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(54) HOLLOW BALL STORAGE METHOD

(57) [Object] To provide a method for storing a hollow ball easily at low cost.

[Solution] A method for storing a hollow ball according to the present invention includes the steps of: (1) putting a hollow ball 4 including an outer shell and a space surrounded by the outer shell, into a housing portion 6; (2) decreasing a temperature of the hollow ball 4 to a temperature lower than a temperature of external air; and (3) storing the hollow ball in a state where the temperature of the hollow ball 4 is made lower than the temperature of the external air. Preferably, the storing method further includes the step of (4) increasing the temperature of the hollow ball 4 after the step (3). Preferably, in the step (4), the temperature of the hollow ball 4 is increased to a temperature exceeding a dew point of the external air.

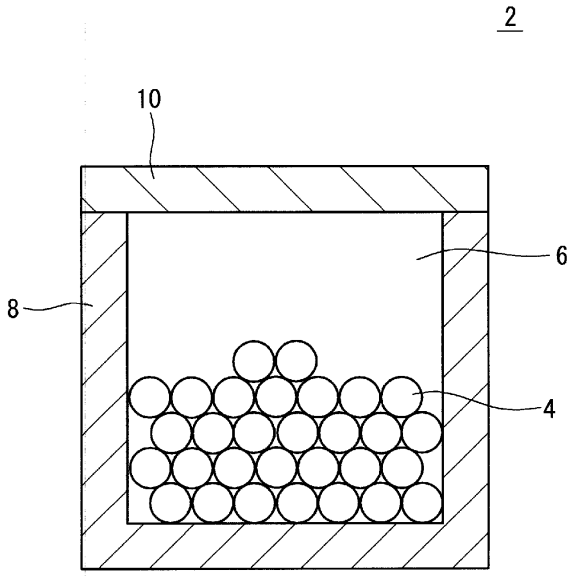

FIG. 1

EP 3 025 768 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to methods for storing hollow balls such as regulation tennis balls, soft tennis balls, and the like.

BACKGROUND ART

[0002] In order to obtain appropriate elasticity of hollow balls such as a regulation tennis ball, a soft tennis ball, and the like, the internal pressures of the balls are kept higher than the atmospheric pressure. For example, the internal pressure of a regulation tennis ball is set to be about 1.8 times of the atmospheric pressure. If a ball has an internal pressure higher than this, a user feels that the ball is too hard or flies too far. If a ball has an internal pressure lower than this, the user feels that the ball is too soft or does not fly well. A hollow ball needs to be manufactured such that the internal pressure thereof has an appropriate value, and the internal pressure of the manufactured ball needs to be kept in an appropriate range.

[0003] In order to increase the internal pressure of a ball, for example, in manufacturing a regulation tennis ball, there is a case where a method of generating gas by a chemical reaction is used and a case where air is compressed and injected. The ball includes a core which is a hollow sphere made of rubber; and two felt portions (also referred to as "melton") which cover the surface of the core. The core is obtained by attaching together two half shells. In the case where the internal pressure is increased by a chemical reaction, prior to attaching together the two half shells, a tablet of ammonium chloride, a tablet of sodium nitrite, and water (or aqueous solutions thereof) are put into the core. In crosslinking the core, they are heated, so that ammonium chloride and sodium nitrite cause a chemical reaction. Nitrogen gas is generated by the chemical reaction. The internal pressure of the core is increased by the nitrogen gas.

[0004] In a ball having an internal pressure higher than the atmospheric pressure, the gas within the ball passes through an outer shell to come out of the ball due to the difference between the internal pressure and the atmospheric pressure. That is, even when a ball is manufactured so as to have an appropriate internal pressure, the internal pressure decreases over time. For example, when a regulation tennis ball is left in the atmospheric pressure for about two months, the internal pressure thereof decreases by 10% to 15% thereby to begin to affect playing such as "not bouncing well, poor feel at impact", or the like.

[0005] Results of examination of storage containers for suppressing a decrease in the internal pressures of tennis balls are disclosed in JP7-155406, JP7-187252, and JP8-89600. These storage containers are all airtight containers. After tennis balls are housed in these containers, the air pressures within the containers are increased to a pressure higher than the atmospheric pressure. By decreasing the difference between the internal pressure of each tennis ball and the air pressure of each container outside the tennis ball, a speed at which the gas within the ball passes through an outer shell can be decreased. By eliminating the difference between the internal pressure of each tennis ball and the air pressure of the container, the gas within the ball does not come out. In other words, the internal pressure of the tennis ball does not decrease.

CITATION LIST

PATENT LITERATURE

[0006]

Patent Literature 1: JP7-155406
Patent Literature 2: JP7-187252
Patent Literature 3: JP8-89600

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0007] Regarding each of the storage containers in JP7-155406, JP7-187252, and JP8-89600, the air pressure within the container is increased to a pressure higher than the atmospheric pressure as described above. The storage container is required to have strength to withstand the difference between the pressure within the container and the atmospheric pressure. For example, when the pressure within the container is made higher than the atmospheric pressure by 1.0 kgf/cm^2, if the size of an inlet of the container is set at 300 mm for easily putting balls into the container, a force of about

700 kgf is applied to the inlet portion. The container that can withstand the force is increased in size, and the weight thereof is also increased. It is difficult to handle the container. The container is expensive. A method for storing a hollow ball easily at low cost is desired.

[0008] An object of the present invention is to provide a method for storing a hollow ball easily at low cost.

SOLUTION TO THE PROBLEMS

[0009] A method for storing a hollow ball according to the present invention includes the steps of:

(1) putting a hollow ball including an outer shell and a space surrounded by the outer shell, into a housing portion;
(2) decreasing a temperature of the hollow ball to a temperature lower than a temperature of external air; and
(3) storing the hollow ball in a state where the temperature of the hollow ball is made lower than the temperature of the external air.

[0010] Preferably, the storing method further includes the step of (4) increasing the temperature of the hollow ball after the step (3).

[0011] Preferably, in the step (4), the temperature of the hollow ball is increased to a temperature exceeding a dew point of the external air.

[0012] Preferably, in the step (3), the temperature of the hollow ball is equal to or lower than 10°C.

[0013] Preferably, in the step (3), the temperature of the hollow ball is equal to or lower than 0°C.

[0014] Preferably, in the step (3), the temperature of the hollow ball is equal to or lower than -10°C.

ADVANTAGEOUS EFFECTS OF THE INVENTION

[0015] In the method for storing the hollow ball according to the present invention, after the hollow ball is housed within the housing portion, the temperature of the hollow ball is decreased to the temperature lower than the temperature of the external air. The hollow ball is stored in a state of being cooled. Under the low temperature, the permeability of gas relative to the outer shell of the hollow ball decreases. Thus, the speed at which the gas within the ball comes out of the ball is lower than that at normal temperature. Therefore, the internal pressure of the hollow ball can be maintained for a long period of time as compared to a conventional method for storing the ball at normal temperature. According to this method, it is possible to easily store the hollow ball without using a pressure container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

[FIG. 1] FIG. 1 is a conceptual diagram showing an apparatus for a method for storing a hollow ball according to an embodiment of the present invention.
[FIG. 2] FIG. 2 is a conceptual diagram showing an apparatus for a method for storing a hollow ball according to a second embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0017] The following will describe in detail the present invention based on preferred embodiments with appropriate reference to the drawings.

[0018] FIG. 1 shows an apparatus for a method for storing a hollow ball according to an embodiment of the present invention. The apparatus is a refrigerator 2. The interior of the refrigerator 2 is a housing portion 6 which houses hollow balls 4 each of which includes an outer shell and a space surrounded by the outer shell. The refrigerator 2 includes a main body 8 and a lid 10. The main body 8 has, at an upper portion thereof, an input port for putting in the hollow balls 4 therethrough. The refrigerator 2 keeps the internal temperature thereof low. The refrigerator 2 typically cools the interior thereof by electric power. The refrigerator 2 may cool the interior thereof by having ice therein.

[0019] In the method for storing the hollow balls 4 according to the present invention, in the first step, the hollow balls 4 are put into the housing portion 6 of the refrigerator 2. The lid 10 of the refrigerator 2 is opened, the hollow balls 4 are put into the main body 8 through the input port of the main body 8, and the lid 10 is closed. In the next step, the hollow balls 4 are cooled in the housing portion 6 of the refrigerator 2 to a temperature lower than the temperature of the external air. In the next step, the hollow balls 4 are stored in a state where the hollow balls 4 are cooled to the temperature lower than the temperature of the external air.

[0020] As described above, in the method for storing the hollow balls 4 according to the present invention, the hollow

balls 4 are stored in a state of being cooled. Under the low temperature, the permeability of gas relative to the outer shell of each hollow ball 4 decreases. The speed at which the gas within the ball 4 comes out of the ball 4 is lower than that at normal temperature. Thus, the internal pressure of each hollow ball 4 can be maintained for a long period of time as compared to a conventional method for storing the balls 4 at normal temperature. According to this method, it is possible to easily store the hollow balls 4 without using a pressure container.

[0021] Hereinafter, regulation tennis balls 4 are taken as an example, and the case of storing the balls 4 at normal temperature of 25°C and the case of storing the balls 4 while cooling the balls 4 to 10°C are compared as to the speed at which gas comes out of the interior of each ball 4. The outer shell of each regulation tennis ball 4 is generally made from natural rubber. The gas within each regulation tennis ball 4 is generally composed of nitrogen gas (N_2) and oxygen gas (O_2), similarly to the atmosphere. Carbon dioxide gas (CO_2) is also present in the interior of each regulation tennis ball 4 and the atmosphere, but the amount thereof is negligibly small.

[0022] When: the permeability coefficient of a gas for a film is denoted by Cp; the partial pressure difference of the gas between the outer side and the inner side across the film is denoted by P; and the thickness of the film is denoted by W, a speed V at which the gas passes through the film is represented by:

$$V = Cp \times P/W.$$

[0023] As shown in the above formula, the speed V at which the gas passes through the film is proportional to the permeability coefficient Cp of the gas for the film. In the case of the regulation tennis balls 4 that are commercially available, the permeability coefficient Cp of each of nitrogen gas and oxygen gas for the outer shell at a temperature of 10°C is substantially 1/2 of the permeability coefficient Cp thereof at a temperature of 25°C. The partial pressure difference P also decreases as the temperature decreases, but the effect of the partial pressure difference P on the speed V is less than that of the permeability coefficient. The thickness W of the film does not change in response to the temperature. Therefore, by cooling the balls 4 at 25°C to 10°C, the speed V at which each of nitrogen gas and oxygen gas passes through the outer shell of each ball 4 becomes substantially 1/2 due to the effect of the temperature dependency of the permeability coefficient Cp.

[0024] As described above, at each of the tennis balls 4, the speed at which the gas within the tennis ball 4 comes out of the tennis ball 4 is lower than the speed at which the gas within the tennis ball 4 at normal temperature comes out of the tennis ball 4. The internal pressure of each of the tennis balls 4 can be maintained for a long period of time as compared to storing the balls 4 at normal temperature. In this method, a decrease in the internal pressure of each tennis ball 4 can be controlled without using a pressure container.

[0025] The gas of which the permeability coefficient for a film such as rubber or the like decreases as the temperature decreases is not limited to nitrogen gas and oxygen gas. In general, the permeability coefficient of a gas passing through a film decreases as the temperature decreases. The present method is effective also for hollow balls 4 filled with a gas other than nitrogen gas and oxygen gas.

[0026] From the standpoint that the speed at which the gas comes out of the interior of each hollow ball 4 is decreased to maintain the internal pressure of the hollow ball 4, the storage temperature for the hollow balls 4 is preferably equal to or lower than 10°C. From this standpoint, the storage temperature for the hollow balls 4 is more preferably equal to or lower than 0°C and further preferably equal to or lower than -10°C.

[0027] FIG. 2 shows an apparatus for a method for storing hollow balls according to a second embodiment of the present invention. The apparatus includes a refrigerator 11 and a bag 12.

[0028] The bag 12 houses hollow balls 14. The bag 12 is typically made from a resin composition. The bag 12 has an input port for putting in the hollow balls 14 therethrough. The input port is provided with a zipper 16. By closing the zipper 16, the bag 12 is kept airtight.

[0029] The interior of the refrigerator 11 is a housing portion 18 which houses the bag 12 in which the hollow balls 14 are put. The refrigerator 11 includes a main body 20 and a lid 22. The main body 20 has, at an upper portion thereof, an input port for putting in the hollow balls 14 therethrough. The refrigerator 11 keeps the internal temperature thereof low. The refrigerator 11 typically cools the interior thereof by electric power. The refrigerator 11 may cool the interior thereof by having ice therein.

[0030] In the method for storing the hollow balls 14 according to the present invention, in the first step, the hollow balls 14 are housed in the housing portion 18 of the refrigerator 11. In this step, first, the hollow balls 14 are put into the bag 12. Thereafter, the zipper 16 of the bag 12 is closed. The bag 12 is put into the refrigerator 11. The lid 22 of the refrigerator 11 is opened, the bag 12 is put into the main body 20 through the input port of the main body 20, and the lid 22 is closed.

[0031] In the next step, the hollow balls 14 are cooled in the interior of the refrigerator 11 to a temperature lower than the temperature of the external air. In a step subsequent to this, the hollow balls 14 are stored in a state where the hollow balls 14 are cooled to the temperature lower than the temperature of the external air.

[0032] In the final step, before the hollow balls 14 are used, the bag 12 in which the hollow balls 14 have been put is taken out from the refrigerator 11, so that the temperature of each hollow ball 14 is increased. Thereafter, the hollow balls 14 are taken out from the bag 12 and used.

[0033] As described above, in the method for storing the hollow balls 14 according to the present invention, the hollow balls 14 are stored in a state of being cooled. Under the low temperature, the permeability of gas relative to the outer shell of each hollow ball 14 decreases. The speed at which the gas comes out of the interior of the ball 14 is lower than that at normal temperature. Thus, the internal pressure of each hollow ball 14 can be maintained for a long period of time as compared to a conventional method for storing the balls 14 at normal temperature. According to this method, it is possible to easily store the hollow balls 14 without using a pressure container.

[0034] When the hollow balls 14 that have been stored at the low temperature are exposed directly to the atmosphere, dew condensation may occur on the surface of each ball 14. In each regulation tennis ball 14, felt portions cover the surface. If each ball 14 is used in a state where the felt portions contain water generated due to dew condensation, yarns that form the felt portions are twisted, so that irregularities can occur on the surface. The tennis ball 14 can be no longer used. In the storing method according to the present invention, the hollow balls 14 are exposed to the atmosphere while being housed in the bag 12 before being used. Thus, dew condensation occurs on the surface of the bag 12. Since the airtightness of the bag 12 is ensured, water does not adhere to the surface of each ball 14. Then, after the temperature of each hollow ball 14 is increased, the hollow balls 14 are taken out from the bag 12. Thus, the amount of dew condensation occurring on the surface of each hollow ball 14 can be decreased. In this method, occurrence of twist of the felt is suppressed.

[0035] Before the hollow balls 14 are taken out from the bag 12, the temperature of each hollow ball 14 is preferably increased to a temperature exceeding the dew point of the external air. By increasing the temperature of each hollow ball 14 to the temperature exceeding the dew point of the external air, dew condensation does not newly occur on the surface of each of the taken-out hollow balls 14. According to this method, twist of the felt due to dew condensation does not occur.

[0036] From the standpoint that the bag 12 is kept airtight and is excellent in waterproofness, the principal component of the base resin of the resin composition of the bag 12 is preferably nylon or polyethylene.

[0037] In the above-described storing method, after the hollow balls 14 are housed in the bag 12, the bag 12 is housed in the refrigerator 11. The hollow balls 14 may not be housed in the bag 12. The hollow balls 14 may be housed directly in the refrigerator 11. In this case, before the hollow balls 14 are used, for example, by increasing the temperature within the refrigerator 11, the temperature of each hollow ball 14 is increased. After the temperature of each hollow ball 14 is increased, the hollow balls 14 are taken out, whereby dew condensation can be prevented from occurring on the surface of each hollow ball 14. According to this method, occurrence of twist of the felt can be suppressed even without using the bag 12.

[0038] In a third embodiment of the present invention, the present method is used when hollow balls are transported. In this storing method, in the first step, the hollow balls are housed in the interior of a freezing container which is a housing portion. In the next step, the hollow balls are cooled in the interior of the freezing container to a temperature lower than the temperature of the external air. In the next step, the hollow balls are stored and transported in a state where the hollow balls are cooled to the temperature lower than the temperature of the external air.

[0039] When the hollow balls produced in a factory are shipped to a remote place such as a foreign country or the like, the hollow balls may be transported over several weeks. Thus, for example, regarding regulation tennis balls, sets of several balls are generally put in pressurized containers, such as steel cans and the like, and transported, in order to suppress a decrease in the internal pressure of each ball. At a user who uses many balls every day such as a tennis school or the like, pressurized containers are opened and discarded immediately after the pressurized containers are delivered. In addition, since it is bothersome to open a pressurized container, a manufacturer opens pressurized containers immediately before delivery of the pressurized containers to a user and then delivers only balls to the user in some cases. That is, only for transportation, an operation of housing the balls in the pressurized containers and opening the pressurized containers is performed, and further the used pressurized containers are discarded. This increases the transportation cost for balls. In addition, this can be a factor for increasing consumption of resources.

[0040] In the method for storing the hollow balls according to the present invention, the hollow balls are stored in the interior of the freezing container in a state where the hollow balls are cooled. Under the low temperature, the permeability of gas relative to the outer shell of each hollow ball decreases. The speed at which the gas comes out of the interior of each ball is lower than that at normal temperature. Thus, the internal pressure of each hollow ball can be maintained for a long period of time as compared to a conventional method for storing the balls at normal temperature. According to this method, no pressurized container is needed. According to this method, at the time of transportation, it is not necessary to put balls into a pressurized container in a sealed manner. In addition, it is also not necessary to open a pressurized container before delivery of balls to a user. In this method, the transportation cost can be reduced. In this method, waste matters which are pressurized containers are also not generated. In this method, consumption of resources is reduced.

[0041] The effects of the present invention have been described above in the representative three types of embodiments. Embodiments of the present invention are not limited to the three types described here. For example, the kind of apparatus for cooling hollow balls and whether to use the bag, and the like can be determined and combined as appropriate according to a use purpose of the present method. According to the present invention, in any of the embodiments, it is not necessary to use a pressure container, and thus hollow balls can be stored easily at low cost as compared to the conventional method. Due to the above, advantages of the present invention are clear.

EXAMPLES

[0042] The following will show effects of the present invention by means of examples, but the present invention should not be construed in a limited manner based on the description of these examples.

[Example 1]

[0043] In Example 1, the apparatus shown in FIG. 1 was prepared, and a method for storing hollow balls was executed under the conditions shown in Table 1. As the hollow balls, commercially-available regulation tennis balls were used. The initial internal pressure of each of the regulation tennis balls is 1.8 kgf/cm^2. The outer shell of each of the tennis balls is made from natural rubber. These balls were put into a refrigerator of which the internal temperature can be adjusted. In the table, "average external air temperature" is the average temperature of the external air during a period when the balls were stored. "Playing temperature" is the temperature of the external air when tennis is played by using the balls after end of the storage period. "Ball temperature increasing treatment" indicates whether a treatment for increasing the temperature of each ball to a temperature exceeding the dew point of the atmosphere was performed before taking out the balls from the refrigerator after the end of the storage period. "No" indicates that the treatment was not performed, and "Yes" indicates that the treatment was performed. In Example 1, the ball temperature increasing treatment was not performed.

[Comparative Example 1]

[0044] Comparative Example 1 is the same as Example 1, except the storage temperature for the balls was not adjusted and the balls were stored at the same temperature as the temperature of the external air.

[Examples 2 and 3]

[0045] Examples 2 and 3 are the same as Example 1, except the storage temperature for the balls was as shown in Table 1.

[Examples 4 to 6]

[0046] Examples 4 to 6 are the same as Example 1, except the storage temperature for the balls was as shown in Table 1 and the ball temperature increasing treatment was performed.

[Evaluation of Internal Pressure Decrease]

[0047] After the balls were housed in the refrigerator, the balls were stored for 1 month under the conditions shown in Table 1. Thereafter, the balls were taken out from the refrigerator, and the internal pressure of each ball was measured. The difference between this internal pressure and the internal pressure before the storage is shown as "internal pressure decrease" in Table 1.

[Evaluation of Felt Twist]

[0048] After the balls were housed in the refrigerator, the balls were stored for 1 month under the conditions shown in Table 1. Thereafter, the balls were taken out from the refrigerator, and a tennis match was held by using the balls under the temperature shown in Table 1. After the match, it was visually confirmed whether felt twist of each ball occurred. The results are shown as "felt twist" in Table 1. In the table, "A" indicates that no felt twist occurs, "B" indicates that felt twist occurs but the degree of the felt twist is such a degree as not to affect playing, and "C" indicates that felt twist occurs to such a degree as to affect playing.

[Table 1]

Table 1 Evaluation Results							
	Comparative Example 1	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6
Average external air temperature [°C]	23	23	23	23	23	23	23
Storage temperature [°C]	23	10	0	-10	10	0	-10
Playing temperature [°C]	25	25	25	25	25	25	25
Ball temperature increasing treatment	No	No	No	No	Yes	Yes	Yes
Internal pressure decrease [kgf/cm^2]	0.12	0.06	0.04	0.03	0.06	0.04	0.03
Felt twist	A	B	C	C	A	A	A

[0049] As shown in Table 1, in the method for storing the balls according to each Example, a decrease in the internal pressure of each ball is significantly suppressed as compared to the method for storing the balls according to each Comparative Example. From the evaluation results, advantages of the present invention are clear.

INDUSTRIAL APPLICABILITY

[0050] The method described above can be used for storing various hollow balls.

DESCRIPTION OF THE REFERENCE CHARACTERS

[0051]

2, 11···refrigerator

4, 14···ball

6, 18···housing portion

8, 20···main body

10, 22···lid

12···bag

16···zipper

Claims

1. A method for storing a hollow ball, the method comprising the steps of:

(1) putting a hollow ball including an outer shell and a space surrounded by the outer shell, into a housing portion;
(2) decreasing a temperature of the hollow ball to a temperature lower than a temperature of external air; and
(3) storing the hollow ball in a state where the temperature of the hollow ball is made lower than the temperature of the external air.

2. The method according to claim 1, further comprising the step of (4) increasing the temperature of the hollow ball

after the step (3).

3. The method according to claim 2, wherein in the step (4), the temperature of the hollow ball is increased to a temperature exceeding a dew point of the external air.

4. The method according to any one of claims 1 to 3, wherein in the step (3), the temperature of the hollow ball is equal to or lower than 10°C.

5. The method according to claim 4, wherein in the step (3), the temperature of the hollow ball is equal to or lower than 0°C.

6. The method according to claim 5, wherein in the step (3), the temperature of the hollow ball is equal to or lower than -10°C.

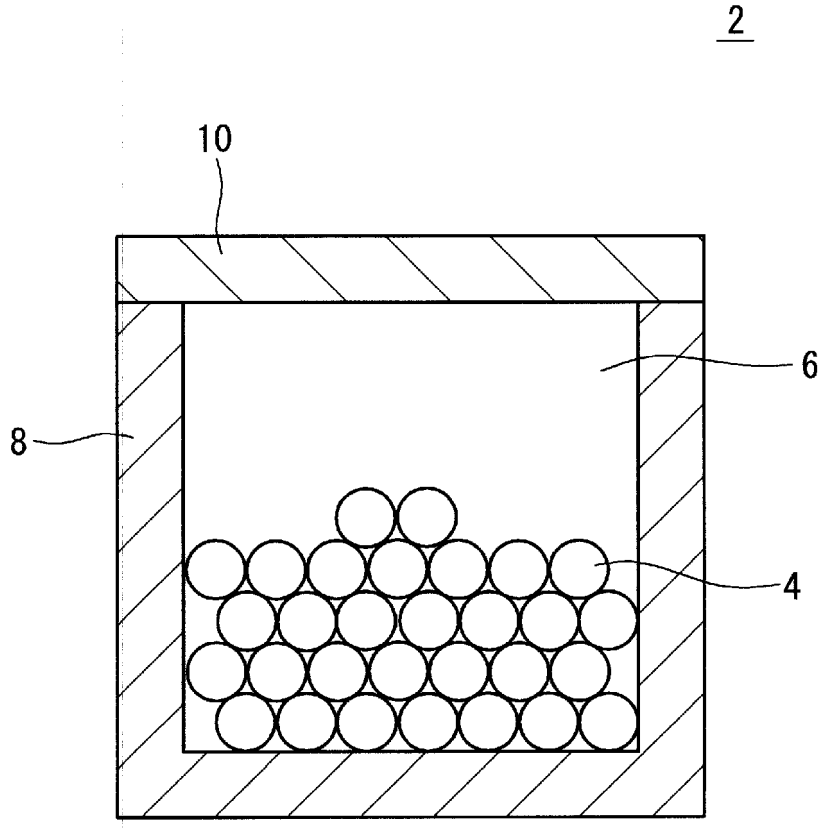

FIG. 1

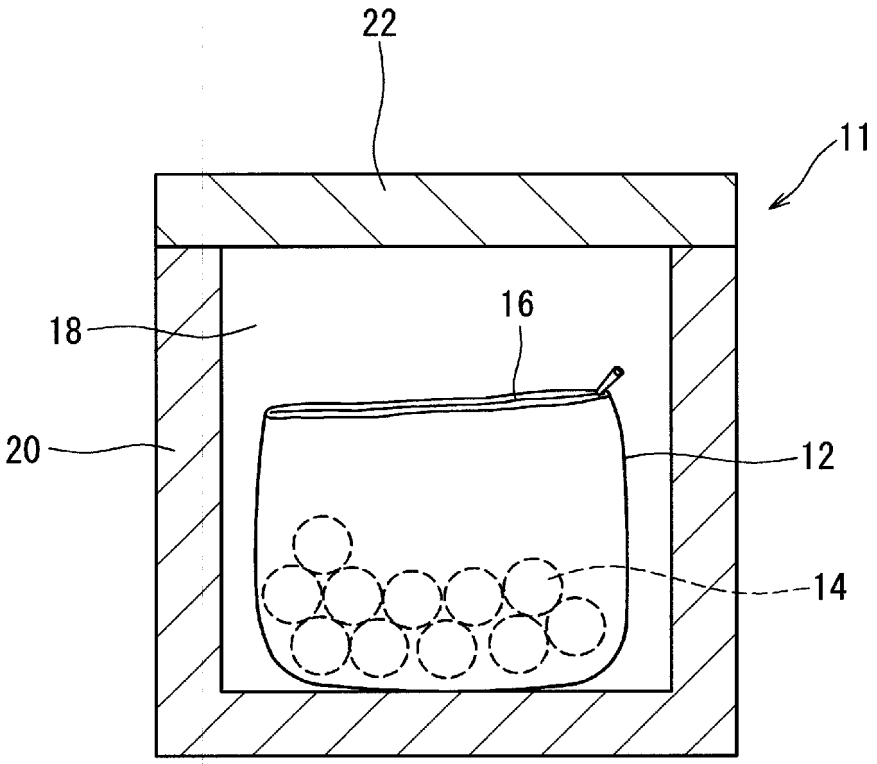

FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/063314

A. CLASSIFICATION OF SUBJECT MATTER
A63B47/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A63B47/00, A63B39/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2014
Kokai Jitsuyo Shinan Koho 1971-2014 Toroku Jitsuyo Shinan Koho 1994-2014

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/0098936 A1 (Gerard KUMA), 25 April 2013 (25.04.2013), paragraphs [0022], [0033], [0039] to [0069]; fig. 1 to 3 & US 2011/0259907 A1 & US 2013/0126546 A1 & EP 2560736 A1 & EP 2561488 A1 & WO 2011/131853 A1 & WO 2011/131848 A1 & FR 2959336 A & FR 2959335 A	1-6
A	US 2013/0043158 A1 (Robert Lee FLOOD, II et al.), 21 February 2013 (21.02.2013), paragraphs [0042], [0051]; fig. 12 to 13 (Family: none)	1-6

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 July, 2014 (25.07.14)	05 August, 2014 (05.08.14)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2014/063314

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 11-278434 A (Sumitomo Rubber Industries, Ltd.), 12 October 1999 (12.10.1999), paragraph [0003] (Family: none)	1-6

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 7155406 A **[0005] [0006] [0007]**
- JP 7187252 A **[0005] [0006] [0007]**
- JP 8089600 A **[0005] [0006] [0007]**