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(54) **Water spot-free hand dryer**

Wasserfleckenfreier Handtrockner

Séchoir à main sans des taches d'eau

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(56) References cited:
WO-A1-2011/044247
GB-A- 1 602 115
GB-A- 2 209 935
JP-A- 2005 027 693

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a hand dryer and particularly to a watermark-free hand dryer.

BACKGROUND OF THE INVENTION

[0002] With people's increasing demand for life quality, hygienic details become an important issue in their daily life, and this is especially notable on public lavatory facilities. In the past many public lavatory facilities must be operated manually by users. With development of infrared sensors, many manual public lavatory facilities were gradually replaced by untouched lavatory equipment. Now paper towels have been provided in many sites to enable users to dry hands after washing without dripping water everywhere. However, with increasing awareness of environmental protection and reservation, and growing consciousness of limited resources, using hand dryers to replace dispensable paper towel gradually becomes trendy.

[0003] Conventional hand dryers, such as R.O.C. patent Nos. M357271 and 579813, include an air outlet on the exterior thereof to eject air downwards to dry user's slippery. Not only the environment looks untidy, it also creates hazardous concern to users.

[0004] WO 2011 / 044 247 A1 discloses a watermark-free hand dryer according to the preamble of claim 1. It includes a main body (see "48" in Fig. 2) to generate high pressure airflow, an annular air discharge portion connecting to the main body to receive the high pressure airflow and including at least one extending section (see "72" and "74" in Fig. 9) extended from the main body and a connecting section (see "68") connecting to the extending section, the extending section and the connecting section surrounding to form an annular hand drying passage (see "76") to receive user's hands. The annular air discharge portion includes an air discharge surface relative to the annular hand drying passage, an air discharge side at one end of the annular hand drying passage and at least one nozzle ("air outlets" in [0069]) located on the air discharge surface and communicating with the annular air discharge portion.

[0005] R.O.C. patent No. 567822 also discloses a dryer with air discharge from two sides. Its hand dryer has multiple air outlets located at two sides of a hand drying zone to form bidirectional air discharge. Hand drying range is greater, and user's palm and back side of the hand can receive airflow simultaneously. It also has a water collection space between two walls to collect drops of water from user's hands into a water collection trough to facilitate water gathering and disposal. However, it requires regular handling of the water collection trough to empty the collected water. The water collection trough also tends to form watermarks after a prolonged period of time, or even becomes moldy or breeds bacteria. Hence it creates a troublesome sanitary issue.

[0006] To remedy the aforesaid problems, Japan patent Nos. JP9051861A and JP11018999A disclose a hand dryer equipped with a water absorbing means in the water collection trough. The water absorbing means (such as water absorbing disinfection sheet or sachet) can absorb a small amount of water collected by the hand dryer without breeding bacteria or forming watermarks in the water collection trough. However, the water absorbing means in the water collection trough has to be replaced regularly. It still cannot thoroughly resolve the water discharge problem of the hand dryer.

[0007] Further hand dryers are disclosed e.g. in JP 2005 / 027 693 A, GB 2 209 935 A or GB 1 602 115 A.

SUMMARY OF THE INVENTION

[0008] The primary object of the present invention is to provide a hand dryer that can clear and manage water drops during drying without a water collection trough

[0009] To achieve the foregoing object, the invention provides a watermark-free hand dryer comprising the features of claim 1.

[0010] The watermark-free hand dryer includes a main body, an annular air discharge portion and a water absorbing portion. The main body aims to generate high pressure airflow. The annular air discharge portion is connected to the main body and includes at least two extending sections which extended from the main body and a connecting section connecting the extending sections. The extending sections, the connecting section and the main body are joined and surround to form an annular hand drying passage to receive user's hands. Accordingly, the extending sections of the annular air discharge portion, the connecting section and the main body are connected to form the annular hand drying passage. The main body is formed at a thickness greater than that of the annular air discharge portion to form an air discharge side between the annular air discharge portion and the wall, and further includes the water absorbing portion disposed thereon to correspond to the air discharge side. The annular discharge portion includes at least one nozzle located on surfaces of the extending sections and the connecting section. According to the present invention, the at least one nozzle outputs the high pressure airflow towards the air discharge side at an angle, so that so that the water absorbing portion absorbs and evaporates water drops which are introduced by the high pressure airflow into the air discharge side. The water absorbing portion is made of materials selected from the group consisting of water absorbing ceramics and porous materials.

[0011] In one aspect the annular air discharge portion is located vertically on the main body.

[0012] In another aspect the annular air discharge portion includes a water collecting section located on extending sections to tilt towards the water absorbing portion.

[0013] In yet another aspect the water absorbing portion includes a water receiving surface indented downwards.

[0014] In yet another aspect the main body includes a channel connecting to the water absorbing portion to channel water drops on the water absorbing portion to drip.

[0015] In yet another aspect the main body includes a water collection tray communicating with the channel to receive the water drops therefrom.

[0016] In yet another aspect the annular air discharge portion includes an infrared sensor.

[0017] Thus, as the high pressure airflow generated by the annular air discharge portion can blow water drops on the user's hands to the water absorbing portion and also blow away moisture on the water absorbing portion at the same time, the hand dryer of the present invention is free of a water collection trough, thus can deal with the water problem efficiently. As a result, the problems of forming watermarks and breeding bacteria due to the water collection trough can be eliminated. The trouble of periodically clearing the water collection trough to empty the contaminated water in the water collection trough can also be averted.

[0018] The foregoing, as well as additional objects, features and advantages of the invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019]

FIG. 1 is a perspective view of the watermark-free hand dryer of the invention.

FIG. 2 is an exploded view of the hand dryer of the invention.

FIG. 3 is a sectional view of the hand dryer of the invention.

FIG. 4 is a schematic view of the invention in a use condition.

FIG. 5 is a perspective view of another embodiment of the invention.

FIG. 6 is an exploded view of another embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Please refer to FIGS. 1, 2 and 3, the present invention aims to provide a watermark-free hand dryer. The hand dryer mainly includes a main body 10, an annular air discharge portion 20 vertically located on the main body 10 and a water absorbing portion 30 located in the air discharge direction of the annular air discharge portion 20. The water absorbing portion 30 is made of water absorbing ceramics or other porous materials to achieve higher water absorbing efficiency and evaporation effect. The main body 10 can generate high pressure airflow to supply to the connected annular air discharge portion 20. The annular air discharge portion 20 has a plurality of nozzles 25 to blow water drops on user's hands to the water absorbing portion 30. Thus forms the main structure of the invention.

[0021] Structural details and technical features of the invention are elaborated below. The annular air discharge portion 20 includes at least one extending section 21 extended from the main body 10 and a connecting section 22 connected to the extending section 21. The extending section 21 and connecting section 22 are joined and surround to form an annular hand drying passage 40 to receive user's hands. The annular air discharge portion 20 further has an air discharge surface 23 relative to the annular hand drying passage 40, an air discharge side 24 at one end of the annular hand drying passage 40 and at least one nozzle 25 located on the air discharge surface 23 and communicating with the annular air discharge portion 20. The nozzle 25 forms an air discharge angle α against the air discharge surface 23 to output the high pressure airflow towards the air discharge side 24. The water absorbing portion 30 is located on the main body 10 and relative to the air discharge side 24 to receive the high pressure airflow output from the nozzle 25.

[0022] In order to install the water absorbing portion 30 relative to the air discharge side 24, the main body 10 is formed at a thickness greater than that of the annular air discharge portion 20 so that a zone to hold the water absorbing portion 30 is formed. The main body 10 further has a holding trough 11 corresponding to the air discharge side 24 to hold the water absorbing portion 30 by screwing. The annular air discharge portion 20 also has a water collecting section 26 located on an upper edge of the main body 10 and between the two extending sections 21 to tilt towards the water absorbing portion 30, so that when water drops drip into the water collecting section 26, they can flow along the water collecting section 26 to the water absorbing portion 30, thus the water absorbing portion 30 can absorb the water drops. Moreover, the annular air discharge portion 20 also has an infrared sensor 27 to detect insertion of the user's hands and activate the hand dryer.

[0023] Please also refer to FIGS. 2 and 4, when the user's hands are inserted into the annular hand drying passage 40, the infrared sensor 27 (referring to FIG. 1) detects the user's hands and activates an air blower 12 on the main body 10 to generate high pressure airflow and supply the high pressure airflow to the nozzles 25 on the annular air discharge portion 20. The nozzles 25 are located on the two extending sections 21 at two sides of the annular hand drying passage 40 and connecting

section 22 at the upper end of the annular hand drying passage 40 to form the air discharge angle α against the air discharge side 24. When the high pressure airflow flows to the nozzles 25, the nozzles 25 eject the high pressure airflow to form the converged airflow towards the air discharge side 24 so that the water drops on the user's hands are blown to the water absorbing portion 30 or the wall and then the water drops on the wall are dripped on the water absorbing portion 30. Moreover, as the converged airflow blows the water absorbing portion 30, the moisture on the water absorbing portion 30 is also evaporated at a high temperature.

[0024] Also refer to FIGS. 5 and 6 for another embodiment of the invention. The water absorbing portion 30 includes a water receiving surface 31 indented downwards (also referring to FIG. 4). When the water absorbing portion 30 is saturated, the water absorbed thereon flows downwards along a channel 13 located at a lower side thereof and collected by a water collection tray 14 below the channel 13, therefore the problem that water spilling outside to the floor when the water absorbing portion 30 is saturated can be prevented. The water collection tray 14 has a mounting portion 141, and the main body 10 has a mounting groove 15 at a lower end inserted by the mounting portion 141 so that when the water collection tray 14 is filled with water it can be removed from the lower end of the main body 10. The main body 10 further has a fastening panel 16 to allow the main body 10 to be securely fastened to a wall.

[0025] As a conclusion, as the high pressure airflow generated from the annular air discharge portion can blow water drops from user's hands to the water absorbing portion and also blow away the moisture on the water absorbing portion, the present invention is free of a water collection trough, hence can deal with water problem effectively and also solve the problems of watermarks and breeding of bacteria because of the water collection trough. In addition, there is no need to clear the water collection trough regularly or empty the contaminated water held in the water collection trough. The invention can be mounted onto a wall. When the water drops on the user's hands splash on the wall, the water drops can flow downwards to the water absorbing portion along the wall without spattering on the floor.

[0026] In summary there is disclosed a watermark-free hand dryer including a main body 10, an annular air discharge portion 20 and a water absorbing portion 30. The main body 10 generates high pressure airflow. The annular air discharge portion 20 is connected to the main body 10 and includes at least one extending section 21 extended from the main body 10 and a connecting section 22 connected to the extending section 21. The extending section 21 and connecting section 22 surround to form an annular hand drying passage 40 to receive user's hands. The annular air discharge portion 20 further has at least one nozzle 25 on an air discharge surface 23 communicating with the annular air discharge portion 20. The nozzle 25 forms an air discharge angle α against the air discharge surface 23 to output the high pressure airflow towards an air discharge side 24. The water absorbing portion 30 is located on the main body 10 and relative to the air discharge side 24 to receive the high pressure airflow output from the nozzle 25.

[0027] While the preferred embodiments of the invention have been set forth for the purpose of disclosure, they are not the limitations of the invention, modifications of the disclosed embodiments of the invention as well as other embodiments thereof may occur to those skilled in the art. Accordingly, the appended claims are intended to cover all embodiments which do not depart from the spirit and scope of the invention.

Claims

1. A watermark-free hand dryer, comprising:

a main body (10) which is configured to be fastened to a wall and which generates high pressure airflow;
an annular air discharge portion (20) connecting to the main body (10) to receive the high pressure airflow and including at least two extending sections (21) extended from the main body (10) and a connecting section (22) connecting the extending sections (21), the extending sections (21), the connecting section (22) and the main body (10) being connected to form an annular hand drying passage (40) to receive a user's hands;
characterized in that
the main body (10) is formed at a thickness greater than that of the annular air discharge portion (20) to form an air discharge side (24) between the annular air discharge portion (20) and the wall, when the hand dryer is fastened to the wall, the main body further including a water absorbing portion (30) disposed thereon to correspond to the air discharge side (24);
the annular discharge portion (20) includes at least one nozzle (25) disposed on surfaces of the extending sections (21) and the connecting section (22) to output the high pressure airflow towards the air discharge side (24) at an air discharge angle (α), so that the water absorbing portion (30) absorbs and evaporates water drops which are introduced by the high pressure airflow into the air discharge side (24); and that the water absorbing portion (30) is made of materials selected from the group consisting of water absorbing ceramics and porous materials.

2. The watermark-free hand dryer of claim 1, wherein the annular air discharge portion (20) is vertically located on the main body (10).

3. The watermark-free hand dryer of one of the preceding claims, wherein the annular air discharge portion (20) includes a water collecting section (26) located on an upper edge of the main body (10) and between two extending sections (21) to tilt towards the water absorbing portion (30).

4. The watermark-free hand dryer of one of the preceding claims, wherein the water absorbing portion (30) includes a water receiving surface (31) indented downwards.

5. The watermark-free hand dryer of one of the preceding claims, wherein the main body (10) includes a channel (13) connecting to the water absorbing portion (30) to channel water drops on the water absorbing portion (30) to drip.

6. The watermark-free hand dryer of claim 6, wherein the main body (10) includes a water collection tray (14) communicating with the channel (13) to receive the water drops therefrom.

7. The watermark-free hand dryer of one of the preceding claims, wherein the annular air discharge portion (20) includes an infrared sensor (27) to detect insertion of the user's hands to activate the watermark-free hand dryer to output the high pressure airflow.

Patentansprüche

1. Wasserfleckenfeier Handtrockner umfassend:

   ein Hauptgehäuse (10), das beschaffen ist, an einer Wandung befestigt zu werden, und das eine Luftströmung hohen Drucks erzeugt;
   wobei ein ringförmiger Luftauslassabschnitt (20) mit dem Hauptgehäuse (10) verbunden ist, um die Luftströmung hohen Drucks aufzunehmen, und mindestens zwei Erstreckungsabschnitte (21) aufweist, die sich von dem Hauptgehäuse (10) erstrecken, und einen Verbindungsabschnitt (22) aufweist, der die Erstreckungsabschnitte (21) verbindet, wobei die Erstreckungsabschnitte (21), der Verbindungsabschnitt (20) und das Hauptgehäuse (10) verbunden sind, um eine ringförmige Handtrocknungspassage (40) auszubilden, um eine Benutzerhand aufzunehmen;
   dadurch gekennzeichnet dass
   das Hauptgehäuse (10) mit einer Dicke ausgebildet ist, die größer als die des ringförmigen Luftauslassabschnitts (20) ist, um eine Luftauslassseite (24) zwischen dem ringförmigen Luftauslassabschnitt (20) und der Wand auszubilden, wenn der Handtrockner an der Wand befestigt ist, wobei das Hauptgehäuse ferner einen Wasser-absorbieren Abschnitt (30) aufweist, der daran ausgebildet ist, um an die Luftauslassseite (24) zu passen;
   wobei der ringförmige Luftauslassabschnitt (20) mindestens eine Düse (25) enthält, der an Flächen der Erstreckungsabschnitte (21) und des Verbindungsabschnitts (22) angeordnet ist, um die Luftströmung hohen Drucks in Richtung der Luftauslassseite (54) unter einem Luftauslasswinkel (α) auszugeben, so dass der Wasser-absorbierende Abschnitt (30) Wassertropfen absorbiert und evaporiert, die von der Luftströmung hohen Drucks in die Luftauslassseite (24) eingeführt werden; und dass der Wasser-absorbierende Abschnitt (30) aus Materialien gefertigt ist, die aus der Gruppe ausgewählt sind, die aus Wasser-absorbieren Keramiken und porösen Materialien besteht.

2. Wasserfleckenfreier Handtrockner nach Anspruch 1, wobei der ringförmige Luftauslassabschnitt (20) vertikal an dem Hauptgehäuse (10) angeordnet ist.

3. Wasserfleckenfreier Handtrockner nach einem der vorhergehenden Ansprüche, wobei der ringförmige Luftauslassabschnitt (20) einen Wasser-sammelnden Abschnitt (26) enthält, der an einen oberen Rand des Hauptgehäuses (10) und zwischen zwei Erstreckungsabschnitten (21) angeordnet ist, um sich in Richtung des Wasser-absorbieren Abschnitts (30) zu neigen.

4. Wasserflecken freier Handtrockner nach einem der vorhergehenden Ansprüche, wobei der Wasser-absorbierende Abschnitt (30) eine Wasseraufnehmende Oberfläche (31) enthält, die nach unten eingedrückt ist.

5. Wasserflecken freier Handtrockner nach einem der vorhergehenden Ansprüche, wobei das Hauptgehäuse (10) einen Kanal enthält (13), der mit dem Wasser-absorbierenden Abschnitt (30) verbunden ist, um Wassertropfen auf dem Wasser-absorbieren Abschnitt (30) zum Tröpfeln zu kanalisieren.

6. Wasserflecken freier Handtrockner nach Anspruch 5, wobei das Hauptgehäuse (10) eine Wasser-Sammelschale (14) enthält, die mit dem Kanal (13) in Verbindung steht, um die Wassertropfen davon aufzunehmen.

7. Wasserflecken freier Handtrockner nach einem der vorhergehenden Ansprüche, wobei der ringförmigen Luftauslassbereich (20) einen Infrarotsensor (7 20) enthält, um das Einführen der Benutzerhand zu detektieren, um den Wasserfleckenfreien Handtrockner zu aktivieren, die Luftströmung hohen Drucks auszugeben.

Revendications

1. Un sèche-mains sans tâche d'eau, comprenant:

un corps principal (10) configuré pour être fixé à un mur et pour générer un flux d'air à haute pression;
une partie annulaire de décharge d'air (20) reliée au corps principal (10) pour recevoir le flux d'air à haute pression et comprenant au moins deux sections d'extension (21) s'étendant depuis le corps principal (10) et une section de liaison (22) reliant les deux section d'extension (21), les sections d'extension (21), la section de liaison (22) et le corps principal (10) étant reliés pour former un passage annulaire de séchage des mains (40) pour recevoir les mains d'un utilisateur;
caractérisé en ce que
le corps principal (10) est formé avec une épaisseur plus importante que celle de la partie annulaire de décharge d'air (20) pour former un côté de décharge d'air (24) entre la partie annulaire de décharge d'air (20) et le mur, lorsque le sèche-malins est fixé sur le mur, le corps principal comprenant en outre une partie d'absorption d'eau (30) située sur celui-ci et correspondant au côté de décharge d'air (24) ;
la partie annulaire de décharge (20) comportant au moins une buse (25) disposée(s) sur les surfaces des sections d'extension (21) et de la section de liaison (22) pour libérer le flux haute pression vers le côté de décharge d'air (24) avec un angle de décharge d'air (α), de telle manière que la partie d'absorption d'eau (30) absorbe et évapore les gouttes d'eau introduites dans le côté de décharge d'air (24) par le flux d'air haute pression ; et **en ce que**
la partie d'absorption d'eau (30) est réalisée en un matériau choisi parmi le group des matériaux poreux et des céramiques absorbantes d'eau.

2. Le sèche-mains sans tâche d'eau selon la revendication 1, dans lequel la partie annulaire de décharge d'air (20) est située verticalement sur le corps principal (10).

3. Le sèche-mains sans tâche d'eau selon l'une des revendications précédentes, dans lequel la partie annulaire de décharge d'air (20) comprend une partie collectant l'eau (26) située sur un bord supérieur du corps principal (10) et entre les deux sections d'extension (21) inclinée vers la partie d'absorption d'eau (30).

4. Le sèche-mains sans tâche d'eau selon ['une des revendications précédentes, dans lequel la partie d'absorption d'eau (30) comprend une surface de collecte d'eau (31) en retrait vers le bas.

5. Le sèche-mains sans tâche d'eau selon l'une des revendications précédentes, dans lequel le corps principal (10) comprend un canal (13) reliant à la partie d'absorption d'eau (30) pour écouler les gouttes d'eau sur la partie d'absorption d'eau (30).

6. Un sèche-mains sans tâche d'eau selon la revendication 5, dans lequel le corps principal (10) comprend un bac de collecte d'eau (14) communiquant avec le canal (13) pour y recueillir les gouttes d'eau.

7. Le sèche-mains sans tâche d'eau selon l'une des revendications précédentes, dans lequel la partie annulaire de décharge d'air (20) comporte un capteur infrarouge (27), pour détecter l'insertion des mains d'un utilisateur et activer le sèche-mains sans tâches pour produire le flux d'air haute-pression.

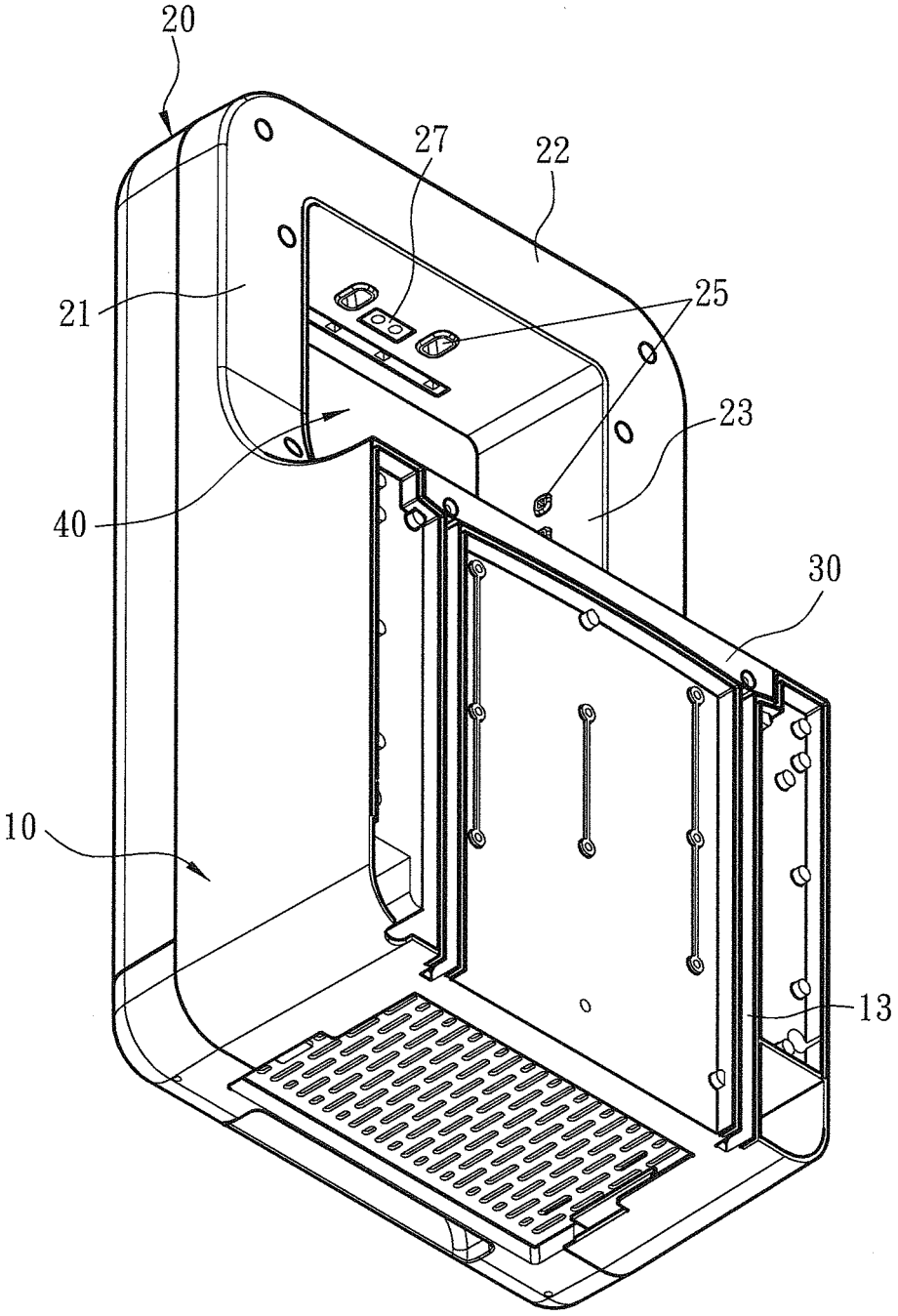

Fig. 1

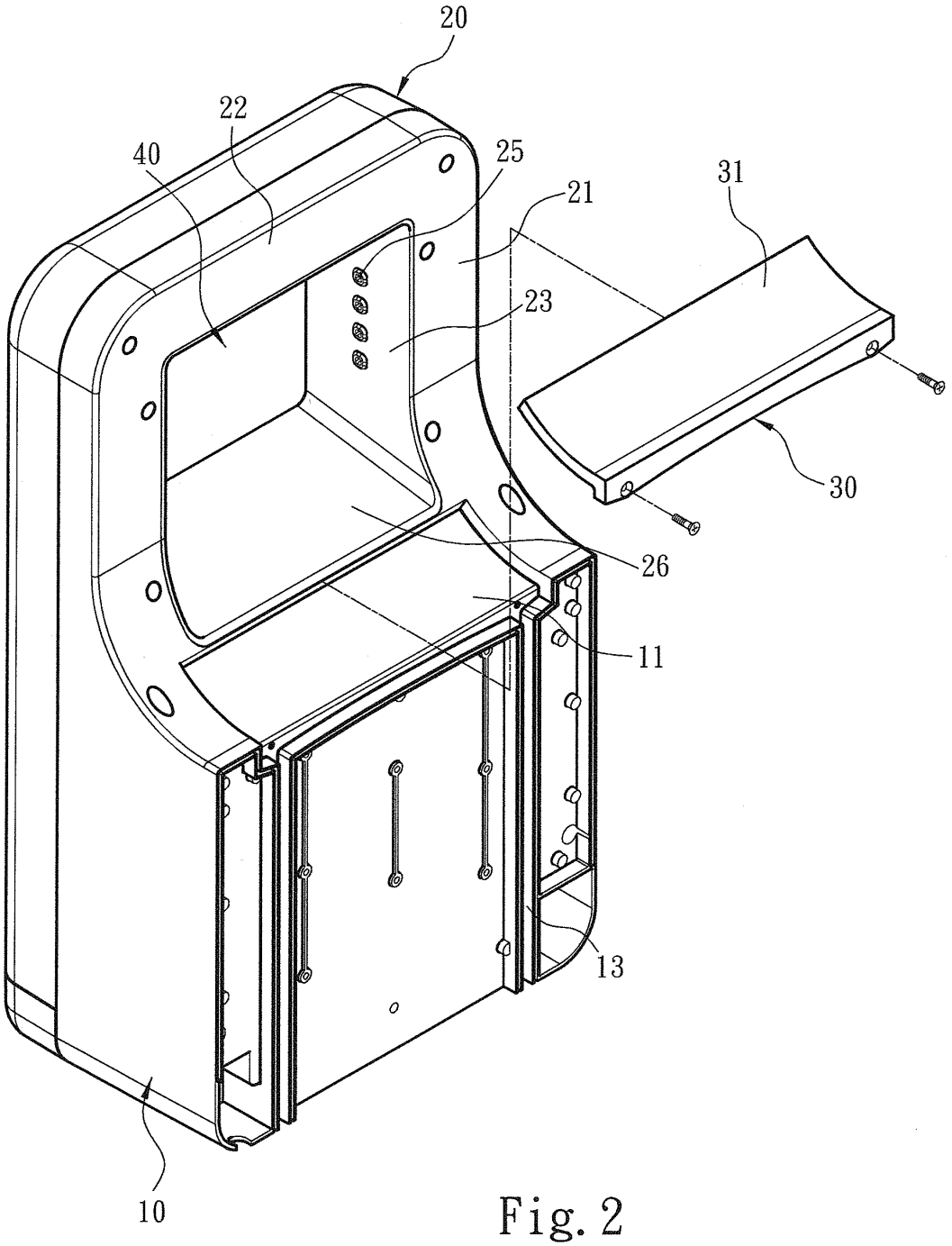

Fig. 2

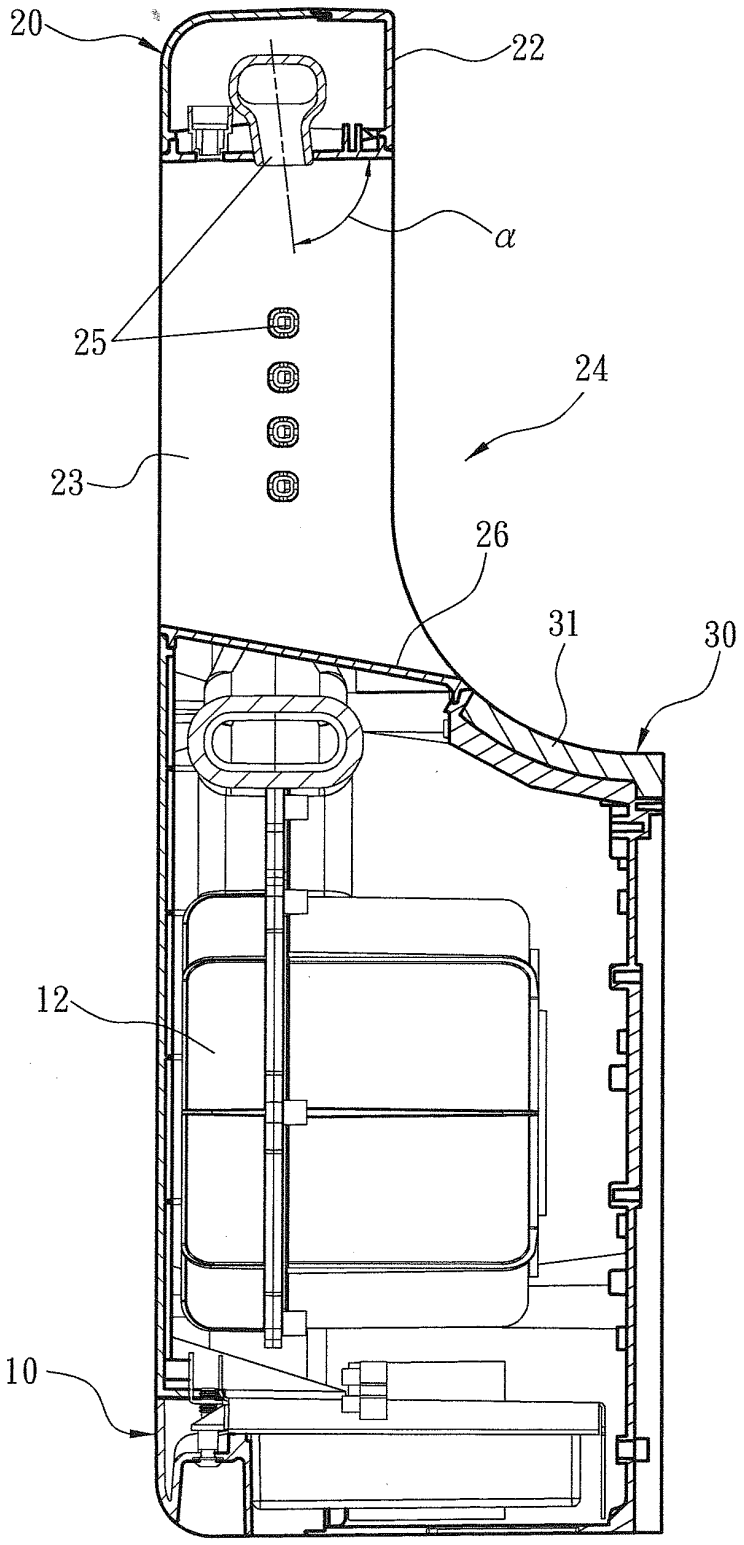

Fig. 3

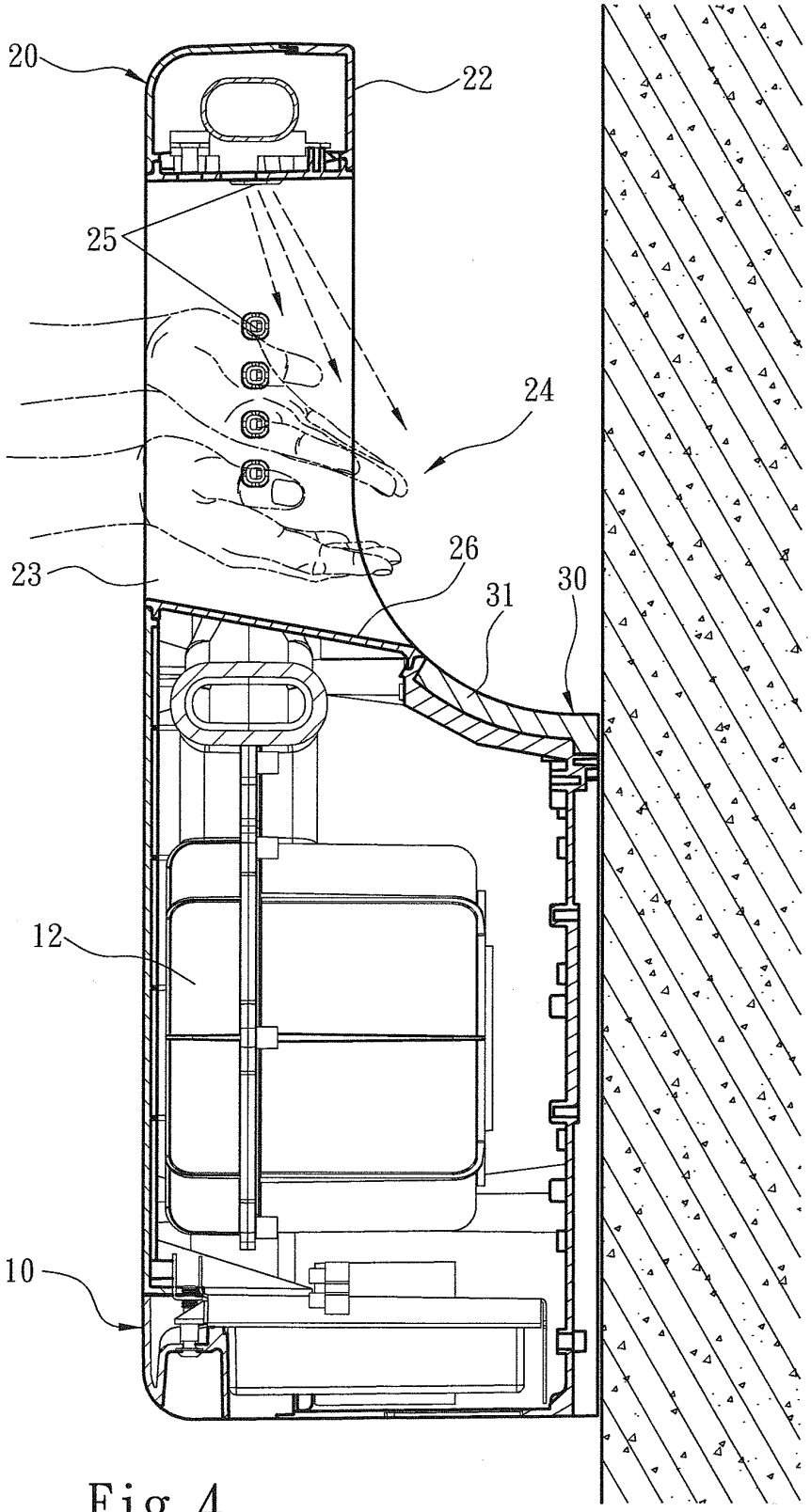

Fig. 4

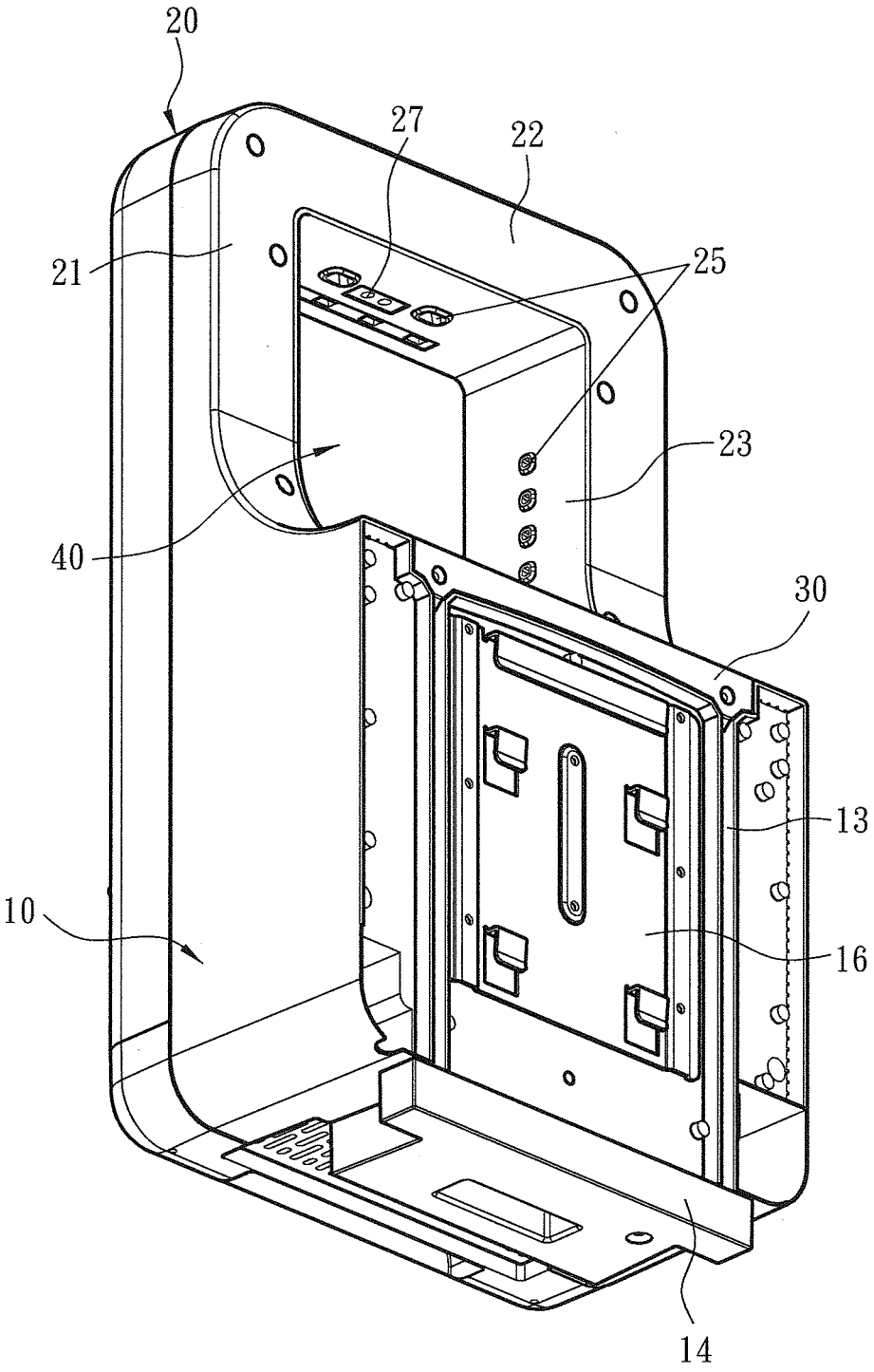

Fig. 5

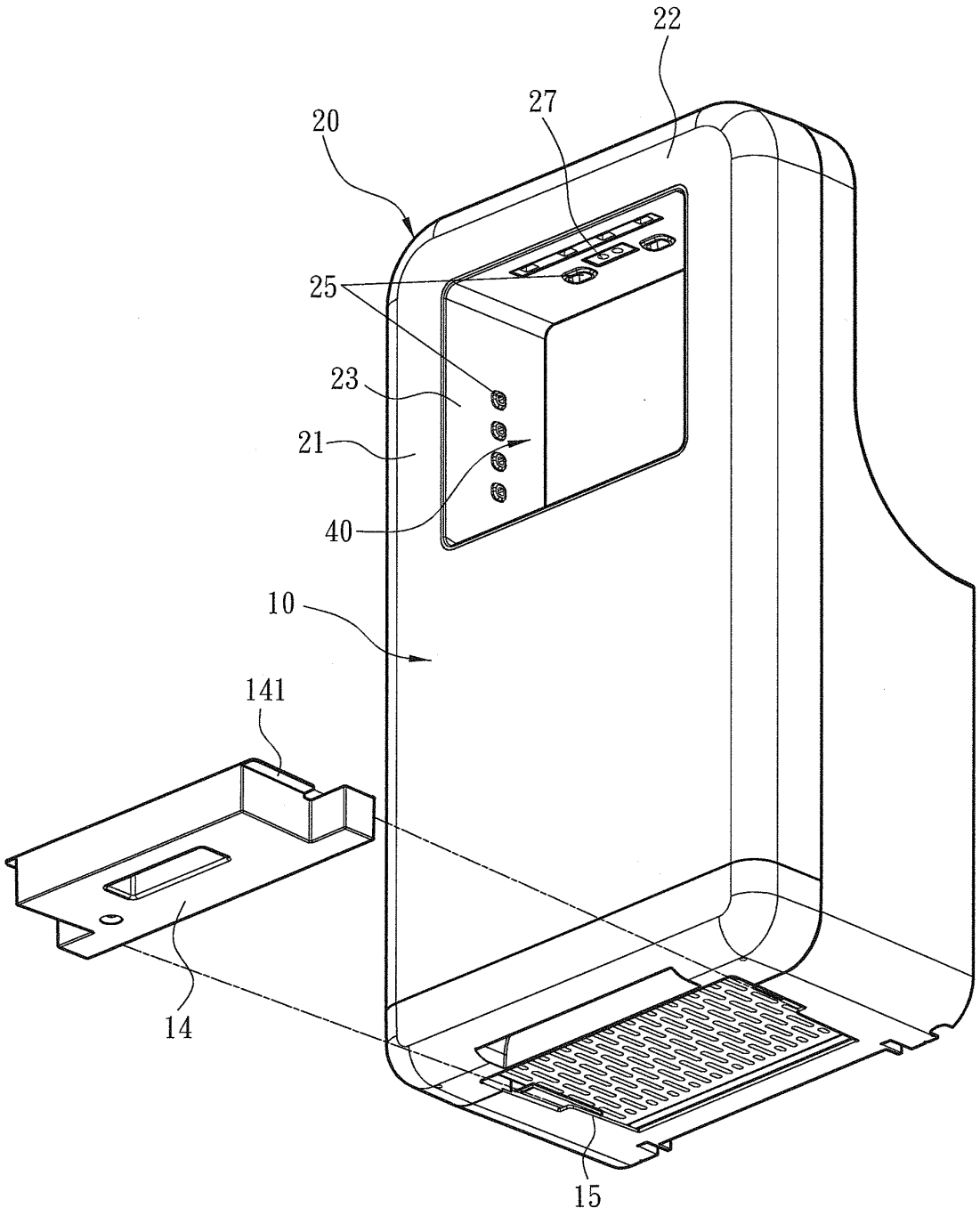

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN M357271 **[0003]**
- CN 579813 **[0003]**
- WO 2011044247 A1 **[0004]**
- CN 567822 **[0005]**
- JP 9051861 A **[0006]**
- JP 11018999 A **[0006]**
- JP 2005027693 A **[0007]**
- GB 2209935 A **[0007]**
- GB 1602115 A **[0007]**