

## DESCRIPTION

Title of the Invention: LIQUID DISPENSER

### 5 Technical Field

[0001] The present invention relates to a liquid dispenser.

### Background Art

[0002] Conventionally, liquid dispensers such as disinfectant dispensers and soap  
10 dispensers that are to be installed in restrooms and so on have been provided. In particular, from the viewpoint of infection control, restrooms equipped with liquid dispensers called toilet seat cleaners for disinfecting toilet seat surfaces have recently been increasing (see Non-patent Document 1). It discloses a manual type that sprays a disinfectant when a push button provided on the top of the toilet seat cleaner is pushed  
15 and a touchless type that has a detection sensor (for example, an optical sensor) provided at a predetermined position of a casing to detect the approach of a spraying target such as fingers of a user's hand or toilet paper held by a user and is configured to automatically spray the disinfectant without the user touching the device.

[0003] The manual type starts spraying when the user pushes the push button and thus  
20 is able to spray the disinfectant on toilet paper relatively easily if the toilet paper held in the hand is positioned at a spraying part beforehand. On the other hand, the touchless type sprays the disinfectant when the hand itself, the toilet paper held in the hand, or a cuff of his/her clothes enters a detection range of the detection sensor, and thus the disinfectant may adhere to a place other than the toilet paper.

[0004] To solve such a problem with the touchless type, the present applicant has  
25 proposed a liquid dispenser including two detection sensors at different positions and configured to spray a liquid only when fingers of the user's hand or the like are detected by the two sensors (see Patent Document 1).

### Prior Art Document

### 30 Patent Document

[0005] Patent Document 1: Japanese Laid-open Patent Publication No. 2022-172426

### Non-patent Document

[0006] Non-patent Document 1: homepage of NIPPON CALMIC LTD., Rental Service,  
Toilet Seat Cleaner Series (cleaner for toilet seats),  
35 URL:[https://www.calmic.co.jp/service/toilet\\_seat\\_cleaner/](https://www.calmic.co.jp/service/toilet_seat_cleaner/)

## Summary of the Invention

### Problems to Be Solved by the Invention

[0007] According to the art of Patent Document 1, since the liquid filled in a container is controlled to be sprayed only when the two sensors both detect the approach of the fingers of the user's hand or the like, it is possible to prevent an incorrect operation such as the spraying of the liquid when the user merely enters a detection range of one of the sensors (detection parts). However, though being capable of preventing the spraying at an unexpected moment, this art still has a problem in terms of whether or not the spraying target such as toilet paper held in the hand can be accurately aligned with the spraying direction of the liquid (disinfectant or the like) sprayed from the spraying part, and the liquid (disinfectant or the like) may be sprayed beyond a range where the spraying target is present. One reason for this is as follows. In the case of the toilet seat cleaner of Non-patent Document 1, the sprayed liquid is a transparent disinfectant, and its amount sprayed is about 0.2 to 0.5 ml and thus is very small, because of which it is difficult to distinguish whether or not the toilet paper is wet even if it has been sprayed with the liquid, that is, a spray mark is difficult to recognize. Accordingly, even if the disinfectant has already been sprayed on the toilet paper, the user thinks that the disinfectant has not been sprayed or the sprayed amount is not sufficient, and moves the toilet paper to cause the sensors to react again so that the disinfectant will be sprayed, and while such behavior is repeated, the disinfectant is sprayed by mistake to the vicinity of the cuff to wet it. This tends to result in the waste of the disinfectant.

[0008] The present invention has been made in consideration of the above and has an object to provide a liquid dispenser that is able to more reliably spray a liquid such as a disinfectant on a spraying target such as toilet paper.

### Means for Solving the Problems

[0009] To solve the aforesaid problem, a liquid dispenser of the present invention includes:

- a casing;
- a container housed in the casing and filled with a liquid;
- a detection sensor configured to detect a spraying target; and
- a spraying mechanism unit including a pump, a drive control part configured to receive a signal indicating that the detection sensor has detected the spraying target to control driving of the pump, and a spraying part, the spraying mechanism unit being configured to feed the liquid from the container to the spraying part by driving the pump

and spray the liquid from the spraying part,

wherein the detection sensor is set to detect the spraying target of a prescribed color,

wherein the drive control part drives the pump and the spraying part sprays the liquid when the drive control part receives a detection signal indicating that the detection sensor has detected the spraying target of the prescribed color.

[0010] Preferably, the spraying target is paper, and the detection sensor is set to detect color of the paper.

More preferably, the detection sensor is set to detect a prescribed white-toned color because paper used in restrooms, such as toilet paper, often has a white-toned color.

[0011] Preferably, in the casing, an insertion part where to insert the spraying target is formed so as to dent from a front surface toward a rear surface of the casing and has an upper wall portion and a bottom wall portion apart from the upper wall portion by a predetermined interval, and the spraying part is disposed in the upper wall portion.

Preferably, the detection sensor is disposed in the upper wall portion, and a detection distance of the detection sensor is adjusted to be within a distance up to the bottom wall portion. More preferably, the detection sensor is disposed in the upper wall portion, and a detection distance of the detection sensor is adjusted to be less than a distance up to the bottom wall portion.

Preferably, on both sides of the bottom wall portion, rising portions rising upward are formed.

Preferably, the liquid dispenser includes an illumination part configured to light up when the liquid is sprayed from the spraying part, to make a spray mark of the liquid adhering to the spraying target visually recognizable.

[0012] As the liquid, a disinfectant is usable. In this case, the disinfectant is used to disinfect a toilet seat surface, and is suitable for use in the application where the liquid dispenser is installed in a restroom stall.

### Effect of the Invention

[0013] The liquid dispenser of the present invention is configured such that the detection sensor detects only a spraying target of a prescribed color. Paper used to wipe toilet seats, such as toilet paper, is mainly white-toned, and therefore, as a result of limiting a spraying target to that having the color of paper used to wipe toilet seats, the spraying mechanism unit operates to spray the liquid such as a disinfectant only when a

spraying target of the prescribed color (for example, white paper such as toilet paper) enters the detection range of the detection sensor. This inhibits the liquid from being sprayed when the spraying target such as toilet paper is not present in the detection range of the detection sensor.

5 [0014] Further, in the casing, the dented insertion part where to insert the spraying target is provided, and the spraying part is provided in the upper wall portion of the insertion part. Owing to this, only by placing the spraying target in the insertion part, the user can easily and quickly set the spraying target such that it faces the spraying part, and the liquid can be more reliably sprayed toward the spraying target. Specifically, to  
10 align the spraying target with the spraying part, the user only needs to insert it into the insertion part, and this insertion part functions as what is called a guide to align the spraying target with the spraying part. Further, providing the illumination part that lights up when the liquid is sprayed from the spraying part facilitates confirming a spray mark of the liquid adhering to the spraying target. In particular, since the amount of the  
15 sprayed disinfectant for toilet seats is very small, it is not easy to confirm its spray mark when it is sprayed on white paper, but owing to the lighting of the illumination part, the user can more surely confirm that the disinfectant has been sprayed on the paper, and the frequency with which the user repeats the operation of placing the paper at the spraying part is reduced, making it possible to reduce the waste of the disinfectant and the  
20 adhesion of the disinfectant to places other than the spraying-target paper.

#### Brief Description of Drawings

[0015] [FIG. 1] FIG. 1 is a perspective view of a liquid dispenser according to an embodiment of the present invention seen from the upper direction.

25 [FIG. 2] FIG. 2 is a perspective view of the liquid dispenser according to the embodiment of the present invention seen from the lower direction.

[FIG. 3] FIG. 3 is a front view of the liquid dispenser according to the embodiment of the present invention.

[FIG. 4] FIG. 4 is a side view of the liquid dispenser according to the  
30 embodiment of the present invention.

[FIGs. 5] FIG. 5(a) is a perspective view illustrating an insertion part, FIG. 5(b) is its front view, and FIG. 5(c) is its sectional view taken along the A-A line in FIG. 5(b).

[FIGs. 6] FIG. 6(a) is a perspective view of a holder member seen from the upper direction, and FIG. 6(b) is a perspective view of the holder member seen from the  
35 lower direction.

## Modes for Carrying out the Invention

[0016] An embodiment of the present invention will be hereinafter described based on the drawings. FIG. 1 to FIG. 4 are explanatory views of a liquid dispenser 1 according to the embodiment of the present invention. Here, for example, the liquid dispenser 1 according to this embodiment is attached on a wall or the like of a restroom stall and sprays a disinfectant ("disinfectant" in this specification includes all agents for preventing/reducing the growth of bacteria, such as a bacteriostatic agent and a sanitizer) for disinfecting a toiled seat surface. However, the kind (use) of the liquid dispenser 1 is not limited to this, and the liquid dispenser 1 may be a dispenser for chemical agents that suppress viruses, a soap dispenser that sprays a soap liquid, and any of various dispensers that spray other chemical agents or detergents.

[0017] As illustrated in FIG. 1 to FIG. 4, the liquid dispenser 1 has a casing 10, a container 20, a spraying mechanism unit 30, a detection sensor 40, and so on, and the container 20 and the spraying mechanism unit 30 are housed in the casing 10.

[0018] The casing 10 has an insertion part 110 where to insert a spraying target. This insertion part 110 dents from a front surface toward a rear surface of the casing 10, and a lower front surface 10a and an upper front surface 10b sandwiching the insertion part 110 are located more forward than a rearward surface (a surface near the rear surface of the casing 10) 111 of the insertion part 110. Specifically, as illustrated in FIG. 4, the insertion part 110 is substantially C-shaped when seen from the side surface, with its front side and lateral sides being open, and is formed such that the height of the rearward surface 111 is shorter than a gap between the lower front surface 10a and the upper front surface 10b which form the frontal opening. A later-described spraying part 340 is disposed in an upper wall portion 113 forming the insertion part 110, specifically, in the upper wall portion 113 at a position closer to the rearward surface 111 than the lower front surface 10a and the upper front surface 10b. Further, a later-described detection sensor 40 is also disposed near the spraying part 340.

[0019] In more detail, as illustrated in FIGs. 5(a) to (c), the insertion part 110 has a bottom wall portion 114 located at an upper end position of the lower front surface 10a and located a predetermined interval downward from the upper wall portion 113, and a liquid sprayed from the spraying part 340 disposed in the upper wall portion 113 is sprayed in the direction of the bottom wall portion 114. To inhibit, at this time, the liquid from scattering to the outside of the bottom wall portion 114 from the space between the side portions of the bottom wall portion 114, rising portions 115, 116

projecting upward are preferably provided on both sides of the bottom wall portion 114. Further, since the height of the rearward surface 111 is shorter than the gap between the lower front surface 10a and the upper front surface 10b which form the frontal opening as described above, the spraying target can be easily inserted from the front surface side, and in addition, that the space close to the rearward surface 111 is narrow contributes to the inhibition of the liquid from scattering to the outside of the insertion part 110.

[0020] The liquid (disinfectant) to be sprayed from the liquid dispenser 1 is filled in the container 20. The container 20 is set in the lower part in the casing 10, that is, at a position corresponding to the lower front surface 10a (see FIG. 4).

[0021] The spraying mechanism unit 30 includes a pump 310, a first liquid feed tube 320 connecting the pump 310 and the container 20, a second liquid feed tube 330 connecting the pump 310 and the spraying part 340, and a drive control part 350 that controls the driving of the pump 310. When receiving a detection signal from the later-described detection sensor 40, the drive control part 350 drives the pump 310. Consequently, the disinfectant in the container 20 is fed to the spraying part 340 through the first liquid feed tube 320 and the second liquid feed tube 330 to be sprayed. Note that the spraying part 340 is structured to have holes through which the disinfectant can be sprayed in a minute particulate form, and is attached to the leading end of the second liquid feed tube 330.

[0022] The spraying part 340 is provided in the upper wall portion 113 of the insertion part 110 as described above. Specifically, in the upper wall portion 113, the spraying part 340 faces downward, and the disinfectant is sprayed from the spraying part 340 toward the bottom wall portion 114 of the insertion part 110. As described above, since the rising portions 115, 116 are provided on both sides of the bottom wall portion 114, the scattering of the liquid to the outside of the insertion part 110 is inhibited.

[0023] The detection sensor 40 is installed near the position where the spraying part 340 is provided as described above. In this embodiment, it is provided in the upper wall portion 113 at a position close to the upper front surface 10b and adjacent to the spraying part 340. The detection sensor 40 detects an object located in the bottom wall portion 114 direction from this position of the upper wall portion 113. Further, its detection distance is preferably adjusted to be within the distance up to the bottom wall portion 114 of the insertion part 110. Further, depending on the color of the bottom wall portion 114, the detection distance is more preferably adjusted to be less than the distance up to the bottom wall portion 114 in order to prevent the detection of the bottom wall portion 114 itself. Consequently, the detection distance falls within the range of

the insertion part 110, and even if some object is present outside the liquid dispenser 1, for example, in front of the lower front surface 10a or outside the side portions of the insertion part 110, the detection sensor 40 does not detect it.

[0024] For example, the position of the liquid dispenser 1 may be relatively high in the state where the user sits on the toilet seat, though this depends on the installation height of the liquid dispenser 1. In such a case, even if the hand, arm, thigh or the like of the person sitting on the toilet seat moves, it is not detected by mistake and the liquid is not sprayed.

[0025] The detection sensor 40 is set to detect a spraying target having a prescribed color. In this embodiment, the liquid dispenser 1 is installed in a restroom stall to spray a disinfectant for toilet seats, and its spraying target is paper such as toilet paper. Therefore, the detection sensor 40 is set to detect the color of paper such as toilet paper, for example, white, pink, light blue, and the like. However, since toilet paper or the like is basically white-toned, the detection sensor 40 is preferably set to detect a white-toned color. The kind of the detection sensor 40 is not limited as long as it is capable of detecting the prescribed color such as a white-toned color. As the detection sensor 40 capable of detecting a specific color such as a white-toned color, a photoelectric sensor such as an infrared sensor or a color sensor is usable, for instance. For example, in the case of the infrared sensor, by adjusting its detection luminance, the infrared sensor can be set to detect only paper of a white-toned color whose reflected light is strong but not to detect the skin color of hands or the like. Consequently, only when paper of the prescribed white-toned color is present in the insertion part 110, the detection sensor 40 detects its presence and transmits the detection signal to the drive control part 350. Note that a lens part 41 that cuts light in the visible spectrum is preferably provided on a front surface of a light-receiving part of the detection sensor 40, or in the case where a reflective infrared sensor having a light-emitting/light-receiving part in which a light-emitting element and a light-receiving element are incorporated is used, the lens part 41 is preferably provided on a front surface of the light-emitting/light-receiving part. This is intended to prevent the detection sensor 40 from reacting to a bright color of LED or the like and operating by mistake.

[0026] The disinfectant sprayed from the spraying part 340 on paper adheres to a range of about 3 to 6 cm diameters, and its amount sprayed is 0.2 to 0.5 ml and thus is very small. Accordingly, even if the disinfectant is sprayed on paper of a white-toned color, it is not easy to recognize a spray mark indicating that the paper is wet with the disinfectant. Therefore, in this embodiment, an illumination part 360 is provided at a

predetermined position of the upper wall portion 113 of the insertion part 110. As the illumination part 360, LED or the like that emits colored light of blue, red, or green is used. Further, the illumination part 360 is preferably provided near the spraying part 340 so that the illumination part 360 can illuminate the range of the disinfectant sprayed on the paper.

It should be noted that "white-toned color" in this specification refers to, in addition to white, white-toned colors such as off-white, pearl white, milk white, ivory, pearl white, cherry blossom pink, and pearl color which are often used as the color of paper used in restrooms, such as toilet paper.

[0027] Here, FIG. 6 illustrates a holder member 370 for supporting the spraying part 340, the illumination part 360, and the detection sensor 40. On a front part of the holder member 370, the lens part 41 for the detection sensor 40 is integrally provided. This lens part 41 has a function of cutting visible light. At the back of the lens part 41, a spraying part placement hole 372 for holding the spraying part 340 provided at the leading end of the second liquid feed tube 330 is formed, and an LED placement hole 373 where to place LED forming the illumination part 360 is formed adjacently to the spraying part placement hole 372. This holder member 370 is disposed inside the upper wall portion 113 of the insertion part 110. Owing to the holder member 370, the illumination part 360 and the detection sensor 40 can be disposed adjacently to the spraying part 340.

[0028] Next, the operation of the liquid dispenser 1 of this embodiment will be described. The liquid dispenser 1 of this embodiment is fixed on a wall of each stall of a restroom. After entering the stall, a user pulls out a certain length of toilet paper to take it in his/her hand. Next, the toilet paper taken in his/her hand is inserted into the insertion part 110 of the liquid dispenser 1 (see FIG. 4). The insertion part 110 dents from the lower front surface 10a and the upper front surface 10b as described above, facilitating the determination of a place, in the whole liquid dispenser 1, on which the disinfectant is to be sprayed.

[0029] When the toilet paper is inserted into the insertion part 110, the detection sensor 40 detects its presence since the toilet paper has the prescribed white-toned color. In addition, the detection distance of the detection sensor 40 is adjusted such that the detection sensor 40 detects an object that has entered inside the insertion part 110 and does not detect an object outside the range of the insertion part 110. For example, in the case where the aforementioned reflective infrared sensor is used, the detection distance of infrared rays emitted from the light-emitting/light-receiving part is adjusted

to be within the distance up to the bottom wall portion 114, preferably adjusted to be less than the distance up to the bottom wall portion 114. Therefore, it is possible to surely detect the presence of the toilet paper located in the insertion part 110. The detection signal of the detection sensor 40 is transmitted to the drive control part 350 of the spraying mechanism unit 30. When receiving this detection signal, the drive control part 350 drives the pump 310. Consequently, a predetermined amount of the disinfectant is sucked up from the container 20, fed to the spraying part 340 through the first liquid feed tube 320 and the second liquid feed tube 330, and sprayed from the spraying part 340.

[0030] The disinfectant is sprayed from the spraying part 340 in the direction of the bottom wall portion 114 of the insertion part 110, and since the rising portions 115, 116 are provided on both sides of the bottom wall portion 114, the scattering of the disinfectant to the outside of the insertion part 110 is inhibited. Further, the drive control part 350 causes the illumination part 360 to light up when driving the pump 310. Consequently, even if the amount of the sprayed disinfectant is small, it is easy to visually recognize whether the toilet paper of the white-toned color is wet with the disinfectant. This prevents the user from misunderstanding that the toilet paper is not wet and re-inserting the toilet paper into the insertion part 110, as has conventionally been the case. This also reduces the waste of the disinfectant.

#### Explanation of Reference Signs

[0031] 1 liquid dispenser

10 casing

10a lower front surface

10b upper front surface

110 insertion part

111 rearward surface

113 upper wall portion

114 bottom wall portion

115, 116..rising portion

30 spraying mechanism unit

310 pump

340 spraying part

350 drive control part

360 illumination part

370 holder member  
40 detection sensor  
41 lens part

## CLAIMS:

1. A liquid dispenser comprising:  
a casing;  
5 a container housed in the casing and filled with a liquid;  
a detection sensor configured to detect a spraying target; and  
a spraying mechanism unit including a pump, a drive control part configured to receive a signal indicating that the detection sensor has detected the spraying target to control driving of the pump, and a spraying part, the spraying mechanism unit being  
10 configured to feed the liquid from the container to the spraying part by driving the pump and spray the liquid from the spraying part,  
wherein the detection sensor is set to detect the spraying target of a prescribed color,  
wherein the drive control part drives the pump and the spraying part sprays the  
15 liquid when the drive control part receives a detection signal indicating that the detection sensor has detected the spraying target of the prescribed color.
2. The liquid dispenser according to claim 1, wherein the spraying target is paper, and the detection sensor is set to detect color of the paper.  
20
3. The liquid dispenser according to claim 2, wherein the color of the paper is a white-toned color, and the detection sensor is set to detect a prescribed white-toned color.
- 25 4. The liquid dispenser according to claim 1, wherein in the casing, an insertion part where to insert the spraying target is formed so as to dent from a front surface toward a rear surface of the casing and has an upper wall portion and a bottom wall portion apart from the upper wall portion by a predetermined interval, and the spraying part is disposed in the upper wall portion.  
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5. The liquid dispenser according to claim 4, wherein the detection sensor is disposed in the upper wall portion, and a detection distance of the detection sensor is adjusted to be within a distance up to the bottom wall portion.
- 35 6. The liquid dispenser according to claim 4, wherein the detection sensor is

disposed in the upper wall portion, and a detection distance of the detection sensor is adjusted to be less than a distance up to the bottom wall portion.

5 7. The liquid dispenser according to claim 4, wherein on both sides of the bottom wall portion, rising portions rising upward are formed.

10 8. The liquid dispenser according to claim 1, comprising an illumination part configured to light up when the liquid is sprayed from the spraying part, to make a spray mark of the liquid adhering to the spraying target visually recognizable.

9. The liquid dispenser according to claim 1, wherein the liquid is a disinfectant.

10 10. The liquid dispenser according to claim 9, wherein the disinfectant is for use to disinfect a toilet seat surface,  
15 the liquid dispenser being installed in a restroom stall.