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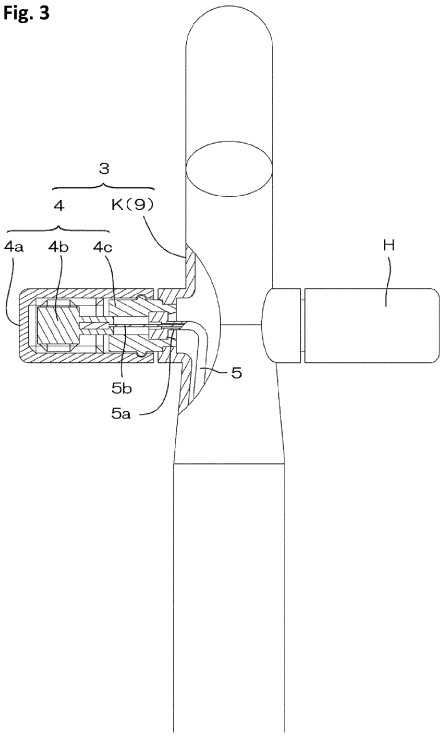
(54) REMOTE-CONTROLLED DRAIN PLUG DEVICE

(57) Provided is a remote operation type drain plug device which improves a degree of freedom of arrangement, configuration, and an operation method of an operation portion, in particular, improves a sense of use of the operation portion when the operation portion is arranged on a water discharge metal fixture. The remote operation type drain plug device includes: an operation portion; a drain outlet of a vessel to be opened and closed in accordance with operation of the operation portion; and an operation transmitting member configured to transmit the operation of the operation portion to the drain outlet side, wherein the operation portion includes: an operation portion main body which is mounted and fixed to an operation portion mounting surface provided to the vessel or in a vicinity of the vessel; and an operation body configured to perform an opening and closing operation of the drain outlet through operation under a state of being guided by the operation portion, and wherein a connection part between the operation transmitting member and the operation body is provided more on a front side than the operation portion mounting surface.

Fig. 3



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Description

Technical Field

[0001] The present invention relates to a drain plug device of a remote operation type configured to open and close a drain outlet of a vessel through operation of an operation portion provided at a position apart from the drain outlet, and more particularly, to a configuration of an operation portion of a remote operation type drain plug device.

Background Art

[0002] Hitherto, for removing wastewater generated inside a vessel such as a bathtub or a washbowl, there has been widely known a method of providing a drain outlet at a bottom surface or the like of the vessel to drain the wastewater to a sewage side from the drain outlet through a pipe member. Further, there exists a method of accumulating water in the vessel with a valve body arranged in such a manner as to cover the drain outlet and opening the drain outlet by raising the valve body away from the drain outlet, and there has been known a remote operation type drain plug device configured to open and close the drain outlet by raising and lowering the valve body through operation of an operation portion provided at a position apart from the valve body and the drain outlet, for example, at an edge portion of the vessel or on an upper side of a side surface of the vessel.

[0003] As a remote operation type drain plug device that is widely known, there has been known a remote operation type drain plug device like the one as described in Patent Literature 1. The remote operation type drain plug device as described in Patent Literature 1 includes: a drain outlet provided at a bottom surface of a vessel; a valve body arranged above the drain outlet; and an operation portion located at a position apart from the valve body, and is configured to open and close the drain outlet by remote operation through operation of the operation portion.

[0004] More specifically, the remote operation type drain plug device as described in Patent Literature 1 includes a drain outlet main body, a mechanism portion, a valve body, a joint member, an operation body, and a release wire. The drain outlet main body has a tubular shape, and includes a drain outlet at an upper edge thereof. The mechanism portion is mounted inside the drain outlet main body at a position directly below the drain outlet, and includes a shaft portion, which is called "lock shaft," and a mechanism main body portion. The mechanism main body portion has a tubular shape, and accommodates the lock shaft. The valve body has a disc shape, has the lock shaft connected at a center of a lower surface thereof, and is configured to open and close the drain outlet. The joint member is connected to a lower end of the drain outlet main body, and includes an insertion portion that allows the release wire, which is described later, to be inserted therethrough. The operation body has a shaft shape, and includes a knob portion for performing a pushing operation. The release wire includes an outer tube and an inner wire. The outer tube has a tubular shape, and serves as an operation transmitting member configured to transmit operation of the operation body. The inner wire advances and retreats in the outer tube.

[0005] The inner wire and the release wire are each flexible in a lateral direction and rigid in an axial direction.

[0006] The mechanism portion has a configuration called "thrust lock mechanism." After completion of installation, the mechanism portion allows the release wire to operate the lock shaft. Every time the pushing operation is performed on the operation body, the mechanism portion alternately repeats operations of fixing the lock shaft under a raised state and canceling the fixing to lower the lock shaft.

[0007] Further, in this related-art example, for example, for the purpose of improving the ease of installation, a guide member for the operation body, which is called "operation portion main body," is not provided, and an operation through hole (guide column) serving as an opening for guiding is provided at a part, specifically, on a back side of a water discharge metal fixture configured to discharge water to the vessel, and the operation body is arranged in the operation through hole such that the operation body can freely advance and retreat. That is, the water discharge metal fixture is configured as the operation portion main body. A bathtub being a vessel to which those remote operation type drain plug devices are installed is open on an upper side. Further, a mounting hole for mounting the drain outlet main body is formed in a bottom surface, and a metal fixture mounting hole for mounting the water discharge metal fixture is formed at a flange portion of the bathtub or at a bathtub deck portion in the vicinity of an upper edge of the opening.

[0008] The remote operation type drain plug device formed of the members described above is installed to the bathtub being the vessel in the following manner.

[0009] First, the drain outlet main body is mounted to the mounting hole of the bathtub, and the water discharge metal fixture is mounted to the metal fixture mounting hole.

[0010] Next, one end of the release wire is inserted through a branch pipe portion of the joint member. Further, the release wire is pulled up from an end portion on an upstream side. Then, the release wire is connected to the mechanism portion.

[0011] With this connection, every time the inner wire advances and retreats in the outer tube to operate the lock shaft of the mechanism portion, the mechanism portion can alternately repeat operations of fixing the lock shaft under a raised state and canceling the fixing to lower the lock shaft. Next, the end portion of the joint member on the upstream side is connected to a lower end of the drain outlet main body.

[0012] Next, the operation body is inserted through the

operation through hole of the water discharge metal fixture. Next, another end of the release wire is connected to the operation body and to the water discharge metal fixture being the operation portion main body. At the time of this connection, an end portion of the inner wire is connected and fixed to a lower end of the operation body, and an end portion of the outer tube is connected and fixed to the water discharge metal fixture.

[0013] Further, the valve body is connected to the lock shaft of the mechanism portion. Accordingly, the installation of the remote operation type drain plug device of the related-art example is completed.

[0014] When the remote operation type drain plug device having the configuration described above is to be used, first, the valve body is lowered so that the valve body is brought into a state of closing the drain outlet. At this time, the fixing of the lock shaft is canceled so that the lock shaft is at a lowered position.

[0015] When the pushing operation is performed on the knob portion of the operation body from this state, the operation body is pushed in so that the inner wire advances in the outer tube toward the drain outlet side. As a result, the lock shaft of the mechanism portion is pushed up and raised by the inner wire, and the mechanism portion fixes the lock shaft under the raised state.

[0016] Thus, the valve body provided at the distal end of the lock shaft also rises away from the drain outlet, and is fixed under a state in which the drain outlet is open. When hot and cold water is present in the bathtub, the hot and cold water is drained as wastewater from the drain outlet to piping on a sewage side via an inside of the drain outlet main body and an inside of the joint member.

[0017] When the pushing operation is performed again on the knob portion of the operation portion, the pushing operation is transmitted again to the lock shaft via the inner wire. As a result, the fixing of the lock shaft in the raised state is canceled so that the lock shaft is lowered, for example, by its own weight. Along with the lowering of the lock shaft, the valve body is also lowered so that the valve body moves to a position of abutting against the drain outlet, thereby closing the drain outlet.

[0018] Subsequently, through the pushing operation of the knob portion of the operation portion, the drain outlet can be opened and closed by remote operation at a position apart from the valve body.

[0019] Further, in this related-art example, the operation through hole for arranging the operation body in the water discharge metal fixture is provided. Thus, it is not required to separately prepare an operation portion main body serving as a receiving member for the operation body or to provide a through hole for the operation portion main body for arranging the operation portion main body in the vicinity of the vessel, thereby being capable of eliminating work for boring and labor for mounting.

Citation List

Patent Literature

[0020] [PTL 1] Japanese Utility Model Application Laid-open No. 6-35370

Summary of Invention

Technical Problem

[0021] In the remote operation type drain plug device as described in Patent Literature 1, the operation body is formed of a rod-like member having the knob portion provided at the end portion. The upper end of the operation body is arranged on the water discharge metal fixture for operation, and the lower end is formed so as to connect the release wire serving as the operation transmitting member for transmitting the operation.

[0022] Thus, the operation body is arranged in such a manner as to vertically pass through the metal fixture mounting hole formed in the flange portion or the deck portion of the bathtub to which the water discharge metal fixture is mounted.

[0023] Here, in consideration of a position of arranging the operation body on the water discharge metal fixture, a water discharge port is provided on the front of the water discharge metal fixture, and the operation body arranged in the vertical direction interferes with the water discharge port. Thus, the operation body cannot be arranged on the front of the water discharge metal fixture.

[0024] Further, water discharge operation handles for opening and closing water discharge from the water discharge port and for adjusting a water amount are provided on the right and left of the water discharge metal fixture, and the operation body that is arranged in the vertical direction interferes with the water discharge operation handles. Thus, the operation body cannot be arranged also on the side of the water discharge metal fixture. There exists a water discharge metal fixture including a water discharge operation handle only on one side. However, in this case, the water discharge operation handle and the knob portion may be significantly different in design. Further, also with regard to the direction of operation, the water discharge operation handles are operated through rotating operation, whereas the operation body is operated through vertical pushing/pulling operation or through pushing operation. Thus, the shapes and operation methods are completely different. Accordingly, there has been a problem in that design and operability are significantly deteriorated.

[0025] As a result, in the case of arranging the operation body on the water discharge metal fixture, the operation body can be arranged only on the back side of the water discharge metal fixture. Such arrangement is difficult to handle because a user of the remote operation type drain plug device is required to reach out a hand to the back while circumventing the main body portion of

the water discharge metal fixture.

[0026] Further, the water discharge metal fixture has a structure in which the water discharge metal fixture extends upward at least from the mounting position and then turns such that an end portion thereof on the water discharge port side faces downward, and the water discharge metal fixture and the operation body are both arranged in the vertical direction from the metal fixture mounting hole. As described above, both the water discharge metal fixture and the operation body extend upward from the metal fixture mounting hole. Thus, when the operation body is to be operated, the water discharge metal fixture may become an obstacle.

[0027] When the operation body is arranged at a position different from the position of the water discharge metal fixture for operation, the problems described above are solved. However, in such a case, it is required that a hole for the operation portion be provided separately from the metal fixture mounting hole, for example, in the flange portion of the bathtub or the bathtub deck portion.

[0028] In this case, it is required to process, for example, the vessel, such as the bathtub or the washstand, and the deck portion in advance on the assumption that the remote operation type drain plug device is to be used, which may increase labor for design and installation.

[0029] Further, in recent years, there is an increase in use of a washstand of a vessel type having a structure in which a major part of a vessel of a washbowl, specifically, a part occupying at least about 80% of an overall height is located on an upper surface of a seat on which the washbowl is installed.

[0030] A related-art washstand has a structure of an embedding type in which a vessel part of a washbowl is arranged in an opening provided to a seat and below an upper surface of a seat and in which a flange portion provided on a peripheral edge of the vessel is locked to the opening of the seat, or a structure of an under-counter type in which an opening of a washbowl is arranged below an opening provided to a seat and in which a vessel part of the washbowl is entirely arranged below an upper surface (counter) of the seat. Meanwhile, the washstand of the vessel type has a structure in which almost an entirety of the washbowl including the vessel part is arranged on the seat and in which a part arranged below the upper surface of the seat is absent or only a drain outlet and a vicinity thereof located at a lower end of the vessel is arranged below the upper surface of the seat. In the case of the washstand of the vessel type, almost the entirety of the vessel is arranged above the upper surface of the seat. Thus, as compared to the embedding type or the under-counter type, the degree of freedom of selection or arrangement position of the washbowl part is higher.

[0031] More specifically, in the embedding type or the under-counter type, it is required to match the opening of the seat and the opening of the washbowl with each other, and hence it is required to adjust both the seat and the washbowl in a stage of designing. Meanwhile, in the vessel type, there is provided a structure in which the washbowl including the vessel part is simply placed on the seat, and hence it is not required to, for example, accurately match the opening of the seat and the opening of the washbowl with each other. Accordingly, there is an advantage in that the washbowl can be freely selected in accordance with preference of a user. However, there arises a problem in a way of forming the hole for the operation portion. When a mounting hole for the operation portion is provided to both the washbowl and the seat, one of the holes is kept open. Thus, there is a problem in that design is poor. Meanwhile, when the mounting hole for the operation portion is not provided to both the washbowl and the seat, it is difficult to employ the remote operation type drain plug device. It is conceivable to, for example, employ a washbowl having no hole for the operation portion and then form a hole with a drill or the like in a seat having no hole for the operation portion. However, when the seat is formed of ceramics such as tiles, those methods may not be employed.

[0032] The present invention has been made in view of the problems described above, and relates to a remote operation type drain plug device which improves a degree of freedom of arrangement, configuration, and an operation method of an operation portion, in particular, improves a sense of use of the operation portion when the operation portion is arranged on a water discharge metal fixture.

Solution to Problem

[0033] According to one embodiment of the present invention, there is provided a remote operation type drain plug device, including: an operation portion; a drain outlet of a vessel to be opened and closed in accordance with operation of the operation portion; and an operation transmitting member configured to transmit the operation of the operation portion to the drain outlet side, wherein the operation portion includes: an operation portion main body which is mounted and fixed to an operation portion mounting surface provided to the vessel or in a vicinity of the vessel; and an operation body configured to perform an opening and closing operation of the drain outlet through operation under a state of being guided by the operation portion, and wherein a connection part between the operation transmitting member and the operation body is provided more on a front side than the operation portion mounting surface.

[0034] The expression "more on a front side than the operation portion mounting surface" indicates a side closer to a part for operating the operation portion when a user uses the remote operation type drain plug device in a normal manner.

[0035] For example, when the operation portion is mounted on an inner side surface of the vessel, and operation is performed from an inner side of the vessel, the inner surface side of the vessel corresponds to the front side. When the operation portion is mounted on an outer side surface of the vessel, and operation is performed

from an outer side of the vessel, the outer surface side of the vessel corresponds to the front side. When the working portion is mounted on a horizontal surface around the opening of the vessel or in the vicinity of a substantially horizontal surface of the vessel, such as on the seat having the vessel placed thereon, and operation is performed from above the vessel, the upper surface side of the peripheral edge of the opening of the vessel corresponds to the front side. When the operation portion is mounted on a vertical surface such as a vertical panel provided in the vicinity of the vessel, and operation is performed from the front of the vertical surface, the front surface (near surface) side of the vertical surface corresponds to the front side.

[0036] In the remote operation type drain plug device according to the one embodiment of the present invention, the operation portion main body is a water discharge metal fixture of the vessel.

[0037] The term "operation portion mounting surface" as used here corresponds to a mounting surface for the water discharge metal fixture being the operation portion main body.

[0038] In the remote operation type drain plug device according to the one embodiment of the present invention, the operation portion of the remote operation type drain plug device is provided to a water discharge metal fixture of a drain device having a configuration in which a major part of the vessel is placed on a seat.

[0039] In the remote operation type drain plug device according to the one embodiment of the present invention, the operation transmitting member is formed of a release wire including: an outer tube having a tubular shape; and an inner wire configured to advance and retreat in the outer tube.

[0040] In the remote operation type drain plug device according to the one embodiment of the present invention, the operation body is a rotary handle, and the drain outlet is to be opened and closed through operation of the rotary handle.

[0041] In the remote operation type drain plug device according to the one embodiment of the present invention, the operation body is a button portion, and every time pushing operation is performed on the button portion, operations of opening and closing the drain outlet are alternately repeated so that the drain outlet is to be opened and closed.

Advantageous Effects of the Invention

[0042] According to the one embodiment of the present invention, the connection part between the operation body of the operation portion and the operation transmitting member in the remote operation type drain plug device is provided more on the front side than the surface on which the operation portion is mounted. Accordingly, the degree of freedom of arrangement layout and an operation method of the operation body can be increased. Specifically, for example, the operation body is arranged in a horizontal direction with respect to the surface on which the operation portion is mounted, and the operation portion is operated by moving the operation body in the horizontal direction with respect to the surface on which the operation portion is mounted. Thus, it is not required to arrange or operate the operation body toward the operation portion mounting hole, thereby being capable of improving the degree of freedom of arrangement and an operation method.

[0043] According to the one embodiment of the present invention, the operation portion of the remote operation type drain plug device is the water discharge metal fixture. Accordingly, it is not required to additionally provide an operation portion mounting hole for the operation portion. Further, in the case in which the related-art water discharge metal fixture is the operation portion, it is required that the operation body be arranged in such a manner as to extend upward from the metal fixture mounting hole similarly to the water discharge metal fixture. Thus, only the configuration in which the water discharge metal fixture may become an obstacle with respect to the operation body is obtained. However, according to the present invention, the connection part between the operation body and the operation transmitting member is arranged more on the front side than the surface on which the operation body is mounted. Accordingly, the degree of freedom of arrangement and an operation method of the operation body is increased. For example, the operation body of the rotary handle type may be arranged on the lateral surface of the water discharge metal fixture, or the operation body may be arranged on the front surface side of the water discharge metal fixture, and the operation body may be pushed and pulled in the direction parallel to the operation portion mounting surface. As in such cases, the operation body may be arranged with a freely selected position, a freely selected direction, and a freely selected operation method, thereby being capable of achieving the operation body and the operation method that prevents the water discharge metal fixture from becoming an obstacle.

[0044] According to the one embodiment of the present invention, in the drain device of, for example, the vessel type having a structure in which a major part of the vessel is located on the upper surface of the seat for installing the vessel, the operation portion is provided to the water discharge metal fixture. Accordingly, the problem of the mounting structure for the operation portion main body, such as whether the operation portion is to be arranged on the vessel or the seat, which may arise in the case of employing the vessel having the above-mentioned structure can be solved.

[0045] According to the one embodiment of the present invention, the configuration of the operation transmitting member can be clarified.

[0046] According to the one embodiment of the present invention, the operation method of the operation portion can be clarified.

Brief Description of Drawings

[0047]

FIG. 1 is a sectional view for illustrating an installation state of a washstand of a first embodiment as viewed from the front.

FIG. 2 is a reference view for illustrating the installation state of the washstand of the first embodiment as viewed from the side.

FIG. 3 is a partial cutout reference view for illustrating a water discharge metal fixture and an operation portion of the first embodiment.

FIG. 4 is a reference view for illustrating a configuration of members of the operation portion of FIG. 3.

FIG. 5 is a sectional view for illustrating a configuration of members provided in the vicinity of the drain outlet of the first embodiment.

FIG. 6A and FIG. 6B are reference views for illustrating the operation portion and the drain outlet, respectively, of the first embodiment in a closed state.

FIG. 7A and FIG. 7B are reference views for illustrating the operation portion and the drain outlet, respectively, of the first embodiment in an opened state.

FIG. 8A and FIG. 8B are reference views for illustrating an operation portion and a drain outlet, respectively, of a second embodiment in a closed state.

FIG. 9A and FIG. 9B are reference views for illustrating the operation portion and the drain outlet, respectively, of the second embodiment in an opened state.

FIG. 10 is a reference view for illustrating an operation portion of another embodiment in a closed state.

FIG. 11 is a reference view for illustrating the operation portion of the embodiment of FIG. 10 in an opened state.

FIG. 12 is a sectional view for illustrating an operation portion of another embodiment in a closed state.

FIG. 13 is a sectional view for illustrating an operation of the operation portion of the embodiment of FIG. 12.

Description of Embodiments

[0048] Now, a first embodiment of the present invention is described with reference to the drawings. In the following description of each embodiment, movement of an inner wire 5b of a release wire 5 toward a drain outlet 1a side is described as "advance," and movement toward the operation portion 3 side is described as "retreat." Further, directions of "up," "down," "right," and "left" in the description of this embodiment are described based on the illustration of FIG. 1. Further, in this embodiment, a water discharge metal fixture K is illustrated. However, the illustration of the interior of the water discharge metal fixture K is a reference view, and illustration of a mechanism of water supply piping such as piping on a water supply side that does not directly relate to the invention is omitted.

[0049] A drain plug device according to the first embodiment of the present invention illustrated in FIG. 1 to FIG. 7 is a drain plug device of a remote operation type that is employed in a washbowl B of a washstand being a vessel, and is formed of members such as a drain outlet main body 1, a joint member 6, an operation body 4, an operation portion 3, a valve member 2, a release wire 5 being an operation transmitting member, a plate nut member N, and a trap pipe T, which are described below.

[0050] The washstand is formed of the washbowl B of a mode called "vessel type" and a cabinet C having a box shape for placing the washbowl B, which are described below.

[0051] The washbowl B is a vessel including a vessel part B1 and a side wall portion B2. The vessel part B1 is formed of a box body that is open on an upper side. The side wall portion B2 extends downward from a peripheral edge of the opening of the vessel. The washbowl B has, in a bottom surface of the vessel part B1, a mounting hole B3 for mounting the drain outlet main body 1. Further, a lower end of the side wall portion B2 is located at a position slightly higher than the bottom surface of the vessel part B1 in the vicinity of the drain outlet 1a. Thus, as illustrated in FIG. 1 and FIG. 2, when the washbowl B is placed on an upper surface of the seat C1 at an upper surface of the cabinet C, a major part of the vessel part B1, specifically, a part occupying about 80% of an overall height of the washbowl B is arranged above the upper surface of the seat C1.

[0052] The cabinet C is a box body including a door of an openable and closable type on the front and including the seat C1 having a plate shape on an upper side for placing the washbowl B. Piping opening portions C2 for arranging and passing drain piping are provided at a center of the seat C1 and on a lower side of the cabinet C, respectively. Further, in the cabinet C of this embodiment, a metal fixture mounting hole C3 for arranging the water discharge metal fixture K is provided on an upper surface of the seat C1 separately from the piping opening portion C2.

[0053] The drain outlet main body 1 is a member having a substantially cylindrical shape, and has a drain outlet 1a in the opening part at an upper end and a flow passage for draining at an inner part of the cylinder that continues from the drain outlet 1a. Further, a flange portion 1b projecting laterally is provided on an outer periphery of the upper end part, and a male thread is provided on a lower side surface of the flange portion 1b.

[0054] The joint member 6 is a pipe member connected to the drain outlet main body 1, and is formed of a straight pipe portion 6a and an insertion portion 6b. The straight pipe portion 6a includes a nut member at an upper end thereof. The insertion portion 6b is a branch pipe part, which is provided on a side surface of the straight pipe

portion 6a and allows the release wire 5, which is described later, to be inserted therethrough. A support member 8, which is described later, is fitted and fixed to the upper end of the straight pipe portion 6a.

[0055] The support member 8 is a member that is fitted to the upper end of the straight pipe portion 6a of the joint member 6, and is configured to fix an end portion of the outer tube 5a of the release wire 5, which is described later, and arrange an end portion of the inner wire 5b at a lower end position of the valve member 2 after completion of installation.

[0056] The release wire 5 is formed of an outer tube 5a, an inner wire 5b, a rod portion 5c, and a cap member 5d. The outer tube 5a has a cylindrical shape, and is rigid in an axial direction and flexible in a lateral direction. The inner wire 5b is formed of a stranded metal wire being rigid in the axial direction and flexible in the lateral direction, and is configured to advance and retreat in the outer tube 5a. The rod portion 5c being hard and having a rod-like shape is provided at an end portion of the inner wire 5b on the valve member 2 side. The cap member 5d is configured to close an end portion of the insertion portion 6b in a watertight manner under a state in which the outer tube 5a passes therethrough.

[0057] The operation portion 3 is formed of the water discharge metal fixture K being the operation portion main body 9 and the operation body 4, which are described later. The operation portion main body 9 is a member that is fixed to a drain device, such as a washstand or a wall surface located in the vicinity of the washstand. The operation body 4 is a member which is guided by the operation portion main body 9 in directions of operation such as advancing, retreating, and rotation, and is configured to at least partially perform operations such as advancing, retreating, and rotation through operation by a user.

[0058] The water discharge metal fixture K serving also as the operation portion main body 9 is a pipe body having a reversed J shape in side view as illustrated in FIG. 2 and being made of a metal material. A lower end part thereof is fixed to the metal fixture mounting hole C3 of the cabinet C and is connected to piping on the water supply side. Thus, the water discharge metal fixture K is configured to perform water discharge from the end portion on the washbowl B side.

[0059] Further, the water discharge metal fixture K of this embodiment includes a water discharge operation handle H of a rotary type having a cylindrical shape, with a rotation axis being arranged in the horizontal direction, on the right side of FIG. 1 and FIG. 3. Through rotation of the water discharge operation handle H, a flow rate and a temperature of the water discharged from the water discharge metal fixture K can be adjusted.

[0060] Further, the water discharge metal fixture K of this embodiment includes, on the left side of FIG. 1 and FIG. 3 and at a position symmetrical to the water discharge operation handle H over the water discharge metal fixture K, the operation body 4, and an operation body connection port K1. The operation body 4 includes a knob portion 4a of a rotary handle type having a rotation axis arranged in the horizontal direction, and is configured to open and close the drain outlet 1a. The operation body connection port K1 is configured to connect the operation body 4.

[0061] Now, details of a configuration of the operation body 4 are described.

[0062] The operation body 4 of this embodiment is formed of the knob portion 4a, an advancing/retreating portion 4b, and a wire fixing portion 4c, which are described below.

[0063] The knob portion 4a is a member having a cylindrical shape with one end being closed, and has a female thread inside.

[0064] The advancing/retreating portion 4b is a member accommodated inside the knob portion 4a and having a protruding shape in sectional view. The advancing/retreating portion 4b has a male thread formed partially in an outer peripheral part thereof to be fitted to the female thread of the knob portion 4a, and is configured to be connected to the end portion of the inner wire 5b.

[0065] The wire fixing portion 4c is a member having a substantially cylindrical shape. The wire fixing portion 4c has the end portion of the outer tube 5a fixed thereto, and is fixed to the operation body connection port K1. Further, the knob portion 4a is fixed to the wire fixing portion 4c in such a manner as to be rotatable and immovable in the axial direction. Further, the wire fixing portion 4c accommodates a part of the advancing/retreating portion 4b, that is, a distal end part having the protruding shape such that the advancing/retreating portion 4b is capable of advancing and retreating in the axial direction, and is not capable of turning.

[0066] Further, the end portion of the outer tube 5a of the release wire 5 is fixed to the wire fixing portion 4c, and the wire fixing portion 4c is fixed to the operation body connection port K1 provided to the water discharge metal fixture K. Accordingly, the end portion of the outer tube 5a of the release wire 5 is fixed to the operation body connection port K1. After completion of the installation, the wire fixing portion 4c of the operation body 4 is fixed to the operation body connection port K1 provided to the water discharge metal fixture.

[0067] Further, the knob portion 4a is connected to the wire fixing portion 4c so as to be rotatable and immovable in the axial direction. Further, the male thread of the advancing/retreating portion 4b is threadedly engaged with the female thread of the knob portion 4a, and a part of the advancing/retreating portion 4b is connected to the wire fixing portion 4c such that the advancing/retreating portion 4b is not capable of turning, and is capable of advancing and retreating in the axial direction.

[0068] With such configuration and connection, after completion of the installation, when the knob portion 4a is rotated, the thread structure allows the advancing/retreating portion 4b and the inner wire 5b to perform the operation of advancing in the direction toward the valve

member 2 or the operation of retreating toward the knob portion 4a side. In this embodiment, when the knob portion 4a is rotated toward a near side, the advancing/retreating portion 4b and the inner wire 5b advance, to thereby open the drain outlet 1a. When the knob portion 4a is rotated toward a far side, the advancing/retreating portion 4b and the inner wire 5b retreat, to thereby close the drain outlet 1a.

[0069] The valve member 2 is formed of a valve body 2a, a valve shaft 2b, and a guide portion 2c. The valve body 2a has a disc shape, and is configured to close the drain outlet 1a. The valve shaft 2b extends downward from a lower side of the valve body 2a at a center. The guide portion 2c is provided to the valve shaft 2b, and is configured to prevent inclination of the valve body 2a.

[0070] Further, as another members, the plate nut member N and the trap pipe T are provided. The plate nut member N includes a female thread configured to threadedly engage with a male thread of the drain outlet main body 1. The trap pipe T provides connection between a lower end of the joint member 6 and underfloor piping, and forms a water trapping portion obtained by bending the pipe body into an S-shape.

[0071] The washstand having the configuration described above and the drain piping using the remote operation type drain plug device are installed in the following manner.

[0072] At connection parts of the members, even when no particular description is given, watertight connection is suitably performed by methods such as packing and bonding as needed.

[0073] First, the washbowl B is placed and fixed on the seat C1 located on the upper surface of the cabinet C. At this time, the bottom surface of the washbowl B in the vicinity of the mounting hole B3 of the vessel part B1 is arranged in the piping opening portion C2 provided on the seat C1.

[0074] The lower end of the side wall portion B2 of the washbowl B is located at a position slightly higher than the bottom surface of the vessel part B1 in the vicinity of the drain outlet 1a. Thus, when the washbowl B is arranged on the seat C1 of the cabinet C as described above, as illustrated in FIG. 1 and FIG. 2, a major part of the washbowl B, specifically, a part occupying about 80% of an overall height is arranged above the seat C1.

[0075] Next, the end portion of the outer tube 5a on the operation portion 3 side is fixed to the wire fixing portion 4c. Then, the inner wire 5b is drawn out and connected to the advancing/retreating portion 4b of the operation body 4. After the connection, the distal end part of the advancing/retreating portion 4b is inserted into the wire fixing portion 4c. Then, the wire fixing portion 4c is mounted and fixed to the operation body connection port K1.

[0076] Next, the knob portion 4a being a part of the operation portion 3 is threadedly engaged with the advancing/retreating portion 4b and connected to the wire fixing portion 4c.

[0077] With this connection, in normal use, the knob portion 4a is connected to the wire fixing portion 4c and the operation body connection port K1 in such a manner as to be rotatable and immovable in the axial direction, and the advancing/retreating portion 4b is connected to the operation body connection port K1 such that the advancing/retreating portion 4b is not capable of rotating, and is capable of advancing and retreating in the axial direction.

[0078] In the case of being different from the normal use, for example, when it is required to mount and remove members for maintenance or the like, the knob portion 4a is intentionally and forcibly pulled outward to cancel the connection, thereby being capable of removing the knob portion 4a and the advancing/retreating portion 4b from the water discharge metal fixture K.

[0079] Next, the water discharge metal fixture K is mounted to the metal fixture mounting hole C3 provided on the seat C1 of the cabinet C. At this time, the end portion of the piping for water discharge of the water discharge metal fixture K and the release wire 5 are arranged inside the cabinet C through the metal fixture mounting hole C3.

[0080] Next, the drain outlet main body 1 is inserted through the mounting hole B3 of the washbowl B, and the plate nut member N is threadedly engaged with the drain outlet main body 1 so that a peripheral edge of the mounting hole B3 of the washbowl B is sandwiched between the flange portion 1b and the upper surface of the plate nut member N, to thereby mount the drain outlet main body 1 to the washbowl B.

[0081] Next, the end portion of the inner wire 5b on the drain outlet 1a side is inserted through the insertion portion 6b of the joint member 6 and drawn out from the upper end side of the straight pipe portion 6a. Then, the end portion of the outer tube 5a of the release wire 5 is connected and fixed to the support member 8.

[0082] Next, the support member 8 is fitted to the upper end part of the straight pipe portion 6a. Then, the end portion of the insertion portion 6b is closed with the cap member 5d.

[0083] Next, an upstream end portion of the straight pipe portion 6a of the joint member 6 is connected to the lower end of the drain outlet main body 1. Further, the trap pipe T is connected to a downstream end portion of the joint member 6. Further, the downstream end portion of the trap pipe T is connected to the underfloor piping that is led to the sewage side.

[0084] Further, the valve member 2 is arranged inside the drain outlet main body 1 through the drain outlet 1a. Accordingly, the installation of the washstand and the remote operation type drain plug device for the washstand according to this embodiment is completed.

[0085] In the configuration described above, the water discharge metal fixture K is the operation portion main body 9. The mounting surface for the operation portion main body 9 is the upper surface of the seat C1. The front side of the mounting surface for the operation portion

main body 9 of this embodiment is the side above the upper surface of the seat C1. Further, the connection part between the operation body 4 and the operation transmitting member of this embodiment is the connection part between the advancing/retreating portion 4b and the inner wire 5b. Thus, the advancing/retreating portion 4b is connected to the inner wire 5b above the upper surface of the seat C1, and hence the remote operation type drain plug device according to this embodiment is the remote operation type drain plug device in which the connection part between the operation transmitting member and the operation body 4 is provided more on the front side than the operation portion mounting surface.

[0086] Now, a method of use of the washstand of the above-mentioned embodiment is described.

[0087] When the water discharge into the washbowl is to be performed with the water discharge metal fixture, through rotation of the water discharge operation handle H on the right side of FIG. 1 and FIG. 3, the water discharge can be performed while adjusting the flow rate and the temperature of the water discharged from the water discharge metal fixture K.

[0088] Further, when the drain outlet 1a is to be opened and closed by remote operation, first, as illustrated in FIG. 6B, a valve main body is lowered so that the valve body 2a is brought into abutment against the peripheral edge of the drain outlet 1a to close the drain outlet 1a. At this time, as illustrated in FIG. 6A, the advancing/retreating portion 4b and the inner wire 5b are in the position of retreating toward the knob portion 4a side.

[0089] When the knob portion 4a of the operation body 4 provided to the water discharge metal fixture K is operated to rotate toward the near side from this state, as illustrated in FIG. 7A, the screw mechanism incorporated in the knob portion 4a and the advancing/retreating portion 4b allows the advancing/retreating portion 4b and the inner wire 5b to advance toward the drain outlet 1a side so that the rod portion 5c arranged at the lower end position of the valve shaft 2b rises to push up the valve shaft 2b. As a result, the valve body 2a rises together with the valve shaft 2b so that the valve body 2a separates away from the drain outlet 1a. Thus, as illustrated in FIG. 7B, the drain outlet 1a is opened.

[0090] When hot and cold water is present in the vessel part B1 of the washbowl B, the hot and cold water is drained from the drain outlet 1a to the sewage side via the inside of the drain outlet main body 1, the joint member 6, and the trap pipe T.

[0091] When the knob portion 4a provided to the water discharge metal fixture K is operated to rotate toward the far side from this state, the screw mechanism incorporated in the knob portion 4a and the advancing/retreating portion 4b allows the advancing/retreating portion 4b and the inner wire 5b to retreat toward the knob portion 4a side so that the rod portion 5c arranged at the lower end position of the valve shaft 2b is lowered, and the support on the lower end of the valve shaft 2b is lost. As a result, the valve body 2a and the valve shaft 2b are both lowered so that the valve body 2a is brought into abutment against the peripheral edge of the drain outlet 1a to close the drain outlet 1a. Thus, the drain outlet 1a returns to the state of FIG. 6B.

[0092] Subsequently, through the rotating operation on the knob portion 4a of the operation portion 3, the drain outlet 1a can be opened and closed by the remote operation at a position apart from the valve body 2b.

[0093] In the first embodiment described above, the connection part between the operation body 4 of the operation portion 3 and the release wire 5 being the operation transmitting member in the remote operation type drain plug device is provided more on the front side than the upper surface of the seat C1 on which the water discharge metal fixture K being the operation portion main body 9 is mounted. Accordingly, the knob portion 4a for operation having the same shape as that of the water discharge operation H can be arranged at the position symmetrical to the water discharge operation handle H over the pipe body part of the water discharge metal fixture K, thereby being capable of improving the design.

[0094] Further, the water discharge operation handle H for operating the water discharge and the knob portion 4a are both operated through the rotating operation, thereby being capable of achieving a favorable sense of use without any sense of incompatibility.

[0095] Further, the water discharge metal fixture K serves as the operation portion main body 9. Thus, the opening for mounting the operation portion main body 9 can be used also as the metal fixture mounting hole C3. Thus, it is not required to separately provide the opening dedicated for mounting the operation portion main body 9.

[0096] Accordingly, the remote operation type drain plug device can be used also for the washbowl B and the cabinet C having no opening dedicated for mounting the operation portion main body 9, to thereby increase a variety in selection of the washbowl B.

[0097] Next, a second embodiment of the present invention is described with reference to the drawings.

[0098] The second embodiment of the present invention is similar to the first embodiment except for the configuration of the operation portion 3. Thus, only the configurations of the operation portion 3 different from those of the first embodiment are described below, and description of other configurations is omitted.

[0099] The operation portion 3 of the remote operation type drain plug device according to the second embodiment illustrated in FIG. 8 and FIG. 9 is formed of the operation body 4, which is formed of a mechanism portion 7, a button portion 4d, and the wire fixing portion 4c, which are described below, and the water discharge metal fixture K serving as the operation portion main body 9 similar to that of the first embodiment.

[0100] The mechanism portion 7 includes a shaft-shaped lock shaft 7a and a tubular mechanism main body portion 7b configured to accommodate the lock shaft 7a,

and has a mechanism called "thrust lock mechanism" which performs repeatedly every time the pushing operation is performed on the lock shaft 7a, operations of fixing the lock shaft 7a by allowing the lock shaft 7a to advance and canceling the fixing of the lock shaft 7a to allow the lock shaft 7a to retreat with stress.

[0101] The button portion 4d is a disc-shaped member, and has the lock shaft 7a fitted and connected to the center part of the button portion 4d.

[0102] The wire fixing portion 4c is a member having a substantially cylindrical shape. The mechanism portion 7 and the end portion of the outer tube 5a are fixed such that the end portion of the inner wire 5b is opposed to the end portion of the lock shaft 7a of the mechanism portion 7. Then, the wire fixing portion 4c is fixed to the operation body connection port K1. Further, the wire fixing portion 4c includes a tubular part configured to cover the sides of the button portion 4d and the mechanism portion 7. The tubular part has the same shape as that of the water discharge operation handle H, and is provided at a position symmetrical to the water discharge operation handle H over the pipe body part of the water discharge metal fixture K, to thereby improve the design of the operation portion 3.

[0103] The end portion of the outer tube 5a of the release wire 5 is fixed to the wire fixing portion 4c, and the wire fixing portion 4c is fixed to the operation body connection port K1 provided to the water discharge metal fixture K. Accordingly, the end portion of the outer tube 5a of the release wire 5 is fixed to the operation body connection port K1.

[0104] Further, although illustration is not given, the release wire 5 includes a return spring configured to urge the inner wire 5b toward the operation portion 3 side.

[0105] In the second embodiment, one end of the lock shaft 7a of the mechanism portion 7 is fixed to the disc-shaped button portion 4d, and another end of the lock shaft 7a of the mechanism portion 7 is connected such that the end portion of the inner wire 5b is brought into abutment thereagainst. Further, the mechanism main body portion 7b of the mechanism portion 7 is fixed to the water discharge metal fixture K through intermediation of the wire fixing portion 4c.

[0106] Configurations other than those described above are the same as those of the first embodiment.

[0107] In the configuration of the second embodiment, the water discharge metal fixture K is the operation portion main body 9. The mounting surface for the operation portion main body 9 is the upper surface of the seat C1. The front side of the mounting surface for the operation portion main body 9 of this embodiment is the side above the upper surface of the seat C1. Further, the connection part between the operation body 4 and the operation transmitting member of the second embodiment is the connection part between the lock shaft 7a and the inner wire 5b. In this embodiment, the inner wire 5b is urged toward the operation portion 3 side by an action of the return spring. As a result, the inner wire 5b is connected to the lock shaft 7a being a part of the operation body 4 in a mode of always being held in abutment. Thus, in the remote operation type drain plug device according to the second embodiment, the lock shaft 7a is connected to (held in abutment against) the inner wire 5b above the upper surface of the seat C1, and hence the remote operation type drain plug device according to the second embodiment is the remote operation type drain plug device in which the connection part between the operation transmitting member and the operation body is provided more on the front side than the operation portion mounting surface.

[0108] When the remote operation type drain plug device according to the second embodiment is to be used, first, as illustrated in FIG. 8B, the valve body 2a and the valve shaft 2b of the valve member 2 are lowered so that the valve member 2 is brought into a state of closing the drain outlet 1a. At this time, as illustrated in FIG. 8A, the inner wire 5b retreats toward the button portion 4d side, and the rod portion 5c is lowered. When the pushing operation is performed on the button portion 4d of the operation body 4 from this state, the thrust lock mechanism actuates so that, as illustrated in FIG. 9A, the lock shaft 7a and the inner wire 5b connected to and held in abutment against the lock shaft 7a are fixed under the state of advancing toward the drain outlet 1a side.

[0109] The inner wire 5b advances to cause the rod portion 5c to rise and push up the valve shaft 2b and the valve body 2a, to thereby cause the valve body 2a to separate away from the peripheral edge of the drain outlet 1a. As a result, the drain outlet 1a is opened as illustrated in FIG. 9B.

[0110] When the pushing operation is performed again on the button portion 4d from this state, the fixing of the thrust lock mechanism is canceled. Accordingly, the own weight of the valve body 2a and the valve shaft 2b and the action of the return spring cause the inner wire 5b to retreat toward the operation body 4 side, and the valve body 2a and the valve shaft 2b are also lowered so that the valve body 2a covers the peripheral edge of the drain outlet 1a, to thereby close the drain outlet 1a.

[0111] Subsequently, through the pushing operation on the button portion 4d, the drain outlet 1a can be opened and closed by remote operation at a position apart from the valve body 2a.

[0112] Embodiments of the present invention are as described above. However, the present invention is not limited to the embodiments described above, and may be freely changed within the range of not departing from the gist of the present invention.

[0113] For example, in the embodiments described above, the operation portion 3 of the remote operation type drain plug device is arranged on the lateral side of the water discharge metal fixture K. However, as in the embodiment illustrated in FIG. 10 and FIG. 11, the operation body 4 which is formed of the knob portion 4a including a shaft part and the wire fixing portion 4c configured to fix the outer tube 5a of the release wire 5 may be

arranged in the horizontal direction on the front surface of the water discharge metal fixture K so that the knob portion 4a advances and retreats forward and backward. Further, the end portion of the inner wire 5b may be connected to the shaft part of the knob portion 4a to allow the inner wire 5b to advance and retreat by pushing and pulling the knob portion 4a being the operation body. In the embodiment illustrated in FIG. 10 and FIG. 11, when the knob portion 4a is pushed toward the far side, the inner wire 5b advances to cause the rod portion 5c to push up the valve shaft 2b so that the valve body 2a and the valve shaft 2b rise to cause the valve body 2a to separate away from the peripheral edge of the drain outlet 1a, to thereby open the drain outlet 1a. When the knob portion 4a is drawn out toward the near side, the inner wire 5b retreats to cause the rod portion 5c to be lowered so that the valve shaft 2b loses its support, and the valve body 2a and the valve shaft 2b are lowered, to thereby bring the valve body 2a into abutment against the peripheral edge of the drain outlet 1a and closing the drain outlet 1a.

[0114] In the embodiment illustrated in FIG. 10 and FIG. 11, the water discharge metal fixture K is the operation portion main body 9. The mounting surface for the operation portion main body 9 is the upper surface of the seat C1. The front side of the mounting surface for the operation portion main body 9 of the embodiment illustrated in FIG. 10 and FIG. 11 is the side above the upper surface of the seat C1. Further, the connection part between the operation body 4 and the operation transmitting member of the embodiment illustrated in FIG. 10 and FIG. 11 is the connection part between the knob portion 4a and the inner wire 5b. Thus, the knob portion 4a is connected to the inner wire 5b above the upper surface of the seat C1, and hence the remote operation type drain plug device according to the embodiment illustrated in FIG. 10 and FIG. 11 is the remote operation type drain plug device in which the connection part between the operation transmitting member and the operation body 4 is provided more on the front side than the operation portion mounting surface.

[0115] In this embodiment, the arrangement position of the knob portion 4a being the operation body 4 is on the front surface of the water discharge metal fixture K. However, the arrangement and the direction of operation of the knob portion 4a being the operation body 4 is the forward and backward directions with respect to the pipe body part of the water discharge metal fixture K extending vertically. Thus, the operation on the operation body 4 is not interfered by the water discharge metal fixture K, thereby being capable of smoothly performing the operation.

[0116] Further, all of the embodiments described above relate to the remote operation type drain plug device employed in the washstand. However, the present invention is not limited to the embodiments described above, and may be employed in any vessel such as a bathtub or a kitchen sink.

[0117] Further, in the embodiments described above, all of the operation portions 3 are used also as the water discharge metal fixture K. However, the present invention is not limited to the embodiments described above. As in the operation portion main body 9 illustrated in FIG. 12 and FIG. 13, the water discharge metal fixture and the operation portion main body 9 may be provided as separate members. In the embodiment illustrated in FIG. 12 and FIG. 13, the operation portion main body 9 is mounted to a vertical panel P being a vertical surface, and the connection part between the knob portion 4a and the inner wire 5b of the release wire 5 is provided more on the knob portion 4a side than the vertical panel P.

[0118] In the embodiment illustrated in FIG. 12 and FIG. 13, the front side of the mounting surface for the operation portion main body 9 is the side on which the knob portion 4a is provided with respect to the vertical panel P (left side of FIG. 12). Further, the connection part between the operation body 4 and the operation transmitting member of the embodiment illustrated in FIG. 12 and FIG. 13 is the connection part between the knob portion 4a and the inner wire 5b. Thus, the knob portion 4a is connected to the inner wire 5b more on the front side than the surface of the vertical panel P being the mounting surface for the operation portion main body 9, and hence the operation portion 3 of the remote operation type drain plug device according to the embodiment illustrated in FIG. 12 and FIG. 13 is the remote operation type drain plug device in which the connection part between the operation transmitting member and the operation body 4 is provided more on the front side than the operation portion mounting surface. When the knob portion 4a is raised as illustrated in FIG. 12, the drain outlet 1a is closed, for example, as illustrated in FIG. 6B. When the knob portion 4a is lowered as illustrated in FIG. 13, the drain outlet 1a is opened as illustrated in FIG. 7B.

Reference Signs List

[0119]

1	drain outlet main body
1a	drain outlet
1b	flange portion
2	valve member
2a	valve body
2b	valve shaft
2c	guide portion
3	operation portion
4	operation body
4a	knob portion
4b	advancing/retreating portion
4c	wire fixing portion
4d	button portion
5	release wire
5a	outer tube
5b	inner wire
5c	rod portion

5d	cap member
6	joint member
6a	straight pipe portion
6b	insertion portion
7	mechanism portion
7a	lock shaft
7b	mechanism portion main body
8	support member
9	operation portion main body
B	washbowl
B1	vessel part
B2	side wall portion
B3	mounting hole
C	cabinet
C1	seat
C2	piping opening portion
C3	metal fixture mounting hole
H	water discharge operation handle
K	water discharge metal fixture
K1	operation body connection port
N	plate nut member
P	vertical panel
T	trap pipe

Claims

1. A remote operation type drain plug device, comprising:

an operation portion;
a drain outlet of a vessel to be opened and closed in accordance with operation of the operation portion; and
an operation transmitting member configured to transmit the operation of the operation portion to the drain outlet side,
wherein the operation portion includes:

an operation portion main body which is mounted and fixed to an operation portion mounting surface provided to the vessel or in a vicinity of the vessel; and
an operation body configured to perform an opening and closing operation of the drain outlet through operation under a state of being guided by the operation portion, and

wherein a connection part between the operation transmitting member and the operation body is provided more on a front side than the operation portion mounting surface.

2. The remote operation type drain plug device according to claim 1, wherein the operation portion main body is a water discharge metal fixture of the vessel.

3. The remote operation type drain plug device according to claim 2, wherein the operation portion of the remote operation type drain plug device is provided to a water discharge metal fixture of a drain device having a configuration in which a major part of the vessel is placed on a seat.

4. The remote operation type drain plug device according to any one of claims 1 to 3, wherein the operation transmitting member is formed of a release wire including: an outer tube having a tubular shape; and an inner wire configured to advance and retreat in the outer tube.

5. The remote operation type drain plug device according to any one of claims 1 to 4, wherein the operation body is a rotary handle, and the drain outlet is to be opened and closed through operation of the rotary handle.

6. The remote operation type drain plug device according to any one of claims 1 to 4, wherein the operation body is a button portion, and every time pushing operation is performed on the button portion, operations of opening and closing the drain outlet are alternately repeated so that the drain outlet is to be opened and closed.

Fig. 1

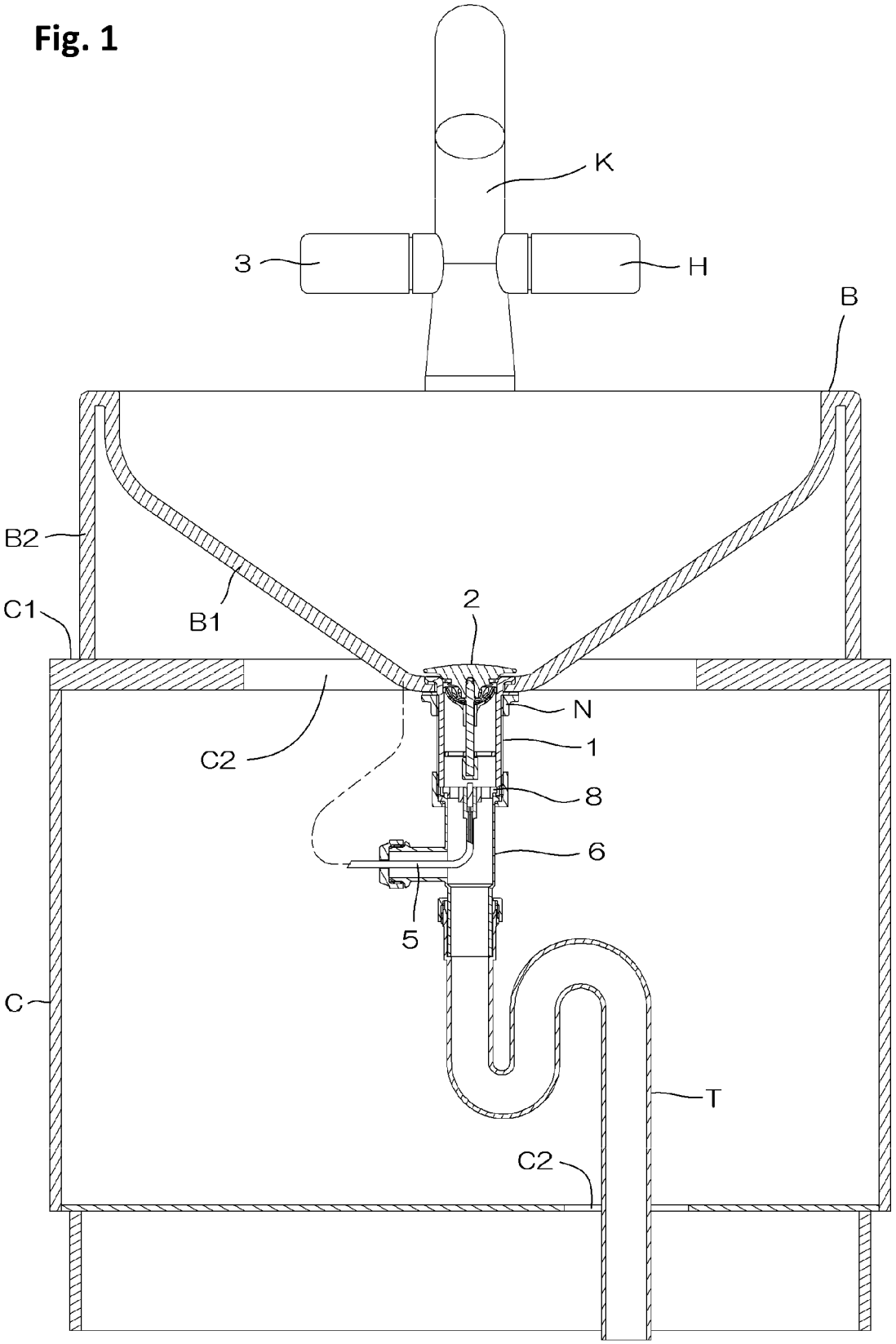


Fig. 2

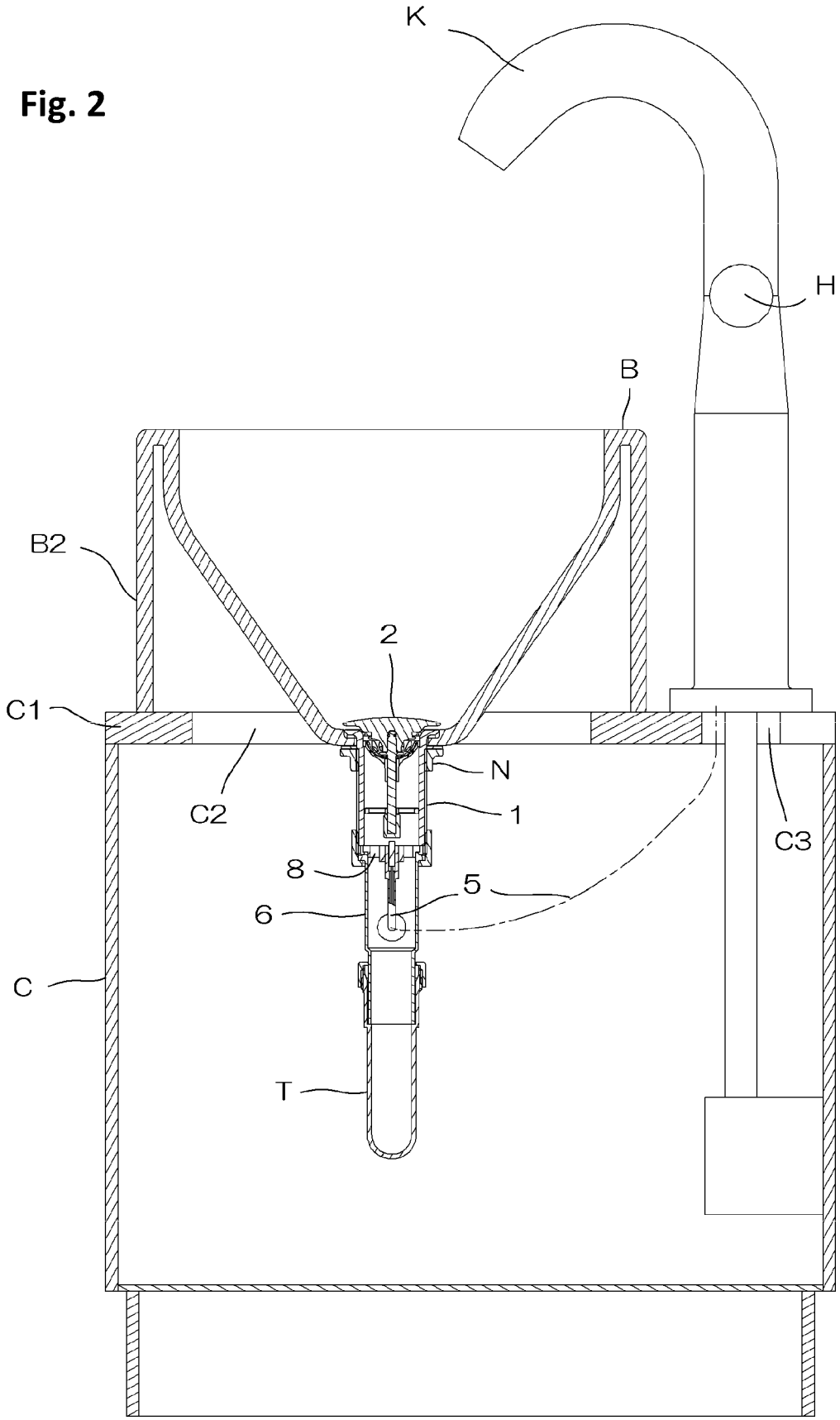


Fig. 3

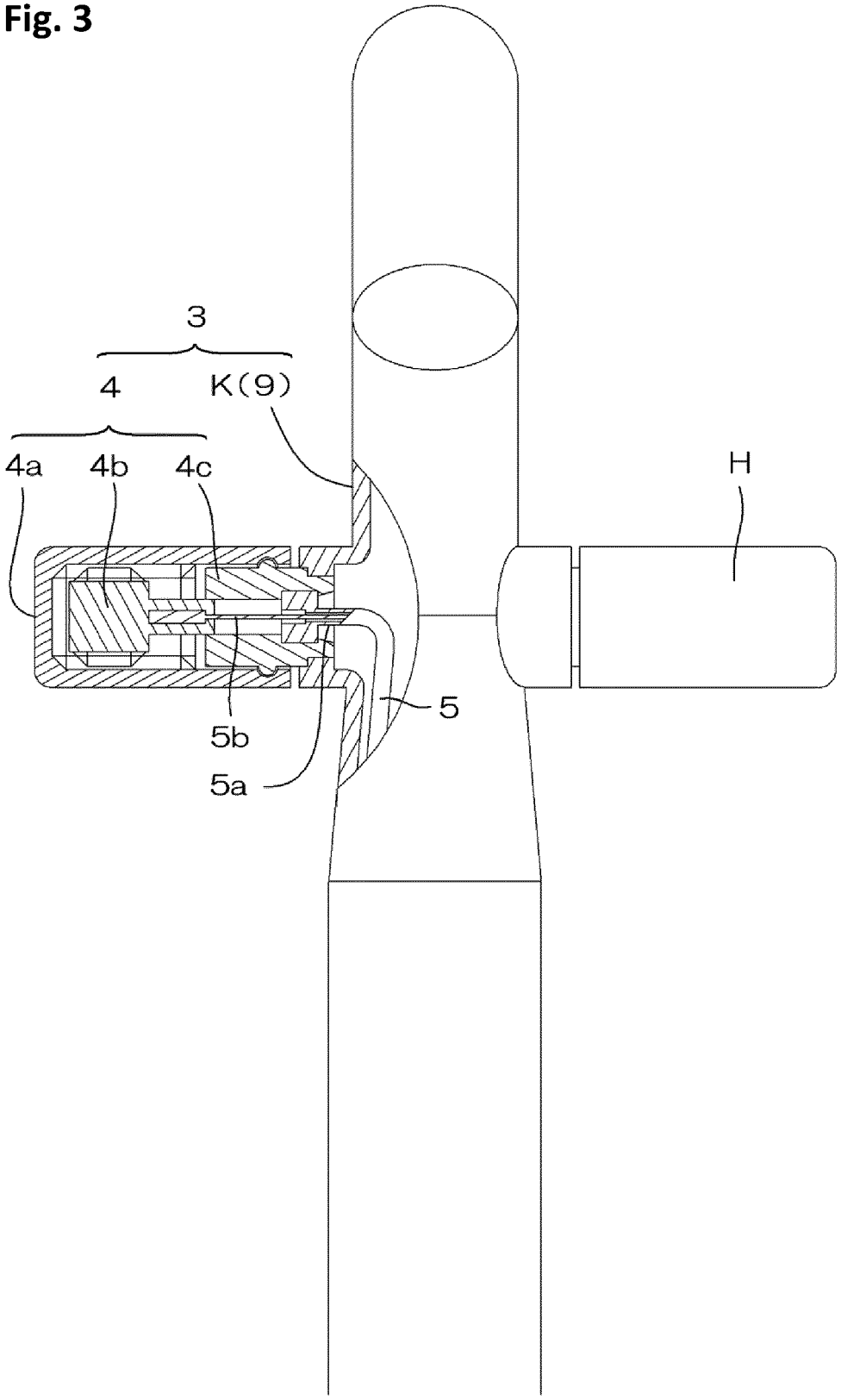


Fig. 4

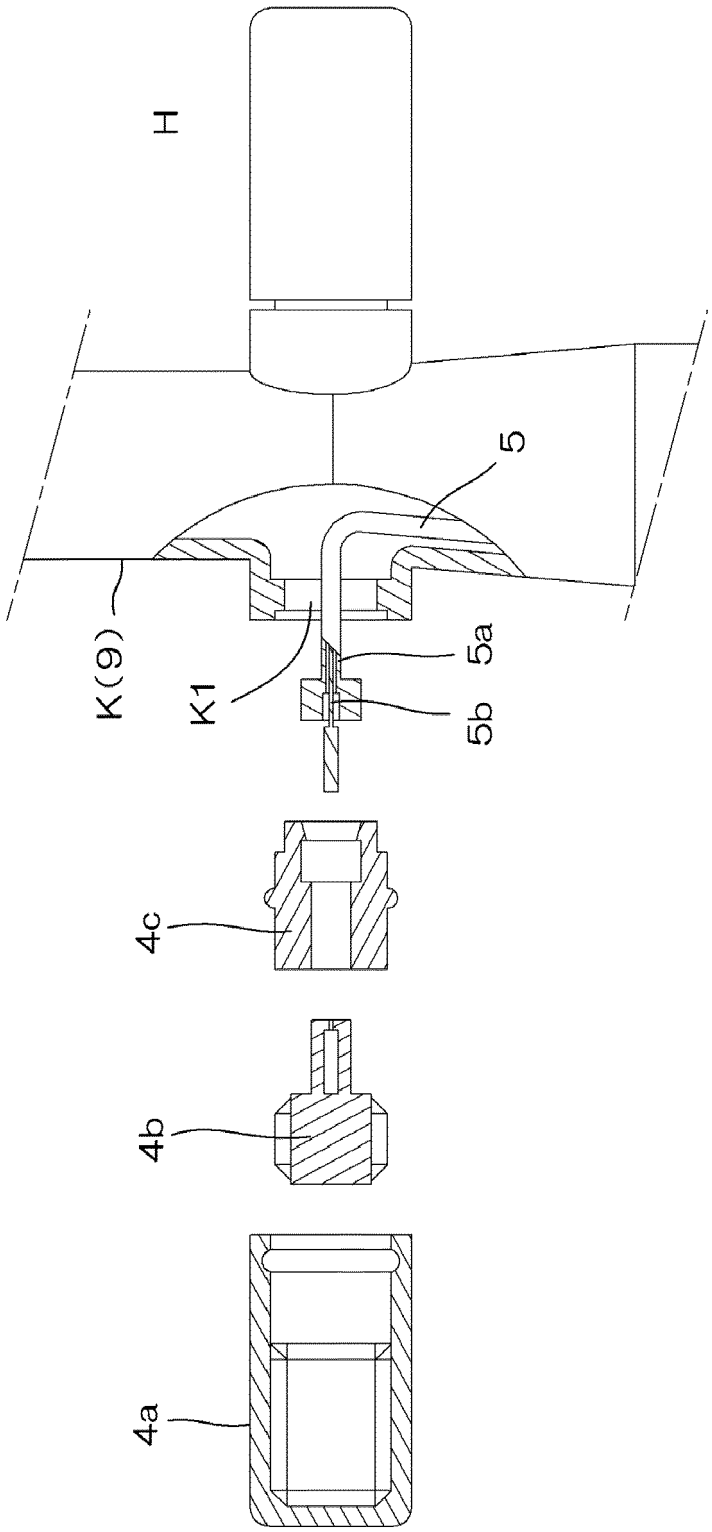


Fig. 5

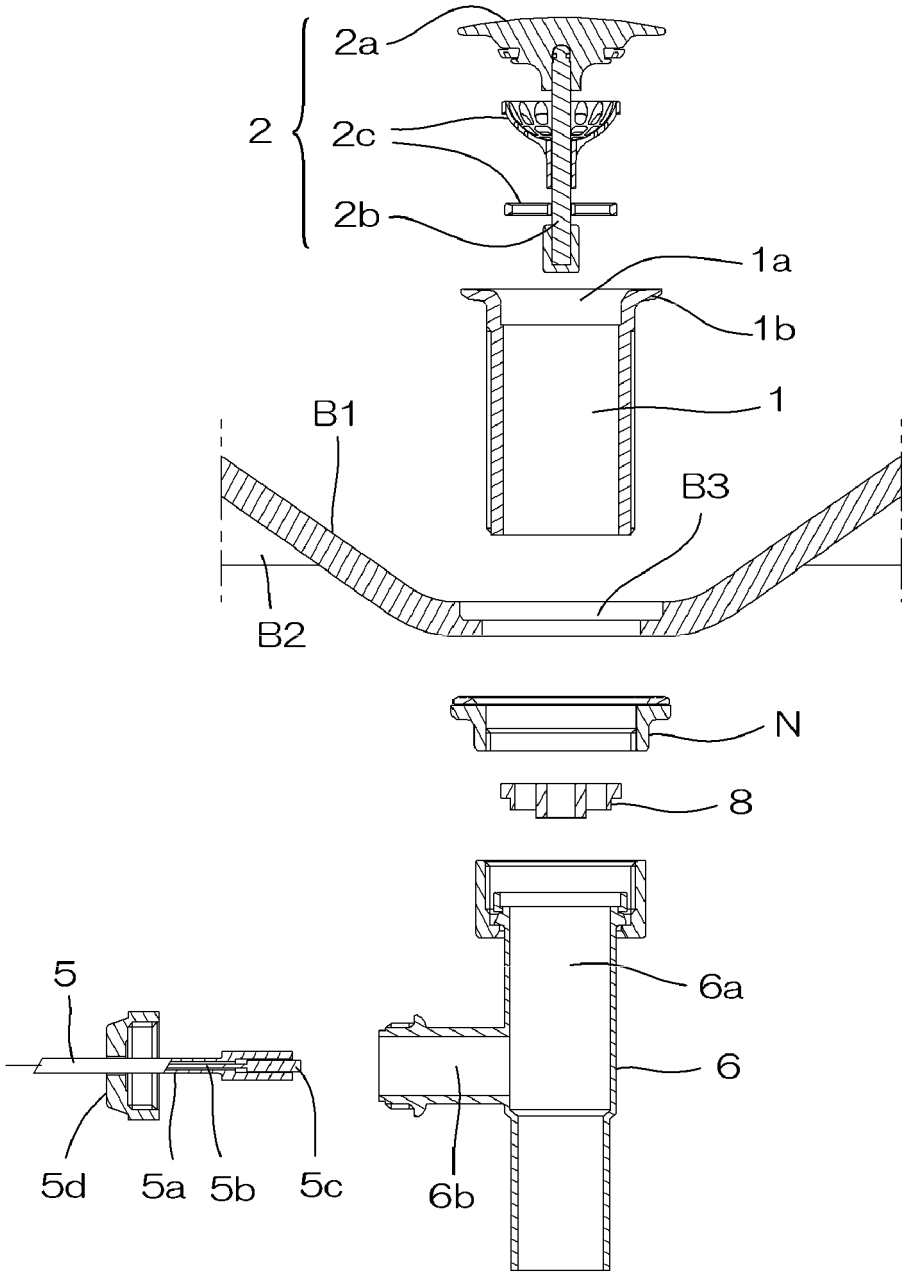
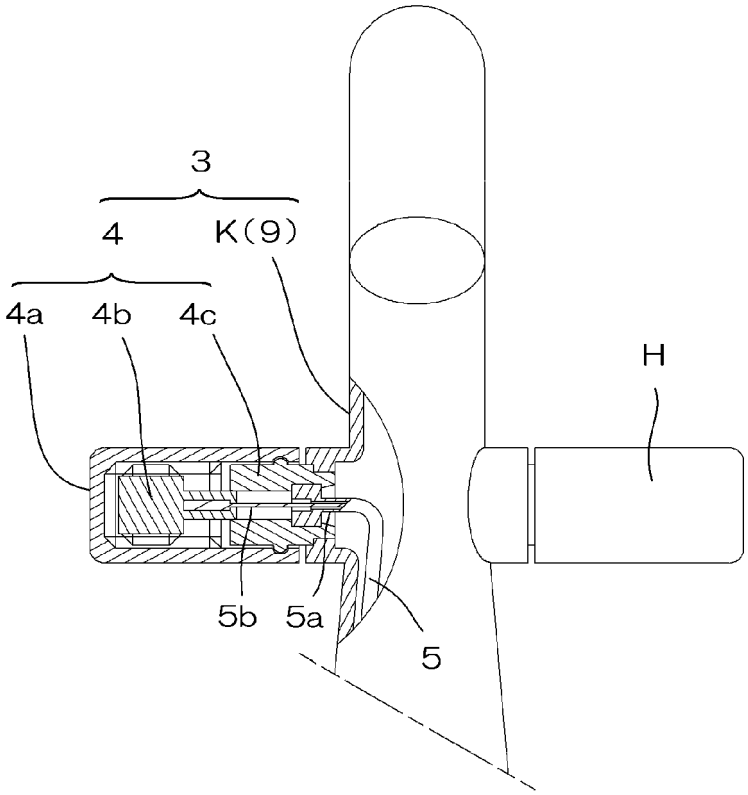


Fig. 6

（a）



（b）

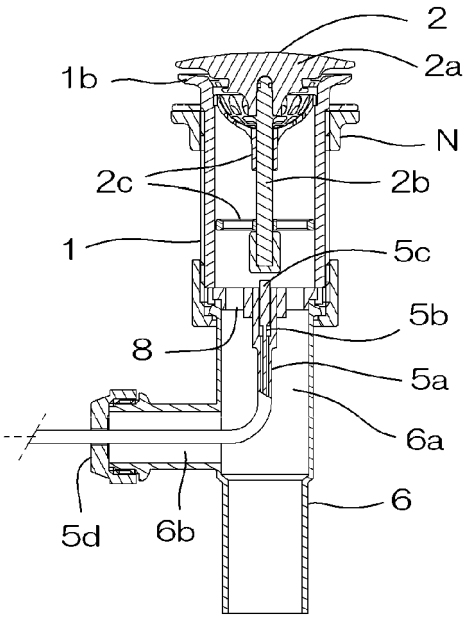
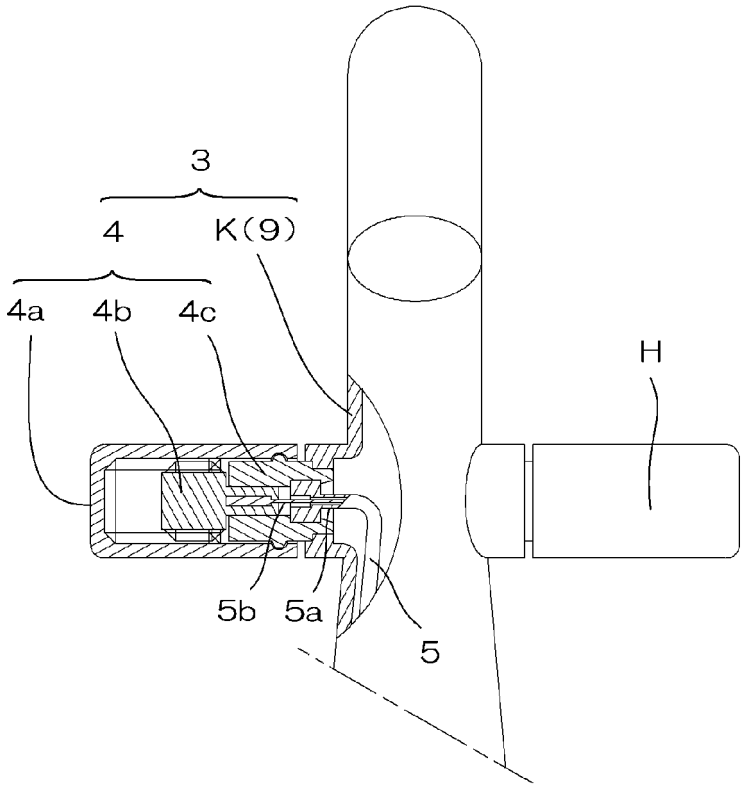


Fig. 7

(a)



(b)

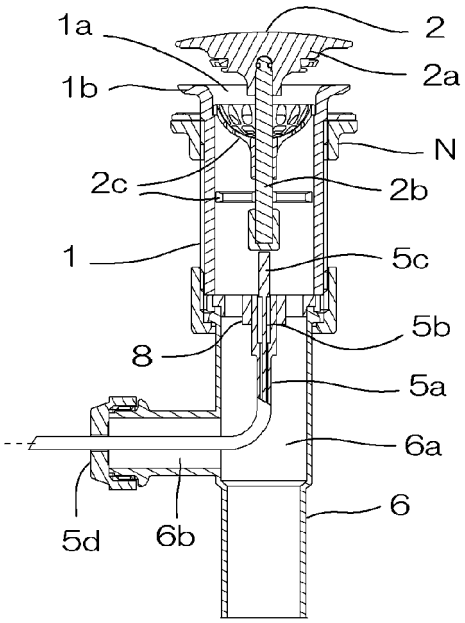
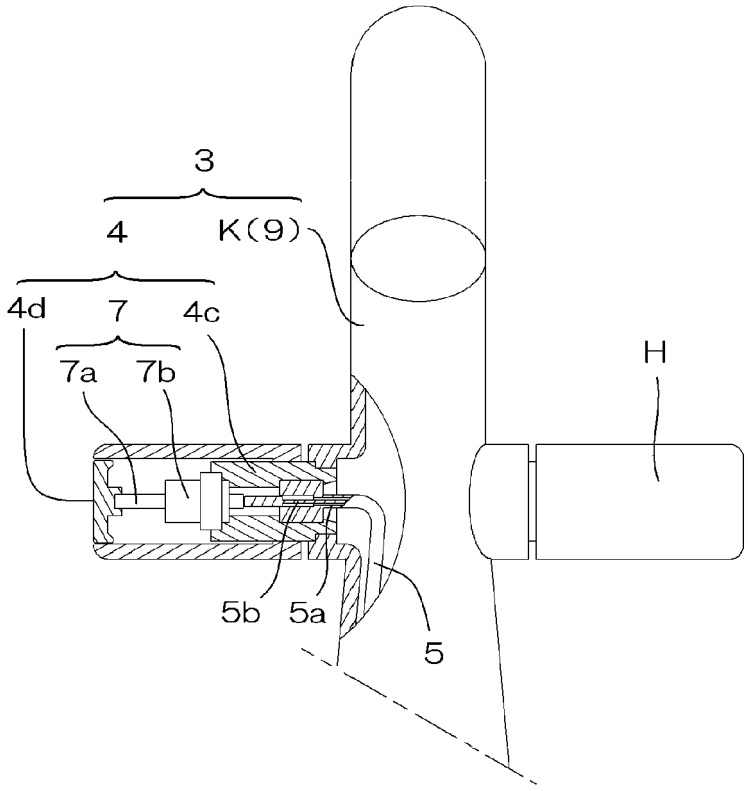


Fig. 8

(a)



(b)

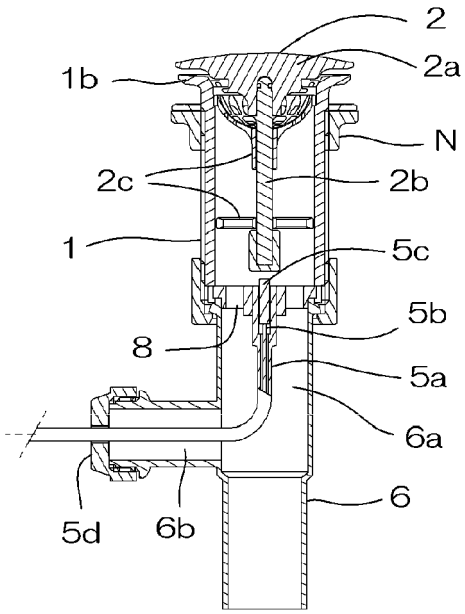
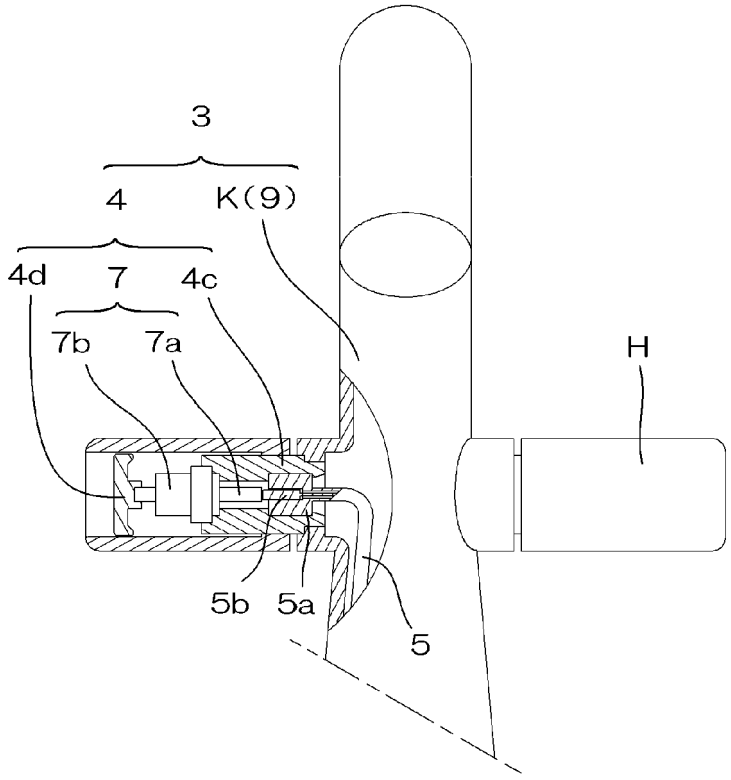


Fig. 9

(a)



(b)

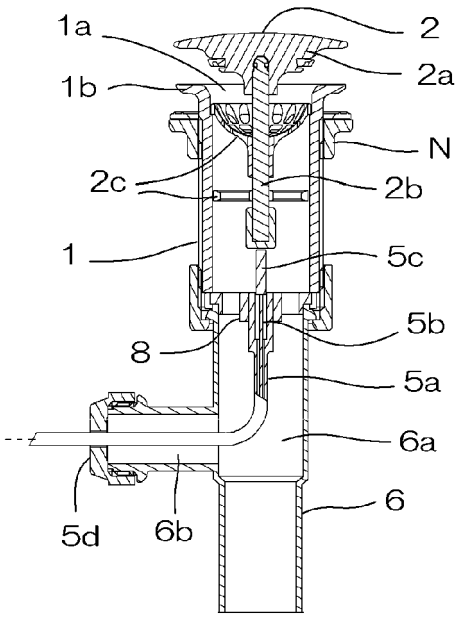


Fig. 10

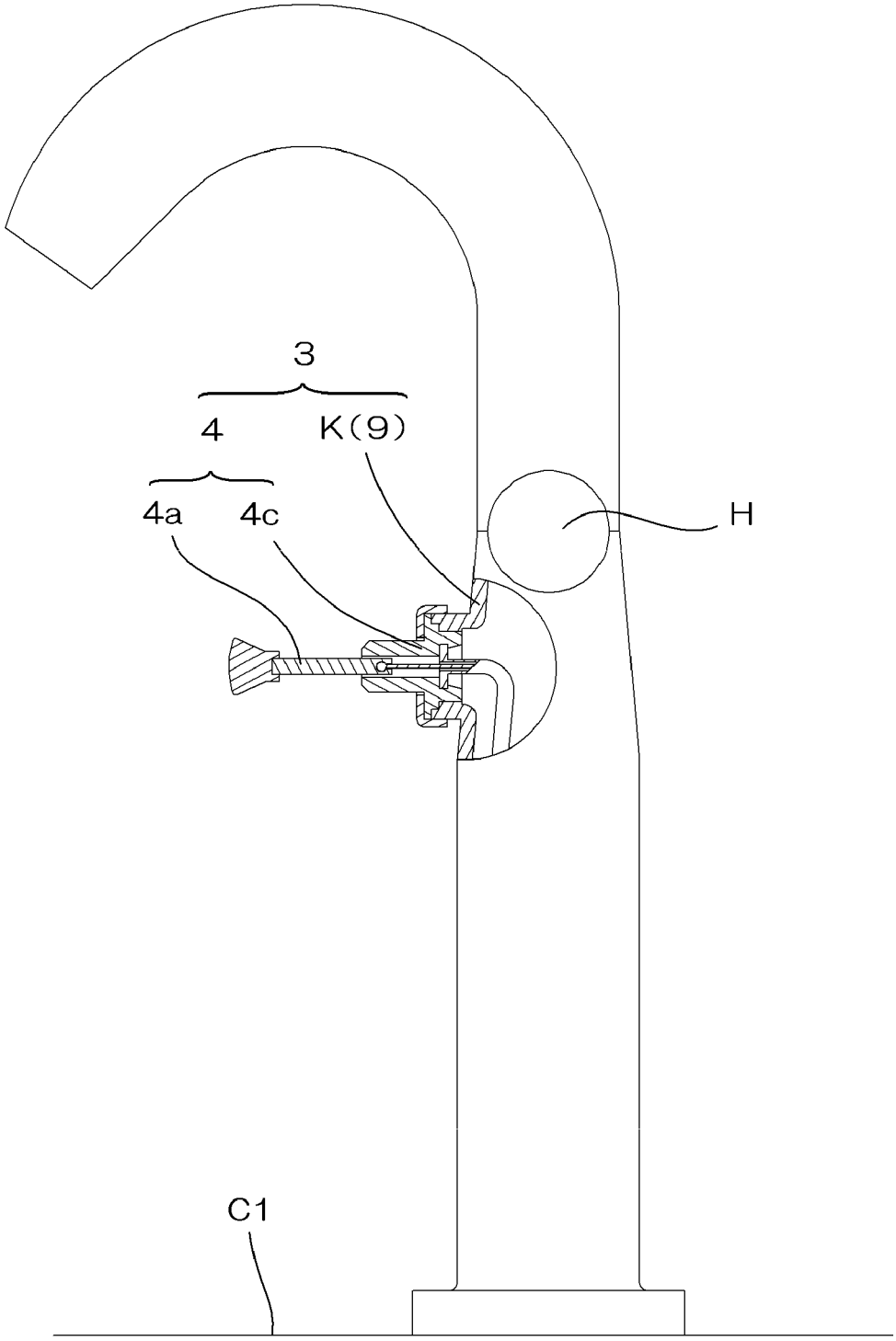


Fig. 11

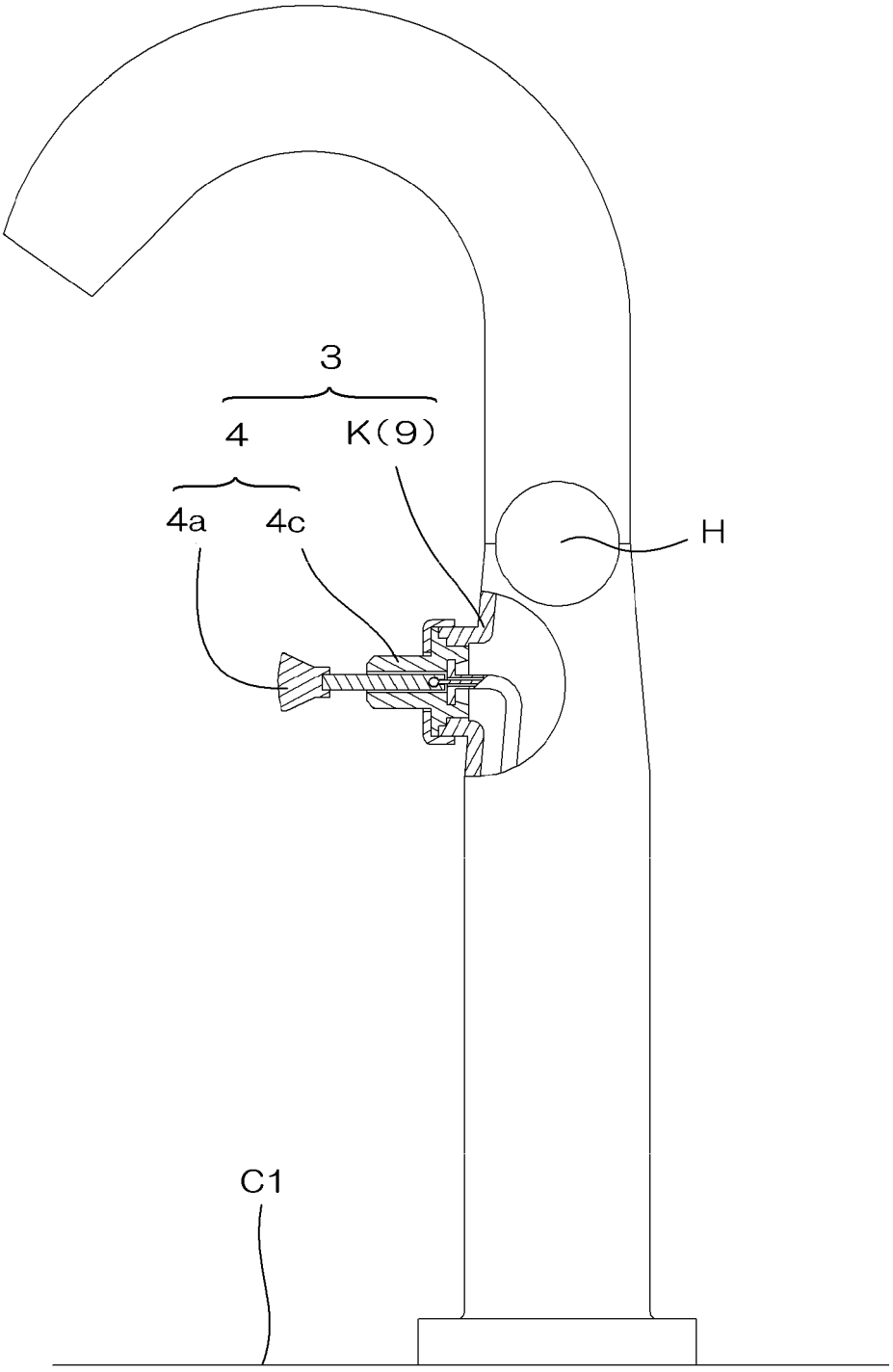


Fig. 12

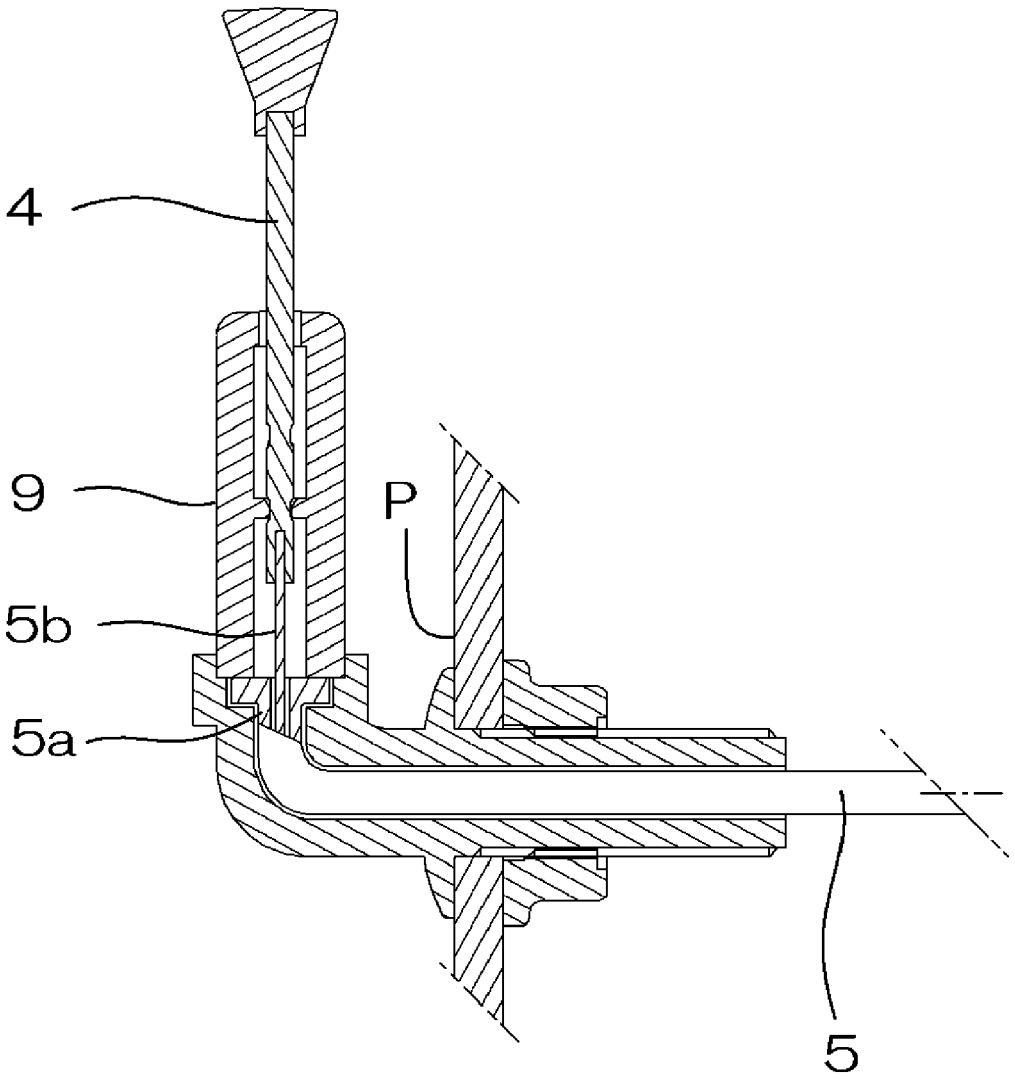
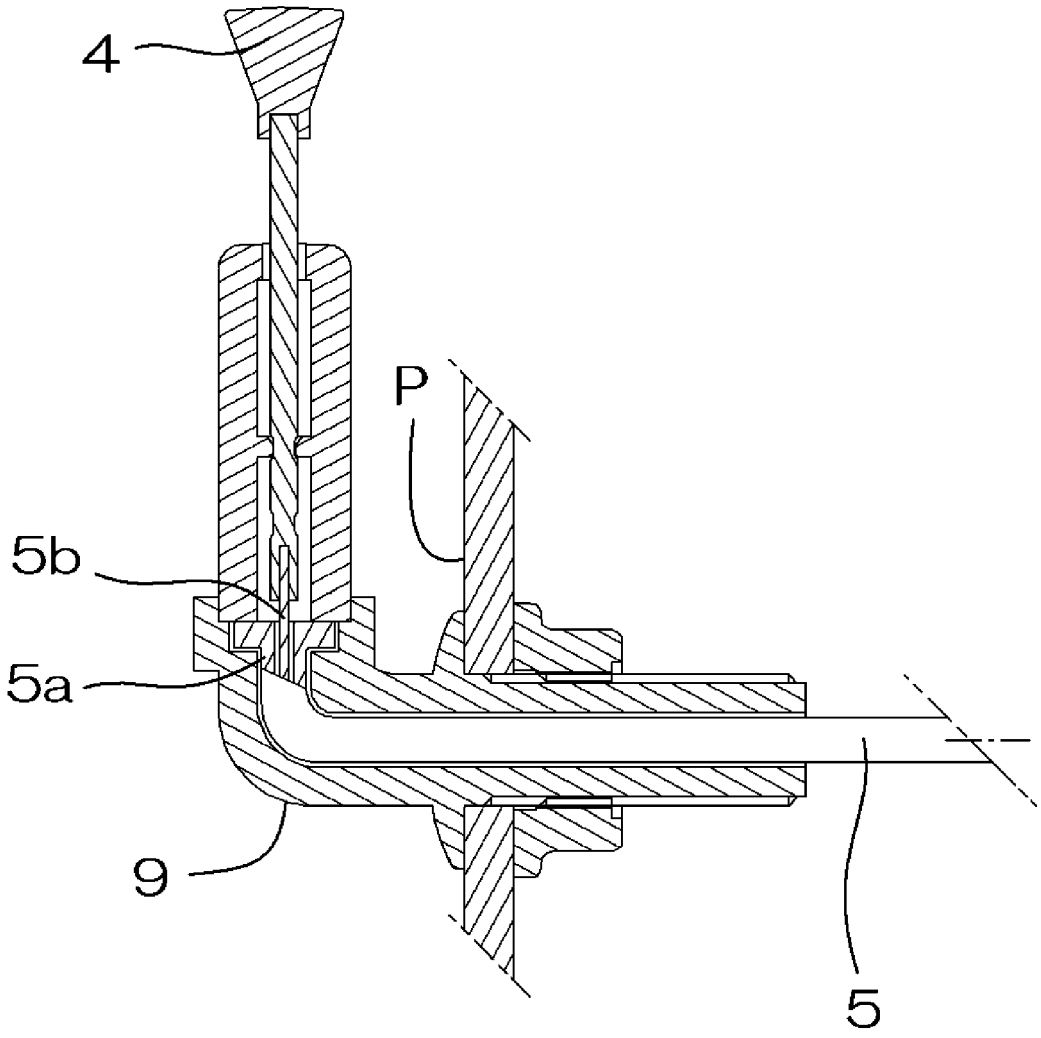


Fig. 13



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EUROPEAN SEARCH REPORT

Application Number
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Place of search	Date of completion of the search	Examiner
Munich	15 February 2022	Posavec, Daniel

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