

Title of the Invention

Urinal

Background of the Invention

5 0001

The present invention relates to a urinal, and in particular to a urinal for receiving and discharging urine.

Description of the Related Art

10 0002

As shown in Japanese Patent Unexamined Publication 2013-14965 (Patent Document 1) and Japanese Patent Unexamined Publication 2011-214262 (Patent Document 2), urinals comprising a discharge trap at the bottom of a bowl portion for receiving a user's urine are known.

15 In the urinal shown in Patent Document 1 and Patent Document 2, a discharge trap has: a downward extending descending conduit, a horizontal conduit bending gradually from the descending conduit and extending horizontally, and an ascending conduit similarly gradually bending from the horizontal conduit and extending upward; and is approximately U-shaped.

20 A predetermined amount of pooled water is constantly pooled at the bottom portion of the discharge trap in order to prevent the intrusion of foul odors or the like from drain pipes; a water seal is formed by the pooled water.

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25 In the type of conventional urinal, when a user urinates urine flows into the discharge trap; the majority of pooled water is discharged by the inflow of urine, and inside the discharge trap a liquid with a high urine concentration mixture of urine and water is present as pooled water.

30 When flush water is supplied to the bowl portion to flush the bowl portion after use by a user, the flush water once again flows from the bowl portion into

the discharge trap; high urine concentration pooled water is discharged from the discharge trap, and high urine concentration pooled water in which urine and water are mixed in the discharge trap is replaced by low urine concentration flush water newly flowing into the discharge trap.

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In the past, the problem has occurred that if the substitution rate (the ratio at which pooled water pooled in the discharge trap is substituted by new flush water) is low when the high urine concentration pooled water consisting of mixed
10 urine and water in a discharge trap is substituted by flush water with a low urine concentration newly flowing into the discharge trap, the urine concentration in the post-substitution pooled water increases, making it easier for uric scale to form.

15 Brief Summary of the Invention

Problems to be Solved by the Invention

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On the other hand, in recent years, the call for water conservation stemming from higher environmental awareness has increased even further,
20 leading to a demand that the amount of flush water used to flush the bowl portion be reduced.

However when the flush water amount is reduced, the amount of flush water for substituting high urine concentration pooled water is also reduced, so that the pooled water substitution rate is decreased, leaving the post-substitution
25 pooled water urine concentration high, so that uric scale can easily form in the discharge trap.

Therefore an improvement is sought in the substitution rate so that high urine concentration pooled water is substituted even when the flush water amount is relatively slow.

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In connection with the problem, the present inventors have discovered the following knowledge through diligent research.

First, forming the discharge trap compactly and forming the water seal with a small amount of pooled water is one conceivable way to improve the substitution rate, but when the discharge trap is compactly formed, the bends from the descending conduit of the discharge trap to the horizontal conduit and from the horizontal conduit to the ascending conduit are sharpened, and the direction of flow within the discharge trap changes suddenly in each conduit connecting portion.

A flush water flow speed differential between the inner side and the outer side of the urinal can therefore easily occur in each of the conduit connecting portions.

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It was thus discovered that if a flush water flow speed differential between the inner side of the urinal and the outer side of the urinal occurs in each of the conduit connecting portions, flush water flow stagnation can easily occur so that the pooled water substitution rate inside the discharge trap cannot be improved.

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It is therefore an object of the present invention to provide a urinal with which a pooled water substitution rate can be improved and a depositing of uric scale in a discharge trap can be constrained.

Means to Solve the Problems

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The above object is achieved according to the present invention by providing a urinal for receiving and discharging urine, comprising a bowl portion having a bowl surface for receiving urine, a spouting device disposed on a top

portion of the bowl portion for spouting flush water onto the bowl surface, and a discharge trap portion, communicating with a discharge port disposed on a bottom portion of the bowl portion, for discharging flush water and forming a water seal on a downstream side of the bowl portion; wherein the discharge trap includes a descending conduit extending downward from a discharge port, a horizontal conduit connected to the descending conduit and extending horizontally, and an ascending conduit connected to the outlet of the horizontal conduit and extending upward; and wherein a cross section perpendicular to the discharging direction of either the horizontal conduit or the ascending conduit on the discharge trap portion is formed so that an inner side of the urinal from a center of the cross section has a smaller cross sectional area than an outer side of the urinal from the center of the cross section.

In the present invention thus constituted, because the cross section perpendicular to the draining direction of either the horizontal conduit or the ascending conduit on the discharge trap portion is formed so that the inner side of the urinal from the center of the cross section has a smaller cross sectional area than the outer side of the urinal from the center of the cross section, speed differences between the flow speed on the side to the inside of the center of the cross section of the discharge trap portion horizontal conduit or ascending conduit and the flow speed on the side to the outside of the center of the cross section are constrained, and by the means stagnation of flow in the horizontal conduit or ascending conduit is constrained, therefore the substitution rate of pooled water inside the discharge trap portion can be improved, and deposition of uric scale in the horizontal conduit or ascending conduit can be constrained.

0011

In a preferred embodiment, the ascending conduit of the discharge trap portion is formed so that a cross sectional area thereof is essentially constant from an inlet thereof to an outlet thereof.

In the present invention thus constituted, the discharge trap portion

ascending conduit is formed so that the cross sectional area thereof is essentially constant from the inlet to the outlet thereof, thereby inhibiting changes in flow speed within the ascending conduit on the discharge trap portion, so that stagnation of flows in the ascending conduit of the discharge trap portion is constrained, thereby further constraining the deposition of uric scale in the ascending conduit.

Note that "essentially constant" here includes cases where the cross sectional area is completely constant, and also includes "essentially constant" cases of a degree sufficient to present the same effect as in the completely constant case.

0012

In another preferred embodiment, the descending conduit of the discharge trap portion is formed so that a cross sectional area gradually decreases from an inlet thereof to an outlet thereof.

In the present invention thus constituted, the discharge trap portion descending conduit is formed so that the cross sectional area gradually decreases from the inlet to the outlet, therefore substitution of pooled water inside the discharge trap portion is performed quickly due to the increased flow speed inside the descending conduit heading toward the downstream side, hence deposition of uric scale in the horizontal conduit and ascending conduit can be constrained.

0013

In still another preferred embodiment, descending conduit of the discharge trap portion is formed so that a cross section thereof is essentially circular.

In the present invention thus constituted, the descending conduit of the discharge trap portion is formed so that the cross section is essentially circular, therefore the cross section surface area of the descending conduit is larger than the surface area of the inlet to the horizontal conduit, and flows into the

horizontal conduit are accelerated from the interior of the descending conduit, so that stagnation of flow in the horizontal conduit is constrained, thereby enabling the deposition of uric scale in the horizontal conduit to be constrained.

Note that "essentially circular" here includes cases where the cross sectional area is completely constant, and also includes "essentially circular" cases, such as ellipses, of a degree sufficient to present the same effect as completely circular cases.

0014

In another preferred embodiment of the present invention, the horizontal conduit and ascending conduit of the discharge trap portion are respectively formed so that the cross sectional width dimensions thereof are essentially the same size as the minimum width dimension of the flow path cross section of the descending conduit outlet.

In the present invention thus constituted, the horizontal conduit and ascending conduit of the discharge trap portion are respectively formed so that the cross sectional width dimensions thereof are essentially the same size as the minimum width dimension of the flow path cross section of the descending conduit outlet, therefore the flow speed of discharged water in the discharge trap portion is maintained, and the occurrence of turbulence is inhibited, so that stagnation of flows in the horizontal conduit or ascending conduit is constrained; hence substitution of pooled water inside the discharge trap portion is performed quickly, such that deposition of uric scale in the horizontal conduit and ascending conduit can be constrained.

Note that "essentially the same" here includes cases of being completely the same, and also includes "essentially the same" cases of a degree sufficient to present the same effect as completely same cases.

Effect of the Invention

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In the urinal of the present invention, the pooled water substitution rate can be improved, and deposition of uric scale in the discharge trap can be constrained.

5 Brief Description of Drawings

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Fig. 1 is a front elevation perspective view seen from in front and above a urinal according to an embodiment of the present invention.

Fig. 2 is a cross section seen along line II-II in Fig. 1.

10 Fig. 3 is a partial enlarged cross section in the vicinity of the discharge trap portion of the urinal shown in Fig. 2.

Fig. 4 is a partial cross section seen along line IV-IV in Fig. 2.

Fig. 5 is a partial cross section seen along line V-V in Fig. 2.

15 Fig. 6 is a diagram showing the flow of flush water in the urinal according to an embodiment of the present invention.

Detailed Description of the Preferred Embodiments

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20 Next, referring to the attached drawings, the basic structure of a urinal according to an embodiment of the present invention will be explained.

Fig. 1 is a front elevation perspective view seen from in front and above a urinal according to an embodiment of the present invention, and Fig. 2 is a cross section seen along line II-II in Fig. 1.

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As shown in Figs. 1 and 2, a urinal 1 according to an embodiment of the present invention comprises a bowl portion 10 formed in a bowl shape on the front side.

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A bowl surface 12 for receiving a user's urine is formed on the bowl portion 10; when seen in the vertical direction, the top portion of the bowl surface 12 is formed as an arced surface with a relatively large curvature radius, and the bottom portion thereof is formed as an arced surface with a relatively small curvature radius, while the bottom portion thereof is formed to converge as it curves in a bowl shape.

0020

A spout apparatus 30 for spouting flush water W for flushing bowl surface 12 is disposed at the top of the bowl portion 10; a water supply pipe 32 supplying flush water W is connected at the rear side of the spout device 30.

The spout device 30 spouts flush water W to the bowl surface 12 based on a detection signal from a body sensor (not shown) and a predetermined control program, etc.

0021

A discharge port 14, to which flush water used to flush the bowl surface 12 is discharged, is formed at the lowermost position of a bottom region R1 inside the bowl portion 10, and a discharge trap portion 40 communicating with the discharge port 14 is formed on the downstream side of the discharge port 14.

A mesh 20 covering the discharge port 14 is mounted on the bowl portion 10.

0022

The discharge trap portion 40 comprises: a descending conduit 42 extending downward from the discharge port 14, a horizontal conduit 44 connected to the outlet 42d of the descending conduit 42 (see Fig. 3) and extending horizontally from the descending conduit 42 with a gradual bend to the horizontal conduit 44; and an ascending conduit 46 connected to the horizontal conduit outlet 44d of the horizontal conduit 44 (see Fig. 3) and extending

similarly in a gradual bend upward from the outlet 44d of the horizontal conduit 44 (see Fig. 3).

0023

5 Flush water accumulates as pooled water in the horizontal conduit 44; a water seal is thus formed inside the discharge trap portion 40, and foul odors, etc. from sewers, etc. outside the urinal 1 are prevented from spilling out into the bowl portion 10 and the toilet space in the vicinity thereof.

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The descending conduit 42 and the ascending conduit 46 are adjacent, mediated by a common wall 48; by the means the size of the discharge trap portion 40 is compacted, and the amount of pooled water stored inside the discharge trap portion 40 is reduced compared to conventional urinals.

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0025

A discharge chamber 60 is connected to the downstream side of the discharge trap portion 40, and flush water (discharge water) which has flushed the bowl surface 12 and flowed into the discharge trap portion 40 from the
20 discharge port 14 is made to discharge to the discharge pipe portion 50 on the rear surface outer side of the urinal 1 by the discharge chamber 60.

The drain pipe portion 50 comprises a drain socket 52 connected at one end to the discharge chamber 60, and drain pipe 54, connected to the other end of the drain socket 52.

25 Note that, in the present embodiment, the drain socket 52 is connected to the discharge chamber 60, but the drain pipe 54 may also be directly connected to the discharge chamber 60 without disposing a drain socket 52.

0026

30 In the present embodiment, the discharge chamber 60 is integrally formed

with the ascending conduit 46 on the discharge trap portion 40, but may also be formed as a separate body from the discharge trap portion 40 using resin or the like.

5 0027

Next, using Figs. 3 through 5, details of the discharge trap portion according to an embodiment of the present invention will be explained.

Fig. 3 is a partial enlarged cross section close to the discharge trap portion of the urinal shown in Fig. 2; Fig. 4 is a partial cross section seen along line IV-IV in Fig. 3; and Fig. 5 is a partial cross section seen along line V-V of Fig. 3.

0028

As shown in Fig. 4, the descending conduit 42 on the discharge trap portion 40 has an essentially circular shape in section.

15 As is further shown in Fig. 3, the descending conduit 42 is formed by a descending conduit front wall 42a on the front side of the descending conduit 42, and a common wall 48 forming a descending conduit rear wall 42b on the rear side of the descending conduit 42.

20 The descending conduit front wall 42a and descending conduit rear wall 42b of the descending conduit 42 are essentially symmetrical about the center axis line C of the descending conduit 42, and are formed to have a diminishing cross sectional area in the downstream direction.

For the reason, the descending conduit 42 entrance 42c cross sectional area is formed to be the largest, and the outlet 42d is formed to be the smallest.

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0029

The horizontal conduit 44 of the discharge trap portion 40 comprises a horizontal conduit inlet 44a connected to the outlet 42d on the descending conduit 42, a first bent portion 44b for changing the flow path in the vertical direction to a horizontal flow path, a horizontal portion 44c connected to the

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downstream side of the first bent portion 44b and forming a flow path in the horizontal direction, and a horizontal conduit outlet 44d on the downstream end of the horizontal portion 44c connected to the ascending conduit 46, described below; whereby falling flush water is smoothly introduced into the horizontal
5 portion 44c of the horizontal conduit 44.

0030

As shown in Fig. 5, the shape of cross section A on the horizontal portion 44c of the horizontal conduit 44 is essentially semicircular relative to the vertical
10 direction center line C1 of cross section A on the urinal outer side (bottom side), and essentially trapezoidal on the urinal inner side (top side).

Therefore in the cross section A of the horizontal portion 44c of the horizontal conduit 44, the surface area S1 on the inner side of the urinal is smaller than the surface area S2 on the outside of the urinal.

0031

Note that the dimension of the height in the vertical direction of the cross section of the horizontal conduit 44 on the discharge trap portion 40 is essentially the same as the smallest width dimension of the flow path cross
20 section of the outlet 42d on the descending conduit 42.

The cross sectional shape of the first bent portion 44b of the horizontal conduit 44 has the same shape as the horizontal portion 44c of the horizontal conduit 44 across the whole range in the flow direction, but it is also acceptable for the shape to change continuously toward the downstream side from the cross
25 sectional shape of the descending conduit 42 to the cross sectional shape of the horizontal portion 44c of the horizontal conduit 44.

0032

The discharge trap portion 40 ascending conduit 46 comprises a second
30 bending portion 46a, the inlet of which connects to the horizontal conduit 44

outlet 44d and changes the horizontal flow path to a vertical flow path, and an ascending portion 46b connected to the outlet of the second bending portion 46a and extending upward; whereby flush water is smoothly supplied to the ascending conduit 46 ascending portion 46b by the second bending portion 46a.

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0033

The ascending portion 46b of the ascending conduit 46 comprises an ascending portion front wall 46c on the front side, formed by the common wall 48, and an ascending portion rear wall 46d on the rear side; the ascending
10 portion front wall 46c and ascending portion rear wall 46d are essentially parallelly inclined in the front-to-back direction, therefore the distance between the ascending portion front wall 46c and the ascending portion rear wall 46d is essentially constant from the inlet to the outlet on the ascending portion 46b.

15 0034

As shown in Fig. in 4, the cross section B of the ascending conduit 46 ascending portion 46b has essentially an "arch shape on the urinal outer side (rear side) relative to the center line C2 in the front-to-back direction of cross section B; and an essentially trapezoidal shape on the inner side (front side) of
20 the urinal.

In the cross section B of the ascending portion 46b of the ascending conduit 46, the surface area S3 on the urinal inner side is smaller than the surface area S4 of the outer side of the urinal.

25 0035

Note that the width measurement in the front-to-back direction of the cross section of the ascending conduit 46 is essentially the same as the minimum width direction of the flow path cross section of the outlet 42d of the descending conduit 42.

30 In addition, the cross sectional shape of the ascending conduit 46 second

bending portion 46a is the same as the cross section A of the horizontal portion 44c over the entire span of the flow direction, but it may also change continuously toward the downstream side from the cross sectional shape of the horizontal conduit 44 horizontal portion 44c to the shape of cross section B of the ascending conduit 46 ascending portion 46b.

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The cross section B of the ascending conduit 46 ascending portion 46b is essentially the same shape from the inlet to the outlet of the ascending conduit 46 ascending portion 46b, therefore the cross sectional area of the cross section B of the ascending conduit 46 ascending portion 46b is essentially constant from the inlet to the outlet of the ascending conduit 46 ascending portion 46b.

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As described above, the common wall 48 is formed by the descending conduit front wall 42a, which is the side surface on the rear side of the descending conduit 42, and the ascending portion front wall 46c, which is the side surface on the front side of the ascending conduit 46.

Flush water inside the discharge trap portion 40 thus flows downward in the descending conduit 42, changes direction in the vicinity of the common wall 48, turning nearly half a revolution about the return flow path forming portion 48a at the bottom of the common wall 48 as it passes through the horizontal conduit 44, and flows upward inside the ascending conduit 46.

I.e., the discharge trap portion 40 of the present embodiment is formed to create a flow which changes direction from a downward flow through the descending conduit 42, suddenly turning back as it passes through the horizontal conduit 44, then changes flow direction to an approximately 180° upward direction inside the ascending conduit 46 formed on the reverse side (rear side) which sandwiches the common wall 48.

0038

Next, the operation of a urinal based on the above-described embodiment of the present invention will be explained.

Before a user urinates, low urine concentration flush water exists as pooled
5 water in the discharge trap portion 40.

When a user urinates in the urinal 1, urine flows from the bowl portion 10
discharge port 14 into the discharge trap portion 40, and the majority of the
originally existing low urine concentration pooled water is discharged
(substituted) by the flowed-in urine, so that pooled water with an extremely high
10 urine concentration containing a mixture of urine and water is present in the
discharge trap portion 40.

0039

When a user finishes urinating and leaves the front of urinal 1, a
15 predetermined amount of flush water W is spouted into bowl portion 10 by
spouting device 20 in response to the output of a body sensor (not shown),
spreading out and flowing down the bowl portion 10, reaching the discharge port
14.

At the point, the flush water W flows down as an essentially uniform flow
20 volume from the direction of the entire circumference toward the discharge port
14.

0040

Here, because the descending conduit front wall 42a and the descending
25 conduit rear wall 42b of the descending conduit 42 are symmetrical relative to
the center axis line C of the descending conduit 42, the flow of flush water
flowing down the descending conduit 42 is symmetrical relative to the center axis
line C.

Therefore the flush water flow becomes a downward flow, essentially
30 uniform in the front-to-back and left-to-right directions, and flush water can flow

smoothly without flow stagnation in the descending conduit 42, so that flush water flowing into the horizontal conduit 44 horizontal conduit inlet 44a also forms an approximately uniform downward inflow in the front-to-back and left-to-right directions.

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Also, because the cross sectional area of the descending conduit 42 on the above-described discharge trap portion 40 gradually declines from the descending conduit 42 to the outlet 42d, the flow speed inside the descending
10 conduit 42 increases toward the downstream side, and flow stagnation in the horizontal conduit 44 is constrained.

0042

Moreover, the cross sectional shape of the discharge trap portion 40
15 descending conduit 42 is essentially circular, therefore the cross sectional area of the descending conduit 42 is larger than the surface area of the inlet portion of the horizontal conduit 44, and the flow into the horizontal conduit 44 is accelerated, thus constraining the stagnation of flow in the horizontal conduit 44.

20 0043

Next the flow within the horizontal conduit 44 of the discharge trap portion 40 will be explained.

In the front-to-back and left-to-right directions, flush water flowing into the horizontal conduit 44 horizontal conduit inlet 44a forms an essentially uniform
25 in-flow in the downward direction, and the cross sectional shape in the draining direction of the first bent portion 44b from the horizontal conduit inlet 44a to the horizontal portion 44c may, as described above, be such that the surface area on the inside of the cross section center line is smaller than the surface area on the outside of the cross section center line.

30 Therefore the speed difference arising when the cross sectional shape of

the first bent portion 44b of the horizontal conduit 44 is essentially circular, between the flow speed inside the cross section center line and the flow speed outside the cross section center line, is constrained.

Thus in the first bent portion 44b the flow speed on the inside of center line C1 on cross section A and the flow speed on the outside of center line C1 on cross section A is essentially uniform, and stagnation of flow in the first bent portion 44b is constrained.

With respect to the horizontal portion 44c connected to the first bent portion 44b, as well, because the has the same cross sectional shape as the first bent portion 44b, the flow speed on the inside of the cross section A center line C1 and the flow speed on the outside of the cross section A center line C1 are essentially uniform, and stagnation of flows in the horizontal portion 44c is constrained.

0044

Next the flow within the ascending conduit 46 of the discharge trap portion 40 will be explained.

The cross sectional shape in the water draining direction of the second bending portion 46a, which communicates from the horizontal conduit 44 outlet 44d up to the outlet of the ascending portion 46b on the ascending conduit 46, as described above, is such that the surface area on the inside of the cross section center line is smaller than the surface area on the outside of the cross section center line.

For the reason, the speed difference occurring when the cross sectional shape of the ascending conduit 46 second bending portion 46a is essentially circular between the flow speed on the inside of the cross section center line and the flow speed on the outside of the cross section center line is constrained, therefore the flow speed on the inside of the cross section center line and the flow speed on the outside of the cross section center line are essentially uniform, and stagnation of flow in the second bending portion 46a is constrained.

0045

Moreover, the ascending conduit 46 ascending portion 46b has the same cross sectional shape as the second bending portion 46a, therefore the flow speed on the inside of the cross section B center line C2 and the flow speed on the outside of the cross section B center line C2 are essentially uniform, and stagnation of flow inside the ascending portion 46b is constrained.

Because the cross sectional area of the ascending conduit 46 ascending portion 46b is essentially constant from the inlet to the outlet thereof, flush water flowing into the ascending conduit 46 ascending portion 46b is able to essentially maintain its flow speed distribution as it flows from the inlet to the outlet in the ascending conduit 46 ascending portion 46b.

0046

As described above, the ascending conduit 46 ascending portion 46b forms a wall surface in the front-to-back direction parallel to the ascending portion front wall 46c and the ascending portion rear wall 46d, and is formed to have the same slope and slope angle, therefore in the front-to-back direction a relatively parallel ascending flow is formed by the flow F3 along the common wall 48 and the flow F4 along the ascending conduit rear wall 40b.

In addition, the distance between the ascending portion front wall 46c and the ascending portion rear wall 46d is formed to be constant from the inlet portion to the outlet portion of the ascending conduit 46 ascending portion 46b, thereby inhibiting turbulence in the flow along each wall surface, such that flow can occur without interference between flows or the creation of stagnation.

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Using the urinal 1 of the above-described embodiment, the above-described structure was adopted for the discharge trap portion 40, therefore pooled water with an extremely high urine concentration consisting of

urine and water in the discharge trap portion 40 is discharged so as to be efficiently substituted (replaced) by new flush water flowing into the discharge trap portion 40.

Therefore even when the flush water amount is reduced, high urine
5 concentration pooled water in the discharge trap portion 40 can be efficiently substituted by a relatively small amount of flush water, and the pooled water substitution rate improved.

0048

10 Flush water flowing out of the discharge trap portion 40 ascending conduit 46 flows into the discharge chamber 60 and is discharged from the discharge chamber 60 through the discharge socket 52 to the discharge piping 54.

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15 The spout device 30 spouts water toward the bowl portion 10 for a fixed time then stops spouting, thus completing one iteration of the urinal 1 flushing operation.

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20 Immediately after the completion of the iteration of the urinal 1 flushing operation, low urine concentration flush water is present as pooled water inside the discharge trap portion 40, and because the pooled water substitution rate has been improved in the manner, the concentration of urine remaining in the pooled water in the discharge trap portion 40 after completion of each iteration of
25 the urinal 1 flushing operation is reduced to a certain base level or below, and the adhesion (occurrence) of uric scale in the discharge trap portion 40 due to residual urine component in pooled water is constrained.

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30 Using the urinal 1 according to the above-described embodiment of the

invention, the cross section perpendicular to the water discharge direction of at least one of either the horizontal conduit 44 or the ascending conduit 46 on the discharge trap portion 40 is formed so that the side of the urinal to the inside of the center of the cross section has a smaller cross sectional area than the side of the urinal to the outside of the center of the cross section, therefore flow speed differentials are constrained between the flow speed on the inside of the center of the cross section and the flow speed on the outside of the center of the cross section of the discharge trap portion 40 horizontal conduit 44 or ascending conduit 46, with the result that stagnation of flow in the horizontal conduit 44 or the ascending conduit 46 is constrained, so that the pooled water substitution rate inside the discharge trap portion 40 is improved, and deposition of uric scale in the horizontal conduit 44 or the ascending conduit 46 can be improved.

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Also, using the urinal 1 according to the present embodiment, the discharge trap portion 40 ascending conduit 46 is formed so that its cross sectional area is essentially constant from the inlet to the outlet thereof, thereby inhibiting the occurrence of changes in flow speed within the discharge trap portion 40 ascending conduit 46 so that stagnation of flow in the discharge trap portion 40 ascending conduit 46 can be constrained, as can the deposition of uric scale in the ascending conduit 46.

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In addition, using the urinal 1 according to the present embodiment, the discharge trap portion 40 descending conduit 42 is formed so that its cross sectional area gradually decreases from the inlet to the outlet, therefore flow speed inside the descending conduit 42 increases toward the downstream side such that substitution of pooled water in the discharge trap portion 40 is quickly carried out, thereby constraining the deposition of uric scale in the horizontal conduit 44 and the ascending conduit 46.

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Also, using the urinal 1 according to the present embodiment, the cross section of the discharge trap portion 40 descending conduit 42 is formed to be essentially circular, therefore the descending conduit 42 cross sectional area is larger than the surface area of the horizontal conduit 44 horizontal conduit inlet 44a, and the flow flowing into the horizontal conduit 44 is accelerated more than in the descending conduit 42, so that stagnation of flow in the descending conduit 42 is constrained, and deposition of uric scale in the descending conduit 42 is further constrained.

0055

Moreover, in the urinal 1 according to the present embodiment, the discharge trap portion 40 horizontal conduit 44 and ascending conduit 46 are formed so that their respective cross section width dimensions are essentially the same size as the smallest flow path cross section width dimension in the descending conduit 42 outlet 42d, therefore the discharge water flow speed inside the discharge trap portion 40 is maintained, and the increased difficult in forming turbulent currents means that flow stagnation in the horizontal conduit 44 or the ascending conduit 46 is constrained, therefore substitution of pooled water in the discharge trap portion 40 is quickly accomplished, and deposition of uric scale in the horizontal conduit 44 or the ascending conduit 46 can be further constrained.

Claims

1. A urinal for receiving and discharging urine, comprising:
 - a bowl portion having a bowl surface for receiving urine;
 - a spouting device disposed on a top portion of the bowl portion for spouting flush water onto the bowl surface; and
 - a discharge trap portion, communicating with a discharge port disposed on a bottom portion of the bowl portion, for discharging flush water and forming a water seal on a downstream side of the bowl portion;
 - wherein the discharge trap includes a descending conduit extending downward from the discharge port, a horizontal conduit connected to the descending conduit and extending horizontally, and an ascending conduit connected to an outlet of the horizontal conduit and extending upward; and
 - wherein a cross section perpendicular to a discharging direction of either the horizontal conduit or the ascending conduit on the discharge trap portion is formed so that an inner side of the urinal from a center of the cross section has a smaller cross sectional area than an outer side of the urinal from the center of the cross section, and the descending conduit of the discharge trap portion is formed so that a cross section thereof is essentially circular.
2. The urinal according to claim 1, wherein the ascending conduit of the discharge trap portion is formed so that a cross sectional area thereof is essentially constant from an inlet thereof to an outlet thereof.
3. The urinal according to claim 1 or claim 2, wherein the descending conduit of the discharge trap portion is formed so that a cross sectional area thereof gradually decreases from an inlet thereof to an outlet thereof.
4. The urinal according to any one of claim 1 to 3, wherein the horizontal conduit and the ascending conduit of the discharge trap portion are respectively formed so that a width dimension of cross sections thereof has essentially the same size as the smallest width dimension of a flow path cross section at an outlet of the descending conduit.