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Anti-liquid Splash Device

This invention relates to an anti-liquid splash device and is particularly concerned with the inhibiting, dampening or suppression of the splashing effect when solid matter impacts a liquid surface. During such an impact the kinetic energy of the solid matter impacting the surface is released and transferred to or shared with the impacted liquid, which thereby achieves its own momentum and is displaced from the liquid surface. The problem of splashing varies with the size of the solid matter in relation to the impacted water surface area and this in turn is related to the size of the receptacle or duct in which the liquid is present. In the case of a receptacle the impact may splash water up and indeed over the sides of the receptacle if the solid matter is of sufficient mass or size and falls through a sufficient distance before impacting the liquid surface.

It is an object of the invention to achieve an anti-liquid splash device which will not obstruct the general passage of solid matter after the initial impact with the liquid surface.

The invention is particularly, but not exclusively concerned with the suppression of splashing in sanitary ware, in particular in water closet receptacles or bowls where a water sealed trap is formed in a U-shaped waste pipe integrally formed with the base of the receptacle

and communicating with a waste pipe.

The water seal or trap is essential for hygiene purposes to retain the cleanliness of the receptacle and waste pipe wall, to form an initial mass of water for carrying away in solution the waste matter deposited in the bowl and also to form a seal against noxious gases passing up the waste pipe into the bowl from the waste services into which the water closet installation is connected. The water seal acts in conjunction with the water flushing facility from the bowl rim to sweep the contents of the bowl into the waste system in solution; a fresh water seal being formed after each flush by surplus water gathering in the U trap, after the primary force of the flushing action has driven the original contents of the U trap into the waste pipe connected thereto and beyond by the connected waste and sewer system.

Sucking out of the water seal is prevented by venting the waste pipe or stack to which the water closet is connected, thereby avoiding a suction action of the main waste pipe which would destroy the water seal.

Whilst the water seal is virtually indispensable as described, there is the unfortunate attendant side effect of the splashing upon the impact of solid matter, for example faeces or other matter falling or deposited into the bowl. The splashing effect will vary with the

character of the impact as described generally above and may have the unpleasant and unhygienic effect of contacting the user with soiled water

According to the invention an anti-liquid
5 splash device comprises a restrained float extending across a major part of the surface of a liquid in a receptacle and/or in a flow passage, and extending generally transversely to the liquid flowpath along said passage or from said receptacle,
10 the float periphery being marginally spaced from the receptacle or passage walls to leave exposed only a residual peripheral portion of the liquid surface, the float being disposed to be impacted by any solid matter entering the receptacle ~~and~~ or
15 moving along the flow passage and to deflect such solid matter from immediate impact with the liquid surface, thereby inhibiting the liquid splashing effect of that impact.

There now follows a description of a particular embodiment of the invention, by way of example only, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 shows a part-sectioned cut-away view of an anti-liquid splash device according to the invention installed in the U-trap of a water closet bowl;

Figure 2a shows a side elevation of one form of float used in the device according to Figure 1;

Figure 2b shows an alternative form of float used in the device shown in Figure 1;

Figure 3 shows a further form of float used in the device shown in Figure 1; and

Figure 4 shows an alternative means of restraining the float used in the device shown in Figure 1.

Referring to the drawings, an anti-liquid splash device, in particular an anti-water splash device is installed in a sanitary water closet; the general arrangement being as shown in Figure 1.

A generally disc like float 12 is restrained within a water flow passage 21 comprising a vertical limb of a U-trap at the lower half or neck 16 of a receptacle 20 formed by the water closet bowl 17. A water column 15 with an upper exposed surface 14 is located within the U-trap to form a water seal with respect to the bowl 17 and waste matter flowing into the bowl 17 is held in

solution in the water seal 15 prior to discharge through the U-trap into the interconnected waste sewerage system (not shown) by the conventional flushing mechanism (not shown) which discharges water from the rim of the bowl 17 down the sides into the neck 16. Solid matter falling into the bowl is inhibited from direct impact with the water surface 14 by means of the restrained float 12. In the particular arrangement illustrated, the float 12 is tethered by means of a flexible mooring line 19 threaded through a hole in the periphery of the disc 12 and attached at the opposite end to a rigid fixing either on the bowl 17 itself or on the associated water closet cistern and plumbing assembly.

The line 19 is provided with a slack loop 18 to allow the float 12 to move freely about the water surface 14.

The float 12 covers a substantial part of the water surface 14, leaving only a peripheral annular area, which accommodates lateral movement of the float transversely to the flow passage 21. Thus the float 12 may move up or down in the water, may tip, or may move transversely, as indicated by the various arrows in Figure 1 of the drawings.

Upon impact with solid matter falling into the bowl 17, the float 12 is deflected downwards and may tip, tilt or tumble to allow the solid matter to move

progressively into the water column 15 without water splashing from the water surface 14. The float 12 has a generally self-cleaning action by its interaction with the water surface 14 during its tilting action upon impact, allowing the water surface 14 to sweep across its surface in a scouring action.

Thus the float 12 allows solid matter to enter the water column 15 and be held in solution therewith until the water closet is flushed, and yet inhibits the water splash which would otherwise occur upon impact with the water surface 14.

The float 12 may be removed by means of the line tether 19 to allow larger items of solid matter to pass into the waste pipe and if necessary to facilitate cleaning of the bowl 17, lower neck 16 and waste pipe of the U-trap.

The float 12 may be of any configuration to fit the neck of the water closet bowl 17 and a preferred form is a flat disc of generally uniform thickness as shown in Figure 2a. Alternatively a tapering thickness towards the outer peripheral edge may be employed as shown in Figure 2b. Such a configuration may promote the tilting or tipping action of the float 12 upon impact with solid matter.

The float 12 may be of a standard dimension to fit the general range of water closet sizes generally produced, but for particular applications greater universality is

achieved by utilising a float comprising a central disc-like core with a flexible peripheral flange 18, as shown in Figure 3. The flange 18 may be cut to the particular shape and size of the neck 16. The float core itself is generally rigid, but may be either solid or hollow.

An alternative means of restraining the float 12 may be by means of a hinged or pivoted link 22 with a ball joint 23 at one end, fitted into a ball-shaped recess of slightly larger dimensions in the float 12, and a similar ball-shaped end 24 at the opposite end, fitted into a slightly larger opening in a pivot bracket 25 fitted into the wall of the receptacle 20. In this construction it is preferred that the toilet bowl 17 or neck 16 itself incorporates some special fitment 25 at the time of manufacture.

The surface of the float 12 is preferably finished to a high degree of smoothness and may be either flat or slightly bevelled as shown in Figure 2b, in order to facilitate discharge of impacted contents on the surface thereof and its movement in the water column 15.

It will be appreciated that some form of anchoring or restraint of the float 12 is necessary in order to prevent it being discharged into the waste passage 21 during flushing of the water closet.

The float cross-sectional size is preferably circular

but may be oval or of any desired shape to meet particular requirements.

It will further be appreciated that the anti-liquid splash device according to the invention may be used in other applications than the sanitary water closet previously described, for example the discharge of chemical or industrial waste, where the device may be located in a column or receptacle or container for waste matter which has a liquid and solid content, to allow additional matter to be discharged into the container without splashing noxious chemicals therefrom. The restrained float principle of the present invention may be employed in a variety of industrial applications where dipping or immersion of a solid object in a noxious liquid is required, for example in electroplating. The float 12 will then be formed of suitable corrosion resistant material, for example a special plastic or ceramic or a coated metal and may also act to suppress the emission of noxious vapour from volatile liquids.



Claims:

1. An anti-liquid splash device comprising a restrained float extending across a major part of the surface of a liquid in a receptacle and/or
5 in a flow passage and extending generally transversely to the liquid flow path along said passage or from said receptacle, the float periphery being marginally spaced from the receptacle or passage walls to leave exposed only a residual peripheral portion
10 of the liquid surface, the float being disposed to be impacted by any solid matter entering the receptacle or moving along the flow passage and to deflect such solid matter from immediate impact with a major part of the liquid surface and thereby
15 inhibit the liquid splashing effect of that impact.
2. A device as claimed in Claim 1 in which the float restraintment is such as to allow generally free movement of the float about the liquid surface,
20 but inhibiting passage of the float from the receptacle or along the flow path.
3. A device as claimed in either of the preceding Claims, in which the float incorporates at least a central core of rigid material.
- 25 4. A device as claimed in Claim 3, in which the



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float incorporates a peripheral flange of flexible resilient material.

5. A device as claimed in any of the preceding Claims, in which the float incorporates a rigid-

5 walled, hollow core.

6. A device as claimed in any of the preceding Claims, in which said float restraint comprises a flexible line attached at one end to the float and at the opposite end to a fixture point.

10 7. A device as claimed in any of Claims 1 to 5, in which the restraint comprises a universally hinged or pivoted link with a universal joint at each end, one of which is fitted into a universal joint recess in the float body and the other of
15 which is fitted into a universal joint recess in the fixed fulcrum point.

8. A device as claimed in any of the preceding Claims, in which at least the core of the float is of generally uniform cross-section.

20 9. A device as claimed in any of the preceding Claims, in which the float is of thickened central section tapering at its peripheral edge.

10. A device as claimed in any of the preceding Claims and substantially as hereinbefore described

25 with reference to and as shown in any of the accompanying



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drawings.

11. A flow passage and/or receptacle incorporating a device as claimed in any of the preceding Claims.

12. A device as claimed in any of the Claims

5 1 to 10 adapted for sanitary use in which the receptacle comprises a water closet bowl and the passage is the neck and waste pipe thereof.

13. A device as claimed in any of Claims 1 to 10 and 12 in which the periphery of the float

10 may be cut to a desired shape and size.

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