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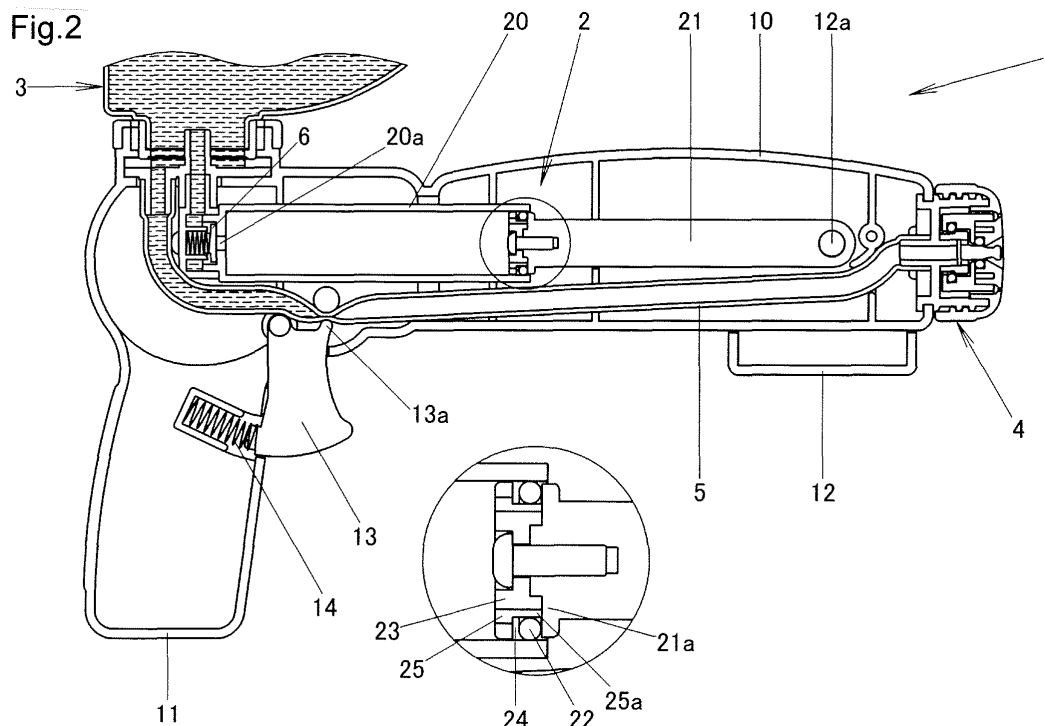
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(54) **Toy water gun**

(57) A toy water gun with a simple configuration and easy handling, said toy water gun (1) comprising a housing (10) having a grip part (11), a removable tank (3), a muzzle part (4), a cylinder (20), a pump mechanism (2) having a piston (21) and a check valve (6), a water passage connecting the tank (3) and the muzzle part (4), an operation part (12), and a water stopper, wherein the

piston (21) includes a piston head (21a) at its end, a discoid ring mounting plate (23) being secured to the piston head (21a), a ring groove (24) being formed between the piston head part (21a) and the rear of the ring mounting plate (23). The ring mounting plate (23) has through-holes (25) which communicate with the ring groove (24), and an O-ring (22) which is slidably provided in the ring groove (24).



Description

[0001] The present invention relates to a toy water gun that squirts water pneumatically.

[0002] There have conventionally been proposed various toy water guns that squirt water in a pressurizing tank pneumatically. For example, an invention of JP 3000621 U proposes an air pressure accumulator-type toy water gun comprising a housing, a pressurizing tank that is removably attached to the housing, a pump mechanism that supplies air to the pressurizing tank under pressure, a water stop mechanism that is provided in a water passage that connects the pressurizing tank and a muzzle part, the muzzle part that is provided at an end of the water passage, a check valve that controls air to flow only toward the pump mechanism, and a check valve that controls air to flow only toward the pressurizing tank from the pump mechanism.

[0003] In addition, JP 06-94395 A proposes a toy water gun further comprising a storage tank and a pump mechanism for drawing air or water out of the storage tank for supply to the air or the water to the pressurizing tank, the toy water gun comprising a check valve that controls air and water to flow only toward the pump mechanism, and a check valve that controls air and water to flow only toward the pressurizing tank from the pump mechanism, wherein air within the pressurizing tank is compressed by water and air drawn out by pump mechanism, and the compression of a flexible tube functioning as a water passage connected to the pressurizing tank is released to thereby squirt water in the pressurizing tank from the muzzle part.

[0004] However, the pump mechanisms of the toy water guns in the above mentioned references are made up of a cylinder, a piston and the check valves. The pump mechanisms of the toy water guns are such that air or water is drawn into the cylinder from outside of the cylinder or the storage tank by pulling out the piston from the cylinder and the air or water in the cylinder is supplied into the pressurizing tank by inserting the piston into the cylinder. These toy water guns require a check valve that controls air or the water to flow only into the cylinder from the outside of the cylinder or the storage tank. This causes drawbacks that the mechanisms of the toy water guns get complicated and that the production costs are increased.

[0005] The present invention has been made in view of the problems inherent in the related art, and an object thereof is to provide a toy water gun which can easily increase an air pressure within a tank with a simple configuration by introducing air into a cylinder and compressing the air so introduced for supply into the tank.

[0006] A toy water gun of the present invention comprises a housing having a grip part, a detachable tank disposed above the vicinity of a rear end of the housing, a muzzle part disposed at a front end of the housing, a pump mechanism having: a circular cylinder secured in the housing; a piston disposed so as to move in a front-

rear direction; and a check valve disposed so as to be able to close an opening which connects the cylinder and the tank, a water passage connecting the tank and the muzzle part, an operation part disposed at a front lower part of the housing so as to move in the front-rear direction relative to the housing at a front lower part of the housing, and a water stop mechanism provided halfway the water passage, wherein the piston has a piston head part at an end thereof, a ring mounting plate having a circular disc shape is secured to the piston head part, the ring mounting plate is formed in such a manner that a diameter of a front part is smaller than that of a rear part so as to form a ring groove between the piston head part and the rear part of the ring mounting plate when the ring mounting plate is secured to the piston head part and has a plurality of through-holes which communicates with the ring groove, an O-ring is slidably disposed in the ring groove, a gap between the cylinder and the piston is sealed by the O-ring when the O-ring is closely attached to the piston head part, while the gap between the cylinder and the piston is allowed to communicate with the through-holes to thereby allow air to flow in the gap therebetween when the O-ring is closely attached to a rear part of the ring mounting plate, and wherein the piston connected to the operation part is inserted into the cylinder to thereby supply air residing in the cylinder to the tank via the check valve by moving the operation part rearward while the water stop mechanism holds the water passage in a stop-water state, while the piston is withdrawn from the cylinder to thereby draw air into the cylinder by moving the operation part forward, so that a pressure in the tank is increased by repeating the back-and-forth movement of the operation part, and the stop-water state of the water passage is released to thereby squirt water in the tank forward through the water passage and the muzzle part by means of the pressure in the tank by actuating the water stop mechanism.

[0007] This toy water gun may adopt a configuration in which the water passage is a flexible tube, the water stop mechanism is made up of a trigger part which is rotatably connected to the vicinity of the grip part and an elastic member which biases the trigger part, water in the flexible tube can be stopped by compressing the flexible tube by a compressing part formed at the trigger part by biasing the trigger part by the elastic member, and water in the tank is squirted forward through the flexible tube and the muzzle part by means of pressure in the tank by rotating the trigger part to thereby release the stop-water state of the flexible tube.

[0008] According to the present invention described above, the toy water gun with the simple mechanism can be provided in which air is drawn into the cylinder by activating the operation part to thereby actuate the pump mechanism with ease, and the water in the tank can be squirted by means of air pressure by supplying the air in the cylinder to the tank under pressure and releasing the stop-water state made by the water stop mechanism.

[0009] In addition, by the water passage being formed

by the flexible tube and the water stop mechanism being made up of the trigger part and the elastic member, the stop-water state and a flow-water state of the water passage can be switched with ease by means of activating the trigger part, whereby the squirt of water can be controlled.

[0010] Examples of toy water guns will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a partially cutaway side view of a toy water gun according to an embodiment of the present invention including a sectional view of a part thereof, Fig. 2 is an exemplary diagram showing a sectional side view of the toy water gun according to the embodiment of the present invention, Fig. 3 is an exemplary diagram showing an operation of a pump mechanism of the toy water gun according to the embodiment of the present invention, Fig. 4 is an exemplary diagram showing an operation of the pump mechanism of the toy water gun according to the embodiment of the present invention, Fig. 5 is a cross sectional side view of a muzzle part of the toy water gun according to the embodiment of the present invention, and Fig. 6 is a cross sectional side view of the muzzle part of the toy water gun according to the embodiment of the present invention.

[0011] An embodiment of the invention will be described. A toy water gun 1 includes a housing 10 having a grip part 11, a detachable tank 3 disposed above the vicinity of a rear end of the housing 10, a muzzle part 4 disposed at a front end of the housing 10, a pump mechanism 2, a flexible tube 5 as a water passage for connecting the tank 3 and the muzzle part 4, an operation part 12 disposed in a front-rear direction relative to the housing 10 at a front lower part of the housing 10, and a water stop mechanism provided at a halfway point of the flexible tube 5.

[0012] The pump mechanism 2 is made up of a circular cylinder 20 secured in the inside of the housing 10, a piston 21 disposed movably in the cylinder 20 in the front-rear direction, and a check valve 6 disposed so as to be able to close an air outlet port 20a which is an opening for establishing a communication between the cylinder 20 and the tank 3. A water stop mechanism is made up of a trigger part 13 rotatably connected to the vicinity of the grip part 11 and a coil spring 14 which is an elastic member for biasing the trigger part 13.

[0013] The piston 21 has a piston head part 21a at an end thereof, and a ring mounting plate 23 having a circular disc shape is secured to the piston head part 21a. The ring mounting plate 23 is formed in such a manner that a diameter of a front part thereof is smaller than that of a rear part so as to form a ring groove 24 between the piston head part 21a and a rear part of the ring mounting plate 23 when the ring mounting plate 23 is secured onto

the piston head part 21a and has a plurality of through-holes 25 which communicate with the ring groove. An O-ring 22 is slidably disposed in the ring groove 24.

[0014] Consequently, a gap between the cylinder 20 and the piston 21 is sealed by the O-ring 22 when the O-ring 22 is closely attached to the piston head part 21a, while the gap between the cylinder 20 and the piston 21 is made to communicate with the through-holes 25 to thereby allow air to flow in the gap therebetween when the O-ring 22 is closely attached to the rear part of the ring mounting plate 23.

[0015] The water stop mechanism is such that water in the flexible tube 5 can be stopped by biasing the trigger part 13 by means of the coil spring 14 to thereby force an engaging protrusion part 13a formed as a compressing part on the trigger part against the flexible tube 5 to thereby compress the flexible tube 5. At the same time, the water stop mechanism is also configured such that water in the flexible tube 5 can be squirted by rotating the trigger part 13 resisting against the elastic force to thereby come between the engaging protrusion part 13a and the flexible tube 5 to thereby release the compressed state.

[0016] The toy water gun 1 is configured such that the piston 21 linked to an operation part 12 is inserted into the cylinder 20 to thereby supply air in the cylinder 20 to the tank 3 via the check valve 6 by moving the operation part 12 rearward while the water stop mechanism holds the flexible tube 5 in a stop-water state, the piston 21 is withdrawn from the cylinder 20 to thereby draw air into the cylinder 20 by moving the operation part 12 forward, pressure in the tank 3 is increased by repeating the back-and-forth movement of the operation part 12, and the stop-water state of the flexible tube 5 is released to thereby squirt water in the tank 3 forward through the flexible tube 5 and the muzzle part 4 by means of the pressure in the tank 3 by actuating the water stop mechanism.

[0017] Hereinafter, an embodiment of the invention will be described based on the drawings.

[0018] Fig. 1 is a partially cutaway side view of a toy water gun 1 according to the embodiment of the present invention including a sectional view of a part thereof. The toy water gun 1 includes, as shown in Fig. 1, a housing 10 which resembles a firearm in appearance and is formed into hollow shape, a detachable tank 3 which is disposed above the vicinity of a rear end of the housing 10, a muzzle part 4 which is disposed at a front end of the housing 10, an operation part 12 which resembles a forend of a firearm for compressing operation of the tank 3, a trigger part 13 which resembles a trigger of a firearm for causing squirting.

[0019] The housing 10 has a hollow shape. The housing 10 is formed in such a way that the housing 10 is cut in two at a median face in a transverse direction thereof to form substantially a symmetric shape respectively and so formed housing bodies of a left side and a right side are combined in such a manner that so cut sides face each other. The housing 10 includes a grip part 11 at a

rear lower part thereof which resembles a grip of a firearm and can be held with one hand.

[0020] The operation part 12 is disposed slidably in front-rear direction relative to the housing 10 at a front lower part of the housing 10. The operation part 12 is configured such that the both of side faces of the housing 10 include a sliding opening 15 respectively and a shaft transversely provided to the operation part 12 is inserted into the sliding opening 15 so as to move. Since the shaft is inserted into a piston, which is described later, the piston in the housing 10 can be operated by means of a back-and-forth moving operation of the operation part 12. Namely, an air pressure in the tank 3 can be increased by moving the operation part 12 in a front-rear direction to thereby operate a pump mechanism, which is described later.

[0021] The trigger part 13 is rotatably connected to above the vicinity of the front end of the grip part 11 and can be rotated by a pulling movement of an index finger while holding the grip part 11. The trigger part 13 functions as a water stop mechanism, which is described later, for closing a water passage. Carrying out the pulling operation of the trigger part 13 changes a stop-water state of the water passage to a flow-water state, whereby the toy water gun 1 squirts water. Removing the index finger from the trigger part 13 causes the trigger part 13 to be returned to a primary position by an elastic member, whereby the toy water gun 1 is returned to in the stop-water state of the water passage.

[0022] The tank 3 is a pressurizing tank which is pressurized by the pump mechanism, which is described later. In addition, the tank 3 is formed resembling characters popular among children or animals with hollow in shape, and predetermined amount of water can be poured thereinto. Further, the tank 3 includes a bottom part on which an opening is provided for connecting the tank 3 to the housing 10. When the tank 3 filled with predetermined amount of water and the housing 10 are turned upside down and are connected together, they are combined and an interior so formed is sealed.

[0023] Namely, the toy water gun 1 comprises the pump mechanism which is made up of the cylinder, the piston, and a check valve in the housing 10, and is configured in such a manner that activating the operation part 12 causes the pump mechanism to operate to thereby supply air with pressure into the tank 3, and activating the trigger part 13 changes the stop-water state of the water passage caused by the water stop mechanism to the flow-water state, whereby water in the tank 3 is squirted by means of the air pressure through the water passage and the muzzle part 4.

[0024] Next, with referring to Fig. 2, an internal structure of the toy water gun 1 will be described. Fig. 2 is an exemplary diagram showing a sectional side view of the toy water gun 1 according to the embodiment of the present invention. In the housing 10 of the toy water gun 1, as shown in Fig. 2, there are disposed a piston 21 which operates in conjunction with the movement of the

operation part 12, a pump mechanism 2 which is made up of a cylinder 20 into which the piston 21 is inserted and a check valve 6 which is disposed at a rear end of the cylinder 20.

[0025] The pump mechanism 2 supplies air with pressure into the tank 3 by the operation part 12 being activated. The cylinder 20 has a circular cylindrical shape. One end of the cylinder 20 is formed in a circular opening into which the piston 21 can be inserted and the other end includes an air outlet port 20a which is a circular opening in a smaller diameter than that of the opposite end. The cylinder 20 is secured in the housing 10 in such a state that a center axis of the cylinder 20 is parallel to a front-rear direction of the toy water gun 1.

[0026] The piston 21 is disposed so as to slide in a front-rear direction in the cylinder 20. A shaft 12a which is disposed transversely at substantially a center upper end of the operation part 12 is inserted into the circular opening formed in the vicinity of a front end of the piston 21, whereby the piston 21 is movable integrally with the operation part 12.

[0027] The air outlet port 20a is an opening which makes the cylinder 20 and the tank 3 communicated with each other, and the check valve 6 is disposed on the rear side of the air outlet port 20a so as to be able to close the air outlet port 20a. The check valve 6 is made up of a coil spring as an elastic member and a closure member having an end face which closely attaches to a rear end face of the cylinder 20 by being biased forward by the coil spring. Namely, air in the cylinder 20 flows only to the tank 3 but does not flow back from the tank 3 into the cylinder 20.

[0028] A ring mounting plate 23 in a circular disc shape is screwed on a piston head part 21a which is formed at a distal end of an insertion side of the piston 21. The ring mounting plate 23 includes a plurality of through-holes 25 which is perforated equiangularly.

[0029] The ring mounting plate 23 is formed in such a manner that an outside diameter of a front part (a piston head 21a side) is smaller than that of a rear part (the distal end of the insertion side). That is, a front part of the ring mounting plate 23 is formed extended forward in a predetermined distance from the rear part so as to form a ring groove 24 having a predetermined width when the ring mounting plate 23 is screwed on the piston head 21a.

[0030] An O-ring 22 is seated in the ring groove 24 formed between the rear part of the ring mounting plate 23 and the piston head part 21a so as to slide in a front-rear direction. An outside diameter of the O-ring 22 is formed slightly larger than a bore diameter of the cylinder 20. Therefore, provided that the piston headpart 21a is inserted into the cylinder 20 with the O-ring 22 fitted around the front part of the ring mounting plate 23, the O-ring 22 is inserted into the cylinder 20 in such a state that the O-ring 22 is nipped by an inner peripheral surface of the cylinder 20 and a front outer peripheral surface of the ring mounting plate 23 in an elastically deformed

state. The through-holes 25 of the ring mounting plate 23 are perforated so as to be connected to the ring groove 24, and so as to form ventilation grooves 25 by cutting out the vicinity of the peripheral surface of the front part of the ring mounting plate 23.

[0031] Under the condition that the O-ring 22 is seated in the ring groove 24 and the through-holes 25 are perforated in the way described above, when the O-ring moves forward to thereby be closely attached to the piston head part 21a, a gap between the cylinder 20 and the piston 21 is sealed by the O-ring 22 (that is, an interior space of the cylinder 20 is in hermetically sealed state). In more specific, the interior space of the cylinder 20 is hermetically sealed by an outer edge part of the O-ring 22 being closely attached to the inner peripheral surface of the cylinder 20 and also a front surface part of the O-ring 22 being closely attached to a rear surface of the piston head part 21a in a position lying in the vicinity of the outer periphery thereof.

[0032] In addition, when the O-ring 22 is moved rearward to thereby be closely attached to the rear part of the ring mounting plate 23, the gap between the outer peripheral surface of the piston 21 and the inner peripheral surface of the cylinder 20 and the through-holes 25 of the ring mounting plate 23 are communicated with each other. This allows air to pass through the gap between the cylinder 20 and the piston 21, whereby air can be drawn into the cylinder 20.

[0033] Specifically, the outer edge part of the O-ring 22 is closely attached to the inner peripheral surface of the cylinder 20 and the rear surface part of the O-ring 22 is closely attached to the front surface of the rear part of the ring mounting plate 23 in a position lying in the vicinity of the outer periphery part. That is, communicated with are the gap between the outer peripheral surface of the piston head part 21a and the inner peripheral surface of the cylinder 20, the gap between the O-ring 22 and the rear surface of the piston head 21a, the ventilation grooves 25a on the front part of the ring mounting plate 23 cut toward a central axis of the cylinder 20 from an inner edge of the O-ring 22, and the through-holes 25 of the rear part of the ring mounting plate 23.

[0034] The toy water gun 1 comprises the flexible tube 5 which is a water passage for connecting the tank 3 and the muzzle part 4. The flexible tube 5 is made such that the stop-water state is kept by means of the water stop mechanism which is provided at the halfway point of the water passage. Therefore, the toy water gun 1 has a configuration such that the stop-water state of the water passage can be released and thereby changed to the flow-water state by activating the water stop mechanism.

[0035] Specifically, this water stop mechanism is made up of the trigger part 13 and the coil spring 14 as an elastic member which biases the trigger part 13 forward. The water stop mechanism is designed such that the coil spring 14 biases the trigger part 13 forward, whereby an engaging protrusion part 13a which protrudes upward functioning as a compression part from a front upper end

of the trigger part 13 is forced against the flexible tube 5. Accordingly, the flexible tube 5 can be compressed by an engaging shaft provided transversely in the interior of the housing 10 and the engaging protrusion part 13a.

[0036] Briefly, the toy water gun 1 is configured in such a manner that water in the flexible tube 5 can be stopped by the water stop mechanism, and the trigger part 13 is rotatably actuated to thereby operate the water stop mechanism so as to release the compressed state of the flexible tube 5 to thereby change the stop-water state to the flow-water state, whereby water in the tank 3 is squirted forward through the flexible tube 5 and the muzzle part 4 by the air pressure in the tank 3.

[0037] Next, with referring to Figs. 3 and 4, an operation of the pump mechanism 2 will be described. Figs. 3 and 4 are exemplary diagrams showing the operation of the pump mechanism 2 of the toy water gun 1 according to the embodiment of the present invention. The pump mechanism 2 is made up of the cylinder 20, the piston 21, and the check valve 6 which is disposed so as to be able to close an air outlet port 20a which functions as an opening for communicating the cylinder 20 and the tank 3 with each other.

[0038] This check valve 6 is, as described above, made up of the coil spring and the closing member. When the piston 21 is inserted into the cylinder 20, the air pressure in the cylinder 20 is increased, whereby air in the cylinder 20 is discharged from the air outlet port 20a by resisting against an elastic force of the coil spring of the check valve 6 and the pressure in the tank 3 (a hydraulic head pressure of residing water in the tank 3 at an initial stage), whereby air so discharged is supplied into the tank 3 to thereby increase the pressure in the tank 3.

[0039] The pressurized air supply by the pump mechanism 2 into the tank 3 works as follows. From the initial stage, as shown in Fig. 3 (a), where the water stop mechanism holds the flexible tube 5 in the stop-water state and the operation part 12 is positioned at a front end thereby the piston 21 is disposed forward, a compression stroke starts, as shown in Fig. 3(b), where air in the cylinder 20 is compressed by the piston 21 which is inserted into the cylinder 20 when the operation part 12 is moved rearward and the piston 21 connected thereto is moved rearward.

[0040] At a compression stroke, the O-ring 22 is moved forward relative to the piston 21 by a friction against the inner peripheral surface of the cylinder 20 to thereby be attached closely to a distal end of the piston head part 21a of the piston 21, whereby the gap between the cylinder 20 and the piston 21 is sealed. This causes air residing in the cylinder 20 is compressed rearward without leakage, whereby the check valve 6 is opened and air so compressed is supplied into the tank 3.

[0041] When the operation part 12 is moved to the rear end of its movable range, as shown in Fig. 4(b), the piston 21 is inserted fully into the cylinder 20, whereby the compression stroke is completed and the check valve 6 is closed by means of the elastic force of the coil spring.

[0042] Next, as shown in Fig. 4(b), when the piston 21 is moved forward in such a manner as to be drawn from the cylinder 20 by moving the operation part 12 forward, since the O-ring 22 is moved rearward relative to the piston 21 by the friction against the inner peripheral surface of the cylinder 20, the cylinder 20 is communicated with the piston 21 via the through-holes 25. Thus, an intake stroke is started where air is drawn into the cylinder 20 from the forward outside thereof when the piston 21 is moved forward.

[0043] In the intake stroke, as shown in an enlarged view in Fig. 4(b), since the rear surface part of the O-ring 22 is closely attached to the front surface of a position lying in the vicinity of the outer peripheral part of the rear part of the ring mounting plate 23, air flowing from the gap between the outer peripheral surface of the piston head part 21a and the inner peripheral surface of the cylinder 20 to the side of cylinder 20 flows into the cylinder 20 through the ventilation grooves 25a on the front part of the ring mounting plate 23 and through the through-holes 25 of the rear part of the ring mounting plate 23 after flows in the gap between the O-ring 22 and the rear surface of the piston head part 21a.

[0044] The intake stroke is completed, as shown in Fig. 3 (a), by moving the operation part 12 forward to the front end of the moving range which is referred to as the initial position. According to the mechanisms described above, by moving the operation part 12 back-and-forth direction repeatedly, the compression stroke and the intake stroke are conducted sequentially, whereby the pressure in the tank 3 can be increased gradually. With this configuration, by adjusting a number of activations of the pump mechanism 2, a squirt distance and a squirt time can be adjusted.

[0045] In other words, when the number of activations is increased, the pressure in the tank 3 is increased, whereby the toy water gun can squirt water a longer distance and for a shorter time, and when the number of activations is decreased, the toy water gun can squirt water a shorter distance and for a longer time.

[0046] The muzzle part 4 is connected to the flexible tube 5 for squirting water in the tank 3, and is configured in such a manner as to be able to squirt water in a plurality of squirt modes. Hereinafter, the muzzle part 4 is described in detail with referring to Figs. 5 and 6. Figs. 5 and 6 are cross sectional side views of the muzzle part 4 of the toy water gun according to the embodiment of the present invention.

[0047] The muzzle part 4 is made up of a fixed part 40 which is fixed to a front end of the housing 10, and a movable part 41 which is screwed on the fixed part 40. The fixed part 40 comprises a tubular passage 42 which is connected to the flexible tube 5 to thereby form a water passage, and a circular cylindrical engaging member is fixedly fitted over the tubular passage 42.

[0048] The engaging member comprises a circular cylindrical part, and a rod-shaped engaging rod 46 which is formed in such a manner as to protrude forward from

a center of a plate member of an end part of the circular cylindrical part. A periphery of the engaging rod 46 on the plate member of the end part of the circular cylindrical part includes through ports 43 which is perforated equiangularly. The engaging rod 46 comprises a rear part, a tapered part which is formed in such a manner that the diameter of the rod is tapered from the rear part to the front part, and a front end protrusion part which is formed so as to protrude outward from a distal end of the tapered part. A front part of the circular cylindrical part of the engaging member is a bulged part 47 which is formed larger in diameter than the rear part thereof.

[0049] The movable part 41 can be moved front-rear direction relative to the fixed part 40 by being turned. The movable part 41 is made up of a cover 50 which is screwed on the fixed part 40 for covering thereof, a O-ring 48 which is provided as being able to contact to/detach from the bulged part 47 of the engaging member, and a O-ring 49 which is provided as being able to contact with/detach from the rear part of the engaging rod 46 of the engaging member and the front end protrusion part. The cover 50 includes a central port 44 at its center of the front surface into which the engaging rod 46 can be inserted. A periphery of the central port 44 has shower ports 45 which is perforated equiangularly. The central port 44 is formed forwardly diverging shape.

[0050] Since the muzzle part 4 is configured as described above, a water flow passage can be switched by the movement of the movable part 41, whereby the toy water gun can squirt water in a plurality of squirt modes. Hereinafter, a water flow in various squirt modes switched by the movement of the movable part 41 will be described.

[0051] As shown in Fig. 5(a), when the movable part 41 is screwed fully on the fixed part 40, the rear part of the engaging rod 46 contacts with the O-ring 49 and the bulged part 47 detaches from the O-ring 48. Therefore, water passed through the tubular passage 42 and the through ports 43 runs not to a central port 44 ahead but to outward, then turns to rearward and runs through a gap between the bulged part 47 and the O-ring 48. Next, the water runs outward and then turns toward front again and finally is squirted outside forward through the shower ports 45.

[0052] When the movable part 41 is turned to thereby be moved forward in a predetermined distance relative to the fixed part 40, as shown in Fig. 5 (b), the rear part of the engaging rod 46 detaches from the O-ring 49, and the O-ring 49 and the tapered part forms a gap therebetween and the bulged part 47 contacts with the O-ring 48, whereby the water is squirted outside forward only from the central port 44 ahead after running through the tubular passage 42 and the through ports 43.

[0053] When the movable part 41 is moved further forward in a predetermined distance relative to the fixed part 40, as shown in Fig. 6(a), since the front end protrusion part of the engaging rod 46 contacts with the O-ring 49 and the bulged part 47 contacts with the O-ring 48,

whereby the toy water gun 1 is in shut down state where the squirt opening is closed so as not to flow water even when the stop-water state is released by the trigger part 13 being rotated.

[0054] In the event that the movable part 41 is moved further forward in a predetermined distance relative to the fixed part 40, as shown in Fig. 6(b), the front end protrusion part of the engaging rod 46 detaches from the O-ring 49 and the bulged part 47 detaches from the O-ring 47, whereby water is squirted outside forward from both the central port 44 and the shower ports 45.

[0055] As described, air can be drawn into the cylinder 20 in a smooth fashion without having a purpose built check valve and air in the tank 3 can be compressed with ease by having the pump mechanism 2 and by forming a mechanism for allowing air to flow only into the cylinder 20 of the pump mechanism 2 in a simple configuration which is made up of the ring groove 24 of the piston 21 and the through-holes 25 which is communicated with the ring groove 24. In addition, there can be provided the toy water gun 1 for children to play with easy operation for squirting water from the muzzle part 4, since the air pressure in the tank 3 can be increased by means of the repeated activation of the operation part 12, and since the stop-water state of the water passage can be changed to the flow-water state by means of the activation of the trigger part 13.

[0056] The stop-water state and the flow-water state of the water passage are switched with ease to thereby be able to control the squirting water by configuring the water passage with the flexible tube 5 and by the water stop mechanism being made up of the trigger part 13 and the elastic member. Therefore, after activating the operation part 12 for increasing the air pressure in the tank 3, a shooter can squirt water from the muzzle part 4 continuously by keeping the trigger part 13 being pulled, and can squirt small amount of water in an intended timing by pulling the trigger part 13 instantaneously and intermittently.

[0057] Since the muzzle part 4 is configured such that the squirt mode can be switched, the shooter switches the squirt mode with ease by turning the movable part 41, whereby the shooter can play with squirting a plurality of streams of water like a shower through a plurality of the shower ports 45, or with squirting a stream of water through the center port 44.

[0058] The invention is not limited to the embodiment that has been described heretofore but can be modified or improved variously without departing from the spirit and scope of the invention. For example, while the water passage is a flexible tube and the water stop mechanism is made up of the trigger part 13 and the elastic member, without limiting to these configurations, a variety of water passages and water stop mechanisms may be employed. As to the elastic member which biases the trigger part 13, without limiting to the coil spring 14, a variety of elastic members, such as a leaf spring, may be adopted.

Claims

1. A toy water gun comprising:

a housing having a grip part;
a detachable tank disposed above the vicinity of a rear end of the housing;
a muzzle part that is disposed on a front end of the housing;
a pump mechanism having:

a circular cylinder which is secured in the housing;
a piston which is disposed so as to move in a front-rear direction in the housing; and
a check valve which is disposed closably an opening which allows the cylinder and the tank communicated with each other;

a water passage which connects the tank and the muzzle part;
an operation part that is disposed at a front lower part of the housing so as to move in the front-rear direction relative to the housing; and
a water stop mechanism that is provided halfway the water passage,
wherein the piston is configured such that:

the piston comprises a piston head part at an end thereof;
the piston head part includes a ring mounting plate having a circular disc shape which is secured thereto;
the ring mounting plate is formed in such a manner that a diameter of a front part is smaller than that of a rear part so as to form a ring groove between the piston head part and the rear part of the ring mounting plate when the ring mounting plate is secured to the piston head part and has a plurality of through-holes which communicates with the ring groove;
the ring groove has a O-ring slidably disposed therein;
the O-ring seals a gap between the cylinder and the piston when the O-ring is closely attached to the piston head part, and the gap between the cylinder and the piston are allowed communicated with the through-holes to thereby allow air to flow through the gap therebetween when the O-ring is closely attached to a rear part of the ring mounting plate; and

wherein while the water stop mechanism holds the water passage in a stop-water state, the piston connected to the operation part is inserted into the cylinder to thereby supply air residing in

the cylinder to the tank via the check valve by moving the operation part rearward, the piston is withdrawn from the cylinder to thereby draw air into the cylinder by moving the operation part forward, so that a pressure in the tank is increased by repeating the back-and-forth movement of the operation part, and the stop-water state of the water passage is released to thereby squirt water in the tank forward through the water passage and the muzzle part by means of the pressure in the tank by actuating the water stop mechanism.

2. The toy water gun as set forth in Claim 1, wherein the water passage is a flexible tube, wherein the water stop mechanism is made up of a trigger part which is rotatably connected to the vicinity of the grip part and an elastic member which biases the trigger part, water in the flexible tube can be stopped by compressing the flexible tube by a compression part formed at the trigger part biasing the trigger part by the elastic, and wherein water in the tank is squirted forward through the flexible tube and the muzzle part by means of pressure in the tank by rotating the trigger part to thereby release the stop-water state of the flexible tube.

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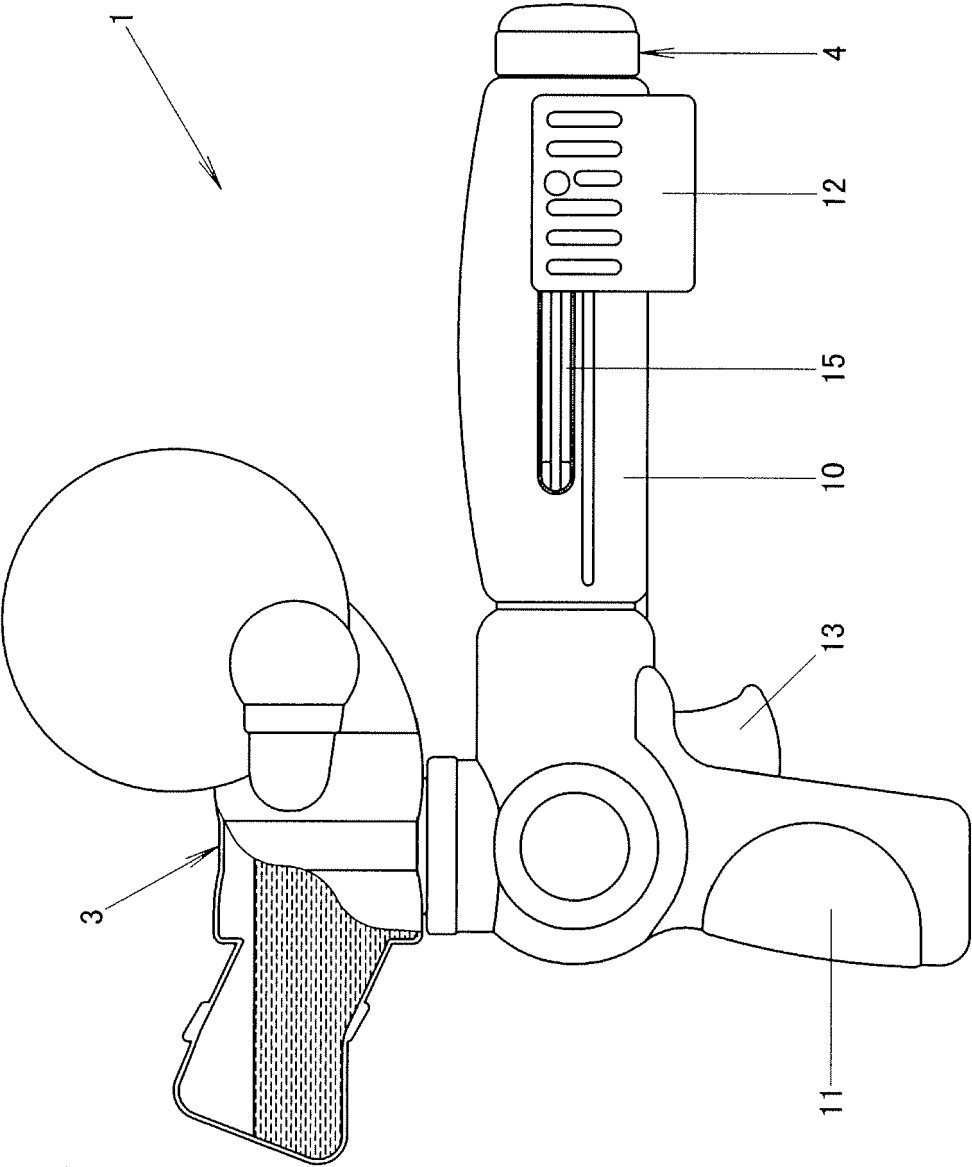
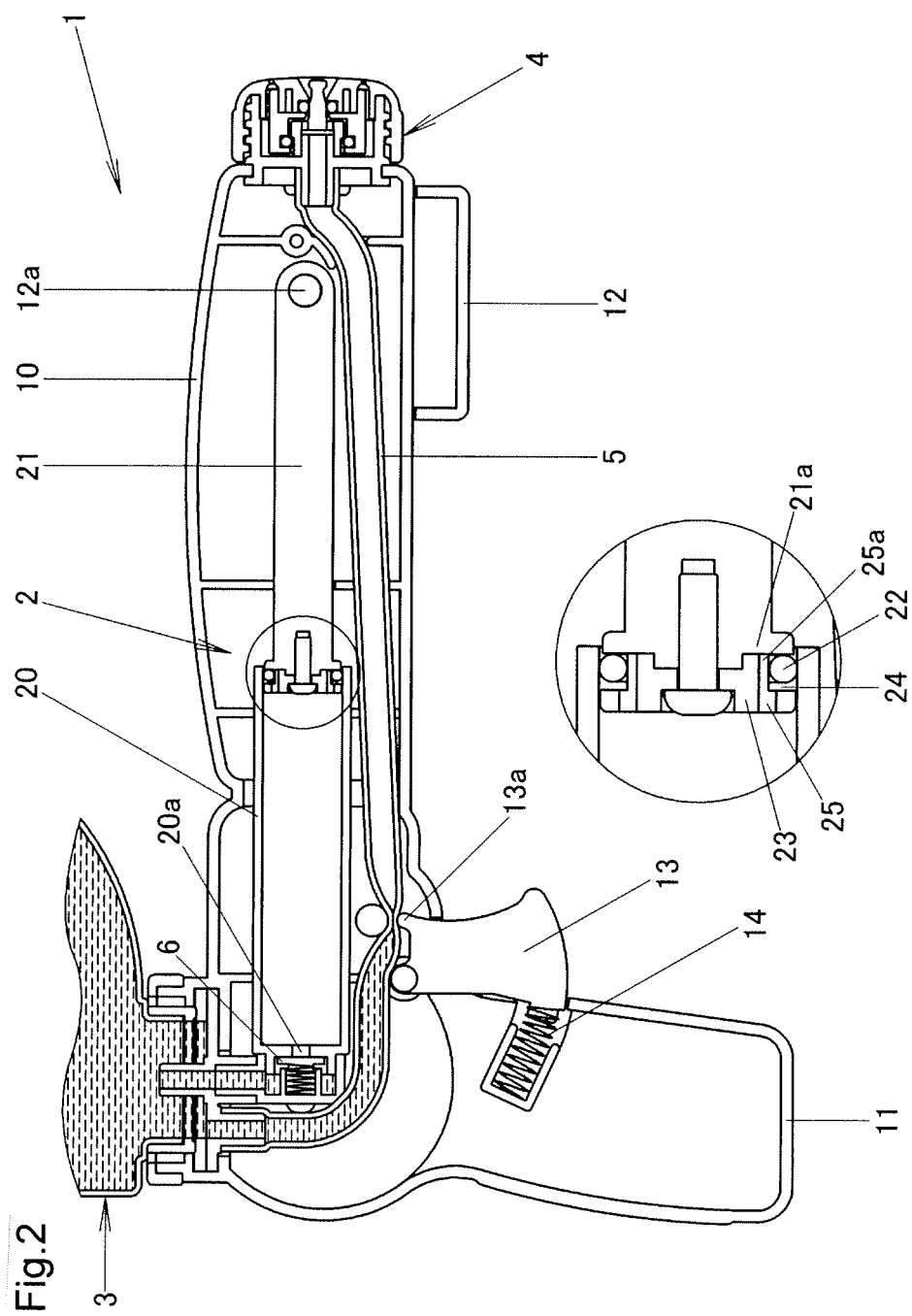


Fig.1



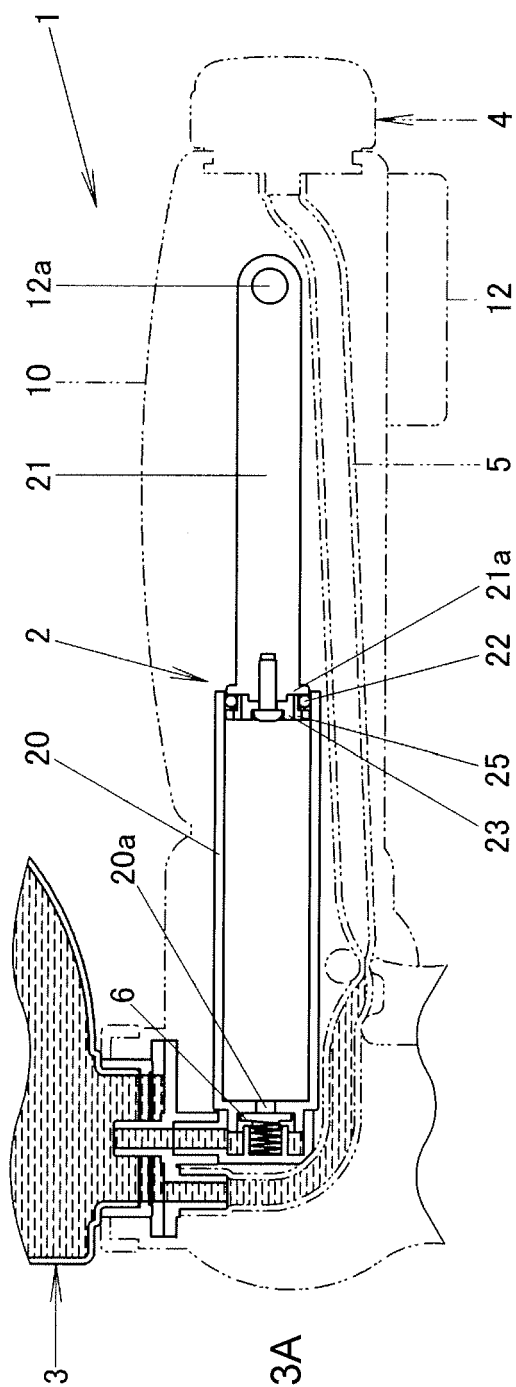


Fig. 3A

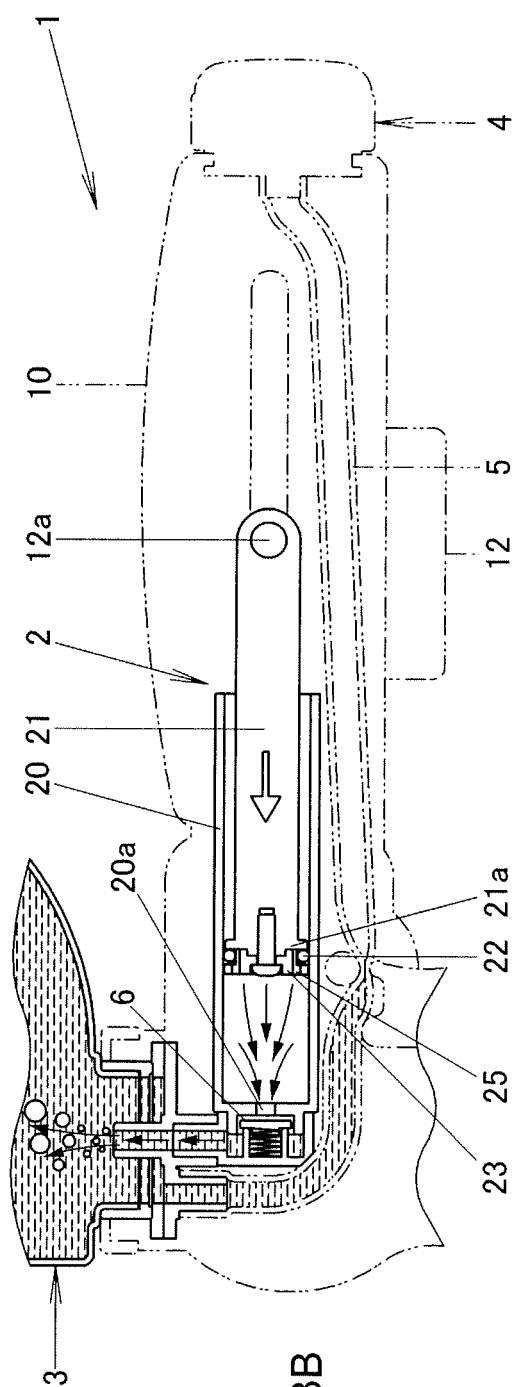


Fig. 3B

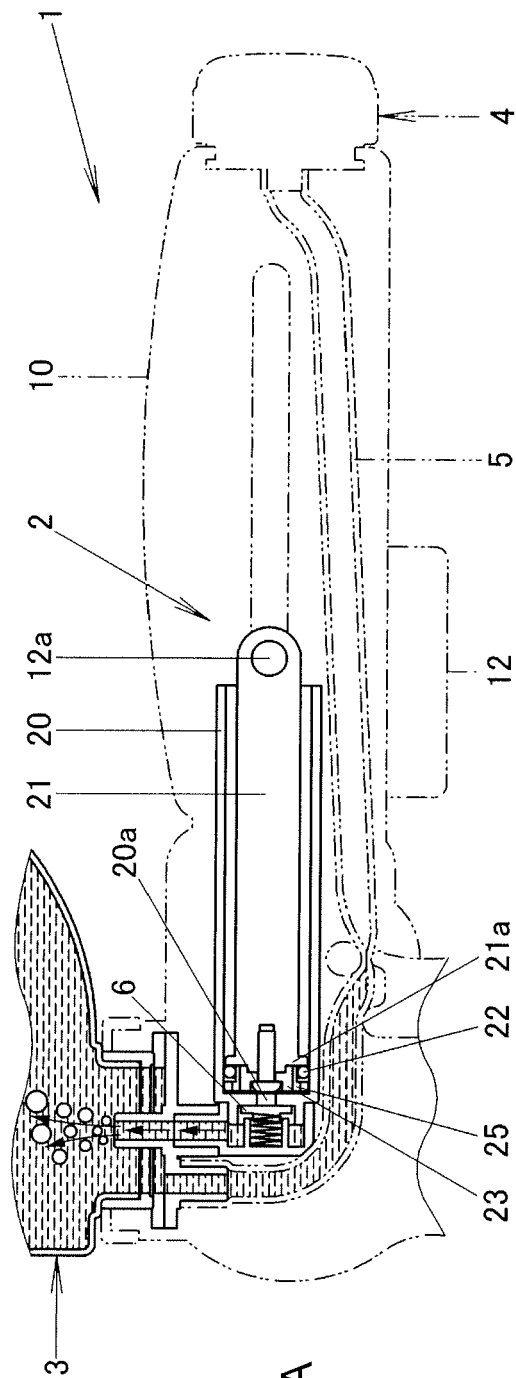


Fig. 4A

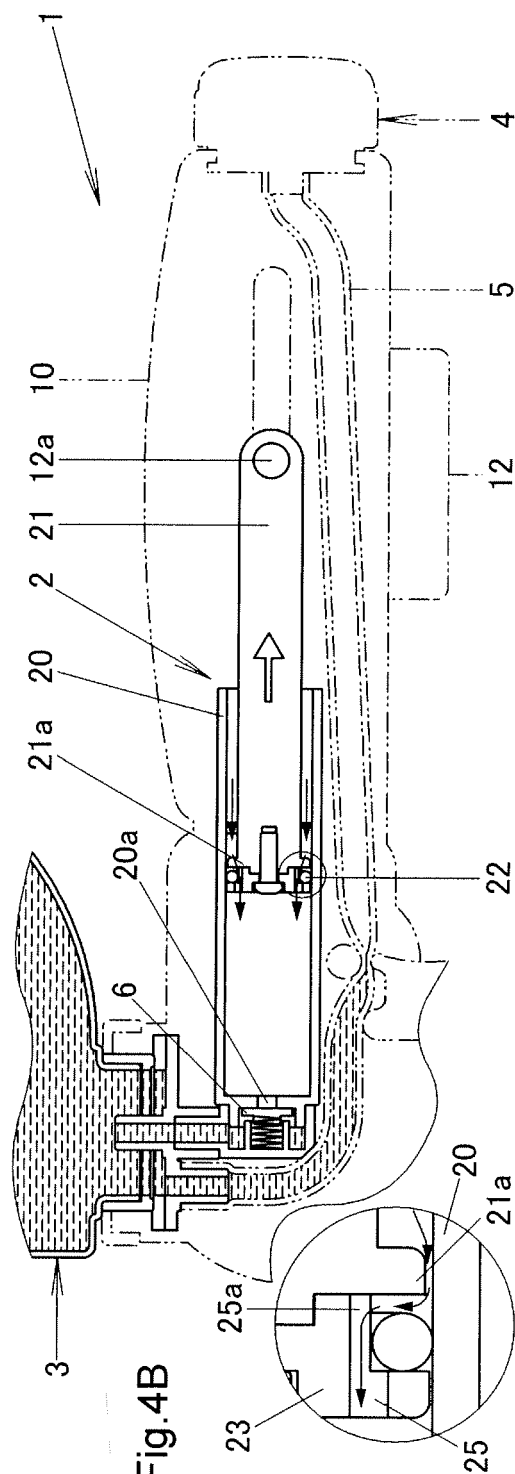


Fig. 4B

Fig.5A

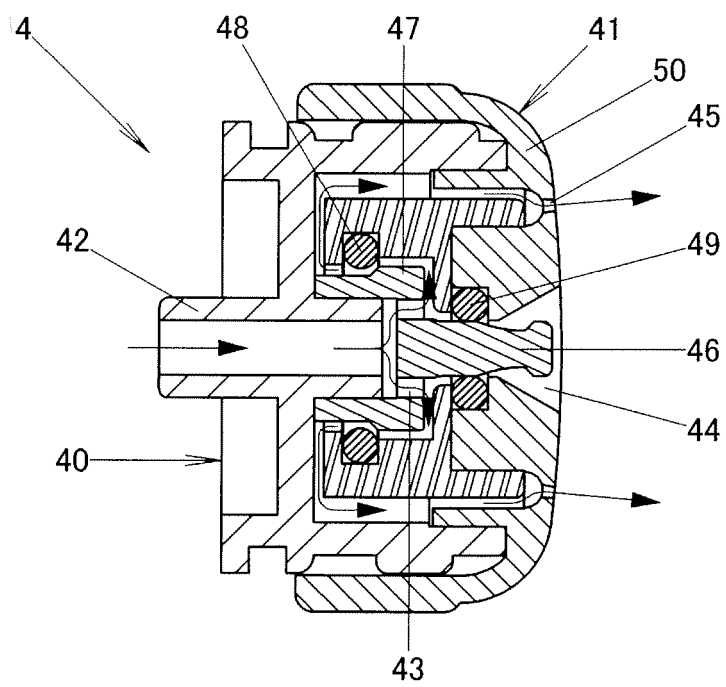


Fig.5B

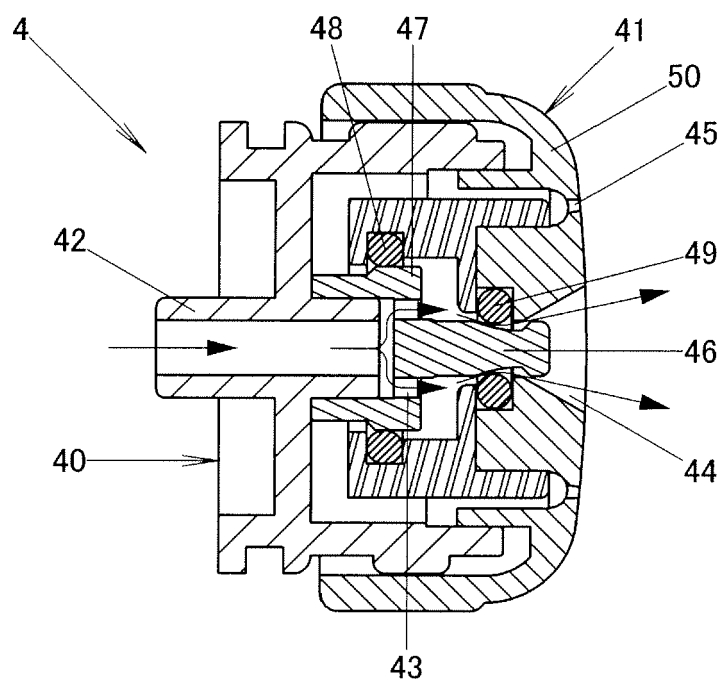


Fig.6A

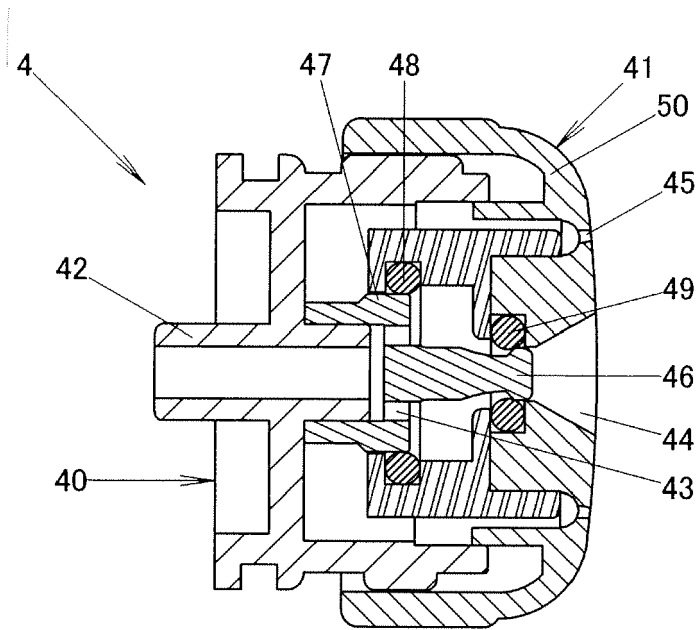
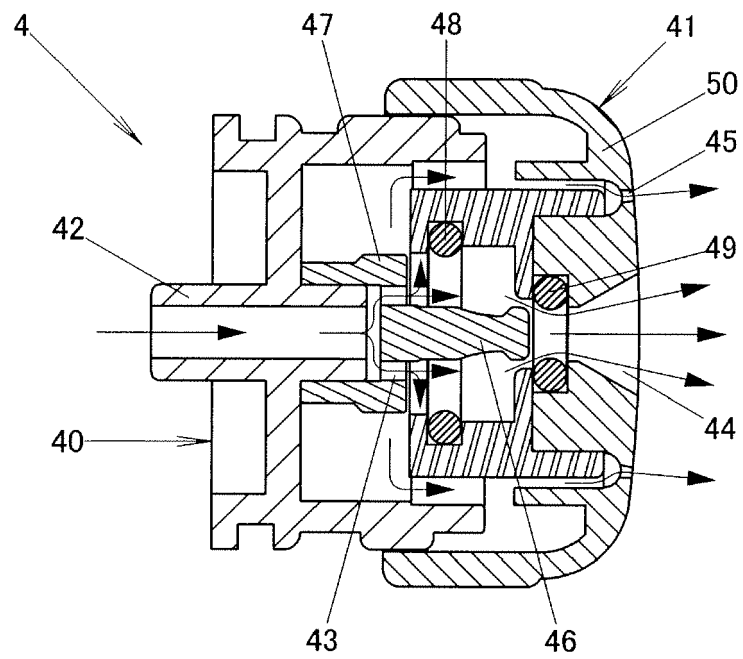


Fig.6B



REFERENCES CITED IN THE DESCRIPTION

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