturally drawn. This facilitates nipping of the film by the sealing mechanism, whereby odor-sealing efficiency can be expected to be increased.

[0032] As a preferred embodiment, the sealing door is tilted and supported at a predetermined angle when located at the closed position, so that a front end side thereof is located at a vertically lower position, and a rear end side thereof is located at a vertically higher position.

[0033] According to this embodiment, mothers can easily push the sealing door open without standing up after changing diapers in a sitting posture. This facilitates the operation of inserting the waste material through the waste inlet.

[0034] As a preferred embodiment, the film nipping portions of the sealing door and the sealing door receiving portion are formed on a front side of the waste accommodating main body. The waste accommodating main body has a tilted surface in a front region of its inner bottom surface, and the tilted surface is tilted so that its vertical height decreases from a front side toward a rear

side.

[0035] According to this embodiment, the waste material placed into the waste accommodating main body slides down toward the back face of the waste accommodating main body along the tilted surface provided on the bottom of the waste accumulating main body. Thus, waste materials are efficiently accumulated in the waste accumulating main body.

[0036] As a preferred embodiment, the film accommodating portion is a film accommodating cassette including the tubular core, a tubular core flange that extends from a lower end of the tubular core in an outer diameter direction, and a film holding flange that extends from an upper end of the tubular core in the outer diameter direction, accommodates the film in a compressed state between the tubular core flange and the film holding flange, and allows the film to be pulled out beyond an outer edge of the film holding flange into the tubular core. The film accommodating cassette is detachably attached to the upper part of the waste accommodating main body.

[0037] According to this embodiment, when the film as a consumable item runs out, the user can replace the used film accommodating cassette with a refill (new) film accommodating cassette by a simple operation.

[0038] According to the waste disposal apparatus of the present invention, sealing of the waste material placed in the film from the waste inlet is implemented by nipping of the film by the sealing door and the sealing door receiving portion. Moreover, since the film is nipped by the concavo-convex shapes provided in the sealing door and the sealing door receiving portion, the film is not bent linearly but laterally with respect to an imaginary straight line. Thus, the film is subjected to a high tension at the bent portion. This tension narrows a remaining airflow path, whereby the capability of blocking passing of odors, namely the odor-sealing capability, can be increased.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

Fig. 1 is an overall perspective view of a waste disposal apparatus according to an embodiment of the present invention.

Fig. 2 is a side cross section of the waste disposal apparatus of the embodiment.

Fig. 3 is a side cross section of the waste disposal apparatus of the embodiment.

Fig. 4 is an enlarged side cross section of a sealing mechanism of the embodiment in the state where a sealing door is closed.

Fig. 5 is an enlarged side cross section of the sealing mechanism of the embodiment in the state where the sealing door is open.

Fig. 6A is an enlarged side cross section schematically showing film nipping portions of the sealing door and a sealing door receiving portion of the embodi-

ment when the sealing door is open, and Fig. 6B is an enlarged side cross section schematically showing the film nipping portions of the sealing door and the sealing door receiving portion of the embodiment when the sealing door is closed.

Fig. 7A is an enlarged side cross section showing film nipping portions of a convex sealing door and a concave sealing door receiving portion of another embodiment of the present invention when the convex sealing door is open, and Fig. 7B is an enlarged side cross section showing the film nipping portions of the convex sealing door and the concave sealing door receiving portion of the another embodiment when the convex sealing door is closed.

Fig. 8 is an exploded perspective view of a film accommodating portion.

Fig. 9 is an overall perspective view of a waste disposal apparatus according to an embodiment of the present invention.

Fig. 10 is a perspective view of the waste disposal apparatus of the embodiment as viewed obliquely from behind.

Fig. 11 is an enlarged side cross section of a main body lock mechanism and a lid lock mechanism according to the embodiment.

Fig. 12 is a perspective view illustrating an operation of unlocking the main body lock mechanism according to the embodiment.

Fig. 13 is a side cross section showing a state where an upper part of a waste accommodating main body of the embodiment is pivoted.

Fig. 14 is a perspective view illustrating an operation of unlocking the lid lock mechanism according to the embodiment.

Fig. 15 is a side cross section of a waste disposal apparatus according to a further embodiment of the present invention when a sealing door is closed.

Fig. 16 is a side cross section of the waste disposal apparatus of Fig. 15 when the sealing door is open.

Fig. 17 is a perspective view of a sealing mechanism of Fig. 16 as viewed obliquely from beneath.

Fig. 18 is a perspective view of a film accommodating cassette according to the present invention.

Fig. 19 is a perspective view of the film accommodating cassette of Fig. 18 with a film removed therefrom.

Fig. 20 is a side view of the film accommodating cassette in the state of Fig. 19.

Fig. 21 is a top view of the film accommodating cassette in the state of Fig. 19 as viewed from above in the direction of an axis O of a tubular core.

Fig. 22 is a diagram showing the appearance of the waste disposal apparatus of Fig. 15 having the film accommodating cassette removed therefrom, as viewed from above in the direction of the axis O.

Fig. 23 is a cross sectional view of a film twisting mechanism of a conventional waste disposal apparatus.

Fig. 24 is a cross sectional view of a film nipping mechanism of a conventional waste disposal apparatus.

5 DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0040] Embodiments of the present invention will be described in detail below with reference to the accompanying drawings. Fig. 1 is an overall perspective view of a waste disposal apparatus according to an embodiment of the present invention. Figs. 2 and 3 are side cross sections of the waste disposal apparatus of the embodiment. Fig. 2 shows a state where a sealing door is closed, and Fig. 3 shows a state where the sealing door is open.

[0041] A waste disposal apparatus 11 includes: an annular waste inlet 16 for inserting a waste material D such as a soiled diaper therethrough; a cylindrical film 15 extending downward from the waste inlet 16 and having its lower end closed by a knot 26; a waste accommodating main body 13 for receiving the waste material D inserted through the waste inlet 16, together with the film 15; and a lid 23 that covers the waste inlet 16 from above.

[0042] The long film 15 is attached to the waste inlet 16. The film 15 extends downward so as to cover the opening of the waste inlet 16.

[0043] The waste accommodating main body 13 is a hollow container for storing waste materials D that are placed in the film 15, and is divided into a lower part 17 and an upper part 19. The lower part 17 of the waste accommodating main body 13 has a bottom 17b at its lower end, and has an opening at its upper end. The upper part 19 of the waste accommodating main body 13 covers, at its lower end, the opening at the upper end of the lower part 17, and has the waste inlet 16 at its upper end.

[0044] An open/close sealing mechanism 28 is provided inside the upper part 19 of the waste accommodating main body 13. The sealing mechanism 28 nips the film 15 at a position between the waste inlet 16 and the stored waste material D to seal the stored waste material D. The sealing mechanism 28 has a sealing door 33 and a sealing door receiving portion 35. The sealing mechanism 28 will be described later.

[0045] When disposing of a waste material D, the user first opens the lid 23 to place the waste material D into the film 15 from the waste inlet 16. Then, the user inserts his/her hand into the waste inlet 16, and pushes the film 15 down together with the waste material D to open the sealing door 33. The waste material D thus pushed down, together with the film 15, passes between the opened sealing door 33 and the sealing door receiving portion 35. The waste material D then drops downward along the film 15, and is stored in the waste accommodating main body 13. As soon as the user drops the waste material D to a position below the sealing door 33 and the sealing door receiving portion 35, and removes his/her hand from the waste inlet 16, the sealing door 33 closes to nip the film 15. Since a new length of the film 15 is

pulled out from the waste inlet 16, the waste inlet 16 is always supplied with a new length of the film 15.

[0046] Fig. 4 is an enlarged cross section of the sealing mechanism 28 of Fig. 2 when the sealing door 33 is closed. Fig. 5 is an enlarged cross section of the sealing mechanism 28 of Fig. 3 when the sealing door 33 is open. Note that line O in Fig. 4 represents the central axis of the waste inlet 16 and a tubular core described later.

[0047] As described above, the waste disposal apparatus 11 includes the open/close sealing mechanism 28 that nips the film 15 at a position between the waste inlet 16 and the waste material D placed in the waste accommodating main body 13, and seals the waste material D. The sealing mechanism 28 has the sealing door 33 and the sealing door receiving portion 35. Each of the sealing door 33 and the sealing door receiving portion 35 is provided with a concavo-convex shape so that, upon closing of the sealing door 33, the concavo-convex shape of the sealing door 33 engages with the concavo-convex shape of the sealing door receiving portion 35 to nip the film 15 therebetween. This configuration will be described later.

[0048] The sealing door receiving portion 35 is provided inside the upper part 19 of the waste accommodating main body 13 so that the sealing door 33 covers and closes the waste inlet 16 from beneath in the state where the sealing door 33 is closed. A guide rail 37 for guiding the sealing door 33 in opening and closing directions is attached to the inner wall of the upper part 19 of the waste accommodating main body 13. The guide rail 37 is positioned so as to extend downward below the sealing door receiving portion 35, and the sealing door 33 slides along the guide rail 37.

[0049] The sealing door 33 is biased toward the sealing door receiving portion 35, and in a normal state, the sealing door 33 is closed in an engaged state with the sealing door receiving portion 35. In the normal state, as shown in Fig. 2, the film 15 is nipped by the sealing door 33 and the sealing door receiving portion 35. If the user pushes the sealing door 33 down, the sealing door 33 slides in the opening direction, namely away from the sealing door receiving portion 35, along the guide rail 37. As shown in Fig. 3, when the sealing door 33 is opened, the nipped film 15 is released to allow the waste material D to be inserted into the waste accommodating main body 13.

[0050] In the present embodiment, as shown in Figs. 2 to 5, each of the sealing door 33 and the sealing door receiving portion 35 is provided with the concavo-convex shape, and the pair of concavo-convex shapes engage with each other when the sealing door 33 is closed. The film 15 is nipped by the concavo-convex shapes of the sealing door 33 and the sealing door receiving portion 35. The concavo-convex shape of the sealing door 33 is formed by a nipping surface 33c that contacts the film 15 when the sealing door 33 is closed. The concavo-convex shape of the sealing door receiving portion 35 is formed by a nipping surface 35c that contacts the film 15 when the sealing door 33 is closed.

[0051] The nipping surfaces 33c, 35c will be described

in detail below with reference to Figs. 6A-6B. Fig. 6A is an enlarged side cross section schematically showing film nipping portions of the sealing door 33 and the sealing door receiving portion 35 of the present embodiment when the sealing door 33 is open. Fig. 6B is an enlarged side cross section schematically showing the film nipping portions of the sealing door 33 and the sealing door receiving portion 35 of the present embodiment when the sealing door 33 is closed. Note that, to facilitate understanding, Figs. 6A-6B schematically show the film nipping portions of the sealing door 33 and the sealing door receiving portion 35, and do not accurately show an actual configuration of the embodiment.

[0052] As shown in Figs. 6A-6B, the nipping surface 33c, which corresponds to the film nipping portion of the sealing door 33, is formed by surfaces 33c₁, 33c₂, 33c₃. The surface 33c₁ corresponds to a front end region of the upper surface of the sealing door 33. The surface 33c₂ connects to the front end of the surface 33c₁ substantially at a right angle to the surface 33c₁, and extends downward to form a substantially right angled portion with the surface 33c₁. The surface 33c₃ connects to the lower end of the surface 33c₂ substantially at a right angle to the surface 33c₂, and extends forward to form a substantially right angled portion with the surface 33c₂.

[0053] The nipping surface 35c, which corresponds to the film nipping portion of the sealing door receiving portion 35, is formed by surfaces 35c₁, 35c₂, 35c₃. The surface 35c₁ is provided at the upper end of the film nipping portion so as to extend substantially perpendicularly to the axis O of the waste inlet 16, and is substantially parallel to the surface 33c₁ when the sealing door 33 is closed. The surface 35c₂ connects to the front end of the surface 35c₁ substantially at a right angle to the surface 35c₁ and extends downward, and is substantially parallel to the surface 33c₂ when the sealing door 33 is closed. The surface 35c₃ connects to the lower end of the surface 35c₂ substantially at a right angle to the surface 35c₂ and extends forward, and is substantially parallel to the surface 33c₃ when the sealing door 33 is closed.

[0054] When the sealing door 33 slides in the direction shown by arrow in Fig. 6A from the open state of Fig. 6A to the closed state of Fig. 6B to nip the film 15, the film 15 is bent substantially at right angles at two angled portions α_1 , α_2 . That is, when nipped by the sealing door 33 and the sealing door receiving portion 35, the film 15 is bent laterally with respect to an imaginary straight line shown by chain line in Fig. 6B at vertical intermediate points α_1 , α_2 of the nipped portion of the film 15, so that the vertical intermediate points α_1 , α_2 are located on both sides of an imaginary straight line. Note that, the imaginary straight line is a line connecting an upper end β and a lower end γ of the nipped portion of the film 15. The film 15 is also bent at the upper end β of the nipped portion of the film 15 by an angled portion formed at the rear end of the surface 35c₁. Similarly, the film 15 is also bent at the lower end γ of the nipped portion of the film 15 by an angled portion formed at the front end of the surface 33c₃.

[0055] The waste material D placed in the film 15 is pulled downward by its own weight due to the gravity. That is, the film 15 is continuously subjected to a vertically downward tension by the waste material D. If the film 15 being subjected to such a tension is nipped as shown in Fig. 6B, and is bent at the four angled portions α_1 , α_2 , β , γ , the film 15 is subjected to a higher tension at these angled portions. This effectively closes a remaining air-flow path that causes passing of odors in the related art described above. Thus, odor sealing capability can be significantly increased. Moreover, the film 15 need not be twisted upon every disposal of a waste material D, which can avoid the disadvantage that the maximum amount of waste that can be accommodated in the waste disposal apparatus 11 is reduced by the twists of the film 15. The concavo-convex shapes having the substantially right angled portions are stepped shapes, and thus are not complex. This facilitates formation of the concavo-convex shapes when mass producing the sealing door 33 and the sealing door receiving portion 35 by a die molding method. Thus, the waste disposal apparatus 11 of the present embodiment is advantageous in terms of mass production of the products.

[0056] Figs. 7A-7B schematically show another embodiment of the sealing door 33 and the sealing door receiving portion 35. Fig. 7A is an enlarged side cross section showing film nipping portions of a convex sealing door 33 and a concave sealing door receiving portion 35 of the present embodiment when the convex sealing door 33 is open. Fig. 7B is an enlarged side cross section showing the film nipping portions of the convex sealing door 33 and the concave sealing door receiving portion 35 of the present embodiment when the convex sealing door 33 is closed. Note that, to facilitate understanding, Figs. 7A-7B schematically show the film nipping portions of the sealing door 33 and the sealing door receiving portion 35, and do not accurately show an actual configuration of the embodiment.

[0057] In the present embodiment, nipping of the film 15 by the sealing door 33 and the sealing door receiving portion 35 is implemented by engagement between the sealing door 33 provided with the film nipping portion having a convex side cross section, and the sealing door receiving portion 35 provided with the film nipping portion having a concave side cross section that is configured to receive the convex shape of the sealing door 33.

[0058] More specifically, a nipping surface 33c has a ridge 133 having a convex cross section, and a nipping surface 35c has a ridge groove 135 having a concave cross section. The ridge 133 protrudes in a direction substantially parallel to the sliding direction of the sealing door 33. Thus, when the sealing door 33 slides in the closing direction to engage with the sealing door receiving portion 35, the concavo-convex shape of the sealing door 33 engages with the concavo-convex shape of the sealing door receiving portion 35 without hindering the sliding movement.

[0059] As shown in Figs. 7A-7B, the nipping surface

33c of the sealing door 33 is formed by surfaces 33c₁ to 33c₅, and the nipping surface 35c of the sealing door receiving portion 35 is formed by surfaces 35c₁ to 35c₅. Of these surfaces 33c₁ to 33c₅, 35c₁ to 35c₅, the surfaces 33c₂, 33c₄ and the surfaces 35c₂, 35c₄ are surfaces that extend substantially perpendicularly to an imaginary straight line connecting an upper end β and a lower end γ of the nipped portion of the film 15 shown in Fig. 7B. Thus, when the sealing door 33 slides in the direction shown by arrow in Fig. 7A from the open state of Fig. 7A to the closed state of Fig. 7B to nip the film 15, the film 15 is bent substantially at right angles at four angled portions α_1 to α_4 . That is, the film 15 is bent substantially horizontally between the angled portions α_1 , α_2 , and between the angled portions α_3 , α_4 .

[0060] As described above with reference to Fig. 6, the film 15 is pulled vertically downward by the weight of the waste material D due to the gravity. That is, the film 15 is subjected to a high tension at the four substantially right angled portions α_1 , α_2 , α_3 , α_4 . Thus, a remaining air flow path formed inside of the film 15 is bent at right angles, whereby odors can be more effectively sealed. Moreover, the film 15 need not be twisted upon every disposal of a waste material D, which can avoid the disadvantage that the maximum amount of waste that can be accommodated in the waste disposal apparatus 11 is reduced by the twists of the film 15. Furthermore, the concavo-convex shapes can be easily formed when mass producing the sealing door 33 and the sealing door receiving portion 35 by a die molding method. Thus, the waste disposal apparatus 11 of the present embodiment is advantageous in terms of mass production of the products.

[0061] The waste disposal apparatus 11 further includes a spring 39 for continuously biasing the sealing door 33 toward the sealing door receiving portion 35. The larger the biasing force of the spring 39 is, the more the force for nipping the film 15 can be increased, whereby the odor sealing capability can further be increased.

[0062] Fig. 8 is an exploded perspective view of a film accommodating portion 14. The waste disposal apparatus 11 includes the film accommodating portion 14, which forms the waste inlet 16 and also accommodates the film 15. The film accommodating portion 14 is detachably attached to a film attachment portion 12 provided at an upper region of the upper part 19 of the waste accommodating main body 13, and forms the outline of the waste inlet 16. The film accommodating portion 14 has a cylindrical tubular core 27 extending downward from the waste inlet 16, a tubular core flange 27f provided at the lower end of the tubular core 27, and a film holding flange 29 that is fitted and fixed to the upper end of the tubular core 27.

[0063] The film 15 is accordion folded in the axial direction of the tubular core 27, and is coaxially inserted on the outer diameter side of the tubular core 27. The film holding flange 29 is fitted and connected to the tubular core 27 so as to prevent the film 15 from coming

off from the tubular core 27. That is, by the film holding flange 29 located at the upper end of the tubular core 27, and the tubular core flange 27f located at the lower end of the tubular core 27, the film 15 is compressed in the accordion folded state and accommodated in the space between the upper and lower ends in the direction of the axis O of the tubular core 27.

[0064] The film 15 is a consumable part of the film accommodating portion 14. If the film 15 accommodated in the film accommodating portion 14 runs out, the user replaces the used film accommodating portion 14 in the film attachment portion 12 with a refill film accommodating portion 14. Alternatively, the film accommodating portion 14 may be configured so that only the film 15 is replaced with a refill film when the film 15 accommodated in the film accommodating portion 14 runs out. That is, the tubular core flange 27f may be fixed to the film attachment portion 12, and the film holding flange 29 may be detachably attached to the tubular core 27. This configuration enables the user to replace only the film 15 with a refill film by removing the film holding flange 29.

[0065] After placing the refill film accommodating portion 14 in the waste disposal apparatus 11, the user pulls out an end of the film 15, which is accommodated in the compressed state on the tubular core 27, upward beyond the outer edge of the film holding flange 29 without closing the lid 23. Then, the user ties a knot 26 at this end of the film 15 to close the film 15. The user pushes the knot 26 down through the tubular core 27 to the bottom 17b while pulling the film 15 out of the film accommodating portion 14. By disposal of waste materials such as soiled diapers into the film 15, the waste materials are accumulated in the film 15, and the film 15 accordion folded on the outer diameter side of the tubular core 27 is pulled out in the downward direction upon each disposal. Thus, the user can successively dispose of waste materials into the waste accumulating main body 13.

[0066] As shown in Fig. 4, in the waste disposal apparatus 11 of the present embodiment, the film accommodating portion 14 is supported by the upper part 19 of the waste accommodating main body 13 so that the direction of the axis O of the tubular core 27, namely the opening direction of the waste inlet 16, is tilted at a predetermined angle. The waste inlet 16 is tilted forward at a predetermined angle θ_{16} with respect to the vertical direction. This makes it easier for mothers to dispose of soiled diapers into the waste disposal apparatus 11. This will be described briefly below. Mothers typically lay their children down on the floor to change diapers. Namely, mothers typically sit on the floor while changing diapers. According to the present embodiment, since the waste inlet 16 is tilted at the predetermined angle θ_{16} , mothers can easily insert soiled diapers (waste materials) through the waste inlet 16 without standing up after changing diapers in a sitting posture.

[0067] Note that although not shown in the figures, the film accommodating portion 14 may be supported by the upper part 19 of the waste accommodating main body

13 so that the opening direction of the waste inlet 16 is horizontal. In this case, the axis O of the tubular core 27 extends horizontally. In this configuration as well, a tension can be applied to the nipped portion of the film.

[0068] As shown in Figs. 4-5, the sealing door 33 has a substantially flat upper surface 34. The shape of the upper surface 34 will be described in detail later. In the waste disposal apparatus 11 of the present embodiment, the sealing door 33 is supported by the upper part 19 of the waste accommodating main body 13 so that the upper surface 34 of the sealing door 33 is tilted at a predetermined angle corresponding to the direction of the tilted axis of the tubular core 27. That is, the sealing door 33 is supported by the upper part 19 of the waste accommodating main body 13 so that, in the closed state, the sealing door 33 is tilted at a predetermined angle with its front end side being located lower in the vertical direction, and its rear end side being located higher in the vertical direction. The sealing door 33 advances and withdraws at the predetermined angle to and from the sealing door receiving portion 35. An advancing/withdrawing direction S of the sealing door 33 is tilted at an angle different from that of the axis O of the tubular core 27.

[0069] More specifically, as shown in Fig. 4, the following expression (1) is satisfied, where θ_{16} represents a tilt angle of the waste inlet 16 (the tubular core 27) with respect to the vertical direction, and θ_{33} represents a tilt angle of the advancing/withdrawing direction S of the sealing door 33 with respect to the vertical direction.

$$0^\circ < \theta_{16} < \theta_{33} \quad \dots (1)$$

[0070] According to the present embodiment, the tilt angle θ_{33} of the advancing/withdrawing direction S of the sealing door 33 is larger than the tilt angle θ_{16} of the waste inlet 16. Thus, as the sealing door 33 is withdrawn in the opening direction, the sealing door 33 is translated downward and backward, and thus away from the axis O of the tubular core 27. That is, when being opened, the sealing door 33 can be sufficiently separated from the film 15. Thus, the film 15 is opened wide when the sealing door 33 is opened, which enables the user to easily insert a waste material D into the waste accommodating main body 13 while sitting on the floor.

[0071] Note that although not shown in the figures, the sealing door 33 may be supported by the upper part 19 of the waste accommodating main body 13 so that the upper surface 34 of the sealing door 33 extends perpendicularly to the horizontal direction ($\theta_{33} = 90^\circ$). In this case, the sealing door 33 advances and withdraws horizontally. In this configuration as well, the sealing door 33 can be effectively separated from the film 15 when being opened.

[0072] According to the present embodiment, the tubular core flange 27f, which is positioned so as to surround the lower end of the tubular core 27 and corre-

sponds to the lower end of the film accommodating portion 14, is supported by the waste accommodating main body 13 so as to be tilted at a predetermined angle. That is, as shown in Figs. 2-5, the front end side of the tubular core flange 27f is located lower in the vertical direction, and the rear end side thereof is located higher in the vertical direction. The nipping surface 35c of the sealing door receiving portion 35 is located near the lowest part of the tubular core flange 27f. This facilitates nipping of the film 15 by the sealing door 33. This will be described below.

[0073] The film 15, which is accommodated in the film accommodating portion 14 so as to be able to be pulled out from the waste inlet 16, passes vertically downward through the tubular core 27, and is accommodated together with the waste material D in the lower part 17 of the waste accommodating main body 13. Thus, when the sealing door 33 is open, the film 15 is pulled vertically downward by the weight of the waste material D placed in the film 15, and thus extends substantially straight downward from the waste inlet 16. As described above, the tubular core 27 is tilted at the predetermined angle θ_{16} . Thus, provided that L_0 represents a diameter of the waste inlet 16, and $\theta_0 (= \theta_{16})$ represents a tilt angle of the waste inlet 16 with respect to the horizontal direction, the film 15 is naturally drawn toward the lower side of the tilt, namely toward the front side, at least by a horizontal distance $L_0 (1 - \cos\theta_0)$ if the film 15 extends straight downward from the waste inlet 16. The film 15 is nipped by the sealing door 33 and the sealing door receiving portion 35 at a position on the lower side of the tilt to which the film 15 is naturally drawn. This can facilitate nipping of the film 15 by the sealing door 33, whereby sealing for blocking passing of odors can be more efficiently performed.

[0074] In the present embodiment, the upper surface 34 of the sealing door 33 is substantially flat, as described above. To be exact, however, the upper surface 34 of the sealing door 33 is formed by a substantially flat front part 34f, and a rear part 34r that is gently curved so as to be tilted with respect to the front part 34f. This will be described below with reference to Fig. 4. The film accommodating portion 14 is supported in a tilted state by the upper part 19 of the waste accommodating main body 13 so that the front side of the film accommodating portion 14 is located lower than the rear side thereof. The sealing door 33 nips the film 15 by engaging with the sealing door receiving portion 35 on the front side thereof, namely on the lower side of the tilt. When the sealing door 33 is in a closed state, the nipping surface 35c of the sealing door receiving portion 35 is present between the film accommodating portion 14 and the front part 34f of the upper surface 34 of the sealing door 33. On the other hand, the nipping surface 35c of the sealing door receiving portion 35 is not present between the film accommodating portion 14 and the rear part 34r of the upper surface 34 of the sealing door 33. Thus, the upper surface 34 of the sealing door 33 is formed by two different surfaces (the

flat front part 34f and the tilted rear part 34r) in order to contact the sealing door receiving portion 35 to close the waste inlet 16 from beneath.

[0075] In the present embodiment, as shown in Fig. 4, the upper surface 34 of the sealing door 33 is formed so as to satisfy the following expression (2), where θ_{34f} represents an angle of the front part 34f with respect to the horizontal plane, and θ_{34r} represents an angle of the rear part 34r with respect to the horizontal plane.

$$0^\circ \leq \theta_{34f} < \theta_{34r} \quad \dots (2)$$

[0076] Thus, by putting his/her hand on the rear part 34r of the upper surface 34 when pushing the sealing door 33 open to dispose of a waste material D, the user can efficiently transmit the pushing force to the sealing door 33. Thus, the user can open the sealing door 33 with a smaller force.

[0077] As a modification of the present embodiment, the rear part 34r of the upper surface 34 may be substantially perpendicular to the advancing/withdrawing direction S. According to this modification, the pushing force that is applied from the user's hand to the sealing door 33 can be applied to the spring 39 without being reduced. Thus, the user can push the sealing door 33 open with a smaller force.

[0078] The operation of opening the waste accommodating main body 13 will be described below.

[0079] Fig. 9 is an overall perspective view of a main body lock mechanism 25 and a lid lock mechanism 24 of the present embodiment. Fig. 10 is an overall perspective view of the waste disposal apparatus 11 of the present embodiment as viewed obliquely from behind. Fig. 11 is an enlarged side cross section of the main body lock mechanism 25 and the lid lock mechanism 24.

[0080] While the waste disposal apparatus 11 is in normal use, the upper part 19 and the lower part 17 of the waste accommodating main body 13 are closed so that the upper part 19 covers at its lower end a main body opening 17h located at the upper end of the lower part 17. The film attachment portion 12 is provided at an upper region of the upper part 19 of the waste accommodating main body 13, and the film accommodating portion 14 is attached to the film attachment portion 12.

[0081] A main body hinge 31 is provided on the back face of the waste accommodating main body 13. The main body hinge 31 is provided substantially in the middle of the vertical height of the waste disposal apparatus 11. The upper part 19 of the waste accommodating main body 13 is pivotally attached to the lower part 17 thereof by the main body hinge 31, and is pivotable about the main body hinge 31 as a fulcrum. As the upper part 19 of the waste accommodating main body 13 is pivoted, the main body opening 17h at the upper end of the lower part 17 is open to the outside.

[0082] The main body lock mechanism 25 and a main

body unlock mechanism are provided on the front face of the waste accommodating main body 13. When being locked, the main body lock mechanism 25 prevents pivoting of the upper part 19 in the state where the upper part 19 covers the lower part 17, namely in the state where the upper part 19 closes the lower part 17. The main body unlock mechanism is a mechanism for unlocking the main body lock mechanism 25.

[0083] The main body lock mechanism 25 has a columnar main body push button 21, and a push button receiving hole 32 that is formed as a through hole in the upper part 19 of the waste accommodating main body 13 in order to latch and lock the main body push button 21.

[0084] The main body push button 21 is formed at the upper end of a vertical flexible pillar portion 21p. The lower end of the pillar portion 21p is connected to the upper end of the lower part 17 of the waste accommodating main body 13.

[0085] The main body push button 21 is a column that protrudes in the outer diameter direction of pivoting of the upper part 19 of the waste accommodating main body 13. A push button outer peripheral edge 21g, which is an outer peripheral edge of the column, engages with the push button receiving hole 32 formed in the lower end of the upper part 19, thereby preventing pivoting of the upper part 19.

[0086] The main body unlock mechanism includes the main body push button 21 as an operation portion for unlocking the main body lock mechanism 25, and an opening operation portion for placing a user's hand thereon to pivot and open the upper part 19 of the waste accommodating main body 13 after unlocking the main body lock mechanism 25.

[0087] The upper part 19 of the waste accommodating main body 13 has a handle 22 as the opening operation portion. The handle 22 is provided at the lower end of the front face of the upper part 19, which is located on the side away from and opposite to the back face of the upper part 19 to which the main body hinge 31 is attached. The handle 22 is positioned near and below the main body push button 21.

[0088] The main body push button 21 is disengaged from the push button receiving hole 32 and the main body lock mechanism 25 is unlocked only while the main body push button 21 is being pressed. If the user releases the main body push button 21, the pillar portion 21p is restored to its original position, and the main body lock mechanism 25 is locked again.

[0089] When the waste accommodating main body 13 is filled with waste materials D, the user empties the waste accommodating main body 13 by unlocking the main body lock mechanism 25 and opening the upper part 19 of the waste accommodating main body 13.

[0090] Fig. 12 is a perspective view illustrating the operation of unlocking the main body lock mechanism 25. As shown in Fig. 12, the user places four fingers, namely fingers other than the thumb, of one hand on the handle 22 from beneath, and at the same time presses with the

thumb the main body push button 21 located near and above the handle 22, thereby unlocking the main body lock mechanism 25. The user lifts the handle 22 while unlocking the main body lock mechanism 25. Thus, the upper part 19 of the waste accommodating main body 13 is pivoted toward the back face, and the waste accommodating main body 13 is opened.

[0091] Fig. 13 is a side cross section showing the state where the upper part 19 of the waste accommodating main body 13 of the present embodiment has been fully pivoted. As shown in Fig. 13, when emptying the waste accommodating main body 13 that is filled with waste materials D, the user first fully opens the upper part 19 of the waste accommodating main body 13, and cuts the film 15 with a film cutter 38. Then, the user ties a knot to close the cut face of the film 15, and removes the bag of the film 15 filled with the waste materials D from the waste accommodating main body 13 to throw the bag out. After emptying the waste accommodating main body 13, the user places the upper part 19 of the waste accommodating main body 13 over the lower part 17 thereof. Thus, the push button 21 engages with the push button receiving hole 32, and the upper part 19 of the waste accommodating main body 13 is locked again.

[0092] In the waste disposal apparatus 11 of the present embodiment, the main body push button 21 is positioned near and above the handle 22 so that, when unlocking the main body lock mechanism 25 to pivot and open the upper part 19 of the waste accommodating main body 13, an adult user can press the main body push button 21 with other finger while supporting the handle 22 with any of the fingers of his/her one hand.

[0093] More specifically, the main body push button 21 is positioned on a path the thumb is ergonomically most likely to follow naturally when the user places the other four fingers on the handle 22 from beneath and closes his/her hand with the four fingers as a fulcrum.

[0094] This makes it easier and more comfortable for the user to unlock the main body lock mechanism 25 to pivot and open the upper part 19 of the waste accommodating main body 13. That is, the user can unlock the main body lock mechanism 25 with one hand according to the user's movement of naturally closing his/her hand.

[0095] In order to unlock the main body lock mechanism 25 to open the upper part 19 of the waste accommodating main body 13, the user needs to press the main body push button 21 in the inner diameter direction that is substantially perpendicular to the pivoting direction of the upper part 19, and to lift the handle 22 to pivot the upper part 19.

[0096] Since the two operations in different directions are required, it is very difficult for infants, who have neither an intent to open the upper part 19 of the waste accommodating main body 13 nor knowledge of how to open it, to open the upper part 19. This prevents the infants from accidentally opening the upper part 19 of the waste accommodating main body 13 and being injured by touching the film cutter 38 for cutting the film 15.

[0097] On the other hand, adults with intent to open the upper part 19 of the waste accommodating main body 13 can easily unlock the main body lock mechanism 25 and open the upper part 19 of the waste accommodating main body 13 with one hand. Thus, the waste disposal apparatus 11 is easy to handle when throwing out the waste materials D stored in the waste accommodating main body 13.

[0098] The operation of opening the lid 23 will be described below.

[0099] The lid 23 is pivotally attached, at its end on the back side, to the upper end of the upper part 19 of the waste accommodating main body 13 by a lid hinge 30, and the lid 23 is pivotable about the lid hinge 30 as a fulcrum. When the lid 23 is pivoted to open, the waste inlet 16 is open to the outside as shown in Fig. 1.

[0100] As shown in Figs. 9 and 11, the waste disposal apparatus 11 includes a lid lock mechanism 24, and a lid unlock mechanism. When being locked, the lid lock mechanism 24 prevents pivoting of the lid 23 in the state where the lid 23 covers the waste inlet 16, namely in the state where the lid 23 is closed. The lid unlock mechanism is a mechanism for unlocking the lid lock mechanism 24.

[0101] The lid lock mechanism 24 has a lid push button 20, and a lid push button receiving portion 36 provided in the upper part 19 of the waste accommodating main body 13. The lid push button 20 is provided in the lower part of the front face of the lid 23. A lid push button hook 20h is formed at the lower end of the lid push button 20. The lid push button hook 20h moves integrally with the lid push button 20.

[0102] The lid push button receiving portion 36 is formed at the upper end of the upper part 19 of the waste accommodating main body 13. When the lid 23 is in the closed state, the lid push button receiving portion 36 engages with the lid push button hook 20h.

[0103] The lid unlock mechanism includes the lid push button 20 as an operation portion for unlocking the lid lock mechanism 24, and an opening operation portion for placing a user's hand thereon to pivot and open the lid 23 after unlocking the lid lock mechanism 24.

[0104] As the opening operation portion, the lid 23 has a lid handle 18 on the front face side of the lid 23. The lid handle 18 is positioned near and above the lid push button 20.

[0105] When inserting a waste material through the waste inlet 16, the user unlocks the lid locking mechanism 24 to open the lid 23. Fig. 14 is a perspective view illustrating the operation of unlocking the lid lock mechanism 24.

[0106] When the user places four fingers, namely the fingers other than the thumb, of his/her one hand on the lid handle 18 from above, and presses the lid push button 20 by the thumb, the lid push button 20 together with the lid push button hook 20h moves in the pressing direction, and the lid push button hook 20h is disengaged from the lid push button receiving portion 36, whereby the lid lock mechanism 24 is unlocked. The user lifts the lid handle

18 while pressing the lid push button 20 with the thumb and unlocking the lid lock mechanism 24. Thus, the lid 23 is pivoted toward the back face, and the waste inlet 16 is opened.

[0107] After inserting a waste material through the waste inlet 16, the user closes the lid 23. Thus, the lid push button hook 20h is restored to its original position, and is engaged again with the lid push button receiving portion 36, whereby the lid lock mechanism 24 is locked.

[0108] In the lid lock mechanism 24, the lid push button hook 20h is disengaged from the lid push button receiving portion 36 only while the lid push button 20 is being pressed. That is, if the user releases the lid push button 20, the lid lock mechanism 24 is locked again.

[0109] Thus, in order to unlock the lid lock mechanism 24 to open the lid 23, it is necessary to press the lid push button 20 in the inner diameter direction that is substantially perpendicular to the pivoting direction of the lid 23, and to lift the lid handle 18 to pivot the lid 23. This makes it very difficult for infants, who have neither an intent to open the lid 23 nor knowledge of how to open it, to open the lid 23. This prevents the infants from accidentally opening the lid 23 and putting their hands into the waste disposal apparatus 11.

[0110] However, adults with intent to open the lid 23 can easily unlock the lid lock mechanism 24 and open the lid 23 with one hand. Thus, the waste disposal apparatus 11 is easy to handle when inserting waste materials through the waste inlet 16.

[0111] According to the present embodiment, as shown in Fig. 14, the user can place the four fingers other than the thumb of his/her one hand on the lid handle 18 from above, and at the same time press the lid push button 20 located near and below the lid handle 18 with the thumb. That is, the operator can unlock the lid lock mechanism 24 according to the user's movement of naturally closing his/her hand.

[0112] More specifically, the lid push button 20 is positioned on a path the thumb is ergonomically most likely to follow naturally when the user places the other four fingers on the lid handle 18 from above and closes his/her hand with the four fingers as a fulcrum. This makes it easier and more comfortable for the user to unlock the lid lock mechanism 24 to pivot and open the lid 23.

[0113] A waste disposal apparatus 41 according to a further embodiment of the present invention will be described below with reference to Figs. 15 to 17. Fig. 15 is a side cross section of a waste disposal apparatus 41 of the further embodiment of the present invention when a sealing door 53 is closed. Fig. 16 is a side cross section of the waste disposal apparatus 41 of the further embodiment when the sealing door 53 is open. Fig. 17 is a perspective view of a sealing mechanism 48 in Fig. 16 as viewed obliquely from below. Note that in the following description, components similar to those of the embodiment described with reference to Figs. 1 to 14 are denoted by the same reference characters as those of Figs. 1 to 14, and detailed description thereof will be omitted.

[0114] Referring to Figs. 15 to 17, the waste disposal apparatus 41 includes: a waste inlet 16 for inserting a waste material D therethrough; a cylindrical film 15 extending downward from the waste inlet 16 and having its lower end closed by a knot 26; a waste accommodating main body 43 for receiving the waste material D inserted through the waste inlet 16, together with the film 15; and a lid 23 that covers the waste inlet 16 from above.

[0115] The waste accommodating main body 43 is a hollow container for storing waste materials D that are placed in the film 15, and is divided into a lower part 47 and an upper part 49. The lower part 47 of the waste accommodating main body 43 has a bottom 47b at its lower end. A slope portion 42 is provided on the front side of the bottom 47b. The slope portion 42 is provided on the bottom 47b so as to form a tilted surface whose vertical height decreases from the front side to the rear side. The lower part 47 of the waste accommodating main body 43 has an opening at its upper end. The upper part 49 of the waste accommodating main body 43 covers, at its lower end, the opening at the upper end of the lower part 47. The waste inlet 16 is formed in the upper end of the upper part 49.

[0116] A tubular pillar portion 44 is provided in the rear part of the upper end of the upper part 49 of the waste accommodating main body 43. The tubular pillar portion 44 is a hollow pillar portion that extends vertically downward from the upper end of the upper part 49. A film cutter 38 described above is attached to the lower end of the tubular pillar portion 44. As shown in Figs. 15-16, the vertical length of the tubular pillar portion 44 is determined so that the film cutter 38 attached to the lower end of the tubular pillar portion 44 is located at about the same height or lower than a main body hinge 31 in the vertical direction. This configuration will be described briefly below.

[0117] As described above with reference to Fig. 13, when emptying the waste accommodating main body 43 that is filled with waste materials D, the user first fully opens the upper part 49 of the waste accommodating main body 43 to the state shown in Fig. 13. Then, the user cuts the film 15 with the film cutter 38. If the vertical length of the tubular pillar portion 44 is less than the value determined as described above, the film cutter 38 is contained in the space in the upper part 49 of the waste accommodating main body 43 in the state where the upper part 49 is open. This makes it difficult for the user to cut the film 15. Thus, the vertical length of the tubular pillar portion 44 is determined as described above so that the film cutter 38 protrudes outside the upper part 49 of the waste accommodating main body 43 in the state where the upper part 49 is open. Note that the configuration of the lower part 47 and the upper part 49 of the accommodating main body 43 is similar to that of the above embodiments except for the slope portion 42 and the tubular pillar portion 44.

[0118] As in the above embodiments, an open-close sealing mechanism 48 for nipping the film 15 at a position

between the waste inlet 16 and the stored waste material D to seal the waste material D is provided inside the upper part 49 of the waste accommodating main body 43. The sealing mechanism 48 includes: a sealing door receiving portion 55 that is coupled with the lower end of a film attachment portion 12 provided at an upper region of the upper part 49; and a sealing door 53 that is located below the sealing door receiving portion 55, and engages with the sealing door receiving portion 55 to form a film nipping portion. The sealing door receiving portion 55 is an annular member that is provided below the film attachment portion 12 and along the inner diameter surface of a tubular core 27. The sealing door 53 is a plate-like member that is larger than a central hole of the sealing door receiving portion 55, and covers the central hole of the sealing door receiving portion 55 from beneath.

[0119] In the present embodiment, the sealing door 53 forms, at its front end, the film nipping portion together with the sealing door receiving portion 55, and is pivotally supported at its rear end by the sealing door receiving portion 55 via a sealing mechanism hinge 45 as a fulcrum. That is, the opening/closing operation of the sealing door 53 is implemented by pivoting. As shown in Fig. 15, when in the closed state, the sealing door 53 engages with the sealing door receiving portion 55 to nip the film 15. As in the above embodiments, this closes a remaining airflow path that causes passing of odors. The film nipping portion, which is formed by the sealing door 53 and the sealing door receiving portion 55, will be described below.

[0120] The film nipping portions of the sealing door 53 and the sealing door receiving portion 55 includes stepped concavo-convex shapes, and the sealing door 53 engages with the sealing door receiving portion 55 when in the closed position. More specifically, the film nipping portion of the sealing door 53 has a nipping surface 53c that contacts the film 15, while the film nipping portion of the sealing door receiving portion 55 has a nipping surface 55c that contacts the film 15.

[0121] The nipping surface 53c of the sealing door 53 is formed by surfaces 53c₁, 53c₂, and 53c₃. The surface 53c₁ corresponds to a front end region of the upper surface of the sealing door 53. The surface 53c₂ connects to the front end of the surface 53c₁ substantially at a right angle to the surface 53c₁, and extends downward to form a circular arc surface along the entire width of the front end of the sealing door 53. The surface 53c₃ connects to the lower end of the surface 53c₂ substantially at a right angle to the surface 53c₂, and extends forward to form a substantially right angled portion with the surface 53c₂.

[0122] The nipping surface 55c of the sealing door receiving portion 55 is formed by surfaces 55c₁, 55c₂, and 55c₃. The surface 55c₁ is provided at the upper end of the film nipping portion so as to extend substantially perpendicularly to the axis O of the waste inlet 16, and is substantially parallel to the surface 53c₁ when the sealing door 53 is closed. The surface 55c₂ connects to the front end of the surface 55c₁ substantially at a right angle to

the surface 55c₁, and extends downward to form a circular arc surface that is substantially parallel to the surface 53c₂ when the sealing door 53 is closed. The surface 55c₃ connects to the lower end of the surface 55c₂ substantially at a right angle to the surface 55c₂ and extends forward, and is substantially parallel to the surface 53c₃ when the sealing door 53 is closed.

[0123] The sealing mechanism 48 further includes a spring 69 that biases the sealing door 53 in the closing direction, and spring covers 46 that cover the spring 69. The spring 69 is a single helical extension spring capable of extending and contracting in its extending direction, and both ends of the spring 69 are coupled with right and left side edges of the sealing door receiving portion 55. A central region of the spring 69 is accommodated in a spring guide 63 provided in the lower surface of the sealing door 53. The spring guide 63 is a groove formed in the lower surface of the sealing door 53. The spring guide 63 is provided in the longitudinal central portion of the lower surface of the sealing door 53 so as to extend along the entire lateral width of the lower surface of the sealing door 53.

[0124] Thus, in the present embodiment, the spring 69 is a single helical extension spring, and the central region of the spring 69 extends laterally along the lower surface of the sealing door 53 so as to be accommodated in the spring guide 63 provided in the lower surface of the sealing door 53. Thus, the sealing door 53 is stably and laterally substantially equally biased by the spring 69. This will be described below.

[0125] When in a normal state, the spring 69 biases the sealing door 53 in the closing direction by using the right and left side edges of the sealing door receiving portion 55, with which both ends of the spring 69 are coupled, as a fixed point, and using the entire lateral width of the longitudinal central portion of the lower surface of the sealing door 53 as a working point. Since the spring 69 is a helical extension spring, the spring 69 bilaterally symmetrically applies a substantially uniform elastic force to the lower surface of the sealing door 53. Moreover, since the spring 69 is latched by the spring guide 63, the spring 69 is stably fixed to a predetermined position on the lower surface of the sealing door 53. With these configurations, the sealing door 53 is stably and laterally substantially equally biased toward the sealing door receiving portion 55. That is, a pressing force is substantially evenly distributed in the film nipping portions of the sealing door 53 and the sealing door receiving portion 55.

[0126] Two spring covers 46, namely right and left spring covers 46, are attached to the sealing mechanism 48. The spring covers 46 are members having a C-shaped cross section and extending from the sealing door 53 to the sealing door receiving portion 55, and accommodate both side portions of the spring 69. The upper end of each spring cover 46 is pivotally supported by the sealing door receiving portion 55 by using as a fulcrum a hinge 50 that is provided near the coupling point be-

tween the spring 69 and the sealing door receiving portion 55. Each spring cover 46 has a groove recess 51, which is formed in its side surface facing the sealing door 53 so as to be recessed in the direction to the inside the spring cover 46. The groove recess 51 is a groove that extends from the upper end to the lower end of the spring cover 46. The groove recess 51 is open to the side edge of the sealing door 53. Rail-like pawls 56 are provided on both sidewalls of the groove. The pawls 56 extend from the upper end to the lower end of the spring cover 46. The pawls 56 engage with a hook portion (not shown) that is provided so as to protrude outward from the central portion of the side edge of the sealing door 53.

[0127] The pawls 56 and the hook portions of the sealing door 53 engage with each other so as to be relatively slidable with respect to each other along the extending direction of the spring cover 46. Thus, when the sealing door 53 is opened/closed, the sealing door 53 slides along the extending direction of the spring cover 46. As described above, the spring covers 46 are pivotally supported by the sealing door receiving portion 55. Thus, each spring cover 56 can smoothly pivot so as to follow a circular arc-shaped path that is followed by the engaged portion between the sealing door 53 and the spring cover 46 when the sealing door 53 is opened/closed. The spring covers 46 are positioned on the right and left side edges of the sealing door 53 and the sealing door receiving portion 55 so as to contain the spring 69 in the groove recesses 51 of the spring covers 46. With these configurations, the spring 69 is always accommodated in the groove recesses 51 regardless of the opening/closing operation of the sealing door 53.

[0128] A method for disposing of a waste material D in the waste disposal apparatus 41 according to the further embodiment of the present invention will be described with reference to Figs. 15-17. When disposing of a waste material D, the user first opens the lid 23 to place the waste material D in the film 15 through the waste inlet 16. Then, the user inserts his/her hand into the waste inlet 16, and pushes the film 15 down together with the waste material D to push the sealing door 53 down. Thus, the sealing door 53 pivots with the sealing mechanism hinge 45 as a fulcrum so as to follow a circular arc-shaped path shown by arrow A in Fig. 16, whereby the sealing door 53 is opened. The waste material D thus pushed down, together with the film 15, passes between the opened sealing door 53 and the sealing door receiving portion 55. The waste material D then drops downward along the film 15 as shown by arrow B in Fig. 16, and is stored in the lower part 47 of the waste accommodating main body 43.

[0129] As described above, the slope portion 42 is provided on the front side of the bottom 47b of the lower part 47 of the waste accommodating main body 43. Thus, when the waste material D is placed in the lower part 47 of the waste accommodating main body 43 as shown in Fig. 16, the waste material D slides down toward the back face of the lower part 47 as shown by arrow C in Fig. 16

along the slope portion 42 provided in a region corresponding to the position to which the waste material D is supposed to drop. This prevents the waste materials D from being stored only in the front region of the lower part 47 of the waste accommodating main body 43, and thus enables the waste materials D to be evenly stored in the lower part 47.

[0130] After placing the waste material D in the lower part 47 of the waste accommodating main body 43, the user removes his/her hand from the waste inlet 16. The sealing door 53 then immediately closes to nip the film 15. As described above with reference to Fig. 6, the film 15 nipped by the sealing door 53 and the sealing door receiving portion 55 is bent substantially at right angles at two angular portions formed in the film nipping portions. That is, an imaginary straight line, which connects the upper and lower ends of the film nipping portions, is bent substantially horizontally in the film nipping portions. This closes a remaining airflow path, which causes passing of odors, at right angles, whereby the passing of odors can be effectively blocked.

[0131] In the waste disposal apparatus 41 of the present embodiment, the opening/closing operation of the sealing door 53 is implemented by pivoting of the sealing door 53 about the sealing mechanism hinge 45 as a fulcrum. Thus, the user can easily open the sealing door 53 when pressing the waste material D into the waste accommodating main body 43, which facilitates the waste disposal operation.

[0132] As described above, the sealing mechanism 48 of the waste disposal apparatus 41 of the present embodiment further has the spring covers 46 that cover the spring 69. The spring 69 is always accommodated in the groove recesses 51 of the spring covers 46 regardless of the opening/closing operation of the sealing door 53. This configuration can prevent the film 15 from being damaged by being caught by the spring 69 positioned on both side surfaces (the right and left surfaces) of the sealing door 53, when the user opens/closes the sealing door 53 for disposal of the waste material D. Moreover, both ends of the spring 69 are guided by the spring covers 46 so as to be always positioned inside the groove recesses 51. This can prevent the spring 69 from coming off from the sealing door 53 even if the spring guide 63 is not provided in the lower surface of the sealing door 53.

[0133] Note that the present embodiment is described with respect to an example in which each of the nipping surfaces 53c, 55c, which correspond to the film nipping portions of the sealing door 53 and the sealing door receiving portion 55, is formed by flat surfaces and a circular arc surface that is substantially at right angles with the flat surfaces. However, the present invention is not limited to this, and the flat surfaces and a circular arc surface may cross each other at a predetermined angle such as an acute or obtuse angle. In addition, the sealing door 53 and the sealing door receiving portion 55 may be configured so that each of the nipping surfaces 53c, 55c may consist of a plurality of flat surfaces, a plurality of curved

surfaces, or a plurality of flat and curved surfaces.

[0134] In the present embodiment, an elastic member for biasing the sealing door 53 in the closing direction is the spring 69 that is a single helical extension spring. However, the present invention is not limited to this, and any type of spring may be used, and a plurality of springs may be used. Alternatively, a rubber material, a resin material, or a mixture thereof may be used as the elastic member. The sealing door 53 may be magnetically biased in the closing direction by incorporating a permanent magnet or an electromagnet into the sealing door 53 and the sealing door receiving portion 55.

[0135] A film accommodating cassette 54 for use in the waste disposal apparatus 41 according to the further embodiment of the present invention will be described with reference to Figs. 18-21. Fig. 18 is a perspective view of the film accommodating cassette 54 according to the further embodiment of the present invention. Fig. 19 is a perspective view of the film accommodating cassette 54 of Fig. 18 having the film 15 removed therefrom. Fig. 20 is a side view of the film accommodating cassette 54 in the state of Fig. 19. Fig. 21 is a top view of the film accommodating cassette 54 in the state of Fig. 19 as viewed from above in the direction of the axis O of a tubular core 57.

[0136] The waste disposal apparatus 41 includes the film accommodating cassette 54, which forms the waste inlet 16 and also accommodates the film 15. The film accommodating cassette 54, which is a film accommodating portion, has the cylindrical tubular core 57 defining the waste inlet 16, a tubular core flange 57f extending from the lower end of the tubular core 57 in the outer diameter direction, and a film holding flange 59 extending from the upper end of the tubular core 57 in the outer diameter direction.

[0137] As shown in Fig. 18, the film 15 is accommodated in an accordion folded state in a space between the axial upper and lower ends of the tubular core 57 by the film holding flange 59 located at the upper end of the tubular core 57 and the tubular core flange 57f located at the lower end of the tubular core 57. In this manner, the long film 15 can be accommodated in a compressed state between the tubular core flange 57f and the film holding flange 59. The radial dimension of the film holding flange 59 is relatively smaller than that of the tubular core flange 57f. This enables the film 15 to be pulled out beyond the outer edge of the film holding flange 59, whereby the film 15 can be extended downward through the waste inlet 16 formed in the tubular core 57.

[0138] In the present embodiment, cutouts 58 are provided in the outer edge of the tubular core flange 57f so as to extend through the tubular core flange 57f along the direction of the axis O thereof. As shown in Fig. 21, the tubular core flange 57f has the cutouts 58 at intervals of about 120° in the circumferential direction based on the axis O. These cutouts 58 are provided at the three positions of the tubular core flange 57f in a substantially rotational symmetrical pattern based on the axis O.

[0139] An upper surface 60 and a lower surface 64 of the tubular core flange 57f are flat surfaces that extend substantially parallel to each other. A rib 61 is provided on the upper surface 60. The rib 61 is formed by a circumferential rib 61a, a plurality of radial ribs 61b, and engagement ribs 61c₁, 61c₂. The circumferential rib 61a is formed at a predetermined radial position on the upper surface 60 so as to extend continuously in the circumferential direction about the axis O. The plurality of radial ribs 61b extend radially from the outer peripheral surface of the tubular core 57 to the circumferential rib 61a, and are arranged at substantially regular intervals in the circumferential direction. The engagement ribs 61c₁, 61c₂ extend radially from the circumferential rib 61a to the outer edge of the tubular core flange 57f.

[0140] As shown in Fig. 21, the engagement ribs 61c₁, 61c₂ are substantially equally arranged on the upper surface 60 of the tubular core flange 57f at intervals of about 60° in the circumferential direction based on the axis O. The engagement ribs 61c₁ are located at positions corresponding to one circumferential end of the cutouts 58. That is, in the present embodiment, the three engagement ribs 61c₁ are provided at the clockwise ends of the cutouts 58 as viewed from above in the direction of the axis O. The three engagement ribs 61c₁ and the three engagement ribs 61c₂, namely a total of six engagement ribs 61c₁, 61c₂, are arranged at substantially regular intervals of about 60° in the circumferential direction.

[0141] A method for attaching the film accommodating cassette 54 to the waste disposal apparatus 41 according to the further embodiment of the present invention will be described below with reference to Figs. 15-22. Fig. 22 is a diagram showing the appearance of the waste disposal apparatus 41 of the further embodiment of the present invention with the film accommodating cassette 54 removed therefrom, as viewed from above in the direction of the axis O. Note that the axis O in Fig. 22 represents the central axis of the tubular core 57 in the state where the film accommodating cassette 54 is attached to the waste disposal apparatus 41, and the axis O substantially corresponds to the central axis of an inner peripheral surface 12a of the film attachment portion 12. The axis O in Fig. 22 is a line that extends perpendicularly to the plane of the paper of the figure.

[0142] As described above, the film attachment portion 12, which forms a space for attaching the film accommodating cassette 54, is provided at an upper region of the upper part 49 of the waste accommodating main body 43. The film attachment portion 12 includes the inner peripheral surface 12a and a bottom surface 12b. The inner peripheral surface 12a faces a side of the film accommodating cassette 54 when the film accommodating cassette 54 is attached to the film attachment portion 12. The bottom surface 12b is a flat surface that contacts the lower surface 64 of the tubular core flange 57f when the film accommodating cassette 54 is attached to the film

attachment portion 12, the axis O of the inner peripheral surface 12a of the film attachment portion 12 substantially corresponds to the axis O of the tubular core 57. A circular opening 12h is formed about the axis O in the central portion of the bottom surface 12b of the film attachment portion 12 so as to communicate with the space inside the inner peripheral surface of the tubular core 57 that forms the waste inlet 16. When in the closed state shown in Fig. 22, the sealing door 53 covers and closes the opening 12h from beneath.

[0143] Pawls 62 are provided on the inner peripheral surface 12a of the film attachment portion 12 at a predetermined height from the bottom surface 12b in the upper direction of the axis O. The pawls 62 protrude from the inner peripheral surface 12a in the inner diameter direction. In the present embodiment, three pawls 62 are provided on the inner peripheral surface 12a of the film attachment portion 12 at regular intervals of about 120° in the circumferential direction based on the axis O. These pawls 62 are thus provided at the three positions in a substantially rotational symmetrical pattern based on the axis O. The pawls 62 are formed so that the circumferential width of the pawls 62 is smaller than that of the cutouts 58. This configuration will be described below.

[0144] When attaching the film accommodating cassette 54 to the waste disposal apparatus 41, the user places the film accommodating cassette 54 into the film attaching portion 12 with the tubular core flange 57f facing downward, and matches the positions of the pawls 62 provided on the inner peripheral surface 12a of the film attachment portion 12 with the positions of the cutouts 58 provided in the outer edge of the tubular core flange 57f. Then, the user pushes the film accommodating cassette 54 toward the bottom surface 12 of the film attachment portion 12. Since the circumferential width of the pawls 62 is smaller than that of the cutouts 58 as described above, the pawls 62 pass through the cutouts 58, and the lower surface 64 of the tubular core flange 57f contacts the bottom surface 12b of the film attachment portion 12.

[0145] Then, the user turns the film accommodate cassette 54 clockwise in the circumferential direction as viewed from above in the direction of the axis O. Thus, the outer edge of the tubular core flange 57f enters the gaps between each pawl 62 and the bottom surface 12b of the film attachment portion 12. The user continues to turn the film accommodating cassette 54 until the pawls 62 contact the engagement ribs 61c₂ and restrict turning of the film accommodating cassette 54. The film accommodating cassette 54 is attached to the waste disposal apparatus 41 in this manner.

[0146] In the state where the film accommodating cassette 54 is attached to the waste disposal apparatus 41, the pawls 62 of the waste disposal apparatus 41 engage with the outer edge of the tubular core flange 57f. This prevents the film accommodating cassette 54 from coming off from the film attachment portion 12. That is, the film accommodating cassette 54 of the present embod-

iment includes a coupling mechanism for attaching the film accommodating cassette 54 to the waste disposal apparatus 41, and the coupling mechanism is formed by the outer edge of the tubular core flange 57f that engages with the pawls 62 of the waste disposal apparatus 41, and the cutouts 58 for introducing coupling/decoupling of the film accommodating cassette 54. This embodiment can prevent the film accommodating cassette 54 from coming off in the state where the upper part 49 of the waste accommodating main body 43 is open as shown in Fig. 13.

[0147] When detaching the film accommodating cassette 54 from the waste disposal apparatus 41, the user turns the film accommodating cassette 54 counterclockwise in the circumferential direction as viewed from above in the direction of the axis O. Thus, the pawls 62 contact the engagement ribs 61c₁, and restrict turning of the film accommodating cassette 54. As described above, the engagement ribs 61c₁ are provided at the clockwise ends of the cutouts 58. Thus, the positions of the pawls 62 substantially match the positions of the cutouts 58 as soon as the pawls 62 contact the engagement ribs 61c₁. Accordingly, the film accommodating cassette 54 can be lifted and removed from the film attachment portion 12.

[0148] The film accommodating cassette 54 and the waste disposal apparatus 41 configured as described above can facilitate the operation of replacing the film accommodating cassette 54. That is, when coupling/decoupling the film accommodating cassette 54, the user need only place the film accommodating cassette 54 in the film attachment portion 12 and turn the film accommodating cassette 54 in the manner described above. Thus, when the film 15 as a consumable item runs out, the user can replace the used film accommodating cassette 54 with a refill (new) film accommodating cassette 54 by a simple operation. Since the coupling mechanism for attaching the film accommodating cassette 54 to the waste disposal apparatus 41 is implemented by such a simple configuration, the user can easily figure out how to attach/detach the film accommodating cassette 54 even without referring to the procedures described in an instruction manuals or the like.

[0149] Note that in the present embodiment, the coupling mechanism for attaching the film accommodating cassette 54 to the waste disposal apparatus 41 is formed by the outer edge of the tubular core flange 57f, which engages with the pawls 62 of the waste disposal apparatus 41, and the cutouts 58 for introducing coupling/decoupling of the film accommodating cassette 54. However, the present invention is not limited to this, and the coupling mechanism may be formed by any type of coupling member that is attached to the film accommodating cassette 54 and/or the waste disposal apparatus 41. Alternatively, the film accommodating cassette 54 may merely be placed in the film attachment portion 12 without coupling/engaging the film accommodating cassette 54 to/with the waste disposal apparatus 41.

[0150] The present embodiment is described above with respect to an example in which the film accommodating cassette 54 is used for the waste disposal apparatus 41. However, the present invention is not limited to this, and the film accommodating cassette 54 may be used in other applicable waste disposal apparatuses as an independent complete member.

[0151] As a still further embodiment, the waste disposal apparatus may further include a rotary plate that is rotatably attached to the central portion of the bottom of the lower part of the waste accommodating main body, and a waste material placed in the waste disposal apparatus, together with the film may be supported from beneath by the rotary plate. According to this configuration, as the user places waste materials into the waste disposal apparatus, these waste materials together with the film are accumulated on the rotary plate located on the bottom of the lower part of the waste accommodating main body. When the waste accommodating main body is filled with waste materials, the user can empty the waste accommodating main body in the following manner. The user rotates the rotary plate to twist the film in a region between the waste inlet and the waste materials, and cuts the twisted and thus compressed part of the film with the film cutter to remove the bag of the film filled with the waste materials, from the waste accommodating main body. This can make it easier for the user to cut the film with the film cutter when emptying the waste accommodating main body that is filled with the waste materials. This can also prevent odors of the waste materials accommodated in the film from leaking to the outside while the user is emptying the waste accommodating main body.

[0152] As a yet further embodiment, the waste disposal apparatus may further include an adhesive tape accommodating portion that is attached near the film cutter. According to this configuration, when emptying the waste accommodating main body filled with waste materials, the user can cut the film with the film cutter, and seals the opening of the bag of the film with a tape accommodated in the tape accommodating portion. This can prevent leakage of odors of the waste materials accommodated in the film when the user empties the waste accommodating main body filled with the waste materials. Note that the adhesive tape accommodating portion and the film cutter may be integrally attached to the waste accommodating main body so that the user can simultaneously cut the film and seal the opening of the bag of the film. According to this configuration, since the user can simultaneously cut the film and seal the opening of the bag of the film, the user can easily and quickly empty the waste accommodating main body.

[0153] Although the embodiments of the present invention are described above with reference to the drawings, the present invention is not limited to the illustrated embodiments. Various modifications and variations can be made to the illustrated embodiments within a scope that is the same as, or equivalent to the present invention.

[0154] The present invention provides waste disposal apparatuses having high sealing capability, and can be expected to be widely applied to industrial products such as, e.g., diaper disposal apparatuses.

Claims

1. A waste disposal apparatus (11, 41), comprising:

a film accommodating portion (14), which has a tubular core (27,57) that forms a waste inlet (16) at its upper end, and which accommodates a film (15), which is compressed into a cylindrical shape, so as to surround said tubular core;
 a waste accommodating main body (13, 43), which has said film accommodating portion positioned in an upper part thereof, and which receives a waste material placed in said film pulled out into said waste inlet, together with said film; and
 an open/close sealing mechanism (28, 48) that nips said film at a position between said film accommodating portion and said waste accommodating main body to seal a space below the nipped part of said film from a space above said nipped part of said film, wherein
 said sealing mechanism has a sealing door (33, 53) capable of being opened and closed, and a sealing door receiving portion (35; 55) that, together with said sealing door, nips said film when said sealing door is located at a closed position, and
 film nipping portions of said sealing door and said sealing door receiving portion include concavo-convex shapes that bend a vertical intermediate portion of a film portion to be nipped, laterally with respect to an imaginary straight line that connects upper and lower ends of said film portion to be nipped.

2. The waste disposal apparatus according to claim 1, wherein each of said concavo-convex shapes of said sealing door and said sealing door receiving portion, which engage with each other when said sealing door is closed, is formed by a plurality of surfaces.

3. The waste disposal apparatus according to claim 2, wherein at least two of said plurality of surfaces of each of said concavo-convex shapes are connected together substantially at a right angle to form an angled portion.

4. The waste disposal apparatus according to any one of claims 1 to 3, wherein
 said concavo-convex shape of said sealing door is formed in a front end of said sealing door, and said sealing door is pivotally supported at its rear end by

said waste accommodating main body or said sealing door receiving portion.

5. The waste disposal apparatus according to any one of claims 1 to 4, wherein
 said sealing mechanism further includes an elastic member (39, 69) that biases said sealing door in a closing direction.

6. The waste disposal apparatus according to claim 5, wherein said elastic member is a single elastic material capable of extending and contracting in its extending direction, and
 both ends of said elastic material are coupled with right and left side edges of said sealing door receiving portion, and a central region of said elastic member extends along a lower surface of said sealing door.

7. The waste disposal apparatus according to claim 6, wherein said sealing door includes, in its lower surface, an elastic member guide (63) for holding said central region of said elastic member.

8. The waste disposal apparatus according to claim 6 or 7, wherein
 said sealing mechanism further includes
 a left elastic member cover (46), which has its upper end latched by a left side edge of said sealing door receiving portion, and its lower end latched by a left side edge of said sealing door, and accommodates a left end of said elastic member, and
 a right elastic member cover (46), which has its upper end latched by a right side edge of said sealing door receiving portion, and its lower end latched by a right side edge of said sealing door, and accommodates a right end of said elastic member, and
 said elastic member covers follow opening/closing movement of said sealing door while being kept latched by said left and right side edges of said sealing door.

9. The waste disposal apparatus according to any one of claims 1 to 8, wherein
 said film accommodating portion is supported by said waste accommodating main body so that an axis of said tubular core is tilted at a predetermined angle.

10. The waste disposal apparatus according to claim 9, wherein a lower end of said film accommodating portion, which surrounds a lower end of said tubular core, is tilted and supported at said predetermined angle so that a front end side of said lower end of said film accommodating portion is located at a vertically lower position, and a rear end side of said lower end thereof is located at a vertically higher position, and
 said concavo-convex shape of said sealing door re-

ceiving portion is located near a lowest position of said lower end of said film accommodating portion.

11. The waste disposal apparatus according to any one of claims 1 to 10, wherein
said sealing door is tilted and supported at a predetermined angle when located at said closed position, so that a front end side thereof is located at a vertically lower position, and a rear end side thereof is located at a vertically higher position. 5 10
12. The waste disposal apparatus according to any one of claims 1 to 11, wherein
said film nipping portions of said sealing door and said sealing door receiving portion are formed on a front side of said waste accommodating main body, and
said waste accommodating main body has a tilted surface in a front region of its inner bottom surface, and said tilted surface is tilted so that its vertical height decreases from a front side toward a rear side. 15 20
13. The waste disposal apparatus according to any one of claims 1 to 12, wherein
said film accommodating portion is a film accommodating cassette (54) including
said tubular core,
a tubular core flange (57f) that extends from a lower end of said tubular core in an outer diameter direction, and
a film holding flange (59) that extends from an upper end of said tubular core in said outer diameter direction, accommodates said film in a compressed state between said tubular core flange and said film holding flange, and allows said film to be pulled out beyond an outer edge of said film holding flange into said tubular core, and
said film accommodating cassette is detachably attached to said upper part of said waste accommodating main body. 25 30 35 40

45

50

55

FIG. 1

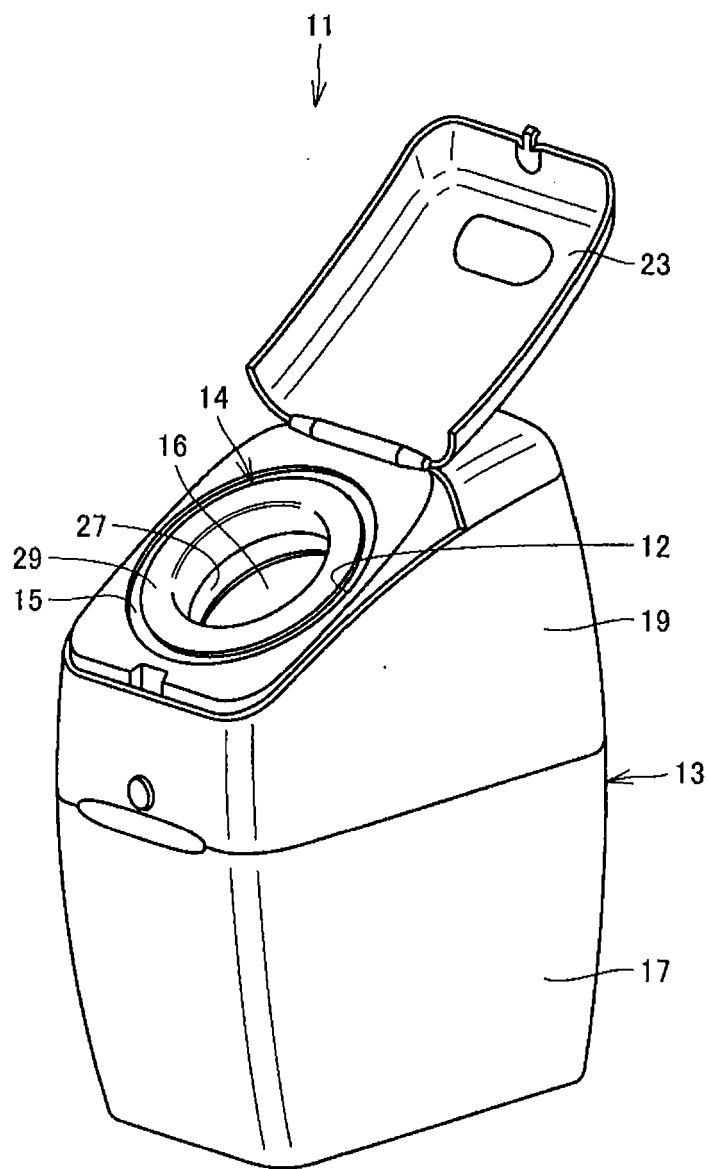


FIG. 2

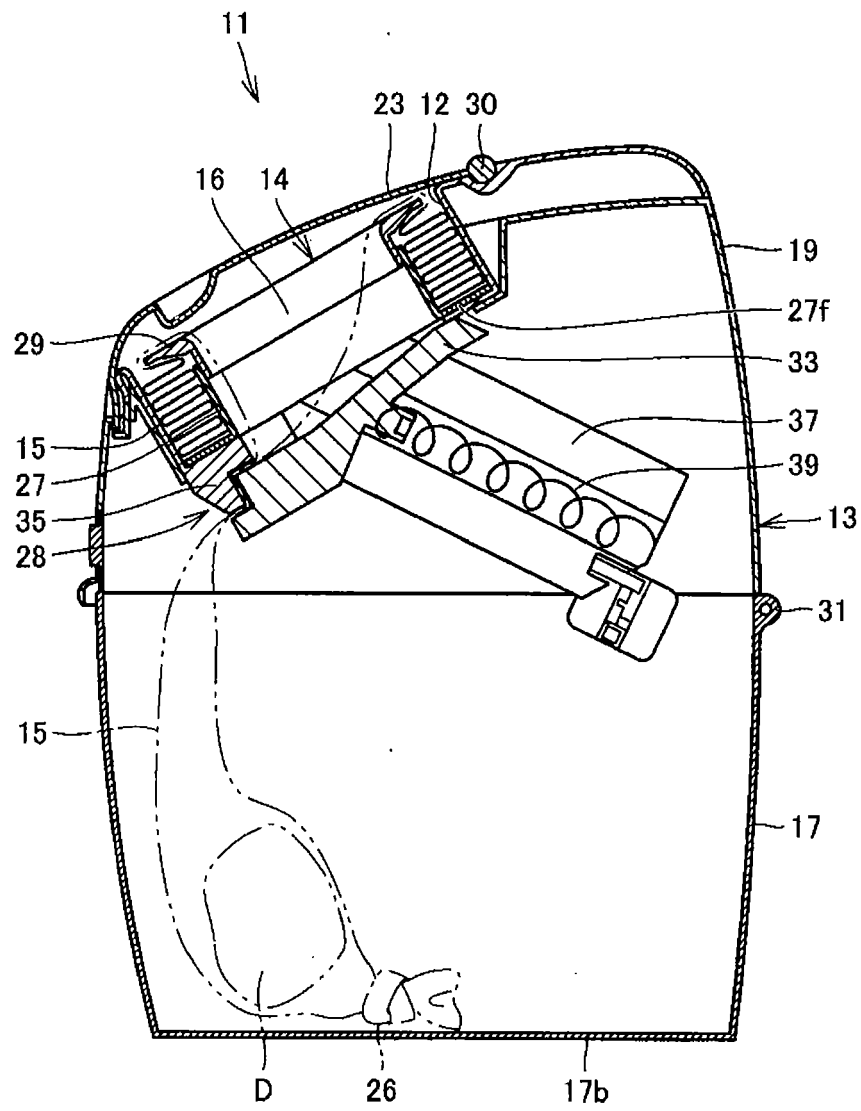


FIG. 3

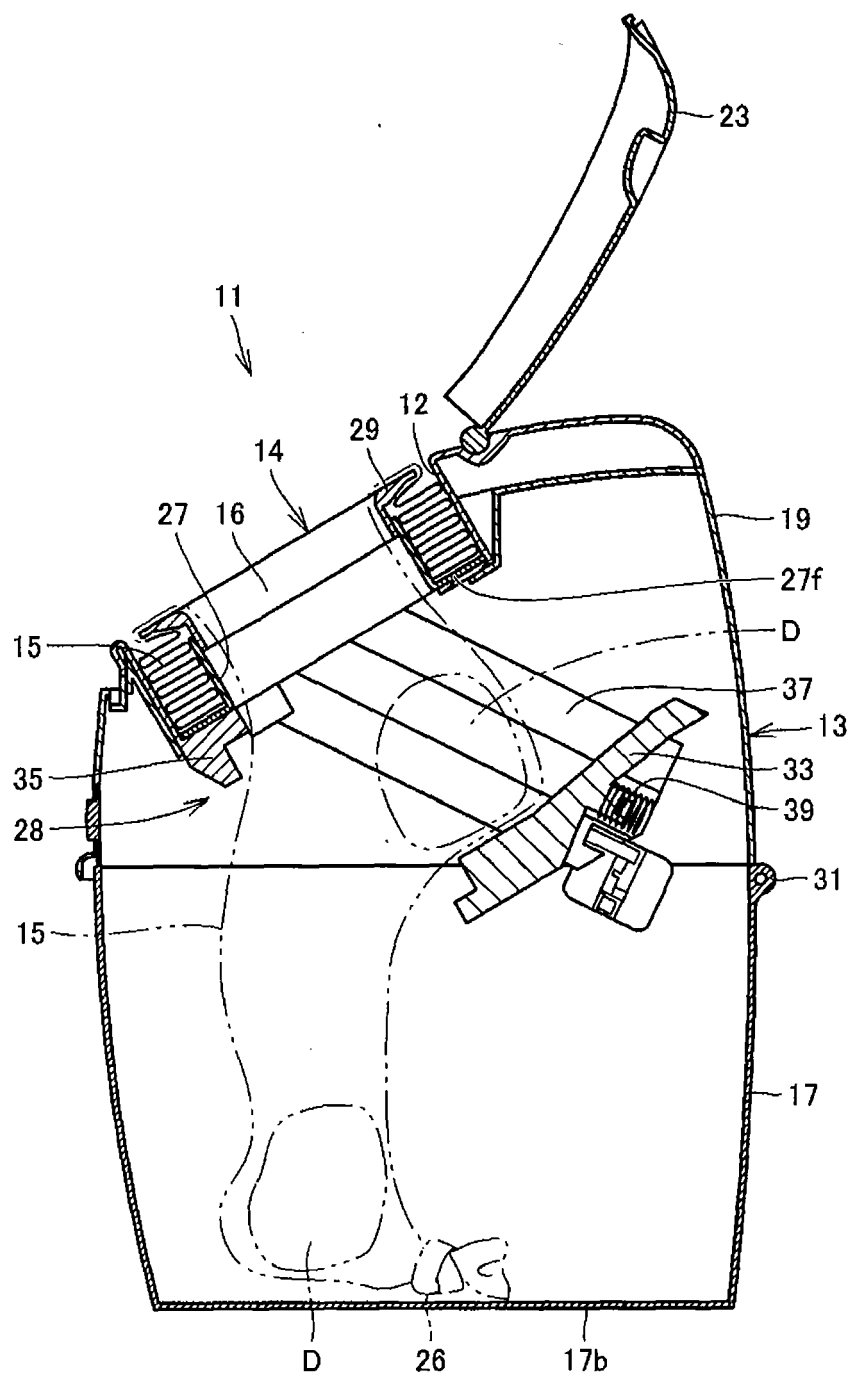


FIG. 4

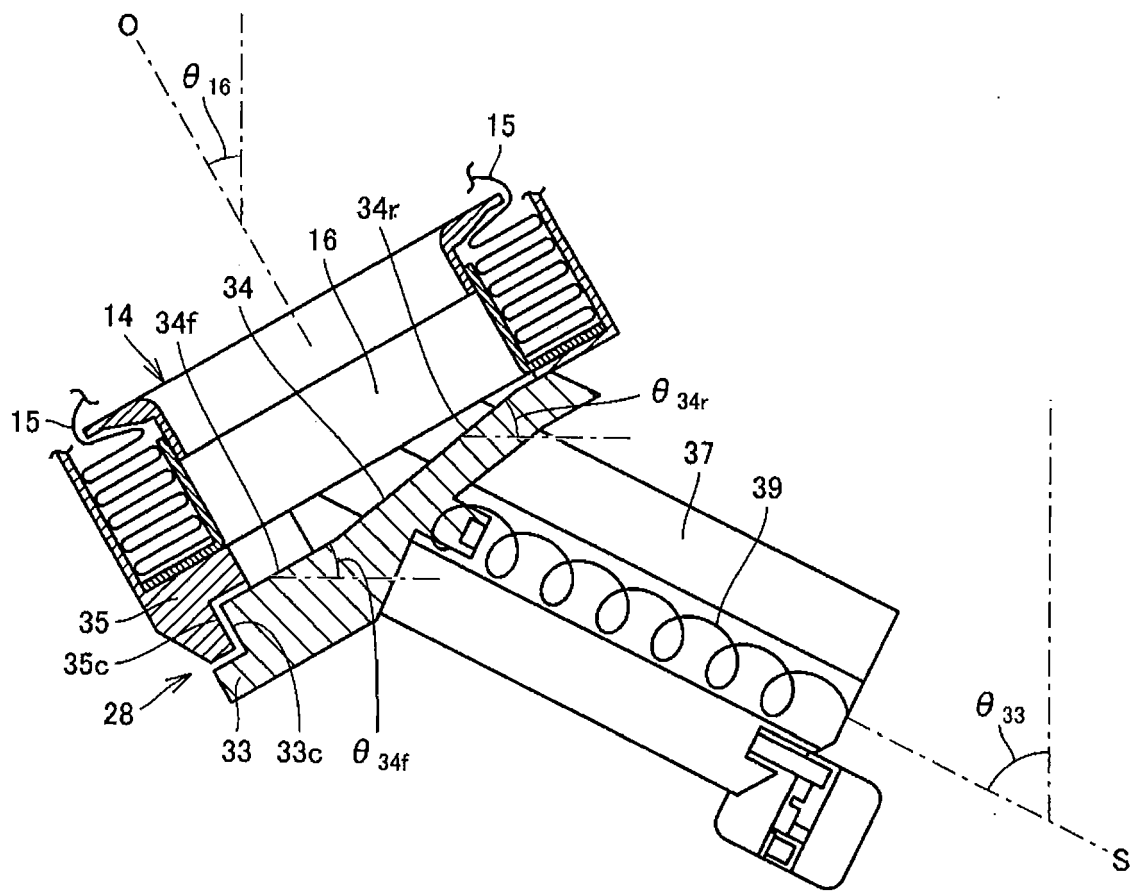


FIG. 5

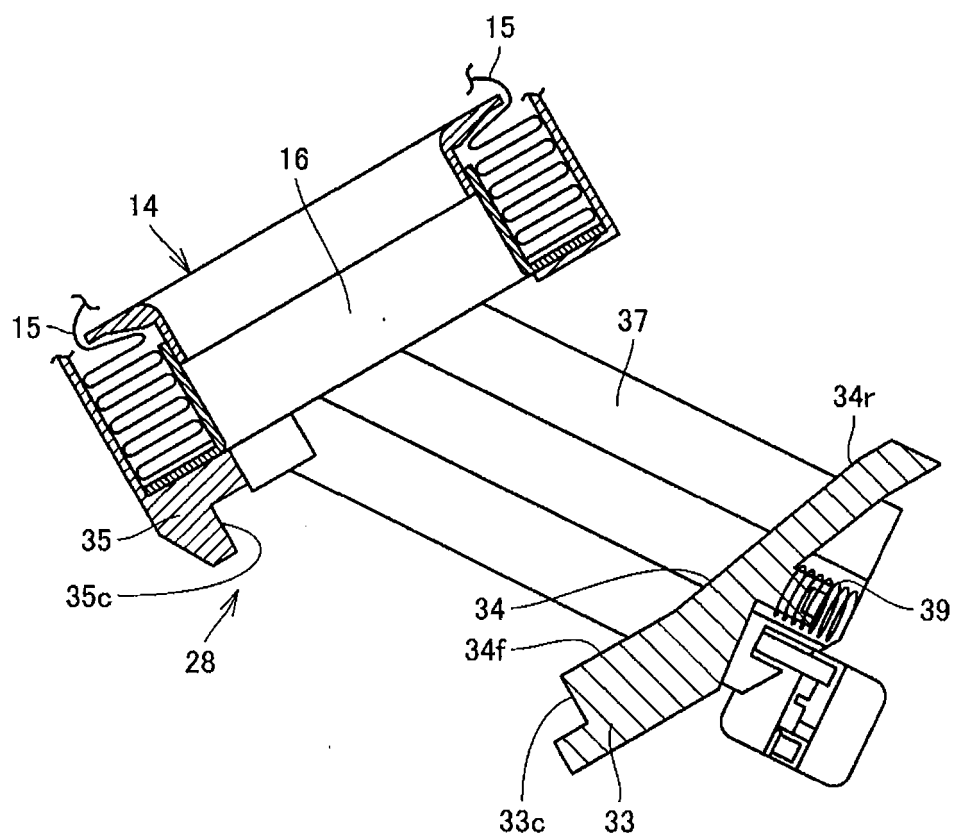


FIG. 6A

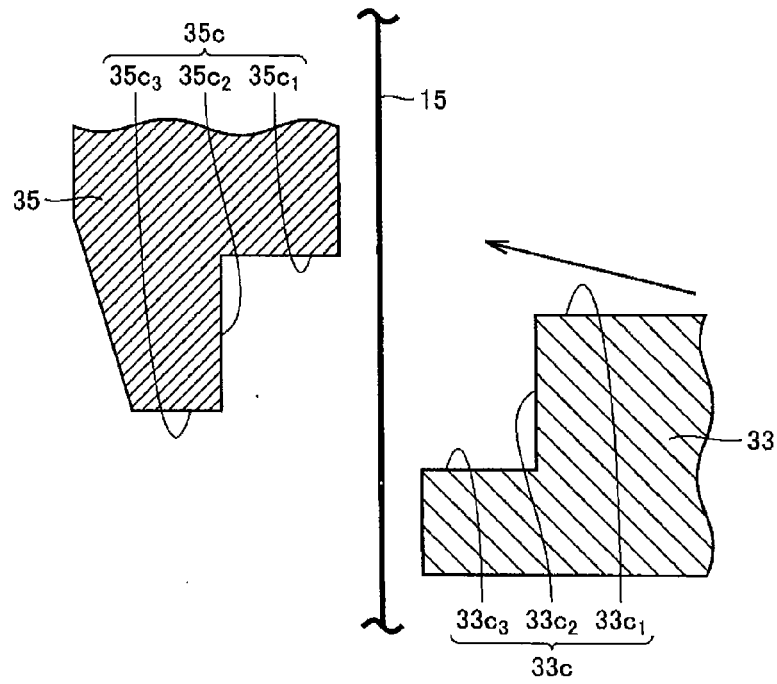


FIG. 6B

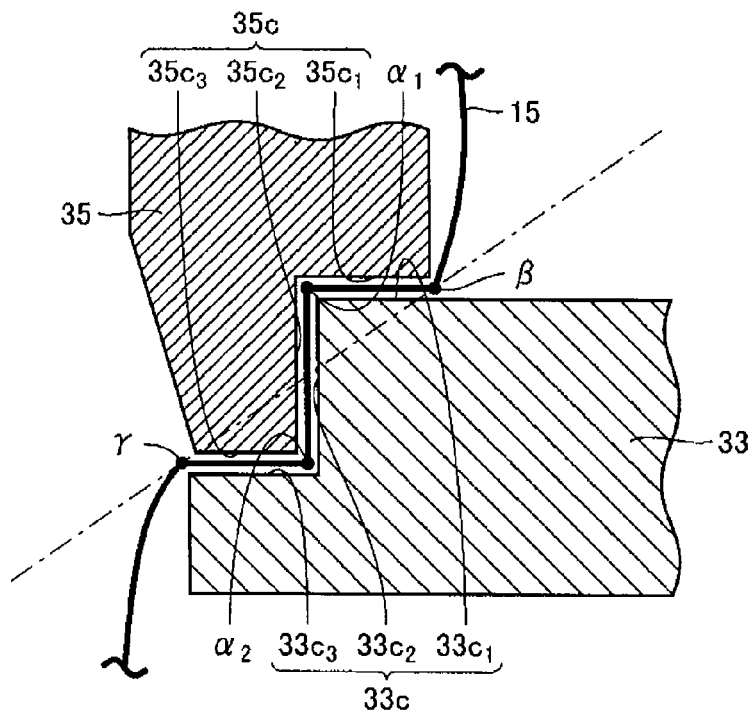


FIG. 7A

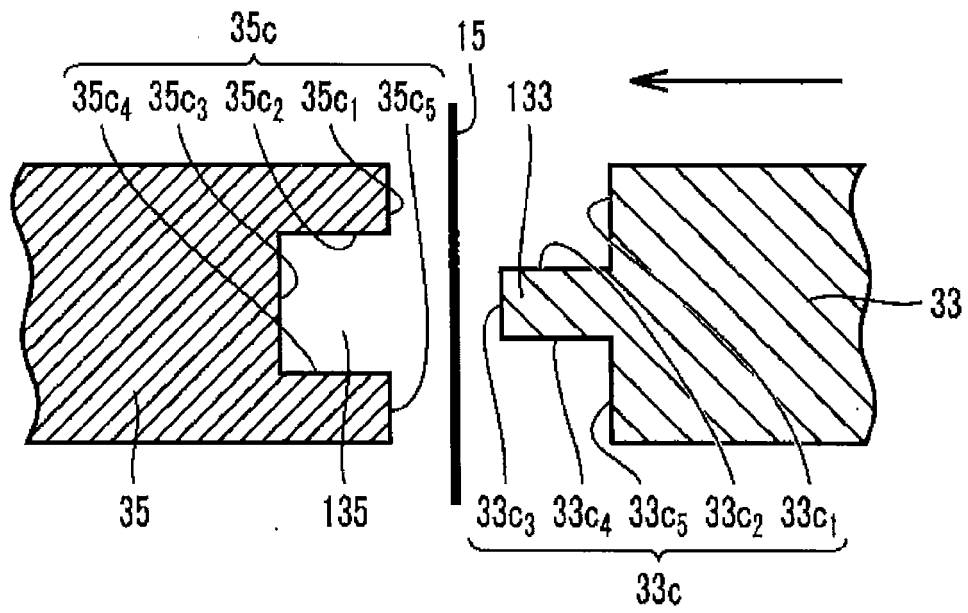


FIG. 7B

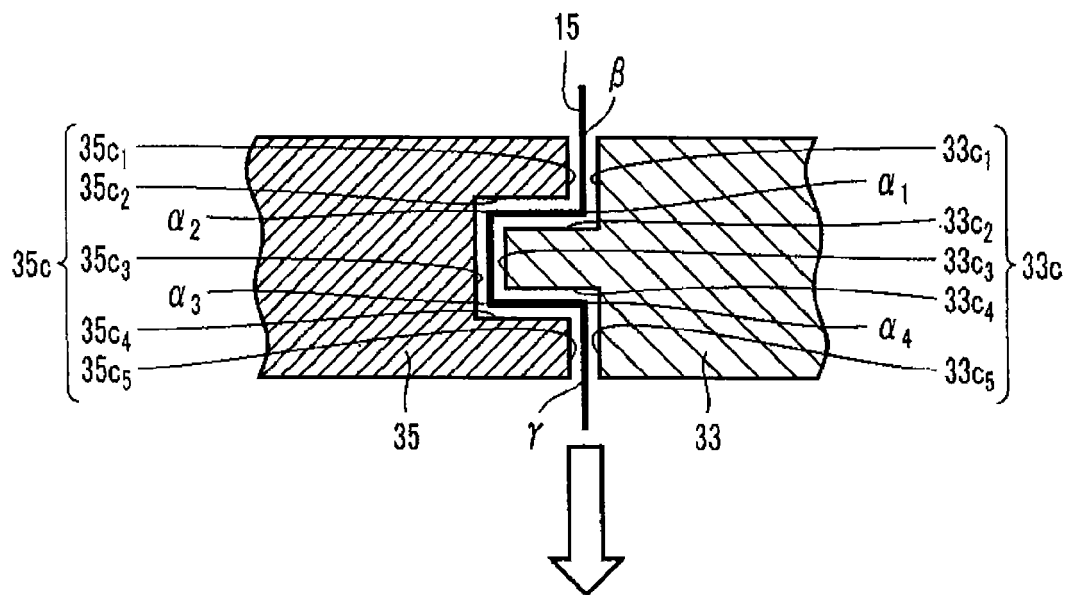


FIG. 8

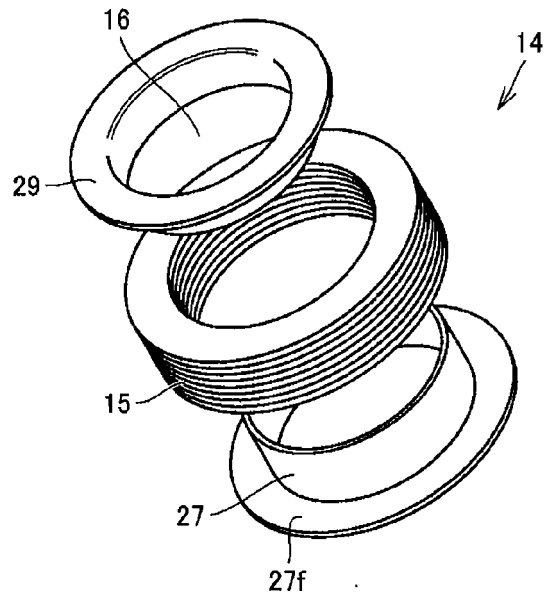


FIG. 9

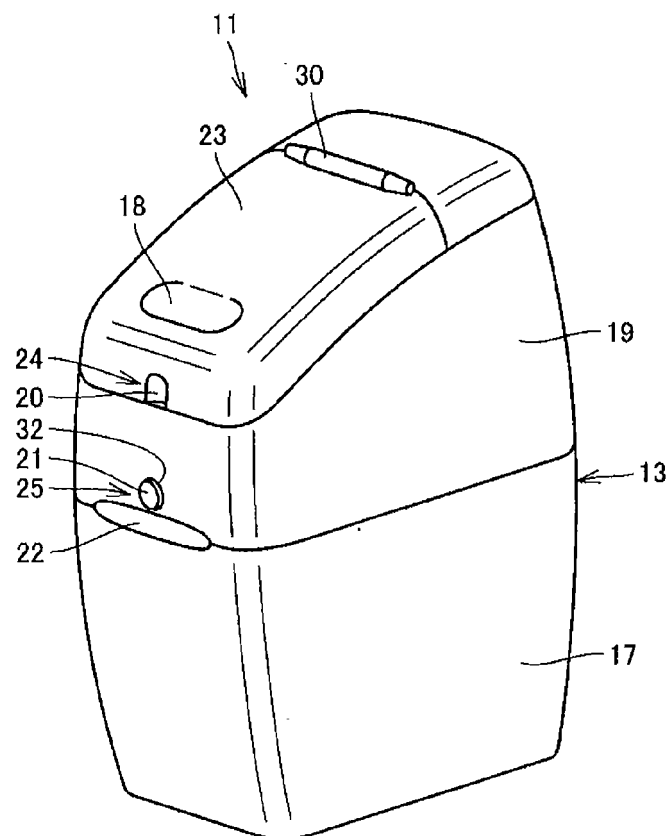


FIG. 10

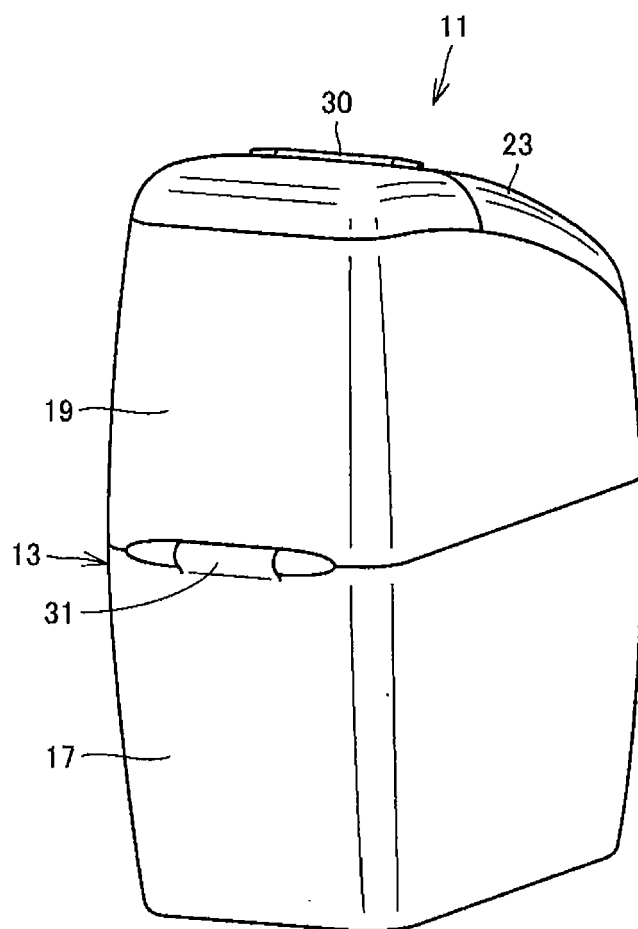


FIG. 11

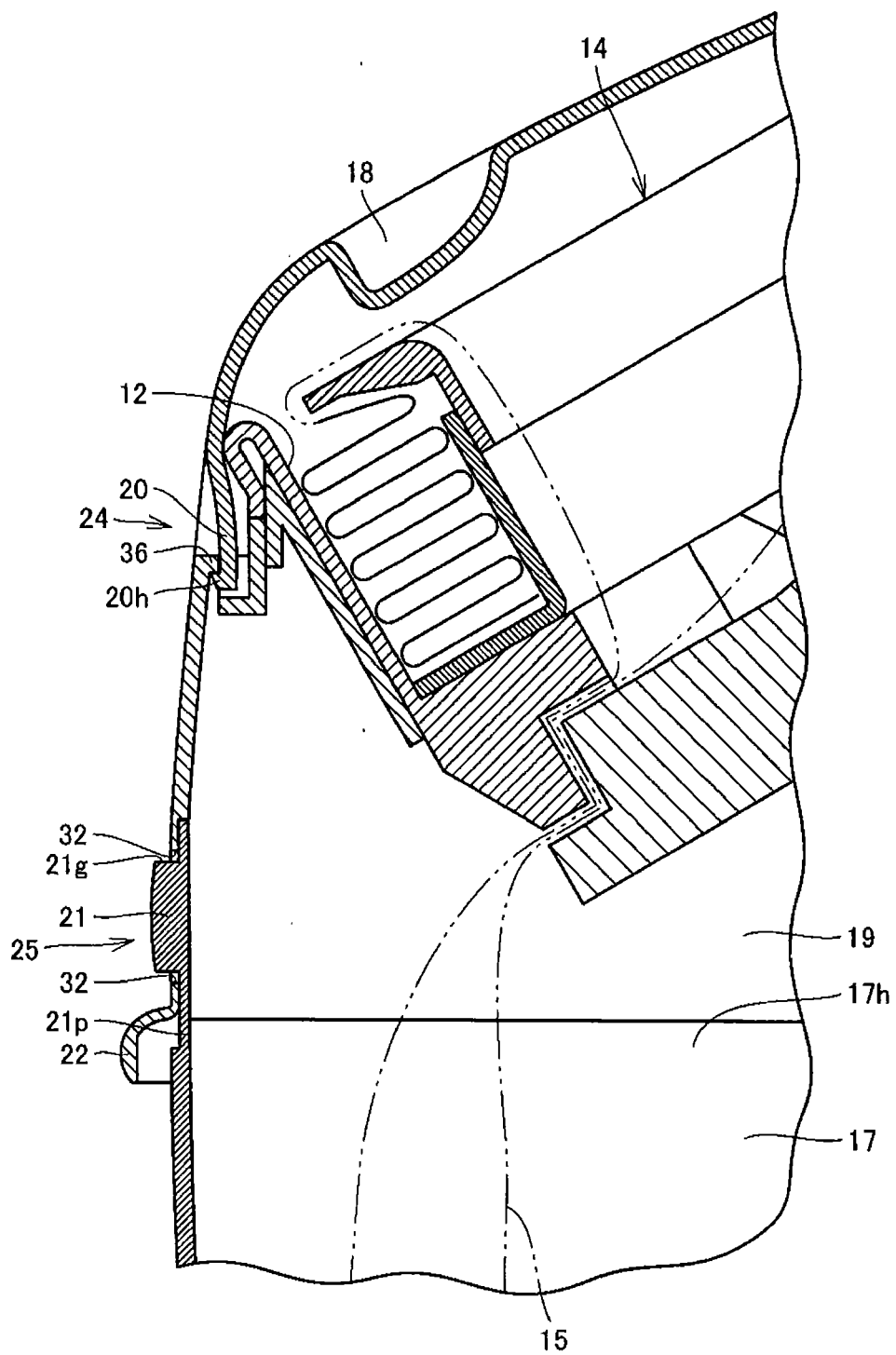
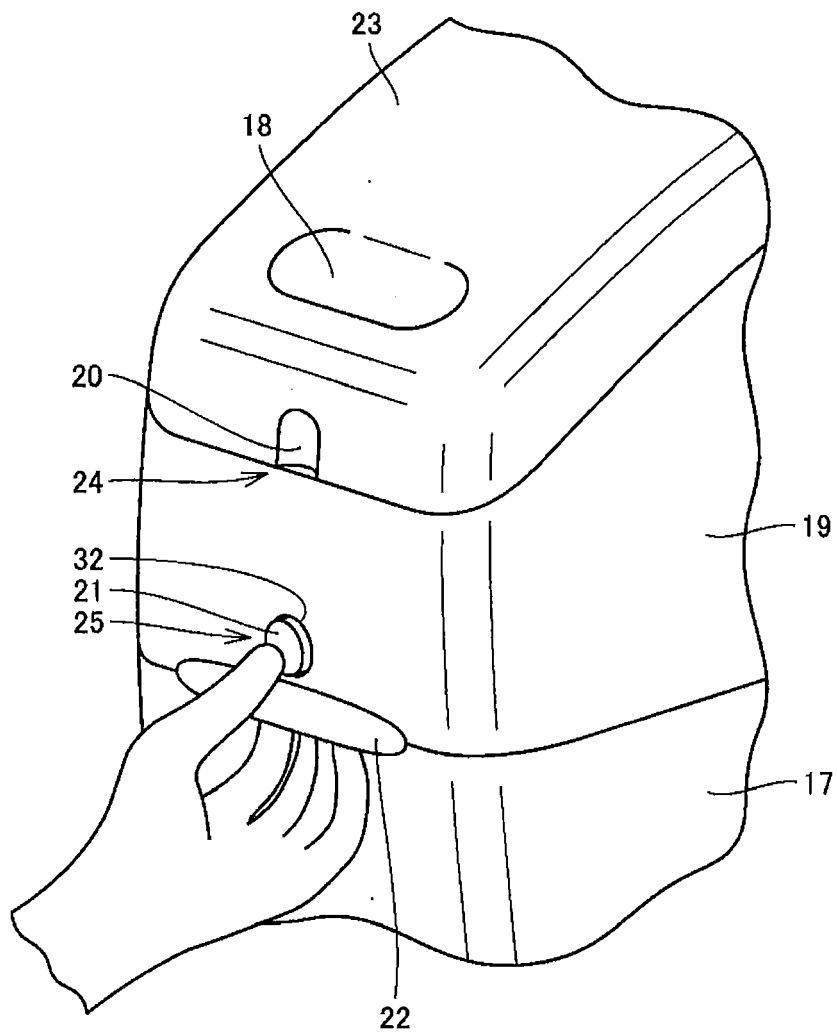


FIG. 12



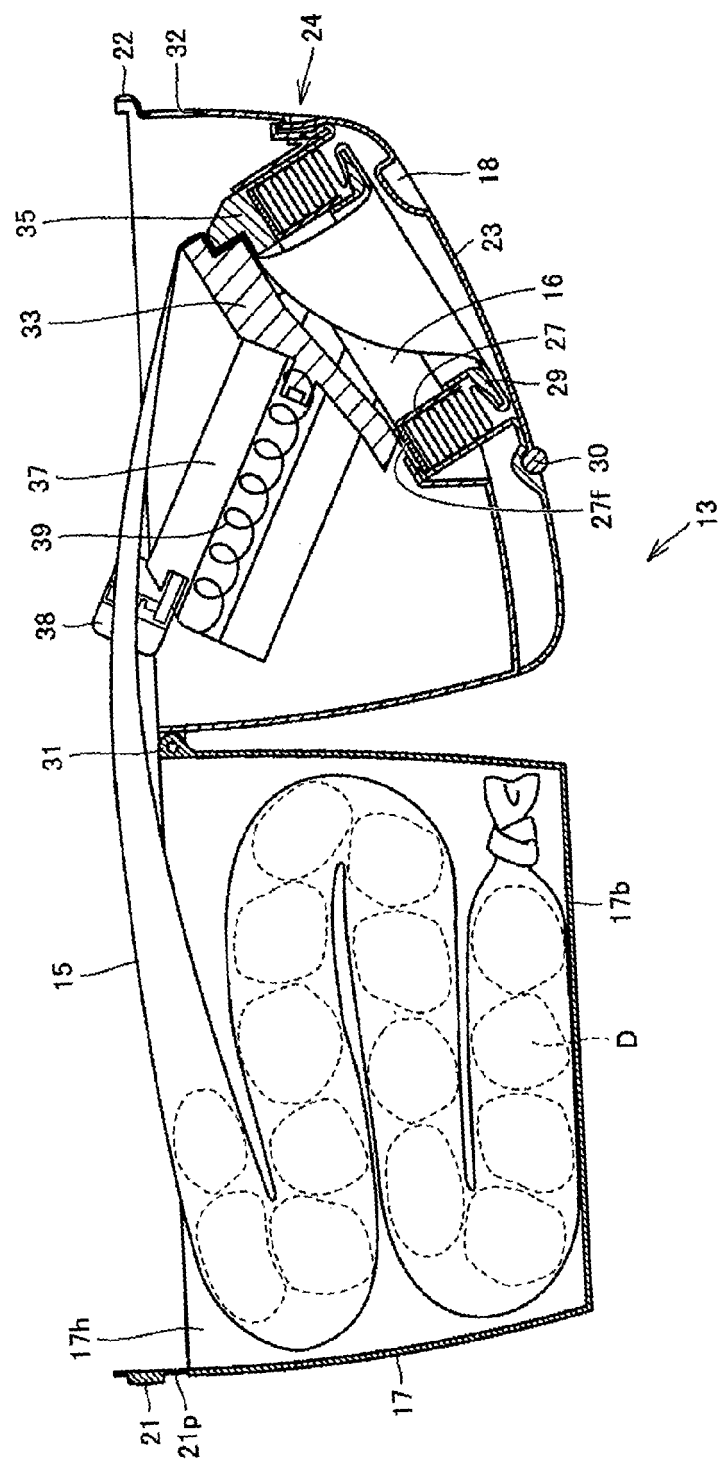


FIG. 13

FIG. 14

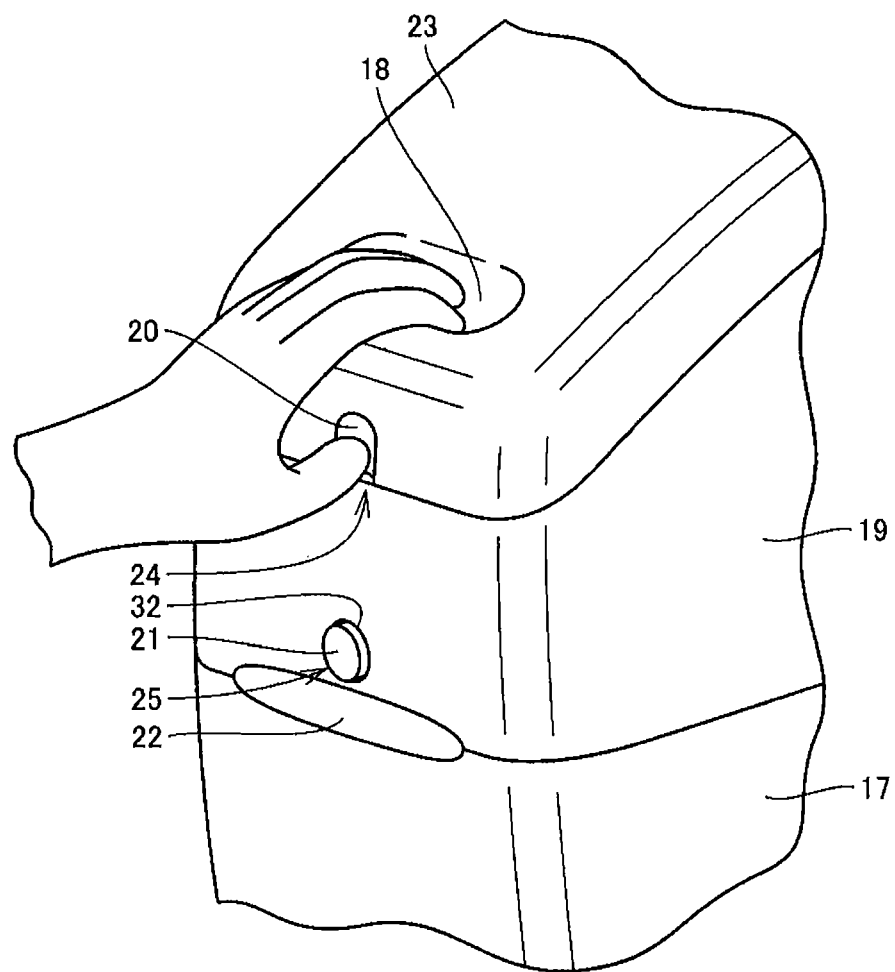


FIG. 15

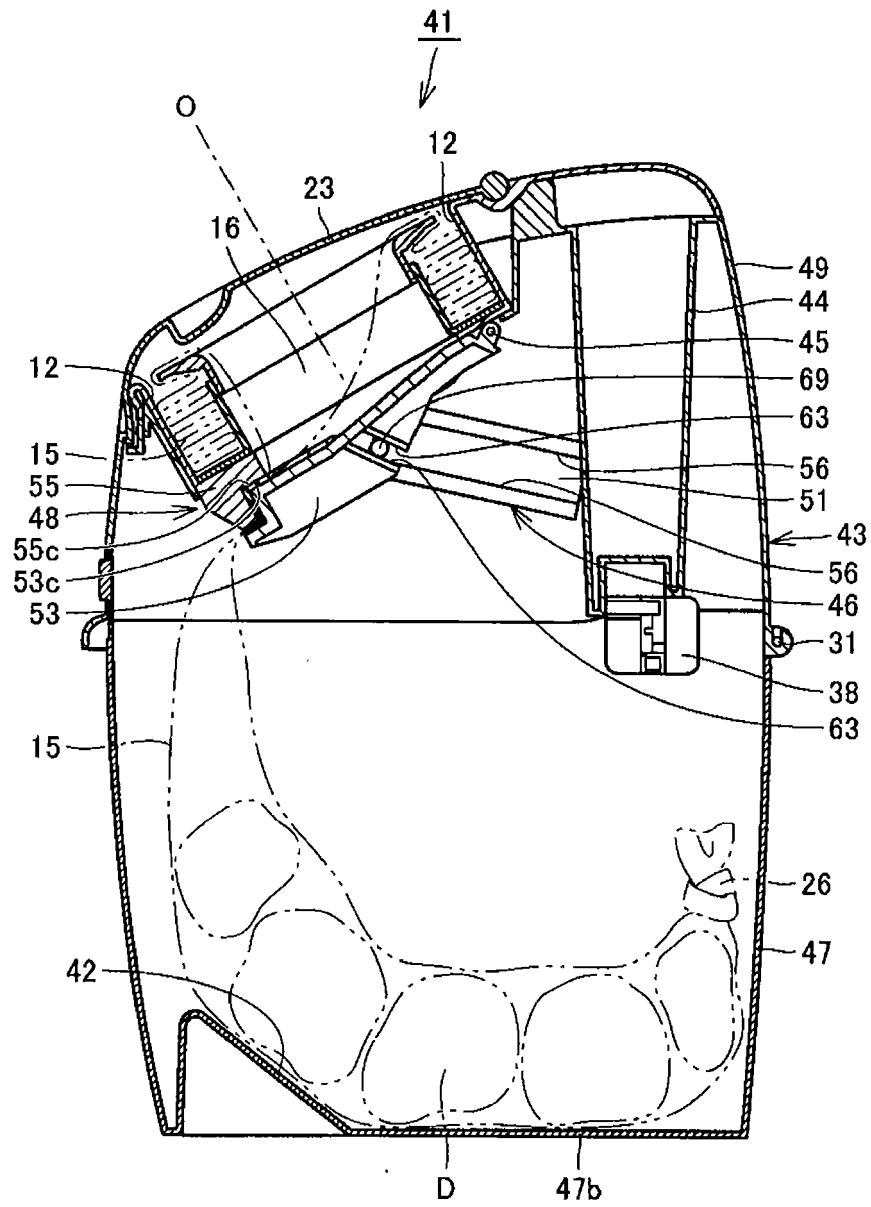


FIG. 16

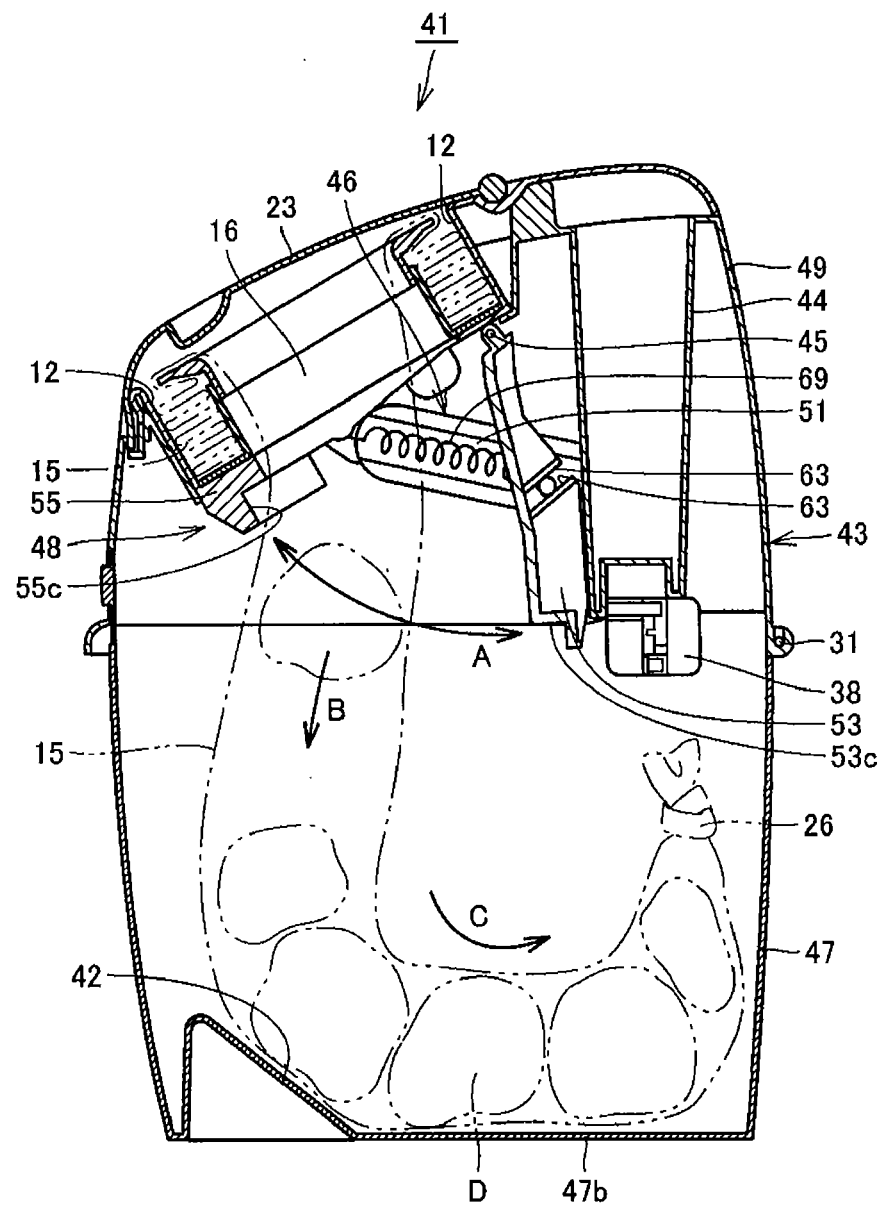


FIG. 17

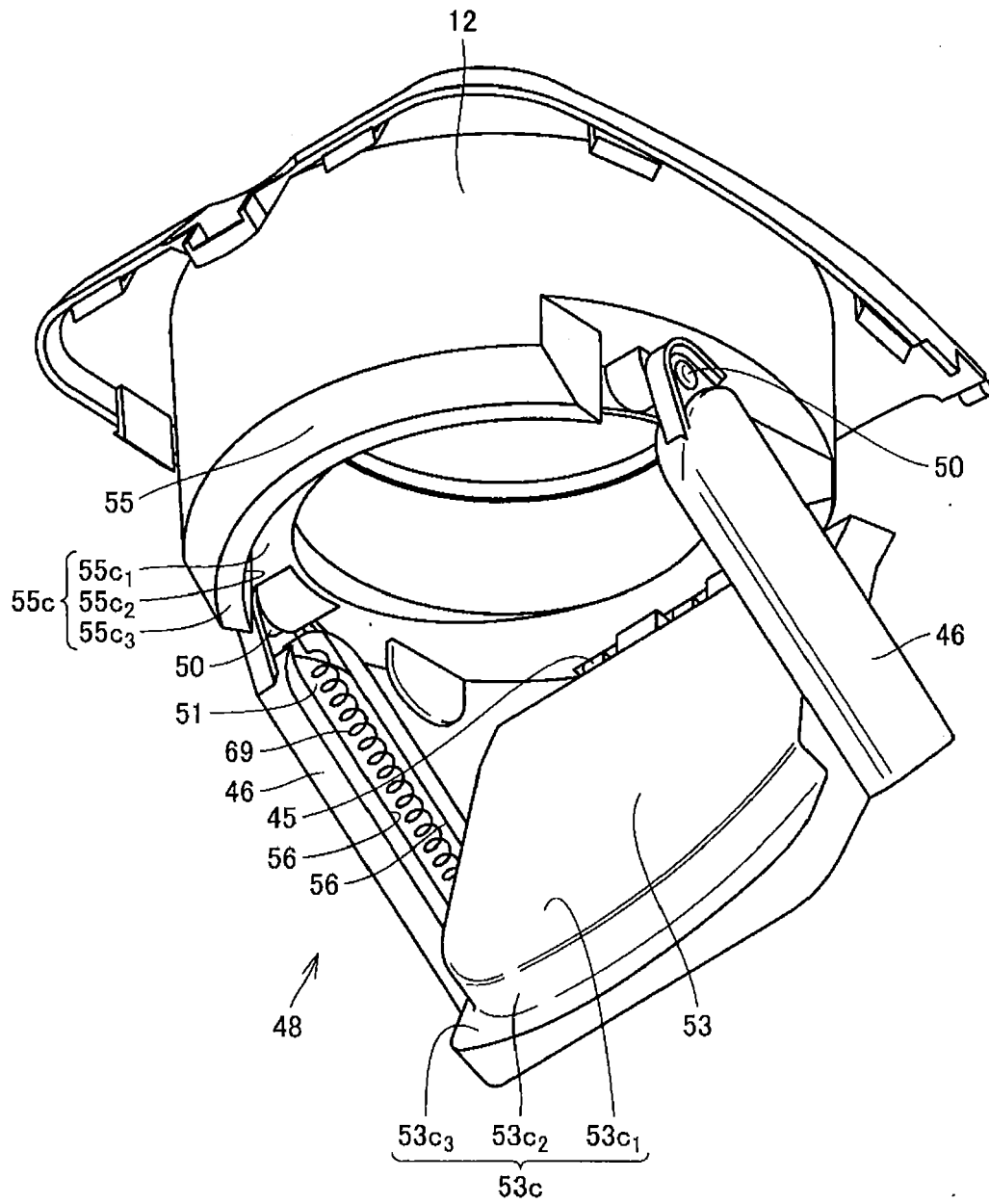


FIG. 18

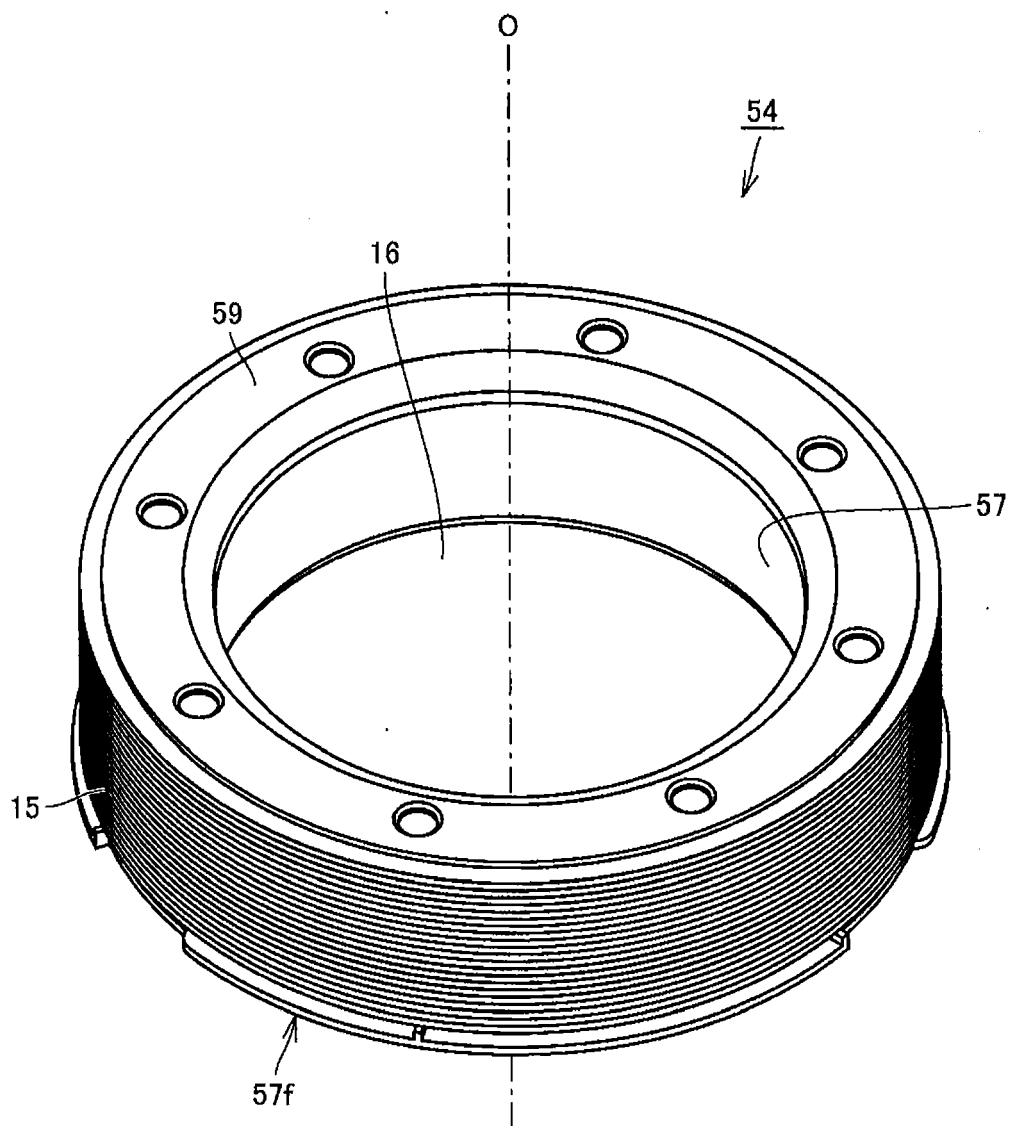


FIG. 19

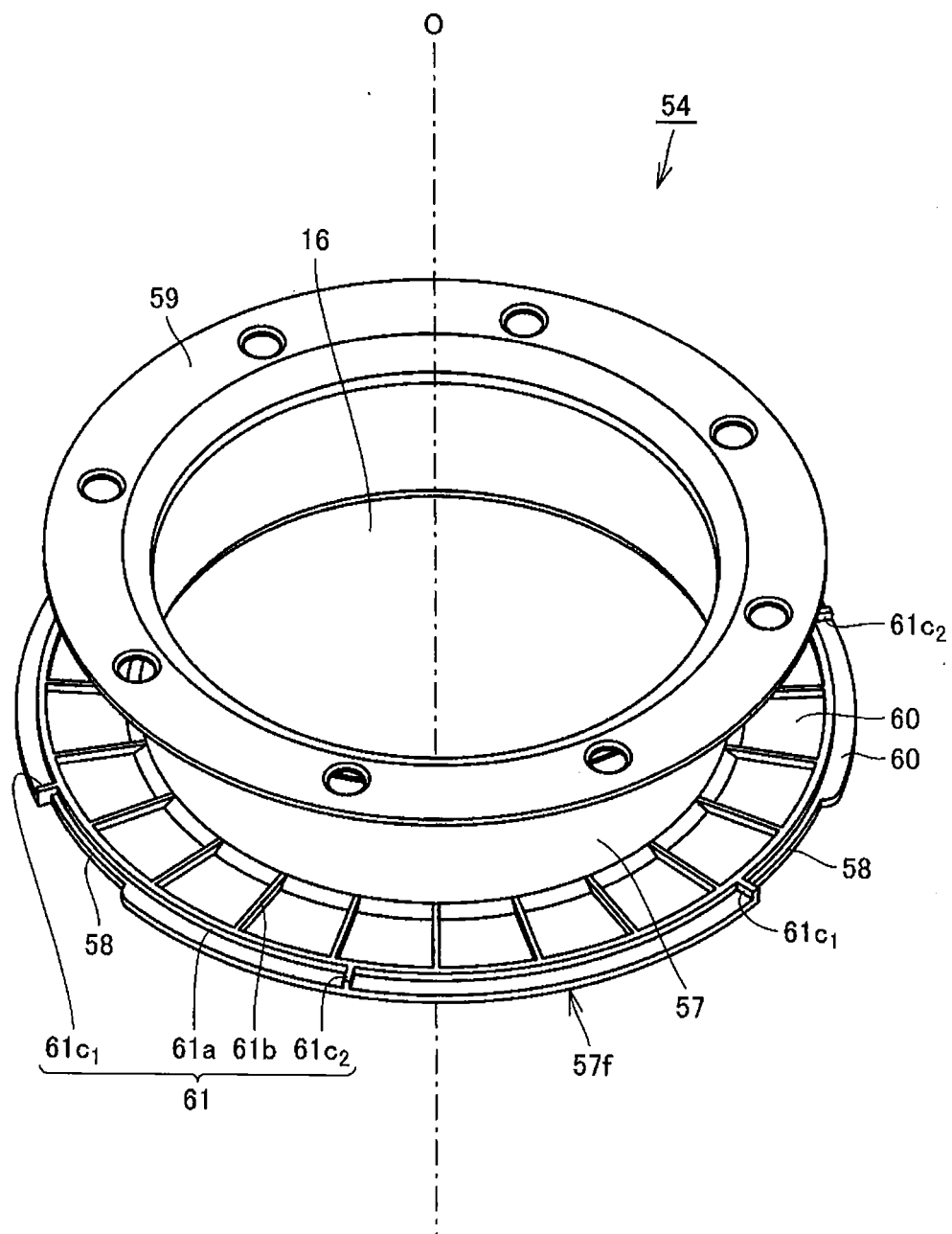


FIG. 20

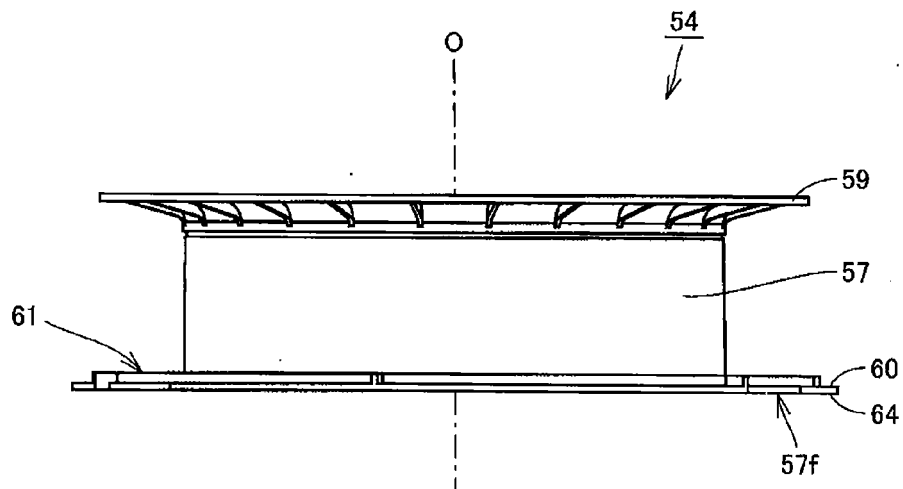


FIG. 21

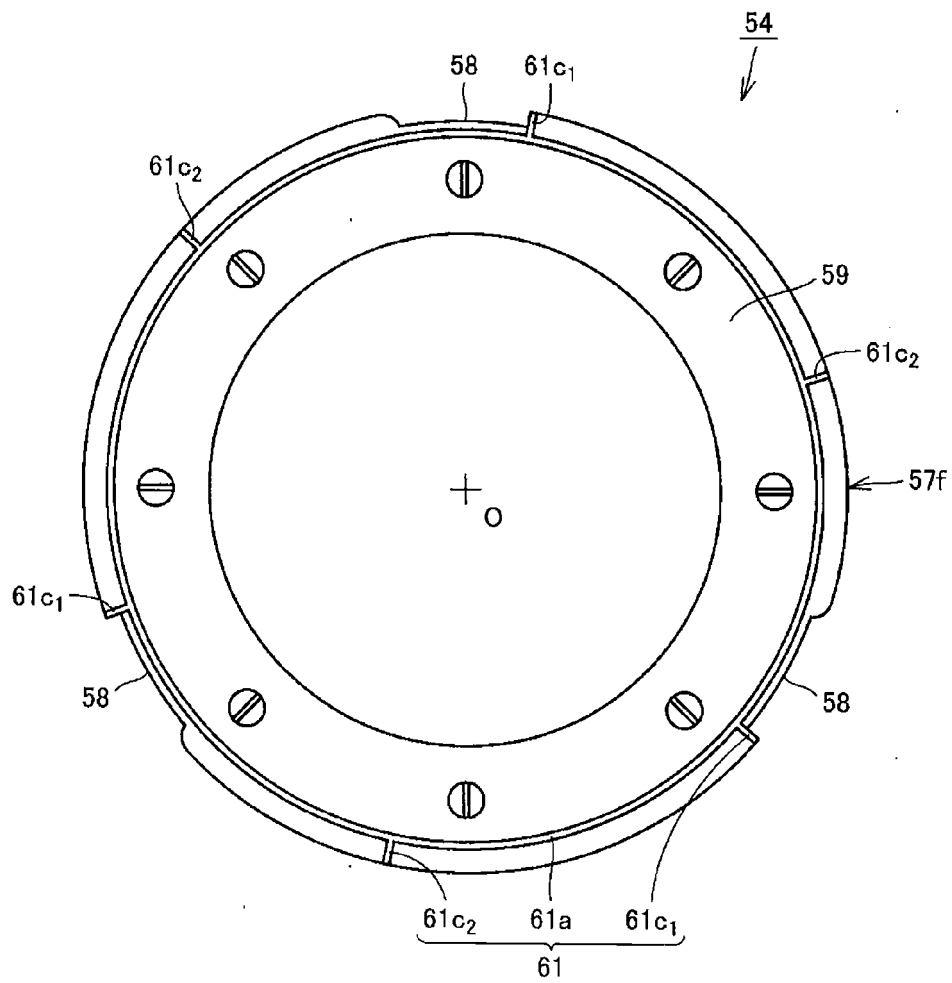


FIG. 22

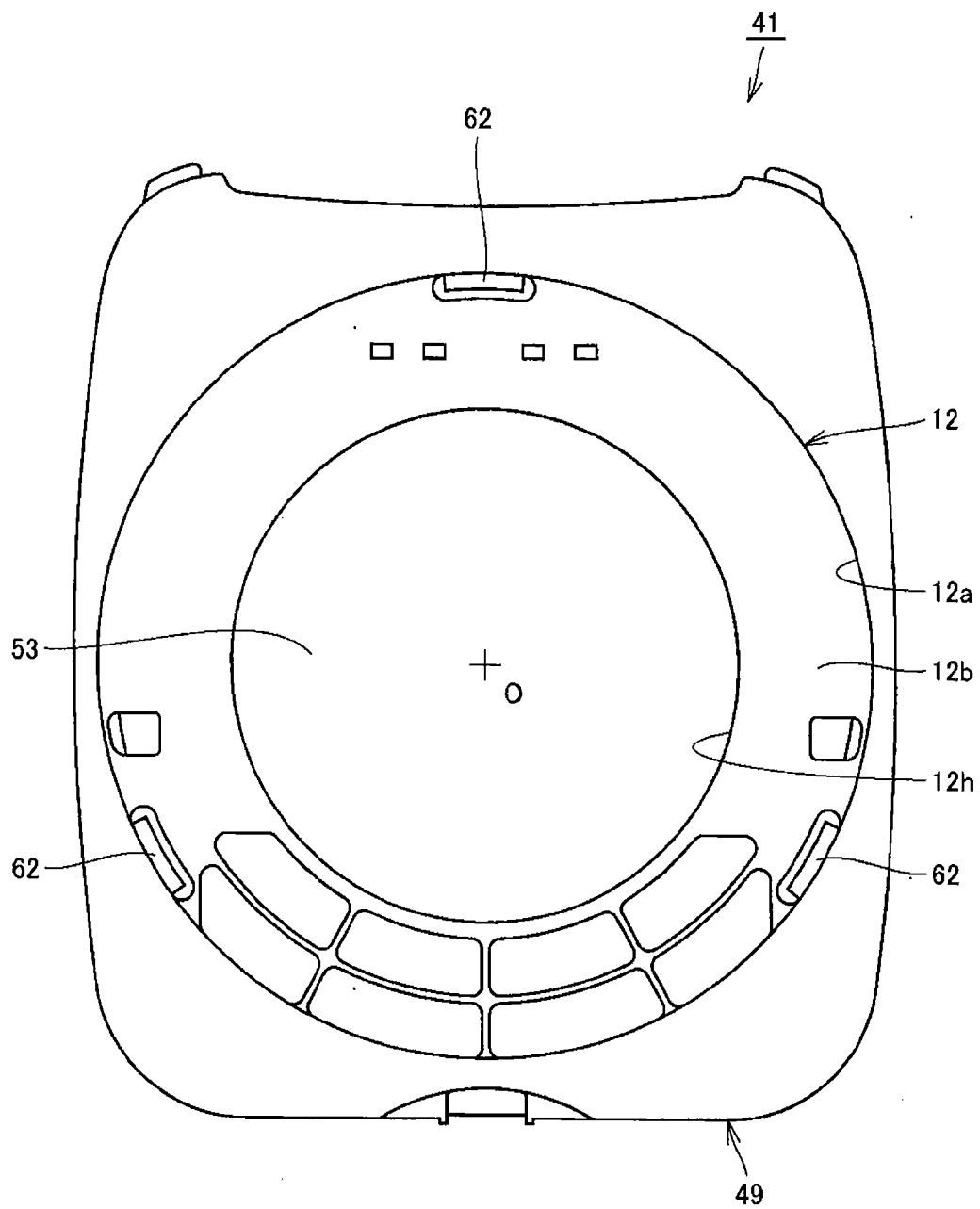


FIG. 23

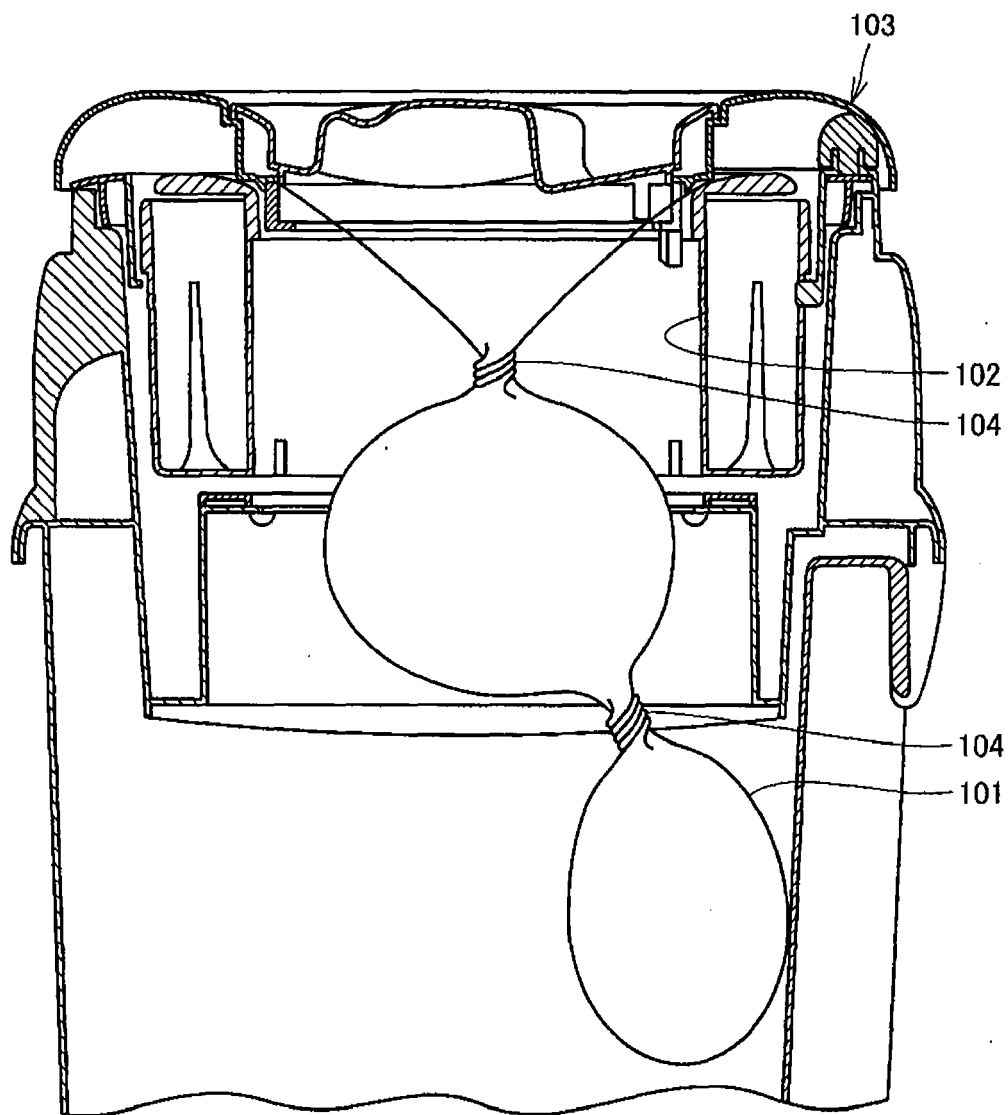
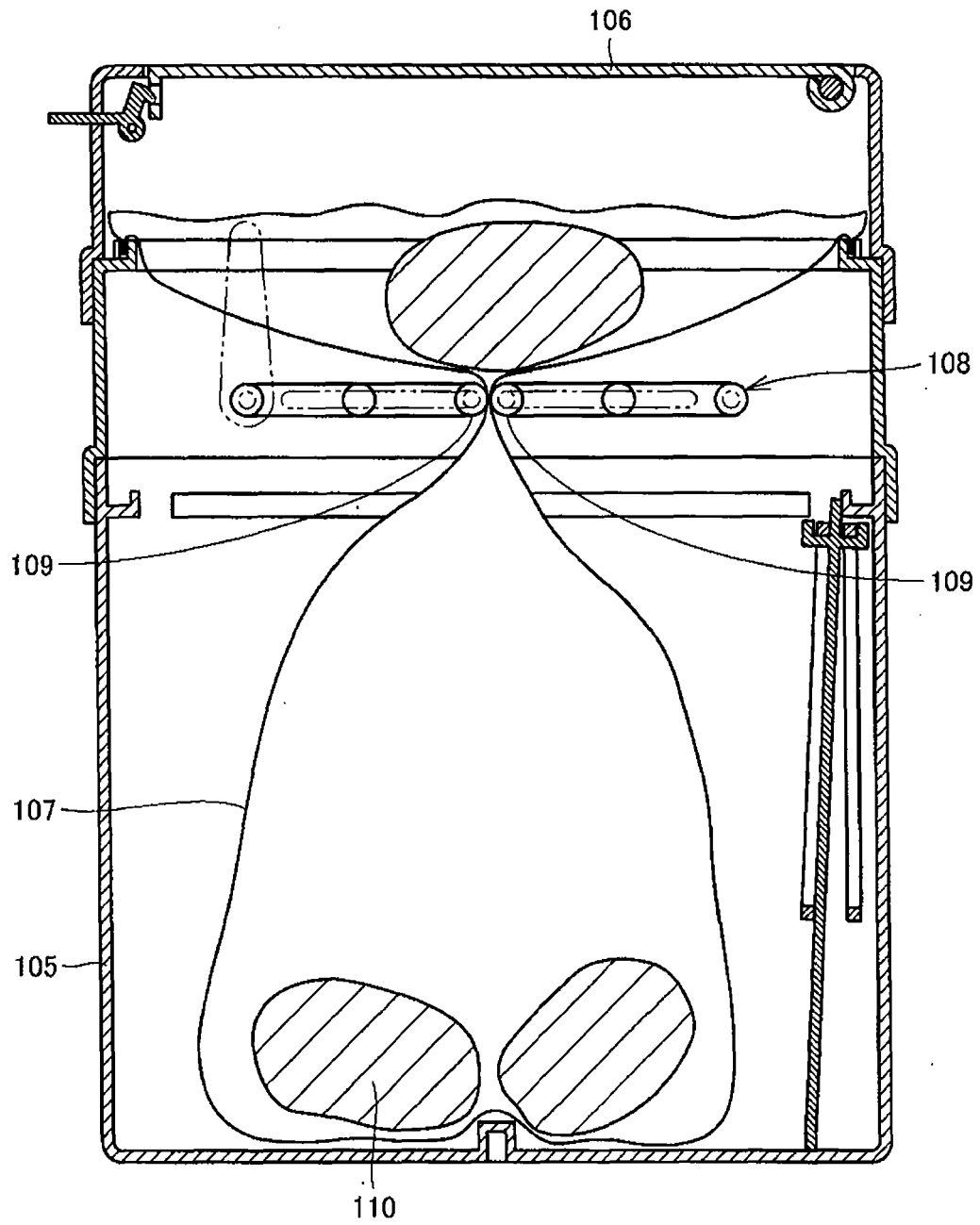


FIG. 24





EUROPEAN SEARCH REPORT

Application Number
EP 10 17 2767

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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Place of search The Hague		Date of completion of the search 5 November 2010	Examiner Smolders, Rob
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