

Description

Title of Invention: CONTAINER-SECURING DEVICE

Technical Field

[0001] The present invention relates to a container-securing device capable of fixing containers that are stacked on top of each other.

Background Art

[0002] Patent Literature 1 discloses a container-securing device having a bifurcated convex structure including: a flange portion located outside a slot of a corner fitting of a container; a support portion provided on the flange portion and configured to fit into a long hole-shaped opening of the slot; and a fitting portion provided on the support portion and configured to fit into a cavity of the slot. The fitting portion is provided with a contact portion that does not contact the center side of the long hole-shaped opening in a longitudinal direction, but contacts each end side in the longitudinal direction.

[0003] Furthermore, this Patent Literature 1 discloses that a container fixed state is formed with the flange portion contacting an outer surface portion of the corner fitting and a movable protrusion contacting a back corner portion located at a back side of the opening during a rotation operation, and thus it becomes possible to stack many containers by reducing the gap between the movable protrusion and the slot.

[0004] In addition, Patent Literature 2 discloses a container-securing device including: a flange portion located outside a slot of a corner fitting of a container; a support portion provided on the flange portion; a fitting portion provided on the support portion and configured to fit into the slot of the corner fitting; a movable protrusion that forms a part of the fitting portion and forms a container fixed state in

which the movable protrusion protrudes laterally from a vertical surface portion of the support portion; and a stopper that maintains (locks) the container fixed state by limiting rotation of the movable protrusion.

[0005] With such a container-securing device including the stopper, by performing the locking in a state in which the container-securing device is engaged with both upper and lower corner fittings of two vertically stacked containers, it becomes possible to simultaneously lift the lower container by lifting the upper container. As illustrated in Fig. 16, a slot 1150 of a corner fitting 1100a of a container 1100 consists of a cavity 1150a formed inside a peripheral wall portion of the corner fitting 1100a, and a long hole-shaped opening 1150b that is formed in the peripheral wall portion, communicates with the cavity 1150a, and is smaller than this cavity 1150a. In addition, the opening 1150b includes an opening vertical surface portion A formed by the thickness of the peripheral wall portion; an entrance corner portion B (tapered portion) located at the entrance side of the opening vertical surface portion A; an outer surface portion C that is perpendicular to the opening vertical surface portion A and continuous with the entrance corner portion B; a back corner portion D located at the back side of the opening vertical surface portion A; an inner surface portion E that is perpendicular to the opening vertical surface portion A and continuous with the back corner portion D; and so forth.

Citation List

Patent Literature

[0006] Japanese Patent No. 6570743 (Patent Literature 1)

Japanese Patent No. 6371471 (Patent Literature 2)

Summary of Invention

Technical Problem

[0007] However, the container-securing device having the bifurcated convex structure described in Patent Literature 1 does not have a structure capable of locking the container fixed state. In addition, it is not easy to apply the stopper structure described in Patent Literature 2 to the container-securing device described in Patent Literature 1. Furthermore, a structure capable of locking the container fixed state is desired even in a container-securing device that does not include such a movable protrusion.

[0008] In view of the above-described circumstances, an object of the present invention is to provide a container-securing device capable of locking the container fixed state.

Solution to Problem

[0009] A container-securing device of the present invention includes:

- a flange portion located outside a slot of a corner fitting of a container;
- a first support portion provided on the flange portion and configured to fit into a long hole-shaped opening of the slot;
- a first fitting portion provided on the first support portion and configured to fit into a cavity of the slot;
- a second support portion provided on a side of the flange portion opposite to a side on which the first support portion is provided and configured to fit into a long hole-shaped opening of a slot of a corner fitting of a different container;
- a second fitting portion provided on the second support portion and configured to fit into a cavity of the slot of the corner fitting of the different container;
- a stopper arranged to be movable between a facing position that is a position facing an opening vertical surface portion on a long side of the opening into which

the first support portion fits, and a retracted position that is a position on the second support portion side;

a stopper inserting portion formed in the flange portion so as to allow movement of the stopper;

a stopper accommodation groove formed in the second support portion so as to allow movement of the stopper; and

an operation portion that moves the stopper between the facing position and the retracted position.

[0010] With the above-described configuration, when the stopper is at the facing position that is the position facing the opening vertical surface portion on the long side of the opening into which the first support portion fits, the first support portion cannot move laterally within the opening of the slot. As a result, the lateral movement of the container-securing device is restricted, making it impossible to pull the first fitting portion out of the slot. That is, the container fixed state is locked. In this locked state, in a state in which the container-securing device is engaged with both upper and lower corner fittings of containers stacked in two tiers, it becomes possible to simultaneously lift the lower container by lifting the upper container.

[0011] In the container-securing device, when the container-securing device is in use, the facing position is located below the retracted position. When the stopper is moved to the facing position, the upper side of the stopper may be located within the stopper inserting portion, and the lower side of the stopper may be located at the facing position. When the stopper is moved to the retracted position, the upper side of the stopper may be located within the stopper accommodation groove, and the lower side of the stopper may be located within the stopper inserting portion.

[0012] In the container-securing device, in a state in which the stopper is at the retracted position, a part of the stopper may protrude from a surface of the second support portion to be located in the long hole-shaped opening of the slot of the corner

fitting of the different container, thereby preventing rotation of the second support portion with respect to the corner fitting of the different container.

[0013] In the container-securing device, the stopper may consist of a plurality of parts, and, in a state in which some of the parts are inserted into the stopper inserting portion, the other parts may be connectable to those parts.

[0014] In the container-securing device, the operation portion may include: a rotation shaft passing through the flange portion; a rotation engaging member having a base side connected to the rotation shaft and a tip side engaged with a recess formed in the stopper; and an operation handle located outside the flange portion and configured to perform a rotating operation on the rotation shaft.

[0015] In the container-securing device, when the container-securing device is in use, the facing position may be located below the retracted position. In a state in which the stopper is located at the facing position, the tip side of the rotation engaging member may be located below a rotation center on the base side of the rotation engaging member, and, in a state in which the stopper is located at the retracted position, the tip side of the rotation engaging member may be located above the rotation center on the base side of the rotation engaging member.

[0016] In the container-securing device, a base accommodation groove that accommodates the base side of the rotation engaging member may be formed within the stopper inserting portion.

[0017] In the container-securing device, in a state in which the stopper is located at the retracted position, the upper surface on the tip side of the rotation engaging member may be inclined upward or may be substantially horizontal with respect to a portion in a vicinity of an entrance of the recess.

[0018] In the container-securing device, a ball pressing member may be mounted in a hole reaching the rotation shaft from a surface of the flange portion, and a rotation state of the rotation shaft may be maintained by a ball of the ball pressing member

fitting into one of a plurality of concave portions formed in the rotation shaft.

Alternatively, a ball pressing member may be mounted in a hole reaching the stopper from a surface of the flange portion, and a movement position of the stopper may be maintained by a ball of the ball pressing member fitting into one of a plurality of concave portions formed in the stopper.

[0019] In the container-securing device, the first fitting portion may include two protrusions having different height positions. One of the protrusions positioned lower in a use state of the container-securing device may be a fixed protrusion, while the other one of the protrusions positioned upper in the use state may be a movable protrusion urged to protrude laterally from a vertical surface portion of the first support portion. The movable protrusion may include a contact portion that does not contact the center side of the long hole-shaped opening in a longitudinal direction, but contacts each end side in the longitudinal direction.

[0020] In the container-securing device, a container fixed state may be formed in a state in which the flange portion contacts an outer surface portion of the corner fitting, and the contact portion contacts a back corner portion located at a back side of the opening during a rotation operation.

[0021] In the container-securing device, the first fitting portion may consist of a fixed protrusion.

Advantageous Effects of Invention

[0022] According to the present invention, the container fixed state can be locked. Therefore, by performing the locking of the container fixed state in which the container-securing device engages both upper and lower corner fittings of containers stacked in two tiers, it becomes possible to simultaneously lift the lower container by lifting the upper container.

Brief Description of Drawings

[0023] Fig. 1 is an explanatory diagram illustrating a container-securing device according to one embodiment, a corner fitting on the bottom surface of an upper container, and a corner fitting on the upper surface of a lower container.

Fig. 2 is a cross-sectional view illustrating a locking state in the container-securing device according to the embodiment.

Fig. 3 is a perspective view illustrating the container-securing device according to the embodiment.

Fig. 4 is a perspective view illustrating the container-securing device according to the embodiment.

Fig. 5 is a diagram illustrating a bottom view, a front view, a rear view, and a plan view of the container-securing device according to the embodiment.

Fig. 6 is an explanatory diagram illustrating an upper support portion, a stopper, a corner fitting, and the like of the container-securing device according to the embodiment.

Fig. 7 is a diagram illustrating a front view, a rear view, a bottom view, a plan view, a side view, and a perspective view of a movable protrusion of the container-securing device of the embodiment.

Fig. 8 is an explanatory diagram of the stopper of the container-securing device of the embodiment.

Fig. 9A is a perspective view of an operation portion of the container-securing device of the embodiment.

Fig. 9B is a perspective view of the operation portion of the container-securing device of the embodiment.

Fig. 10A is a perspective view of the operation portion (a socket part and a rotation engaging member are omitted) of the container-securing device of the embodiment.

Fig. 10B is a perspective view of the operation portion (the socket part and the rotation engaging member are omitted) of the container-securing device of the embodiment.

Fig. 11 is a cross-sectional view illustrating an unlocked state in the container-securing device of the embodiment.

Fig. 12 is the cross-sectional view illustrating a locked state in a container-securing device according to another embodiment.

Fig. 13 is a perspective view illustrating the container-securing device according to the another embodiment.

Fig. 14 is an explanatory diagram illustrating an engagement relationship of a rotation shaft, a rotation engaging member, and a stopper of the container-securing device illustrated in Fig. 13.

Fig. 15 is an explanatory diagram of the stopper of the container-securing device illustrated in Fig. 13.

Fig. 16 is an explanatory diagram illustrating corner fittings of container located up and down.

Description of Embodiments

[0024] Hereinafter, embodiments of the present invention will be described based on the accompanying drawings.

Fig. 1 and Fig. 2 illustrate a use state of a container-securing device 1. A corner fitting 100a is provided to a corner of a bottom surface of an upper container 100, and a corner fitting 101a is provided to a corner of an upper surface of a lower container 101. The container-securing device 1 is located between the corner fitting 100a and the corner fitting 101a, and connects and fixes the upper container 100 and the lower container 101.

[0025] A slot 150 of the corner fitting 100a consists of a cavity 150a formed inside a peripheral wall portion of the corner fitting 100a, and a long hole-shaped opening 150b that is formed in the peripheral wall portion, communicates with the cavity 150a, and is smaller than this cavity 150a. In addition, the opening 150b includes an opening vertical surface portion A formed by the thickness of the peripheral wall portion, an entrance corner portion B (tapered portion) located on an entrance side of the opening vertical surface portion A, an outer surface portion C that is perpendicular to the opening vertical surface portion A and that is continuous with the entrance corner portion B, a back corner portion D located on a back side of the opening vertical surface portion A, an inner surface portion E that is perpendicular to the opening vertical surface portion A and that is continuous with the back corner portion D, and so forth.

[0026] Similarly, a slot 151 of the corner fitting 101a consists of a cavity 151a formed inside a peripheral wall portion of the corner fitting 101a, and a long hole-shaped opening 151b that is formed in the peripheral wall portion, communicates with the cavity 151a, and is smaller than this cavity 151a. In addition, the opening 151b includes an opening vertical surface portion A formed by the thickness of the peripheral wall portion, an entrance corner portion B (tapered portion) located on an entrance side of the opening vertical surface portion A, an outer surface portion C that is perpendicular to the opening vertical surface portion A and that is continuous with the entrance corner portion B, a back corner portion D located at a back side of the opening vertical surface portion A, an inner surface portion E that is perpendicular to the opening vertical surface portion A and that is continuous with the back corner portion D, etc.

[0027] The container-securing device 1 includes a flange portion 2 as illustrated also in Fig. 3 and Fig. 4. This flange portion 2 is located outside the slots 150 and 151 of the corner fittings 100a and 101a. In addition, an upper support portion (second

support portion) 3 is provided on an upper surface side of the flange portion 2, and a lower support portion (first support portion) 4 is provided on a bottom surface side. In a container fixed state of the container-securing device 1, the flange portion 2 contacts outer surface portions C of the corner fittings 100a and 101a. In addition, at a boundary portion between the lower support portion (the first support portion) 4 and the flange portion 2, a support portion side tapered portion 4a is formed that has an inclination along the inclination of the entrance corner portion B, and that contacts the entrance corner portion B.

[0028] An upper cone (second fitting portion) 31 is provided on an upper side of the upper support portion 3. The upper support portion 3 fits into the opening 150b, and the upper cone 31 fits into the cavity 150a. In addition, a lower cone (first fitting portion) 41 is provided on a lower side of the lower support portion 4. The lower support portion 4 fits into the opening 151b, and the lower cone 41 fits into the cavity 151a.

[0029] As illustrated in Fig. 5 and Fig. 6, the upper support portion 3 and the upper cone 31 have, for example, a substantially parallelogram cross section, and can be put into the opening 150b of the corner fitting 100a from a sharp end side of the upper cone 31, and furthermore, in a state in which the upper support portion 3 and the upper cone 31 are put in the cavity 150a, the container-securing device 1 can be rotated within a predetermined range. At the end of this rotation, the longitudinal direction of the lower support portion 4 coincides with the longitudinal direction of the opening 150b and the opening 151b.

[0030] Vertical surface portions that are to be located parallel to respective opening vertical surface portions A on a long side of the opening 151b are formed in the lower support portion 4. The lower cone (first fitting portion) 41 includes a fixed protrusion 42 protruding from one of the vertical surface portions, and a movable protrusion (latch) 43 protruding from the other one of the vertical surface portions.

The most protruding portion of the fixed protrusion 42 and the most protruding portion of the movable protrusion 43 are offset vertically, and the movable protrusion 43 is located closer to the flange portion 2 (on the upper side) than the fixed protrusion 42.

[0031] The fixed protrusion 42 includes a first inclined surface 420, a second inclined surface 421, and a convex top portion 422 located between these inclined surfaces. The first inclined surface 420 contacts the back corner portion D located at the back side of the opening 151b at the time of a pull-out operation during unloading. The second inclined surface 421 contacts the entrance corner portion B located at the entrance side of the opening vertical surface portion A at the time of a lowering operation for container fixing. The convex top portion 422 contacts the opening vertical surface portion A at the time of the lowering operation for container fixing and at the time of the pull-out operation during unloading.

[0032] The movable protrusion 43 includes a first inclined surface 430, a second inclined surface 431, and a convex top portion 432 located between these inclined surfaces. The first inclined surface 430 contacts the back corner portion D located at the back side of the opening 151b at the time of the pull-out operation during unloading. The second inclined surface 431 contacts the entrance corner portion B located at the entrance side of the opening vertical surface portion A at the time of the lowering operation for container fixing. The convex top portion 432 contacts the opening vertical surface portion A at the time of the lowering operation for container fixing and at the time of the pull-out operation during unloading. It should be noted that a rotation restraining portion 433 is formed on the movable protrusion 43, and the movable protrusion 43 is prevented from rotating (protruding) beyond a specified amount by this rotation restraining portion 433.

[0033] At the time of the lowering operation for container fixing, and the pull-out operation during unloading, it is necessary for the lower cone (first fitting portion) 41

of the container-securing device 1 to be shifted laterally (horizontally). The state in which the lateral shifting of the lower support portion 4 and the lower cone (first fitting portion) 41 is prevented as illustrated in Fig. 1 and Fig. 2 is a locked state in which the pull-out operation during unloading cannot be performed. On the other hand, in an unlocked state in which the lateral shifting of the lower support portion 4 and the lower cone (first fitting portion) 41 is allowed, the above-described pull-out operation during unloading can be performed.

[0034] Here, in a state in which the container-securing device 1 is engaged with both the upper and lower corner fittings 101a and 100a of the containers 101 and 100 stacked in two tiers, when the container-securing device 1 is operated to be in the locked state, it becomes possible to simultaneously lift the lower container 101 by lifting the upper container 100. The switching between the locked state and the unlocked state is performed by the stopper 5. An operation to the stopper 5 is performed by an operation portion 6. The stopper 5 and the operation portion 6 will be described in detail later.

[0035] As illustrated in Fig. 7, the movable protrusion 43 includes a pair of shaft hole forming portions 43a, contact portions 43b that exist as a part of the respective shaft hole forming portions 43a, and a plate-like portion 43c provided so as to extend between the shaft hole forming portions 43a to connect these. A portion of the contact portion 43b that constitutes the first inclined surface 430 does not contact the center side of the long hole-shaped opening 151b in the longitudinal direction, but contacts each end side in the longitudinal direction. That is, the contact portion 43b can contact the end side instead of the center side of the opening 151b of the corner fitting 101a. Accordingly, since a load is likely to be applied to the vicinity of the end of the opening 151b, it is possible to prevent the vicinity of the center of the opening 151b from being deformed into a convex shape, and to prevent the corner fitting 101a from becoming defective.

[0036] As illustrated in Fig. 4, a shaft member 435 that rotatably supports the movable protrusion 43 is inserted in shaft holes formed in the shaft hole forming portions 43a. On the other hand, a shaft supporting portion 425 that supports the shaft member 435 is formed in the fixed protrusion 42. A concave portion 425a is formed in a center portion of this shaft supporting portion 425, and in this concave portion 425a, as illustrated in Fig. 2, a coil spring 44 is attached to the peripheral side of the shaft member 435. One end side of the coil spring 44 contacts a rear surface side portion of the fixed protrusion 42, and the other end side of the coil spring 44 contacts a rear surface side portion of the plate-like portion 43c.

[0037] The movable protrusion 43 is rotated by the elastic force of the coil spring 44 to protrude laterally from the vertical surface portion of the lower support portion 4. In addition, at the time of the lowering operation for container fixing and at the time of the pull-out operation during unloading, the movable protrusion 43 is rotated against the elastic force of the coil spring 44 to temporarily enter the lower support portion 4 side. That is, the movable protrusion 43 forms a state of protruding laterally from the vertical surface portion of the lower support portion 4, and a state of entering the lower support portion 4 side.

[0038] As illustrated in Fig. 1 and Fig. 2, in the locked state of the container-securing device 1, the stopper 5 faces the opening vertical surface portion A on the long side of the opening 151b (a facing position), and fits into a gap between this opening vertical surface portion A and the lower support portion 4. On the other hand, as illustrated in Fig. 11, in the unlocked state of the container-securing device 1, the stopper 5 escapes from the gap to retract to the upper support portion 3 side (a retracted position). That is, the stopper 5 is arranged to be movable between the facing position and the retracted position.

[0039] A stopper inserting portion 21 that is an opening for allowing movement of the stopper 5 is formed in the flange portion 2.

[0040] Furthermore, a stopper accommodation groove 301 for allowing movement of the stopper 5 is formed in the upper support portion (second support portion) 3.

[0041] The facing position is located lower than the retracted position, and when the stopper 5 is moved to the facing position, an upper side of the stopper 5 is located in the stopper inserting portion 21, and a lower side of the stopper 5 is located in the gap. On the other hand, when the stopper 5 is moved to the retracted position, the upper side of the stopper 5 is located in the stopper accommodation groove 301, and the lower side of the stopper 5 is located in the stopper inserting portion 21.

[0042] In the state in which the stopper 5 is located in the retracted position, an upper corner portion 5c, which is a part of a side portion 5a of the stopper 5, protrudes laterally from a surface of the upper support portion (second support portion) 3 as illustrated in Fig. 6, and faces the opening vertical surface portion A of the long hole-shaped opening 150b of the slot 150 of the corner fitting 100a of the upper container 100. Accordingly, the rotation of the upper support portion 3 with respect to the corner fitting 100a of the upper container 100 can be prevented. It should be noted that in the locked state in which the stopper 5 is in the facing position, the above-described function of preventing the rotation of the upper support portion 3 with respect to the corner fitting 100a of the upper container 100 is not demonstrated. However, by being in the locked state, as a result of the rotation of the lower support portion 4 with respect to the corner fitting 100a being prevented, the rotation of the upper support portion 3 with respect to the corner fitting 100a of the upper container 100 is prevented.

[0043] As illustrated in Fig. 3 and Fig. 8, the stopper 5 can be divided into a first part 51 located on the upper side and a second part 52 located on the lower side, and after only the first part 51 is put into the stopper inserting portion 21, the second part 52 can be connected to the first part 51. For example, an internal screw to be screwed onto a bolt is formed on a lower side of the first part 51 (the side to be connected to

the second part 52), and a bolt insertion hole is formed in the second part 52. The first part 51 and the second part 52 can be integrated together by screwing the bolt inserted into the bolt insertion hole onto the internal screw.

[0044] In addition, in the stopper 5, a front surface that faces the opening vertical surface portion A on the long side of the opening 151b is a flat surface. On the other hand, a recess 5b is formed on a rear surface of the stopper 5. As illustrated in Fig. 2, this recess 5b is engaged with a tip side of a rotation engaging member 62 in the operation portion 6. In addition, when only the first part 51 is put into the stopper inserting portion 21, the tip side of the rotation engaging member 62 is engaged with a portion that forms the recess 5b of this first part 51, and thereafter, the second part 52 can be connected to the first part 51 with the bolt.

[0045] The stopper 5 can move between the facing position and the retracted position by an operation on the operation portion 6. As illustrated in Fig. 9A, Fig. 9B, Fig. 10A, and Fig. 10B, the operation portion 6 includes a rotation shaft 61 rotatably provided within the flange portion 2, the rotation engaging member 62 whose base side is connected to the rotation shaft 61, and whose tip side is engaged with the recess 5b of the stopper 5, and an operation handle 63 that is located outside the flange portion 2, and that performs a rotating operation on the rotation shaft 61. In the stopper inserting portion 21 of the flange portion 2, a base accommodation groove 21a that accommodates the base side of the rotation engaging member 62 is formed.

[0046] The rotation shaft 61 is passed through the flange portion 2 parallel to the shaft member 435. The operation handle 63 is provided to one end side of the rotation shaft 61. As illustrated in Fig. 10A and Fig. 10B, the rotation shaft 61 includes a square axis 61a from a middle position to the other end side. An internal thread portion is formed on the tip side of the square axis 61a. In addition, a cylindrical socket portion 61b is fitted to this tip side. The socket portion 61b is

rotatably fitted to the flange portion 2 from the side opposite to the operation handle 63. A bolt insertion hole 61c is formed on the other end side of the socket portion 61b, and the rotation shaft 61 is rotatably attached to the flange portion 2 by screwing a bolt inserted into this bolt insertion hole 61c onto the internal thread portion on the tip side of the square axis 61a. It should be noted that the square axis 61a exists in the base accommodation groove 21a.

[0047] In addition, as illustrated in Fig. 2, in the state in which the stopper 5 is located in the opposed position, the tip side of the rotation engaging member 62 is located lower than the rotation center on the base side of the rotation engaging member 62. On the other hand, as illustrated in Fig. 11, in the state in which the stopper 5 is located in the retracted position, the tip side of the rotation engaging member 62 is located higher than the rotation center on the base side of the rotation engaging member 62. In the state in which the stopper 5 is located in the retracted position, an upper surface of the tip side of the rotation engaging member 62 is substantially horizontal to a portion in the vicinity of the entrance of the recess 5b. It should be noted that the upper surface of the tip side of the rotation engaging member 62 is not limited to be substantially horizontal as described above, and may be inclined upward. When the upper surface of the tip side of the rotation engaging member 62 is formed in this manner, it becomes easy to reduce the height of a top surface portion of the base accommodation groove 21a.

[0048] As illustrated in Fig. 5, a hole 2b reaching the rotation shaft 61 from a surface of the flange portion 2 in the thickness direction of the flange portion 2 is formed in the flange portion 2. A ball plunger (ball pressing member) 28 that presses a ball with a built-in spring is mounted in this hole 2b. On the other hand, concave portions are formed at the locations of the socket portion 61b of the rotation shaft 61 that are rotating positions corresponding to the locked state and the unlocked state,

respectively. The rotation state of the rotation shaft 61 is maintained by the ball of the ball plunger 28 fitting into one of the concave portions.

[0049] It should be noted that a vertical hole 32 communicating with the base accommodation groove 21a is formed in the upper support portion 3 and the upper cone 31, and with this vertical hole 32, weight reduction of and drainage of rainwater from the container-securing device 1 are achieved.

[0050] With the container-securing device 1, by a basic operation in the unlocked state, the container fixed state is formed in which the flange portion 2 contacts the outer surface portion (upper surface) C of the corner fitting 101a, the lower cone 41 enters the slot 151, and the movable protrusion 43 protrude laterally from the vertical surface portion of the lower support portion 4. In addition, in the container-securing device 1 of this embodiment, the container fixed state is formed in the state in which the movable protrusion 43 is rotated to the maximum extent within the cavity 151a. That is, in this container fixed state, the rotation of the movable protrusion 43 is prevented by the rotation restraining portion 433, and a gap exists between the first inclined surface 430 of the movable protrusion 43 and the back corner portion D.

[0051] When the pull-out operation during unloading is performed in the unlocked state of the container fixed state, the container-securing device 1 is raised straight up until the first inclined surface 430 contacts the back corner portion D, and thereafter, when the first inclined surface 430 contacts the back corner portion D, the container-securing device 1 is lifted diagonally upward (the upper left in Fig. 11) while maintaining this contact state.

[0052] When the container-securing device 1 is further pulled up, the convex top portion 432 is moved upward while contacting the opening vertical surface portion A, and thereafter, the first inclined surface 420 of the fixed protrusion 42 contacts the back corner portion D. Then, when the container-securing device 1 is further pulled

up, the container-securing device 1 is lifted diagonally upward (the upper right in Fig. 11) along the inclination of this first inclined surface 420. In addition, by this operation, the movable protrusion 43 is pressed by the opening vertical surface portion A and is rotated counterclockwise in Fig. 11.

[0053] When the container-securing device 1 is further pulled up, the convex top portion 422 is moved while contacting the opening vertical surface portion A.

[0054] On the other hand, as previously described, as illustrated in Fig. 2, in the locked state in which the stopper 5 is located in the facing position, since the lateral shifting of the lower support portion 4 and the lower cone (first fitting portion) 41 is prevented, resulting in the state where the pull-out operation during unloading cannot be performed.

[0055] It should be noted that the container-securing device 1 of this embodiment forms the container fixed state in a state in which the movable protrusion 43 is rotated to the maximum extent within the cavity 151a, but is not limited to such a structure. The container-securing device 1 may have a structure in which the container fixed state is formed in a state in which the movable protrusion 43 contacts the back corner portion D located at the back side of the opening 151b during a rotation operation. With the container-securing device 1 having the structure as described above, since the container fixed state is formed in a state in which the flange portion 2 contacts the outer surface portion C of the corner fitting 101a, and the movable protrusion 43 contacts the back corner portion D located at the back side of the opening 151b during a rotation operation, the gap between the movable protrusion 43 and the slot 151 can be reduced. Accordingly, it becomes possible to stack more containers, which has the advantage that the container transportation cost can be reduced, etc.

[0056] In addition, the container-securing device 1 is not limited to the structure that includes the movable protrusion 43 having the bifurcated convex structure, and may

be a container-securing device 1A as illustrated in Fig. 12. A lower support portion 4 of the container-securing device 1A includes a lower cone (first fitting portion) 41A consisting of a fixed protrusion. The other portions of the container-securing device 1A have configurations similar to, for example, those of the container-securing device 1. In addition, the lower cone (first fitting portion) 41A is not limited to a bifurcated convex structure, and may be a general single convex structure.

[0057] In addition, a container-securing device of another embodiment may be a container-securing device 1B illustrated in Fig. 13 and Fig. 14. In this container-securing device 1B, a cylindrical socket portion 61d is fitted to a tip side of a square axis 61a. This socket portion 61b can be fitted into the flange portion 2 from the side where the operation handle 63 is located. A coil spring 61f is mounted to the outer circumference of the square axis 61a, and between a base portion of the rotation engaging member 62 and an end portion of the rotation shaft 61. In addition, a hole into which a spring pin 65 can be inserted is formed at a position close to the operation handle 63 of the rotation shaft 61. By pressing the rotation shaft 61 against the coil spring 61f and inserting the spring pin 65, the operation portion 6 cannot be detached from the flange portion 2. It should be noted that the flange portion 2 includes a wall portion that receives an end face of the socket portion 61d.

[0058] In addition, the container-securing device 1B includes a stopper 5A. As also illustrated in Fig. 15, the stopper 5A consists of a first part 54 and a second part 55. The first part 54 has a gate-like shape in which an opening is formed from a center to a lower side, and the second part 55 has a shape that fits into the opening from the lower side. The first part 54 and the second part 55 are integrated together by screwing a bolt 56 with the second part 55 being fitted into the opening.

[0059] A concave portion 54a is formed on a rear surface of the first part 54, and a concave portion 55a is formed on a rear surface of the second part 55. In addition, a ball plunger 28 (ball pressing member) is attached within a hole extending from a surface of the flange portion 2 to a rear surface of the stopper 5A. The movement position of the stopper 5A is maintained by a ball of the ball plunger 28 being fitted into one of the plurality of concave portions 54a and 55a formed in the stopper 5A.

[0060] It should be noted that the stopper 5A and related components in the container-securing device 1B can also be applied to the container-securing device 1 illustrated in Fig. 1 and other related figures, as well as to the container-securing device 1A illustrated in Fig. 12.

[0061] Although the embodiments of the present invention have been described with reference to the drawings, the present invention is not limited to the illustrated embodiments. Various modifications and variations can be made to the illustrated embodiments within the same scope of the present invention or a scope equivalent to the present invention.

Reference Signs List

[0062]

- 1 : container-securing device
- 1A : container-securing device
- 1B : container-securing device
- 2 : flange portion
- 2b : hole
- 3 : upper support portion (second support portion)
- 4 : lower support portion (first support portion)
- 4a : support portion side tapered portion
- 5 : stopper

5A	: stopper
5a	: side portion
5b	: recess
5c	: upper corner portion (part of stopper)
6	: operation portion
21	: stopper inserting portion
21a	: base accommodation groove
28	: ball plunger (ball pressing member)
31	: upper cone (second fitting portion)
32	: vertical hole
41	: lower cone (first fitting portion)
41A	: lower cone (first fitting portion)
42	: fixed protrusion
43	: movable protrusion
43a	: shaft hole forming portion
43b	: contact portion
43c	: plate-like portion
44	: coil spring
51	: first part
52	: second part
54	: first part
54a	: concave portion
55	: second part
55a	: concave portion
56	: bolt
61	: rotation shaft
61a	: square axis

61b	: socket portion
61c	: bolt insertion hole
61d	: socket portion
61f	: coil spring
62	: rotation engaging member
63	: operation handle
65	: spring pin
100	: upper container
100a	: corner fitting
101	: lower container
101a	: corner fitting
150	: slot
150a	: cavity
150b	: opening
151	: slot
151a	: cavity
151b	: opening
301	: stopper accommodation groove
420	: first inclined surface
421	: second inclined surface
422	: convex top portion
425	: shaft supporting portion
425a	: concave portion
430	: first inclined surface
431	: second inclined surface
432	: convex top portion
433	: rotation restraining portion

435 : shaft member

1100 : container

1100a : corner fitting

1150 : slot

1150a : cavity

1150b : opening

A : opening vertical surface portion

B : entrance corner portion

C : outer surface portion

D : back corner portion

E : internal surface portion

Claims

[Claim 1]

A container-securing device comprising:

a flange portion located outside a slot of a corner fitting of a container;

a first support portion provided on the flange portion and configured to fit into a long hole-shaped opening of the slot;

a first fitting portion provided on the first support portion and configured to fit into a cavity of the slot;

a second support portion provided on a side of the flange portion opposite to a side on which the first support portion is provided and configured to fit into a long hole-shaped opening of a slot of a corner fitting of a different container;

a second fitting portion provided on the second support portion and configured to fit into a cavity of the slot of the corner fitting of the different container;

a stopper arranged to be movable between a facing position that is a position facing an opening vertical surface portion on a long side of the opening into which the first support portion fits, and a retracted position that is a position on the second support portion side;

a stopper inserting portion formed in the flange portion so as to allow movement of the stopper;

a stopper accommodation groove formed in the second support portion so as to allow movement of the stopper; and

an operation portion that moves the stopper between the facing position and the retracted position.

[Claim 2]

The container-securing device according to claim 1, wherein when the container-securing device is in use, the facing position is located below the retracted position, when the stopper is moved to the facing position, an upper side of the stopper is located within the stopper inserting portion, and a lower side of the stopper is located at the facing position, and when the stopper is moved to the retracted position, the upper side of the stopper is located within the stopper accommodation groove, and the lower side of the stopper is located within the stopper inserting portion.

[Claim 3]

The container-securing device according to claim 2, wherein in a state in which the stopper is at the retracted position, a part of the stopper protrudes from a surface of the second support portion to be located in the long hole-shaped opening of the slot of the corner fitting of the different container, thereby preventing rotation of the second support portion with respect to the corner fitting of the different container.

[Claim 4]

The container-securing device according to claim 1, wherein the stopper consists of a plurality of parts, and, in a state in which some of the parts are inserted into the stopper inserting portion, the other parts is connectable to those parts.

[Claim 5]

The container-securing device according to claim 1, wherein the operation portion includes: a rotation shaft passing through the flange portion; a rotation engaging member having a base side connected to the rotation shaft and a tip side engaged with a recess formed in the stopper; and an operation handle located outside the flange portion and configured to perform a rotating operation on the rotation shaft.

[Claim 6]

The container-securing device according to claim 5, wherein when the container-securing device is in use, the facing position is located below the retracted position, the tip side of the rotation engaging member is located below a rotation center on the base side of the rotation engaging member, in a state in which the stopper is located at the facing position, and the tip side of the rotation engaging member is located above the rotation center on the base side of the rotation engaging member, in a state in which the stopper is located at the retracted position.

[Claim 7]

The container-securing device according to claim 6, wherein a base accommodation groove that accommodates the base side of the rotation engaging member is formed within the stopper inserting portion.

[Claim 8]

The container-securing device according to claim 6, wherein in a state in which the stopper is located at the retracted position, the tip side of the rotation engaging member is inclined upward or substantially horizontal with respect to a portion in a vicinity of an entrance of the recess.

[Claim 9]

The container-securing device according to claim 6, wherein

a ball pressing member is mounted in a hole reaching the rotation shaft from a surface of the flange portion, and a rotation state of the rotation shaft is maintained by a ball of the ball pressing member fitting into one of a plurality of concave portions formed in the rotation shaft, or

a ball pressing member is mounted in a hole reaching the stopper from a surface of the flange portion, and a movement position of the stopper is maintained by a ball of the ball pressing member fitting into one of a plurality of concave portions formed in the stopper.

[Claim 10]

The container-securing device according to claim 1, wherein the first fitting portion includes two protrusions having different height positions, one of the two protrusions positioned lower in a use state of the container-securing device being a fixed protrusion, the other one of the two protrusions positioned upper in the use state is a movable protrusion urged to protrude laterally from a vertical surface portion of the first support portion, and the movable protrusion including a contact portion that does not contact a center side of the long hole-shaped opening in a longitudinal direction, but contacts each end side in the longitudinal direction.

[Claim 11]

The container-securing device according to claim 10, wherein a container fixed state is formed in a state in which the flange portion contacts an outer surface portion of the corner fitting, and the contact portion contacts a back corner portion located at a back side of the opening during a rotation operation.

[Claim 12]

The container-securing device according to claim 1, wherein the first fitting portion consists of a fixed protrusion.