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(54) **AIR DISCHARGE STRUCTURE OF INDUSTRIAL CABINET**

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(57) **ABSTRACT**

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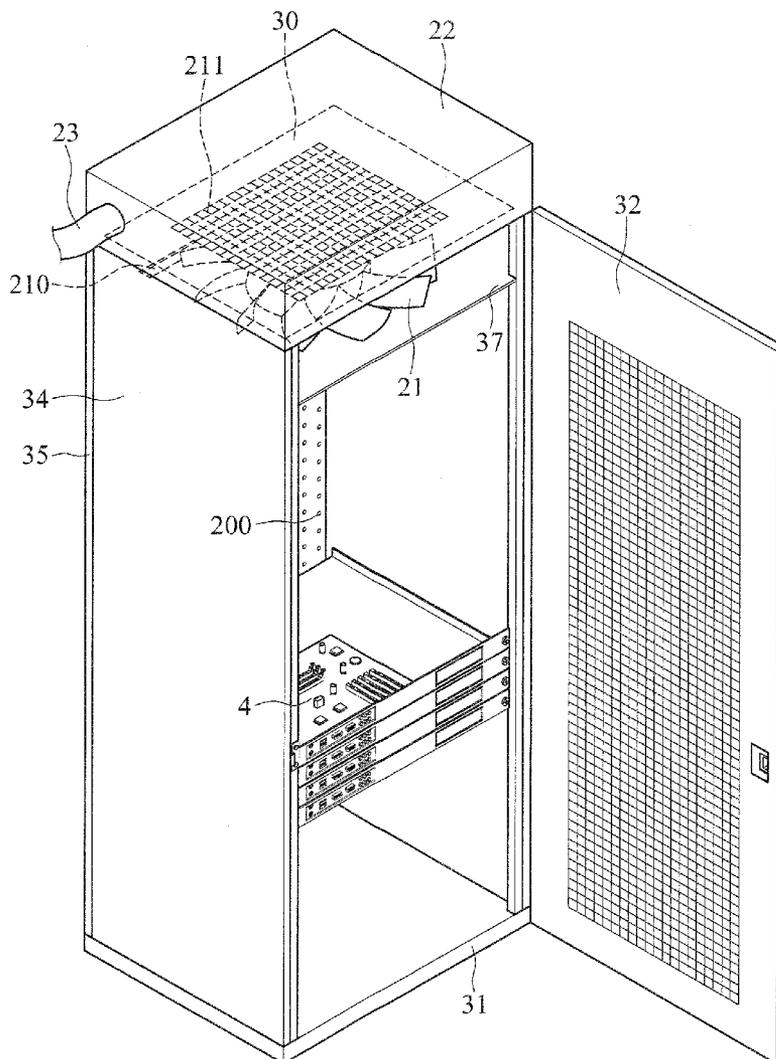
An air discharge structure of an industrial cabinet comprises at least one duct and at least one heat dissipating device, and the duct is installed at the rear and/or both sides of the industrial cabinet, and the heat dissipating device is installed at the top of the industrial cabinet and has at least one air inlet and at least one air outlet coupled to the top for extracting and discharging internal hot air of the industrial cabinet to the outside. The duct has a size corresponding to the size of a plurality of pillars of the industrial cabinet, so that the duct will not occupy the internal using space of the industrial cabinet.

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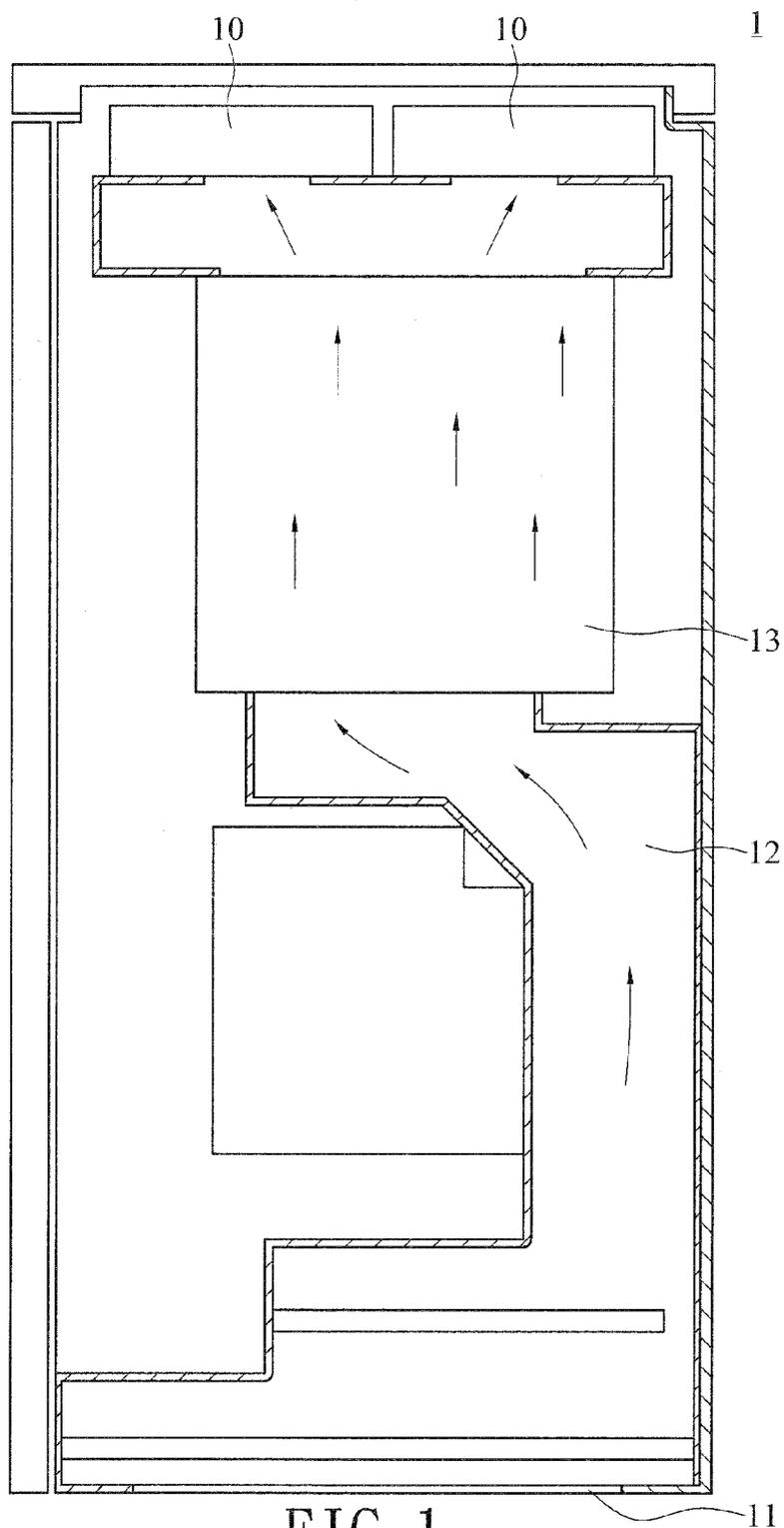


FIG. 1
PRIOR ART

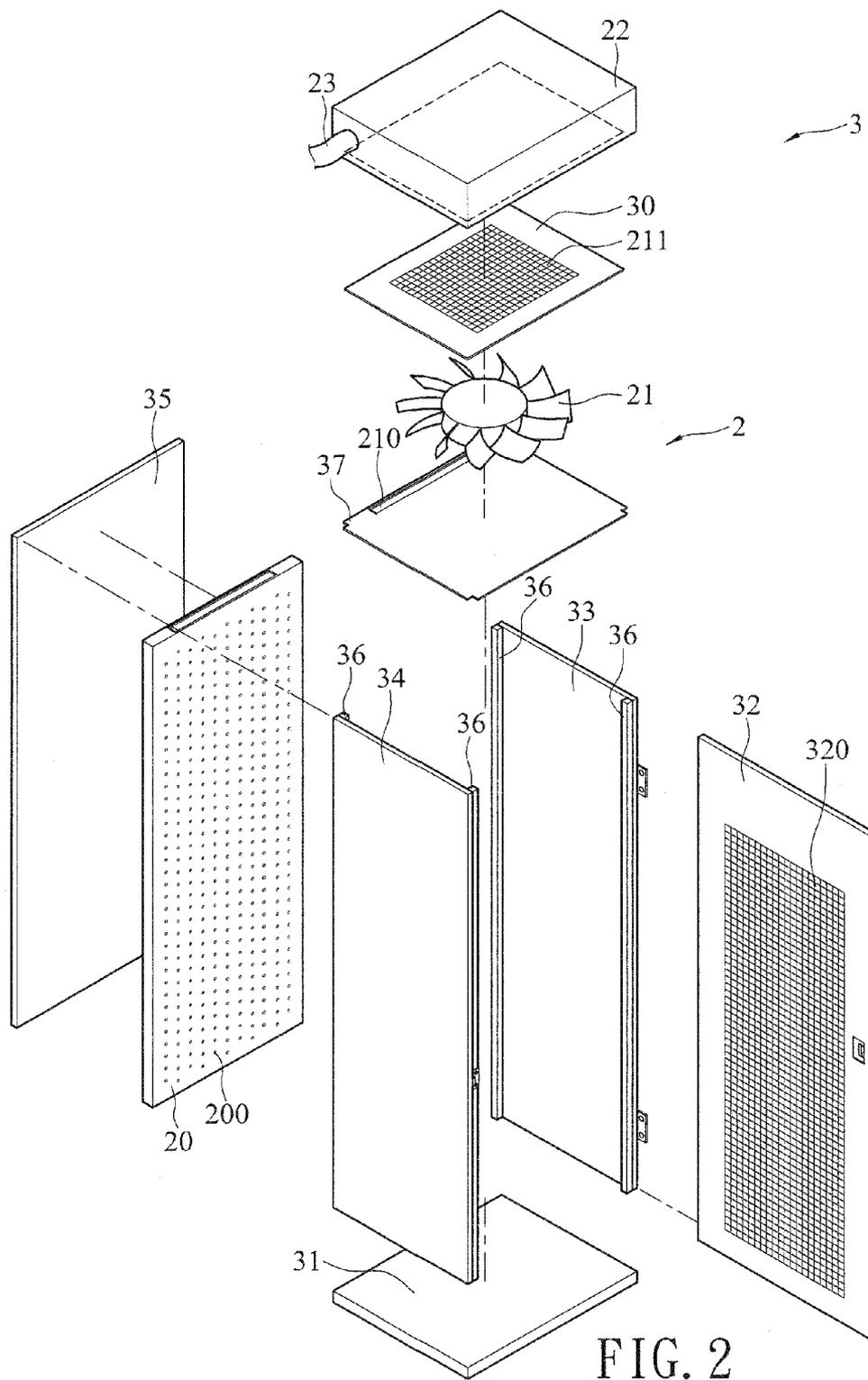


FIG. 2

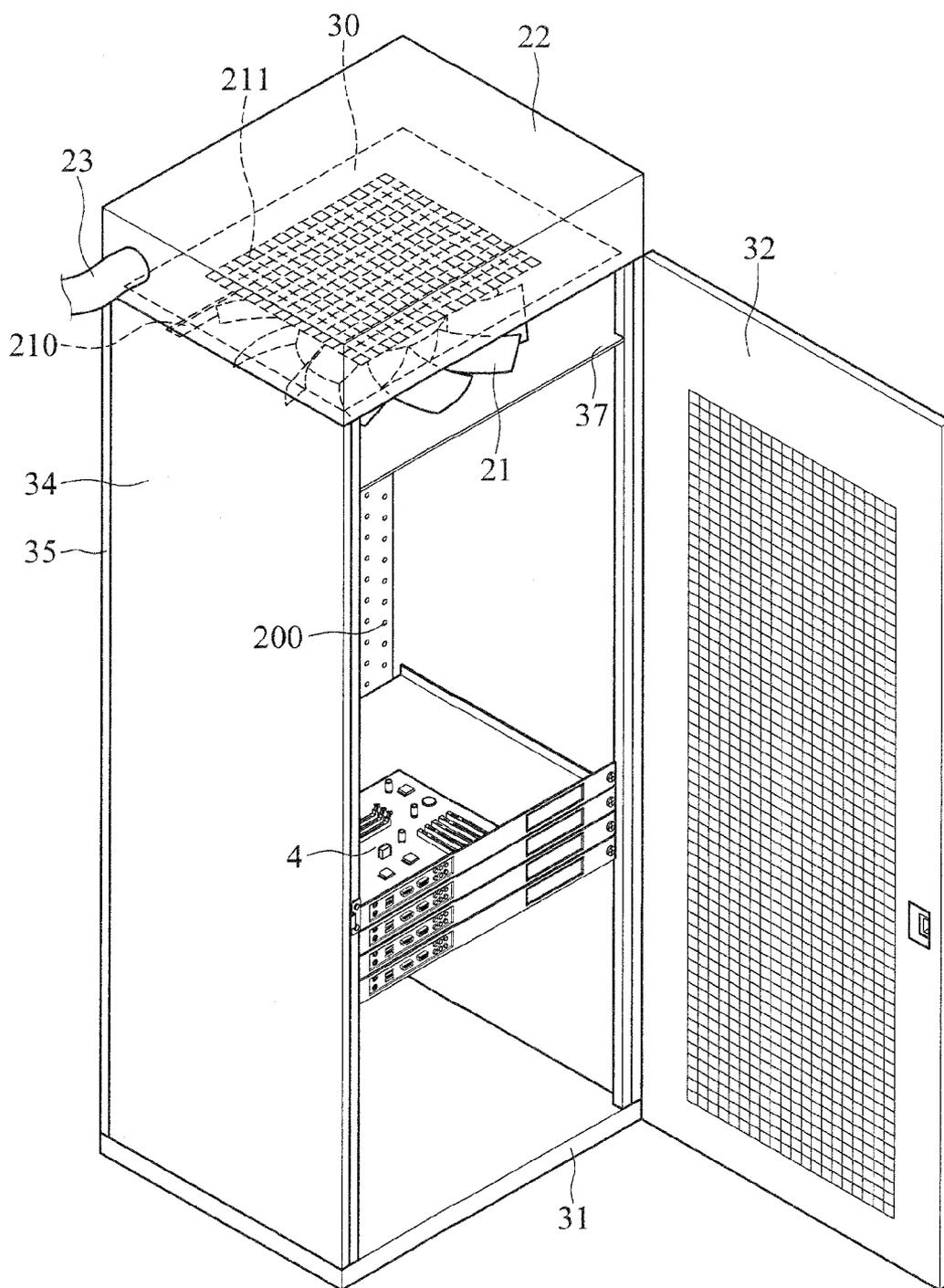


FIG. 3

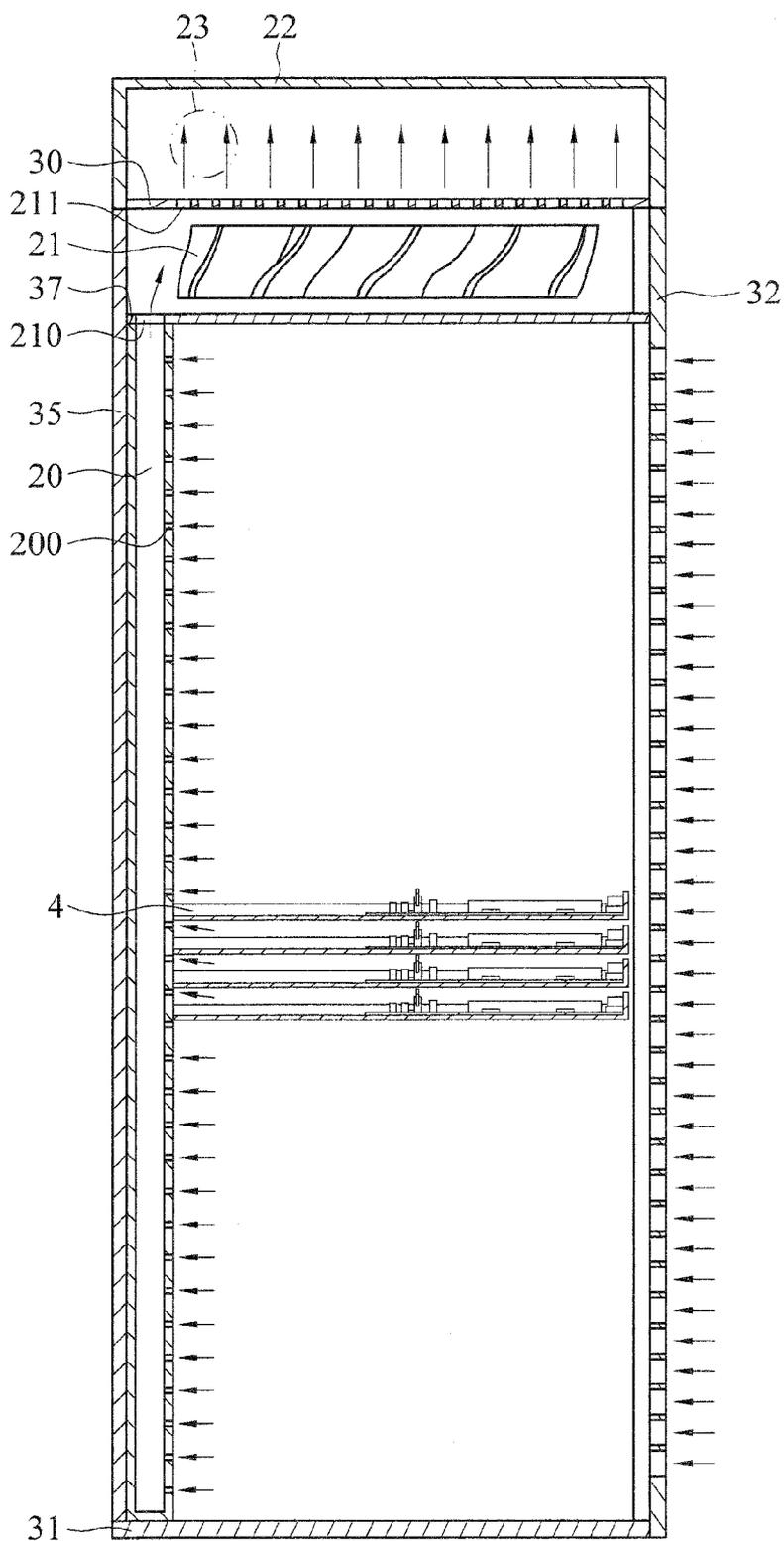


FIG. 4

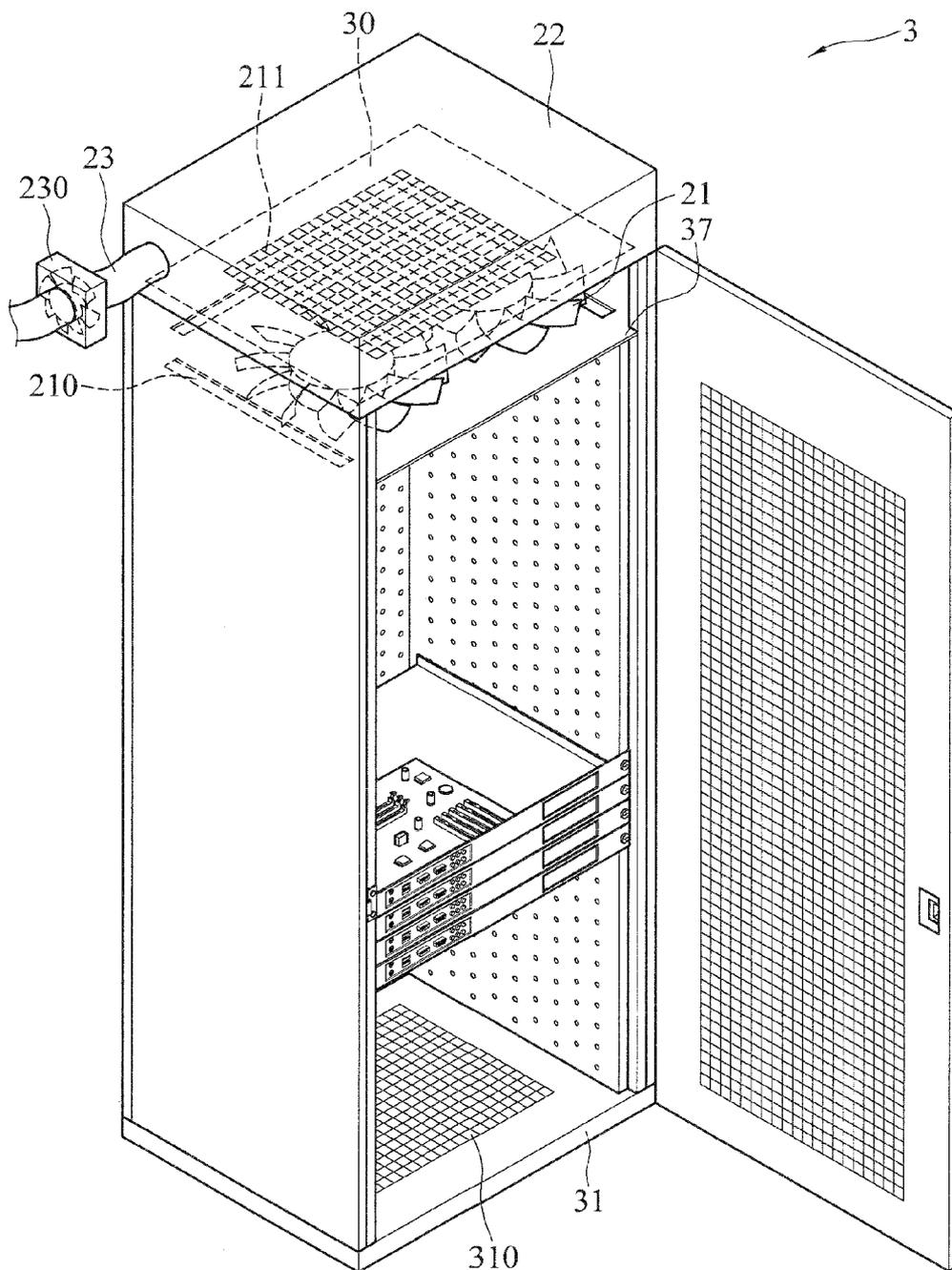


FIG. 5

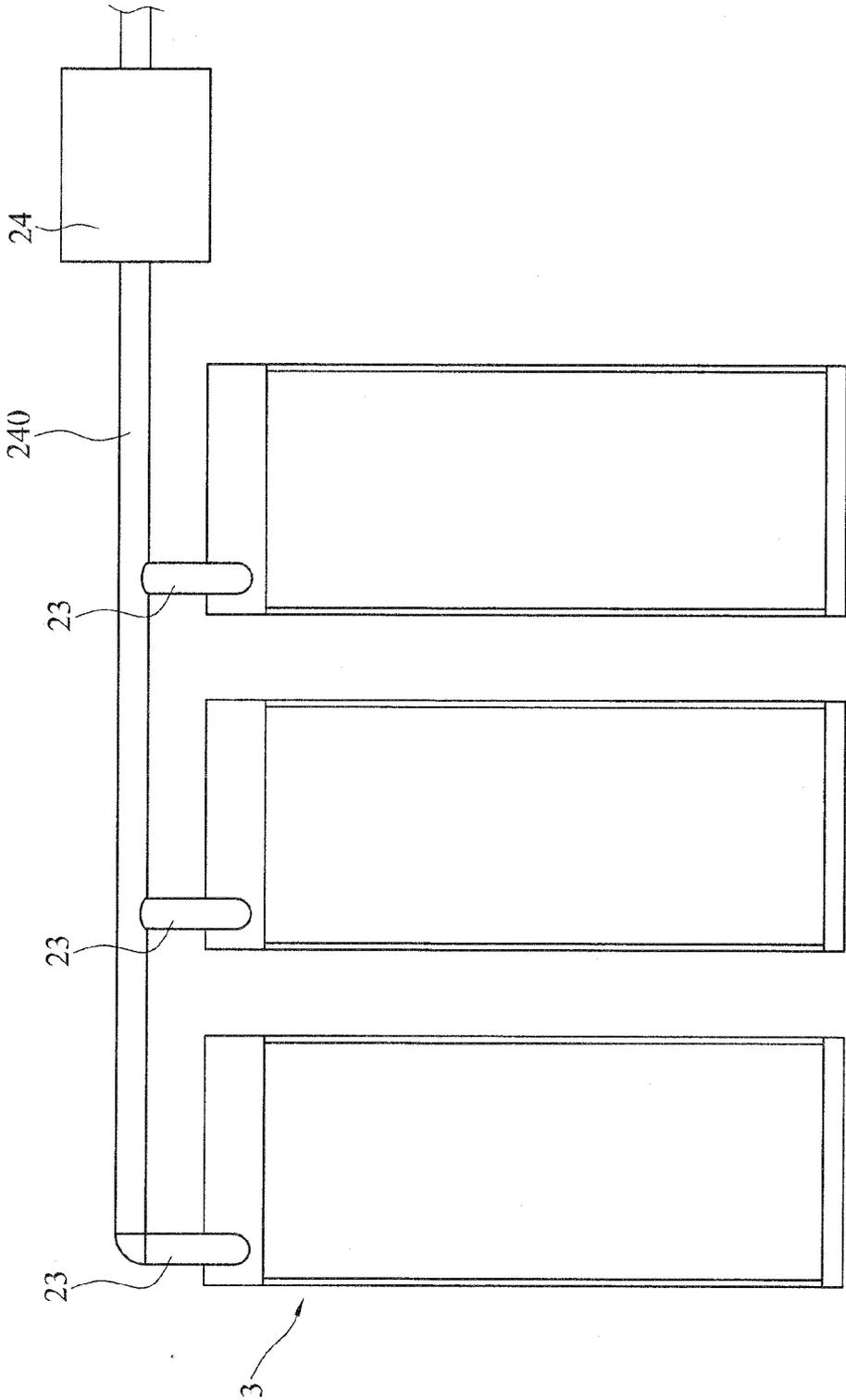


FIG. 6

AIR DISCHARGE STRUCTURE OF INDUSTRIAL CABINET

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the technical field of a housing of electric equipments or components, in particular to an air discharge structure of an industrial cabinet having a plurality of through holes formed on a surface of a duct, and internal hot air are extracted uniformly from one of the sides other than the front side of the industrial cabinet and discharged from the top of the cabinet.

[0003] 2. Description of the Related Art

[0004] In general, the industrial computer cabinet is used for containing a plurality of electronic equipments such as industrial computers or servers, and the temperature in the industrial computer cabinets will be increased by the heat generated during the operation of the electronic equipments. To prevent abnormality of the electronic equipments due to high temperature, the industrial computer cabinets generally come with a plurality of extraction fans installed at the rear of the computer cabinets for extracting internal hot air from the rear to the outside, and an airflow is produced to drive external cold air to flow into the computer cabinets from the front side to dissipate the heat. However, the industrial computer cabinets are installed in an air-conditioned engine room of a constant temperature. With the characteristics of the rising hot air and the descending cold air, air sucked from the front side is not the cold air with the lowest temperature around, so that the internal temperature of industrial computer cabinet cannot be lowered immediately.

[0005] To overcome the aforementioned problem, an electronics cabinet cooling system is disclosed in U.S. Pat. No. 6,127,663. With reference to FIG. 1 for a schematic view the electronics cabinet cooling system as disclosed in U.S. Pat. No. 6,127,663, the electronics cabinet 1 comprises at least one fan 10 installed at the top of the electronics cabinet 1, a ventilation opening 11 formed at the bottom of the electronics cabinet 1, a duct 12, and a subrack 13 for carrying a plurality of electronic equipments, and the fan 10 draws internal hot air of the electronics cabinet 1 to speed up an air flow, such that the cold air outside the bottom of the electronics cabinet 1 flows through the ventilation opening 11, and then the duct 12 directs the cold air to the subrack 13 to lower the internal temperature. In other words, the subrack 13 and the electronic equipments are installed between the fan 10 and the duct 12, so that the airflow is blocked to reduce the flow rate and the heat dissipating efficiency.

SUMMARY OF THE INVENTION

[0006] In view of the problems of the prior art, it is a primary objective of the present invention to provide an air discharge structure of an industrial cabinet, wherein a vertical duct is provided for drawing hot air from each position inside the industrial cabinet uniformly, and then the heat dissipating device installed at the top of the industrial cabinet is provided for discharging the hot air to enhance the heat dissipating effect.

[0007] To achieve the foregoing objective, the present invention provides an air discharge structure of an industrial cabinet, and the discharge structure is installed inside the industrial cabinet and comprises at least one duct and at least one heat dissipating device, and the duct is installed on at least

one of the side panels other than the front panel and having a plurality of through holes, such that a channel is formed inside the duct for guiding air. The heat dissipating device is installed at the top of the industrial cabinet and has at least one air inlet and at least one air outlet, and the air inlet is coupled to the duct, and the heat dissipating device draws internal hot air from the industrial cabinet through the through holes, and the duct directs the hot air to pass through the air inlet and then discharge from the air outlet.

[0008] Wherein, the heat dissipating device is a vortex fan, and the duct is combined and installed at the rear side of the industrial cabinet, or two ducts are installed on both lateral sides of the industrial cabinet respectively.

[0009] In addition, the industrial cabinet is installed in an engine room with constant-temperature air-conditioning to prevent the hot air discharged from the heat dissipating device increases the temperature inside the engine room to affect the heat dissipating effect. The air discharge structure of an industrial cabinet further comprises a heat collection cover, an air guide tube and an air guide fan, wherein the heat collection cover is provided for connecting the air outlet to gather hot air, and an end of the air guide tube is coupled to the heat collection cover and the other end of the air guide tube is coupled to the outside. If a plurality of industrial cabinets is combined for use, the air discharge structure further comprises an air collection box coupled between the air guide tubes and the outside to gather the hot air discharged from the industrial cabinets and then discharge the hot air to the outside. Further, the air guide fan is installed at a middle section of the air guide tube for guiding and discharging the hot air to the outside compulsorily.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a schematic view of an electronics cabinet cooling system as disclosed in U.S. Pat. No. 6,127,663;

[0011] FIG. 2 is an exploded view of an exemplary embodiment of the present invention;

[0012] FIG. 3 is a schematic view of an exemplary embodiment of the present invention;

[0013] FIG. 4 is a cross-sectional view of an exemplary embodiment of the present invention;

[0014] FIG. 5 is a schematic view of another exemplary embodiment of the present invention; and

[0015] FIG. 6 is a schematic view of a further exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] The technical contents of the present invention will become apparent with the detailed description of preferred embodiments and the illustration of related drawings as follows.

[0017] With reference to FIGS. 2 to 4 for an exploded view, a schematic view and a cross-sectional view of a preferred embodiment of the present invention respectively, an air discharge structure 2 of an industrial cabinet 3 is installed inside the industrial cabinet 3, and the industrial cabinet 3 is substantially in the shape of a rectangular box and comprises a top cover panel 30, a bottom retaining panel 31, a door panel 32 disposed at a front side of the industrial cabinet 3 and a right panel 33, a left panel 34 and a rear panel 35 disposed at the remaining three sides of the industrial cabinet 3 respectively. Pillars 36 are separately and vertically disposed at four

corners of the top cover panel 30, and a plurality of electronic equipments 4 is installed between the pillars 36 to form plurality of installation spaces horizontally stacked on top of one another, and the top cover panel 30 has a top panel 37 disposed there below. The door panel 32 includes an air inlet 320 formed thereon for drawing nearby air into the industrial cabinet 3 to speed up the airflow inside the industrial cabinet 3. The air discharge structure 2 comprises a heat dissipating device 21 and a duct 20.

[0018] The heat dissipating device 21 is installed on the top panel 37 and has an air inlet 210 and an air outlet 211. In this preferred embodiment, the heat dissipating device 21 is a vortex fan for producing a suction force.

[0019] An end of the duct 20 is coupled to the air inlet 210, and the duct 20 has a plurality of through holes 200 formed on a surface of the duct 20, so as to form a channel therein for guiding air. In addition, the duct 20 has a size corresponding to the size of the pillars 36. In this preferred embodiment, the duct 20 is substantially in the shape of a rectangular box and installed between the pillars 36 in the rear panel 35, so that the duct 20 will not occupy any using space inside the industrial cabinet.

[0020] When use, the through holes 200 are provided for sucking hot air discharged from the electronic equipments 4 inside the industrial cabinet 3, and the duct 20 is provided for directing the hot air through the air inlet 210 and then discharging the hot air from the air outlet 211 to enhance the heat dissipating effect. In addition, the air outlet 211 can be formed at the top side, both left and right side, or the rear side of the top cover panel 30, and the air inlet 210 is formed on both left and right edges or a rear edge of the top panel 37 and at a position corresponding to the duct 20. Further, a gauze or a filter can be installed to the air inlet 210, the air outlet 211 and the air inlet 320 to reduce the chance for external dust or foreign substances to enter the industrial cabinet 3 and prevent the electronic equipments 4 from being damaged by the dust or foreign substances.

[0021] In addition, the industrial computer cabinet 3 is installed in an air-conditioned engine room of a constant temperature, the air discharge structure 2 further comprises a heat collection cover 22 and an air guide tube 23 in case the temperature in the engine room will be increased or the heat dissipating effect will be affected by the hot air discharged from the heat dissipating device 21. The heat collection cover 22 is coupled to the air outlet 211, and an end of the air guide tube 23 is coupled to the heat collection cover 22 and the other end of the air guide tube 23 is coupled to the outside. After the heat collection cover 22 gathers the hot air, the hot air is directed by the air guide tube 23 and discharged to the outside, so as to maintain the engine room at a low temperature and assure the heat dissipating efficiency.

[0022] With reference to FIG. 5 for a schematic view of another exemplary embodiment of the present invention together with FIG. 2, the top panel 37 has two heat dissipating devices 21 installed thereon for improving the effect of drawing air, and two ducts 20 can be installed between the pillar 36 and the right panel 33, and the pillar 36 and the left panel 34 to speed up the suction of hot air. Further, an air guide fan 230 is installed at a middle section of the air guide tube 23 for driving the hot air to the outside compulsorily, speeding up the airflow, and enhancing the heat dissipating efficiency. Since the cold air flows downward, an air inlet 310 can be

designed at the bottom retaining panel 31 for drawing cold air proximate from the ground into the cabinet to enhance the speed of lowering the temperature.

[0023] With reference to FIG. 6 for a schematic view of a further exemplary embodiment of the invention, if the industrial cabinets 3 are combined for use, the air guide tubes 23 can be coupled to an air collection box 24 directly, or coupled to an air collection tube 240 first, and then coupled to the air collection box 24 through the air collection tube 240, so as to gather the hot air discharged from the industrial cabinets 3 at the air collection box 24, and finally discharge the hot air to the outside through the air collection box 24.

[0024] In summation, the air discharge structure 2 of the industrial cabinet 3 of the present invention draws hot air through the duct 20 and uses the heat dissipating device 21 at the top of the industrial cabinet 3 to discharge the hot air to the outside, and the air discharge structure 2 can also be a box or a case installed at the top of the industrial cabinet 3, and the duct 20 is coupled to the air discharge structure 2.

What is claimed is:

1. An air discharge structure of an industrial cabinet, installed inside the industrial cabinet, comprising:

at least one duct, installed on at least one of side panels other than a front panel and having a plurality of through holes, such that a channel is formed inside the duct for guiding air; and

at least one heat dissipating device, installed at a top of the industrial cabinet, and having at least one air inlet and at least one air outlet, and the air inlet being coupled to the duct, and the heat dissipating device drawing hot air from the industrial cabinet through the through holes, such that the duct directs the hot air to pass through the air inlet and then discharges the hot air from the air outlet.

2. The air discharge structure of an industrial cabinet as recited in claim 1, wherein the heat dissipating device is a vortex fan.

3. The air discharge structure of an industrial cabinet as recited in claim 1, further comprising a heat collection cover for connecting the air outlet and gathering hot air.

4. The air discharge structure of an industrial cabinet as recited in claim 3, further comprising an air guide tube with an end coupled to the heat collection cover and the other end coupled to the outside.

5. The air discharge structure of an industrial cabinet as recited in claim 4, further comprising an air guide fan installed at a middle section of the air guide tube and provided for guiding and discharging air to the outside compulsorily.

6. The air discharge structure of an industrial cabinet as recited in claim 4, further comprising an air collection box coupled to the air guide tubes and the outside, gathering hot air discharged from the industrial cabinets and discharging hot air to the outside, if a plurality of industrial cabinets being used.

7. The air discharge structure of an industrial cabinet as recited in claim 1, wherein the duct is combined and installed at the rear of the industrial cabinet.

8. The air discharge structure of an industrial cabinet as recited in claim 1, wherein the duct comes with a quantity of two and the ducts are installed on both left and right sides of the industrial cabinet respectively.