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FUMEHOOD WITH AUXILIARY AIR SUPPLY AND BY-PASS CONDUIT MEANS

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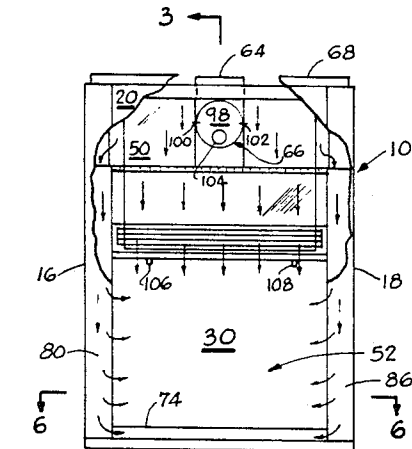


FIG. 1

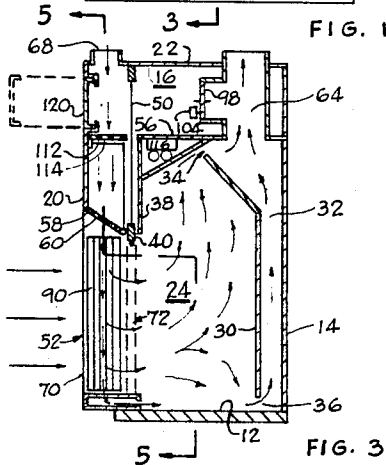


FIG. 3

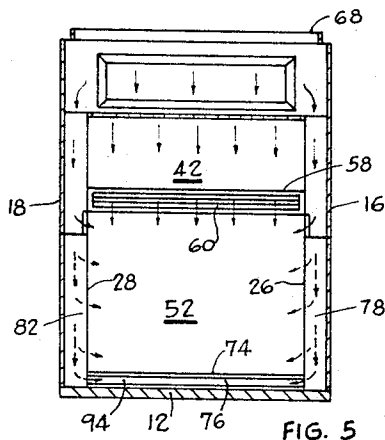


FIG. 5

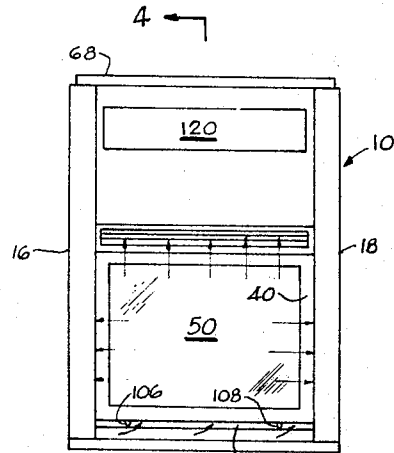


FIG. 2

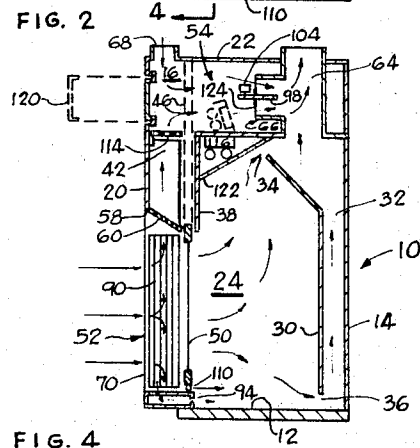


FIG. 4

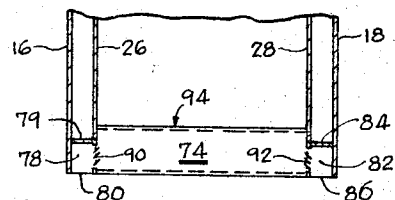


FIG. 6

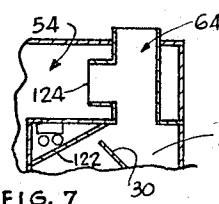


FIG. 7

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3,408,914
**FUMEHOOD WITH AUXILIARY AIR SUPPLY AND
BY-PASS CONDUIT MEANS**

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of survivorship

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ABSTRACT OF THE DISCLOSURE

A fumehood comprising a face opening and a supplementary air supply to supply supplementary air to the face opening of the fumehood when it is open, and by-pass conduit means to conduct the supplementary air to exhaust means of the fumehood when the face opening is closed. A face opening and by-pass conduit closure means cooperate with the face opening and the by-pass conduit means to cause the auxiliary air to flow toward the face opening when open and through the by-pass conduit to the exhaust when the face opening is closed.

This invention relates to fumehoods having supplementary air supply to supplement the room air so that a minimum of room air will be drawn into the hood in its operation. In particular, this invention relates to a fumehood having a face opening with a sash closure and having a supplementary air supply which is supplied from outside of the face opening of the sash closure; said supplementary air supply being supplied through a novel type of air by-pass providing the advantages of substantially minimized danger to personnel from explosions, providing for flow of supplementary air through the working chamber of the hood with less turbulence, and providing for the diverted flow of supplementary air through the by-pass the instant the sash is lowered. These and other advantages will become apparent from the specification hereinbelow.

Prior to my invention, various types of fumehoods were well known and used for the purpose of drawing off undesirable gases, fumes or other substances which might poison or pollute the air, for the purpose of providing breathable air around the working area of working chamber associated with the fumehood.

Originally, fumehoods comprised a working chamber having an open front and means usually at the top of the chamber to exhaust air and undesirable gases or other substances from the chamber. This would permit a person or technician to conduct experiments and other processes within the chamber, and be free from the danger of inhaling the undesirable gases because the force of the exhaust would remove air from the room in which the fumehood was located through the working chamber, thence through the exhaust duct, carrying the undesirable gases and not permitting them to enter the room. It was then desirable to provide a transparent protective shield through which the technician could observe the reactions taking place within the fumehood. Such a transparent shield is in the form of a strong glass such as a safety glass or wired glass, and is placed within a sash so that the shield may be moved up or down to provide access to the working chamber.

In conventional fumehoods, closing the shield would reduce the intake area at the face of the working chamber until the intake area would be completely closed and block further flow of air. Thus, provision was made, by means of a grille or other opening, to provide for flow of air and continued operation of the device through a

by-pass other than the face opening, even though the glass sash was completely closed. In order to overcome the correlated problem of changing the rate of flow of air by enlarging and reducing the size of the front opening of the chamber by raising and lowering the sash, an open grille of substantially the same size as the front opening of the chamber was placed above the front opening and communicating with the working chamber through the by-pass. The sash, which would be just large enough to cover the front opening, or the grille (or by-pass), could then be moved up and down to completely cover the grille (or by-pass) or completely cover the face opening, or in any intermediate position partially to cover the grille (or by-pass) and the front opening simultaneously. In this way, that portion of the front opening which would be reduced by the sash would be compensated for by a corresponding portion of the grille which would be uncovered as the sash was lowered.

Thus, air would be removed from the room at a constant rate of flow, whether the sash was up or down. This prevents high air velocities at the lower level of the working chamber which are undesirable. Thus, the constant volume fumehood, as these hoods are called, which may be operated without creating undesirable velocities, even with the sash substantially closed, solves this problem.

However, with the advent of air conditioning, need for a type of hood was dictated which could be operated without drawing large quantities of air from the room in which it was installed, the ideal hood, of course, being one which could supply its own air and would draw no air out of the room in which it was installed. Hoods have been developed which minimize the withdrawal of room air and are called supplementary air fumehoods. An example of such a hood is the one shown in the United States Letters Patent No. 3,000,292, issued September 19, 1961, on application of C. A. Wojan.

In principle, these hoods supply air through an intake duct or port. The air is then removed through the exhaust port. In such hoods, there is no grille, and the glass sash may be substantially closed without affecting the velocity of the exhaust system. Such hoods work well with the sash closed. However, when the sash is opened, there is sometimes undesirable leakage of noxious fumes from the working chamber into the room, especially from the lower part of the working chamber.

In a hood without a by-pass, the face velocity increases to an undesirable speed as the sash is lowered, especially when the original face velocity is high. Such high face velocity is undesirable for many reasons; for example, hot plates are cooled off too rapidly, Bunsen burners are upset, and Bunsen burner flames are put out. In addition, delicate balances within the hood enclosure are disturbed, and delicate setups are in danger of being upset. This problem was partially solved in a laboratory fumehood disclosed in United States Letter Patent No. 2,819,666 issued January 14, 1958, on application of George L. McNeil et al. by providing for the supplementary air to be supplied from chambers having a nozzle opening directing the supplementary air outside of the open face opening of the device when the sash was up, or directly into the working chamber of the device by means of a by-pass port when the sash was down. While the construction of McNeil et al. overcomes the problem of face velocity increasing as the sash is closed, the problem still remained as to how to furnish the supplementary air in a supplementary air fumehood without permitting it to be blown directly on the operator who stands in front of the face opening, and also to provide it particularly at the lower part of the face opening where there was greater danger of noxious fumes escaping during the operation

of the hood. The fumehood disclosed in United States Letters Patent No. 3,237,548 issued Mar. 1, 1966, on my application provided the solution to these problems.

The fumehood of the last mentioned patent provides an auxiliary air supply in which the auxiliary air is supplied to the device from outside of the top and sides of the circumference or perimeter around the sash opening of the device, without interfering with the operator of the device, and provides a fairly even distribution of auxiliary air from directly outside the sash or face opening of the device, when the sash is open, to minimize as much as possible the use of room air through the sash opening, and to prevent as much as possible the escape of noxious fumes out of the said sash opening. The fumehood which I disclosed in Patent No. 3,237,548 also provided means to adjust or control the distribution of the flow of the auxiliary air, and means to introduce auxiliary air at the forward portion of the floor of the working chamber to carry heavier-than-air gases directly into the exhaust chamber and out of the fumehood.

While the construction of the devices disclosed in the mentioned patents overcame many of the problems attendant to the operation of fumehoods, the problem still remained as to how to provide improved air by-pass means to minimize turbulence in the exhaust chamber as well as to provide a fumehood with supplementary air supply where the force of an explosion would not be carried through a supplementary air supply duct toward the operator of the fumehood and where the supplementary air supply could be diverted from the face opening of the fumehood to the by-pass immediately upon closure of the sash, while still retaining all of the advantages of the prior art. To cite one or two examples: reference to the fumehood of Patent No. 3,237,548 will show that when the sash is down as shown in FIG. 4 of the patent, the working chamber 18 communicates directly through by-pass opening 38 and through openings 54 to the face opening, and then to the operator of the device. Thus, the force of an explosion within working chamber 18 can be directed to and through the sash opening even when the sash is closed. In the fumehood of the invention disclosed herein, the novel construction eliminates this potential explosion passage and, therefore, provides advantages over the prior art. Further, reference to Patent No. 3,237,548 will show that when the sash is lowered from its position in FIG. 3 to its position as shown in FIG. 4, the supplementary air will not be diverted through by-pass 38 until the sash is lowered more than half way. In the novel construction of the fumehood of the invention, the supplementary air by-pass is made so that it will become operative immediately upon lowering the sash.

It is now apparent that it is an object of this invention to provide a novel by-pass means to divert the supplementary air when the face opening of the fumehood is closed by sash means, said novel by-pass being positioned away from the front of the chamber permitting the front of the chamber to have a solid wall in combination with a sash so that the operator who is standing in front of the fumehood will be protected from the force of an explosion within the working chamber. The solid wall portion above the face opening of the fumehood combined with the safety glass of the sash when the sash is in down or closed position will form a continuous wall separating the working chamber from the operator to protect the operator. This construction eliminates the provision of a grille or duct or other means between the supplementary air conduit means communicating directly into the working chamber when the sash is closed at a point in front of the operator. Thus, the operator will have the advantage of the outer front wall of the device which would ordinarily be the outer wall of the supplementary air conduit means as well as the solid inner wall between the supplementary air conduit means and the working chamber.

It is a further object of this invention to supply such

a novel by-pass means which includes a directional valve means.

It is also an object of this invention to provide a supplementary air by-pass operable in combination with a face opening sash closure in which the supplementary air is diverted to the by-pass as soon as the sash closure is moved from open to closed position.

Another object of the invention is to provide a novel air by-pass system for a fumehood which will minimize turbulence within the hood during the air by-pass phase of operation when the sash is closed, and it is also an object of this invention to provide means for easy replacement of illuminating elements within the exhaust chamber through the front of the hood without disturbing the explosion protective features of the novel air by-pass system.

Further object and advantages will appear in the specification hereinbelow. These objects and advantages are achieved in the forms of invention illustrated in the accompanying drawings in which:

FIG. 1 is a face view of the apparatus with parts cut away to show air flow currents with sash up;

FIG. 2 is a view similar to FIG. 1 with sash down to show the reverse trend of air flow;

FIG. 3 is a section along the lines 3—3 in FIG. 1;

FIG. 4 is a section along the lines 4—4 in FIG. 2;

FIG. 5 is a section along the lines 5—5 in FIG. 3;

FIG. 6 is a section of the device along the lines 6—6 in FIG. 1 with portions cut away; and

FIG. 7 is a sectional detail similar to the upper right hand portion of FIGS. 3 and 4 showing an alternate form of the invention without a valve gate.

Similar numerals refer to similar parts throughout the several views.

It is an important object in all fumehoods to move a relatively high velocity of air through the face opening from the outside, away from the operator, into the hood. The rate of the movement of such air through the sash opening may be termed "face velocity." It is very important to have the supplementary air come from outside the sash because otherwise if the air comes from inside the sash opening, the most critical portion of the fumehood, that portion nearest the operator, is not cleared properly. For example, if it is desired to have a fumehood with a face velocity of 100 feet per minute at the sash opening, if supplementary air is supplied from inside the hood, it will move the high point of the velocity inside the hood and there will be a minimum face velocity through the sash opening. By providing the supplementary air at the outside top and sides of the sash opening, it is supplied outside of the plane (sash opening) where the highest velocity is desired, and creates this desired face velocity.

It is to be understood, of course, that the speed of the face velocity is controlled by the combined action of the suction or exhaust blower of the hood at the suction end of the hood and the supplementary air blower pushing air through the openings outside the sash opening.

The fumehood may be constructed of any material strong enough for the purpose. It is also desirable for the construction material to be fireproof and for the floor or counter of the device to be acid resistant.

A main frame 10 is therefore provided, made of enameled steel coated with acid resistant paint. The floor or counter 12 should be of material such as stone, and sufficiently thick to withstand acids, heat and damage reactions. The floor 12 may be a separate counter top over which the main frame 10 of the hood is placed, or it may be an integral part of the hood construction; or in another form of the device, such as a larger floor model, it could rest directly on the floor of a room rather than on a table, in which case the floor of the room could act as the counter or floor of the device.

The main frame or housing 10 has a rear wall 14,

a pair of side walls 16 and 18, a front wall 20 and a top 22. A working chamber 24 is formed between the floor or counter top 12, inner side walls 26 and 28 and an internal baffle 30. An exhaust chamber 32 is formed between the internal baffle 30, the inner side walls 26 and 28 and the rear wall 14. The working chamber 24 and the exhaust chamber 32 communicate with each other at upper and lower exhaust apertures 34 and 36 respectively. The front of working chamber 24 is formed partially by an inner front wall 38 and partially by the sash 40.

A supplementary air chamber 42 is formed between inner walls 26 and 28, front wall 20, inner front wall 38 and top 22. Sash 40, when in an "up" position as shown in FIG. 3, acts as an extension of inner front wall 38 to define the upper rear portion of the supplementary air chamber 42. The supplementary air chamber has a bottom wall 58 having a number of openings 60. The sash 40 moves up and down on a pair of appropriate sash guides such as U-shaped channels or other such means which are located at the inner side walls 26 and 28 in the vertical plane of movement of the sash 40. These sash guides are indicated at the dotted lines, reference numerals 44 and 46 respectively, in FIGS. 3 and 4 of the drawings. The sash guides, the lower part of which are indicated at reference numeral 44 in FIG. 3 and the upper part at reference numeral 46 in FIG. 4, may be in the form of a U-shaped channel or any other guide means known to the art which will permit the sash 40 to be moved from its upper position as shown in FIG. 3 to its lower position as shown in FIG. 4. The sash 40 is provided with a pane of safety glass or wired glass 50, and may be maintained at various positions by balancing means such as a counterweight or sash balance (not shown) installed in any manner known to the art of hanging windows.

An exhaust conduit 64 is provided above the exhaust chamber 32 so that the gas contents of the working chamber may be exhausted from the device. A by-pass chamber, or conduit 54 is provided so that the supplementary air can be moved directly to the exhaust conduit from the supplementary air chamber 42 through valve means 66. When the sash 40 is down as shown in FIG. 4, the by-pass chamber comprises upper parts of side walls 16 and 18, top 22, portions of front wall 20 and back wall 14 and partition 56 which is between the by-pass chamber 54 and working chamber 24. Exhaust conduit 64 may be placed within the by-pass chamber as shown in the drawings with valve gate 98 acting as a closure between by-pass chamber 54 and exhaust conduit 64, or the exhaust conduit means may be constructed separately from the by-pass chamber so long as there is means of communication between the by-pass chamber and the exhaust conduit 64. The exhaust conduit 64 may be attached to any suitable type of duct or other means which should be connected to an exhaust blower (not shown) or other means of moving the air out of the exhaust chamber 32. I do not show the ducts or the exhaust pumps since these are well known to the art, and may be of any suitable type for the purpose.

An intake collar 68 is provided above the supplementary air supply chamber 42. A suitable duct (not shown) is attached to intake collar 68 and connected to an input blower (not shown) to provide a supplementary air input for the device. Here again, the ducts and the input blowers need not be shown since these are well known in the art and may be of any type suitable for the purpose.

Face opening means 52 are provided in front of the working chamber 24 so that an operator may have access to the work being performed in the working chamber. The face opening means 52 forms an imaginary oblong between an outer face opening located at a plane designated by reference numeral 70 substantially in alignment with front wall 20, and an inner face opening located at a plane which would be a lower extension of inner front wall 38 and generally designated by reference numeral

arrow 72 in FIG. 3. The ends of the imaginary oblong would be formed by the inner side walls 26 and 28 at the front of the device, by the bottom wall 58 of the supplementary air chamber 42, and by the top portion 74 of a bottom conduit 76.

The device has a side conduit 78 comprising side wall 16 and inner side wall 26, an internal partition 79, and a lower leg 80 of front wall 20. Side conduit 82 is comprised of side wall 18, internal partition 84, inner wall 28 and a lower leg 86 of front wall 20. Side conduits 78 and 82 communicate with supplementary air chamber 42, and the bottom conduit 76 communicates with the supplementary air chamber 42 by means of the side conduits 78 and 82.

The inner face opening 72 of the face opening means 52 is at the lower part of the device in front of working chamber 24 beneath and to the rear of supplementary air chamber 42. The sash guides as indicated at reference numerals 44 and 46 in FIGS. 3 and 4 of the drawings guide the sash 40 from a position in FIG. 3 above the inner face opening 72 to a position as shown in FIG. 4 substantially covering the inner face opening 72.

It will be noted that when sash 40 is up as shown in FIG. 3, the pane 50 acts as a rear wall for the supplementary air chamber 42, effectively closing it off from the by-pass chamber 54, and that when the sash 40 is lowered to the position as shown in FIG. 4, it will gradually be removed as such portion of rear wall of chamber 42 permitting communication between supplementary air chamber 42 and by-pass chamber 54 at such gradually increasing open portion between such chambers. At the same time, the lowering sash pane 50 will commence to cover inner face opening 72, and by the same token, when the sash is raised from the position of FIG. 4 to the position of FIG. 3, the inner face opening 72 will be increasingly uncovered, and the closure between supplementary air chamber 42 and by-pass chamber 54 will be increasingly expanded until a complete closure is effected between both chambers by the sash 40 and its pane 50. Thus, when the sash is lowered, the supplementary air will normally move from the supplementary air chamber 42 to by-pass chamber 54 through valve gate 98 and out of the exhaust conduit 64, and when the sash 40 and its pane 50 are completely up as shown in FIG. 3, the supplementary air will move from chamber 42 through bottom openings 60 and through openings or vanes 90 and 92 in the side conduits, and through opening 94 in the bottom conduit, through the oblong of face opening means 52, thence through inner face opening 72 into working chamber 24, thence through exhaust chamber 32, and out through the exhaust conduit 64.

Valve gate 98 which is pivoted on pivot points 100 and 102 has a weight 104. It will normally be closed by reason of the weight 104 as shown in FIG. 3 when the flow of supplementary air is directed through the face opening as just described. Valve gate 98 will normally be opened as shown in FIG. 4 when the force of supplementary air is directed through by-pass chamber 54.

The action of a perimeter face opening such as face opening means 52 of the device and methods of control of the supplementary air at the top, sides and bottom are explained in my prior U.S. Patent No. 3,237,548 and need not be explained herein. It is to be understood that the same types of openings, grilles or vanes at the inner sides of the side conduits and at the rear of the bottom conduit may be employed in the device of this invention without further description herein. In the form of invention shown herein, I do provide the openings 90 and 92 at the inner sides of the side conduits 78 and 82, and I also provide the openings 94 at the rear of bottom conduit 76.

I also provide in this invention sash bumper means such as pins 106 and 108 at the bottom of the sash 40. This is an optional feature which prevents sash 40 from being completely closed at the bottom so that there will

remain a small opening as designated at reference numeral 110. Provision is made for small opening 110 at the bottom of the almost completely closed inner face opening 72 so that when the sash 40 is down as shown in FIG. 4, a small portion of room air may be permitted to enter the working chamber at this area, the purpose of which will be more fully explained hereinbelow.

I provide a diffusing baffle 112 within the supplementary air chamber 42 having a series of openings 114 to provide for the supplementary air to be diffused substantially evenly throughout the width of the supplementary air chamber so that some of it will pass through the bottom holes 60 and some will pass down through side conduits 78 and 82.

I also provide a novel means of installing illuminating lights for the device. The lights 116 are installed beneath partition 56. Partition 56 is hinged at point 118 so that it may be raised as shown in dotted line in FIG. 4. A removable, air-tight panel 120, kept in position by any fastening means known to the art, is provided in front of supplementary air chamber 42, within front wall 20. This panel may be removed as shown in dotted line in FIG. 4. Thus, when partition 56 is raised on its hinge as shown in FIG. 4 and the removable panel 120 is removed, the illuminating bulbs or tubes 116 may be easily removed and replaced. It is to be understood that any intervening partition such as partition 122 may be made of a transparent or translucent material so that the illumination can be directed into the working chamber 24.

In a supplementary air fumehood, it is most desirable to have some of the room air enter the hood at all times, even though this may occasion a loss of some room air. The reason for this is that there should always be a positive flow at the face opening from the room toward the working chamber to prevent noxious gases from slipping out of the working chamber into the room and onto the operator. This balance of air flow is purely a function of the input blower and the exhaust blower. By adjusting the exhaust blower to pull proportionately more than the push of the input blower, this effect will be created, and by making these adjustments, the amount of room air to be pushed through the fumehood can be predetermined. With these principles in mind, reference to FIG. 3 of the drawings shows that when the sash 40 is up, air will flow generally in the direction of the arrows from the intake collar 68 through the supplementary air chamber 42 and its diffuser panel 112, out through bottom holes 60, and out through side conduit openings 90 and 92, and out through bottom conduit opening 94 into working chamber 24, through exhaust apertures 34 and 36 into exhaust chamber 32, and up and out through exhaust conduit 104. In addition to this flow of supplementary air, there will be a flow of a small amount of room air through the face opening as indicated by the arrows in front of the face opening means 52. The air flow, when the sash 40 is down as shown in FIG. 4, would be different because lowering the sash opens supplementary air chamber 42 into direct communication with by-pass chamber 54 drawing the actual flow of supplementary air from collar 68 through upper portion of supplementary air chamber 42, through by-pass 54, through opening 124 into exhaust conduit 64, and out of the hood as shown by the arrows. Room air under these circumstances will flow into the hood from the room as shown by the directional arrows in FIG. 4 as follows: through openings 60, up into supplementary air chamber 42 and thence to join the stream of supplementary air as aforesaid, into side conduit openings 90 and 92, and up into supplementary air chamber 42, into side openings 90 and 92, and downwardly through bottom conduit opening 94 and into the working chamber 24, and also through optional bottom opening 110 and into the working chamber 24. The flow of room air through the working chamber as aforesaid will then continue through the exhaust apertures 34 and 36 into the exhaust chamber 32, and up through exhaust conduit

64 to join the main flow of supplementary air as aforesaid. Thus, as shown in FIG. 3, the supplementary air will flow together with some room air through the sash opening when the sash is up, and as shown in FIG. 4, the supplementary air will completely by-pass the working chamber leaving only a small amount of room air flowing through the working chamber when the sash is down.

In addition to the form of invention shown in the drawings, the fumehood may be constructed without valve 66 in which case it would have the identical appearance to the hood illustrated in the drawings except that valve gate element 98 together with its weight 104 and the pivot pins 100 and 102 would be eliminated. This would leave an opening as indicated at reference numeral 124 as shown in FIG. 7 of the drawings. Opening 124 would be permanently open between by-pass chamber 54 and exhaust conduit 64 in this second form of the invention.

One of the main advantages of the construction of the present invention over the prior art is the provision for a supplementary air by-pass outside of the working chamber of the fumehood. Reference to my prior Patent No. 3,237,548 will show, in FIG. 4, that when the sash is down, all the supplementary air will nevertheless travel through the working chamber. Reference to FIG. 4 of the drawings accompanying this specification shows that the flow of supplementary air, when the sash is down, is through by-pass chamber 54. None of the supplementary air enters the working chamber. Only a small amount of room air will enter the working chamber. The principal advantage of this new feature is that there will be no turbulence from the supplementary air to upset delicate balances in the work going on in the working chamber during the time when the sash is down.

While I have described my invention in its preferred forms, there are other forms which it may take without departing from the spirit and scope of the invention, and I, therefore, desire to be protected for all forms coming within the claims hereinbelow.

Wherefore I claim:

1. A fumehood having a main frame comprising: a working chamber defined by at least one wall including face opening means, said working chamber having exhaust means including exhaust conduit means for exhausting gases; supplementary air conduit means outside of said working chamber having air exit means outside said face opening means; by-pass conduit means communicating between said supplementary air conduit means and said exhaust conduit means; closure means, for the face opening means and by-pass conduit, comprising slideable panel means being substantially as large in area as said face opening means adapted to be moved on guide means in the main frame to selected positions relative to said face opening means and relative to said by-pass conduit means to block the flow of gas therein so that when said closure means is moved from a position substantially covering said face opening means toward said by-pass conduit means, said face opening means will be progressively uncovered and said by-pass conduit means will be progressively blocked.

2. The fumehood as defined in claim 1, in which the said face opening and by-pass conduit closure means is substantially parallel to said face opening means and is transverse to the direction of gas flow in said by-pass conduit means.

3. The fumehood as defined in claim 2, in which the said supplementary air conduit means has input blower means to provide supplementary air.

4. The fumehood as defined in claim 3, in which the exhaust conduit means has exhaust blower means.

5. The fumehood as defined in claim 1, in which the said supplementary air conduit means has at least one air exit comprising at least one opening above said face opening means and at least one other air exit comprising aperture means at a front wall portion of said working chamber beneath said face opening means in a position

facing toward the rear of said working chamber and relatively near the lowest portion of the wall of said working chamber.

6. The fumehood as defined in claim 1, in which there is a by-pass valve means interposed between said supplementary air conduit and said exhaust conduit means.

7. The fumehood as defined in claim 6, in which said by-pass valve means is adapted to be in closed position when said slideable panel closure means is in position blocking said by-pass conduit means, and said by-pass valve means is adapted to be in open position when said slideable panel is in position substantially covering said face opening means.

8. The fumehood as defined in claim 7, in which the said by-pass valve means comprises a weighted valve gate adapted to be substantially closed when exhaust gases are flowing through the exhaust conduit means and adapted to be substantially open when supplementary air is flowing through the by-pass conduit means, so that when said panel closure means is in first position blocking said by-pass conduit means, gases will flow through the working chamber from the face opening means to the exhaust conduit means, and the by-pass valve gate will be in substantially closed condition, and when the closure means is progressively moved from its first position blocking the by-pass conduit means to a second position covering the face opening means, the flow of air will progressively diminish through the working chamber and increase through the by-pass conduit means, and the by-pass valve gate will progressively move to substantially open position.

9. The fumehood as defined in claim 8, in which the valve gate is mounted on pivot means to pivot reciprocally from closed to open positions.

10. The fumehood as defined in claim 1, in which the slideable panel closure means is at least as large as and is adapted to cover the entire face opening.

11. The fumehood as defined in claim 1, in which the slideable panel closure means is large enough to cover nearly all the face opening means and there are spacing means to provide a relatively small open space in the face opening when the panel is in substantially covering position over the face opening means.

12. The fumehood as defined in claim 11, in which said panel spacing means is located at the bottom of the panel.

13. The fumehood as defined in claim 1, in which the supplementary air conduit means includes aperture means on at least one side of said face opening means, said aperture means being in a wall comprised in said conduit means facing said face opening means.

14. The fumehood as defined in claim 5, in which the supplementary air conduit means includes aperture means at at least one side of said face opening means, said aperture means being in a wall comprised in said conduit means facing said face opening means.

15. The fumehood as defined in claim 1, in which said supplementary air conduit means is comprised of components adjacent portions of the perimeter of said face opening means of said working chamber including an air exit portion near the top of said face opening, and air exit portions at the sides of said face opening.

16. The fumehood as defined in claim 5, in which said supplementary air conduit means is comprised of components adjacent portions of the perimeter of said face opening means of said working chamber including an air exit portion near the top of said face opening, and air exit portions at the sides of said face opening.

17. The fumehood as defined in claim 1 which comprises illumination means adapted to illuminate the working chamber, being located adjacent said by-pass conduit

means, said main frame having removable panel means at a portion of said supplementary air conduit means whereby access to said illumination means can be had by removing said removable panel means creating a passage to said supplementary air conduit means through said by-pass conduit means.

18. The fumehood as defined in claim 17, in which said illumination means is mounted on a movable partition adapted to be moved from a position between said working chamber and said by-pass conduit means to a position within said by-pass conduit means.

19. The fumehood as defined in claim 12, in which the said slideable panel closure means for said face opening means and said by-pass conduit means is substantially parallel to said face opening means and is substantially transverse to the direction of gas flow in said by-pass conduit means; in which there is a by-pass valve means interposed between said supplementary air conduit means and said exhaust conduit means, said by-pass valve means comprising a weighted valve gate mounted on pivot means to pivot reciprocally from closed to open positions, said by-pass valve means adapted to be substantially closed when exhaust gases are flowing through the exhaust conduit means and adapted to be substantially open when supplementary air is flowing through the by-pass conduit; so that when said sliding panel closure means are in first position blocking said by-pass conduit means, gases will flow through the working chamber from the face opening means to the exhaust conduit means, with the by-pass valve gate in substantially closed position, and when the sliding panel closure means, comprising said spacing means, is progressively moved from a first position blocking the by-pass conduit means to a second position substantially covering the face opening means, the flow of air will diminish through the working chamber and increase through the by-pass conduit means and the by-pass valve gate will be in substantially open position; said supplementary air conduit means comprising components adjacent portions of the perimeter of said face opening means of said working chamber having air exit portions near the top of said face opening and air exit portions at the sides of said face opening, and at least one air exit portion comprising aperture means at a front wall portion of said working chamber beneath said face opening means in a position facing toward the rear of said working chamber and relatively near the lowest portion of the wall of said working chamber; said working chamber having at least one wall portion above said face opening means between said working chamber and said supplementary air conduit means, and said main frame having an outer wall portion between the front thereof and the said supplementary air conduit means in spaced relationship to said wall portion between said working chamber and said supplementary air conduit means so that when said slideable closure panel is in position substantially covering said face opening means, it, together with said wall portion between said working chamber and said supplementary air conduit means, will comprise a continuous wall portion substantially separating the working chamber from the front of the fumehood.

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