

SPECIFICATION

TITLE OF THE INVENTION

STOP COCK HAVING NONRETURN FUNCTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a stop cock having backflow preventing function.

2. Description of the Related Art

Conventionally, a stop cock provided in a water-supply pipe for branching a distributing water pipe does not have a check valve. Therefore, there is a risk that negative pressure is created at a primary side of the stop cock or pressure at a secondary side of the stop cock becomes higher than the primary side thereof, and as a result, water flows backward and contaminates the distributing water pipe.

In order to prevent the backflow such as described above, a check valve has come to be provided at a midpoint of a flow path. However, since the check valve needs a space for installation, it can be installed only to a limited position in order to keep harmony with peripheral devices when it is installed. Therefore, the check valve has a problem that it lacks general versatility. In such a circumstance, a stop cock integrally formed with a check valve has come to be widely used (for example, see Japanese Patent Publication No. 3453424).

However, the above-described stop cock formed with a check valve is structured by simply incorporating a check valve. Since it is

necessary to combine two valve mechanisms, that is, a stop cock and a check valve, there arises a problem that the resultant structure is inevitably complicated and large in size and its assembly and maintenance and checking operations are burdensome.

SUMMARY OF THE INVENTION

In view of the problems described above, the present invention solves the problems by providing a stop cock having nonreturn function including: a valve seat at a secondary side of a valve port communicating a flow path at a primary side with a flow path at a secondary path; a valve body detachably provided at the valve seat; and a spring mounted to the valve body between the valve body and a spindle capable of advancing or withdrawing in an axial line direction of the valve port, the spring expanded or compressed between the valve body and the spindle in correspondence with the advancing and withdrawing movements of the spindle.

The valve body may be formed into a spherical shape that is in contact with the spring.

Specifically, in the present invention, a valve seat is provided at a secondary side of a valve port communicating a flow path at a primary side with a flow path at a secondary path, and a valve body is detachably provided at the valve seat. In addition, a spring is mounted to the valve body between the valve body and the spindle capable of advancing or withdrawing in an axial line direction of the valve port. The spring is expanded or compressed between the valve body and the spindle in correspondence with the advancing and withdrawing movements of the

spindle. With this arrangement, the biasing (elastic) force of the spring to the valve body in a valve closing direction can be adjusted by advancing or withdrawing the spindle. Therefore, when the spring is compressed to its most compressed state, the valve body is closed to stop water. Then, loosening the spring from its most compressed state enables the valve body to open, thereby allowing water to enter.

If backflow has occurred when the valve body is opened, besides the pressure at the secondary side where the backflow has occurred, elastic force of the spring which is always forced toward the valve closing direction is combined with the backflow pressure. These combined forces allow the valve body to immediately seat on the valve seat, thereby preventing the backflow toward the primary side.

As described above, since the elastic force of the spring is always forced toward the valve closing direction of the valve body, even if the difference between the pressures at the primary side and the secondary side is slight when backflow has occurred, the valve can be securely and tightly closed by the spring before the pressure at the primary side becomes equal to the pressure at the secondary side and this valve closed state can be maintained. As a result, backflow prevention with higher accuracy can be achieved.

Consequently, according to the present invention, there is no need to combine two valve mechanisms, that is, a stop cock and a check valve as has been made in prior arts, and the number of parts is small and the structure is simple as described above. Thus, the stop cock itself can be downsized and its assembly and maintenance and checking operations are extremely easy and need low cost.

Since the valve body is formed into a spherical shape in contact with the spring, the site to be seated on the valve seat differs from operation to operation. Therefore, it is possible to prevent a foreign matter from getting caught between the valve body and the valve seat. In addition, since there is no slight leakage at the time of stopping water, there is no need of maintenance. Further, since water passing through the valve body smoothly flows from the primary side toward the secondary side along a spherical surface, the pressure loss can be reduced and the performance of the stop cock can be enhanced. As described above, the practical effect of the present invention is enormous.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a longitudinal cross-sectional view showing a state where water is stopped by a stop cock having nonreturn function; and

Fig. 2 is a longitudinal cross-sectional view of a stop cock showing a state where water is stopped at the time of backflow.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Hereinafter, an embodiment of the present invention will be described based on drawings.

Figs. 1 and 2 are longitudinal cross-sectional views of a stop cock having nonreturn function. Specifically, Fig. 1 shows a state where water is stopped whereas Fig. 2 shows a state where water is stopped when backflow has occurred.

A valve casing 1 of the stop cock is formed into a so-called Y shape in which the center line of a flow path 3 (at a primary side) of an inlet 2 communicating with a water supply source side and the center

line of a flow path 5 (at a secondary side) of an outlet 4 communicating with the water discharge side are located on one and the same straight line, and an axial line extending toward a secondary side of a valve port 6 for communicating between the flow path 3 at the primary side and the flow path 5 at the secondary side and the flow path 5 at the secondary side form an acute angle.

The upper portion of the valve casing 1 is formed into a substantially cylindrical shape along the axial line extending toward the secondary side of the valve port 6 and its upper end is opened. This opened portion is clogged into a water-tight state by screwing a covering body 9 having an O-ring 8 for penetratedly supporting a spindle 7 in a water-right state which is capable of advancing and withdrawing in an axial line direction of the valve port 6.

The valve port 6 is formed into a funnel shape having a diameter reduced from the secondary side toward the primary side. A valve seat 10 is provided at a secondary side with an enlarged diameter of the valve port 6.

A spherical valve body 11 made of rubber is detachably provided to the valve seat 10, and a spring 12 is mounted between the valve body 11 and the spindle 7. The spring 12 is expanded or compressed between the spindle 7 and the valve body 11 in correspondence with the advancement or withdrawal of the spindle, and valve 12 always forces the valve body 11 toward a valve closing direction.

The spindle 7 is structured such that a male screw formed at its bottom end portion is screwed and fit into a female screw formed on an inner surface of a cylindrical portion 9a projecting from the center

of an upper surface of the covering body 9, and one concaved groove 7a is formed on an end surface of the bottom end portion of the spindle 7 in its diameter direction. The spindle 7 is capable of advancing or withdrawing in the axial line direction of the valve port 6 by fitting a top of a tool such as a minus driver etc. and rotating the tool in a forward or reverse direction.

An O-ring groove is circumferentially formed in the spindle 7 at its site penetrating through the covering body 9 and having no male screw. The O-ring 13 mounted in the O-ring groove seals between the covering body 9 and the spindle 7 penetrated through the covering body 9 in a water-tight state. At a site which is a midpoint of the spindle 7, a stopper 7b in a flange shape having a diameter larger than the spindle penetrating hole of the covering body 9 is formed so as to project outwardly, so that the stopper 7b is in contact with the inner end surface 9b of the covering body 9 when the withdrawal of the spindle 7 is completed.

The spring 12 is made of a conical coil spring. A small-diameter end portion of the spring 12 is fixedly attached to a spring receiver 7c provided at the top end portion of the spindle 7 whereas a large-diameter end portion thereof is always in contact with the valve body 11.

The spring 12 is not limited to the conical coil spring, but may be a cylindrical coil spring. In addition, a bottom end of the spindle 7 may be formed so as to be extendedly projected, and a handle may be provided at the extendedly projected end portion for operating the spindle 7 to advance or withdraw.

Further, in this embodiment, the Y-shaped valve casing 1 has been exemplified; however, the form of the valve casing 1 is not limited to the Y shape, but may be an angle shape. In addition, the form of the valve body 11 is not limited to the spherical shape, but may be a disc shape. In this case, the forms of the valve port 6, valve seat 10 and spring 12 are formed into the shapes corresponding to the valve body 11.

[Next, a function of the stop cock having nonreturn function according to the present invention will be described.

In a water stopped state shown in Fig. 1, the spindle 7 is moved in a valve closing direction and the spring 12 is compressed into its most compressed state, so that the valve body 11 is tightly seated on the valve seat 10 to stop water.

In this water stopped state, the spindle 7 is rotated so as to be withdrawn, and the spring 12 is expanded between the valve body 11 and the spindle 7 so as to weaken the elastic force of the spring 12 (i.e. a valve closing force to the valve body 11). As a result, a pressure at a primary side acting toward the valve opening direction of the valve body 11 overcomes the elastic force of the spring 12 acting toward the valve closing direction of the valve body 11 and the pressure at a secondary side, and compresses the spring 12 so that the valve body 11 is distanced from the valve seat 10. Consequently, water flows from the primary side toward the secondary side through the valve port 6 and the water enters.

When the valve body 11 is opened and the water is communicated, if backflow has occurred, the pressure at the secondary side where the

backflow has occurred becomes larger than the pressure at the primary side. This pressure of the backflow and the elastic force of the spring 12 always acting in the valve closing direction of the valve body 11 together allows the valve body 11 to immediately seat on the valve seat 10 so as to prevent backflow toward the primary side (see Fig. 2).

WHAT IS CLAIMED IS:

1. A stop cock having nonreturn function comprising: a valve seat at a secondary side of a valve port communicating a flow path at a primary side with a flow path at a secondary path; a valve body detachably provided at said valve seat; and a spring mounted to said valve body between said valve body and a spindle capable of advancing or withdrawing in an axial line direction of the valve port, said spring expanded or compressed between the valve body and the spindle in correspondence with the advancing and withdrawing movements of the spindle.

2. A stop cock having nonreturn function according to claim 1, wherein the valve body is formed into a spherical shape in contact with the spring.