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(54) [Title of the Invention] Container

(57) [Abstract]

[Problems to be solved]

To provide a container, which is excellent in preservability of a mixture, does not adversely affect the biological sample when transported, is easy to handle, and allows quick and simple preparation of the preserved biological sample when necessary.

[Means for Solving]

The cap 3 that is provided to close the container body 2 and holds the mixture to be placed into the container body consists of an outer cylindrical member 7 detachably connected to the container body 2; a mixture holding member 8 that holds the mixture 5 inside and is provided in the outer cylindrical member 7 so as to be movable along its axial direction, and has a mixture input passage that does not communicate with the inside of the container body 2 when it does not protrude from one end opening of the outer cylindrical member 7 toward the container body 2, but communicates with the interior of the container body 2 to introduce the mixture 5 when it protrudes toward the container body 2; and a plug member 9 that holds the mixture holding member 8 and is screwably attached to the outer cylindrical member 7 or the container body 2 to drive the mixture holding member 8 along the axial direction of the outer cylindrical member 7.

[Representative Drawing] FIG. 2

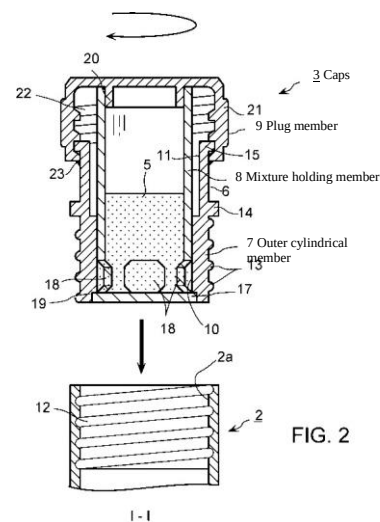


FIG. 2

[Scope of Patent Claims]

[Claim 1]

A container having a container body and a cap provided close the container body and to hold a mixture to be introduced into the interior of the container body, characterized in that

the cap comprises:

an outer cylindrical member having an opening at one end and an opening at the other end, and detachably connected to the container body with the one end opening communicating with the inside of the container body; and

a mixture holding member having a mixture input passage that holds the mixture internally and is movably provided within the outer cylindrical member along its axis direction, where it does not communicate with the interior of the container body, when the opening at one end of the outer cylindrical member does not protrude to the container body side, but communicates with the inside of the container body and into which the mixture is introduced, when the opening at one end of the outer cylindrical member protrudes to the container body side;

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a plug member that holds the mixture holding member and is rotatably attached to the outer cylindrical member or the container body, and that drives the mixture holding member along the axial direction of the outer cylindrical member.

[Claim 2]

The container according to claim 1, characterized in that

the mixture holding member has

a main body having an outer wall with a shape that conforms to the inner circular shape of the outer cylindrical member and defining a mixture holding space therein;

the mixture input passage is provided at a predetermined position on the outer wall; the mixture holding member is closed by the outer cylindrical member, when not protruding from one end opening of the outer cylindrical member toward the container body; but the mixture holding member is released, when protruding toward the container body, where the mixture holding space is communicated with the container body.

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[Claim 3]

The container according to claim 2, characterized in that

the mixture holding member comprises:

a locking mechanism provided for restricting the mixture holding member from protruding in a state where the mixture holding member does not protrude from one end opening of the outer cylindrical member toward the container body.

[Claim 4]

The container according to claim 3, characterized in that

the locking mechanism comprises:

a connecting member that connects the container body and the outer cylindrical member and that releases the connection only when the plug member is driven with a force greater than or equal to a predetermined force.

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[Claim 5]

The container according to claim 4, characterized in that

when the mixture holding member does not protrude from the one end opening of the outer cylindrical member toward the container body, the connecting member seals the gap between the outer cylindrical member and the container body, so that the mixture holding member does not communicate with the container body.

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[Claim 6]

The container according to claim 1, characterized in that

the mixture input passage is provided at one end of the mixture holding member facing the container body,

wherein the outer cylindrical member has a partition wall that closes the one end opening and closes the mixture input passage in a state where the mixture holding member does not protrude,

wherein when the mixture holding member protrudes toward the container body, the mixture holding space communicates with the container body, whether the partition separates from or is broken from the outer cylindrical member.

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[Claim 7]

The container according to claim 6, characterized in that
the partition seals the mixture input passage of the mixture holding member.

[Claim 8]

The container according to claim 1, characterized by
having a restricting member that restricts screwing of the plug member.

[Claim 9]

The container according to claim 1, characterized in that
the outer cylindrical member is screwed to the container body.

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[Claim 10]

The container according to claim 1, characterized in that
this container
is provided in a state of containing a second mixture, capable of coagulating in the container body by reacting with
the mixture held in the cap; and securing the biological sample introduced into the container body in the container.

[Detailed Description of the Invention]

[Technical field]

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[0001]

The present invention relates to containers, in particular to containers suitable for storing biological samples.

[Background art]

[0002]

In recent years, there has been increasing demand for containers in the medical field using biological samples, such as regenerative medicine, cell-containing drugs, and other pathological tests, gene therapy, organ transplantation, and autologous transplantation.

[0003]

In other words, in these medical fields, it is very important to store and transport biological samples without adversely affecting them. There is also a demand for such a container that is excellent in preservability and that does not adversely affect the biological sample during transportation.

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[0004]

Being developed as containers for storing biological samples are, for example, a cryopreservation container suitable for injection, storage, and thawing of a biological sample without allowing germs, viruses, etc. to enter the container (Patent Literature 1), biochemical test containers used for mixing, diluting, stirring, centrifuging, and storing liquids, reagents, specimens, etc. in biochemical tests (Patent Literature 2), etc.

[0005]

The containers disclosed in Patent Literatures 1 and 2 have been studied in terms of preservability such as sealing of the biological sample, operability of opening the cap to prevent the mixture from scattering when unsealed, and the like. However, the containers have no safety consideration in terms of transporting preserved specimens with their containers. That is, during transportation, the biological samples may move within these containers and being shocked and may be subject to more adverse effects.

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[Prior art literature]

[Patent literature]

[0006]

[Patent Literature 1] Japanese Unexamined Patent Application Publication No. 2007-302567

[Patent Literature 2] Japanese Unexamined Patent Application Publication No. 2007-232399

[Outline of the Invention]

[Problem to Be Solved by the Invention]

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[0007]

As mentioned above, conventional containers for storing biological samples do not consider safety when transporting biological samples, and do not have a structure for that purpose. Some other method must be used to ensure transport safety.

[0008]

The invention was made in light of such challenges and provides containers capable of safely transporting contained mixtures.

[Means for Solving the Problem]

[0009]

To solve the above problem, the present invention provides

a container

having a container body and a cap provided close the container body and to hold a mixture to be introduced into the interior of the container body, characterized in that

the cap comprises:

an outer cylindrical member having an opening at one end and an opening at the other end, and detachably connected to the container body with the one end opening communicating with the inside of the container body; and

a mixture holding member having a mixture input passage that holds the mixture internally and is movably provided within the outer cylindrical member along its axis direction, where it does not communicate with the interior of the container body, when the opening at one end of the outer cylindrical member does not protrude to the container body side, but communicates with the inside of the container body and into which the mixture is introduced, when the opening at one end of the outer cylindrical member protrudes to the container body side;

a plug member that holds the mixture holding member and is rotatably attached to the outer cylindrical member or the container body, and that drives the mixture holding member along the axial direction of the outer cylindrical member.

[0010]

According to such a constitution, the mixture passage of the mixture holding member is communicated with the container body by, for example, placing the biological sample into the container body, attaching the cap to the container body, and driving the plug member toward the container body. This allows the mixture held in the mixture holding member to be loaded into the container body, and if the container is made to coagulate the surroundings of the biological sample loaded into the container body is stored as the mixture, the biological sample can be secured within the container body.

[0011]

According to one embodiment of the invention, the mixture holding member has a main body having an outer wall having a shape that conforms to the circular shape of the inner surface of the outer cylindrical member and defining a mixture holding space therein, the mixture input passage is provided at a predetermined position on the outer wall, where the mixture holding member is closed by the outer cylindrical member when it does not protrude from one end opening of the outer cylindrical member toward the container body, but the mixture holding member is released when protruding toward the container body, so as to allow the mixture holding space to communicate with the container body.

[0012]

In this case, it is preferred that the mixture holding member has a locking mechanism for regulating the mixture holding member from protruding, in a state in which the mixture holding member does not protrude from the opening at one end of the outer cylindrical member toward the container body. In addition, in this case, it is preferable that the aforementioned locking mechanism has a connecting member that couples the aforementioned container body and the outer cylindrical member, and first disengages the connection, only when the plug member is driven with a force greater than or equal to a predetermined force. It is further preferred that this connecting member seals the gap between the aforementioned outer cylindrical member and the container body so that the mixture holding member does not communicate with the container body in a state where the mixture holding member does not protrude from one end opening of the outer cylindrical member toward the container body.

[0013]

Moreover, according to another embodiment of the present invention, the mixture input passage is provided at one end of the mixture holding member facing the container body, the outer cylindrical member has a partition wall that closes the one end opening and closes the mixture input passage in a state where the mixture holding member does not

protrude,

when the mixture holding member protrudes toward the container body, the partition is detached or broken from the outer cylindrical member, and this allows the mixture holding space to communicate with the container body.

[0014]

In this case, it is preferred that the aforementioned partition seals the aforementioned mixture input passage of the aforementioned mixture holding member. It is also desirable to have a restricting member that regulates the spiraling of the plug member.

[0015]

Further, according to still another embodiment of the present invention, the outer cylindrical member is screwed to the container body.

[0016]

According to yet another embodiment, the container is desirably provided in a state containing the second mixture that is coagulated in the container body by reacting with the mixture held in the cap and that can secure the biological sample introduced into the container body in the container.

[0017]

Although the present invention may have features and significant advantages other than those described above, as can be understood by those skilled in the art from the best mode of the invention described below and the accompanying drawings, it will not be mentioned here.

[Brief Description of the Drawings]

[0018]

[FIG. 1] is a front view showing an initial state of a container according to a first embodiment of the present invention.

[FIG. 2] is also a cross-sectional view along the I-I line of FIG. 1.

[FIG. 3] is a front view in the first screw-in state (FIG. 3A) and also a cross-sectional view along the III-III line (FIG. 3B).

[FIG. 4] is a front view (FIG. 4A) in a second screw-in state; and also a sectional view along the IV-IV line.

[FIG. 5] is also a schematic constitution diagram showing a locking mechanism.

[FIG. 6] is also a schematic constitution diagram showing a second locking mechanism.

[FIG. 7] is a front view showing the initial state of the container according to a second embodiment of the present invention.

[FIG. 8] is also a cross-sectional view along the V-V line of FIG. 5.

[FIG. 9] is a front view in the first screw-in state [FIG. 9A] and also a cross-sectional view along the VII-VII line [FIG. 9B].

[FIG. 10] is a front view in the first screw-in state [FIG. 10A] and also a cross-sectional view along the VIII-VIII line [FIG. 10B].

[Best Embodiments of the Invention]

[0019]

Embodiments of the present invention will be described in detail below.

[Embodiment 1]

First, the first embodiment of the invention will be described with reference to FIGS. 1-4.

[0020]

[Constitution]

A container according to the present embodiment is indicated by reference numeral 1 in FIG. 1. This container 1 consists of a container body 2 containing a first mixed material 4, and a cap 3 that holds a second mixed material 5 [shown in FIG. 2] to be mixed with the first mixed material 4, when detachably screwed to the container body 2.

[0021]

As will be explained in detail later, this container 1, after a biological sample [for example, "deciduous tooth"] indicated by 6 in the FIG. is placed into the container body 2, releases the second mixed material 5 from the cap 3 by screwing the cap 3 onto the container body 2. In this embodiment, the first mixed material 4 is a solution such as physiological saline, and the second mixed material 5 is a granular gelling material, where mixing this with the first mixed material 4 gels the first mixed material 4. This action allows the container 1 to secure the above biological sample 6 within the above container body 2.

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[0022]

This FIG. 1 shows an initial state in which the cap 3 is not screwed onto the container body 2, and FIG. 2 shows a longitudinal section of the cap 3 and container body 2 in this state.

[0023]

And FIG. 3 shows a state in which the cap 3 is screwed onto the container body 2, where the second mixed material 5 is not released into the container body 2 (hereinafter referred to as a "first screw-in state"). FIG. 4 shows a state in which the second mixed material 5 is released into the container body 2 (hereinafter referred to as a "second threaded state"), where the cap 3 is screwed.

[0024]

As shown in FIGS. 1 and 2, the container body 2 is formed into a test tube shape in which the lower end is blocked and open upwards. A first female screw groove 12 for screwing the cap 3 is formed in the inner surface of the upper end opening 2a of the container body 2.

[0025]

Also, as shown in FIG. 2, the cap 3 consists of three members, i.e., an outer cylindrical member indicated by reference numeral 7, a mixture holding member indicated by reference numeral 8, and a plug member indicated by reference numeral 9.

[0026]

The outer cylindrical member 7 is a circular outer cylindrical member having a lower end opening 10 and an upper end opening 11, where a male screw projection 13 that can be screwed into the female screw groove 12 of the container body 2 is provided on the outer peripheral portion thereof, so that the lower end opening 10 can be detachably connected to the upper end opening 2a of the container body 2. A first flange portion 14 as a stopper for restricting the amount of insertion into the container body 2 protrudes from the outer circumference of the outer cylindrical member 7 in the middle in the height direction. A second flange portion 15 for screwing with the plug member 9 is projected from the outer shape portion of the upper end portion of the outer cylindrical member 7.

[0027]

On the other hand, the mixture holding member 8 is a cylindrical member whose lower end is closed with a bottom wall plate 17, and its outer diameter is formed to a dimension such that it slides vertically along its axial direction within the outer cylindrical member 7. Then, at the lower end of this mixture holding member 8, a plurality of communication passages 18 opening radially outwardly are formed at predetermined circumferential intervals. When the holding member 8 does not protrude from the lower end opening 10 of the outer cylindrical member 7 toward the container body 2, so that it does not communicate with the inside of the container body 2 (see the first screw-in state shown in FIG. 3), the communication passage 18 is closed by the inner peripheral surface of the outer cylindrical member 7. With the mixture holding member 8 projecting toward the container body 2 (see the second screw-in state in FIG. 4), the passage 18 allows the internal space of the container body 2 and the internal space of the mixture holding member 8 to communicate with each other. By setting this state, the second mixed material 5 held in the mixture holding member 8 can be configured to be released into the container body 2.

[0028]

In addition, as shown in FIG. 2, the bottom wall plate 17 of the mixture holding member 8 is formed to be larger than the inner diameter of the outer cylindrical member 7. By fitting with the concave portion 19 formed at the lower end of the outer cylindrical member 7, the bottom wall plate is constructed so as to liquid-tightly seal the space between the outer cylindrical member 7 and the mixture holding member 8. In this state, the outer cylindrical member 7 and the lower end of the mixture holding member 8 (the lower surface of the bottom wall plate 17) are configured to be flush with each other.

[0029]

Next, the plug member 9 has a rib indicated by reference numeral 20 in FIG. 2. By adhering the rib 20 to the upper end of the mixture holding member 8, the mixture holding member 8 can be held with the upper end closed. Further, the outer peripheral portion 21 of the plug member 9 is formed larger than the outer shape of the outer cylindrical member 7, where the second female thread groove 22 is formed in the inner peripheral portion thereof so as to be screwed with the second flange portion 15 formed at the upper end of the outer cylindrical member 7. As a result, the cap 3 can be screwed downward so as to be screwed into the outer cylindrical member 7. Thereby, the mixture holding member 8 can be driven downward along the axial direction of the outer cylindrical member 7.

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[0030]

A locking mechanism (connecting member) is required between the plug member 9 or the outer cylindrical member 7 and the mixture holding member 8 to secure them so that they do not easily rotate in the rotational direction. In this embodiment, as shown in FIG. 5, a pair of meshing portions 17a and 19a are formed in the bottom wall plate 17 of the mixture holding member 8 and the concave portion 19 of the outer cylindrical member 7 so as to mesh with each other and restrict displacement in the rotational direction. This allows the above-mentioned outer cylindrical member 7 and mixture holding member 8 to be coupled so as to prevent the second mixed material 8 from being accidentally released from the mixture holding member 8 during the transition from the initial state to reach the first screw-in state shown in FIGS. 1 and 2, as detailed later.

[0031]

Further, as shown in FIG. 6, in this embodiment, a second locking mechanism 29 is provided for locking the plug member 9 to the container body 2 after reaching the second screw-in state. The locking mechanism 29 includes a pair of second meshing portions 14a, 21a provided between the lower end surface of the outer peripheral portion 21 on the plug member 9 side and the upper surface of the first flange portion 14 of the outer cylindrical member 7. By screwing the above-described plug member 9 relative to the container body 2 until they engage one another, the above-described plug member 9 can be secured relative to the container body 2.

[0032]

[Operation]

The operation of storing the biological sample 6 using this container 1 will then be described.

[0033]

In this embodiment, the container 1 is provided with the first mixed material 4 contained in the container body 2 side and the second mixed material 5 held in the cap 3. As mentioned above, the first and second mixed materials 4 and 5 are, for example, materials that cause a gelation reaction when they come into contact with each other. With this gelation, the biomaterial 6 put into the container body 2 can be secured.

[0034]

Also, as a product, this container 1 is preferably supplied with the cap 3 attached to the container body 2 as shown in FIG. 3. Then, the above cap 3 is removed once from the container body 2 as shown in FIG. 1, and after the biomaterial 6 is placed into the container body 2, it is reinstalled.

[0035]

At this time, first, by holding the plug member 9 and screwing the cap 3 onto the container body 2, as shown in FIG. 3, the lower end portion of the outer cylindrical member 7 is inserted until the first flange portion 14 contacts the upper end of the container body 2 (the first screw-in state).

[0036]

From this state, applying more force to rotate the cap 3 rotates the plug member 9 with respect to the outer cylindrical member 7 against the locking force of the locking mechanism [meshing portions 17a, 19a] between the plug member 9 and the outer cylindrical member 7, driving the mixture holding member 8 downward. This causes the lower end of the above mixture holding member 8 to protrude from the lower end opening of the above-mentioned outer cylindrical member 7, the bottom wall plate 17 at the lower end of the mixture holding member 8 to separate from the concave portion 19 of the outer cylindrical member 7 to release the sealed state, and the communication passage 18 to opens into the container body 2.

[0037]

This releases the second mixing material 5 held in this mixture holding member 8 into the container body 2. This results in gelation as described above when the second mixing material 5 is mixed with the first mixing material 4, securing the biological sample 6 within the container body 2.

[0038]

Furthermore, as mentioned above, the plug member 9 can be secured to the container body 2, by screwing the plug member 9 into the container body 2 with a stronger force until the second meshing portions 14a and 21a provided on the plug member 9 and the outer cylindrical member 7 mesh with each other.

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[0039]

Various methods are conceivable for setting the second holding member 5 to the cap 3. For example, in a state in which the mixture holding member 8 and the outer cylindrical member 7 are combined in the state shown in FIG. 2, after the upper end of the mixture holding member 8 is left open, and the second mixed material 5 is introduced, the plug member 9 may be fixed to close the mixture holding member 8.

[The second embodiment]

Next, with reference to FIGS. 7-10, the second embodiment of the invention will be described.

[0040]

In addition, the same reference numerals are given to the same constitutions as in the first embodiment, and the detailed description thereof will be omitted.

[0041]

[Constitution]

FIG. 7 shows the overall constitution of the container according to the second embodiment of the present invention.

[0042]

Also in this second embodiment, as shown in FIG. 7, the container 1' comprises a container body 2' containing the first mixed material 4' and a second mixed material which is detachably screwed to the container body 2' and mixed with the first mixed material 4', and a cap 3' holding material 5' (shown in FIG. 8). After the biological sample (for example, "deciduous tooth") indicated by 6' in the drawing is placed into the container body 2', the container 1' releases the second mixed material 5' from the cap 3' by screwing the cap 3' onto the container body 2', so as to secure the biological sample 6' within the container body 2'.

[0043]

FIG. 8 shows a longitudinal section of the cap 3' and the container body 2' in the initial state where the cap 3' is not screwed onto the container body 2', and FIG. 9 shows the "first screw-in state" (FIG. 7A) in which the cap 3' is screwed onto the container body 2' but the second mixed material 5' is not released into the container body 2', and its longitudinal section. (FIG. 7B).

[0044]

In addition, FIG. 10 shows the "second screw-in state" (FIG. 8A) in which the second mixed material 5' is released into the container body 2' by further screwing the cap 3' onto the container body 2'] and its longitudinal section [FIG. 8B].

[0045]

As shown in FIG. 8, in this embodiment, the container body 2' has a flange portion 2b that can be screwed with the cap 3' on the outer peripheral portion of the upper end opening.

[0046]

Also, the cap 3' in the second embodiment of the invention is formed as a unit of the mixture holding member 8' and the plug member 9', as shown in FIG. 6. In addition, the outer cylindrical member 7' is an outer cylindrical member whose lower end is closed with a film-like bottom wall plate 17' having the same diameter as the outer diameter of the outer cylindrical member 7', and this bottom wall plate 17' and the outer cylindrical member 7 are configured to isolate the inner space of the mixture holding member 8' from the outside.

[0047]

The plug member 9' is formed with a female thread groove 22' in its inner peripheral portion to be screwed with the flange portion 2b formed at the upper end of the container body 2'. As a result, the cap 3' can be screwed downward into the container body 2'.

[0048]

The female thread groove 22' is provided with a locking member 26 so as to prevent the cap 3' from screwing into the container body 2' side more than necessary, and to prevent the second mixing material 8' held in the internal space of the mixture holding member 8' from accidentally being released into the interior of the container body 2'.

[0049]

[Operation]

The container in the second embodiment of the invention also provides the container 1' with the first mixing material 4' housed on the container body 2' side and the second mixing material 5' housed in the cap 3', similar to the container in the first embodiment.

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[0050]

Also, as a product, the container 1' is preferably supplied with the above cap 3' attached to the container body 2', as shown in FIG. 7; the above cap 3' is removed from the container body 2' as shown in FIG. 5 to place the biomaterial 6' into the container body 2', and then reattach it.

[0051]

The cap 3' is screwed onto the container body 2' until it reaches the first screw-in state. From this state, when the cap 3' is further rotated with respect to the container body 2' against the resistance of the lock member 26, the mixture holding member 8' is driven downward with respect to the outer cylindrical member 7' having a bottom wall portion 17' at its lower end, and the bottom wall portion 17' is broken due to the shear stress caused by the lower end of the mixture holding member 8' and the upper end of the container body 2'. As a result, the space within the mixture holding member 8' is in communication with the interior space of the container body 2' as shown in FIG. 8, and a second mixing material 5' held within the interior of the mixture holding member 8' is released into the container body 2'. This causes gelation as described above when the second mixing material 5' is mixed with the first mixing material 4, securing the biological sample 6' within container body 2'.

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[0052]

[Effect]

According to the constitution as described in the embodiment of the present invention, a container capable of securing and holding a biological sample inside can be obtained simply by closing the cap without preparing any other special material.

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[0053]

In addition, although they are not conventional storage containers for biological samples, there are two documents below as a container that can store two agents simultaneously and separately, and can mix, stir, and extract two agents with simple operations in use. A comparison with them explains the structural superiority of the present invention.

[0054]

Patent Literature 3 Japanese Unexamined Patent Application Publication No. H8-91418

Patent Literature 4 Japanese Unexamined Patent Application Publication No. 2004-75133

The structures described in these documents have features in common with the present invention in terms of retaining the mixed material within the cap. In both cases, the mixed material is released into the container body by pulling up a component corresponding to the plug member of the present invention. That is, [this invention] is configured to demonstrate its function by driving the holding member not in the protruding direction but in the retracting direction with respect to the member corresponding to the outer cylindrical member of the present invention, so it is necessary to pull up the plug member, which is the opposite operation to when attaching the cap. Therefore, for example, the cap that pulls up the plug member may loosen or fall off.

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[0055]

In contrast, the structure of the present invention is as follow: in order to screw the cap 3 onto the container body 2 and release the mixed material 5, it is not necessary to pull up the plug member 9. Always rotating in the same direction can release [the mixed material] with a simple operation. In the above patent literatures, a complicated structure was required to pull up the plug. The present invention has the effect of eliminating the need for such a structure.

[0056]

Also, to drive in the same direction above, it is necessary to prevent the mixed material 5 from being released at an unintended timing due to carelessness during operation. In the above embodiments, this is achieved by providing the locking mechanisms (17a, 19a, 26, 29).

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[0057]

The locking mechanism is not limited to the above. For example, in the first embodiment described above, the locking mechanism may be configured by attaching a locking member (e.g., a thermoplastic resin material) to adhere the plug member 9 to the outer cylindrical member 7 at the position shown in FIG. 2.

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[0058]

In addition, as the material of each member constituting the container of the present invention, there are no particular restrictions as long as it is suitable for storage and transportation of mixtures, but it is preferable that the material be cryopreservable. It is preferable to select an appropriate material in consideration of strength, moldability, sealability, sterilization, and the like. The materials of each member comprising the container of the present invention may all be the same material, or a different material may be used for each member.

[0059]

The inner volume and shape of the container of the present invention can be appropriately set by those skilled in the art according to storage stability, stability during transportation, so ease of handling and mixture preparation, etc., and are not particularly limited. As for the shape of the container, for example, the shape of the container body may be cylindrical, prismatic, conical, or pyramidal. Furthermore, in order to improve handling, anti-slip means and anti-overturn means may be provided around the container body and the outer cylindrical member.

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[0060]

Mixtures stored in the container of the present invention include: biological samples, environmental mixtures, food mixtures, high-molecular/low-molecular-weight organic mixtures, inorganic mixtures such as rocks and metals, and combinatorial mixtures; although they are not limited, the container of the present invention is particularly excellent in preservability and the like for biological samples.

[0061]

The biological sample to be stored in the container of the present invention is not particularly limited as long as it is of biological origin, and includes animal-derived substances and microorganisms. Examples include deciduous teeth, permanent teeth, retinas, hair, various cells, blood components, organ tissues, sperm, ova, saliva, and the like.

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[0062]

The first mixed material held in the container body of the present invention and the second mixed material held in the cap of the present invention are not particularly limited, as long as it is possible to secure and hold the mixture to be stored in the container by mixing them, and it does not adversely affect the stored mixture such as damage.

[Explanation of References]

[0063]

1, 1'	Containers according to the invention
2, 2'	Container body
2a	Upper end opening of container body 2
3, 3'	Cap
4, 4'	First mixed material
5, 5'	Second mixed material
7, 7'	Outer cylindrical member
8, 8'	Mixture holding member
9, 9'	Plug member
10, 10'	Lower end opening
11, 11'	Upper end opening
12	First female thread groove
13	Male thread protrusion
14	First flange part
15	Second flange part
17, 17'	Bottom wall plate
18	Communication passage
19	Recess
19, 19'	Side wall
20'	Rib
21	Peripheral part of plug member 9
22	Second female thread groove

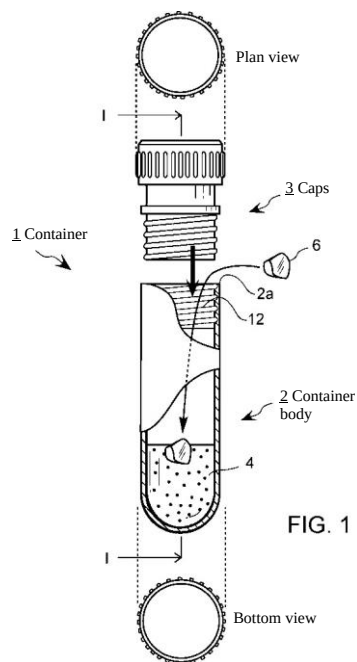
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40

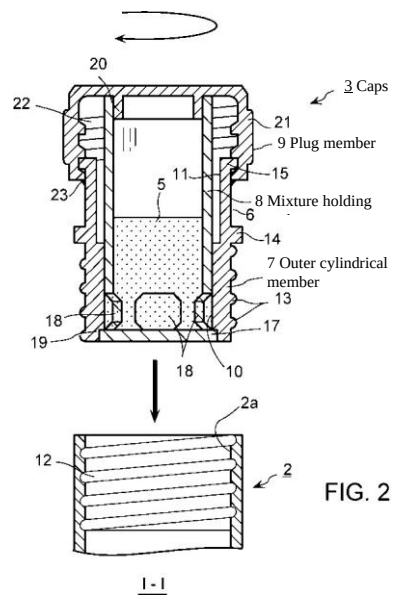
50

- 23 Locking mechanism
 25 Flange part
 26 Locking member

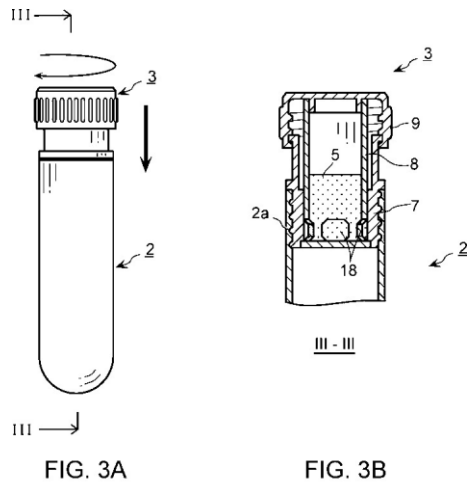
[FIG. 1]



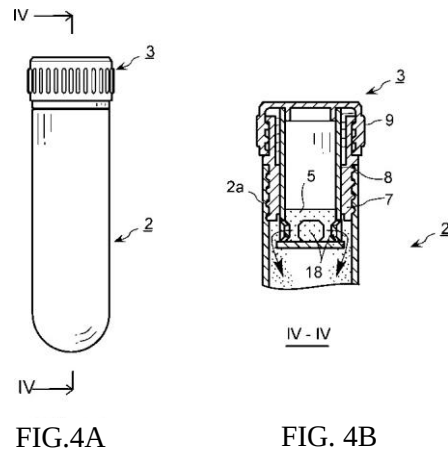
[FIG. 2]



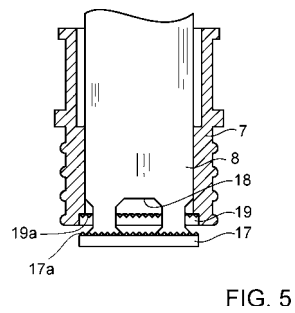
[FIG. 3]

First screw-in state

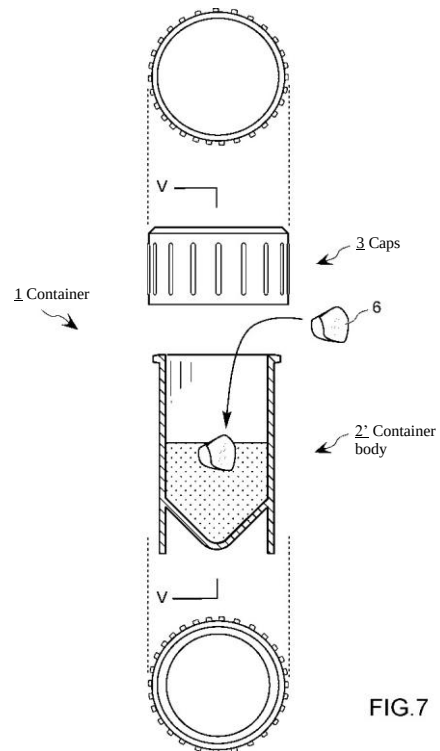
[FIG. 4]

Second screw-in state

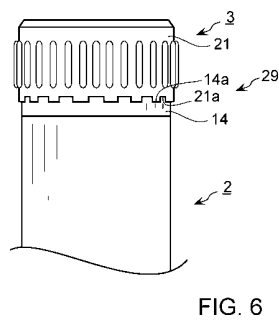
[FIG. 5]



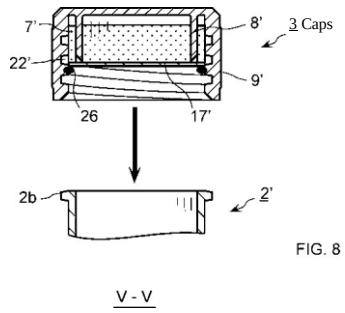
[FIG. 7]



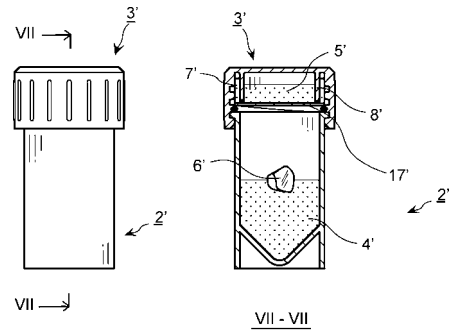
[FIG. 6]



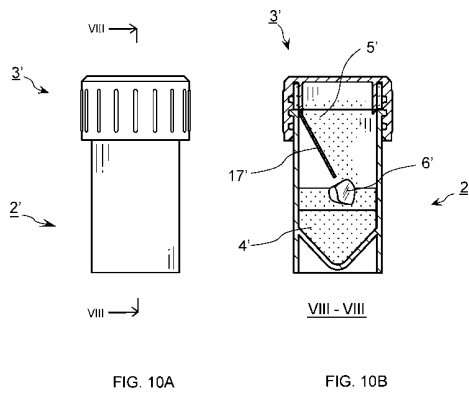
[FIG. 8]



[FIG. 9]



[FIG. 10]



Continued from the front page

F term (reference) 2G045 HA13 HA14

2G052 AA28 DA02 DA12 DA13 DA27

4B029 AA27 BB01 CC01 GA02 GB04 GB10 HA05

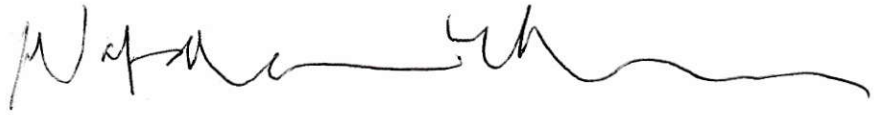
DECLARATION OF NATALIA LEHMANN

I, Natalia Lehmann, pursuant to 28 U.S.C. § 1746, hereby declare as follows:

1. I am a freelance translator at TransPerfect, Inc.
2. I submit this declaration to certify the accuracy of the English translation of JP2010-213660A.
3. My statements are based on personal knowledge and my review of JP2010-213660A and its translation. If called as a witness about the facts contained in these statements, I could testify competently based on such personal knowledge and the investigation I have conducted.
4. Attached as Exhibit A is a true and accurate copy of JP2010-213660A.
5. Attached as Exhibit B is a true and accurate copy of an English translation JP2010-213660A.
6. JP2010-213660A Translation is a true and accurate translation of JP2010-213660A from Japanese-English.
7. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed to be true. Further, I am aware that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001. I declare under penalty of perjury that the foregoing is true and correct.
8. I also understand that by submitting this declaration I may be asked to appear for a deposition asking me questions limited to the material in my declaration. With my signature below, I agree to make reasonable efforts to make myself available for such a deposition at a reasonable place and time of my choosing.

* * *

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed on February 20, 2023 at Lindale, TX.

A handwritten signature in black ink, appearing to read 'Natalia Lehmann', written over a horizontal line.

Natalia Lehmann