

DESCRIPTION

CAP MOUNTING DEVICE

TECHNICAL FIELD

[0001] The present invention relates to a cap mounting device to be attached to a neck portion of a cylinder and to which a cylinder cap is to be mounted thereto.

BACKGROUND ART

[0002] Conventionally, there has been known a cap mounting device screwed and attached to a neck portion of a cylinder and to which a cylinder cap is to be mounted thereto (see, for example, PTL 1). In this type of cap mounting device, a threaded hole penetrating from the outer circumferential surface to the inner circumferential surface of the cap mounting device is formed and a set screw is screwed into the threaded hole with the cap mounting device being attached to the neck portion of the cylinder, to thereby press the tip end of the set screw against the neck portion of the cylinder. In this manner, the cap mounting device is fixed to the neck portion of the cylinder to prevent rotation and slackening thereof to integrate the cylinder and the cap mounting device. In addition, to the cap mounting device, a cylinder cap for protecting a valve of the cylinder is screwed and mounted.

[0003] Especially in the field of specialty gases, valves having a connector conforming to a foreign standard have been increasingly adopted as valves for cylinders, and large valves have been used more frequently. Accordingly, cylinder caps to protect the larger valves also have become larger in diameter. In cap mounting devices using a large-diameter cylinder cap, a neck collar is fitted to a neck ring attached to the cylinder, which has made the overall size of the cap mounting device larger.

CITATION LIST

PATENT LITERATURE

[0004] PTL 1: Japanese Patent Laid-open No. 2021-8925

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] However, in the cap mounting device of the conventional technology described above, there is a risk that vibrations when detaching the mounted cylinder cap or when transporting the cylinder may loosen the set screw to loosen the neck collar with respect to the neck ring. Therefore, it has been necessary to additionally tighten the set screw when the cylinders are shipped.

[0006] An object of the present invention is to solve the problems of the conventional technology described above and to provide a cap mounting device that is resistant to loosening with respect to a neck portion of a cylinder.

SOLUTION TO PROBLEM

[0007] The present invention is a cap mounting device to be attached to a neck portion of a cylinder and to which a cylinder cap is to be mounted thereto, comprising: a first ring having, on an inner circumferential surface thereof, a first threaded portion formed so as to be threadably engageable with a threaded portion of the neck portion; and a second ring having, on an inner circumferential surface thereof, a second threaded portion formed so as to be threadably engageable with a threaded portion of the neck portion, wherein the second ring is formed with a recessed portion into which the first ring can be assembled, and the first ring engages a bottom surface of the recessed portion when being assembled into the second ring.

[0008] In this case, a third threaded portion for attaching the cylinder cap may be formed on an outer circumferential surface of the second ring, and the recessed portion may be surrounded by the third threaded portion. The first ring may be formed with a first hole portion for hooking a tool. The first hole portion may extend parallel to an axial center of the first ring. The first ring may be formed with a pair of the first hole portions at positions opposite to each other about an axial center of the first ring. The second ring may be formed with a second hole portion for hooking a tool provided in the third threaded portion. The second hole portion may extend perpendicular to an axial center of the second ring. The second ring may be formed with a pair of the second hole portions at positions opposite to each other about the axial center of the second ring. The first ring may be formed with a first hole portion for hooking a tool, the second ring may be formed with a second hole

portion for hooking a tool provided in the third threaded portion, and, when the first ring is assembled into the recessed portion of the second ring, a direction in which the first hole portion extends and a direction in which the second hole portion extends may be orthogonal to each other.

ADVANTAGEOUS EFFECTS OF INVENTION

[0009] The present invention can provide a cap mounting device that is resistant to loosening with respect to a neck portion of a cylinder.

BRIEF DESCRIPTION OF DRAWINGS

[0010] [Fig. 1] Fig. 1 is a cross-sectional view of a cap mounting device according to the present embodiment, in a state of being attached to a cylinder.

[Fig. 2] Fig. 2(a) is a top view of a first ring, and Fig. 2(b) is a cross-sectional view of the first ring.

[Fig. 3] Fig. 3(a) is a top view of a second ring, and Fig. 3(b) is a cross-sectional view of the second ring.

DESCRIPTION OF EMBODIMENTS

[0011] Hereinafter, a cap mounting device according to one embodiment of the present invention will be described with reference to the drawings. Fig. 1 shows a cross-sectional view of the cap mounting device in a state of being attached to a cylinder, Fig. 2(a) shows a top view of the first ring, Fig. 2(b) shows a cross-sectional view of the first ring, Fig. 3(a) shows a top view of the second ring, and Fig. 3(b) shows a cross-sectional view of the second ring.

[0012] As shown in Fig. 1, a cap mounting device 100 is configured to be attached to a neck portion 1A of a cylinder 1 to which a neck ring is attached. That is, the cap mounting device 100 according to this embodiment is a neck collar for being attached to the neck ring. The neck portion 1A of the cylinder 1 is integrally constituted by the neck ring being attached to a container body of the cylinder 1 by crimping, welding, or screwing. The outer circumferential surface of the neck ring is threaded to act as a threaded portion of the neck portion 1A. The cap mounting device 100 is configured to be screwed onto the neck ring to

thereby be attached to the container body via the neck ring. The cylinder 1 is configured to allow a valve 2 to be attached within the neck portion 1A with the cap mounting device 100 being attached to the neck portion 1A. The cap mounting device 100 is configured to allow a cylinder cap 3 formed to accommodate the valve 2 to be attached thereto, and the cylinder 1 is configured to protect the valve 2 by the cylinder cap 3.

[0013] The cap mounting device 100 includes a first ring 10 and a second ring 20, and when being attached to the cylinder 1, the first ring 10 is assembled into the second ring 20.

[0014] As shown in Fig. 2(a), the first ring 10 is formed in an annular shape and formed with a first threaded portion 12 on an inner circumferential surface 11. On the other hand, the first ring 10 is formed with a smooth surface on an outer circumferential surface 13. The first threaded portion 12 is configured to be threaded onto a threaded portion formed on the outer circumferential surface of the neck portion 1A of the cylinder 1 (see Fig. 1).

[0015] The annular surface of the first ring 10 is formed with a pair of first hole portions 14, 14 having smooth surfaces, for hooking a tool. The pair of first hole portions 14, 14 are formed on the circumference between the inner circumferential surface 11 and the outer circumferential surface 13 of the first ring 10, and are formed at positions opposite to each other about a first axial center C1 of the inner circumferential surface 11. Each of pair of first hole portions 14, 14 has a circular cross section and, as shown in Fig. 2(b), penetrates through the first ring 10 so as to extend in parallel along the first axial center C1 of the first ring 10.

[0016] As shown in Fig. 3(a), the second ring 20 is formed in an annular shape and formed with a second threaded portion 22 on an inner circumferential surface 21 having the same diameter as the inner circumferential surface 11 of the first ring 10. The second threaded portion 22 is configured to be threaded onto a threaded portion formed on the outer circumferential surface of the neck portion 1A of the cylinder 1 (see Fig. 1).

[0017] On the other hand, the second ring 20 is formed with a third threaded portion 24 on its outer circumferential surface 23 for screwing the cylinder cap 3 onto it, and is also formed with a flange portion 25 against which the open end of the cylinder cap 3 abuts.

[0018] The outer circumferential surface 23 of the second ring 20 is formed with a pair of second hole portions 26, 26 for hooking a tool. The pair of second hole portions 26, 26 are formed at positions opposite to each other about a second axial center C2 of the inner circumferential surface 21 and the outer circumferential surface 23. These second hole portions 26, 26 are formed to have a circular cross section with a diameter smaller than that of the first hole portions 14, 14 of the first ring 10 and have a smooth surface on the inner circumferential surface thereof. As shown in Fig. 3(b), the second hole portions 26, 26 are formed to extend in a direction perpendicular to the second axial center C2. The second hole portions 26, 26 are configured to be closed by the cylinder cap 3 (see Fig. 1) when the cylinder cap 3 is mounted onto the second ring 20 so as not to be exposed to the outside.

[0019] The second ring 20 is formed with a recessed portion 27 into which the first ring 10 can be assembled such that the axial center C1 of the first threaded portion 12 coincides with the axial center C2 of the second threaded portion 22. The recessed portion 27 is formed to have a cross section perpendicular to the second axial center C2 being a circular cross section about the axial center C2, and the circular cross section of the recessed portion 27 is concentric with the circular cross section of the second threaded portion 22 and the third threaded portion 24. The diameter of the recessed portion 27 is formed larger than the diameter of the outer circumferential surface 13 of the first ring 10, so that a gap is created between the first ring 10 and the second ring 20 when the first ring 10 is assembled into the second ring 20. Furthermore, the depth of the recessed portion 27 is formed deeper than the thickness of the first ring 10 along the first axial center C1. The recessed portion 27 is located to be surrounded by the inner side of the third threaded portion 24 and is formed to have a size of such an extent that does not allow the second hole portions 26, 26 formed in the third threaded portion 24 to penetrate therethrough. The second ring 20 is configured such that the second hole portions 26, 26 do not penetrate through to the recessed portion 27, whereby the second hole portions 26, 26 are not exposed inside the recessed portion 27. Further, the bottom surface 28 of the recessed portion 27 is located farther from the end surface on the flange portion 25 side of the second ring 20 than the second hole portions 26,

26. Since no through-holes other than the inner circumferential surface 21 on which the second threaded portion 22 is formed are provided in the second ring 20, when the cylinder 1 and the cylinder cap 3 are attached, the second ring 20 is sealed to prevent dust from entering.

[0020] As shown in Fig. 1, in a state where the first ring 10 is assembled into the second ring 20 to form the cap mounting device 100, the direction in which the first hole portions 14, 14 of the first ring 10 extend and the direction in which the second hole portions 26, 26 of the second ring 20 extend are orthogonal to each other. As a result, even in a state where the first ring 10 is assembled into the recessed portion 27 of the second ring 20 and the outer circumferential surface 13 of the first ring 10 is not exposed, the operator can hook a tool on each of the first hole portions 14, 14 and the second hole portions 26, 26.

[0021] Since the thickness of the second ring 20, to which the cylinder cap 3 is mounted, in the direction of the second axial center C2 is formed to be thicker than the thickness of the first ring 10 in the direction of the first axial center C1, the strength of the cap mounting device 100 is increased.

[0022] Hereinafter, the procedure of attaching the cap mounting device 100 to the cylinder 1 is described.

When attaching the cap mounting device 100 to the cylinder 1, the operator first inserts a tool for the second ring 20 into the second hole portions 26, 26 and screws the second ring 20 onto the neck portion 1A of the cylinder 1 and tightens the second ring 20 to the end.

[0023] After tightening the second ring 20 onto the neck portion 1A of the cylinder 1 to the end, the operator inserts a tool for the first ring 10 into the first hole portions 14, 14 and screws the first ring 10 onto the neck portion 1A of the cylinder 1 with the second ring 20 being fixed using the tool for the second ring 20 so as to prevent the second ring 20 from rotating. At this time, the operator tightens the first ring 10 to the end until the first ring 10 is assembled into the recessed portion 27 of the second ring 20 and strongly pressed against the bottom surface 28.

[0024] After the first ring 10 is tightened with respect to the bottom surface 28 of the second ring 20, the operator rotates the second ring 20 backward toward the first ring 10 and tightens the second ring 20 with respect to the first ring 10 with the first ring 10 being fixed using the tool for the first ring 10 so as to prevent the first ring 10 from rotating. As a result, the cap mounting device 100 is attached to the neck portion 1A of the cylinder 1 with a double-nut locking effect being provided by the first ring 10 and the second ring 20.

[0025] The cap mounting device 100 according to this embodiment comprises: the first ring 10 having, on the inner circumferential surface 11 thereof, the first threaded portion 12 formed so as to be threadably engageable with the threaded portion of the neck portion 1A of the cylinder 1; and the second ring 20 having, on the inner circumferential surface 21 thereof, the second threaded portion 22 formed so as to be threadably engageable with the threaded portion of the neck portion 1A of the cylinder 1, wherein the second ring 20 is formed with the recessed portion 27 into which the first ring 10 can be assembled, and the first ring 10 engages the bottom surface 28 of the recessed portion 27 when being assembled into the second ring 20. As a result, when the cap mounting device 100 is attached to the neck portion 1A of the cylinder 1, a double-nut locking effect can be provided, whereby the cap mounting device 100 is made resistant to loosening with respect to the neck portion 1A of the cylinder 1.

[0026] The embodiment of the present invention is as described above. However, the present invention is not limited only to the above examples, and can be modified within the scope of the present invention as required and as preferred. For example, the first threaded portion 12 of the first ring 10 and the second threaded portion 22 of the second ring 20 only need to be configured to be capable of threadably engaging at least with the threaded portion of the neck portion 1A of the cylinder 1, and are not strictly limited to the example shown in the drawings.

[0027] Furthermore, in the above embodiment, the cap mounting device 100 is described as a neck collar attached to the neck ring, but is not limited thereto. In a case where the threaded portion is formed in the container body of the cylinder, the cap mounting device

may be a neck ring directly threadably engaged with the container body.

[0028] Furthermore, the first hole portion 14 and the second hole portion 26 are not limited to have the number and arrangement shown in the drawings.

REFERENCE SIGNS LIST

[0029]

1	cylinder
1A	neck portion
2	valve
3	cylinder cap
10	first ring
11	inner circumferential surface
12	first threaded portion
13	outer circumferential surface
14	first hole portion
20	second ring
21	inner circumferential surface
22	second threaded portion
23	outer circumferential surface
24	third threaded portion
25	flange portion
26	second hole portion
27	recessed portion
28	bottom surface
100	cap mounting device
C1	first axial center
C2	second axial center

CLAIMS

1. A cap mounting device to be attached to a neck portion of a cylinder and to which a cylinder cap is to be mounted, comprising:
 - a first ring having, on an inner circumferential surface thereof, a first threaded portion formed so as to be threadably engageable with a threaded portion of the neck portion;
 - and
 - a second ring having, on an inner circumferential surface thereof, a second threaded portion formed so as to be threadably engageable with a threaded portion of the neck portion,
 - wherein the second ring is formed with a recessed portion into which the first ring can be assembled, and
 - the first ring engages a bottom surface of the recessed portion when being assembled into the second ring.
2. The cap mounting device according to claim 1, wherein
 - a third threaded portion for attaching the cylinder cap is formed on an outer circumferential surface of the second ring, and
 - the recessed portion is surrounded by the third threaded portion.
3. The cap mounting device according to claim 1, wherein
 - the first ring is formed with a first hole portion for hooking a tool.
4. The cap mounting device according to claim 3, wherein
 - the first hole portion extends parallel to an axial center of the first ring.
5. The cap mounting device according to claim 3, wherein
 - the first ring is formed with a pair of the first hole portions at positions opposite to each other about an axial center of the first ring.
6. The cap mounting device according to claim 2, wherein
 - the second ring is formed with a second hole portion for hooking a tool provided in the third threaded portion.
7. The cap mounting device according to claim 6, wherein

the second hole portion extends perpendicular to an axial center of the second ring.

8. The cap mounting device according to claim 6, wherein

the second ring is formed with a pair of the second hole portions at positions opposite to each other about an axial center of the second ring.

9. The cap mounting device according to claim 2, wherein

the first ring is formed with a first hole portion for hooking a tool,

the second ring is formed with a second hole portion for hooking a tool provided in the third threaded portion, and,

when the first ring is assembled in the recessed portion of the second ring, a direction in which the first hole portion extends and a direction in which the second hole portion extends are orthogonal to each other.