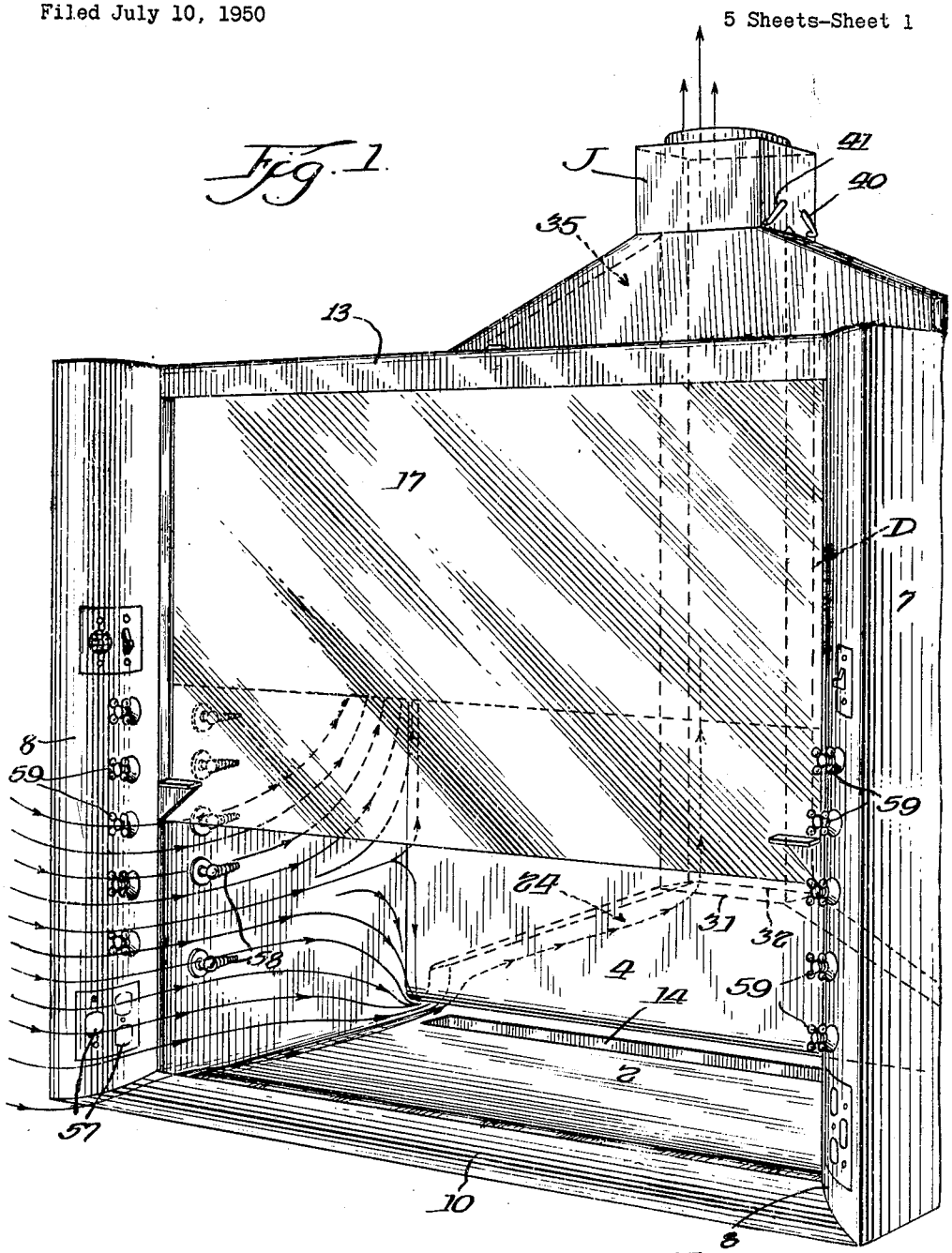
Feb. 22, 1955 L. N. NELSON 2,702,505

FUME HOOD

Filed July 10, 1950 5 Sheets-Sheet 1

Fig. 1.



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By Hill & Hill Attys.

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FUME HOOD

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Fig. 3

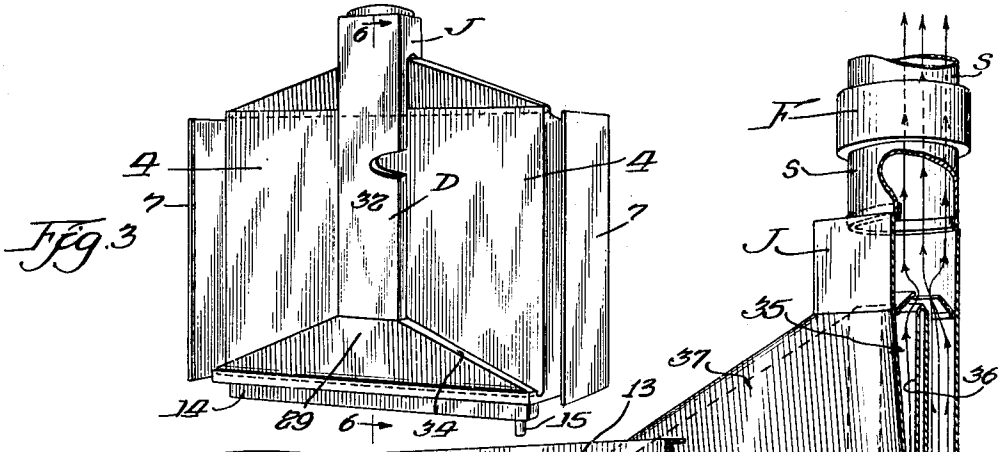

Fig. 2.

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FUME HOOD

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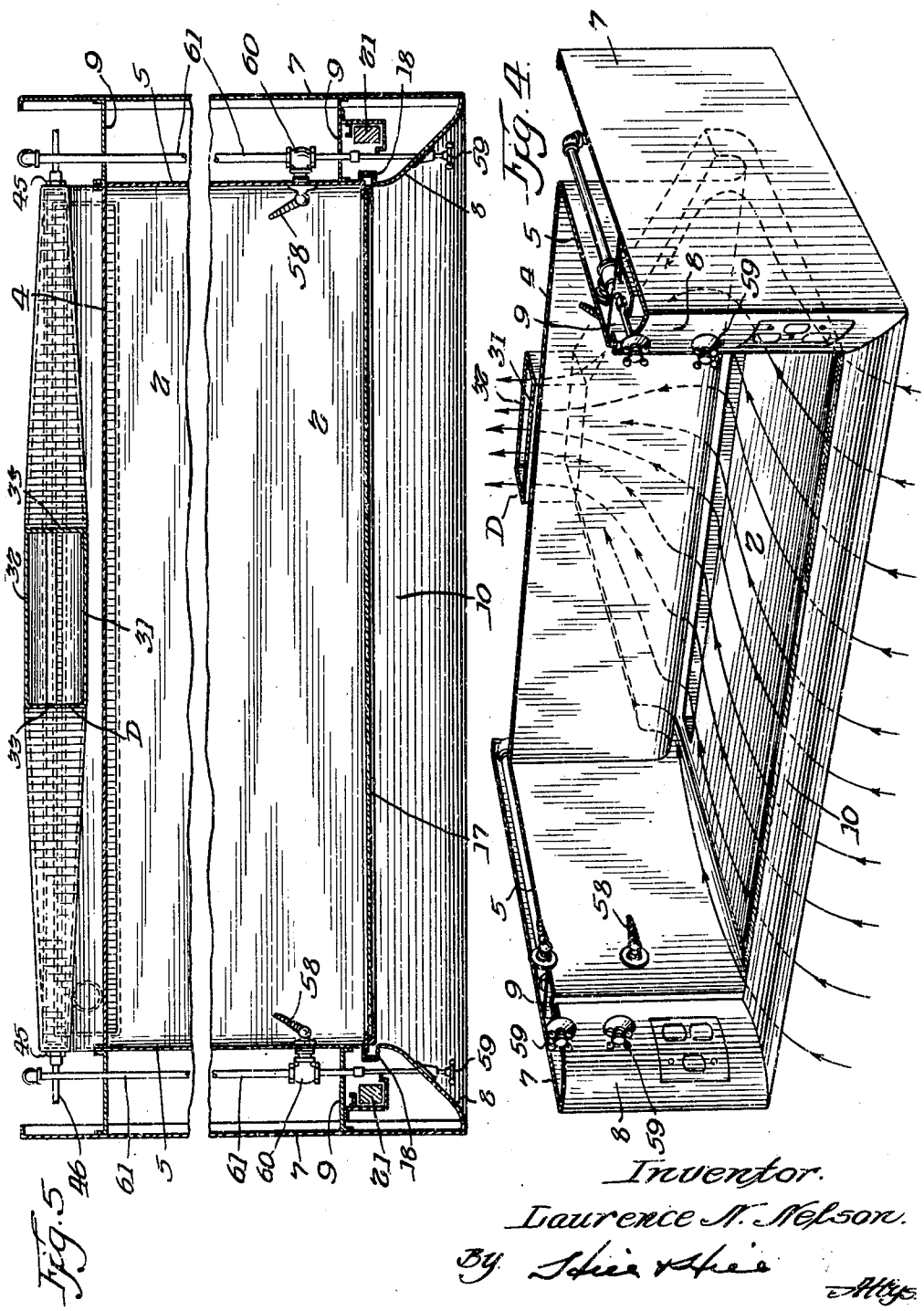

Fig. 5

Fig. 4

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FUME HOOD

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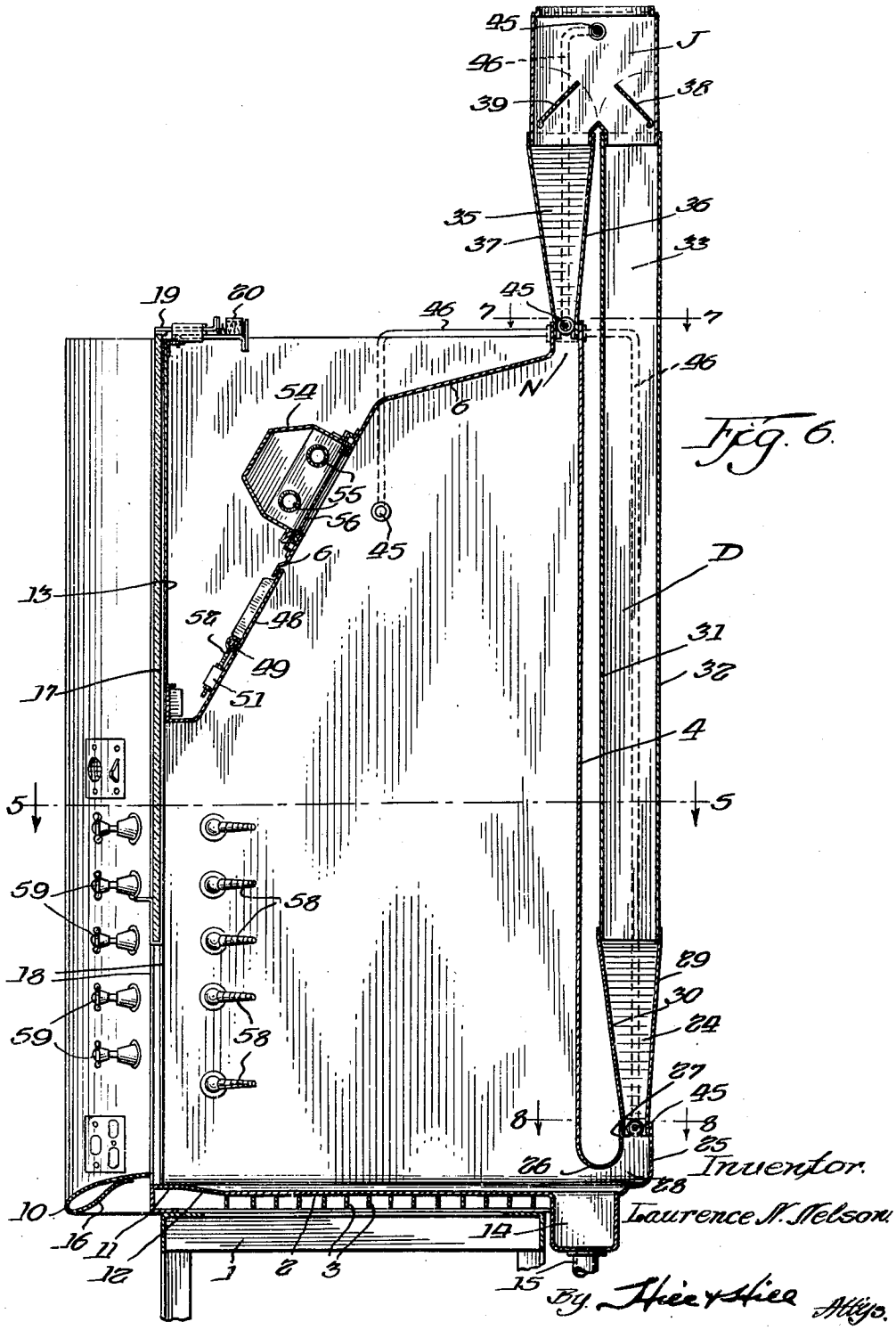

Fig. 6.

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FUME HOOD

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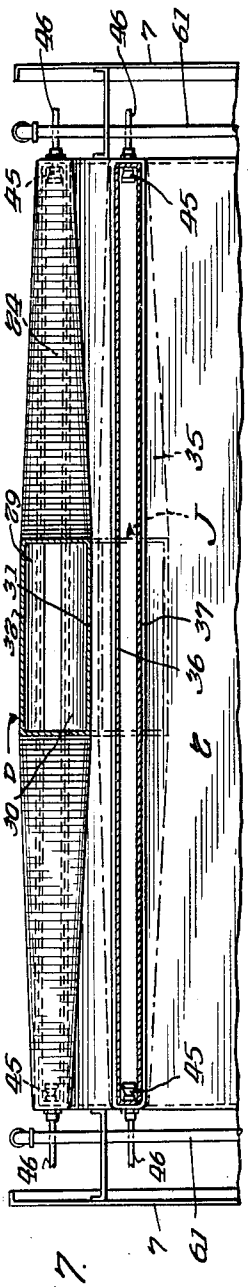

Fig. 7.

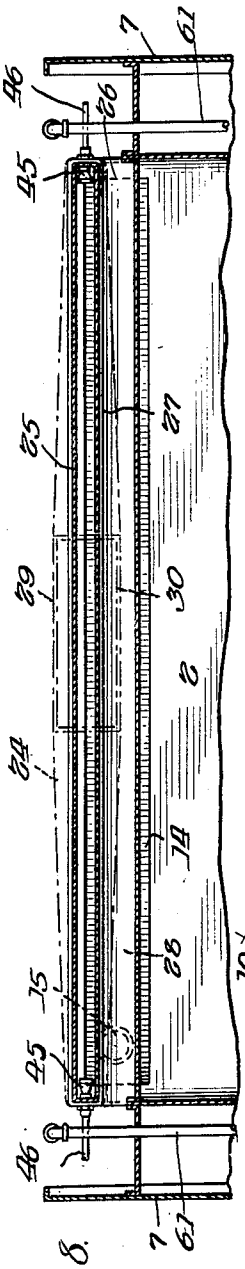

Fig. 8.

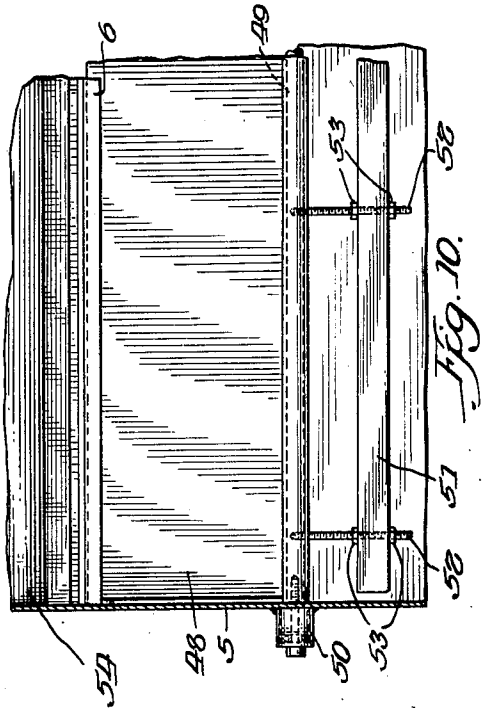

Fig. 10.

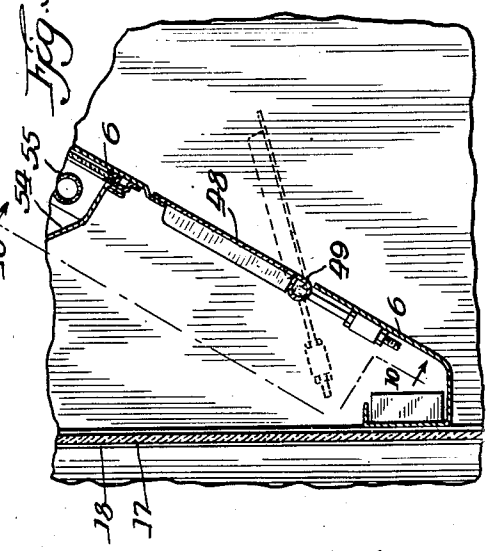

Fig. 9.

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United States Patent Office 2,702,505 Patented Feb. 22, 1955

2,702,505

FUME HOOD

Laurence N. Nelson, Adrian, Mich., assignor to Kewaunee Mfg. Co., Adrian, Mich., a corporation of Michigan

Application July 10, 1950, Serial No. 172,896

15 Claims. (Cl. 98—115)

My invention relates to a low velocity fume hood for use wherever found applicable, the same being particularly adapted for use in air conditioned laboratories and buildings, and which is especially desirable for the handling of radioactive isotopes.

The invention has generally among its objects the production of an efficient fume hood for the handling of gases and the eradication of fumes and air-borne particles at a low velocity of air, with the elimination of all possible turbulence in the hood.

A further object is a fume hood adapted to provide or direct a smooth, uniform flow or blanket of air over the entire face opening toward the rear of the hood including the working surfaces of the hood and along the surfaces of the ends and other surfaces of the hood.

The invention has particularly as an object the production of a more efficient fume hood having improved exhaust openings, improved air foil vanes at the sash posts, and a directional vane across the front edge of the bottom at the front opening to the hood, the hood being particularly adapted for use where fumes, dangerous to health or life, are present. The vanes cause the air streams to sweep over the ends and bottom of the hood without eddies or turbulence.

Another object of the invention is the providing of means to prevent back currents along the front of the working surface out at the front of the hood. The front edge of the pan or working surface is sloped upwardly and outwardly, the edge of the pan being sloped at approximately a seven or other suitable degree angle, whereby the air stream created by the air foil directional vane at the front of the opening will follow this slope downwardly and sweep the bottom of the hood.

A further object is the production of a hood constructed with what may be termed lower and upper transition chambers where the flow of air and gas from the plenum or work chamber is changed from long, narrow sections extending across the full length of the hood to an exhaust duct or stack preferably of a rectangular shape arranged intermediate the ends, the air flowing through the hood from the bottom into and through the lower transition chamber, and at the top into and through the upper transition chamber to merge into a junction box. The flow of air from and through the lower and upper exhaust openings into the transition chambers is controlled by necking down the air stream from the chambers into the junction box and by dampering the two streams together at the center of the box, a smooth flow of air through the exhaust openings is thus obtained, allowing accurate control of the air.

A further object of the invention is to make the same adapted for air conditioned rooms where the hoods are used to exhaust the air from the room and a positive amount of conditioned air is forced into the room, in which case it is desirable that an auxiliary opening be provided into the hood to exhaust the conditioned air from the room when the hood is closed, as well as to prevent excessive air velocities through the face of the hood when the sash has been almost closed.

There are many other objects and advantages of the construction herein shown which will be obvious to those familiar with the handling of gases, and especially those gases which must be handled with the greatest of care in order to avoid injury to the laboratory workers.

To this end my invention consists in the novel construction, arrangement and combination of parts herein

shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a front elevation of the improved fume hood in perspective, particularly intended to illustrate the air flow over the ends and bottom of the hood;

Fig. 2 is a similar perspective view of a portion of the same illustrating air flow through the hood and to the exhaust;

Fig. 3 is a perspective view of the rear of the hood;

Fig. 4 is a perspective view of the lower portion of the hood, also indicating air flow over the bottom into the lower transition chamber;

Fig. 5 is a sectional view taken substantially on line 5—5 of Fig. 6;

Fig. 6 is a sectional view taken substantially on line 6—6 of Fig. 3;

Fig. 7 is a sectional view taken substantially on line 7—7 of Fig. 6;

Fig. 8 is a sectional view taken substantially on line 8—8 of Fig. 6;

Fig. 9 is an enlarged view of a portion of Fig. 6 showing the automatic by-pass valve; and

Fig. 10 is a view in elevation of the by-pass valve taken substantially on line 10—10 of Fig. 9.

Referring to the drawings, 1 represents a support of any suitable construction which may be provided with suitable supporting legs or their equivalent. The hood consists of a bottom 2 or pan constituting a work surface which may be provided with reinforcements 3 to stiffen the same. The hood is provided with a back wall 4, end walls 5 and top 6. There are also provided exterior end walls 7 which connect with the inner walls 5 forming the streamlined facia 8, the connecting portions 8 providing substantially directional vanes for directing the air entering the hood as will be more fully explained hereinafter. Walls 5 and 7 are shown connected by stays 9 which serve as stiffeners and spacers. At the front edge of the hood is provided an air foil or vane 10 which is mounted proximate the bottom 2. As most clearly shown in Figs. 2 and 6, the bottom 2 is raised at the front edge 11 above the body of the bottom 2, with the bottom at 12 joining the portion 11 preferably on substantially a seven degree gradual rise, the bottom providing a water tight pan for supporting the apparatus within the hood. At the rear or inner edge of the bottom or pan 2, the same is constructed to provide a trough 14, 15 being a drain pipe extending to waste. The vane 10 or air foil is provided with an inclined bottom portion 16. It will be noted by referring to Figs. 2 and 6 that the inner edge of the vane or air foil 10 is slightly spaced above the outer edge of the bottom or pan.

Arranged at the front side or wall 13 of the hood is a sash or closure 17, preferably of glass or any equivalent which is arranged to slide in guides or sash posts 18 at each side, a stop 19 being provided for normally limiting the raising of the glass panel 17. The streamlined facia 8 forming directional vanes are connected to the sash posts 18. The stop 19 may be moved inwardly to permit the raising of the panel 17, the same normally being maintained in operative stopping position by means of a spring 20 or the equivalent. The front panel or closure 17 is provided with counter-balances 21 arranged at either side and suitably connected to the panel by means of cables or their equivalents not shown in detail, any other suitable type of movable panels may be employed if desired.

Referring to Fig. 6, the bottom or pan is extended at the rear as at 25, the same being disposed across the length of the hood. The back 4 is bent down as at 26 and over as at 27 to form a baffle and extends from side to side of the hood forming a bottom air exhaust opening above the bottom 2 and trough 14, the lower end of the back being spaced from the back member 25, substantially providing a nozzle with the passage 28 between 27 and 25. Portions 25 and 27 are connected with the members 29 and 30 which diverge from the bottom and form a lower transition chamber 24. The baffle may therefore be considered as the back wall turned

back and then merging with the transition chamber 24, through the partition 27. Extending from the transition chamber 24 is a duct D (see Figs. 3 and 6) enclosed by the walls 31, 32 and 33, the duct extending up and above the top of the hood and communicating with what may be termed a junction box J. It will be noted by referring to Figs. 3 and 6 that the lower transition chamber walls diverge up to the duct, and the top faces 34 converge to the stack so that there is provided a chamber 24 in which gases and air from the interior of the fume hood may travel to the duct from the bottom without turbulence or variation in velocity. At the top of the hood is arranged a similar provision for an upper transition chamber 35 communicating with the interior of the hood at the top thereof by an upper air exhaust opening, the walls 36 and 37 extending across the hood as more or less indicated in Figs. 2, 3 and 6, providing an exhaust nozzle N adjacent the upper end of the duct D and the transition chamber 35 above the nozzle N communicating with junction box or chamber J. In the junction box which is operatively mounted at the end of the duct D and is an extension thereof are preferably arranged valves or dampers 38 and 39 which may be moved to control the passage of air or gases from the lower and upper transition chambers 24 and 35, thus varying the relative sizes of the inlet openings to the junction box. These valves may be controlled by valve control handles 40 and 41 or in an equivalent manner. From the junction box may extend a flue or stack S extending to wherever desired for the discharge of the gases, vapors, etc. A fan F (not shown in detail) of suitable capacity and with driving means, for example, an electric motor (not shown) is arranged to draw the air and gases from the junction box through the flue or stack S to waste (see Fig. 2).

As shown in the drawings, particular reference being made to Figs. 6, 7 and 8, the desired number of wash down nozzles 45, connected by suitable piping 46 to a source of wash water or like supply, are preferably provided so that the various walls of the hood may be washed down from time to time as necessary, the water flowing over the walls. There may be any desired number of nozzles, control valves, etc., arranged as desired, this being dependent upon the desire of the user.

As illustrated in Figs. 2, 6, 9 and 10, I have illustrated an automatic damper 48, the purpose of which is to by-pass air into the work or plenum chamber within the hood to control the air pressure when the sash or closure 17 is opened or closed. I have illustrated an automatic or barometric damper 48 secured to a shaft 49 suitably mounted in bearings 50, preferably anti-friction bearings, which damper may be open as required as indicated by the dotted lines in Fig. 9. The damper is provided with a counter-weight 51 extending across the same and secured to it by means of the bolts 52 and adjusting nuts 53. By adjusting the nuts 53, the damper 48 may be balanced to control the opening or closing of the damper to meet desired conditions and control the pressures within the hood.

As most clearly shown in Figs. 2 and 6, I also provide a housing 54 within which may be arranged fluorescent bulbs or tubes 55, the inner side of the housing having a transparent inner wall 56, thus providing for the lighting of the interior of the hood as desired.

As shown in Figs. 1 and 2, the hood is provided with electrical outlets 57 for use when required and with nozzles 58 through which air, gas, water or other fluids may be admitted to the interior of the hood and if desired conducted through hose or piping to desired apparatus, the nozzles being controlled by valves 60 (see Fig. 5), having handles 59 which are shown in the several figures. Of course, the gases or fluids are admitted to the nozzle through suitable piping 61 or the like (see Fig. 5).

The fume hood herein described differs materially from the conventional type of hood in numerous particulars and has been found to be particularly efficient as well as desirable from the standpoint of the safety of the laboratory worker. It is particularly desirable that undue turbulence in the working area be avoided, and it is likewise desirable that the velocity of air and gases passing through the hood and out be controlled and that the withdrawal from the hood through the exhaust openings be properly and uniformly extended over the full length or width of the hood, and in the present construction air and gases flow directly to the rear of the hood and the exhaust openings without eddies, turbulence or swirling. The present hood described is so constructed with the exhaust openings and ducts arranged so that just the right amount of air is withdrawn from the top and bottom exhaust openings with the flow through the openings uniform over the entire length of the hood.

In the present invention, as described, in the low velocity hood the nozzles 28 and N, the radii of which are based on the U. S. Bureau of Standards nozzle, gives emission from the working area under the conditions of least loss. The air flows through the nozzle and around the radiused bends into the transition sections where the flow of air is changed from a long, narrow section to a rectangular duct D. The angle of expansion in this duct is kept less than 14 degrees to prevent turbulence from occurring and air will expand to approximately this angle without the air stream breaking away from the sides to form eddy currents. The nozzle N serves the same purpose at the upper transition chamber. The transition chambers also cause the air to flow through the entire width of the exhaust openings of the hood at approximately an even velocity.

The dampering to control the flow of air through the upper exhaust opening and stack is controlled by "necking down" the air streams into the junction box. The dampering of the two streams together at the center of the box produces a smooth flow of air through the openings, allowing an accurate control of air.

The purpose of the air by-pass is two-fold. One is to prevent excessive air velocities through the face of the hood when the sash has been nearly closed. With an exhaust fan in the waste stack capable of drawing one-fourth of an inch or more of static pressure of air, the velocity through the face of the hood will steadily increase as the sash is closed and that depending upon the original face velocity of the hood would increase to a point two hundred and fifty feet per minute lineal velocity or more, which would be sufficient to sweep paper or light glassware back along the working surface of the hood. This action would frequently ruin experiments or break glassware containing valuable test samples so that it is desirable that it be eliminated if at all possible. The action of the automatic by-pass shown prevents this since it provides an auxiliary opening through which the air can pass, thus preventing the air velocity from exceeding approximately two hundred feet or more when the sash or closure is closed.

Likewise, in air conditioned rooms where the hoods are used to exhaust the air from the room and a positive amount of conditioned air is forced into the room, it is necessary that an auxiliary outlet of air from the room be provided to exhaust the conditioned air from the room when the hood is closed. This by-pass accomplishes this by allowing the air to pass into the hood when the sash is in a more or less closed position, thus providing a uniform flow of air from the room and allowing uniform air conditioning.

The by-pass as illustrated is self-actuating, the dampering being counter-balanced to a point where it almost balances and, if the sash is closed and a slight increase in static pressure occurs within the hood, the damper operates automatically to allow the air to by-pass the sash openings. The extent of the opening is dependent on the position of the sash, the damper opening further as the sash is closed. When the sash is opened, the suction pressure within the hood is lowered and the damper returns to its original position for normal operation of the hood. While I have shown an automatically operable counter-weighted damper, it is of course obvious that if preferred a mechanically or manually operated damper might be employed. While the by-pass is shown in the top it should be understood that the same need not be located at the point shown.

For conventional laboratory use the hood interior will preferably be made of transite or chemstone panels and with stainless steel inserts wherever radiused pieces are required. As illustrated in the drawings, the hood interior is stainless steel which is recommended for use with radioactive isotopes. I generally prefer that the working surface of the hood should provide a pan approximately three-eighths of an inch deep, and as previously described raise the front edge of the pan to substantially a seven degree slope so that the air stream

created by the air foil directional vane will follow this slope and sweep the bottom of the pan.

I have endeavored to show in Figs. 1, 2 and 4, the sweeping action of the air currents over the bottom and ends at the interior of the hood, and it will be noted that these air currents wipe over the hood walls and bottom in substantially a uniform sweep. This has been amply demonstrated in tests of the completed hoods.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In a fume hood, the combination of a housing having a bottom wall providing a work surface, a rear wall, side walls, a movable closure cooperable when in closed position with the housing structure to operatively enclose the work surface or to expose said surface when in open position, said housing having an air exhaust opening adjacent the bottom of the rear wall thereof communicating with the housing interior adjacent said work surface for receiving exhaust air flowing rearwardly across the latter, said housing having a second air exhaust opening adjacent the top of the rear wall for receiving exhaust air flowing upwardly and rearwardly in said housing, air directional vane means adjacent the front edge of said work surface and the side walls for directing the flow of air entering the hood rearwardly along such surface and side walls, exhaust means including a junction box and an exhaust duct and operatively communicating with said air openings for receiving exhaust air flowing therethrough, and damper means positioned in the junction box for controlling the relative flow of air through the respective exhaust openings.

2. In a fume hood, the combination of a housing having a bottom pan providing an interior work surface, a front wall, a rear wall, a movable closure for the front wall cooperable when in closed position with the housing structure to operatively enclose the work surface or to expose said surface when in open position, said housing having an air exhaust opening adjacent the bottom of the rear wall thereof communicating with the housing interior adjacent said work surface for receiving exhaust air flowing rearwardly across the latter, said housing having a second air exhaust opening adjacent the top of the rear wall for receiving exhaust air flowing upwardly and rearwardly in said housing, exhaust means including a transition chamber and an exhaust duct operatively communicating with said air exhaust openings for receiving exhaust air flowing therethrough, a junction box including damper means for controlling the relative flow of air through the respective exhaust openings, and pressure responsive means operatively mounted upon the housing to form a second air intake opening of variable size in said housing communicating with the housing exterior, said last mentioned means being responsive to predetermined differentials in the air pressure within said housing to control the volume of air admitted therethrough into the housing.

3. In a fume hood, the combination of a housing structure having a bottom pan providing an interior work surface, a rear wall, a front wall, a movable front wall closure cooperable when in closed position with the housing structure to operatively enclose the work surface or to expose said surface when in open position, said housing having an air exhaust opening adjacent the bottom of the rear wall thereof communicating with the housing interior adjacent said work surface for receiving exhaust air flowing rearwardly across the latter, said housing having a second air exhaust opening adjacent the top of the rear wall for receiving exhaust air flowing upwardly and rearwardly in said housing, the housing having an air intake passage adjacent the front edge of said work surface, communicating with the housing exterior for admitting air into the housing along such front edge, exhaust means comprising a junction box, a lower transition chamber and an exhaust duct and an upper transition chamber operatively communicating with said air openings for receiving exhaust air flowing therethrough, damper means arranged in the junction box for controlling the relative flow of air through the respective exhaust openings, and means operative to form a second air intake opening for controlling the volume of air admitted therethrough into the housing.

4. In a fume hood, the combination of a housing structure having a bottom pan providing an interior work surface, a rear wall, a front wall, a movable front wall closure cooperable when in closed position with the housing structure to operatively enclose the work surface or to expose said surface when in open position, said housing having an air exhaust opening adjacent the bottom of the rear wall thereof communicating with the housing interior adjacent said work surface for receiving exhaust air flowing rearwardly across the latter, said housing having a second air exhaust opening adjacent the top of the rear wall for receiving exhaust air flowing upwardly and rearwardly in said housing, the housing having an air intake passage adjacent the front edge of said work surface, communicating with the housing exterior for admitting air into the housing along such front edge, exhaust means including a junction box operatively communicating with said air openings for receiving exhaust air flowing therethrough, damper means arranged in the junction box for controlling the relative flow of air through the respective exhaust openings, and means operative to form a second air intake opening for automatically controlling the volume of air admitted therethrough into the housing when the front wall closure is in closed or partly closed position.

5. In a fume hood of the kind described and in combination, a housing open at the front and including a bottom wall, a rear wall, a top having an upper transition chamber, a back wall and end walls, an exhaust duct operatively connected to the housing and a closure including sash posts at the front of the housing providing an enclosed working chamber, a lower transition chamber spaced from the rear wall and projecting into the exhaust duct, the lower end of the lower transition chamber extending down to proximate the bottom wall and with the rear wall providing a nozzle thereat formed by the passage between the lower transition chamber and the back wall, the upper end of the lower transition chamber being affixed to the exhaust duct, the front edges of the closure sash posts at either end of the housing converging inwardly and providing a directional vane at each side of the housing, the bottom wall of the housing extending from the rear to the front and elevated adjacent the front face of the housing, and an air foil directional vane arranged at the front edge of the bottom wall and curved outwardly and downwardly with the inner edge spaced from the bottom wall.

6. In a fume hood of the kind described and in combination, a housing open at the front including a pan-shaped bottom wall, a top having an upper transition chamber, a back wall and end walls, an exhaust duct operatively connected to the housing at the rear thereof, and a closure including sash posts at the front of the housing providing an enclosed working chamber, a lower transition chamber spaced from the rear wall and projecting into the exhaust duct, the lower end of the transition chamber extending down to proximate the bottom wall and with the back wall providing a nozzle thereat formed by the passage between the transition chamber and the back wall, the upper end of the transition chamber being affixed to the exhaust duct, the front edges of the closure sash posts at either end of the housing converging inwardly and providing a directional vane at each side of the housing, the bottom wall of the housing extending from the rear to the front and slightly elevated adjacent the front face of the housing, and an air foil directional vane arranged at and slightly spaced above the front edge of the bottom wall and curved outwardly and downwardly with the inner edge spaced from the bottom wall.

7. In a fume hood of the kind described and in combination, a housing providing an enclosed working chamber having an opening at the front side thereof and having a movable closure for the opening arranged at the front side of the housing, a back wall, said housing provided with an exhaust duct communicating with the chamber adjacent the back wall of the housing and extending

above the upper part of the housing, a junction box operatively connected to the exhaust duct, a baffle arranged within the housing and a continuation of the back wall thereof but spaced therefrom with its upper end extending upwardly and connecting to the duct and with the lower end of the baffle disposed slightly above the bottom of the housing, the lower end of the baffle and the rear end of the housing adjacent thereto providing a lower transition chamber with a nozzle at the lower end of the baffle and the rear end of the housing, an upper transition chamber with a nozzle at the lower end thereof contiguous to the upper end of the duct and to the adjacent top portion of the housing, said junction box also operatively connected to the upper transition chamber, dampers operatively mounted in said junction box for controlling the passage of gas from the upper transition chamber and from the lower transition chamber, the bottom of the housing providing a working table extending forwardly from adjacent the lower end of the baffle toward the front end of the housing with the front portion of the bottom sloping upwardly toward the front edge thereof, the front side edges of the opening in the housing at the front thereof being outwardly curved, and an air foil directional vane arranged at the exterior of the housing and extending between the side curved edges with its inner edge adjacent the front edge of the bottom and spaced slightly thereabove.

8. In a fume hood of the kind described and in combination, a housing providing an enclosed working chamber open at the front having a movable closure arranged at the front side of the housing, a back wall, said housing provided with an exhaust duct communicating with the chamber adjacent the back wall of the housing and extending above the upper part of the housing, a baffle arranged within the housing and a continuation of the back wall thereof but spaced therefrom with its upper end extending upwardly and connecting to the duct and with the lower end disposed slightly above the bottom of the housing, the lower end of the baffle and the rear end of the housing adjacent thereto providing a lower transition chamber with a nozzle at the lower end of the same, an upper transition chamber with a nozzle at the lower end of the chamber contiguous to the upper end of the duct and connected to the junction box and to the working chamber, dampers in said duct at the upper end of the housing for controlling the passage of gas from the upper transition chamber and from the lower transition chamber, the bottom of the housing providing a working table extending forwardly from adjacent the lower end of the baffle toward the front end of the housing with the front portion of the bottom elevated at an angle of approximately 7 degrees, the front side edges of the opening in the housing at the front thereof being curved to reduce turbulence of air entering the chamber therealong, and an air foil directional vane arranged at the exterior of the housing and extending between the curved side edges with its inner edge adjacent the front edge of the bottom and spaced slightly thereabove to provide an air passage therebetween.

9. In a low velocity hood for exhausting gases formed therein, the combination of a housing having top, bottom, side, and front walls, said front wall having an opening and a closure therefor, of means for controlling an air stream through the hood to provide a uniform velocity over the entire face of the hood when the opening in the front wall is at working height comprising streamlined facia formed in the side walls contiguous to the opening in the front wall, an air foil directional vane contiguous to the opening in the front wall and spaced above the bottom wall, and a portion of said bottom wall contiguous to the opening in the front wall inclined downwardly toward the rear of the hood whereby a part of the air stream entering the hood passes over the top of the air foil directional vane, and beneath it along the bottom wall.

10. In a low velocity hood for exhausting gases formed therein, the combination of a housing having top, bottom, side, and front walls, said front wall having an opening and a closure therefor, of means for controlling an air stream through the hood to provide a uniform velocity over the entire face of the hood when the opening in the front wall is at working height comprising streamlined facia formed in the side walls contiguous to the opening in the front wall, an air foil directional vane contiguous to the opening in the front wall and spaced above the bottom wall, a portion of said bottom wall contiguous to the opening in the front wall inclined downwardly toward the rear of the hood whereby a part of the air stream entering the hood passes over the top of the air foil directional vane, and beneath it along the bottom wall, the housing having a bottom exhaust opening extending across the rear of the hood contiguous to the junction of the bottom and rear walls, an upper exhaust opening extending across the rear of the hood contiguous to the top and rear wall, a lower transition flue section adjacent the bottom exhaust opening, an upper transition flue section adjacent the upper exhaust opening, exhaust means including a junction box and an exhaust duct and operatively connecting the upper and lower transition flue sections, said upper and lower transition flue sections having upwardly tapering walls, and forming substantially venturi-shaped nozzle sections, with the openings to said nozzle sections formed by the upper and lower exhaust openings, said upper transition flue section and exhaust duct operatively connected to the junction box, adjustable dampers operatively mounted in the junction box contiguous to the discharge opening of the upper transition section and exhaust duct, said top wall being inclined upwardly.

11. In a low velocity hood for exhausting gases formed therein, the combination of a housing having top, bottom, side, and front walls, said front wall having an opening and a closure therefor, of means for controlling an air stream through the hood to provide a uniform velocity over the entire face of the hood when the opening in the front wall is at working height comprising streamlined facia formed in the side walls contiguous to the opening in the front wall, an air foil directional vane contiguous to the opening in the front wall and spaced above the bottom wall, a portion of said bottom wall contiguous to the opening in the front wall inclined downwardly toward the rear of the hood whereby a part of the air stream entering the hood passes over the top of the air foil directional vane, and beneath it along the bottom wall, the housing having a bottom exhaust opening extending across the rear of the hood contiguous to the junction of the bottom and rear walls, an upper exhaust opening extending across the rear of the hood contiguous to the top and rear wall, a lower transition flue section adjacent the bottom exhaust opening, an upper transition flue section adjacent the upper exhaust opening, exhaust means including a junction box and an exhaust duct and operatively connecting the upper and lower transition flue sections, said upper and lower transition flue sections having upwardly tapering walls, and forming substantially venturi-shaped nozzle sections, with the openings to said nozzle sections formed by the upper and lower exhaust openings, said upper transition flue section and exhaust duct operatively connected to the junction box, adjustable dampers operatively mounted in the junction box contiguous to the discharge opening of the upper transition section and exhaust duct, said top wall being inclined upwardly, and pressure responsive means operatively mounted in the inclined top wall, exhaust means operatively connected to the junction box whereby upon operation of the exhaust means, with the opening in the front wall at working height, the air stream may move at a substantially uniform velocity over the entire face of the hood, the air stream entering about the streamlined facia, and over and underneath the air foil directional vane, a part of the air stream discharging through the bottom exhaust opening, and another part of the air stream discharging through the upper exhaust opening, whereby the air stream shall flow smoothly and evenly through the hood opening, exhausting any gases present within the hood.

12. In a fume hood, the combination of a housing having a bottom wall providing an interior work surface, a front wall, a rear wall, a movable front wall closure cooperable when in closed position with the housing structure to operatively enclose the work surface or to expose said surface when in open position, said housing having an air exhaust opening adjacent the bottom of the rear wall thereof communicating with the housing interior adjacent said work surface for receiving exhaust air flowing rearwardly across the latter, said housing having a second air exhaust opening adjacent the top of the rear wall for receiving exhaust air flowing upwardly and rearwardly in said housing, the housing having an air

intake passage adjacent the front edge of said base surface, communicating with the housing exterior for admitting air into the housing along such front edge, a junction box including an exhaust duct and operatively communicating with said air openings for receiving exhaust air flowing therethrough, and a stack including stack draft means operatively connected to the junction box for controlling the relative flow of air through the respective exhaust openings, and pressure responsive means operative to form a second air intake opening of variable size in said housing, communicating with the housing exterior, said last mentioned means being responsive to predetermined differentials in the air pressure within said housing to control the volume of air admitted therethrough into the housing.

13. In a fume hood, the combination of a housing structure having a bottom wall providing a work surface, back and end walls and a top, a movable front closure cooperable when in closed position with the housing structure to operatively close the front of the housing or to expose said work surface when in open position, said housing having an exhaust opening adjacent the bottom of the rear wall thereof communicating with the interior of the housing adjacent said bottom for receiving exhaust air and gases flowing rearwardly across the bottom, said housing having a second exhaust opening adjacent the top of the rear wall for receiving air flowing upwardly and rearwardly in said housing, the housing having an air intake passage adjacent the front edge of said work surface, communicating with the housing exterior for admitting air into the housing along such front edge, an exhaust stack operatively communicating with the interior of the housing for receiving exhaust air flowing therethrough, stack draft means operatively mounted within the exhaust stack for controlling the relative flow of air through the stack from the respective exhaust openings, and pressure responsive means automatically operative to form a second air intake opening of variable size to said housing and communicating with the housing interior, said last mentioned means being responsive to predetermined differentials in the air pressure within and without said housing to control the volume of air admitted therethrough into the housing.

14. The combination in a low velocity hood for exhausting gases formed therein consisting of a housing having laterally extending, upper and bottom exhaust openings extending across the same between the ends, of a lower transition flue section contiguous to and communicating with the bottom exhaust opening and including upwardly tapering walls, a similar upper transition flue section contiguous to and communicating with the upper exhaust opening and also including upwardly tapering walls, a junction box operatively connected to the lower and upper transition flue sections, a stack operatively connected with the junction box whereby the hood is adapted to exhaust from the lower and upper transition flue sections into the stack, and means including pressure responsive damper means for inducing a flow of air and gas from the housing into the stack.

15. In a fume hood of the kind described and in combination, a housing open at the front and provided with an exhaust gas stack communicating with the interior of the housing at the top and bottom thereof, a movable closure for the open front side of the housing, air directional vane means at the bottom and ends of the opening at the front of the housing for providing a uniform flow of air entering the hood along the ends and bottom of the housing, and automatic pressure responsive damper means at the top of the housing for controlling the relative proportions of air and gas entering the stack from the top and bottom of the housing.

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