

DESCRIPTION

TITLE OF THE INVENTION: WATER PURIFIER

TECHNICAL FIELD

[0001]

The present invention relates to a domestic water purifier that is mainly used at home, and filters tap water.

BACKGROUND ART

[0002]

There are proposed a large number of direct faucet mount type water purifiers in which a switcher is attached to a faucet, and are used by switching a flow path with a switching valve. In the water purifiers of this type, there is proposed a type of a water purifier that directly discharges raw water from the switcher, and directly discharges purified water from the switcher, or from a cartridge attached to the switcher.

[0003]

These switchers are directly attached to a faucet to be used. Therefore, there is a problem that when the switcher is used for a long period of time, dirt adheres to the under side of the switcher, or a faucet joint or a biofilm is formed, by rinse water or detergent splashed back by a sink.

[0004]

To cope with this, there is devised a structure, in which a shielding valve is provided to cover a purified water discharge port, so that purified water discharge port is

protected (Patent Document 1). However, the dirt of the switcher under side cannot be prevented, and it is necessary to detach the switcher from the faucet and clean the detached switcher.

[0005]

Additionally, a water purifier that is capable of cleaning not only the under side of a switcher but also the inside of the switching valve (valve unit) is developed (Patent Document 2). However, a case cover on the outer side of the switching valve is longitudinally divided, and a male screw on each lower side is screwed into a raw water discharge port (nozzle for a raw water outlet), and therefore work for decomposing and cleaning is not ordinary. Additionally, after the cleaning, four members, namely, the front and back case covers, the switching valve, and the raw water discharge port need to be accurately assembled such that water does not leak from the raw water discharge port.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0006]

Patent Document 1: Japanese Patent Laid-open Publication No. H9(1997)-314133

Patent Document 2: Japanese Patent No. 3629322

SUMMARY OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0007]

In order to solve the above problems, the present invention provides a water purifier in which the adhesion of dirt onto the outer surface of the water purifier is reduced and easy cleaning and removal of adhered dirt is possible while the water purifier is attached to a faucet on a daily basis.

SOLUTIONS TO THE PROBLEMS

[0008]

In order to solve the above objects, a water purifier of the present disclosure is configured from the following configuration. That is, the present disclosure is a water purifier having a switcher having a switching valve for switching a raw water flow path, and a cartridge that is connected to the switcher and filters raw water, and has a protective cover detachably attached to the switcher.

[008a]

In an aspect, there is provided a water purifier having a switcher having a switching valve for switching a raw water flow path, and a cartridge that is connected to the switcher and filters raw water, the water purifier comprising: a protective cover detachably attached to the switcher and configured to cover a lower part of the switcher,

wherein the switcher and the protective cover are different members of the water purifier, and

the switcher has an upper cover and a lower cover that cover the switching valve sandwiched therebetween from the top

and the bottom, and engage with each other.

[0009]

Herein, the protective cover is preferably configured to cover a lower part of the switcher, and the protective cover preferably has an opening that enables passing of raw water discharge.

[0010]

The protective cover is preferably configured to cover a lower part of the switcher, and the protective cover preferably has a discharge port that forms a raw water discharge form.

[0011]

A surface layer of the switcher is preferably formed by a plurality of members, and the protective cover is preferably configured to cover a part of a boundary between at least adjacent two members of the plurality of members.

[0012]

The plurality of members preferably include a lower cover configured to cover at least a circumference of a raw water discharge part of the switching valve, and the protective cover is preferably configured to cover at least boundaries between the lower cover, and the members of the plurality of members adjacent to the lower cover.

[0013]

The lower cover is preferably formed by a plurality of members, and the protective cover is preferably configured to cover a boundary between the plurality of members that serve as the lower cover.

[0014]

The protective cover is preferably attached and detached by being moved to a front side with respect to the switcher.

[0015]

The switcher preferably has a flat spring structure, and the protective cover is preferably fixed to the switcher by the flat spring structure.

[0016]

The protective cover preferably has a finger hooking recess.

[0017]

The switcher preferably has a replacement timing display means of a cartridge, and the protective cover is preferably configured to cover a boundary part between the switcher and the replacement timing display means.

[0018]

The protective cover preferably has a thin-walled shape along an outer surface shape of the switcher.

[0019]

The protective cover and the switcher are preferably watertightly sealed.

[0020]

A water discharge cap configured to flow out raw water is preferably detachably attached to the raw water discharge part of the switching valve.

[0021]

The protective cover preferably has a purified water discharge hole.

EFFECTS OF THE INVENTION

[0022]

Embodiments of the present disclosure produces the following excellent effects by the above configuration. That is, the present disclosure is the water purifier having the switcher having the

switching valve for switching the raw water flow path, and the cartridge that is connected to the switcher and filters raw water, and has the protective cover detachably attached to the switcher, and therefore the protective cover is detached to be cleaned, so that dirt on the under side (lower part) of the switcher can be cleaned while the switcher is attached to a faucet.

[0023]

The protective cover is configured to cover the lower part of the switcher, and the protective cover has the opening that enables the passing of the raw water discharge, and therefore the under side of the switcher can be protected without disturbing the raw water form formed by the switcher.

[0024]

The protective cover is configured to cover the lower part of the switcher, and the protective cover has the discharge port that forms the raw water discharge form, and therefore it is possible to clean not only the under side of the switcher but also the raw water discharge port.

[0025]

The surface layer of the switcher is formed by the plurality of members, and the protective cover is configured to cover the one part of the boundary between at least the adjacent two members of the plurality of members, and therefore dirt is prevented from accumulating in the boundary.

[0026]

The plurality of members include the lower cover configured to cover at least the circumference of the raw water discharge part of the switching valve, and the protective cover is configured to cover at least the boundaries between the lower cover, and the members of the plurality of members adjacent to the lower cover, and therefore dirt is prevented from accumulating in the boundary particularly on the switcher under side that is difficult to be cleaned.

[0027]

The lower cover is formed by the plurality of members, and the protective cover is configured to cover the boundary between the plurality of members that serve as the lower cover, and therefore dirt is prevented from accumulating in the boundary between the plurality of boundaries on the switcher under side.

[0028]

The protective cover is attached and detached by being moved to the front side with respect to the switcher, and therefore operation is easy.

[0029]

The switcher has the flat spring structure, and the protective cover is fixed to the switcher by the flat spring structure, and therefore the abrasion of the protective cover at the time of repeatedly attaching and detaching the protective

cover is prevented.

[0030]

The protective cover has the finger hooking recess, and therefore a finger is easily hooked on the protective cover, so that the protective cover is easily attached and detached.

[0031]

The switcher has the replacement timing display means of a cartridge, and the protective cover is configured to cover a boundary part between the switcher and the replacement timing display means, and therefore dirt is prevented from accumulating in the boundary where the dirt easily accumulates.

[0032]

The protective cover has the thin -walled shape along the outer surface shape of the switcher, and therefore the protective cover is integrally formed with the switcher, so that good external appearance can be kept.

[0033]

The protective cover and the switcher are watertightly sealed, and therefore mold or water stains is prevented from generating between the protective cover and the switcher.

[0034]

The water discharge cap configured to flow out raw water is detachably attached to the raw water discharge part of the switching valve, and therefore not only the protective cover but also the raw water discharge port that flows out raw water

can be cleaned, so that the raw water can be kept sanitary.

[0035]

The protective cover has the purified water discharge hole, and therefore the switcher, the raw water, and the purified water can be kept sanitary.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036]

Fig. 1 is an outline front view of a water purifier of the present embodiment.

Fig. 2 is a front longitudinal sectional view of a switcher of the present embodiment.

Fig. 3 is a horizontal sectional view of the switcher of the present embodiment.

Fig. 4 is a side longitudinal sectional view of the switcher of the present embodiment.

Fig. 5 is a bottom view of the switcher of the present embodiment.

Fig. 6 is a bottom perspective view of the switching valve of the present embodiment.

Fig. 7 is a top view of a switching valve case of the present embodiment.

Fig. 8 is a perspective view of a water discharge cap of the present embodiment.

Fig. 9(a) is a top view showing a water discharge cap mounting start position in a state where a protective cover of

the present embodiment is removed, Fig. 9(b) is a bottom view showing the water discharge cap mounting start position of Fig. 9(a), and Fig. 9(c) is a bottom view showing a water discharge cap mounting completion position in a state where the protective cover is removed, of the present embodiment.

Fig. 10(a) is a right side view of the switcher of the present embodiment, and Fig. 10(b) is a right side view showing a state where the water discharge cap is mounted in Fig. 10(a).

Fig. 11 is a perspective view of the protective cover according to the present embodiment.

Fig. 12 is a bottom perspective view of the switcher on which the protective cover is mounted, according to the present embodiment.

Fig. 13 is a right side view of the switcher on which the protective cover is mounted, according to the present embodiment.

EMBODIMENTS OF THE INVENTION

[0037]

Hereinafter, an example of an embodiment of the present invention will be described with reference to the drawings, while a direct faucet mount type water purifier is taken as an example.

[0038]

In the present invention, a state where a plurality of members in contact with each other are fastened with a seal

member or by press-fitting, raw water or purified water cannot move only by fastening parts is referred to as watertight, and the members may have holes on their parts other than the fastening parts. The present invention is not limited to the following embodiment. Embodiments that are capable of attaining the above object of the present invention such as an embodiment in which the present invention is applied to a switcher of a counter-top type water purifier may be employed.

[0039]

In the embodiment of the present invention, in a state where a switcher 2 is attached to a faucet in a direction in which state where a replacement timing display means of a cartridge can be read, a face on a side of an operator, a right side as viewed from the operator, a left side as viewed from the operator, and the farthest face from the operator are referred to as a front face, a right side face, a left side face, a rear face, respectively. Additionally, in the same state, a faucet side and a sink side are an upper face and a lower face, respectively. Further, a operator side is referred to as a front side.

[0040]

Now, an entire configuration of an embodiment of the present invention will be described.

[0041]

Fig. 1 shows an outline front view of a water purifier

1 according to the embodiment of the present invention. The water purifier 1 is configured by the switcher 2, a cartridge 3 for filtration that is connected to the switcher 2, and a protective cover 4 that detachably covers the lower part of the switcher 2.

[0042]

The switcher 2 is fixed to the tip of a faucet by a fitting nut 11, and has a switching valve 12, an upper cover 13 and a lower cover 14 that cover the switching valve 12 sandwiched therebetween from the top and the bottom, and engage with each other, a switching lever 15 that is connected to the switching valve 12, and located on the lateral side of the upper cover 13 and the lower cover 14, and a water discharge cap 17 that is connected to a raw water discharge part of the switching valve 12, as shown in Fig. 2.

[0043]

The switching valve 12 is a valve for switching a flow path of raw water supplied from the faucet, and raw water that enters the switching valve 12 is discharged in any mode of raw water stream, raw water shower, and raw water supply to the cartridge 3, by the turning angle of the switching lever 15.

[0044]

The raw water that passes through the switching valve 12 is discharged from the water discharge cap 17 that is detachably attached to the raw water discharge part of the switching valve

12, to the outside. The water discharge cap 17 has a raw water stream discharge port and a raw water shower discharge port, and the forms of the raw water stream and the raw water shower are formed by the water discharge cap 17.

[0045]

Herein, the switcher 2 in the present embodiment means an assembly attached to the faucet to be used except the cartridge 3 and the protective cover 4.

[0046]

The switcher 2 is attached to the faucet tip to be used, and therefore dirt splashed back from a sink during the flowing of water is easily attached to the under side. The switcher 2 of the present embodiment has the protective cover 4 that covers at least the lower part of the switcher 2, and therefore an effect capable of cleaning the dirt on the under side of the switcher 2 while the switcher 2 is attached to the faucet is obtained by detaching and cleaning the protective cover 4. Herein, the lower part means a range that can be expressed in the drawing when the switcher is shown in the bottom view.

[0047]

Generally, in the direct faucet mount type water purifier, many types enables the selection of the discharge of raw water among from a stream form and a shower form, and discharge ports for the raw water stream form and the raw water shower form are generally provided on the lower face of the switcher.

[0048]

Therefore, there is a problem that rinse water or detergent is splashed back by the sink, holes of the raw water shower are clogged with dirt or biofilm, and a flow rate is lowered, when the switcher attached to the faucet is used for a long period of time. Additionally, there is a problem that the holes of the raw water shower are clogged with a foreign substance in water service piping from the switcher side.

[0049]

Patent Document 2 describes a structure in which a nozzle for a raw water outlet (water discharge cap) is detached and cleaned. However, a case cover on the outer side of a switching valve is longitudinally divided, and a male screw on each lower side is screwed into a nozzle for a raw water outlet, and therefore there is a problem that the yield of a molded article is reduced, since it is necessary to accurately mold and assemble four members, namely the front and back case covers, the switching valve, and the nozzle for a raw water outlet such that water does not leak from the nozzle for a raw water outlet. Additionally, there is a problem that assembly after the cleaning is difficult since the four members need to be watertightly assembled.

[0050]

Japanese Patent Laid-open Publication No. 2008-173538 being a patent document describes a proposal of dividing a case

cover into upper and lower parts. However, since the adjustment of three members, namely a lower body being the lower side of the case cover, a switching valve, and a raw water shower discharge port (water discharge cap) is required, the proposal cannot solve the problem.

[0051]

In order to solve the above problems, the present invention can provide a water purifier in which the detachable water discharge cap is configured by the combination of two members allowing easy assembly, as described below.

[0052]

In the present embodiment, the water discharge cap 17 can be detached and cleaned, and therefore it is possible to remove dirt that causes the clogging of a large number of shower holes of raw water shower discharge port, and to recover the flow rate. In conventional products, shower holes are cleaned from the outside of the products, and therefore there is a problem that the cause of the clogging stays upstream of the shower holes, and instantly causes the clogging again, even when clogging of the holes can be temporarily solved. In the present embodiment, the water discharge cap 17 is detached, and the cause of the clogging that stays upstream of the shower holes is completely washed away and removed, so that it is possible to greatly reduce the frequency of occurrence of clogging.

[0053]

In the present embodiment, the water discharge cap 17 is connected to the switching valve 12. In a conventional structure in which the water discharge cap is attached to the lower cover 14, in order to prevent raw water from leaking from between the members, it is necessary to enhance the molding accuracy of at least the three members, namely the switching valve 12, the lower cover 14, and the water discharge cap 17, and to create a watertight state by positioning and mounting at least the three members. On the contrary, in the present embodiment, the watertight state is created by only the two members, namely the water discharge cap 17, and the switching valve 12, and there is an advantage of enhancing the yield of the molded article, and an advantage of easily creating the watertight state.

[0054]

In the present embodiment, two kinds of discharge ports, namely a raw water stream discharge port and raw water shower discharge ports are provided in the water discharge cap 17. Raw water is mainly used during tableware cleaning, and there is a tendency to properly use the raw water stream allowing powerful washing away, and the raw water shower allowing wide range washing at a time. Accordingly, it is required that the water purifier has a plurality of kinds of discharge forms. A plurality of kinds of discharge ports are provided in the water discharge cap 17, and therefore it is possible to clean all kinds

of discharge ports to more sanitarily maintain the switcher 2.

[0055]

The switcher 2 will be described with reference to Fig. 1 to Fig. 13.

[0056]

The upper cover 13 has a liquid crystal display 16 (replacement timing display means of a cartridge) that displays the replacement timing of the cartridge 3 on the center of the front side.

[0057]

The lower cover 14 has an opening that enables the passing of raw water in the vicinity of the center.

[0058]

The switching valve 12 has a raw water inlet part 21 on an upper end, and has a raw water discharge part 51 on a lower end. The raw water discharge part 51 of the switching valve 12 has a duplex cylindrical shape as shown in Fig. 6, and has a bayonet groove 52 that allows attachment and detachment of the water discharge cap 17, on an outer wall of an outer cylinder. Two flow paths for raw water discharge, namely a raw water stream flow path 53 configured from the inside of an inner cylinder, and a raw water shower flow path 54 formed in an annular part between the inner cylinder and the outer cylinder are provided. An inner O ring 55 is mounted on the outer circumference of the inner cylinder, and an outer O ring 56 is mounted on the outer

circumference of the outer cylinder.

[0059]

The water discharge cap 17 will be described.

[0060]

The water discharge cap 17 has an annular bottom surface 71, an inner side surface 72 and an outer side surface 73 continuous from a substantially annular bottom surface, and a spatula-shaped knob 74 gently continuous from the annular bottom surface 71 and the outer side surface 73, as shown in Fig. 8. A knob 74 that has a finger hooking part capable of turning the water discharge cap 17 by hooking at least one finger on water discharge cap 17, and pressing the knob in the outer circumferential direction of the water discharge cap 17 is provided on the outer circumferential side of the water discharge cap 17. This enables the reliable turning of the water discharge cap, and the easy and reliable attachment and detachment of the water discharge cap 17. The knob 74 may have such a shape that the knob is continuous from the outer side surface 73, or may have such a shape that the knob is continuous from the annular bottom surface 71, and is preferably provided on the outer circumferential side of the water discharge cap 74.

[0061]

A convex shape 75 for bayonet is provided on an inner wall of the outer side surface 73. The water discharge cap 17 is

attached to the raw water discharge part 51 of the switching valve 12 having a duplex cylindrical shape, by moving the convex shape 75 for bayonet along the bayonet groove 52 of the switching valve 12. At this time, the outer side surface 73 is watertightly connected to the outer cylinder with the outer O ring 56 of the switching valve 12, thereby forming the raw water shower flow path 54. On the annular bottom surface 71 of the water discharge cap 17, a large number of holes are annually arranged, and become raw water shower discharge ports for discharging raw water in the shower form.

[0062]

The inside with respect to the inner side surface 72 in the water discharge cap 17 becomes a raw water stream discharge port that is watertightly connected to the inner cylinder with the inner O ring 55 of the switching valve 12, and forms the raw water stream flow path 53 to discharge raw water in the straight form.

[0063]

The knob 74 has a flat spring 76, and a fixing groove 77 that fixes the protective cover 4. A fixing convex shape 82 provided on a surface of the protective cover 4, coming into contact with the switcher 2 is fitted in the fixing groove 77 of the water discharge cap 17, so that the protective cover 4 can be fixed to the switcher 2. A method of fixing the protective cover 4 is not limited to a convex shape and a concave

snape, and is not particularly designated as long as the shape enables fixing, for example, hooking of a convex shape and a convex shape.

[0064]

The flat spring 76 may not be provided. However, the front side of the fixing groove 77 is configured by the flat spring 76, thereby obtaining an effect that the fixing convex shape 82 is not easily scraped, compared to a shape with no flat spring 76, and maintaining force for fixing the protective cover 4 to the switcher 2 for a long time, also in a case where the protective cover 4 is repeatedly detached and attached.

[0065]

The fixing groove 77 for fixing the protective cover 4 to the switcher 2 should be provided in the switcher 2, and is not necessarily provided in the water discharge cap 17. In the present embodiment, the water discharge cap 17 is provided with holes for creating the raw water stream form and the raw water shower form, and therefore the raw water form is adjusted by attaching and using the water discharge cap 17. The fixing groove 77 for fixing the protective cover 4 to the switcher 2 is provided in the water discharge cap 17, and therefore the protective cover 4 cannot be attached in a state where the water discharge cap 17 is not mounted, which can prevent forgetting to attach the water discharge cap 17.

[0066]

The diameter of a bristle of a general toothbrush is about 0.2 mm, and therefore when the hole diameter of each shower hole of the raw water shower discharge port is designed to be larger than 0.2 mm, an effect of easily cleaning the inside of the holes is obtained.

[0067]

The knob 74 may be formed in such a shape as to extend to the outer edge of the switcher 2. The tip of the knob 74 becomes farther from the rotation center of the water discharge cap, and therefore the water discharge cap can be turned with small force by the principle of leverage. Particularly, when the knob 74 is formed in such a shape as to extend to the front side outer edge, the shape allows easier operation. Additionally, when the length of the knob 74 is increased, the knob 74 can be protruded outside the outer edge of the switcher 2 as shown in Figs. 9 by the turning angle of the water discharge cap 17, when the protective cover 4 is detached, and the water discharge cap 17 is turned. When this protruding position is set to a mounting start position of the water discharge cap 17, the knob 74 is seen when the switcher 2 is seen from the top, and therefore there is an advantage that the water discharge cap 17 is easily attached. Furthermore, when the knob 74 and the switcher 2 are marked, and arrangement in which the respective marks of the water discharge cap 17 and the switcher 2 are aligned, is set to the mounting start position of the water

discharge cap 17 with respect to the switching valve 12, an effect capable of easily finding the mounting start position of the water discharge cap 17 is obtained.

[0068]

When the water discharge cap 17 is formed to have a thickness of 5 mm or more, a finger is easily hooked, and the detachment operation of the water discharge cap 17 is easily performed, and therefore such thickness is preferable. Particularly, in a case where the water discharge cap 17 is attached not by the bayonet, but by a screw, the finger is easily hooked, and therefore such design enables easy operation, and is convenient. Additionally, a finger touching area is increased, and therefore finger touch is soft and pain during operation can be removed.

[0069]

In a structure in which the water discharge cap 17 is attached and detached by using the bayonet mechanism, it is expected that force is applied by hooking the finger only on the knob 74 of the water discharge cap 17, and the water discharge cap 17 is detached. The bayonet groove is obliquely opened, and therefore the water discharge cap 17 can be detached obliquely downward by simply being turned. In the present embodiment, in the groove side surface of the bayonet groove that guides the detachment, about 1 mm just before opening is made parallel to a rotation axis. The water discharge cap 17

is not detached obliquely downward while being turned, but the water discharge cap 17 can be gently dropped on a hand of a user only by being guided substantially vertically downward.

[0070]

In the present embodiment, the knob 74, on which at least a finger is hooked, is provided in the water discharge cap 17, and the water discharge cap 17 is turned by pressing the knob 74, so that the water discharge cap 17 is attached and detached. However, a shape, in which at least two planes or concave shapes may be provided on the outer circumferential surface of the water discharge cap 17, and the water discharge cap 17 is turned to be attached and detached by grasping the planes or the concave shapes, may be employed. By producing the planes or the concave shapes, an effect of easily grasping and easily applying force is obtained.

[0071]

The outer circumferential surface of the water discharge cap 17 may be formed by only planes. For example, in a case where the section of the outer circumference of the water discharge cap 17 is formed in a regular hexagon, the water discharge cap 17 can be detached by a wrench or a hexagonal wrench even when the water discharge cap 17 is strongly fastened.

[0072]

In the present embodiment, the spatula-shaped knob 74 is provided. However, any shape that allows hooking by a finger

may be employed, and a bar-shape, or a convex shape having a recess on a horizontal section so as to allow easy hooking may be employed.

[0073]

Additionally, a method of attaching and detaching the water discharge cap 17 by providing a single linear groove at the center of the water discharge cap 17, and pressing a coin against the linear groove to rotate the coin is also easy and preferable.

[0074]

In the present embodiment, as a method of attaching the water discharge cap 17 to the switching valve 12, the bayonet is employed. However, the water discharge cap 17 may be attached by using a screw. A mechanism, in which a claw is provided in the water discharge cap 17, a convex shape is provided on the inner circumference of the raw water discharge part 51 of the switching valve 12, and inserted into the raw water discharge part 51 while the claw of the water discharge cap 17 is bent inward, and the claw is hooked on the convex shape provided on the inner circumference of the raw water discharge part 51, so that the water discharge cap 17 is attached, may be employed. On the contrary to this, a mechanism, in which a convex shape is provided on the outer circumference of the raw water discharge part 51, and the water discharge cap 17 is attached while the claw of the water discharge cap 17 is bent

outward, may be employed. Similarly, a claw may be provided in the raw water discharge part, and a convex shape, on which the claw is hooked, may be provided in the water discharge cap 17.

[0075]

A recess that is concave shape upward in a state where the switcher 2 is attached to the faucet is provided on the lower face of the lower cover 14, as shown in Fig. 10, the range of the recess is set to at least the installation range of the water discharge cap 17, and the movable range of the knob 74 provided in the water discharge cap 17, as shown in Figs. 9(b) and 9(c). The water discharge cap 17 can be housed in the range of the thickness of the switcher 2, and therefore the thickness of the switcher 2 can be reduced. Even when the sink has a narrow distance between the sink and the faucet, convenience capable of widely using a space below the faucet is obtained. Additionally, when the under side (lower face) recess is provided with a width of 10 mm or more in a radial direction from a central opening that enables passing of raw water, the under side recess can serve as a space where the finger enters when the water discharge cap 17 is attached and detached. Also in a case where the knob 74 is not provided, the water discharge cap 17 can be firmly grasped, and therefore operation is easily performed.

[0076]

In a case of a structure in which the water discharge cap 17 is attached and detached by using a screw mechanism, when the water discharge cap 17 is attached or detached, the water discharge cap 17 is usually turned once or more times. Therefore, when the under side recess is provided on the entire circumference of the central opening that enables the passing of raw water, an effect of easy attachment and detachment is obtained.

[0077]

In a case where the water discharge cap 17 is attached and detached by using a bayonet mechanism, the under side recess may be provided only in the movable area of the water discharge cap 17 and the knob 74. In this case, there is not only an advantage that the water discharge cap 17 can be housed in the range of the thickness of the switcher 2, but also an advantage that a battery box, into which a battery for activating a flow rate counting function or a cartridge replacement timing display function is fitted, or the like can be housed in a large inner capacity part where the under side recess is not provided.

[0078]

Additionally, when the under side recess is widened on the both sides of the movable range of the water discharge cap 17 such that clearances enable the entering of the fingers, there is an advantage that the finger can be prevented from being sandwiched between the water discharge cap 17 and the switcher

2 when the water discharge cap 17 is attached and detached.

[0079]

The inner O ring and the outer O ring mounted in the raw water discharge part 51 of the switching valve 12 play a role of bringing the switching valve 12 and the water discharge cap 17 into a watertight state, and therefore are important. When the depth and the width of O rings mounting grooves are determined so as to make difficult to detach the inner O ring 55 and the outer O ring 56 that appear when the water discharge cap 17 is detached, it is possible to prevent the dropping or the loss of the O rings.

[0080]

In the present embodiment, the raw water discharge part 51 of the switching valve 12 and the water discharge cap 17 are brought into the watertight state by radially crushing the outer circumferences of the O rings. However, a flat gasket may be fitted between the raw water discharge part 51 and the water discharge cap 17, and crushed in a thickness direction, thereby attaining the watertight state.

[0081]

A rectifying member arranged upstream of the water discharge cap 17 is necessary for the above object. The rectifying member mentioned herein indicates a mesh that plays a role of arranging the raw water stream form or a rectifying plate that plays a role of arranging the raw water shower form.

The rectifying member appears when the water discharge cap 17 is detached. However, the rectifying member is firmly fixed to the switching valve 12 by being mounted inside the switching valve 12, by integral molding, or by welding, and therefore cannot be detached. This can prevent loss.

[0082]

The mesh used as the rectifying member that arranges the raw water stream form is preferably installed on an upstream side inside the raw water stream flow path 53 (for example, right behind a raw water stream outlet of a downstream chamber 30). In a case where the mesh is installed on the upstream, even when dirt splashed back by the sink enters the raw water stream discharge port, the dirt is unlikely to be adhered to the mesh, and the switcher 2 can be sanitarily maintained by simply cleaning the water discharge cap 17.

[0083]

The rectifying plate evenly spreads raw water that flows out to the raw water shower flow path 54 of the switcher 2, on the annular bottom surface 71 of the water discharge cap 17, thereby arranging the raw water shower form. When the rectifying plate has a disk shape, the raw water can be diffused in a circumferential direction of the disk, and therefore can be evenly spread on the annular bottom surface 71 of the water discharge cap 17. Additionally, the rectifying plate may be formed in such a shape that a plurality of holes are annularly

provided. Also in a case where the switcher is used with no water discharge cap 17 attached, the rectifying plate itself is formed in a shower form, and therefore water can be prevented from carelessly falling on peripheral household goods by raw water diffusion.

[0084]

In the present embodiment, a form in which the switching valve 12 is sandwiched between the upper cover 13 and the lower cover 14 is referred to as the switcher 2. However, in a case where the surface of the switching valve 12 may double as a surface layer of the switcher 2, the upper cover 13 and the lower cover 14 are not always needed. Accordingly, in a case where the switching valve 12 forms a lower surface layer of the switcher 2, the lower cover 14 is unnecessary, and the recess provided on the lower face of the lower cover in the present embodiment should be provided on the lower face of the switching valve 12.

[0085]

In the present embodiment, the opening that enables the passing of raw water is provided at the center of the lower cover 14 to have a circular shape, and the water discharge cap 17 is mounted. However, in a case where the water discharge cap 17 does not need to be attached and detached, as long as a discharge port that serves as the raw water stream discharge port or the raw water shower discharge port is provided in the lower cover

14, and any form such as a slit and a mesh may be employed.

[0086]

When the switcher 2 is a resin molded article, the switcher 2 is easily produced at a low cost. As a resin material, polystyrene, AS resin (acrylonitrile styrene resin), polycarbonate, acrylic resin, polyethylene, ABS resin (acrylonitrile butadiene styrene resin), polypropylene or the like can be used. Particularly, the switching valve 12 that performs the switching of the flow path has a sealing mechanism, and repeatedly performs switching operation, and therefore POM (polyoxymethylene, polyacetal) that is excellent in molding accuracy and is strong against friction is preferable. The upper cover 13, the lower cover 14, the switching lever 15, and the water discharge cap 17 form external appearance, and have engagement parts with other members, and therefore ABS resin that is excellent in molding accuracy and is glossy is preferable.

[0087]

Now, the protective cover 4 will be described.

[0088]

The protective cover 4 is a thin-walled member along the side surface from the lower face of the switcher 2 as shown in Fig. 11, Fig. 12 and Fig. 13, and is detachably attached to the switcher 2. A thin-walled indicates a resin thickness of 2 mm or less. The protective cover 4 is integrally formed with the

switcher 2, so that good external appearance can be kept.

[0089]

In a case where a surface layer of the switcher 2 is formed by a plurality of members, the protective cover 4 covers a part of a boundary between at least adjacent two members in the plurality of members, so that the boundary is prevented from becoming dirty, and maintenance can be made easy. That is, the side of the switcher 2 is covered, and therefore the boundary between the upper cover 13 and the lower cover 14 can be covered. Accordingly, an effect of preventing dirt from accumulating in the boundary between the upper cover 13 and the lower cover 14, in which the dirt is easily accumulated in the switcher 2, and that is difficult to be cleaned, is obtained. Similarly, in a case where the lower cover 14 is formed by a plurality of members, boundaries between the plurality of members that form the lower cover 14 are covered with the protective cover 4, so that an effect of preventing the boundaries from becoming dirty is obtained.

[0090]

Similarly, as in the present embodiment, when the boundaries between the plurality of adjacent members, such as a boundary between the upper cover 13 and the liquid crystal display 16, are covered with the protective cover 4, portions where a foreign substance or dirt is easily accumulated can be reduced, and sanitary use can be attained.

[0091]

When the protective cover 4 is formed in such a shape as not to cover one of the front face, the rear face, and the right and the left side surfaces of the switcher 2, the protective cover 4 can be easily attached and detached by being simply moved horizontally. When the protective cover 4 is formed in such a shape as not to cover the rear face of the switcher 2, the protective cover 4 can be detached by being pulled in a direction of the front face of the switcher, and the design of the protective cover 4 can be made symmetrical, and therefore good external appearance can be created.

[0092]

A finger hooking convex shape 83 is provided on the lower face of the protective cover 4, and therefore an effect of easily hooking the finger on the protective cover 4, and easily pulling the protective cover 4 to the front side is obtained. Any form may be employed as the finger hooking convex shape 83, as long as the finger is easily hooked on the protective cover 4, and the finger hooking convex shape 83 may be formed by a recess.

[0093]

When the protective cover 4 is a resin molded article, there is an advantage that it is easily produced at a low cost, and flaws caused when the switcher 2 is repeatedly attached and detached are less. As a resin material, polystyrene, AS resin (acrylonitrile styrene resin), polycarbonate, acrylic resin,

polyethylene, ABS resin (acrylonitrile butadiene styrene resin), polypropylene or the like can be used. The protective cover 4 is thin-walled. Therefore, the protective cover 4 that is formed of polypropylene rich in flexibility is preferable, since the protective cover 4 is unlikely to be damaged. Additionally, when ABS resin is used, there is an advantage that coating, plating, printing, and the like are easily performed.

[0094]

As the shape of the protective cover 4 of the present embodiment, only an opening 81 is provided at the center of the protective cover 4, and the raw water forms are formed by the raw water stream discharge port and the raw water shower discharge port provided in the switcher 2, but the raw water stream discharge port and the raw water shower discharge port may be provided in the protective cover 4. In this case, the protective cover 4 doubles as a function of the water discharge cap 17. The protective cover 4 has a substantially annular bottom surface, an inner side surface and an outer side surface continuous from a bottom surface, and is watertightly connected to the raw water discharge part 51 of the switching valve 12. The water discharge cap 17 is unnecessary, thereby enabling low cost production. Additionally, the number of cleaning components is reduced, and therefore there is an advantage that maintenance by a user can be made easy.

[0095]

In the present embodiment, the protective cover 4 is slid to be mounted on the switcher 2, and is fixed to the fixing groove 77 located at the back of the flat spring 76 of the water discharge cap 17. However, the protective cover 4 may be mounted on the switcher 2 from below by using a screw or bayonet around the raw water discharge part 51 of the switcher 2, or may be fixed to the switcher 2 by using a commercially available screw or bolt. Additionally, the protective cover 4 attached with a band formed by a stretchy material such as rubber may be fixed to the switcher 2 by using the band. A claw may be provided in one of the protective cover 4 and the switcher 2, a convex shape may be provided in the other, the protective cover 4 and the switcher 2 may be mounted by bending the claw, and may be fixed by hooking the claw on the convex shape.

[0096]

When the attaching and detaching direction of the protective cover 4 is the front side, operation is easily performed. However, when the attaching and detaching direction is a substantially vertical direction, easy attachment and detachment is possible even in a case of a sink having a narrow depth. Generally, the raw water discharge part 51 is provided on the lower side of the switcher 2 to have a cylindrical shape that extends vertically downward. In this case, the axial direction of the raw water discharge part 51, and the attaching and detaching direction of the protective

cover 4 are nearly parallel, and therefore it is possible to reduce the size of a clearance between the opening 81 that is provided at the center of the protective cover 4 and allows the passing of raw water, and the raw water discharge part 51. A protectable range by the protective cover 4 can be widened compared to a case where the protective cover 4 is attached and detached by being pulled toward the front side.

[0097]

When the protective cover 4 and the switcher 2 are brought into the watertight state, it is possible to prevent mold or water stains caused by water or dirt accumulated between the protective cover 4 and the switcher 2, which is preferable. In a case where the protective cover 4 is provided with a water drain hole, even when water enters between the protective cover 4 and the switcher 2, the water can be drained.

[0098]

According to the present embodiment, the protective cover 4 is produced by a single member at a low cost, and formed in such a shape that the attachment and detachment is possible by simply moving the protective cover 4 in one direction. On the other hand, for example, when two or more members are connected by a hinge, and the protective cover 4 holds a opening/closing function, there is an advantage that a surface of the switcher 2 which cannot be covered by the protective cover 4 that moves in the one direction, such as an entire surface, can be covered,

and a protection region can be freely selected.

[0099]

In a case where the switcher 2 is formed in a substantially cylindrical shape, the protective cover 4 is also formed in a substantially cylindrical shape having a female screw therein. When the protective cover 4 is attached to a male screw provided on the outer circumference of the switcher 2, the protective cover 4 can be compactly and strongly attached.

[0100]

In a case where the switcher 2 is formed such that a rear face side is long from a faucet attachment position, such as a case where the cartridge 3 is housed inside the switcher 2, the protective cover 4 may be formed in such a shape as to be fitted into the rear face side of the switcher 2. In this case, there is an advantage that dirt on the rear face or the lower face on the rear face side which are difficult to be touched with a hand can be cleaned by simply detaching the protective cover 4.

[0101]

The protective cover 4 may be attached to the cartridge 3. For example, in a case where the cartridge 3 is located on the lateral side of the switcher 2 as shown in Fig. 1, the protective cover 4 may be formed in such a shape that a plurality of convex shapes are provided on the side surface of the cartridge 3, and the protective cover 4 is hooked on the convex

shapes to be fixed, and covers the lower part of the switcher 2. Similarly, a coliar or a claw may be provided in place of the convex shapes.

[0102]

In the case where the cartridge 3 is housed inside the switcher 2, or the like, a purified water discharge port is often provided in the switcher 2. The switcher 2 is provided with not only the discharge port for raw water but also the discharge port for purified water, so that the entire lower face of the switcher 2 can be covered and protected by the protective cover 4.

[0103]

As in the present embodiment, for covering the lower part of the switcher 2 with the protective cover, the lower cover 14 may be formed to be attachable and detachable from the switching valve 12, and the lower cover 14 may have a function of the protective cover 4. The lower cover 14 may be formed by a plurality of members, and may be formed such that a member including the circumference of the raw water discharge part 51 desired to be most sanitarilly maintained is attachable and detachable. The discharge port that forms the raw water form may be provided in the switching valve 12, or may be provided in the water discharge cap 17. Additionally, the discharge port that forms the raw water form may be provided in the lower cover that has a protective cover function, or in the member of the

lower cover including the circumference of the raw water discharge part 51, so that functions of the protective cover and the water discharge cap may be provided to the lower cover 14. In either case, the number of component can be reduced, and an effect capable of making a water purifier at low cost and compact is obtained.

[0104]

The protective cover 4 may be formed of high stretchable resin such as silicon, and stretched to be hooked and fixed onto the outer circumference of the lower cover 14. When a fixing molding member, such as a cylinder, that can be fixed to the raw water discharge part 51 of the switching valve 12 is provided, and the outside of the fixing molding member is formed of silicone resin, the protective cover 4 can be easily positioned and attached. Additionally, a concern of disturbing the raw water form due to poor stretching of the silicon resin protective cover 4 can be eliminated. Furthermore, when the outside of the water discharge cap 17 is formed of silicon resin, the protective cover 4 and the water discharge cap 17 can be produced as a single member. There is an advantage that cleaning can be performed at a time.

[0105]

An object of the present embodiment is to protect the under side of the switcher 2 from dirt splashed back from the sink, and to easily implement the cleaning of a part corresponding

to the under side of the switcher 2. However, the protective cover 4 may cover a connecting part between the faucet and the switcher 2.

{0106}

Many clearances between the members and uneven portions are present in the connecting part between the faucet and the switcher 2 corresponding to the faucet, the fitting nut 11, and the switcher 2. Dusts and food dirt are easily accumulated in the clearances and concave shapes, conventional products have a problem that frequent cleaning is required. When the protective cover 4 is configured to cover the connecting part between the faucet and the switcher 2, the switcher 2 can be sanitarilly and beautifully maintained with ease by detaching and cleaning only the protective cover 4. For example, when the protective cover 4 is produced by a single thin molded article, and such a shape as to be wound around a conical shape with no tip is employed, there is an advantage that the protective cover 4 is easily attached and detached, and is easily used since the protective cover 4 can be opened to be cleaned. Additionally, when the protective cover 4 is a cover formed in such a ring shape that a concave shape doughnut shape is divided into halves, a protective cover 4 that is low in height can be obtained. As described above, the prevention of dirt that is difficult to wash away with water, such as dusts and food dirt enables the switcher 2 to be sanitarilly and

beautifully maintained with ease. However, in addition to this, when a sealing property is further provided to the connecting part between the faucet and the protective cover 4, it is possible to suppress the occurrence of water stains, which is preferable.

[0107]

Similarly, the conventional products have a problem that a foreign substance or dirt is easily accumulated in the boundary between the upper cover 13 and the liquid crystal display 16, and it is difficult to clean. In the present embodiment, in order to protect the under side of the switcher 2, the protective cover 4 is attached on the lower part of the switcher 2. However, the protective cover 4 may be formed in such a shape that the upper face of the switcher 2 is protected by attaching the protective cover 4 by slidably fitting above the upper face of the switcher 2.

[0108]

Additionally, a film larger than the liquid crystal display is used as the protective cover 4, and covers also the periphery of the liquid crystal display, so that it is possible to prevent the accumulation of a foreign substance or dirt, and to implement a product that is easily cleaned. Films can be stuck in layers and an uppermost film can be peeled to keep beauty when the protective cover becomes dirty. However, when a film made of a material that is easy to be stuck to the upper cover

13, or a stickable and removable film with adhesive is employed, and the film can be cleaned and stuck again when becoming dirty, and can be repeatedly used, a low cost is attained and waste can be reduced, which is preferable.

[0109]

As the protective cover 4, any cover that attains an object of preventing dirt on the switcher 2, and simplifying cleaning may be employed. For example, the cover is not limited to the molded article, and a mode in which a film is stuck, or a mode in which silicon rubber is stretched and wounded may be employed.

[0110]

In addition, when the protective cover 4 is formed by using a material that easily repels liquid, or is subjected to water repellent coating, an antifouling effect and an effect allowing easy cleaning can be applied to the protective cover 4 itself. Additionally, when the protective cover 4 is subjected to antibacterial coating, or is formed by using antibacterial agent containing resin, bacteria are unlikely to generate even in a case where the cover is damaged by repeated cleaning, and the protective cover 4 itself can be sanitarilly used. Furthermore, the protective cover 4 is colored or has a design property, so that the good external appearance of the water purifier can be added.

[0111]

In the present embodiment, the liquid crystal display is described as a display means of the replacement life of the cartridge. However, other mechanism such as a calendar display may be employed.

[0112]

In the present embodiment, the water discharge cap 17 is a member detachably attached to the switching valve 12, and the raw water stream form and the raw water shower form are formed by the water discharge cap 17. However, also when the water discharge cap 17 is not provided, and the raw water stream form and the raw water shower form is formed by the lower cover 14, an effect of the protective cover 4 can be obtained.

[0113]

According to the present embodiment, the water discharge cap 17 is provided with the discharge port for raw water. However, the water discharge cap 17 can be applicable to the purified water discharge port, and a mode in which discharge ports for both raw water and purified water are provided is preferable. The discharge port for raw water and the discharge port for purified water may be provided by separate members. However, when the both ports are formed by a single member, a low cost is attained, and high convenience is obtained because the user can clean both the raw water discharge port and the purified water discharge port at a time.

INDUSTRIAL APPLICABILITY

[0114]

The present invention is not limited to a water purifier, and applicable to a faucet having stream form water discharge or shower form water discharge. However, the applicable range is not limited to these.

DESCRIPTION OF REFERENCE SIGNS

[0115]

- 1: Water purifier
- 2: Switcher
- 3: Cartridge
- 4: Protective cover
- 11: Fitting nut
- 12: Switching valve
- 13: Upper cover
- 14: Lower cover
- 15: Switching lever
- 16: Liquid crystal display
- 17: Water discharge cap
- 21: Raw water inlet part
- 22: Raw water inlet
- 23: Switching valve case
- 24: Valve element
- 25: Valve spring
- 26: Camshaft
- 27: Case lid

28: Raw water inflow entrance
29: Upstream chamber
30: Downstream chamber
31: Communicating port
32: Partition wall
33: Cam
34:
 Positioning mechanism with click
51: Raw water discharge part
52: Bayonet groove
53: Raw water stream flow path
54: Raw water shower flow path
55: Inner O ring
56: Outer O ring
71: Annular bottom surface
72: Inner side surface
73: Outer side surface
74: Knob
75: Convex shape for bayonet
76: Flat spring
77: Fixing groove
81: opening
82: Fixing convex shape
83: Finger hooking convex shape

CLAIMS

1. A water purifier having a switcher having a switching valve for switching a raw water flow path, and a cartridge that is connected to the switcher and filters raw water, the water purifier comprising:

a protective cover detachably attached to the switcher and configured to cover a lower part of the switcher,

wherein the switcher and the protective cover are different members of the water purifier, and

the switcher has an upper cover and a lower cover that cover the switching valve sandwiched therebetween from the top and the bottom, and engage with each other.

2. The water purifier according to claim 1, wherein the protective cover has an opening that enables passing of raw water discharge.

3. The water purifier according to claim 1, wherein the protective cover has a discharge port that forms a raw water discharge form.

4. The water purifier according to any of claims 1 to 3, wherein

a surface layer of the switcher is formed by a plurality of members, and

the protective cover is configured to cover a part of a boundary between at least adjacent two members of the plurality

of members.

5. The water purifier according to claim 4, wherein
the plurality of members include a lower cover configured
to cover at least a circumference of a raw water discharge part
of the switcher, and
the protective cover is configured to cover at least
boundaries between the lower cover, and the plurality of members
adjacent to the lower cover.

6. The water purifier according to claim 5, wherein
the lower cover is formed by a plurality of members, and
the protective cover is configured to cover a boundary
between the plurality of members that serve as the lower cover.

7. The water purifier according to any of claims 1 to 6,
wherein
the protective cover is attached and detached by being
moved to a front side with respect to the switcher.

8. The water purifier according to any of claims 1 to 7,
wherein
the switcher has a flat spring structure, and
the protective cover is fixed to the switcher by the flat
spring structure.

9. The water purifier according to any of claims 1 to 8,
wherein

the protective cover has a finger hooking recess.

10. The water purifier according to any of claims 1 to 9,
wherein

the switcher has a replacement timing display means of
a cartridge, and

the protective cover is configured to cover a boundary
part between the switcher and the replacement timing display
means.

11. The water purifier according to any of claims 1 to 10,
wherein

the protective cover has a thin-walled shape along an
outer surface shape of the switcher.

12. The water purifier according to any of claims 1 to 11,
wherein

the protective cover and the switcher are watertightly
sealed.

13. The water purifier according to any of claims 1 to 11,
wherein

a water discharge cap configured to flow out raw water is detachably attached to the raw water discharge part of the switching valve.

14. The water purifier according to any of claims 1 to 13, wherein

the protective cover has a purified water discharge hole.