Appeal decision

Appeal No. 2019-4557

Appellant Yamato Scientific Co., Ltd.

Patent Attorney MIYOSHI, Hidekazu

The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2014-23386, entitled "Draft chamber", [the application published on August 24, 2015: Japanese Unexamined Patent Application Publication No. 2015-150465] has resulted in the following appeal decision:

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures

The present application was filed on February 10, 2014, and the history of the procedures is shown as follows.

December 11, 2017 : Notification of reasons for refusal

February 13, 2018 : Written opinion and written amendment

Jun. 11, 2018 : Notification of the reasons for refusal (final notification of the reasons for refusal)

August 17, 2018 : Written opinion and awritten amendment

December 25, 2018 : Decision of refusal

April 5, 2019 : Request for appeal andwritten amendment

May 19, 2020 : Notification of reasons for refusal

July 27, 2020 : Written opinion and written amendment

No. 2 The Invention

The inventions according to Claims 1-3 of the present application are ones specified by the matters recited in Claims 1-3 of the scope of claims amended by the written amendment made on July 27, 2020, and the invention according to Claim 1 thereof (hereinafter, referred to as "the Invention") is as follows.

"[Claim 1]

A draft chamber having a function to send air into a work space through an opening and exhaust the air from the inside of the work space to the outside,

the draft chamber being a low air quantity draft chamber of a VAV control method that is operable, regardless of increase and decrease in an aperture height of a working plane of the opening, in a small air quantity that is lower by 40-60% than a standard air quantity of a constant air quantity draft chamber of a constant exhaust air quantity having a CAV control method incorporated therein, the standard air quantity being standardized based on application of a legal regulation stipulating a controlled wind speed,

the low air quantity draft chamber being made to be capable of making an exhaust air quantity be increased and decreased by increasing and decreasing the aperture height of the working plane, the draft chamber comprising:

an air sending and exhausting means for sending the air into the work space and exhausting the air;

a disturbance detection means at least including an image taking means for identifying an object or a shape operating within a room in which the low air quantity draft chamber is installed in order to detect disturbance occurring around the low air quantity draft chamber; and

a control unit to increase an exhaust air quantity to be exhausted outside from the work space regardless of the working plane aperture height by controlling the air sending and exhausting means in advance based on the disturbance detection by the disturbance detection means."

No. 3 Reasons for refusal

Among the reasons for refusal notified by the body as of May 19, 2020, the reason against the invention according to Claim 1 of the present application is, in effect, that the invention according to Claim 1 of the present application is one that could have been invented with ease by a person ordinarily skilled in the art in the technical field of the invention before the application was filed based, on the invention described in the following Cited Document 1 and the matters described in the following Cited Documents 1 and 2, which were distributed or made available to the public through electric communication lines in Japan or abroad before the application was filed, and, therefore, the Applicant should not be patentable under the provisions of Article 29(2) of the Patent Act, which is related to lack of inventive step.

Note

Cited Document 1: National Publication of International Patent Application No. 1995-

500899
Cited Document 2: The description of U.S. Patent No. 6428408

No. 4 Descriptions of Cited Documents and well-known examples

Here, in addition to descriptions of the above-mentioned Cited Documents 1 and 2, descriptions of the following Well-known Examples 1 and 2 are also made an excerpt in order to understand well-known arts.

Well-known Example 1: Japanese Unexamined Patent Application Publication No. 2009-30837

Well-known Example 2: Japanese Unexamined Patent Application Publication No. 2006-220405

1 Descriptions of the Cited Document 1

In Cited Document 1, there are the following descriptions (note by the body: "..." indicates portions abbreviated by the body, and the underlines were applied by the body; the same shall apply hereinafter).

(1) Page 3, the upper left column, line 1 to the upper right column, line 10

"(Field of the Invention)

This invention relates to a laboratory fume hood, and more specifically to methods and apparatus for varying a fume hood's face velocity in response to variations in one or more fume hood containment-affecting conditions.

(Background of the Invention)

A laboratory fume hood is a ventilated enclosure where harmful materials can be handled safely. The fume hood captures contaminants and prevents the contaminants from escaping into the laboratory by using an exhaust blower to draw air and contaminants in and around the hood's work area away from the operator so that inhalation of and contact with the contaminants are minimized. Access to the interior of the hood is through an opening which is closed with a sash which typically slides up and down to vary the opening into the hood.

The velocity of the air flow through the hood opening is called the face velocity. The more hazardous the material being handled, the higher the recommended face velocity, and guidelines have been established relating face velocity to toxicity. Typical face velocities for laboratory fume hoods are 60 to 150 feet per minute (fpm) (from about 18 to 45 meter per minute), depending upon the application.

When an operator is working in the hood, the sash is opened to allow free access to the materials inside. The sash is opened partially or fully, depending on the operation

to be performed in the hood. While fume hood and sash sizes vary, the opening provided by a fully opened sash is on the order of ten square feet (about 0.9 m2). Thus the maximum air flow which the blower must provide is typically on the order of 600 to 1500 cubic feet per minute (cfm) (about 17.0 to 42.5 meter per minute).

The sash is closed when the hood is not being used by an operator. It is common to store hazardous materials inside the hood when the hood is not in use, and a secure airflow must therefore be maintained to exhaust contaminants from such materials even when the hood is not in use and the sash is closed. As the hazard level of the materials being handled and the resulting minimum face velocity increases, maintaining a safe face velocity becomes more difficult.

An important consideration in the design of a fume hood system is the running cost of the system. There are three major areas of costs: the capital expenditure of installing the hood, the cost of power to operate the hood exhaust blower, and the cost of heating, cooling, and delivering the 'make-up air,' which replaces the air exhausted from the room by the fume hood."

(2) Page 4, the upper left column, line 6 to the upper right column, line 3 from bottom

"An object of this invention is to provide an improved method and apparatus for controlling a fume hood, which controller (a) substantially reduces the replacement air utilized by the system, regardless of sash position, (b) permits fume hood systems to be designed for a lower peak volume flow without permitting or creating any danger of a breakdown in toxic fume containment or any danger of damage to ongoing experiments or equipment, and permits researchers complete flexibility in selecting sash positions.

In accordance with the above, this invention provides a controller for use with a fume hood having a face velocity control. The face velocity control may control face velocity directly or may control it indirectly by controlling flow volume or some other conditions affecting face velocity. The controller has a detector for detecting at least one containment-affecting condition, and this condition may be (a) the presence or proximity of a person within a predetermined area of the fume hood, (b) movement within a predetermined area of the fume hood, either by a person or as a result of air drafts or other conditions, and/or (c) the presence of equipment or material within a predetermined distance from the front of the hood. Appropriate detectors are provided for each condition to be detected. In response to the detector detecting a selected change in containment-affecting conditions, the face velocity control causes a corresponding change in the face velocity of the fume hood to a preselected velocity which is appropriate for the changed containment condition. The change may be an increase in the face

velocity of the fume hood to a level sufficient to assure containment of fumes in the hood including the existing containment-affecting condition, ... The incrementing preferably occurs substantially instantaneously upon the detection of a containment-affecting condition ... Containment-affecting conditions may include a person being within a selected area of the face of the hood, the detection of movement within a selected area of the face of the hood, which movement may be of a person or may be air motion or turbulence either inside or outside the hood ....

The face velocity control may control volume through the fume hood with a change being a change in flow volume. The system may include a means for establishing a maximum flow volume and/or a means for establishing a minimum flow volume with the maximum flow volume and/or the minimum flow volume being changed in response to a change in containment-affecting conditions. ... Where the fume hood has an opening which may be covered to varying extents by at least one moveable sash, a selected volume is normally maintained relative to the sash position. The selected volume maintained may be changed in response to the detection of a change in containment-affecting conditions. ...

The face velocity control may include a speed control for a blower exhausting air from the fume hood; that is, may directly change the outflow from the fume hood."

(3) Page 4, the lower left column, line 3 from bottom to page 5, the upper left column, line 16

"In this system, the sensor may be used to control either the speed of the blower 14 or to control a damper in the exhaust duct 15 to control the air flow. ... One potential problem which relates to the present invention is that the face velocity of a hood controlled by these devices is affected by a user standing close to the front of the hood. ... The present invention increases the average face velocity to generate better fume capture and containment. ... The disturbance of a person walking past the hood could create a significantly worse reaction than a hood with no such control system. The present invention uses different sensing and control equipment to immediately detect the disturbance and respond rapidly in the correct manner to provide better fume hood operation. ... The present invention also tries to sense the user, but unlike the prior art, it changes face velocity to change the hood volume and save energy ... Also, this system, when used in combination with a constant face velocity control system such as that described in U.S. Patent Nos. 4,528,898 and 4,706,553, can achieve greater energy savings than when such systems are used alone, due to the decrease in average face velocity that the present invention achieves. ... The flow controller 32, ... may consist

of a variable volume control system which maintains a constant face velocity based on a sash position. U.S. Patent Nos. 4,741,257, 4,528,898, and 4,706,553 describe various types of variable volume control systems which could be used for the flow controller block 32. All of these flow controllers work to maintain a given setpoint value of face velocity. ... in the variable volume systems, the fume hood volume will vary for a given face velocity setpoint. In many cases, in the variable volume systems, there will also be a minimum and maximum exhaust volume limits placed on the fume hood control."

(4) Page 5, the upper left column, line 17 to Page 5, the lower right column, line 10

"The transducer 35 and the person/motion detector circuit 34 work together to detect the presence and movement of the user/researcher in front of the hood. The transducer may also detect significant air motion or turbulence in front of or near the hood. When air motion or user proximity/movement is detected, the transducer activates the face velocity setpoint change circuit 33. This circuit acts on the flow controller 32 in one of many possible ways, but generally acts to increase its face velocity and/or volume flow setpoint. ... For example, the transducer 35 could be implemented by using a passive far-infrared (typically 8-14 μm) motion sensor, an active ultrasonic motion sensor, an active microwave motion sensor, an active near-infrared (typically 880-940 nm) or visible light proximity sensor, or a combination thereof.

FIG. 3 illustrates a configuration using a passive pyro-electric infrared motion sensor and a detector circuit. The pyro-electric detector 41 detects changes in heat patterns caused by the movement of a person relative to their background radiation, in a detection zone. The optical system 40, for example a mirror or fresnel lens, focuses the infrared energy, in for example the 8-14 μm spectrum, onto the detector. ...

With the use of the variable voltage control 47, the circuit could detect different zones. For example, the variable voltage output would indicate the detection of the researcher in the lab relative to a detection zone in front of the fume hood. The variable voltage would tell the face velocity setpoint change block 33 of FIG. 2 to increase the face velocity a little when the researcher is present in the room and to increase the face velocity even more if the researcher is in front of the hood.

A complete active system that includes a Doppler motion detection is shown in FIG. 4. These systems can be combined with a passive detector and are typically based on one of three technologies: infrared 800-900 nm, microwaves, or ultrasonics. The active system detects the presence or movement of a person. Movement, which indicates where the researcher is and how fast he is moving, is detected by the Doppler effect for microwave and ultrasonics. Presence, which indicates if the researcher is

present at a particular location, is detected by an infrared beam. ... The face velocity may then be increased as the researcher moves closer to the fume hood and decreased as the researcher moves further from the fume hood.

The use of both a presence detector and a motion detector may prove that it is useful to prevent the system from being adversely affected by people walking past the hood."

(5) Page 6, the upper left column, line 6 from bottom to Page 6, the upper right column, line 6 from bottom

"In addition to sensing the presence or motion of a user near the hood, there are, as was mentioned earlier, potentially other factors which might dictate the need for a higher face velocity, for example, the presence of an air velocity greater than 30 to 50 FPM (about 9.1 to 15.2 meter per minute) from a nearby supply air diffuser. Additionally, the presence of apparatus existing in the first 6 inch (about 15 cm) or so from the front to the back of the sash of the hood can also decrease hood containment, necessitating the need for a higher face velocity.

There are many kinds and types of air velocity sensors that could be used to detect air motion, either in front of or at the corners or sides of the fume hood. Unfortunately, many of these tend to be point sensors such as hot wire or thermistor-type thermal aneometers. A better system would sense the presence of low air velocity over a wider area. One such approach would use the long streamer 51 (FIG. 6B), the length of each such streamer being roughly equal to the height of the sash or the opening. ...

An even simpler approach is to use a pyro-electric or a heat sensor mentioned earlier. These devices can be made sensitive to the motion of air that is at a different temperature than the background. For example, the conditioned supply air coming out of a diffuser near a hood is typically 55°F. (about 13°C.) in contrast with the background room temperature of 70°F. (about 21°C.). Depending on the turbulence of the air flow near the hood, this air motion would be detected by the pyro-electric sensor."

(6) Page 6, the lower right column, line 6 from bottom to Page 7, the upper left column, line 1

"There are several ways in which the face velocity or volume could be changed in order to increase containment when a disturbance occurs. FIG. 8 is a diagram indicating one way that can change the volume. In this example, the hood is operated with a standby face velocity of 70 FPM (about 21 meter per minute) which is shown by lines 131 and 105 which intersect at the point 149 of minimum flow, which point in this

example occurs at 20% of open area. When a disturbance occurs, the face velocity is increased, producing a flow-to-sash-position curve outlined in FIG. 8 by lines 130 and 104."

(7) FIG. 8

"

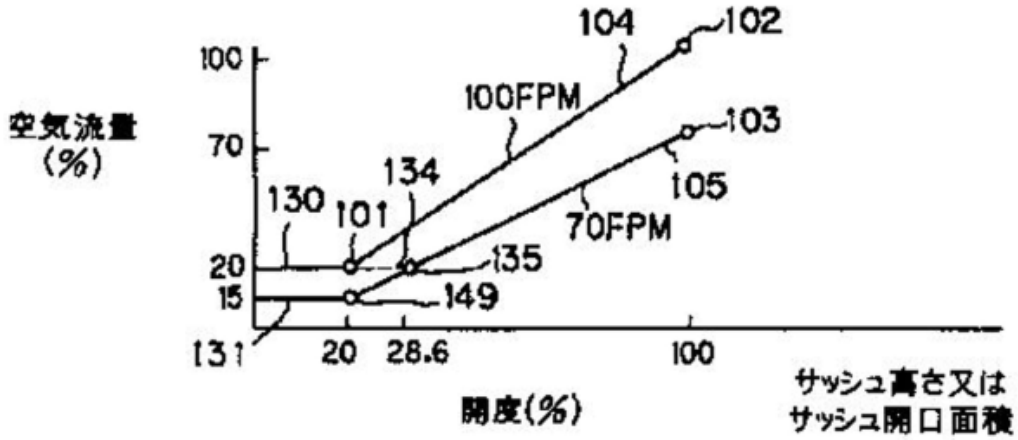

図 8

空気流量 Air flow rate

開度 Opening

サッシュ高さ又はサッシュ開口面積 Sash height or sash aperture area

"

2 Descriptions of Cited Document 2

In Cited Document 2, there are the following descriptions.

(1) Column 1, lines 26 to 34

" Such safety thresholds and other factors relating to testing and performance of laboratory gas fume hoods are prescribed by government and industry standards by organizations, such as the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) of Atlanta, Ga.; for example, ANSI/ASHRAE 110-1995. ASHRAE Standard, "Method of Testing Performance of Laboratory Fume Hoods".

(2) Column 2, lines 31 to 42

"An important factor in a conventional fume hood's ability to contain contaminants

is its face velocity. The face velocity of a fume hood is determined by its exhaust and its open face area. Recommendations for face velocity of conventional fume hoods range from 75 feet per minute (fpm) for materials of low toxicity (Class C:TLV>500 ppm) to 130 fpm for extremely toxic or hazardous materials (Class A:TLV<10 ppm) (Cooper, E. C., 1994. Laboratory Design Handbook, CRC Press). In general, industrial hygienists recommend face velocities in the range of 100 fpm plus or minus 10 fpm for containment of contaminants by conventional hoods with open sashes."

(3) Column 3, lines 33 to 39

"Thus, the abundant amount of air provided for the operation of conventional laboratory fume hoods results in a tremendous waste of energy. Accordingly, alternative fume hood designs which reduce the amount of air required for operability, reduce energy consumption, and provide containment of contaminants would be desirable."

(4) Column 3, lines 43 to 62

"To achieve the foregoing, the present invention provides a fume hood that offers an adequate containment of contaminants while reducing the amount of air exhausted from the hood. The fume hood includes a plurality of air supply outlets which provide fresh air, preferably having laminar flow, to the fume hood. The fume hood also includes an air exhaust which pulls air from the work chamber in a minimally turbulent manner. The push of the air supply outlets and the pull of the air exhaust form a push-pull system that provides a low velocity displacement flow which displaces the volume of gases currently present in the hood in a minimally turbulent and substantially consistent manner. As a result, inconsistent flow patterns associated with turbulent air supply and escape of contaminants from the fume hood are minimized. The displacement flow fume hood in accordance with one embodiment of the present invention greatly reduces the need to exhaust large amounts of air from the hood. It has been shown that exhaust air flow reductions of up to 70% are possible without a decrease in the hood's containment performance."

(5) Column 6, line 1 to Column 7, line 50, FIG. 3A, 3B

It is described that, by "supply air plenums" 312, 320, and 340 provided with "fans" 315, 321, and 342, air is supplied into "work chamber" 302, and, through the "exhaust outlet" 340 provided with the "fan" 362, exhaust is performed.

(6) Column 13, lines 1 to 4

"As displacement flow in accordance with the present invention allows a fume hood to use substantially less air than a conventional fume hood, energy efficiency achievable with a displacement flow fume hood is greatly improved."

(7) Column 13, lines 17 to 20

"In one embodiment, air is emitted from the supply air outlets 314, 325, and 343 at the same speed with a flow velocity in the range of about 30 fpm to 90 fpm (about 0.15 m/s to 0.46m/s)."

(8) Column 13, lines 37 to 40

"The air exhausted from the fume hood 300 may be as low as 30% of that exhausted from a conventional fume hood, resulting in substantial energy savings due to reduced air conditioning requirements. By way of example, the air exhausted from the fume hood 300 maybe in the range of about 30 to 50% of a fume hood with a typical face velocity of 100 fpm."

3 Descriptions of Well-known Example 1

In Well-known Example 1, there are the following descriptions.

(1) "[Claim 1]

A clean room air flow control system using image processing comprising a clean air system, a blower unit, and a wind exhaust unit for automatically controlling the cleanliness function of a clean room, the clean room air flow control system blowing a certain amount of clean air into the clean room from a blowing port of the blowing unit and exhausting a certain amount of clean room air from the wind exhaust unit to outside the clean room, wherein

a monitoring camera is installed in the clean room, wherein

after converting from monitoring camera imaging to image data using image processing at predetermined time intervals,

movement of a person is detected from the image data, wherein

an amount of movement of the person is calculated from a change in movement, and wherein

the amount of air flow corresponding to the amount of movement is calculated, and, after that, the amount of clean air blown into the clean room is increased or decreased, and the amount of clean room air exhausted from the wind exhaust unit to the outside of the clean room is increased or decreased.

[Claim 2]

The clean room air flow control system using image processing according to claim 1, wherein the movement amount of the person includes predicting a movement direction and a movement amount of the person by calculating, from a difference in the image data of a person's position between the current image data and the previous image data, a position of the person immediately thereafter."

(2) "[0043]

In the first example, extracting processing of a human region, for example, a face region as the range of the data difference was carried out, and human motion information was acquired from the face position and the floor position.

[0044]

The distance from the camera position to the person's face region was calculated from the size of the face of the image data, and movement information on the movement amount, the distance, and the movement speed of the person was acquired."

4 Descriptions of Well-known Example 2

In Well-known Example 2, there are the following descriptions.

(1) "[Claim 1]

An air conditioner comprising:

an indoor unit that houses an indoor heat exchanger and an indoor fan, sucks air in a room, and blows out air-conditioned air from a blowout port into the room;

an image sensor disposed in the indoor unit or arranged in the room, and configured to capture image information of a space in which air conditioning of the room is performed and detect a direction and distance of blowing air;

a plurality of flaps disposed in the blowout port and configured to change a position of the wind direction of the air blown out from the blowout port by the driving mechanism in a horizontal direction and a vertical direction; and

a controller for independently controlling the positions of the plurality of flaps according to the direction and distance of the air detected by the image sensor by driving the flaps independently, wherein

the air conditioner is capable of generating a plurality of airflows having different wind directions."

(2) "[0020]

The structure and operations for performing the airflow control as shown in

FIGS. 4 to 12 using the image information from the image sensor described in FIGS. 2 and 3 will be described in FIG. 13 below. FIG. 13 shows a diagram (a) for explaining the relationship between an indoor unit 1 of an air conditioner and a space in which the air conditioner performs air conditioning, and FIG. diagram (b) illustrates image information captured by the image sensor 2 fixed at a predetermined position, and an example of the image information captured by the image sensor.

... From the comparison between the stored image and the newly detected and captured image, it will be detected in which region or in which specific position an air-conditioning target for air-conditioning exists. The direction and distance to this detected air conditioning target, for example, a person, are obtained, and the blowing air direction of the flaps and the rotation speed of the indoor fan are controlled.

[0021]

In the system of FIG. 2 or FIG. 3, the movement of a person is detected based on the image information from the image sensor, and in which area direction and how far away the person's position exists among divided areas is estimated. A general method may be used which involves detecting motion with image recognition when performing shooting continuously, such as continuing it after a short time or continuously, and as an alternative method, an approximate distance can be detected by the size of a moving object; however a moving object may be identified as a human or as a specific person such as classification between a man and a woman by comparison data which is image data between data such as an average height and a size set and stored in the microcomputer in advance, or it may be determined in which region of the stored setting image or around which specific point the moving object exists. Further, by storing a face image in advance, the distance can be estimated by comparison between the face image and the height of a person, for example, by the ratio of the head to the body. If the distance to a region or a specific point is set in advance in this way, the direction and distance can be easily set for the position where the motion exists or for the captured image information. FIG. 13 shows an example in which the position of a person is estimated from image data using an area entry divided into nine segments of A to I. FIG. 13(a) shows an air conditioner and a built-in camera, and a bird's-eye view of a room, and FIG. 13(b) shows the room viewed from the image data of the camera. ... In any case, since it is detected by an image and compared with an image stored in advance or compared with set data, it is possible to detect the direction and distance with high accuracy even for each specific point rather than a region. In addition, because of being image information, processing such as personal recognition, human movement, and shape recognition can be performed flexibly, and thus detection about who is sitting or standing, and further detection of the

number of persons can be performed."

No. 5 Invention described in Cited Document 1 (Cited Invention)
1 According to the above-mentioned "No. 4" 1(1), there are descriptions in Cited Document 1 relating to "a laboratory fume hood, and more specifically to methods and apparatus for varying a fume hood's face velocity in response to variations in one or more fume hood containment-affecting conditions" that "the fume hood captures contaminants and prevents the contaminants from escaping into the laboratory by using an exhaust blower to draw air and contaminants in and around the hood's work area away from the operator", and "The velocity of the air flow through the hood opening is called the face velocity", and, therefore, from these descriptions, it can be said that there is described a matter of a fume hood in which an air flow passes the opening of the hood and is exhausted by an exhaust blower.

2 According to the above-mentioned "No. 4" 1(2), since there is described in Cited Document 1 that "this invention provides a controller for use with a fume hood having a face velocity control" and "The face velocity control may include a speed control for a blower exhausting air from the fume hood; that is, may directly change the outflow from the fume hood", it can be said from these descriptions that the fume hood has a controller to control the exhaust blower.

3 According to the above-mentioned "No. 4" 1(2), since there is described in Cited Document 1 that "The controller has a detector for detecting at least one containment-affecting condition, and this condition may be (a) the presence or proximity of a person within a predetermined area of the fume hood, (b) movement within a predetermined area of the fume hood, either by a person or as a result of air drafts or other conditions, and/or (c) the presence of equipment or material within a predetermined distance from the front of the hood", it can be said from this description that there is described a matter that the controller has a detector to detect presence, proximity, and movement of a human in a predetermined area of the fume hood.

4 According to the above-mentioned "No. 4" 1(2), there is described in Cited Document 1 that "In response to the detector detecting a selected change in containment-affecting conditions, the face velocity control causes a corresponding change in the face velocity of the fume hood to a preselected velocity which is appropriate for the changed containment condition. The change may be an increase in the face velocity of the fume

hood to a level sufficient to assure containment of fumes in the hood including the existing containment-affecting condition", and, therefore, it can be said from this description that there is described a matter that, when the detector has made detection, the face velocity of the fume hood is increased to a level sufficient to assure containment of fumes in the hood.

5 From a matter that the face velocity is maintained by increasing and decreasing an air flow volume according to a height or an aperture area of the sash, which can be perceived from the description "Where the fume hood has an opening which may be covered to varying extents by at least one moveable sash, a selected volume is normally maintained relative to the sash position" of the above-mentioned "No. 4" 1(2), the description "this system, when used in combination with a constant face velocity control system such as that described in U.S. Patent Nos. 4,528,898 and 4,706,553 ... The flow controller 32, ... may consist of a variable volume control system which maintains a constant face velocity based on a sash position" of the above-mentioned "No. 4" 1(3), and the description of the graph of FIG. 8 of the above-mentioned "No. 4" 1(7), it can be said that, in Cited Document 1, there is described a matter that the controller performs variable volume control to maintain a constant face velocity based on a sash position.

6 Thus, it is recognized that there are the following descriptions and matters: "Where the fume hood has an opening which may be covered to varying extents by at least one moveable sash, a selected volume is normally maintained relative to the sash position. The selected volume maintained may be changed in response to the detection of a change in containment-affecting conditions" of the above-mentioned "No. 4" 1(2); "In this example, the hood is operated with a standby face velocity of 70 FPM (about 21 meter per minute) which is shown by lines 131 and 105 which intersect at the point 149 of minimum flow, which point in this example occurs at 20% of open area. When a disturbance occurs, the face velocity is increased, producing a flow-to-sash-position curve outlined in FIG. 8 by lines 130 and 104" of the above-mentioned "No. 4" 1(6); and "When a disturbance occurs, the face velocity is increased" as described in the above-mentioned "No. 4" 1(6) is performed regardless of height or aperture area of the sash, which can be perceived from the graph of FIG. 8 of the above-mentioned "No. 4" 1(7). From the above descriptions and matters, it can be said that, in Cited Document 1, there is described a matter that face velocity is increased according to detection of a change in containment-affecting conditions, regardless of a position of the sash.

7 According to the above-mentioned 1-6, it is recognized that, in Cited Document 1, there is described the following invention (hereinafter, referred to as "Cited Invention").
"A fume hood in which an air flow passes the opening of the hood and is exhausted by an exhaust blower, wherein

the fume hood has a controller to control the exhaust blower, wherein

the controller performs variable volume control to maintain a constant face velocity based on a sash position, and wherein

the controller has a detector to detect presence, proximity, and movement of a human in a predetermined area of the fume hood, and when the detector has made detection, increases the face velocity of the fume hood to a level sufficient to assure containment of fumes in the hood regardless of a position of the sash."

No. 6 Comparison and examination between the Invention and Cited Invention (judgment on lack of inventive step)
1 Comparison
(1) When the Invention and Cited Invention are compared, "fume hood" in Cited Invention is, as is obvious from the description of "as a such draft chamber, generally there are ones called "low air quantity draft chamber" or "low air quantity fume hood" in [0003] of the description of the present application, one is generally called a "draft chamber", and, therefore, it can be said that "a fume hood having a function to exhaust an air flow passing through the hood opening by an exhaust blower" in Cited Invention corresponds to "a draft chamber" "having a function to send air into a work space through an opening and exhaust the air from the inside of the work space to the outside" in the Invention.

(2) Since "Variable volume control" "which maintains a constant face velocity based on a sash position" in Cited Invention is, as described in the above-mentioned "No. 4" 1(2), (3), (6), and (7), a system to maintain a face velocity by changing an air flow volume based on a position of the sash, it can be said that it corresponds to "a VAV control method" "being made to be capable of making an exhaust air quantity be increased and decreased by increasing and decreasing the aperture height of the working plane" in the Invention.

(3) "A detector to detect presence, proximity, and movement of a human in a predetermined area of the fume hood" in Cited Invention is a detector, as has been described in the above-mentioned "No. 4" 1(2) and (3), for detecting instability having an

influence on a containment state of the hood caused by movement of a person, and thus it can be said that it corresponds to "a disturbance detection means" in the Invention for detecting "an object operating within a room in which the draft chamber is installed" "in order to detect disturbance occurring around the draft chamber".

(4) Since, in Cited Invention, a means to increase face velocity of a fume hood is an exhaust blower controlled by a controller, it can be said that "a controller" "when the detector has made detection, increases the face velocity of the fume hood to a level sufficient to assure containment of fumes in the hood regardless of a position of the sash" in Cited Invention corresponds to "a control unit to increase an exhaust air quantity to be exhausted outside from the work space regardless of the working plane aperture height" "by controlling" "based on the disturbance detection by the disturbance detection means" in the Invention.

(5) Then, the Invention and Cited Invention have the following corresponding feature and different features.

<Corresponding Feature>

"A draft chamber having a function to send air into a work space through an opening and exhaust the air from the inside of the work space to the outside,

the draft chamber being a draft chamber of a VAV control method,

the draft chamber being made to be capable of making an exhaust air quantity be increased and decreased by increasing and decreasing the aperture height of the working plane, the draft chamber comprising:

a disturbance detection means for detecting an object operating within a room in which the draft chamber is installed, in order to detect disturbance occurring around the draft chamber; and

a control unit to increase an exhaust air quantity to be exhausted outside from the work space regardless of the working plane aperture height by controlling based on the disturbance detection by the disturbance detection means."

<Different Feature 1>

The Invention is one that includes "a control unit to increase an exhaust air quantity to be exhausted outside from the work space regardless of the working plane aperture height by controlling in advance" "based on the disturbance detection by the disturbance detection means", whereas, Cited Invention is one that includes "a controller" that "when the detector has made detection, increases the face velocity of the fume hood

to a level sufficient to assure containment of fumes in the hood regardless of a position of the sash", and there is no clear indication of such "in advance" as control timing of air quantity increase.

<Different Feature 2>

The Invention is of "a low air quantity draft chamber" "that is operable, regardless of increase and decrease in an aperture height of a working plane of the opening, in a small air quantity that is lower by 40-60% than a standard air quantity of a constant air quantity draft chamber of a constant exhaust air quantity having a CAV control method incorporated therein, the standard air quantity being standardized based on application of a legal regulation stipulating a control wind speed", whereas, from the descriptions of such as the above-mentioned "No. 4" 1(1), (6), and (7), there is a high possibility that the fume hood of Cited Invention operates in an air quantity corresponding to "standard air quantity" stated in the Invention, and, therefore, Cited Invention is not an invention of "a draft chamber of low air quantity".

<Different Feature 3>

The Invention has "an air sending and exhausting means for sending the air into the work space and exhausting the air", and the relevant means is controlled based on "disturbance detection", whereas, in Cited Invention, although an exhaust flow volume is controlled by "an exhaust blower" and air is sent into the fume hood through the hood aperture by airflow generated by "the exhaust blower", it is not a means that generates push air for lowering the air quantity as described in [0032] and [0033] of the description of the present application.

<Different Feature 4>

In the Invention, the disturbance detection means is "an image taking means for identifying an object or a shape operating", whereas, Cited Invention does not use an image taking means as a "detector".

2 Examination on different features

(1) Regarding Different Feature 1

Regarding the above-mentioned control timing of increasing an air quantity to control "in advance" "based on disturbance detection", although it is not clear that "in advance" in question is "in advance" relative to what, it is understood from the descriptions of [0016], [0062], [0096], and [0098] of the description of the present

application that it means "in advance of occurrence of internal gas leakage".

On the other hand, in the above-mentioned "No. 4" 1(2) and (3), it is described that, by rapidly replying at the time of detection of containment-affecting conditions almost immediately, increase of a face velocity of the fume hood to a level sufficient to assure containment of fumes in the hood is performed in order to provide a good fume hood operation, and thus it can be said that the control that "when the detector has made detection, increases the face velocity of the fume hood to a level sufficient to assure containment of fumes in the hood regardless of a position of the sash" in Cited Invention corresponds substantially to performing control "to increase an exhaust air quantity to be exhausted outside from the work space" based on "disturbance detection" "in advance of occurrence of internal gas leakage" in the Invention, and, in addition, there is no reasonable reason to understood that such control can be only performed by a detection means using "image taking means".

Therefore, Different Feature 1 is not a substantial different feature, and even if it is so, it can be said that it could be conceived by a person skilled in the art with ease to perform control to increase a face velocity "in advance" based on the above-mentioned described matter of Cited Document 1.

(2) Regarding Different Features 2 and 3

A According to the above-mentioned "No. 4" 2(4), (5) and (8), it can be said that, in Cited Document 2, there is described a technical matter that a push-pull system to "provide fresh air having laminar flow, to the fume hood" by "a supply air plenum" provided with "a fan" "greatly reduces the need to exhaust large amounts of air from the hood", and, "without a decrease in the hood's containment performance", "exhaust air flow reductions of up to 70%" "of that exhausted from a conventional fume hood" "are possible", for example, "about 30 to 50%" of exhaust air quantity (that is, reduction of about 50-70%).

B Here, since "a supply air plenum" provided with "a fan" in the above-mentioned A is one that sends push air into the hood, and it is obvious that the airflow thereof contributes to exhaust, it can be said to be one corresponding to "an air sending and exhausting means for sending the air into the work space and exhausting the air" in the Invention.

C In addition, according to the above-mentioned "No. 4" 2(1) and (2), "a conventional fume hood" in Cited Document 2 is one whose face velocity is stipulated by standards of government and the industry based on its exhaust, its open face area, and materials to be

handled, and it can be said that it operates substantially "regardless of increase and decrease in an aperture height of a working plane of the opening," "a standard air quantity of a constant air quantity draft chamber of a constant exhaust air quantity having a CAV control method incorporated therein, the standard air quantity being standardized based on application of a legal regulation stipulating a control wind speed" in the Invention, and, therefore, the technical matter in the above-mentioned A that "exhaust air flow reductions of up to 70%" "of that exhausted from a conventional fume hood" "are possible", and, as an example, "about 30 to 50%" of the exhaust air quantity of the conventional fume hood, corresponds to "regardless of increase and decrease in an aperture height of a working plane of the opening, in a small air quantity that is lower by 40-60% than a standard air quantity of a constant air quantity draft chamber of a constant exhaust air quantity having a CAV control method incorporated therein, the standard air quantity being standardized based on application of a legal regulation stipulating a control wind speed" in the Invention, or overlaps in a range of "reduction of 50 to 60%".

D Then, as shown in the descriptions of the above-mentioned "No. 4" 1(1) and (3) and the descriptions of the above-mentioned "No. 4" 2(3), (4), (6) and (8), Cited Document 1 and Cited Document 2 are common in the technical field and the problem to be solved in a point of reducing an exhaust quantity in a fume hood, and reducing operation cost.

E Therefore, in Cited Invention, it could be conceived of by a person skilled in the art with ease to adopt the technical matter described in Documents 2 cited in the above-mentioned A to make Cited Invention include the constitution of the Invention concerning Different Features 2 and 3.

On this occasion, as described in the above-mentioned "No. 4" 2(4), since push air sent by the above-mentioned "supply air plenum" provided with "a fan" is air that contributes to preventing leakage of contaminant, and has direct influence on the face velocity or flow volume, it could be conceived of as a matter of course by a person skilled in the art that, in the control by a flow volume controller for assuring containment when the detector in Cited Invention has made detection, the relevant "fan" should be controlled.

F Incidentally, regarding effects of the constitution of the Invention concerning Different Features 2 and 3, it is alleged in the written opinion as of February 13, 2018 that "in a low air quantity draft chamber to which the VAV control (variable air quantity control) method is incorporated that increases and decreases an exhaust air quantity by increasing and decreasing a working plane aperture height, it is enabled to prevent leakage

of an atmosphere within a work space due to disturbance and the like that tends to occur under a low wind speed condition to the outside, and, by this, it has a particular effect, which cannot be obtained from Cited Document 1, such as enabling realization of coexistence of energy saving and gas leakage density reduction while maintaining a safe state at all times with respect to an operator using the chamber and an operator existing in the room in which the chamber is being installed.".

However, although, from the descriptions of such as the above-mentioned "No. 4" 1(1) and (6), there is a high possibility that the fume hood of Cited Invention is operating in "standard air quantity" described in the Invention, also in such fume hood of standard air quantity, " presence, proximity, and movement of a human" have an influence on a containment state of fumes within the hood, and, therefore, it is a matter within a range that is predictable for a person skilled in the art as a matter of course that, in a fume hood of a low air quantity made by adopting the technical matter described in Cited Document 2 cited in the above-mentioned A for the purpose of further cost reduction, the fume hood would be still more influenced by " presence, proximity, and movement of a human", and that, by "when the detector has made detection, increasing the face velocity of the fume hood regardless of a position of the sash" of Cited Invention, the relevant influence would be able to be reduced; therefore, it is hard to acknowledge that there is a particular effect.

Accordingly, the relevant allegation cannot be adopted.

(3) Regarding Different Feature 4

A To begin, the well-known arts are sorted out.

(A) As the above-mentioned "No. 4" 3(1), in Well-known Example 1, there is described that conversion from image taking of an image monitoring camera to image data is performed using image processing, and it can be said that the relevant "monitoring camera" is an image taking means.

In addition, as the above-mentioned "No. 4" 4(2), in Well-known Example 2, there is a description related to an image sensor, and it can be said that, since the relevant "image sensor" corresponds to "image taking element", it is an image taking means.

(B) Incidentally, it can be said that "image taking means" itself was a technology well-known to a person skilled in the art at the time of the application date of the present application.

Then, in the light of descriptions of "after converting from monitoring camera imaging to image data using image processing at predetermined time intervals, movement

of a person is detected from the image data, wherein an amount of movement of the person is calculated from a change in movement, and wherein the amount of air flow corresponding to the amount of movement is calculated" (Claim 1) and "predicting a movement direction and a movement amount of the person by calculating, from a difference in the image data of a person's position between the current image data and the previous image data, a position of the person immediately thereafter " (Claim 2) of the above-mentioned "No. 4" 3(1), the description "[0044] The distance from the camera position to the person's face region was calculated from the size of the face of the image data, and movement information on the movement amount, the distance, and the movement speed of the person was acquired" of the above-mentioned "No. 4" 3(2), and, the description of "the movement of a person is detected based on the image information from the image sensor, and in which area direction and how far away the person's position exists among divided areas is estimated. A general method may be used which involves detecting motion with image recognition when performing shooting continuously, such as continuing it after a short time or continuously" of the above-mentioned "No. 4" 4(2), it can be said that it was a well-known technology for a person skilled in the art at the time of the application date of the present application to analyze an image taken by an image taking means at predetermined time intervals or continuously, to obtain information on existence, a position, movement, a movement direction, and a moving speed of a human in a target area, and, further, to perform control of target equipment, for example, control of air quantity.

(C) Further, since it is described, in [0043] and [0044] of the above-mentioned "No. 4" 3(2), and [0021] of the above-mentioned "No. 4" 4(2) that, by analyzing an image from an image taking means, a face can be identified and its size can be distinguished, and, in addition, in [0021] of the above-mentioned "No. 4" 4(2), it is described that processing of recognition and the like of movement or a shape of a human can be performed, and, therefore, it can be said that it was also a well-known technology for a person skilled in the art at the time of the application date of the present application that, by analyzing an image from an image taking means, a "shape" can be distinguished.

B In Cited Invention, a "detector" is one "to detect presence, proximity, and movement of a human in a predetermined area of the fume hood", and, further, according to the above-mentioned "No. 4" 1(4), there are descriptions in Cited Document 1 that "The transducer 35 and the person/motion detector circuit 34 work together to detect the presence and movement of the user/researcher in front of the hood. The transducer may

also detect significant air motion or turbulence in front of or near the hood. When air motion or user proximity/movement is detected, the transducer activates the face velocity setpoint change circuit 33. This circuit acts on the flow controller 32 in one of many possible ways, but generally acts to increase its face velocity and/or volume flow setpoint", and that "A complete active system that includes a Doppler motion detection is shown in FIG. 4 ... The active system detects the presence or movement of a person. Movement, which indicates where the researcher is and how fast he is moving, is detected by the Doppler effect for microwave and ultrasonics. Presence, which indicates if the researcher is present at a particular location, is detected by an infrared beam. ... The face velocity may then be increased as the researcher moves closer to the fume hood and decreased as the researcher moves further from the fume hood", and, from such descriptions, it can be said that there is described a matter that the relevant "detector" detects at which location a user/researcher in front of the hood exists, how fast he/her is moving, and whether he/her is approaching to or departing from the fume hood.

In the light of the well-known arts of the above-mentioned A(A)-(C), it is only an addition or substitution of a well-known art that, in Cited Invention, as a detector to detect presence, proximity and movement of a human in a predetermined area of the fume hood, and further, at which location the human exists, how fast he/her is moving, and whether he/her is approaching to or departing from the fume hood, an image taking means is adopted to make Cited Invention be one having the constitution of the Invention concerning the above-mentioned Different Feature 4, and thus it should be said that it could have been conceived of by a person skilled in the art with ease.

In addition, although there is not found an explicit description in the description of the present application regarding unique effects due to adopting an image taking means, an effect that human movement or a position can be recognized easily, accurately, and flexibly by an image taking means, for example, is nothing but an effect that an image taking means has as a matter of course from the nature of an image (refer to the above-mentioned "No. 4" 4(2), [0021]).

C Incidentally, regarding the constitution of the Invention concerning Different Feature 4, there are the following allegations roughly in the written opinion submitted on July 27, 2020, and thus these are examined here.

(A) Outline of the allegation

(Allegation 1) According to the Invention, by making it possible to detect a moving subject in real time optically by an image taking means in a room where a low air quantity draft chamber is installed, it becomes possible to detect whether or not disturbance airflow

is occurring around the chamber more accurately, and, as a result, at the time of disturbance detection, instability of airflow in the vicinity of the working opening of the chamber or its intensity becomes able to be estimated with ease, and, therefore, prediction control to increase an exhaust air quantity from the chamber in advance becomes possible, enabling prevention of leakage of interior gas into the room by disturbance before it happens.

(Allegation 2) It was not an ordinary technology to apply a compact size camera like a CCD (charge coupled device) camera as an image taking means, analyze a photographed image of the compact size camera, and identify a moving object and a shape in the periphery of the low air quantity draft chamber on a frame-by-frame basis at the time of the application, and thus the Invention, in which it is made possible to control a control quantity of VAV (variable air quantity control) in advance by recognizing the position of the detected moving object, and, further, estimating occurrence of disturbance at the working opening of the chamber and its magnitude from the movement direction and a movement distance, is one that has a particular technical feature.

(B) Regarding Allegation 1

Within Allegation 1, regarding the effect that instability of airflow in the vicinity of the working opening of the chamber or its intensity becomes possible to be estimated with ease, and, therefore, prediction control to increase an exhaust air quantity from the chamber in advance becomes possible, enabling prevention of leakage of interior gas into the room by disturbance from occurring, also in Cited Invention, it is detected further, by a "detector to detect presence, proximity and movement of a human in a predetermined area of the fume hood", at which position a person exists (position), how fast (speed) the person is moving, and whether the person is approaching to or departing from the fume hood (movement direction), as the above B, and thus it can be said that it is possible to estimate instability of airflow in the vicinity of the working opening of the chamber and its intensity with ease; and, regarding capability of preventing leakage of interior gas by disturbance into the room from occurring by control "in advance", it can be also exerted in Cited Invention without limited to use of an image taking means, as described in the above-mentioned 2.

Although, by using an image taking means, the effect of being capable of optically accurately detecting a moving object in real time can be exerted surely, the relevant "real time" detection is also possible by sensors cited in the above-mentioned "No. 4" 1(4) and (5), and, in addition, as indicated in the above-mentioned A(B) and A(C) and B, it was a well-known technology for a person skilled in the art at the time of the

application date of the present application that, by an image taking means that continuously takes images, human movement and a position can be recognized easily, accurately, and flexibly, and thus it cannot be said that the relevant effect is a remarkable effect.

Therefore, Allegation 1 cannot be adopted.

(C) Regarding Allegation 2

Regarding the technical feature to detect a moving subject (operating object) in the periphery of the draft chamber, recognize the position of the detected moving object, and further estimate occurrence of disturbance at the working opening of the chamber and its magnitude from the movement direction and movement distance to control a control quantity of an air quantity in advance, in the detailed description of the invention of the description of the present application, there is no description at all regarding measuring a "movement direction and movement distance" and how to "estimate occurrence of disturbance and its magnitude to control a control quantity of an air quantity in advance" using that measurement result, and thus it is not one that can be adopted; however, Cited Invention also "has a detector to detect presence, proximity, and movement of a human in a predetermined area of the fume hood", and, as in the above B, the detector detects further at which position a person exists (position), how fast (speed) the person is moving, and whether the person is approaching to or departing from the fume hood (movement direction), and, therefore, it can be said that it is one capable of estimating occurrence of disturbance and its magnitude, and "when the detector has made detection, increasing the face velocity of the fume hood regardless of a position of the sash" is made, and thus it can be said that Cited Invention has a similar technical feature.

In addition, regarding the technical feature to apply a compact size camera like a CCD (charge coupled device) camera as an image taking means, analyze a photographed image of the compact size camera, and identify a moving object and a shape in the periphery of the low air quantity draft chamber on a frame-by-frame basis, there is no description at all in the detailed description of the invention of the description of the present application regarding analyzing an image of a compact size camera photographed to identify a moving object or a shape on a frame-by-frame basis, and thus it is not one that can be adopted; however, as indicated in the above-mentioned A(B) and (C), analyzing images taken by g image taking means at predetermined time intervals or continuously to obtain information on existence, a position, movement, a shape, a movement direction and a moving speed of a human in a target area, and, further, performing control of a target equipment, for example, its air quantity control, was a well-

known technology for a person skilled in the art at the time of the application date of the present application, and it cannot be said that it exerts a remarkable effect by its application.

Therefore, Allegation 2 cannot be adopted.

(4) Summary of the examination on the different features

As described above, all the constitutions of the Invention concerning Different Features 1 to 4 are matters that could be easily conceived of, and thus it cannot be acknowledged that these exert a synergistic effect.

3 Summary

According to the above, the Invention is an invention that could have been invented by a person skilled in the art with ease in the light of the invention described in Cited Document 1, the matters described in Cited Documents 1 and 2, and further the well-known arts at the time of the application date of the present application, and, therefore, it is recognized that it is one that lacks inventive step.

No. 7 Closing

Since, as the examination mentioned above, the Invention could have been invented with ease before the application was filed by a person ordinarily skilled in the art in the technical field of the invention who is familiar with well-known arts, based on the invention described in Cited Document 1 and the matters described in Cited Documents 1 and 2, distributed in Japan or foreign country before the application was filed, or that was made available to public through telecommunication lines, the Appellant should not be granted a patent for that in accordance with the provisions of Article 29(2) of the Patent Act.

Therefore, the appeal decision shall be made as described in the conclusion.

October 6, 2020

Chief administrative judge: HIBINO, Takaharu
Administrative judge: MURAOKA, Kazuma
Administrative judge: KON, Kimihiko