

【DESCRIPTION】

【Invention Title】

INJECTION WATERSTOP

5 **【Technical Field】**

The present invention relates to a waterstop.

【Background Art】

10 In general, a waterstop is intended to be provided at the wall joint between concrete walls so as to prevent water from penetrating into the inside of the walls from the outside of the walls.

FIGS. 1 and 2 illustrate a waterstop disclosed in Korean Patent Registration No. 10-0975649.

15 The prior art waterstop 10, which is illustrated in the FIGS. 1 and 2, includes a body 20, a lower portion 50, a waterproof portion 40 and lateral supports 30.

20 The body 20 is provided at one end thereof with a protrusion 22 and at the other end thereof with a fitting hole 25 into which the protrusion 22 is fitted. A plurality of such waterstops 10 are coupled to each other, and are provided at the boundary between stacked concrete walls so as to implement waterproofing therebetween.

25 The lower portion 50 extends downwards by a predetermined distance, and is stuck into a first-stage

concrete mass 71 charged in a formwork 60 before the concrete mass 71 cures.

The waterproof portion 40 is integrally extrusion-molded with the body 20, and extends upwards so as to be disposed along the lower portion of a second-stage concrete mass. After the lower portion 50 is stuck into the first-stage concrete mass 71 and is held therein, the second-stage concrete mass (not shown) is charged into a formwork (not shown), which is newly constructed, on the first-stage concrete mass 71. At this point, the waterproof portion 40 is disposed in the lower portion of the second-stage concrete mass in the state of being vertically erected.

Although the FIGS. 1 and 2 illustrate the case in which the waterstop is applied to concrete walls which are vertically stacked on each other, the waterstop may also be applied to the case in which concrete walls are continuously and horizontally stacked such that the wall joint is vertically formed.

The prior art waterstop has a limitation on prevention of penetration of water after construction of the waterstop in concrete walls. For example, when water begins to penetrate into a concrete wall from the outside of the concrete wall, the water may flow along the outer surface of the waterstop and may then reach the inner surface of the concrete wall.

【Disclosure】

【Technical Problem】

It is an object of the present invention to solve at
5 least one of the problems of the prior art.

Specifically, the object of the present invention is
to provide a novel injection-type waterstop capable of
blocking the penetration of water by injecting a grout
material at the time of occurrence of water penetration.

【Technical Solution】

In at least one embodiment of the present invention,
an injection waterstop includes a central portion, a first
extension extending from one side of the central portion and
15 a second extension extending from another side of the central
portion, and is elongated in a longitudinal direction, wherein
the injection waterstop being embedded in a concrete wall
joint so as to basically prevent water from penetrating toward
an inside from an outside of the concrete wall and allow an
20 grout material injection work in case where the water
penetration occurs.

In at least one embodiment of the present invention,
the injection waterstop includes an injection portion
including a hollow hole, which is longitudinally formed
25 therethrough and into which a grout material is injected, and

at least one ejection hole, which allows the hollow hole to communicate with an outside of the hole and thus allows the grout material to be ejected to the outside, and a cover portion, which is provided on one side of an outer surface of the injection portion so as to cover the ejection hole and to thus prevent foreign substances from entering an inside of the injection portion.

In at least one embodiment of the present invention, the injection portion may include a recess formed in an outer surface thereof, and the ejection hole may include an outlet formed on an recessed surface of the recess, wherein the cover portion may include a protrusion, which is received in the recess so as to block the outlet of the ejection hole.

In at least one embodiment of the present invention, the cover portion may be made of a permeable material but a portion of the cover portion corresponding to the ejection hole may be made of an impermeable material.

In at least one embodiment of the present invention, the hollow hole in the injection portion may be provided therein with an inner hollow pipe, which is made of a material having higher hardness than that of the injection portion and has a circular section.

In at least one embodiment of the present invention, the injection portion and the inner pipe may be integrally formed with extrusion molding.

In at least one embodiment of the present invention, the ejection hole may be formed on only one side of the injection portion with respect to an imaginary central line extending through the first and second extensions but not on the opposite side of the injection portion.

In at least one embodiment of the present invention, the one side of the injection portion, on which the ejection hole is formed, corresponds to the side facing the outside of the concrete walls.

In at least one embodiment of the present invention, the injection portion may be formed in the central portion.

In at least one embodiment of the present invention, the injection portion may be formed in each of an end of the first extension and an end of the second extension.

In at least one embodiment of the present invention, the injection portion may be formed in at least one of the central portion, the first extension and the second extension, and a hollow hole may be formed in another one of the central portion, the first extension and the second extension, one end of the injection portion communicating with one end of the hollow hole via a communication pipe.

【Advantageous Effects】

The injection waterstop according to the present invention has an advantage of allowing the injection of grout

to be performed at the time of occurrence of water penetration, thereby further secondarily preventing water penetration.

5 **【Description of Drawings】**

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

10 FIGS. 1 and 2 show a prior art waterstop.

FIG. 3 is a perspective view a waterstop according to an embodiment of the present invention;

FIG. 4 is a cross-sectional view of FIG. 1;

15 FIG. 5 is a view illustrating the waterstop embedded in concrete slurry before the concrete slurry is cured;

FIG. 6 is a view illustrating the state in which water penetration occurs after construction of a concrete wall; and

20 FIG. 7 is a view illustrating the injection of grout, which is performed after the occurrence of water penetration.

【Best Mode】

First, an injection waterstop according to an embodiment of the present invention will be described in detail with reference to FIGS. 3 and 4.

The injection waterstop is elongated so as to have a predetermined length in the longitudinal direction. The length of the injection waterstop may vary depending on the type of wall construction. The injection waterstop may be applied not only to a horizontal wall joint but also to a vertical wall joint.

Particularly, when concrete walls for a subway station building are constructed, the injection waterstop may be used to prevent water penetration to the inner surface from the outer surface of the concrete walls through a vertical wall joint between the concrete walls.

For example, the concrete wall may be constructed to a height of 40 m or more. In this case, because the pressure attributable to water penetration is a high pressure greatly exceeding atmospheric pressure, it is preferable to design the waterstop so as to sufficiently prevent water penetration under high pressure.

The body of the waterstop according to the embodiment of the present invention includes a central portion 110, a first extension 120 and a second extension 130. Here, the first extension 120 and the second extension 130 extend

oppositely from the central portion 110 positioned therebetween.

When concrete slurry is poured so as to construct a first concrete wall, the first extension 120 is stuck into the concrete slurry before the concrete slurry cures, and is securely embedded in the first concrete wall after curing of the concrete slurry. Thereafter, concrete slurry for construction of a subsequent concrete wall is poured so as to embed the second extension 130 therein and is cured.

An injection portion 140 is formed in the central portion 110 of the body of the waterstop. The injection portion 140 includes a hollow hole 141 formed in the central portion 110, and an ejection hole 142 connecting the hollow hole 141 to the outer surface of the central portion 110.

A plurality of the ejection holes 142 may be formed on the central portion 110 and arranged in the longitudinal direction with predetermined intervals. Also, the ejection holes 142 may be formed in a partially circumferential direction in a zigzag pattern. Ejection holes 142 formed along a first imaginary line parallel to the longitudinal direction and ejection holes 142 formed along a second imaginary line parallel to the longitudinal direction may be arranged so as to be out of alignment with each other in a circumferential direction.

The central portion 110 is provided on the outer surface thereof with a plurality of recesses 142 each having a semicircular section, on the bottoms of which the ejection holes 142 are formed.

5 The hollow hole 141 is provided therein with a first inner pipe 160, which also has therein a hollow hole 161 and ejection holes 162.

10 The first inner pipe 160 is preferably made of a material that has a higher hardness than that of the central portion 110 of the body of the waterstop.

15 For example, although the waterstop body and the first inner pipe 160 are made of PBC or TPO (Thermo Plastic Olefin (Polymer)) among plastic materials, the first inner pipe 160 is made of a material having higher hardness than that of the waterstop body.

20 Because the central portion 110 may be pressed and deformed due to external pressure when the first inner pipe 160 is not provided, the first inner pipe 160 is preferably made of a material having higher hardness than that of the central portion 110. As will be described later, the first inner pipe 160 serves as an injection channel for liquid grout. Accordingly, for efficient injection of the liquid grout, the first inner pipe 160 is preferably made of a material capable of preventing the shape of the first inner

pipe 160 from changing even during manufacture of the first inner pipe or construction of a concrete wall.

The waterstop body and the first inner pipe 160 may be integrally formed with each other through extrusion molding, and the ejection holes 142 and 162 may be formed after the extrusion molding.

The central portion 110 is provided on the outer surface thereof with a cover portion 150 for blocking the ejection holes 142.

The cover portion 150 is also elongated in the longitudinal direction, and is provided on the inner surface thereof with protrusions 151, which are formed at positions corresponding to the ejection holes 142.

The protrusions 151 are respectively received in the recesses 143 formed in the outer surface of the central portion 110 so as to block the ejection holes 142 formed in the bottoms of the recesses 143.

The cover portion 150 is preferably made of a permeable material such that, when liquid grout is injected into the waterstop, the cover portion 150 allows the liquid grout to permeate therethrough. For example, the cover portion 150 is made of a foamed material. Specifically, the cover portion 150 is made of permeable sponge, rubber, non-woven fabric or the like.

Furthermore, the cover portion 150 may be made of a material that allows micro-cement, urethane or the like to permeate therethrough.

At least the ends of the protrusions 151 are made of an impermeable material 152 that does not allow water or concrete slurry to permeate therethrough. The impermeable material 152 includes, for example, rubber, silicone and the like, and is applied to the ends of the protrusions 151 so as to form impermeable layers.

FIG. 5 is a view schematically illustrating the injection waterstop embedded in concrete slurry in which external foreign substances are prevented from entering the injection portion 140.

Because concrete slurry includes water therein before the concrete slurry finishes curing, foreign substances may permeate the cover portion 150 and may enter the ejection holes 142. At this point, the impermeable material 152, which constitutes the ends of the protrusions 151 of the cover portion 150, prevents the permeation of foreign substances.

The cover portion 150 is pressed by concrete slurry, and the protrusions 151 are pressed toward the ejection holes 142 by the pressing force. Accordingly, it is possible to prevent external foreign substances from entering the ejection holes 142.

The cover portion 150 is preferably provided on the outer surface of the waterstop body. Accordingly, it is possible to prevent water penetration through the outer surface of the waterstop body by injecting grout.

5 Furthermore, it is preferable that a hole is not formed on the side of the central portion 110 opposite the side on which the ejection holes 142 are formed. The reason for this is because, if a hole is formed on the opposite side of the waterstop body, there may be a problem in which foreign
10 substances are introduced through the hole and thus clog the injection portion 140 during placement of concrete.

After a concrete wall is constructed in the state in which the injection waterstop is embedded therein, water may penetrate through the wall joint in the constructed concrete
15 wall. Specifically, water may penetrate through the water channel in the wall joint from the outer surface of the concrete wall, may flow along the outer surface of the waterstop and may reach the inner surface of the concrete wall, as illustrated in FIG. 6.

20 A maintenance worker may find that water penetrates the concrete wall and flows along the inner surface of the concrete wall. At this point, the maintenance worker may perform an operation of injecting grout in order to prevent further progress of the water penetration.

Specifically, liquid grout may be injected through the injection portion 140 of the end of the waterstop, which is exposed to the outside of the concrete wall. The injected liquid grout is introduced through the hollow hole 161 in the first inner pipe 160, and is ejected to the outside through the ejection holes 142 and 162, as illustrated in FIG. 7. The liquid grout, which is ejected through the ejection holes 142 and 162, flows through the gaps between the protrusions 151 of the cover portion 150 and the recesses 142, permeates the cover portion 150, and reaches the outer surface of the cover portion 150.

The liquid grout, which has reached the outer surface of the cover portion 150, is charged into the water channel in the wall joint, through which water penetrates, and is cured therein, thereby preventing water penetration through the water channel.

Preferably, a hollow hole 121 is formed in the lateral end of the first extension 120 of the waterstop body, and a second inner pipe 170 is provided in the hollow hole 121.

The injection portion 140 in the second end of the waterstop and the hollow hole in the lateral end of the first extension 120 communicate with each other via a communication pipe (not shown).

When gas is injected through the hollow hole in the lateral end of the first extension 120 while liquid grout is

injected through the injection portion 140 in the first end of the waterstop during the injection of grout, the gas introduced into the second inner pipe 170 in the first extension 120 flows to the injection portion 140 through the communication pipe, and thus applies counter pressure to the liquid grout, which flows through the injection portion 140. At this time, because the liquid grout is pressed from opposite sides, the liquid grout is more effectively ejected through the ejection holes 142 and 162.

The second inner pipe 170 is also extrusion-molded together with the waterstop body.

Although this embodiment is provided with the first inner pipe 160 and the second inner pipe 170, the first inner pipe 160 and the second inner pipe 170 may not be provided in another embodiment.

<Description of Reference Numerals>

111: central portion	120: first extension
121: hollow hole	130: second extension
140: injection portion	141: hollow hole
142: injection hole	143: recess
150: cover portion	151: protrusion
152: permeable material	160: first inner pipe
161: hollow hole	162: ejection hole
170: second inner pipe	

【CLAIMS】

【Claim 1】 An injection waterstop, which includes a central portion, a first extension extending from one side of the central portion and a second extension extending from another side of the central portion and which is elongated in a longitudinal direction, the injection waterstop being embedded in a concrete wall joint so as to prevent water from penetrating toward an inside from an outside of the concrete wall, the injection waterstop comprising:

an injection portion including a hollow hole, which is longitudinally formed therethrough and into which a grout material is injected, and at least one ejection hole, which allows the hollow hole to communicate with an outside and thus allows the grout material to be ejected to the outside; and

a cover portion, which is provided on one side of an outer surface of the injection portion so as to cover the ejection hole and thus prevent foreign substances from entering an inside of the injection portion.

【Claim 2】 The injection waterstop according to claim 1, wherein the injection portion includes a recess formed on an outer surface thereof, and the ejection hole includes an outlet formed on an recessed surface of the recess, and

wherein the cover portion includes a protrusion, which is received in the recess so as to block the outlet of the ejection hole.

5 **【Claim 3】** The injection waterstop according to claim 1, wherein the cover portion is made of a permeable material but a portion of the cover portion corresponding to the ejection hole is made of an impermeable material.

10 **【Claim 4】** The injection waterstop according to claim 1, wherein the hollow hole in the injection portion is provided therein with an inner hollow pipe, which is made of a material having higher hardness than a hardness of the injection portion and has a circular section.

15 **【Claim 5】** The injection waterstop according to claim 4, wherein the injection portion and the inner pipe are integrally formed with extrusion molding.

20 **【Claim 6】** The injection waterstop according to claim 1, wherein the ejection hole is formed on only one side of the injection portion with respect to an imaginary central line extending through the first and second extensions but is not formed on an opposite side of the injection portion.

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【Claim 7】 The injection waterstop according to claim 6, wherein the one side of the injection portion, on which the ejection hole is formed, corresponds to the side facing the outside of the concrete walls.

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【Claim 8】 The injection waterstop according to claim 1, wherein the injection portion is formed in the central portion.

10 【Claim 9】 The injection waterstop according to claim 1, wherein the injection portion is formed in each of an end of the first extension and an end of the second extension.

15 【Claim 10】 The injection waterstop according to claim 1, wherein the injection portion is formed in at least one of the central portion, the first extension and the second extension, and a hollow hole is formed in another one of the central portion, the first extension and the second extension, one end of the injection portion communicating
20 with one end of the hollow hole via a communication pipe.

25 【Claim 11】 The injection waterstop according to claim 10, wherein the hollow hole formed in the another one of the central portion, the first extension and the second extension is provided therein with an inner hollow pipe.