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TOY

Abstract

A toy includes: a space defining member that defines a specified space; and a detector provided outside the specified space and configured to detect a pressure change within the specified space in response to deformation of at least a part of the space defining member.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based upon and claims the benefit of priority from Japanese Patent Application No. 2024-022458, filed on Feb. 16, 2024, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present disclosure relates to a toy.

BACKGROUND ART

[0003] In the related art, there have been provided sound-producing toys. For example, JP7286203B discloses a toy including a housing unit and an audio module unit, where the housing unit includes a hollow housing main body having flexibility and shape-restoring properties, and an accommodation portion accommodating the audio module unit therein. The audio module unit includes an air pressure sensor that detects changes in internal pressure in the housing main body due to deformation of the housing main body, a processing means that converts a detection value of the air pressure sensor into audio information, and an output unit that outputs the audio information.

[0004] In JP7286203B, the audio module unit is built in the airtight housing main body having flexibility and shape-restoring properties. This requires high sealing performance of the housing main body.

[0005] An object of the present disclosure is to provide a toy that has stable performance without requiring high airtightness.

SUMMARY OF INVENTION

[0006] According to an aspect of the present disclosure, there is provided a toy including: [0007] a space defining member that defines a specified space; and [0008] a detector provided outside the specified space and configured to detect a pressure change within the specified space in response to deformation of at least a part of the space defining member.

Description

BRIEF DESCRIPTION OF DRAWINGS

[0009] FIG. **1** is a perspective view illustrating an aspect of a toy according to the present disclosure;

[0010] FIG. **2** is a cross-sectional view of a portion taken along the line A-A in FIG. **1**;

[0011] FIG. **3** is an exploded perspective view of an accommodating member;

[0012] FIG. **4** is an exploded perspective view illustrating an example of how to assemble the accommodating member;

[0013] FIG. **5** is an exploded perspective view illustrating an example of how to attach a holding member;

[0014] FIG. **6** is an enlarged cross-sectional view illustrating a fastening structure of a second seal member;

[0015] FIG. **7** is an enlarged schematic view illustrating an initial state of a structure for detecting a pressure change;

[0016] FIG. **8** is an enlarged schematic view illustrating an operating state of the structure for detecting the pressure change;

[0017] FIG. **9** is a cross-sectional view illustrating an example of a deformation form of the second seal member; and

[0018] FIG. **10** is an enlarged cross-sectional view of a regulating valve of the toy.

DESCRIPTION OF EMBODIMENTS

[0019] Hereinafter, an aspect of a toy according to the present disclosure will be described with reference to the drawings.

[0020] FIG. **1** is a perspective view illustrating a toy **1** according to the present disclosure. FIG. **2** is a cross-sectional view of a portion taken along the line A-A in FIG. **1**. FIG. **3** is an exploded perspective view of an accommodating member.

[0021] The toy **1** is a sound-making toy configured to generate sound by using variations in air pressure in an internal space SP of an outer shell portion made of an elastic material. As illustrated in FIGS. **1** and **2**, in this toy **1**, the internal space SP is formed that is sealed by a space defining member **10** consisting of a first sheet member **11**, a second sheet member **12** that form a specified space, and a accommodating member **15** that supports both sheet members **11** and **12**. A part of the second sheet member **12** elastically deforms and a pressure change in the internal space SP is detected. As an operating unit for detecting this pressure change, for example, a detector **20** is provided in a vicinity of the first sheet member **11** inside the accommodating member **15**.

[0022] The second sheet member **12** forming an outer shell is, as illustrated in the figure, made of an elastic material such as silicone rubber in a rounded shape, for example, in the shape of a pufferfish character. The first sheet member **11** is provided in a circular, flat shape on an upper end of the accommodating member **15** that is disposed below the second sheet member **12**. The first sheet member **11** is made of the same silicone rubber as the second sheet member **12**. The first sheet member **11** is configured to have a thickness (t**1**) smaller than that of the second sheet member **12**. As a result, the first sheet member **11** is more easily deformed than the second sheet member **12**. Therefore, the first sheet member **11** has a larger amount of elastic deformation in response to a pressure change in a specified space than the second sheet member **12**.

[0023] A control unit **33**, which detects pressure changes and converts them into electrical signals, is provided with a power source **36**, a control board **37**, a speaker **38**, and the like, and converts the pressure changes into sound. The sounds produced by the toy **1** are capable of expressing a musical scale. For example, it is possible to express a musical scale of two or more octaves. As for this musical scale expression, for example, when a pressure change in the internal space SP is detected, a signal corresponding to strength of the pressure change can be expressed as a musical scale.

[0024] The detector **20** for detecting pressure changes in the internal space SP includes a displacement member **23**, a pressure sensor **25**, and a biasing member **28** provided on an outer side (a lower side in the figure) of the first sheet member **11**, as illustrated in FIGS. **2** and **3**. The displacement member **23** includes an upper flat portion **23***a* having a circular shape that is constantly in contact with the first sheet member **11**, and a central cylindrical portion **23***b* that extends downward from a center of the upper flat portion **23***a*. The displacement member **23** is supported so that the central cylindrical portion **23***b* is vertically movable with passing through a through hole **15***h* (see FIG. **3**) in an upper wall **15***u* of the accommodating member **15**.

[0025] The biasing member **28** made of a coil spring is positioned so as to surround the outside of the central cylindrical portion **23***b*, and is provided between the upper flat portion **23***a* and the upper wall **15***u*. The biasing member **28** causes the upper flat portion **23***a* to be in contact with the first sheet member **11** and causes a lower end surface **23***d* of the central cylindrical portion **23***b* to be spaced away from the pressure sensor **25**. In addition, the displacement member **23** moves in conjunction with vertical movement of the first sheet member **11**. The pressure sensor **25** can accurately detect an amount of change in the displacement member **23** in response to the displacement of the displacement member **23**.

[0026] As illustrated in FIG. **3**, the displacement member **23** is provided with, for example, a pair of restricting guide pieces **23***e* which protrude downward from an outer periphery of the upper flat portion **23***a* in parallel with the central cylindrical portion **23***b*. The restricting guide piece **23***e* restricts the displacement member **23** from moving too far upward by the biasing member **28**. For example, the restricting guide piece **23***e* has a hooking claw **23***f* (see FIG. **6**) at its tip and is provided so as to pass through a hook hole **15***e* of the upper wall **15***u*. When the displacement member **23** is in an initial position (see FIG. **7**), the hooking claw **23***f* engages with the upper wall **15***u*, thereby restricting the displacement member **23** from moving upward.

[0027] As illustrated in FIG. **3**, the first sheet member **11** is formed in a circular shape, and has a plurality of mounting holes **11***h* formed on its outer periphery. The accommodating member **15** is constructed by combining a cylindrical outer wall surface **15***a*, a flange member **15***b*, and a bottom portion **15***d*. The bottom portion **15***d* is fitted inside the cylindrical outer wall surface **15***a*, and the flange member **15***b* is attached to an upper side of the cylindrical outer wall surface **15***a* so as to pinch the first sheet member **11** therebetween. The flange member **15***b* has an opening at its center and is provided with a fixed ring portion **15***m* with a high thickness and surrounding the opening. The fixed ring portion **15***m* is provided with a plurality of screw attachment portions **15***g*, and is configured to receive tightening screws **51**. Then, by pinching the first sheet member **11** and tightening the first sheet member with the tightening screws **51**, the first sheet member **11** is tightly clamped between the fixed ring portion **15***m* and an upper end surface **15***j* of the cylindrical outer wall surface **15***a* and attached in a sealed state.
[0028] In this way, the first sheet member **11** can be attached mechanically without using adhesive, so that no adhesive drips, the assembly work is easy, and the configuration is also useful in terms of cost.
[0029] In the assembled toy **1**, when the upper part of the second sheet member **12** is pressed by, for example, a hand **70** (see FIG. **2**), the second sheet member **12** deforms and a pressure P in the specified space increases. Through this operation, the displacement member **23** comes into contact with the pressure sensor **25** and outputs a signal in accordance with a pressure change caused by the pressing force, the details of which will be described below. On the other hand, when the second sheet member **12** is not deformed, the displacement member **23** is apart from the pressure sensor **25**, and no signal is output from the pressure sensor **25**. By sensing in this way, it is possible to clearly distinguish between on and off signals.
[0030] As is apparent from FIG. **2**, the accommodating member **15** is configured to have a size sufficient to hold almost the entirety of a lower part of the second sheet member **12**. As a result, when the second sheet member **12** is pressed in as illustrated in the figure, the accommodating member **15** made of a hard material is firmly supported by a placement surface **60**, allowing for a stable pressing operation.
[0031] FIG. **4** is an exploded perspective view illustrating an example of how to assemble the accommodating member **15**, and FIG. **5** is an exploded perspective view illustrating an example of how to attach the holding member **30**.
[0032] The toy **1** is assembled, for example, as illustrated in FIGS. **4** and **5**. First, as illustrated in FIG. **4**, the accommodating member **15**, into which a control unit **33** and an electrical system are assembled in advance, is inserted through a circular opening portion **12***h* on the lower side of the second sheet member **12** with the flange member **15***b* on an upper end side facing inward (a state illustrated in FIG. **4**). During this insertion, the insertion is performed while widening a first seal portion **12***a* forming the circular opening portion **12***h*. As a result, the first seal portion **12***a* is positioned so as to be in contact with the cylindrical outer wall surface **15***a* of the accommodating member **15**, and the flange member **15***b* is positioned so that its outer circumferential annular flange portion **15***f* is in contact with the second seal portion **12***b*, and the flange member **15***b* is positioned so that the annular flange portion **15***f* is in contact with the second seal portion **12***b*.
[0033] Thereafter, the bottom portion **15***c* of the accommodating member **15**, in which the control unit **33** and the electrical system are assembled, is attached from below using bottom screws **52**. However, the bottom portion **15***c* is attached in a state in which the bottom screw **52** is not completely tightened.
[0034] Thereafter, as illustrated in FIG. **5**, a holding member **30** is attached. The holding member **30** is attached, for example, by fitting the holding member **30**, which is divided into a front half **31** and a rear half **32**, from the outside of the first seal portion **12***a* so that screw bosses **31***b* and **32***b* fit together. In this fitted state, the bottom screws **52** described above are tightened. In this case, a lower end flange **15***g* formed on an outer periphery of a lower end of the bottom portion **15***c*

presses a lower end of the holding member **30**. As a result, a first pressing portion **30***a* at the upper end of the holding member **30** presses the second seal portion **12***b* from below with a strong force (arrow F**1** in FIG. **6**), pinching the second seal portion **12***b* between the first pressing portion **30***a* and the flange member **15***b*, thereby improving the airtightness.

[0035] FIG. **6** is an enlarged cross-sectional view for illustrating a fastening structure of a second seal member **12**. After the bottom screw **52** is tightened, a fastening member **50** is tightened to fix the holding member **30** in place. As illustrated in FIG. **6**, on the inside of the holding member **30**, the first pressing portion **30***a* at the top, a second pressing portion **30***b* at the middle, and a third pressing portion **30***c* at the bottom are provided in a height direction, which form annular constricting abutment portions.

[0036] The first pressing portion **30***a*, the second pressing portion **30***b*, and the third pressing portion **30***c* are structured so that their tips **30***e* press against the first seal portion **12***a* in three stages in a width direction (a direction away from the flange member **15***b*) of the first seal portion **12***a* toward the cylindrical outer wall surface **15***a* as illustrated in the figure. That is, the tip **30***e* of each of the pressing portions **30***a*, **30***b*, and **30***c* presses against the first seal portion **12***a* with a strong force (F**2**) so as to bite into the first seal portion **12***a*. Furthermore, a boundary portion **12***c* between the first seal portion **12***a* and the second seal portion **12***b* is pressed by the tip **30***e* of the first pressing portion **30***a*, and is firmly pressed by a tightening force (F**1**) applied by the bottom screw **52**. That is, since forces are applied in different directions on either side of the boundary portion **12***c*, the boundary portion **12***c* is firmly pressed down and the airtightness is improved.

[0037] FIG. **7** is an enlarged schematic view illustrating an initial state of the displacement member **23** in a structure for detecting a pressure change. FIG. **8** is an enlarged schematic view illustrating an operating state of the displacement member **23** in the structure for detecting the pressure change.

[0038] In the toy **1**, when no operation that would cause a pressure change is performed, as illustrated in FIG. **7**, the displacement member **23** is pressed upward by the biasing member **28**, and its upper end portion is in contact with the first sheet member **11**. In this case, a tip pressing portion **24** provided on a lower surface side of the lower end surface **23***d* of the displacement member **23** is apart from the pressure sensor **25**. In this state, the restricting guide piece **23***e* of the displacement member **23** is hooked on the upper wall **15***u*, restricting the upward movement of the displacement member **23**. The tip pressing portion **24** is made of a relatively flexible material such as urethane.

[0039] Further, an area (A) of the first sheet member **11** that moves due to a pressure change is a region that corresponds to the opening of the flange member **15***b*. A contact area (B) between the first sheet member **11** and the displacement member **23** is smaller than this area (A). Furthermore, a pressing area (D) where the tip pressing portion **24** presses against the pressure sensor **25** is smaller than the contact area (B). Furthermore, the area (C) of the pressure sensor **25** is configured to be slightly larger than the pressing area (D). This is because by making the area (C) of the pressure sensor **25** larger than the pressing area (D), the tip pressing portion **24** does not protrude from a sensor surface, allowing reliable sensing. The area (C) of the pressure sensor **25** is smaller than the contact area (B). In this way, the area that moves due to pressure changes is configured to become smaller as it approaches the pressure sensor **25**, so that the pressure caused by the operation of the hand **70** can be amplified. The greater the number of steps in the area size relationship, the easier it is to increase the amplification. For example, even a slight movement of the hand **70** can be detected reliably. In particular, in a configuration that expresses a musical scale, a piece of music can be produced by subtle movements of the hand.

[0040] Moreover, the first sheet member **11** is configured to be large so as to be able to widely receive pressure changes. On the other hand, in order to convert the pressure change received over a large area into a large pressure, the tip pressing portion **24** is made smaller than the area over which the first sheet member **11** can move. The first sheet member **11** and the displacement member **23** are not bonded together with an adhesive or the like. However, since the first sheet member **11** is made of silicon or the like, its surface is sticky, and when the first sheet member **11** is

deformed as illustrated in FIG. **8**, the portion in contact with the restricting guide piece **23***e* undergoes extremely small elastic deformation (almost no deformation). Therefore, the elastic deformation of the first sheet member **11** forms an annular region (E), and is capable of large movement in proportion to its size.

[0041] Furthermore, when the first sheet member **11** and the displacement member **23** are bonded together with an adhesive or the like, the adhesive may peel off due to long-term use or the like. This undesirably changes an amount of fluctuation caused by the pressure. Furthermore, as an adhesive portion changes over time, in severe cases it may even tear. However, by not using an adhesive as in this configuration, it is possible to improve the long-term stability of the pressing state. Furthermore, since there is no adhesive step, workability is improved and manufacturing costs can be reduced.

[0042] FIG. **9** is a cross-sectional view illustrating an example of a deformation form of the second seal member **12**.

[0043] When the toy **1** is pressed by the hand **70**, a mouth inner portion **12***m* changes to bulge outward as a first area of the pufferfish character. This is caused by the configuration in which the thickness of the second sheet member **12** is changed. For example, in an initial state in which no pressure change is detected, the mouth inner portion **12***m* is configured to be recessed toward the inside of the main body, and furthermore, its thickness (t**3**) is configured to be smaller than the thickness (t**2**) of its surrounding parts. This makes the mouth inner portion **12***m* easily deformable, and elastic deformation occurs with each pressing operation, and the magnitude of deformation changes depending on the strength of pressing.

[0044] The mouth inner portion **12***m* is recessed so as to curve toward the inside of the main body, but a lip portion **12***n* of a second area adjacent to the mouth inner portion **12***m* bulges in an opposite direction (outward) from the mouth inner portion **12***m*. The lip portion **12***n* is configured to be thicker than the mouth inner portion **12***m*. Furthermore, the lip portion **12***n* bulges differently from the mouth inner portion **12***m*. That is, the mouth inner portion **12***m* is gently curved, whereas the lip portions **12***n* are curved with a large curvature. With this configuration, the lip portion **12***n* is placed in a state in which deformation is suppressed by a pressing operation, so that the deformation of the mouth inner portion **12***m* appears more prominent. It is preferable that the thickness (t**4**) of the second seal member **12** around the lip portion **12***n* is greater than the thickness (t**3**) of the mouth inner portion **12***m* and smaller than the thickness (t**2**) of the lip portion **12***n*. With this configuration, it is possible to easily achieve both deformation of the first sheet member **11** due to deformation of the second seal member **12** other than the mouth inner portion **12***m* and the lip portion **12***n* and deformation of the mouth inner portion **12***m*.

[0045] FIG. **10** is an enlarged cross-sectional view of a regulating valve **40** of the toy **1**. As illustrated in FIG. **10**, the regulating valve **40** for regulating the pressure inside the internal space SP is provided inside the accommodating member **15**. This regulating valve **40** includes a valve portion **41** which opens and closes an air hole **46** which communicates with the internal space SP, a force point portion **42** which presses the valve portion **41** against the air hole **46** and then releases this pressing and is away from the valve portion **41**, and a fulcrum portion **43** which is positioned on an opposite side of the valve portion **41** to the force point portion **42** and is engaged with the force point portion.

[0046] The valve portion **41** can be opened and closed by adjusting a force point member **45** which is constituted by engagement of the fulcrum portion **43** and a screw member provided on the force point portion **42**. For example, when the force point member **45** is turned in a loosening direction, in the regulating valve **40**, the force point portion **42** opens downward in the figure due to the biasing force of a pressure spring **48**, pressure-contact of an O-ring **49** by the valve portion **41** loosens, and the internal space SP is connected to the outside air via the air hole **46**. As a result, the second sheet member **12** is maintained in a bulged shape in which the internal air pressure of the specified space is at substantially atmospheric pressure, and can be returned to an elastically

deformable shape by pressure from the outside.
[0047] On the other hand, when closing the regulating valve **40**, the force point member **45** is tightened, whereby the regulating valve **40** is rotated with the fulcrum portion **43** engaged with a hook portion **15***g*. As a result, the valve portion **41** can press the O-ring **49** with a very strong force using the principle of leverage, ensuring reliable closure.
[0048] The regulating valve **40** is covered with an outer lid **15***d* of the accommodating member **15**. For this reason, the regulating valve **40** cannot be seen from the outside, but an opening **15***h* for screwing is provided in the outer lid **15***d*. Therefore, the regulating valve **40** is accessible only to the force point member **45** via the opening **15***h* from the outside.
[0049] As described above, in the toy **1** of this aspect, the space forming member **10** can change the pressure in the internal space SP by deformation, and the detector **20** can detect the pressure change corresponding to the deformation and is provided outside the specified space. Therefore, in the toy **1** that operates using pressure changes based on the detection of the detector **20**, it is easy to detect pressure changes corresponding to the deformation of the space defining member **10** even when the toy **1** does not have high airtightness at the pressure P in the specified space, making it possible to provide the toy **1** with stable performance.
[0050] In the toy **1** of this aspect, the detector **20** is provided with the displacement member **23** that changes its position in response to a pressure change, so that this positional displacement can be easily converted into an electrical signal by the pressure sensor **25**.
[0051] In addition, since the displacement member **23** is constantly biased in a direction away from the pressure sensor **25**, the on/off operation of the pressure sensor **25**, which coordinates with the deformation operation of the space defining member **10**, can be accurately and reliably binary-coded.
[0052] In the toy **1** of this aspect, the space defining member **10** is provided with the first sheet member **11** and the second sheet member **12** which have different amounts of elastic deformation, so that it is possible to amplify the amount of elastic deformation of one of the sheet members, for example the one with the smaller amount of elastic deformation, by the one with the larger amount of elastic deformation. This makes it possible to reliably pick up small movements as large movements.
[0053] In particular, by constructing the outer shell of the toy **1** from the second sheet member **12**, which has a small amount of elastic deformation, and providing the first sheet member **11**, which has a large amount of elastic deformation, on the side that presses the pressure sensor **25**, slight changes in the outer shell of the toy **1** can be accurately detected. As a result, it becomes easy to divide the strength of the pressing operation into multiple stages, and it is possible to provide the toy **1** that produces a wide range of musical scale sounds.
[0054] Furthermore, in the toy **1** of this aspect, the pressure sensor **25** is accommodated and held within the accommodating member **15** which does not elastically deform, thereby enabling the detection function of the detector **20** to be accurate.
[0055] In the toy **1** of this aspect, the thickness of the first sheet member **11** is configured to be thinner than the thickness of the second sheet member **12**, so that members with different amounts of deformation can be formed using the same material.
[0056] In the toy **1** of this aspect, the second sheet member **12** has a multiple structure in which a plurality of sealing portions are arranged in an overlapping manner to tightly tighten and attach the holding member **30** to the accommodating member **15**, thereby ensuring reliable sealing.
[0057] Furthermore, the fastening member **50** that tightens and fixes the second sheet member **12** is structured to be attached from the rear side of the character of the toy **1**, so that when the character is viewed from the front, the structure of the attachment portion is not visible, and good design can be maintained.
[0058] In the toy **1** of this aspect, the bottom side of the toy **1** is made up of the accommodating member **15** with hardness, the size of which is approximately the same as the bottom size of the

second sheet member **12** that can be pressed, so that the toy **1** can be placed stably on the placement surface **60**. Furthermore, since the entirety of the bottom side is made of a hard material when the second sheet member **12** is pressed, the force of the pressing operation can be stably received, improving operability.

[0059] With the toy of this aspect, by providing the regulating valve **40** that regulates the pressure in the internal space SP, it is possible to respond to changes in atmospheric pressure. For example, an inflated state of the second sheet member **12** can be maintained at approximately the same pressure as atmospheric pressure, so that no special pressurizing means is required and the configuration can be simplified.

[0060] Furthermore, the regulating valve **40** uses the force point member **45** having the force point portion **42** and the fulcrum portion **43** on either side of the valve portion **41** as a structure for operating the valve portion **41** which opens and closes the air hole **46**, which increases the reliability of the closed state of the valve portion **41** and at the same time makes it possible to accurately adjust the open state. Furthermore, the valve portion **41** is configured so that only the force point portion **42** thereof can be accessed from the outer lid **15***d*, thereby ensuring ease of adjustment and protecting the regulating valve **40**.

[0061] Although one aspect of the present disclosure is described above, the present disclosure can be modified as appropriate within the scope of its technical concept. For example, in the above aspect, the operating unit operates to change its position linearly based on the pressure change detected by the detector **20**, but the configuration of this operating unit is not limited to this and may be, for example, a configuration that performs rotational movement or even an electronically varying movement.

[0062] In addition, in the above-described aspect, the pressure fluctuation in the internal space SP is converted into sound, but the aspect is not limited to this, and it is also possible to have a configuration that allows for light emission effects that change the intensity of light, and even color effects that change the color.

[0063] In the configuration of the above-described aspect, the pressure medium in the internal space SP is air, but the pressure medium is not limited to air and may be a liquid such as water.

[0064] At least the followings are described in the present disclosure.

[0065] (1) A toy including: [0066] a space defining member that defines a specified space; and [0067] a detector provided outside the specified space and configured to detect a pressure change within the specified space in response to deformation of at least a part of the space defining member.

[0068] (2) The toy according to (1), in which [0069] the detector includes a displacement member that changes a position in response to a pressure change in the specified space, and a pressure sensor, and [0070] the pressure sensor detects an amount of change in pressure applied to the pressure sensor by the displacement member in response to displacement of the displacement member.

[0071] (3) The toy according to (2), in which [0072] the displacement member is provided in contact with the space defining member and is configured to be displaced in a predetermined direction in response to the deformation of the at least a part of the space defining member.

[0073] (4) The toy according to (3), in which [0074] the detector further includes a biasing member that biases the displacement member in a direction away from the pressure sensor.

[0075] (5) The toy according to (3), in which [0076] the displacement member is apart from the pressure sensor when the space defining member is not deformed, and is configured to come into contact with the pressure sensor when the at least a part of the space defining member is deformed and the pressure in the specified space increases.

[0077] (6) The toy according to any one of (2) to (5), in which [0078] the space defining member includes a first sheet member having elasticity, and [0079] the first sheet member coordinates with the displacement member.

[0080] (7) The toy according to any one of (1) to (5), in which [0081] the space defining member includes a first sheet member having elasticity and a second sheet member having elasticity, [0082] the second sheet member constitutes at least a part of an outer shell of the toy, and [0083] the first sheet member is configured to elastically deform in response to elastic deformation of the second sheet member.
[0084] (8) The toy according to (7), in which [0085] the first sheet member is configured to have a larger amount of elastic deformation in response to a pressure change in the specified space than the second sheet member.
[0086] (9) The toy according to (7) or (8), in which [0087] a thickness of the first sheet member is thinner than a thickness of the second sheet member.
[0088] (10) The toy according to any one of (7) to (9), in which [0089] the second sheet member has a bulging shape when an internal air pressure of the specified space is at essentially atmospheric pressure, and is configured to be elastically deformable by pressure from the outside.
[0090] (11) The toy according to any one of (7) to (10), in which [0091] the detector includes a displacement member that changes a position in response to a pressure change in the specified space, and a pressure sensor, [0092] the pressure sensor detects an amount of change in pressure applied to the pressure sensor by the displacement member in response to displacement of the displacement member, [0093] the toy further comprises: [0094] an accommodating member that accommodates the pressure sensor, and [0095] a holding member that holds the second sheet member on the accommodating member, [0096] the second sheet member is provided such that the second sheet member covers the accommodating member, and [0097] the holding member is attached to the accommodating member constricting the accommodating member via the second sheet member.
[0098] (12) The toy according to (11), in which [0099] the accommodating member includes a cylindrical outer wall surface having a cylindrical shape and an annular flange portion protruding radially outward from the cylindrical outer wall surface, [0100] the second sheet member includes a first seal portion capable of being in contact with the cylindrical outer wall surface and a second seal portion capable of being in contact with the annular flange portion, and [0101] the holding member includes a constricting abutment portion capable of constricting at least a boundary portion between the first seal portion and the second seal portion.
[0102] (13) The toy according to (12), in which [0103] the constricting abutment portion presses the first seal portion toward the cylindrical outer wall surface in a constricting direction of the holding member.
[0104] (14) The toy according to (12) or (13), in which [0105] the holding member includes a plurality of the constricting abutment portions provided in a direction away from the annular flange portion.
[0106] (15) The toy according to (14), in which [0107] the second sheet member has an outer surface that resembles a character, and the holding member includes two members and a fastening member fastening the two members, the fastening member being configured to be attached from a rear side of the character.
[0108] (16) The toy according to any one of (11) to (15), in which [0109] the accommodating member has a predetermined surface to be placed on a predetermined placement surface, and [0110] the second sheet member is configured to be pressed against the accommodating member placed on the predetermined placement surface, and [0111] the accommodating member is made of a material harder than the space defining member.
[0112] (17) The toy according to any one of (2) to (6), in which [0113] the displacement member includes a pressing portion in contact with the pressure sensor and a contact portion in contact with a part of the space defining member, and an area of the pressing portion is smaller than an area of the contact portion.
[0114] (18) The toy according to any one of (7) to (16), in which [0115] a first area of a portion of

the second sheet member is thinner than another area and is recessed inwardly into the specified space.
[0116] (19) The toy according to (18), in which [0117] the second sheet member includes a second area adjacent to the first area, and the second area protrudes in an opposite direction to the first area and is thicker than the first area.
[0118] (20) The toy according to any one of (1) to (19), further including: [0119] a regulating valve configured to regulate pressure inside the specified space.
[0120] (21) The toy according to (20), in which [0121] the detector includes a displacement member that changes a position in response to a pressure change in the specified space, and a pressure sensor, [0122] the pressure sensor detects an amount of change in pressure applied to the pressure sensor by the displacement member in response to displacement of the displacement member, the toy further comprises an accommodating member that accommodates the pressure sensor, and [0123] the regulating valve is provided inside the accommodating member.
[0124] (22) The toy according to (21), in which [0125] the regulating valve includes: [0126] a valve portion configured to open and close an air hole that communicates with the specified space, [0127] a load point portion provided away from the valve portion, the load point portion being configured to press the valve portion against the air hole and release the pressing, and [0128] a fulcrum portion disposed across the valve portion from the load point portion and engaging with the accommodating member, and [0129] the valve portion is opened and closed by engagement of the fulcrum portion and adjustment of the load point member provided on the load point portion.
[0130] (23) The toy according to (22), in which [0131] the regulating valve is covered by an outer lid of the accommodating member, and only the load point portion is accessible from the outside.
[0132] (24) The toy according to any one of (1) to (23), further including: [0133] an operating unit that operates based on the pressure change detected by the detector.

Claims

1. A toy comprising: a space defining member that defines a specified space; and a detector provided outside the specified space and configured to detect a pressure change within the specified space in response to deformation of at least a part of the space defining member.
2. The toy according to claim 1, wherein the detector includes a displacement member that changes a position in response to a pressure change in the specified space, and a pressure sensor, and the pressure sensor detects an amount of change in pressure applied to the pressure sensor by the displacement member in response to displacement of the displacement member.
3. The toy according to claim 2, wherein the displacement member is provided in contact with the space defining member and is configured to be displaced in a predetermined direction in response to the deformation of the at least a part of the space defining member.
4. The toy according to claim 3, wherein the detector further includes a biasing member that biases the displacement member in a direction away from the pressure sensor.
5. The toy according to claim 3, wherein the displacement member is apart from the pressure sensor when the space defining member is not deformed, and is configured to come into contact with the pressure sensor when the at least a part of the space defining member is deformed and the pressure in the specified space increases.
6. The toy according to claim 2, wherein the space defining member includes a first sheet member having elasticity, and the first sheet member coordinates with the displacement member.
7. The toy according to claim 2, wherein the space defining member includes a first sheet member having elasticity and a second sheet member having elasticity, the second sheet member constitutes at least a part of an outer shell of the toy, and the first sheet member is configured to elastically deform to come into contact with the displacement member in response to elastic deformation of the second sheet member.

8. The toy according to claim 7, wherein the first sheet member is configured to have a larger amount of elastic deformation in response to a pressure change in the specified space than the second sheet member.
9. The toy according to claim 8, wherein a thickness of the first sheet member is thinner than a thickness of the second sheet member.
10. The toy according to claim 9, wherein the second sheet member has a bulging shape when an internal air pressure of the specified space is at essentially atmospheric pressure, and is configured to be elastically deformable by pressure from the outside.
11. The toy according to claim 10, wherein the detector includes a displacement member that changes a position in response to a pressure change in the specified space, and a pressure sensor, the pressure sensor detects an amount of change in pressure applied to the pressure sensor by the displacement member in response to displacement of the displacement member, the toy further comprises: an accommodating member that accommodates the pressure sensor, and a holding member that holds the second sheet member on the accommodating member, the second sheet member is provided such that the second sheet member covers the accommodating member, and the holding member is attached to the accommodating member constricting the accommodating member via the second sheet member.
12. The toy according to claim 11, wherein the accommodating member includes a cylindrical outer wall surface having a cylindrical shape and an annular flange portion protruding radially outward from the cylindrical outer wall surface, the second sheet member includes a first seal portion capable of being in contact with the cylindrical outer wall surface and a second seal portion capable of being in contact with the annular flange portion, and the holding member includes a first constricting abutment portion capable of constricting at least a boundary portion between the first seal portion and the second seal portion.
13. The toy according to claim 12, wherein the first constricting abutment portion presses the first seal portion toward the cylindrical outer wall surface in a constricting direction of the holding member.
14. The toy according to claim 13, wherein the holding member includes second constricting abutment portions capable of constricting the first seal portion toward the cylindrical outer wall surface, and the second constricting abutment portions are provided in a direction away from the annular flange portion.
15. The toy according to claim 2, wherein the displacement member includes a pressing portion in contact with the pressure sensor and a contact portion in contact with a part of the space defining member, and an area of the pressing portion is smaller than an area of the contact portion.
16. The toy according to claim 7, wherein a first area of a portion of the second sheet member is thinner than another area and is recessed inwardly into the specified space.
17. The toy according to claim 16, wherein the second sheet member includes a second area adjacent to the first area, and the second area protrudes in an opposite direction to the first area and is thicker than the first area.
18. The toy according to claim 1, further comprising: a regulating valve configured to regulate pressure inside the specified space, wherein the detector includes a displacement member that changes a position in response to a pressure change in the specified space, and a pressure sensor, the pressure sensor detects an amount of change in pressure applied to the pressure sensor by the displacement member in response to displacement of the displacement member, the toy further comprises an accommodating member that accommodates the pressure sensor, and the regulating valve is provided inside the accommodating member.
19. The toy according to claim 18, wherein the regulating valve includes: a valve portion configured to open and close an air hole that communicates with the specified space, a load point portion provided away from the valve portion, the load point portion being configured to press the valve portion against the air hole and release the pressing, and a fulcrum portion disposed across

the valve portion from the load point portion and engaging with the accommodating member, and the valve portion is opened and closed by engagement of the fulcrum portion and adjustment of the load point member provided on the load point portion.

20. The toy according to claim 19, wherein the regulating valve is covered by an outer lid of the accommodating member, and only the load point portion is accessible from the outside.