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(72) Inventor(s):  
**Xianfeng Wu**  
**Guiyu Li**

(73) Proprietor(s):  
**Nanjing Enwell Technology Service Co., Ltd.**  
**Room 407-81, Software Plaza, Building B,**  
**No.9 Xinghuo Road, Jiangbei New District, Nanjing,**  
**Jiangsu 210000, China**

(74) Agent and/or Address for Service:  
**Dehns**  
**St. Bride's House, 10 Salisbury Square, LONDON,**  
**EC4Y 8JD, United Kingdom**

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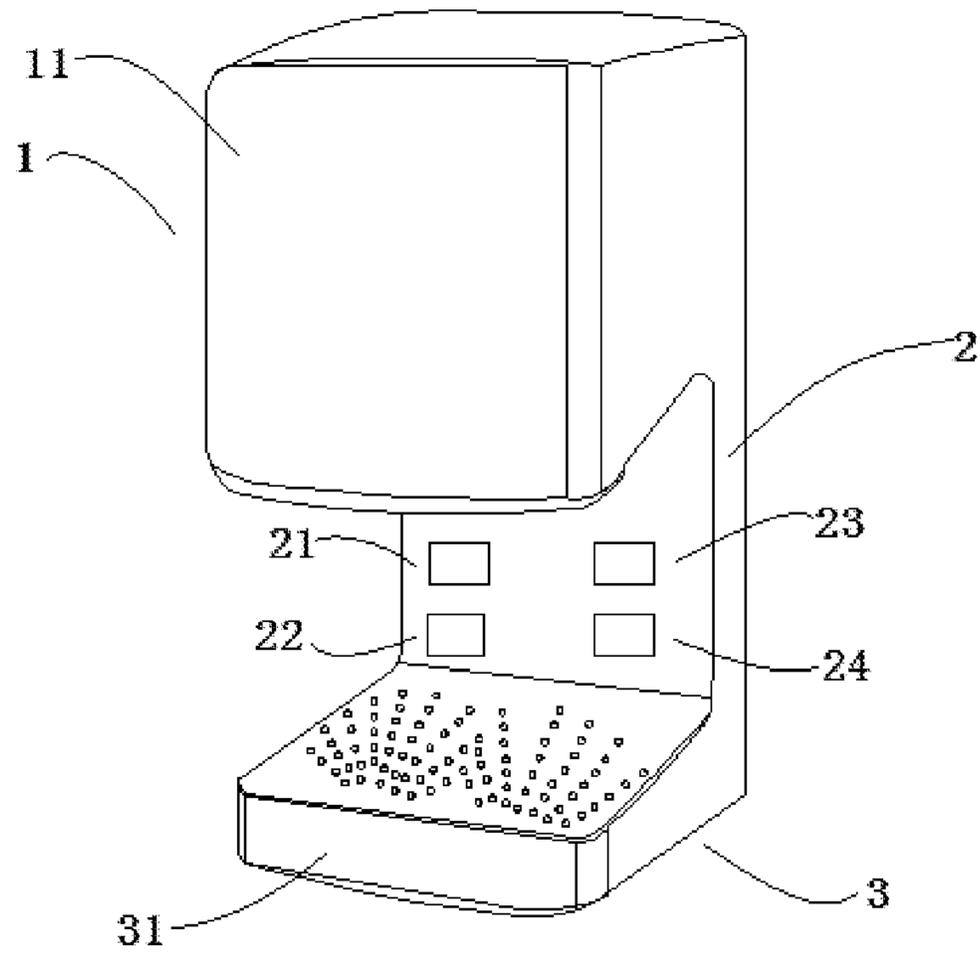


Fig. 1

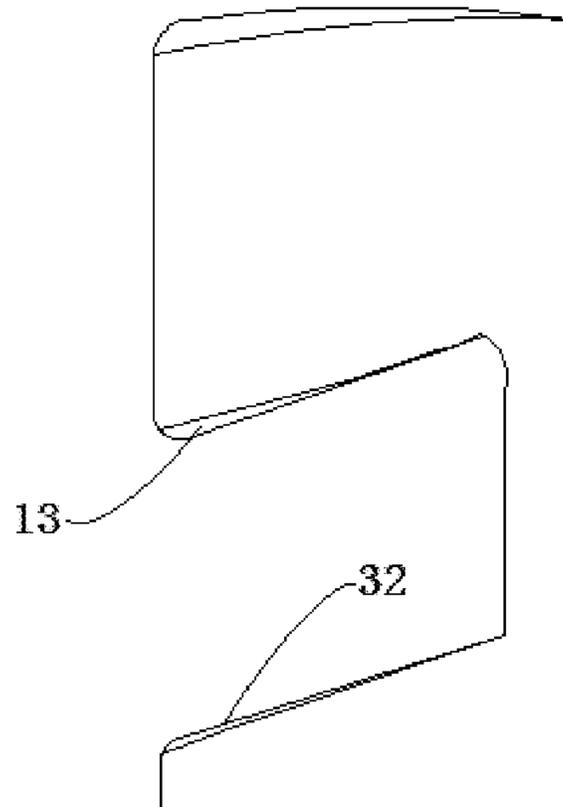
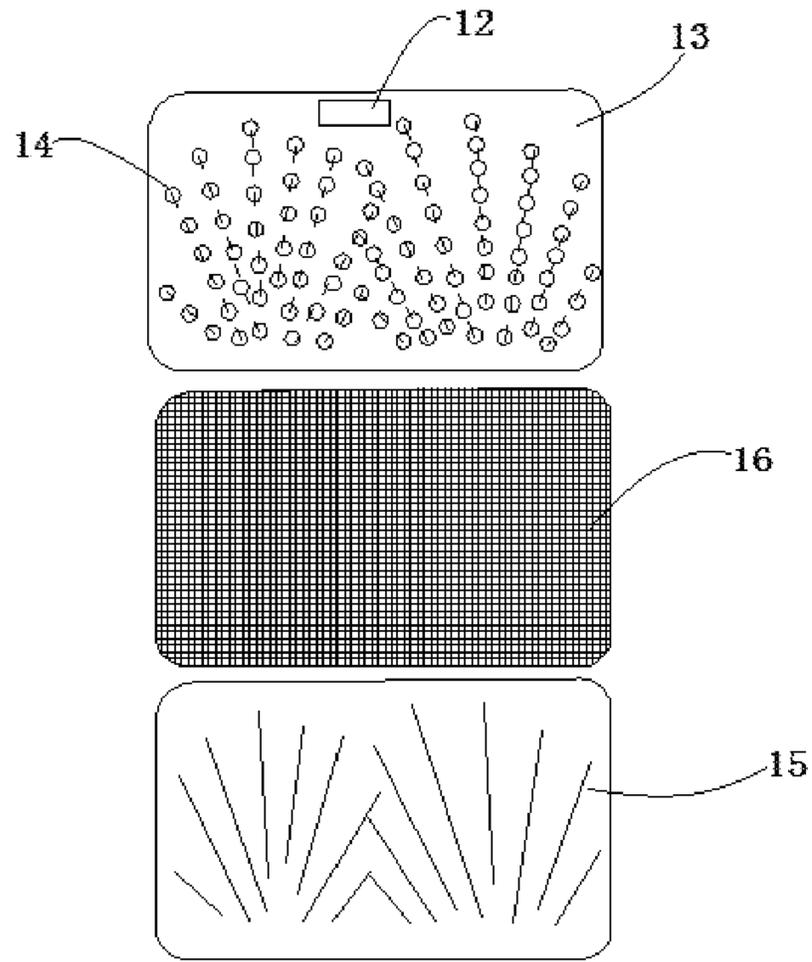
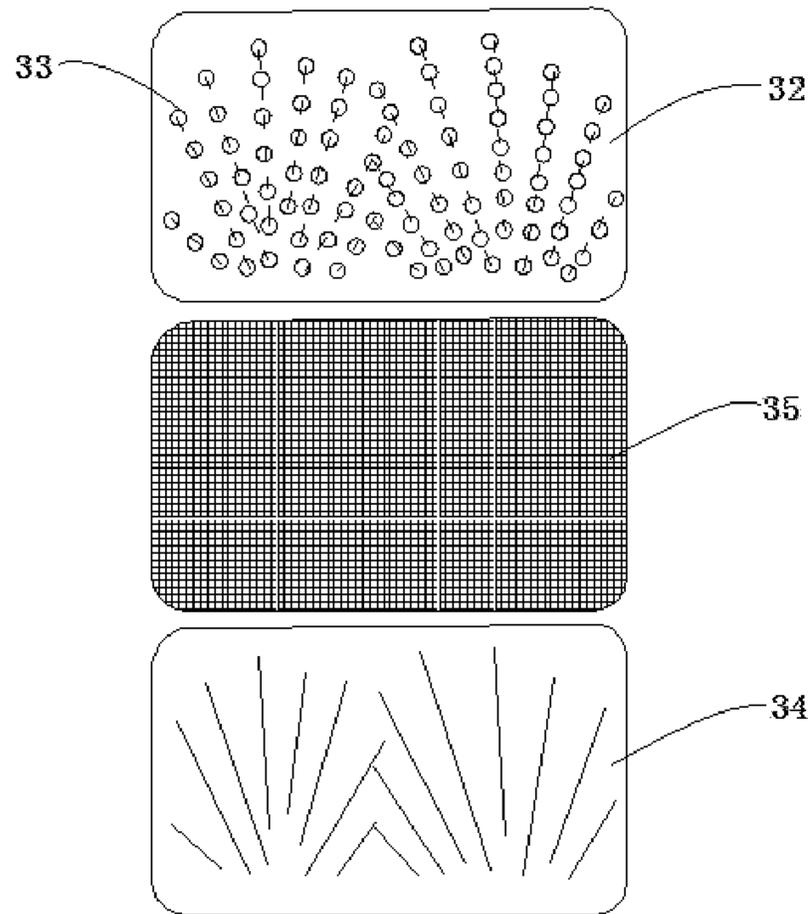


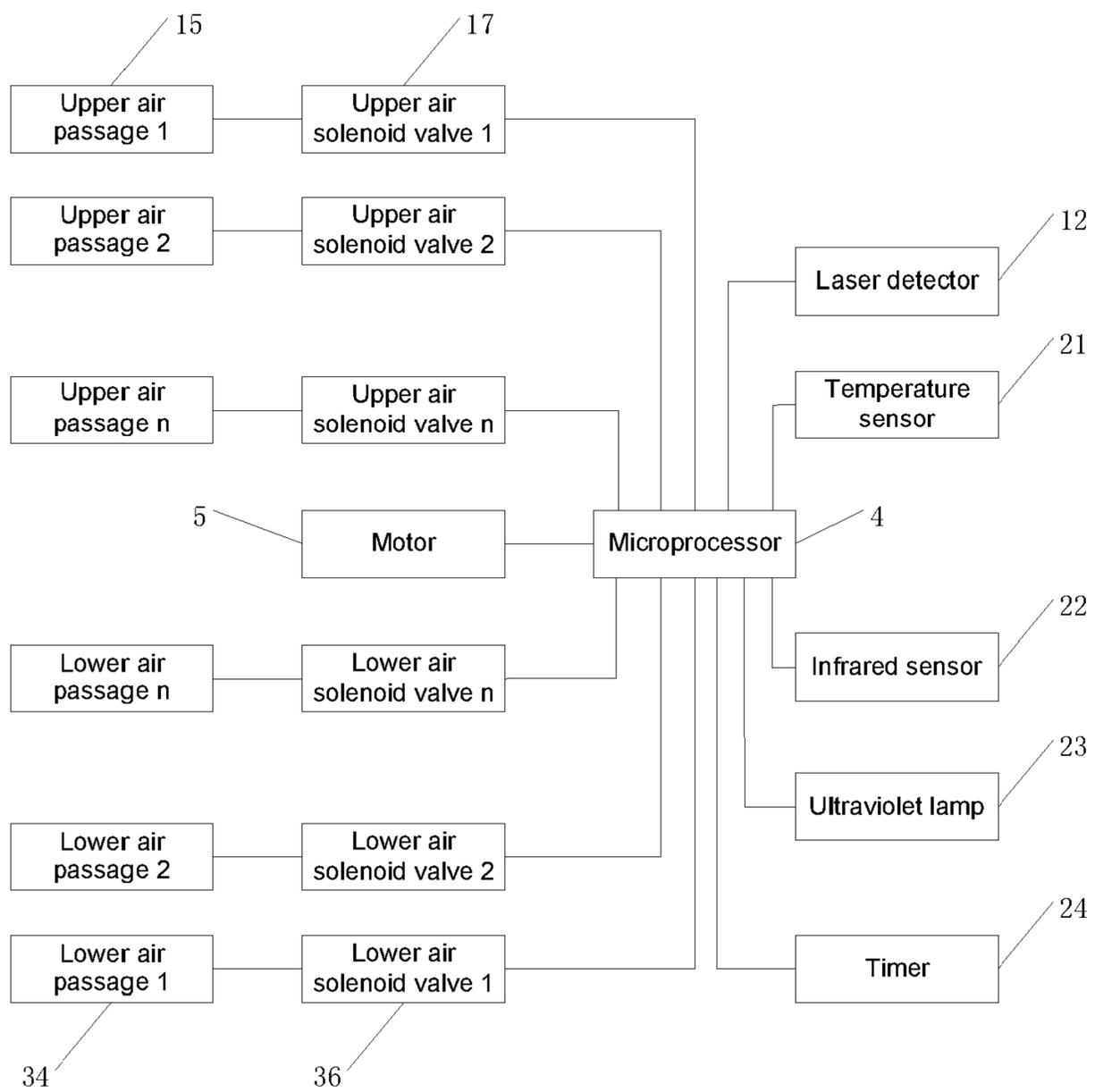
Fig. 2



**Fig. 3**



**Fig. 4**

**Fig. 5**

# **INTELLIGENT AIR BLOWING HAND DRYER**

## **FIELD OF THE INVENTION**

[0001] This application relates to the technical field of smart home, and in particular to an intelligent air blowing hand dryer.

## **BACKGROUND OF THE INVENTION**

[0002] A hand dryer, also known as an automatic hand dryer, is an advanced and ideal sanitary cleaning device, having the characteristics such as large air volume, low noise, high sensitivity, convenient to use, fast. When a user has washed and put two hands into an air outlet of a hand dryer, the hand dryer will automatically blow out comfortable air, so that the two hands are quickly dried from wetness. When the two hands leave the air outlet, the hand dryer will automatically stop the air and shut down. Therefore, a person's hands do not have to touch a component such as a switch, effectively preventing the problem of cross infection of diseases.

[0003] Generally, the air outlet of the existing automatic hand dryer has the same air volume and strength across various parts of two hands. However, in fact, because areas of places such as finger gaps and finger roots of the two hands are small and the distances between fingers are small, it is easy to block the blowing air, affecting the drying effect at the finger gaps and the finger roots. However, the above positions are positions where bacteria and the like easily breed and hide. Especially in wet environment of incomplete drying, it is more likely to aggravate this potential situations so that hand drying does not achieve the desired effect. If the hidden positions such as the finger gaps are to be dried thoroughly, a user needs to rub fingers with the blowing air and also extend the air blowing time. Thus, it will not only greatly reduce the drying efficiency, but the rest of the two hands will become over-dried due to excessive drying.

## **SUMMARY OF THE INVENTION**

[0004] This application provides an intelligent air blowing hand dryer to solve the problem that the existing hand dryer cannot thoroughly dry hidden positions such as finger gaps.

[0005] According to a first aspect, this application provides an intelligent air blowing hand dryer, as claimed in claim 1.

[0006] Optionally, one end of the head part close to the tail part is in an inclined structure, and one end of the head part close to the backboard is higher than one end of the head part away from the backboard;

one end of the tail part close to the head part is in an inclined structure, and one end of the tail part close to the backboard is higher than one end of the tail part away from the backboard.

[0007] Optionally, the upper straight air outlets and the lower straight air outlets are radially arranged;

in the upper straight air outlets and the lower straight air outlets, the density of air holes close to edges of the upper air baffle and the lower air baffle is greater than the density of air holes away from the edges.

[0008] Optionally, the hand dryer further comprises a temperature sensor;

the temperature sensor is arranged on the backboard, and the temperature sensor is connected to the microprocessor to detect an environment temperature of an environment in which the hand dryer is located.

[0009] Optionally, the hand dryer further comprises an infrared sensor and an ultraviolet lamp;

the infrared sensor and the ultraviolet lamp are arranged on the backboard, and the infrared sensor and the ultraviolet lamp are connected to the microprocessor.

[0010] Optionally, the hand dryer further comprises a timer;

the timer is arranged on the backboard, and the timer is connected to the microprocessor.

[0011] Optionally, an upper filter sieve and a lower filter sieve are respectively arranged between the upper air baffle and the upper air passages, and between the lower air baffle and the lower air passages.

[0012] It can be known from the above technical solutions that this application provides an intelligent air blowing hand dryer, comprising a head part, a backboard, a tail part, a microprocessor and a motor; the head part and the tail part are connected by the backboard; the microprocessor and the motor are arranged inside the head part, and the microprocessor is connected to the motor; the head part comprises an upper air box, a laser detector, an upper air baffle, upper straight air outlets and upper air passages; the upper air box is spliced with the upper air baffle, and the upper air baffle is close to the tail part; the upper air baffle is provided

with the upper straight air outlets which are in communication with the upper air box; the upper air baffle is provided with the laser detector on one side close to the tail part, and the laser detector is connected to the microprocessor; the upper air passages are provided inside the upper air box, and the upper air passages are close to the upper air baffle and correspond to the upper straight air outlets; the upper air box is connected to the motor; the tail part comprises a lower air box, a lower air baffle, lower straight air outlets, and lower air passages; the lower air box is spliced with the lower air baffle, and the lower air baffle is close to the head part; the lower air baffle is provided with the lower straight air outlets which are in communication with the lower air box; the lower air passages are provided inside the lower air box, and the lower air passages are close to the lower air baffle and correspond to the lower straight air outlets; the lower air passages are connected to the motor; each of the upper air passages is provided with an upper air solenoid valve, and each of the lower air passages is provided with a lower air solenoid valve; the upper air solenoid valve and the lower air solenoid valve each is connected to the microprocessor. When in use, the intelligent hand dryer is hung to a proper position on a wall through the backboard, so that the intelligent hand dryer is arranged in a vertical direction with the head part above and the tail part below. After the power supply of the intelligent hand dryer is turned on, the upper air box and the lower air box are driven by the motor to start air supply. When two hands are unfolded and placed between the head part and the tail part, the laser detector starts to recognize external contours of the two hands, and determines finger gap positions of the two hands through techniques such as image grayscale recognition, and transmits contour information to the microprocessor. The microprocessor determines air passages adjacent to the finger gap positions as reinforcing air passages according to the contour information, and controls solenoid valves corresponding to the reinforcing air passages to be switched on to a large opening degree and solenoid valves corresponding to remaining air passages to be switched on to a small opening degree, while solenoid valves corresponding to air passages far from the contours of the two hands can be closed directly. In this way, the two hands are under the joint action of the upper and lower air passages, the air strength and air volume are reinforced at the finger gaps, and the air strength and the air volume are relatively reduced at palms and backs of the hands, thus enabling various parts of the two hands including the finger gaps to be quickly dried, eliminating the hidden positions, and making drying more

thorough.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

[0013] To more clearly describe the technical solutions of this application, the accompanying drawings to be used in the embodiments are briefly illustrated below. Obviously, persons of ordinary skills in the art can also derive other accompanying drawings according to these accompanying drawings without inventive effort.

[0014] FIG. 1 is a schematic structural diagram of an intelligent air blowing hand dryer according to an embodiment of this application.

[0015] FIG. 2 is a side structural view of the intelligent air blowing hand dryer according to an embodiment of this application.

[0016] FIG. 3 is a schematic structural diagram of an air outlet of an upper air box of the intelligent air blowing hand dryer according to an embodiment of this application.

[0017] FIG. 4 is a schematic structural diagram of an air outlet of a lower air box of the intelligent air blowing hand dryer according to an embodiment of this application.

[0018] FIG. 5 is a structural block diagram of components related to a microprocessor in the intelligent air blowing hand dryer according to an embodiment of this application.

### **DETAILED DESCRIPTION OF THE EMBODIMENTS**

[0019] Please refer to FIG. 1 to FIG. 5.

[0020] An embodiment of this application provides an intelligent air blowing hand dryer, comprising a head part 1, a backboard 2, a tail part 3, a microprocessor 4 and a motor 5;

the head part 1 and the tail part 3 are connected by the backboard 2;

the microprocessor 4 and the motor 5 are arranged inside the head part 1, and the microprocessor 4 is connected to the motor 5;

the head part 1 comprises an upper air box 11, a laser detector 12, an upper air baffle 13, upper straight air outlets 14 and upper air passages 15;

the upper air box 11 is spliced with the upper air baffle 13, and the upper air baffle 13 is close to the tail part 3; the upper air baffle 13 is provided with the upper straight air outlets 14 which are in communication with the upper air box 11; the upper air baffle 13 is provided with the laser detector 12 on one side close to the tail part 3, and the laser detector 12 is connected to

the microprocessor 4; the upper air passages 15 are provided inside the upper air box 11, and the upper air passages 15 are close to the upper air baffle 13 and correspond to the upper straight air outlets 14; the upper air box 11 is connected to the motor 5;

the tail part 3 comprises a lower air box 31, a lower air baffle 32, lower straight air outlets 33, and lower air passages 34;

the lower air box 31 is spliced with the lower air baffle 32, and the lower air baffle 32 is close to the head part 1; the lower air baffle 32 is provided with the lower straight air outlets 33 which are in communication with the lower air box 31; the lower air passages 34 are provided inside the lower air box 31, and the lower air passages 34 are close to the lower air baffle 32 and correspond to the lower straight air outlets 33; the lower air passages 34 are connected to the motor 5;

each of the upper air passages 15 is provided with an upper air solenoid valve 17, and each of the lower air passages 34 is provided with a lower air solenoid valve 36; the upper air solenoid valve 17 and the lower air solenoid valve 36 each is connected to the microprocessor 4.

**[0021]** When in use, the intelligent hand dryer is hung to a proper position on a wall through the backboard 2, so that the intelligent hand dryer is arranged in a vertical direction with the head part 1 above and the tail part 3 below. Of course, the head part 1 and the tail part 3 are mainly air blowing components, which provide double-sided air blowing for two hands. Therefore, in addition to the structure with the head part 1 above and the tail part 3 below disclosed in the embodiment of this application, an existing air blowing structure on the market can also be used, i.e., a U-shaped structure in which the head part 1 and the backboard 2 together are close to the wall and the tail part 3 is away from the wall corresponding to the head part 1.

**[0022]** After the power supply of the intelligent hand dryer is turned on, the upper air box 11 and the lower air box 31 are driven by the motor 5 to start air supply. When two hands are unfolded and placed between the head part 1 and the tail part 3, the laser detector 12 starts to recognize external contours of the two hands, or determines finger gap positions of the two hands through techniques such as image grayscale recognition, and transmits contour information to the microprocessor. Specifically, the laser detector 12 performs contour detection for the two hands, and determines hidden positions such as the finger gaps through occlusion

and light changes on the hands. Furthermore, in order to enhance the recognition accuracy and drying efficiency, a user should try to spread ten fingers as much as possible. In addition to the laser detector 12 provided in the embodiment of this application to recognize contours of the two hands, an image recognition technique may be used to determine the contours of the two hands. However, since the two hands move randomly, continuous photograph recognition is required, which is inefficient. Therefore, the laser detector 12 provided in the embodiment of this application can better adapt to the movement of the two hands, quickly recognize the contours of the hands, and improve the recognition efficiency.

**[0023]** The microprocessor 4 determines air passages adjacent to the finger gap positions as reinforcing air passages according to the contour information, and controls solenoid valves corresponding to the reinforcing air passages to be switched on to a large opening degree and solenoid valves corresponding to remaining air passages to be switched on to a small opening degree, while solenoid valves corresponding to air passages far from the contours of the two hands can be closed directly. In this way, the two hands are under the joint action of the upper and lower air passages, the air strength and air volume are reinforced at the finger gaps, and the air strength and the air volume are relatively reduced at palms and backs of the hands, thus enabling various parts of the two hands including the finger gaps to be quickly dried, eliminating the hidden positions, and making drying more thorough. In order to adapt to the random movement and placement of the two hands in the intelligent hand dryer, at least 18 groups of upper air passages 15 and lower air passages 34, as well as the corresponding upper straight air outlets 14 and lower straight air outlets 33, thus providing more choices for all fingers and finger gaps. Furthermore, in order to reduce overheat due to excessive air volume caused by blowing the two hands directly from the upper and lower air passages, the upper straight air outlets 14 and the lower straight air outlets 33 are installed to improve the blowing softness while achieving the drying effect.

**[0024]** The intelligent hand dryer provided in the embodiment of this application can ensure uniform drying of two hands without the problem of hidden positions keeping wet or remaining positions being too dry, while reducing the waste of electrical energy caused by the opening of excess air passages and the blowing impact on surrounding environment, thus truly achieving the intelligent effect of the hand dryer for thorough drying of the two hands at 360°

all-around.

**[0025]** As an optional embodiment, one end of the head part 1 close to the tail part 3 is in an inclined structure, and one end of the head part 1 close to the backboard 2 is higher than one end of the head part 1 away from the backboard 2; one end of the tail part 3 close to the head part 1 is in an inclined structure, and one end of the tail part 3 close to the backboard 2 is higher than one end of the tail part 3 away from the backboard 2.

**[0026]** In order to adapt to the height of most people, an intelligent hand dryer is usually hung in a high position. In this way, it is relatively difficult for some people, especially children and the elderly, to place their hands horizontally. The most suitable way for a human body to extend and place two hands is to extend the two hands obliquely upwards. Therefore, in order to make a user more comfortable in use, the head part 1 and the tail part 3 are designed as an inclined structure. Furthermore, such a structure can reduce the stay of water drops that are accidentally dripping onto the lower air baffle 32, and reduce the damage of the water drops to the lower air box 31 and the lower air passages 34. Also, in order to deal with the water drops that slide along the lower air baffle 32, a water absorption strip can be installed at an edge of the lower air baffle 32.

**[0027]** As an optional embodiment, the upper straight air outlets 14 and the lower straight air outlets 33 are radially arranged; in the upper straight air outlets 14 and the lower straight air outlets 33, the density of air holes close to edges of the upper air baffle 13 and the lower air baffle 32 is greater than the density of air holes away from the edges.

**[0028]** The two hands are composed of fingers and palms. In order to adapt to the shape distribution of fingers and improve the air blowing pertinence of air passages, the upper and lower air passages are designed as radial shapes corresponding to opening shapes of the fingers. Furthermore, the palms with a large area and more water may correspond to dense air holes to improve the drying efficiency.

**[0029]** As an optional embodiment, the hand dryer further comprises a temperature sensor 21; the temperature sensor 21 is arranged on the backboard 2, and the temperature sensor 21 is connected to the microprocessor 4 to detect an environment temperature of an environment in which the hand dryer is located.

**[0030]** In order to improve the drying effect of the intelligent hand dryer, a heating device is

installed in the upper air box 11 and the lower air box 31 to increase an air blowing temperature, by mean of which high temperature and air strength are used for drying. In order to prevent the blowing air from being overheated or undercooled, a temperature sensor 21 is provided on the backboard 2 to detect an environment temperature. The microprocessor 4 will control the heating effect of the heating device according to the environment temperature, to ensure that the air blowing temperature is close to the environment temperature, and avoid the irritation of overheating or undercooling of the two hands.

**[0031]** As an optional embodiment, the hand dryer further comprises an infrared sensor 22 and an ultraviolet lamp 23; both of the infrared sensor 22 and the ultraviolet lamp 23 are arranged on the backboard 2, and the infrared sensor 22 and the ultraviolet lamp 23 are connected to the microprocessor 4.

**[0032]** After the intelligent hand dryer is used for a long time, due to water accumulation, splashing, dust falling and other problems, there will be sanitary problems, causing the drying quality to be greatly reduced. Therefore, the ultraviolet lamp 23 is added to the backboard 2 for sterilization. When the infrared sensor 22 senses that two hands are approaching, the microprocessor 4 controls the ultraviolet lamp 23 to be turned off, avoiding ultraviolet radiation to a human body to cause harm to the human body; when the infrared sensor 22 senses that the two hands are moving away, the microprocessor 4 controls the ultraviolet lamp 23 to be turned on, starting sterilization on the intelligent air blowing hand dryer.

**[0033]** As an optional embodiment, the hand dryer further comprises a timer 24; the timer 24 is arranged on the backboard 2, and the timer 24 is connected to the microprocessor 4.

**[0034]** In order to avoid ultraviolet radiation and waste of electrical energy caused by the ultraviolet lamp 23 being turned on for a long time, the timer 24 is added. The timer 24 detects continuous turned-on time of the ultraviolet lamp 23 and transmits time data to the microprocessor 4. Once the turned-on time of the ultraviolet lamp 23 reaches a preset sterilization time, the microprocessor 4 controls the ultraviolet lamp 23 to be turned off.

**[0035]** As an optional embodiment, an upper filter sieve 16 and a lower filter sieve 35 are respectively arranged between the upper air baffle 13 and the upper air passages 15, and between the lower air baffle 32 and the lower air passages 34.

**[0036]** Due to static electricity, air pressure and other problems, dusts and impurities and the

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like are easy to be accumulated in the upper and lower air passages. When blowing air, the dirt is easy to be blown onto two hands together with the air, increasing hidden health risks. Adding the upper filter sieve 16 and the lower filter sieve 35 can block the dusts and impurities, thereby ensuring the quality of the air blown to the two hands.

1. An intelligent air blowing hand dryer, wherein the hand dryer comprises an upper body part, a backboard, a lower body part, a microprocessor and a motor;

the upper body part and the lower body part are connected by the backboard, and the lower body part is arranged underneath the upper body part;

5 both of the microprocessor and the motor are arranged inside the upper body part, and the microprocessor is connected to the motor ;

the upper body part comprises an upper air box, a laser detector, an upper air baffle, upper straight air outlets and upper air passages;

10 the upper air box and the upper air baffle are joined together, and the upper air baffle faces towards the lower body part; the upper air baffle is provided with the upper straight air outlets which are in communication with the upper air box; the upper air baffle is provided with the laser detector on one side facing towards the lower body part, and the laser detector is connected to the microprocessor; the upper air passages are provided inside the upper air box, and the upper air passages face towards the upper air baffle and correspond to the upper straight air outlets; the upper air box is connected to the motor ;

15 the lower body part comprises a lower air box, a lower air baffle, lower straight air outlets, and lower air passages;

20 the lower air box and the lower air baffle are joined together, and the lower air baffle faces towards the upper body part; the lower air baffle is provided with the lower straight air outlets which are in communication with the lower air box; the lower air passages are provided inside the lower air box, and the lower air passages face towards the lower air baffle and correspond to the lower straight air outlets; the lower air passages are connected to the motor;

25 each of the upper air passages is provided with an upper air solenoid valve, and each of the lower air passages is provided with a lower air solenoid valve; the upper air solenoid valve and the lower air solenoid valve are each connected to the microprocessor.

2. The intelligent air blowing hand dryer according to claim 1, wherein a surface of the upper body part facing towards the lower body part is inclined downwards from a joint where the upper body part is connected to the backboard;

30 a surface of the lower body part facing towards the upper body part is inclined downwards

from a joint where the lower body part is connected to the backboard.

3. The intelligent air blowing hand dryer according to claim 1, wherein each of the upper air baffle and the lower air baffle includes an edge area, and the upper straight air outlets and the lower straight air outlets are radially arranged so that the density of the straight air outlets close to the edge area is greater than the density of the straight air outlets away from the edge area.

4. The intelligent air blowing hand dryer according to claim 2 or 3, wherein the hand dryer further comprises a temperature sensor;

the temperature sensor is arranged on the backboard, and the temperature sensor is connected to the microprocessor to detect an environment temperature of an environment in which the hand dryer is located.

5. The intelligent air blowing hand dryer according to claim 4, wherein the hand dryer further comprises an infrared sensor and an ultraviolet lamp;

both of the infrared sensor and the ultraviolet lamp are arranged on the backboard, and both of the infrared sensor and the ultraviolet lamp are connected to the microprocessor.

6. The intelligent air blowing hand dryer according to claim 5, wherein the hand dryer further comprises a timer;

the timer is arranged on the backboard, and the timer is connected to the microprocessor.

7. The intelligent air blowing hand dryer according to claim 6, wherein an upper filter sieve is arranged between the upper air baffle and the upper air passages, and a lower filter sieve is between the lower air baffle and the lower air passages.

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