

DESCRIPTION

TITLE OF THE INVENTION

DRAIN TRAP

5

TECHNICAL FIELD

[0001]

This disclosure relates to a drain trap installed in the course of a drainage route.

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BACKGROUND ART

[0002]

A drain trap is installed in the course of a drainage route for discharging liquid from a drain water of an air conditioner etc. into a sewage ditch.

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Conventionally, there is known a drain trap including a main body portion in the form of a bottomed cylinder having a lateral wall on which a receiving pipe portion for receiving liquid and a discharge pipe portion for discharging the liquid are formed, an attachable/detachable lid portion for closing the inside space of the main body portion, and an attachable/detachable partitioning body for partitioning the inside space into a reservoir space communicated to the receiving pipe portion and reserving liquid therein and a discharge space communicated to the discharge pipe portion and discharging liquid (see Patent Document 1).

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[0003]

With the drain trap disclosed in Patent Document 1, the partitioning body

provides non-communication between the reservoir space and the discharge space, so that in combination with water sealing effect provided by the liquid reserved in the reservoir space, reverse flow of contaminated air, odor etc. is prevented. With this drain trap, if the inner face of the main body portion and/or the partitioning member becomes soiled by the liquid reserved in the reservoir space, cleaning thereof is facilitated by the attachable/detachable features of the lid portion and the partitioning member.

On the other hand, in the drain trap used in e.g. a high-temperature, high-humidity place or the like, condensation tends to occur on the outer face of the main body portion due to a temperature difference between the ambient air and the liquid reserved in the reservoir space. With occurrence of condensation, there occurs such inconvenience as dripping of water droplets, thus immersing its surrounding in water. Further, there occurs a further inconvenience of freezing and expansion of the liquid reserved in the reservoir space by ambient air of extremely low temperature, which can cause damage to the drain trap.

[0004]

Patent Documents 2-3 disclose techniques for preventing occurrence of condensation in a drain trap or freezing of liquid in a reservoir space. A drain trap disclosed in Patent Document 2 is configured to prevent occurrence of condensation by coating an outer surface of metal portion with urethane foam layer. A drain trap disclosed in Patent Document 3 is configured to prevent damage to the drain trap due to freezing of liquid in the reservoir space by coating an outer lateral face thereof except for its bottom face with a thermal insulator material made of foamed resin.

[0005]

Further, Patent Documents 4-6 disclose pipe drain traps having no partitioning member. Patent Document 4 discloses a thermal insulating cap to be gaplessly attached to a main body of a pipe drain trap and an outlet side connecting opening. To a bath-tub side branch pipe of this U-shaped pipe drain trap, a thermal insulating material is attached separately from or in addition to the thermal insulating cap. And, a door lower side connecting opening and a reheating side connecting opening of the U-shaped pipe drain trap are exposed from the thermal insulating cap and firmly engaged with the lid member.

[0006]

Patent Document 5 discloses an inner body through which cold water from a water discharge opening flows, an odor-preventing lid body that closes an opening of an inner pipe of a bottom portion of the inner body, and an outer body having a bottom portion where the discharge pipe is formed and configured to cover the inner body with forming a gap with the outer surface of the inner body. Inside the inner body, drainage water is reserved and when it has been reserved to a predetermined amount, it will be discharged into a discharge pipe via the gap between the lid body and the inner pipe.

[0007]

Patent Document 6 discloses a U-shaped pipe drain trap having a main body portion having its outlet portion connected with a union nut. This U-shaped pipe drain trap is covered entirely with a cover. And, it is described that the cover is made non-transparent preferably in case the plumbing drain trap is made transparent.

CITATION LIST

PATENT LITERATURE

[0008]

5 Patent Document 1: Publication Document of Unexamined International
Patent Application No. 2007/116531

 Patent Document 2: Publication Document of Unexamined Japanese
Utility Model Application No. S53-9761

 Patent Document 3: Publication Document of Unexamined Japanese
10 Utility Model Application No. H2-106087

 Patent Document 4: Publication Document of Unexamined Japanese
Patent Application No. 2002-322706

 Patent Document 5: Publication Document of Japanese Utility Model
Application No. S53-29549

15 Patent Document 6: Publication Document of Unexamined Japanese
Patent Application No. H10-82085

SUMMARY OF INVENTION

TECHNICAL PROBLEM

20 **[0009]**

 In the case of the drain traps disclosed in Patent Document 2-3, the outer
surface of the drain trap is covered with resin foam. Thus, if a detachable
partitioning body were provided therein like the drain trap disclosed in Patent
Document 1, this would inhibit visual recognition of the inside of the main body

portion. Further, in the case also with the drain traps having no partitioning body or having a non-detachable partitioning body such as the pipe drain traps disclosed in Patent Documents 4-6, such outer surface coating with foamed resin, if provided, would inhibit visual recognition of the inside of the drain trap. Therefore, there
5 exists a problem in the respect of maintenance since, confirmation of soiled condition of the inner surface of the main body portion and the partitioning member would be not possible. Further, in the case of coating the entire outer surface of the drain trap with the cover as disclosed in Patent Document 6, its maintenance requires detachment of the entire cover, so that the heat insulating performance
10 cannot be achieved. Moreover, as the durability of the foamed resin is poor, the foamed resin may be damaged under severe use environment, so that its desired heat insulating performance may not be achieved.

[0010]

Thus, there is a need for a drain trap that allows easy maintenance, yet has
15 high durability with ability to prevent condensation.

SOLUTION TO PROBLEM

[0011]

According to a characterizing feature of a drain trap relating to this
20 disclosure, the drain trap comprises:

a cylindrical main body portion having a lateral wall on which a receiving pipe portion receiving liquid and a discharge pipe portion discharging the liquid are formed;

an attachable/detachable partitioning body partitioning an inside space of

the main body portion into a reservoir space communicated to the receiving pipe portion and reserving liquid therein and a discharge space communicated to the discharge pipe portion and discharging the liquid;

a lid portion closing the inside space of the main body portion; and

5 a sealing case surrounding, under a sealed state, at least a portion of an outer surface of the main body portion in which the reservoir space is formed;

an air gap being formed between the sealing case and the main body portion;

the sealing case and the main body portion being formed transparent; and

10 the lid portion being attachable/detachable when the sealing case is attached to the main body portion.

[0012]

According to this configuration, a gap is formed between the sealing case surrounding, under a sealed state, at least a portion of an outer surface of the main
15 body portion in which the reservoir space is formed and the main body portion.

Thus, even when there is a temperature difference between the liquid reserved in the reservoir space of the main body portion and the ambient air, occurrence of condensation can be suppressed by this gap. As a result, such inconvenience as dripping of water droplets, thus immersing its surrounding in water can be
20 prevented. Moreover, since such sealing case can be unified with the main body portion, in comparison with the conventionally employed foamed resin, the inventive configuration provides superior aesthetic appearance as well as higher durability. So that, the drain trap can be put into use for an extended period of time.

[0013]

Further, if both the sealing case and the main body portion are formed transparent as provided in the above-described inventive configuration, the visibility of the inside space of the main body portion is enhanced, so that visual recognition of a degree of soiling developed on the inner surface of the main body portion and the partitioning body is made possible. Moreover, if the lid portion is configured to be attachable/detachable when the sealing case is attached to the main body portion, with detachment of the lid portion with prevention of condensation, cleaning of the attachable/detachable partitioning body, etc. is made possible, so the maintenance can be made extremely easily. Incidentally, when soiling or clogging occurs in the drain trap which is installed in a drain piping of an air conditioner, this is a condition in which a drain pan inside the air conditioner is soiled. So, if such soiling inside the air conditioner is left unattended, the drain pan will be clogged eventually, thus leading to water leak from the air conditioner body. However, checking of the soiling degree of the drain pan requires a great trouble as disassembly of the air conditioner installed in e.g. a ceiling is needed therefor. On the other hand, if both the sealing case and the main body portion are formed transparent as provided in the above-described inventive configuration, the soiling degree of the drain trap can be readily checked by visual recognition, so that need or no-need of cleaning of the drain pan of the air conditioner body can be made. Therefore, water leak due to negligence of drain pan cleaning can be prevented. In this way, a drain trap that allows easy maintenance, yet has high durability with ability to prevent condensation has been realized.

[0014]

According to a further characterizing feature, a connecting portion

between the lateral wall and the receiving pipe portion and a connecting portion between the lateral wall and the discharge pipe portion are covered by the sealing case, with air gaps being formed relative to the sealing case.

[0015]

5 Liquid tends to be accumulated and stay at the connecting portions between the lateral wall and the receiving/discharging pipe portions. Therefore, when air gaps are formed between these respective connecting portions and the sealing case as provided in the above-described arrangement, condensation which may be formed on the surfaces of the receiving pipe portion and the discharge pipe
10 portion can be prevented in a reliable manner.

[0016]

According to a still further characterizing feature, the sealing case is constituted of a plurality of split bodies split from each other.

[0017]

15 If the sealing case is constituted of split bodies as provided in the above-described arrangement, even in the case of a drain trap having a complicated shape having the receiving pipe portion and the discharge pipe portion being formed in the main body portion, the sealing case can be readily attached to the main body portion.

20

BRIEF DESCRIPTION OF DRAWINGS

[0018]

[Fig. 1] is a vertical section view of a drain trap,

[Fig. 2] is a section view along II-II line in Fig. 1,

[Fig. 3] is a section view along III-III line in Fig. 1,
[Fig. 4] is an outer appearance perspective view of the drain trap,
[Fig. 5] is an exploded perspective view of the drain trap,
[Fig. 6] is a vertical section view showing a drain trap relating to a further
5 embodiment,
[Fig. 7] is a section view along VII-VII line in Fig. 6,
[Fig. 8] is a section view along VIII-VIII line in Fig. 6, and
[Fig. 9] is an exploded perspective view of a drain trap relating to a further
embodiment.

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DESCRIPTION OF EMBODIMENTS

[0019]

Next, an embodiment of a drain trap relating to this disclosure will be explained with reference to the accompanying drawings. It is understood however
15 that the invention is not limited to following embodiments, but various modifications thereof are possible within a range not departing from the essence thereof.

[0020]

As shown in Figs. 1 through 5, a drain trap X includes a main body portion
20 5 in the form of a bottomed cylinder having a lateral wall 51 on which a receiving pipe portion 2 for receiving liquid and a discharge pipe portion 3 for discharging the liquid are formed, a lid portion 6 for closing an inside space 4 of the main body portion 5, and a partitioning body 1 for partitioning the inside space 4 into a reservoir space 7 for receiving liquid from the receiving pipe portion 2 and

reserving this liquid therein and a discharge space 8 communicated to the discharge pipe portion 3 and discharging the liquid. Further, the drain trap X includes also a sealing case 9 that surrounds, under a sealed state, at least a portion of the lateral wall 51 of the main body portion 5 and a bottom portion 52 of the main body portion 5 (“at least a portion of an outer surface of the main body portion 5 in which the reservoir space 7 is formed”). In the following discussion, the lid portion 6 side may be sometimes referred to as “upper” side and the bottom portion 52 side may be sometimes referred to as “lower” side, respectively.

[0021]

The main body portion 5 is formed with using resin material and is formed like a cylinder having the bottom portion 52 in the form of a flat face. The receiving pipe portion 2 and the discharge pipe portion 3 are formed, as passages extending in the horizontal direction, integrally with the lateral wall 51 and are connected at opposed positions in the lateral wall 51 of the main body portion 5. And, a connecting portion 2A of the receiving pipe portion 2 and a connecting portion 3A of the discharge pipe portion 3 are provided with a height difference therebetween in such a manner that the receiving pipe portion 2 is formed higher by a small predetermined amount (e.g. 5 mm) than the discharge pipe portion 3. A pipe axis direction Y of the receiving pipe portion 2 and a pipe axis direction Y of the discharge pipe portion 3 are shifted parallel with each other in the vertical direction as seen in the vertical section view (side view) shown in Fig. 1, but are in agreement with each other when seen in the horizontal section view (plan view) shown in Fig. 2. With provision of the above-described height difference between the receiving pipe portion 2 and the discharge pipe portion 3, it is arranged such

that fluid can flow smoothly from the receiving pipe portion 2 toward the discharge pipe portion 3.

[0022]

Of the outer surface of the lateral wall 51 of the main body portion 5, a
5 face oriented perpendicularly to the direction of connections of the receiving pipe portion 2 and the discharge pipe portion 3 forms a flat face 51a (see Figs. 4-5). Further, in the outer surface of the lateral wall 51, there is provided an inclined step portion 51b inclined from the upper side of the receiving pipe portion 2 toward the lower side of the discharge pipe portion 3, and the lid portion 6 side of the inclined
10 step portion 51b has a greater diameter than the bottom portion 52 side of this inclined step portion 51b.

[0023]

The lid portion 6 has a circular shape as seen in the plan view and can be attached to the main body portion 5 through threading engagement of thread
15 portions 18 formed in the outer circumferential face of the main body portion 5 and the inner circumferential face of the lid portion 6, respectively (see Fig. 1). Further, in the outer circumference of the lid portion 6, there are formed a plurality of protrusions 6a arranged equidistantly and protruding radially outwards. By hooking a user's fingers on these protrusions 6a, the user can readily attach the lid
20 portion 6 to the main body portion 5 (see Fig. 4). This lid portion 6 is configured to be attachable/detachable when the sealing case 9 is attached to the main body portion 5.

[0024]

Further, on the outer side of the lid portion 6, a reflector body 23 (e.g. a

reflector tape) is affixed along the entire circumference in its circumferential direction (see Figs. 4-5). With this, in case the drain trap X is installed in a ceiling, a worker can readily recognize the installed position of the drain trap X by irradiating a light beam onto the reflector body 23. Aside from a drainage route in which the drain trap X is installed, a various kinds of other routes may be provided. In such case, e.g. the reflector body 23 included in the drain trap X can be provided with red color, whereas members to be provided in the other routes may be provided with yellow color, so that different colors may be provided to the reflector bodies of the respective routes.

[0025]

The partitioning body 1 is constituted of a first partitioning portion 10 in the form of a cylinder and a second partitioning portion 11 in the form of a plate extending from the first partitioning portion 10 along the entire circumference in the circumferential direction toward the outer side. The first partitioning portion 10 includes a cutout portion 12 that is cut out vertically at a part in the circumferential direction in an area upwardly of the second partitioning portion 11 and a rectangular-shaped opening portion 13 (see Fig. 5). This opening portion 13 is disposed at a position opposed to the cutout portion 12. The second partitioning portion 11 is provided with an inclination along the entire circumference of the first partitioning portion 10 such that a part of the cutout portion 12 in the vicinity of its lower end position is located at the lowest level and a part of the opening portion 13 in the vicinity of its center position is located at the uppermost level (see Fig. 1).

[0026]

The partitioning body 1 is attachable/detachable in the inside space 4 of

the main body portion 5, and when it is attached in this inside space 4 of the main body portion 5, the partitioning body 1 partitions the inside space 4 of the main body portion in such a manner as to form the lower side of the inside space 4 of the main body portion 5 as a reservoir space 7 and to form the upper side of the inside space 4 as a discharge space 8. As the partitioning body 1 partitions the inside space 4 in the manner described above, the entire bottom portion 52 of the main body portion 5 is provided as the reservoir space 7. Further, the partitioning body 1 includes a valve body 15 in the form of a ball which floats for allowing communication of liquid from the reservoir space 7 to the discharge space 8 when liquid has been reserved by an amount exceeding a predetermined amount in the reservoir space 7 and a valve seat 16 for receiving and supporting the valve body 15. The valve seat 16 is provided in the form of a ring disposed in the inside space of the first partitioning portion 10. The valve body 15 is configured as a normally closed type for closing an aperture portion of the ring-shaped valve seat 16.

[0027]

As indicated by two-dotted lines in Fig. 1, when liquid has been reserved by an amount exceeding a predetermined amount in the reservoir space 7, the valve body 15 will float off the valve seat 16, thus opening the valve, whereby the liquid will flow from the reservoir space 7 to the discharge space 8 to be discharged from the discharge pipe portion 3. Whereas, when the amount of the liquid in the reservoir space 7 falls below a set amount, the valve body 15 will drop to be seated on the valve seat 16, thus closing the valve. In the course of this action, the inner circumferential face of the first partitioning portion 10 guides the floating and

lowering movements of the valve body 15 in the vertical direction.

[0028]

The valve seat 16 is disposed in the partitioning body 1 such that this valve seat 16 may be located at a position lower than a lower end portion 3a of the discharge pipe portion 3 when the partitioning body 1 is mounted in the inside space 4 of the main body portion 5. Namely, there is provided a time lag (or time difference) from the floating of the valve body 15 off the valve seat 16 to the discharging of liquid from the discharge pipe portion 3. This time lag is intended to suppress occurrence of noise by limiting repetition of floating movements of the valve body 15 off the valve seat 16 and the lowering movements of the valve body 15 onto the valve seat 16 in a short period of time, in case also when the liquid flowing from the receiving pipe portion 2 into the reservoir space 7 is very small in amount.

[0029]

Further, the valve seat 16 is disposed on more upper side than the lower end portion of the first partitioning portion 10 in the vertical direction and the first partitioning portion 10 includes a pendant portion 10a extending more downwards than the valve seat 16. With this provision of the pendant portion 10a, the reservoir space 7 is formed as a U-shaped passage which reverses (makes a turn) at the bottom portion 52 of the main body portion 5, thus water-sealing the reservoir space 7 with the liquid reserved in the reservoir space 7. Further, as the reservoir space 7 is provided on the bottom portion 52 side of the main body portion 5, the reservoir space 7 can always be water-sealed with the liquid reserved in the reservoir space 7, whenever the valve body 15 floats off the valve seat 16.

[0030]

Between the lid portion 6 and the partitioning body 1 mounted in the inside space 4, there is provided a shield member 17 which is placed in gapless contact with the lid portion 6 and is provided with a reduced frictional coefficient
5 relative to the partitioning body 1. This shield member 17 is formed like a “disc” made of resin such as silicone. And, of this shield member 17, its upper face contacting the lid portion 6 will come into gapless contact with the back face of the lid portion 6 by a suction-cup action. Further, of the shield member 17, its lower face coming into contact with the partitioning body 1 mounted in the inside space 4
10 is provided with a slippery treatment to reduce the frictional coefficient between the lower face of the shield member 17 and the partitioning body 1.

[0031]

The partitioning body 1 and the lateral wall 51 of the main body portion 5 respectively is provided with a sealing portion 14 configured to receive a vertical
15 pressing force from the lid portion 6 in association with attachment of the lid portion 6 to the main body portion 5 and to place a part of the partitioning body 1 in gapless contact with the entire circumference of the lateral wall 51, with application of a component force along the vertical direction. This sealing portion 14 includes a main body side sealing portion 14a formed in the lateral wall 51 of
20 the main body portion 5 and a partitioning body side sealing portion 14b formed in the partitioning body 1.

[0032]

The main body side sealing portion 14a is a stepped portion that protrudes inwards from the lateral wall 51 and that is provided over the entire circumference

of the lateral wall 51. And, this step portion constituting the main body side sealing portion 14a is provided with an inclination such that in the circumferential direction of the main body portion 5, the vicinity of the upper end position of the receiving pipe portion 2 is located at the uppermost level and the vicinity of the lower end position of the discharge pipe portion 3 is located at the lowermost level. The partitioning body side sealing portion 14b is an outer side end portion of the second partitioning portion 11 inclined over the entire circumference in the circumferential direction of the partitioning body 1. And, the partitioning body side sealing portion 14b is provided with a resin member 20 (e.g. elastomer resin) which clamps the partitioning body side sealing portion 14b from the upper and lower sides thereof.

[0033]

Under the state of the partitioning body 1 being mounted in the inside space 4 of the main body portion 5, the lid portion 6 will be attached to the main body portion 5 through threading of the thread portion 18 with the shield member 17 interposed relative to the partitioning body 1. In this, the lid portion 6 will press the partitioning body 1 downwards, whereby the main body side sealing portion 14a and the partitioning body side sealing portion 14b will receive pressing force to the lower side. Then, the main body side sealing portion 14a and the partitioning body side sealing portion 14b will seal with pressing the partitioning body side sealing portion 14b against the main body side sealing portion 14a by the above-described downward pressing force. In this way, by gaplessly attaching the partitioning body side sealing portion 14b and the main body side sealing portion 14a to each other over the entire circumference of the inner face of the lateral wall

51 of the main body portion 5, the reservoir space 7 and the discharge space 8 are shielded from each other.

[0034]

On the resin member 20 of the partitioning body side sealing portion 14b,
5 there is provided a height adjusting member 21 for placing a portion 8a of the discharge space 8 extending toward the discharge pipe portion 3 of the lateral wall 51 at a same height as the lower end portion 3a of the discharge pipe portion 3, when the partitioning body 1 is mounted in the inside space 4. At a position corresponding to the discharge pipe portion 3 in the circumferential direction of the
10 lateral wall 51 of the main body portion 5, the step portion constituting the main body side sealing portion 14a is located downwardly of the lower end portion 3a of the discharge pipe portion 3. Thus, when the partitioning body 1 is mounted in the inside space 4, the one portion 8a of the discharge space 8 toward the discharge pipe portion 3 is located lower than the lower end portion 3a of the discharge pipe
15 portion 3. Here, by forming this height adjusting member 21, reservation of liquid at a portion of the discharge space 8 toward the discharge pipe portion 3 is limited thereby, thus suppressing occurrence of corrosion of the liquid. Further, the resin member 20 provided in the partitioning body side sealing portion 14b is utilized to function also as the height adjusting member 21.

[0035]

The partitioning body 1, as shown in Fig. 5, is provided with leg portions 19 which protrudes downwards from the inside space 4 when the partitioning body 1 is attached in this inside space 4. A plurality of such leg portions 19 are arranged equidistantly in the circumferential direction of the first partitioning

portion 10. With this arrangement, when the partitioning body 1 under its vertically reversed state is inserted into the inside space, the leg portions 19 will protrude upwards from the inside space 4, thus inhibiting attachment of the lid portion 6 to the main body portion 5 under this condition. In this way, when the partitioning body 1 is to be inserted into the inside space 4, error in the vertical orientation of the partitioning body 1 is prevented.

[0036]

The main body portion 5 and the partitioning body 1 are made transparent, and the valve body 15 is provided with a color (e.g. blue color) which can be distinguished from the main body portion 5 and the partitioning body 1. With this arrangement, under the condition of the partitioning body 1 being mounted in the inside space 4 of the main body portion 5, a worker can visually recognize the position of the valve body 15 from outside of the main body portion 5. Accordingly, it is readily possible to check whether the partitioning body 1 has been mounted at an appropriate position or not and also to check a degree of soiling if any of the partitioning body 1. Here, the language “transparent” refers to a condition of the inside of the main body portion 5 being visible therethrough, thus, the language being inclusive of being colorless transparent as well as colored transparent, and even being semi-transparent also.

[0037]

As shown in Fig. 1, the sealing case 9 is mounted on the outer side of the main body portion 5 and is formed of a same transparent resin material as this main body portion 5. The sealing case 9 surrounds, in a sealed state, the lateral wall 51 of the main body portion 5 in the entire area thereof and bottom portion 52 of the

main body portion 5; and between the sealing case 9 and the main body portion 5, an air gap 91 is formed. With this arrangement, even when there exists a temperature difference between the liquid reserved in the reservoir space 7 on the bottom portion 52 side of the main body portion 5 and the ambient air, occurrence of condensation can be effectively suppressed by the air gap 91. Further, the connecting portion 2A between the lateral wall 51 and the receiving pipe portion 2 and the connecting portion 3A between the lateral wall 51 and the discharge pipe portion 3 are covered by the sealing case 9, with the air gaps 91 being formed relative to the sealing case 9. Liquid tends to accumulate and stay at the connecting portions 2A, 3A between the receiving pipe portion 2 or the discharge pipe portion 3 and the lateral wall 51. Then, if the air gaps 91 are formed between these respective contacting portions 2A, 3A and the sealing case 9 as provided in the above-described arrangement, condensation occurring on the surfaces of the receiving pipe portion 2 and the discharge pipe portion 3 can be prevented in a reliable manner.

[0038]

In this way, as the sealing case 9 is formed of same transparent resin material as the main body portion 5, transmittances of the sealing case 9 and the main body portion 5 are same, and also air is present between the sealing case 9 and the main body portion 5 as described above. Thus, a worker can readily recognize the position of the valve body 15 from outside the main body portion 5. Meanwhile, when soiling or clogging has occurred in the drain trap X installed in a drain piping of an air conditioner, this is a situation where a drain pan inside the air conditioner is soiled. If such soiling inside the air condition is left un-attended,

the drain pan will be eventually blocked, thus causing water leakage from the air conditioner body. However, in order to check the soiling degree of such drain pan, disassembly of the air conditioner installed in a ceiling, etc. will be required, thus needing great trouble. Then, if both the sealing case 9 and the main body portion 5 are made transparent as provided in the above-described arrangement, visual checking of the soiling degree of the drain trap X can be readily made, so it is possible to determine need or no need of cleaning of the drain pan of the air conditioner body. Thus, water leakage due to negligence of cleaning of the drain pan can be prevented.

[0039]

The sealing case 9 includes a plurality (“two” in this embodiment) of split bodies 92 split from each other, a cup-like bottom portion side connecting member 93 (an example of a “first connecting member”) for connecting the pair of split bodies 92 from the bottom portion 52 side (reservoir space 7 side) and an annular cylindrical lid portion side connecting member 94 (an example of a “second connecting member”) for connecting the pair of split bodies 92 from the lid portion 6 side (the opposite side to the bottom portion side connecting member 93) (see Figs. 4-5).

[0040]

The split bodies 92 consist of a first split body 92A and a second split body 92B. These first and second split bodies 92A, 92B are formed symmetric relative to a pipe axis direction Y of the receiving pipe portion 2 and the discharge pipe portion 3 (see Fig. 2). Namely, these first and second split bodies 92A, 92b are formed like “split halves” to be connected with each other from the lateral side of

the main body portion 5. As shown in Fig. 5, the first split body 92A and the second split body 92B each includes a flat bonding face 92a extending along the pipe axis direction Y, a first gapless contact face 92b having an arcuate shape and placed in gapless contact with the outer circumferential face of the receiving pipe portion 2, and a second gapless contact face 92c having an arcuate shape and placed in gapless contact with the outer circumferential face of the discharge pipe portion 3. In each of the first split body 92A and the second split body 92B, a receded portion 92a1 and a protruding portion 92a2 are formed along the bonding face 92a, so that with engagement between these receded and protruding portions 92a1, 92a2, the split bodies 92 are assembled to each other. Also, the engagement between these receded and protruding portions 92a1, 92a2 forms a labyrinth structure that serves to prevent leakage of the air in the air gaps 91 to the outside. Moreover, the gapless attachment of the first gapless contact face 92b and the second gapless contact face 92c to the outer circumferential faces of the receiving pipe portion 2 and the discharge pipe portion 3 respectively also serves to prevent leak of air in the air gaps 91 to the outside.

[0041]

As shown in Fig. 3 and Fig. 5, in an inner face of the first split body 92A and the second split body 92B respectively, there is formed a flat face 92d whose inner face opposed to the flat face 51a of the main body portion 5 is formed flat, and an outer surface of the portion where this flat face 92d is formed provides a flat face 92e also. Further, in the bottom portion of the first split body 92A and the second split body 92B respectively, there is formed an engaging stepped portion 92f which is a stepped portion receded in the radially inner direction from the outer

surface and with which the bottom portion side connecting member 93 comes into engagement. In the outer surface of this engaging stepped portion 92f, a flat face 92e is formed continuously therewith, and the cross sectional shape of the split bodies 92 is formed as a circular shape having a pair of straight side portions in opposition to each other. At a straight portion in the outer surface of the engaging stepped portion 92f, there is formed an engaging receded portion 92f1 with which an engaging protrusion 93a of the bottom portion side connecting member 93 comes into engagement. As the bottom portion of the split body 92 has a cross sectional shape in the form of a circle having a pair of opposed straight side portions, rotation of the bottom portion side connecting member 93 engaged with the engaging stepped portion 92f is prevented.

[0042]

At the upper end of the first split body 92A and the second split body 92B respectively, there is formed an annular sealing face 92g which protrudes annularly toward the radial inner direction. As this annular sealing face 92g and the outer face of the main body portion 5 come into gapless contact with each other, leakage of air in the air gaps 91 to the outside is prevented. Further, in the outer face at the upper end of the first split body 92A and the second split body 92B respectively, there is formed an engaging receded portion 92h into which a first engaging protrusion 94a of the lid portion side connecting member 94 comes into engagement.

[0043]

The bottom portion side connecting member 93 is formed like a cup having a bottom wall 93A and a lateral wall 93B protruding annularly from the

outer circumference of the bottom wall 93A. The lateral wall 93B has a shape extending along the lateral face shape of the bottom portion of the split body 92. As the bottom portion side connecting member 93 is attached to the bottom portion of the pair of split bodies 92 bonded to each other, the pair of split bodies 92 are connected to each other. In this, the engaging protrusion 93a formed in the lateral wall 93B is engaged in the engaging recessed portions 92f1 of the split bodies 92, with forming a gap 95 between the bottom portions of the split bodies 92 and the bottom wall 93A. This gap 95 is filled with air, like the air gap 91 described above.

[0044]

The lid portion side connecting member 94 has a circular annular shape having an annular flange portion 94A whose inside diameter is greater than the outside diameter of the main body portion 5 and an erect portion 94B erected on the bottom portion 52 side from the outer circumference of the flange portion 94A. The flange portion 94A has its lower face (inner face) placed in contact with the upper face of the split body 92. In the erect portion 94B on its base end side, there is formed a first engaging protrusion 94a which comes into engagement with an engaging recessed portion 92h of the split body 92 and on its leading end side, there is formed a second engaging protrusion 94b which comes into engagement with the upper end of the flat face 92e of the split body 92. As these first and second engaging protrusions 94a, 94b engage with the split bodies 92, the lid portion side connecting member 94 is firmly fixed to the split bodies 92.

[0045]

In this embodiment, as the air gap 91 is formed between the sealing case 9

which surrounds the entire area of the lateral wall 51 and the bottom portion 52 of the main body portion 5 and this main body portion 5, even when a temperature difference exists between the liquid reserved in the reservoir space 7 on the bottom portion 52 side of the main body portion 5 and the ambient air, occurrence of
5 condensation can be effectively suppressed by this air gap 91. As a result, such inconvenience as dripping of water droplets, thus immersing its surrounding in water can be prevented. Moreover, since the bottom portion 52 side of the main body portion 5 is provided as the liquid reservoir space 7, with provision of the gap 95 formed between the bottom portion of the split body 92 and the bottom wall
10 93A of the bottom portion side connecting member 93 as provided in the instant embodiment, heat retention effect will be improved with the air gap 91 and the gap 95, whereby freezing of the liquid can be prevented. Further, with the sealing case 9 in the instant embodiment, since this sealing case 9 forms an integral unit with continuous outer appearance with the main body portion 5, there are provided
15 superior aesthetic appearance and high durability, so the drain trap X can be used for an extended period of time.

[0046]

If the bonding faces 92a of the split bodies 92 are arranged along the pipe axis direction Y of the receiving pipe portion 2 and the discharge pipe portion 3 as
20 provided in the instant embodiment, the sealing case 9 can be attached from the lateral sides of the receiving pipe portion 2 and the discharge pipe portion 3, so that attachment can be carried out easily. Further, when the air gap 91 is formed between the sealing case 9 and the main body portion 5, the bottom portion side connecting member 93 and the lid portion side connecting member 94 are provided

on the bottom portion and the lid portion side respectively, the manufacture of the drain trap X can be significantly facilitated.

[0047]

5 **[Further Embodiments]**

(1) Figs. 6 through 9 show a drain trap X relating to a further embodiment. For the sake of readiness of understanding, in the following, same names and signs will be used for the same members, and only different arrangements will be explained. In a sealing case 9 in this embodiment, the
10 arc-shaped first gapless contact face 92b to be placed in gapless contact with the outer circumferential face of the receiving pipe portion 2 and the arc-shaped second gapless contact face 92c to be placed in gapless contact with the outer circumferential face of the discharge pipe portion 3 are gaplessly attached to intermediate portions of the receiving pipe portion 2 and the discharge pipe portion
15 3 along the pipe axis direction Y, respectively. With this arrangement, between the sealing case 9 and the receiving pipe portion 2 or the discharge pipe portion 3 of the main body portion 5, a larger air gap 91 can be obtained, so that condensation on the surfaces of the receiving pipe portion 2 and the discharge pipe portion 3 can be prevented in an even more reliable manner.

20 **[0048]**

Further, in this embodiment, the form (type) of engagement between the split body 92 and the lid portion side connecting member 94 is made different. Specifically, engaging receded portions 92i are provided in the outer faces at the upper ends of the first split body 92A and the second split body 92B and an

engaging protrusion 94c is provided on the base end side of the erect portion 94B of the lid portion side connecting member 94. Then, as the engaging receded portions 92i and the engaging protrusion 94c are engaged with each other, the lid portion side connecting member 94 is fixed to the split bodies 92 (see Figs. 8-9).
5 Namely, unlike the foregoing embodiment, the second engaging protrusion 94b engageable with the upper end of the flat face 92e of the split body 92 is not provided on the leading end side of the erect portion 94B. In this case too, when the lid portion 6 is threaded to the main body portion 5, the lid portion 6 presses down the lid portion side connecting member 94, so this lid portion side connecting
10 portion 94 can be firmly fixed to the split bodies 92. Further, in this embodiment, the form (type) of engagement between the split body 92 and the bottom portion side connecting member 93 is made different. Specifically, the engaging protrusion 93a of the bottom portion side connecting member 93 in the foregoing embodiment is replaced by an engaging receded portion 93a1 and the engaging
15 receded portion 92f1 of the split body 92 is replaced by an engaging protrusion 92f2.

[0049]

(2) A heat insulating sheet may be attached in the gap 95 formed between the bottom portion of the split body 92 and the bottom wall 93A of the
20 bottom portion side connecting member 93. This heat insulating sheet is constituted of a heat insulating material such as aluminum or the like or a laminated material with aluminum coated on the surface of the laminated resin layer. Since the bottom portion 52 side of the main body portion 5 is provided as the reservoir space 7, if such heat insulating sheet is provided on the bottom portion side

connecting member 93 which is to be disposed on the bottom portion 52 side of the main body portion 5, freezing of liquid inside the reservoir space 7 can be prevented. Moreover, in case such heat insulating sheet is disposed on the bottom portion 52 side of the main body portion 5, this will not interfere with the visibility
5 of the inside space 4 of the main body portion 5.

(3) A desiccant material may be disposed in place of or in addition to the heat insulating sheet to be attached in the gap 95. In this case, as air having high humidity is enclosed in the gap 95, condensation inside the gap 95 can be prevented. As a result, the heat conduction rate will be lowered, thus enhancing the
10 condensation preventive effect.

[0050]

(4) The sealing case 9 may be provided only at the reservoir space 7 portion. Namely, the sealing case 9 may be provided in opposition to the lower side in the lateral wall 51 of the main body portion 5 than the inclined step portion
15 51b. Also, the sealing case 9 may be provided in opposition to the lower side in the lateral wall 51 of the main body portion 5 than the receiving pipe portion 2 and the discharge pipe portion 3, there is no limitation in this regard.

(5) In the foregoing, the split bodies 92 of the sealing case 9 were formed symmetric relative to the pipe axis direction Y of the receiving pipe portion 2 and
20 the discharge pipe portion 3. Instead, the split body 92 of the sealing case 9 may be split into two in the vertical direction.

(6) Seal members may be provided on the bonding face 92a and the gapless contact faces 92b, 92c.

(7) The air gap 91 and the gap 95 may be evacuated.

(8) The lid portion 6 may be omitted, so that the partitioning body 1 may be configured to be no-attachable/non-detachable.

[0051]

(9) In the foregoing embodiment, the lid portion 6 was configured to be attachable to the main body portion 5 through threading engagement of the thread portions 18. Instead, this may be configured as an engaging type in which the lid portion 6 can be attached to the main body portion 5 by pressing this lid portion 6 into the main body portion 5 to be engaged therewith. Namely, various modifications will be possible in the respect of how the lid portion 6 is to be attached to the main body portion 5.

[0052]

(10) In the foregoing embodiment, the bottom portion of the main body portion 5 was formed like a flat face, thus forming the entire bottom portion of the main body portion 5 as the reservoir space 7. Alternatively, the entire bottom portion of the main body portion 5 may be provided as the reservoir space 7 with various modifications made in the shape of the bottom portion of the main body portion 5 such as forming a step in the bottom portion of the main body portion 5.

[0053]

(11) In the foregoing embodiment, the shape of the lateral wall 51 of the main body portion 5 and the shape of the partitioning body 1 were formed approximately oval as seen in the plan view. Alternatively, they may be formed rectangular or the like, so various modifications can be made for providing the shapes.

[0054]

(12) In the foregoing embodiment, a ball type body was employed as an example of the valve body 15. Instead, this valve body 15 may be provided in the form of a plate-like body pivotable about a horizontal axis. In this way, various modifications are possible in regard of how the valve body 15 is to be shaped.

5

INDUSTRIAL APPLICABILITY

[0055]

The present invention is applicable to a drain trap including a cylindrical main body having an inside space communicated to a receiving pipe portion and a discharge pipe portion and a partitioning body that partitions the inside space of the main body into a reservoir space and a discharge space.

10

REFERENCE SIGNS LIST

[0056]

- | | | |
|----|-----|------------------------|
| 15 | 1: | partitioning body |
| | 2: | receiving pipe portion |
| | 3: | discharge pipe portion |
| | 4: | inside space |
| | 5: | main body portion |
| 20 | 51: | lateral wall |
| | 6: | lid portion |
| | 7: | reservoir space |
| | 8: | discharge space |
| | 9: | sealing case |

91: air gap
92: split body
X: drain trap

CLAIMS

1. A drain trap comprising:

5 a cylindrical main body portion having a lateral wall on which a receiving pipe portion receiving liquid and a discharge pipe portion discharging the liquid are formed;

an attachable/detachable partitioning body partitioning an inside space of the main body portion into a reservoir space communicated to the receiving pipe portion and reserving liquid therein and a discharge space communicated to the
10 discharge pipe portion and discharging the liquid;

a lid portion closing the inside space of the main body portion; and

a sealing case surrounding, under a sealed state, at least a portion of an outer surface of the main body portion in which the reservoir space is formed;

an air gap being formed between the sealing case and the main body
15 portion;

the sealing case and the main body portion being formed transparent; and

the lid portion being attachable/detachable when the sealing case is attached to the main body portion.

20 2. The drain trap of claim 1, wherein a connecting portion between the lateral wall and the receiving pipe portion and a connecting portion between the lateral wall and the discharge pipe portion are covered by the sealing case, with air gaps being formed relative to the sealing case.

3. The drain trap of claim 1 or 2, wherein the sealing case is constituted of a plurality of split bodies split from each other.