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IMAGE CUP FOR DECORATION AND METHOD FOR PROJECTING IMAGE USING THE SAME

BACKGROUND OF THE INVENTION

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1. Field of the Invention

The present invention relates to an image cup for decoration and method for projecting image using the image cup. More particularly, the present invention relates to projecting an image projection substance located at the bottom of the image cup to the surface of contained liquid when the image cup is filled with liquid, such as water, beverage or liquor, etc..

2. Description of the Background Art

A cup is basically used as a container for drinking beverages. In addition to this basic usage, a cup is broadly used for decoration purpose with various styles depending on the individual preferences. Generally, regardless the purposes of the cup, the various materials are used for manufacturing the cups, and the various colors and shapes are used for decoration.

Once a cup is manufactured, it is impossible to alter its original shape due to the solid material. Even if a cup is manufactured with well decoration, a user might be feel tired of using the cup when time has elapsed and it is impossible to divert the user's feeling due to it's fixed shape.

Therefore, in order to solve the problem caused by the fixed shape, as shown in FIG. 1, Korean Utility Model Publication 65-1123 introduces an image cup which allows replacing a picture at the picture compartment of the bottom of the cup, and such

picture compartment is formed between the body and bottom of the cup fixed with screws.

At the bottom of the cup, a convex lens is installed to magnify the picture of the bottom and projected up the picture to the top. Therefore, a user cannot recognize the existence of the picture unless seeing the picture from top of the cup, and only the cup user could see the picture. Moreover, the user could see the picture regardless the cup is filled water for the conventional technology of the cup, and this kind of cup does not attract the user's interest.

Additionally, Korean Utility Model Publication 97-12008 introduces a cup with moving decorations. In the moving decoration cup, the decorations are inserted inside of the wall made in double layers, and the gap between layers are filled with decoration and liquid in order to attract interest by moving decorations when using the cup.

However, due to the double-layer of the wall filled with liquid and decorations, the weight of the moving decoration cup is unnecessary heavier than the ordinary cup. Moreover, it is inconvenient that the effect of moving decoration appears only when a user is shaking the cup and such user's careless shaking could create a problem of spilling the content of the cup.

Additionally, since the moving decoration occurs only when a user shakes the cup, the decoration does not be effected whether the cup is filled with liquid.

SUMMARY OF THE INVENTION

Therefore, an object of the present invention provides that an image cup for decoration could be varied a projected size and shape of an image projection substance on a surface of a contained liquid depending on a character of the filled liquid in the cup.

Another object of the present invention provides that an image cup for decoration could be controllable the projection of the image projection substance being projected on the surface of the contained liquid depending on the existence of contained liquid.

5 Another object of the present invention provides that the image cup for decoration projects the image projection substance on the surface of contained liquid depending on a deflecting rate of contained liquid and a reflecting angle of the image cup, and the various projection on the surface of the contained liquid is viewed at the different angles depending on a status of filled liquid.

10 Another object of the present invention provides that an image projecting method using the image cup for projecting an image projection substance on the surface of the contained liquid.

In order to achieve the above objects, the present invention of an image cup for decoration comprises an opened top, main vertical wall and a bottom, inside and outside
15 of the main vertical wall and inside of the bottom having smooth surfaces in order to uniformly scatter, deflect or reflect lights inside of the image cup, the height of the main vertical wall being larger than the width or diameter of the bottom, and an image projection substance being disposed inside of a hollow portion of the bottom, whereby projecting the image projection substance to the surface of contained liquid when the
20 liquid is filled inside of the image cup. A desirable shape is a cylindrical for the main vertical wall and a flat for the bottom.

A method of image projection for projecting an image projection substance to a surface of contained liquid when the liquid is filled inside of said image cup, the method comprising the steps of:

25 preparing an image cup comprising an opened top, main vertical wall and a

bottom having smooth surfaces of inside and outside of the main vertical wall and inside of the bottom in order to uniformly scatter, deflect or reflect lights inside of the image cup, and height of said main vertical wall being larger than width or diameter of said bottom;

- 5 locating an image projection substance at the bottom of the image cup;
 filling liquid in the image cup with a certain filling ratio of the main vertical wall.

The embodiment of the present invention is described in detail in conjunction with the attached drawings.

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DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side view of a previous image cup.

FIG. 2 shows an illustration of an image cup for decoration according to the present invention.

- 15 FIG. 3 ~ 7 show the various embodiments of the image cup for decoration according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

- 20 FIG. 2 shows an illustration of an image cup for decoration according to the present invention.

The image cup for decoration 10 of the present invention comprises an opened top 40, a cylindrical main vertical wall 30 and a bottom 20. An image projection substance 50 is located at the bottom 20 of the cup.

- 25 A liquid 80 would be filled the image cup 10. The image projection substance

50 could be disposed on the bottom 20 or printed inside the hollow portion 60 of the bottom 20. The detailed description of the bottom 20 of the image cup will be described in the following for the various embodiments.

At this time, the main vertical wall 30 and the bottom 20 of the image cup 10 have smooth surfaces without any carved shape or design. By forming of smooth surfaces of the both sides of the main vertical wall 30 and inside of the bottom 20 of the cup 10, light inside the cup 10 is uniformly dispersed, reflected, and deflected when the cup 10 is filled with liquid. Such optical characteristic acts like a mirror effect at the inside upper part of the bottom 20. That is, when an object or a printed material cannot be seen from the side with certain angle unless viewed direct above when such object or printed material is located at the outside of the bottom 20. Accordingly, the floor of the bottom of the cup has similar characteristic with a mirror.

In order to let the floor of the bottom of the cup have similar characteristic with a mirror, the object attached or located at the floor should be attached closely using an adhesive or water without using an alien substance.

If such alien substance, as a medium to transfer light between the image projection substance 50 and the floor, is included, the object attached part allows light go through and other parts functions as a mirror. Therefore, the image projection substance 50, which attached at the bottom can be seen from the side through the main vertical wall 30.

Also, the main vertical wall 30 of the cup 10 can be shaped in angular column such as rectangular or hexagonal column or columns with more angles. However, a cylindrical main vertical wall is most desirable.

The reason why the cylindrical wall part, which is smooth inside and out is desirable, is for uniformly dispersing, reflecting, and diffracting the light inside of the

main vertical wall 30. If there is any carved shape or design inside or outside of the cup, such part can create discrepancies in light dispersion, reflection, and diffraction from other parts and make the decorative object projection difficult. Also, in case that the cup 10 is not vertical and cylindrical but stands in a certain angle, the projected
5 object appears distorted. This distortion can be a good point by providing various projected images, but it can be a weak point by failing to provide accurate images as a user wanted.

Also, as to the color of the cup 10, a colorless cup is desirable, but light coloring is acceptable. However, thick coloring can hinder the projection of the
10 decoration object to the surface of the liquid material.

In addition to shape, smoothness, and color of the cup, another important factor is the size of a cup. In order to achieve the effect of the present invention, the cup must have more than 1:1 ratio in the height H and the width W of the cup; desirably more than 2:1 ratio in the height H and the width W . Considering the fact that a cup 10 is
15 generally filled with the liquid material 80 in $\frac{2}{3}$ of its height H , and also considering the characteristics of light (dispersion, reflection, etc.) and liquid material, such ratio in making an image cup for decoration, is to be maintained so that the decorative object image can be projected on the surface of the liquid material.

FIG. 2 shows a cup filled with certain liquid material 80 in certain height.
20 Generally, a cup is supposed to be made from transparent glass material or synthetic resins, because a cup with opaque material cannot be considered to project a decorative object image. Such cup 10 has a refractive index of about "1.52".

When the cup is not filled with liquid material 80, the cup can not serve as a mirror as above described and then it is viewed as an ordinary cup.

25 When the cup is filled with liquid material, a mirror effect appears in the image

cup of the present invention as shown from the above. It is like a prism effect by using the image cup so that the image of the decorative object at the bottom is projected to the surface of the liquid by the main vertical wall of the cup. According to the optical characteristics of light, only the light which is reflected or refracted in 40 ~ 70 degrees
5 from the object, forms the image on the surface of the liquid.

Since the light (a1) is reflected inside of the same liquid material and the main vertical wall, the entrance angle and the reflection angle of the light is identical and the reflected light (a2) is projected to the surface of the liquid. Such reflected light forms an image and the image is placed on the surface depending on the users' viewing point.
10 I.e., a user views the formed image at A' when he views from A point, and a user views the formed image at B' when he views from B point. (the dotted and solid lines show viewing direction of a user at the point A and B.) Therefore, depending on viewing angles, the object image formed on the surface varies its location.

Also, keeping the height of the main vertical wall and the width of the bottom
15 as at least 1:1 ratio, the decorative object is projected upside-down at the surface.

As shown from the above, the decorative object is projected clearly on the surface of the liquid material by the effect of surface tension.

Besides the basic constitution of the image cup for decoration according to the present invention in FIG. 2, other various constitution can be added to the image cup as
20 shown in FIG 3 ~ FIG. 7.

FIG. 3 illustrates a second embodiment that forms a space part 60 at the bottom. In the second embodiment, the bottom is made in certain thickness in order to contain a decorative object in said space part. Comparing the first embodiment in which only a flat projecting object can be used because the object is attached at the top of the bottom,
25 the feature of the second embodiment is that it allowed to use a projecting image

projection substance 50 with certain shape and thickness, placing in the space part 60.

In this way, a cubic image is projected on the surface of the liquid material, and such cubic image is another attraction for users to use the image cup. Also, placing a flat projecting object, such as an advertisement logo, etc., at the side part of the bottom, such flat object can be projected to the surface of the liquid material with the projecting image projection substance 50. In the second embodiment, its cylindrical space part allows desirable usage of the side part of the space.

FIG. 4 illustrates the third embodiment which added slopes to the side of the space part in the second embodiment. The third embodiment formed the slope at the side of the space part in order to utilize the space part. Such slope curved inwardly not perpendicularly to the bottom, and maximizes the side area, so that a flat projecting object 70 can be attached to the slope. Such flat projecting object 70 is projected to the surface with the image projection substance 50 located in the center. By forming sloping side, larger side area enabled a larger flat projecting object 70 than one in the third embodiment which has perpendicular side. Such sloping side also does not allow a user to see the attached projecting object 70 from the top. Therefore, an ordinary image cup 10 when not using, intrigue users by surging image from invisible part when the cup is filled in certain height. The degree of the slope can be manipulated when the cup is manufactured.

Also, FIG. 5 illustrates the fourth embodiment which, for the center as an axis of symmetry, contains symmetrically spaces similar with one in FIG 4 of the third embodiment. The side cut view of such space forms a right triangle whose perpendicular side locates to the main vertical wall side 30 and whose hypotenuse locates at the center side of the cup.

FIG. 6 illustrates the fifth embodiment in which the decorative image

projection substance 50 is attached to the top of the bottom. Since the object can be viewed without filling the cup in this fifth embodiment, the effect is somewhat reduced comparing with the other embodiments. This embodiment is identical with an ordinary cup without liquid material filled since the main vertical wall 30 and the bottom 20 of the cup 10 interrupt the mirror effect by uniform dispersion, reflection, and diffraction of light. However, such cup performs the effect of the present invention when it is filled with liquid material.

FIG. 7 illustrates the sixth embodiment in which a curbed part is formed at the lower part of the main vertical wall. The decorative object 50 is attached to the lower part of the curbed part in the sixth embodiment. The effect of image projection for the attached object is identical to that of the other embodiments, and the lower part of the main vertical wall can be changed according to personal favors.

As shown at the above various embodiments, the present invention enables a user to view the projected image of an object located at the bottom of said cup to the surface of the contained liquid while the cup is filled with liquid matter, such as water, beverage, liquor, etc., in order to excite and intrigue the user. Moreover, by using a company logos as the projecting object, an advertising effect can be achieved.

What is claimed is:



1. An image cup for decoration, comprising:
 an opened top, main vertical wall and a bottom, and said image cup made of a
 5 certain cup material;
 inside and outside of said main vertical wall and inside of said bottom having
 smooth surfaces in order to uniformly scatter, deflect or reflect lights inside of the image
 cup;
 height of said main vertical wall being larger than width or diameter of said
 10 bottom; and
 an image projection substance being located at the bottom, whereby projecting
 said image projection substance to a surface of contained liquid when the liquid is filled
 inside of said image cup.
- 15 2. The image cup for decoration according to claim 1, wherein said main vertical
 wall is a cylindrical shape and said bottom is flat.
3. The image cup for decoration according to claim 1, wherein said main vertical
 wall is a polygonal shape.
- 20 4. The image cup for decoration according to claim 1, wherein said height of the
 main vertical wall twice larger than said width or diameter of the bottom
5. The image cup for decoration according to claim 1, wherein said bottom
 25 contains a hollow portion.



6. The image cup for decoration according to claim 5, wherein said image projection substance is located inside the hollow portion.

5 7. The image cup for decoration according to claim 6, wherein side of said hollow portion forms a slope.

8. The image cup for decoration according to claim 1, wherein said image projection substance is attached on the bottom.

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9. The image cup for decoration according to claim 1, wherein projected image location of the image projection substance on the surface of contained liquid varies depending on a seeing angle of a viewer's location.

15 10. The image cup for decoration according to claim 1, wherein said image projecting substance is attached on the bottom by means of water or adhesive.

11. An image cup for decoration, comprising:

an opened top, a cylindrical main vertical wall and a flat bottom, and said
20 image cup made of transparent material;

inside and outside of said cylindrical main vertical wall and inside of said flat bottom having smooth surfaces in order to uniformly scatter, deflect or reflect lights inside of the image cup;

height of said cylindrical main vertical wall being twice larger than width or
25 diameter of said flat bottom; and

an image projection substance being located at the bottom, whereby projecting said image projection substance to a surface of contained liquid when the liquid is filled inside of said image cup.

- 5 12. A method of image projection for projecting an image projection substance to a surface of contained liquid when the liquid is filled inside of said image cup, the method comprising the steps of:

preparing an image cup comprising an opened top, main vertical wall and a bottom having smooth surfaces of inside and outside of the main vertical wall and
10 inside of the bottom in order to uniformly scatter, deflect or reflect lights inside of the image cup, and height of said main vertical wall being larger than width or diameter of said bottom;

locating an image projection substance at the bottom of the image cup;

filling liquid in the image cup with a certain filling ratio of the main vertical
15 wall.

13. The method of image projection according to claim 12, wherein the filling ratio of the main vertical wall is at least $\frac{2}{3}$ of said image cup filled with liquid.

20 14. The method of image projection according to claim 12, wherein said height of the main vertical wall is twice larger than the width or diameter of the bottom of the image cup.

