Feb. 27, 1962 J. B. THOMPSON 3,022,718

LABORATORY FUME HOOD

Filed May 11, 1960 2 Sheets-Sheet 1

Fig. 2.

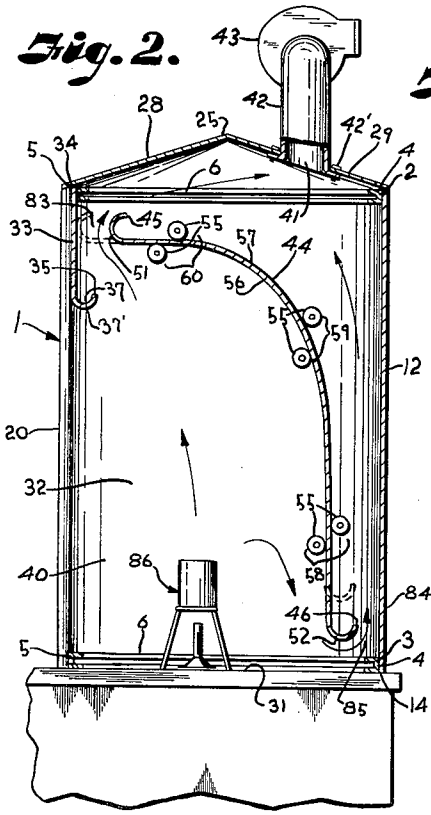


Fig. 1.

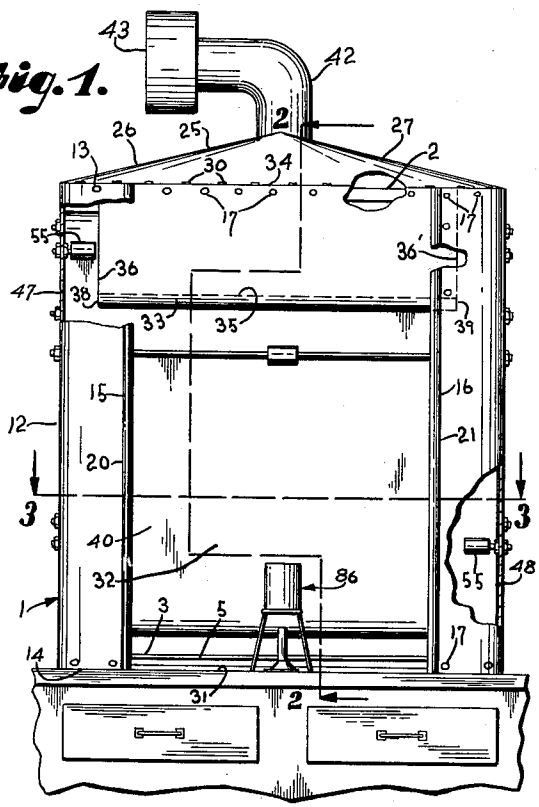
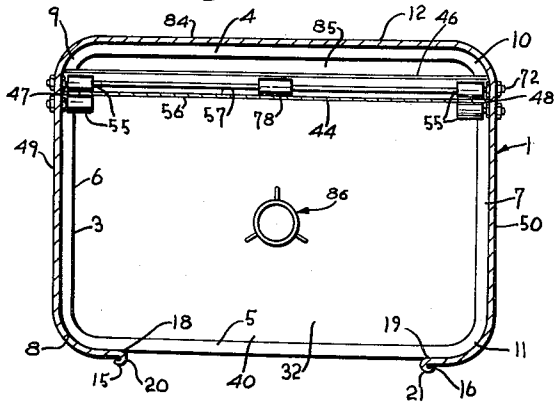


Fig. 3.



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Filed May 11, 1960 2 Sheets-Sheet 2

Fig. 4.

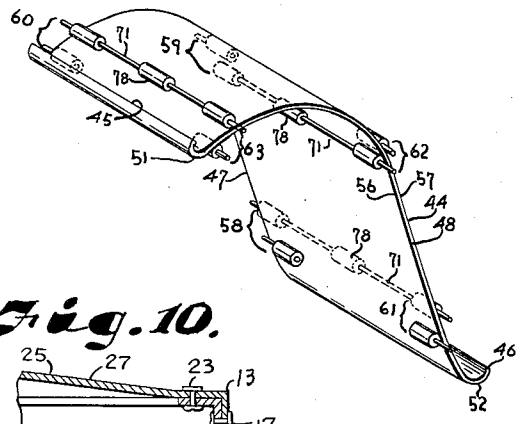


Fig. 7.

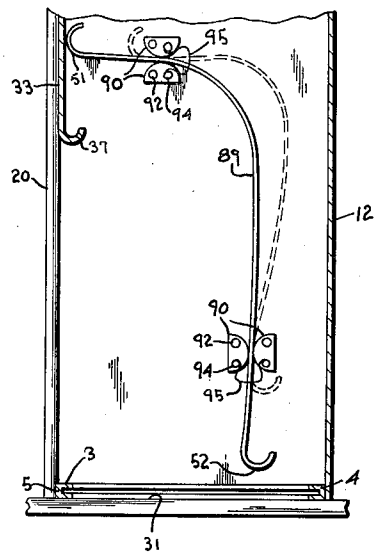


Fig. 10.

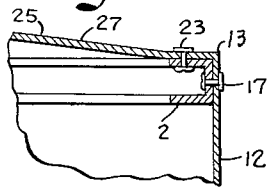


Fig. 8.

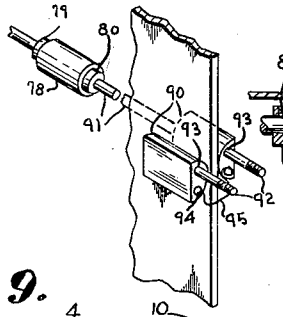


Fig. 6.

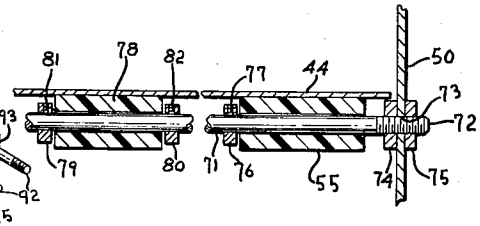


Fig. 9.

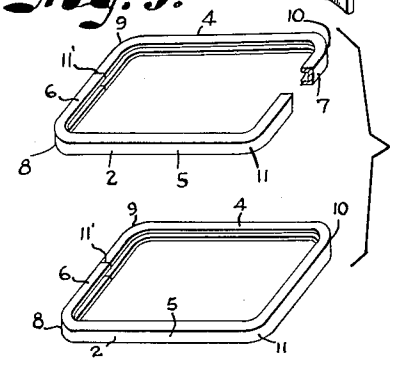
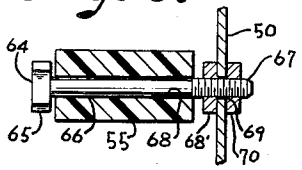


Fig. 5.



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3,022,718

LABORATORY FUME HOOD

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5 Claims. (Cl. 98—115)

This invention relates to laboratory fume hoods and is particularly directed to a novel and serviceable fume hood which is adapted for use in small laboratories where table space is at a premium.

The traditional fume hood generally consists of a base cabinet supporting a heavy box-like structure permanently attached thereto. The back, top and sides of the box-like structure usually are of sheet rock, impregnated and coated wood, or reinforced glass. A baffle plate is provided near the rear wall of the fume hood with openings along the upper and lower edges thereof through which fumes are exhausted. The width of these openings is usually made adjustable by providing extensions selectively slidable or movable with respect to the baffle plate. The adjustment of the extensions generally requires loosening a number of thumb screws and sliding the extensions upwardly or downwardly, depending upon the desired size of the openings, and again tightening the thumb screws. The baffle extensions are often of the same material as the walls of the hood and are so heavy and the thumb screws so far apart and usually so corroded that adjustment is extremely difficult for a single individual. Due to its heavy construction, the traditional fume hood is assembled in the laboratory and considered to be a permanently located fixture.

It is to be understood that, depending upon the fumes to be exhausted from a fume hood, it is desirable to have the baffle openings adjustable. If the fumes are lighter than air the opening at the top of the baffle plate should be widened and the extension at the lower end of the baffle narrowed so that the rising fumes will be withdrawn. On the other hand, if the fumes are heavier than air, it is desirable to adjust the baffle extensions so that the opening at the bottom is wide and the top narrow.

The principal objects of this invention are, to provide a laboratory fume hood which can be placed upon and removed from a table with facility and wherein the table top surface acts as a bottom wall for the fume hood; to provide a fume hood which contains a baffle structure which is easily adjustable and relatively free of the binding effects of corrosion; to provide a fume hood of simple, light and inexpensive construction which can be readily shipped and installed in ready-to-use form; to provide a unique baffle structure for a laboratory fume hood bodily movable in a curved path, which permits the upper and lower exhaust openings to be adjusted simultaneously to maintain a relatively constant area of exhaust opening without the use of thumb screws or the like; to provide a laboratory fume hood baffle which is formed of one-piece, light weight, flexible sheet material and yet is highly serviceable; to provide such a laboratory fume hood baffle which is so constructed and arranged that the upper and lower exhaust openings may be adjusted independently of each other with ease and facility by curving the baffle; and to provide a laboratory fume hood with a body fabricated of thin, light weight sheet material, and containing a trough for directing condensate away from the access opening for safety, and is easily cleaned and serviced.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are

set forth by way of illustration and example certain embodiments of this invention.

FIG. 1 is a front elevational view of the fume hood partly in section.

FIG. 2 is a vertical sectional view through the fume hood taken along the line 2—2 of FIG. 1.

FIG. 3 is a horizontal sectional view through the fume hood taken on the line 3—3 of FIG. 1.

FIG. 4 is a perspective view of the baffle plate showing the relative positions of the mounting rollers.

FIG. 5 is a detail sectional view of one type of mounting roller assembly for the baffle plate shown in FIG. 4.

FIG. 6 is a detail sectional view of another type of mounting roller assembly for the baffle plate shown in FIG. 4.

FIG. 7 is a side elevation of the baffle plate showing a modified form of mounting producing independent exhaust opening adjustment.

FIG. 8 is a detail perspective view, partly in section, of the modified form of mounting the baffle plate shown in FIG. 7.

FIG. 9 is a perspective view of the hood frame members in vertically spaced relation.

FIG. 10 is a fragmentary sectional view on an enlarged scale showing the junction of the frame 2 and the walls of the top and sides of the hood.

Referring more in detail to the drawings:

1 designates the fume hood of this invention. A pair of vertically spaced, horizontally disposed, parallel, frame members 2 and 3 are respectively contained in the fume hood 1 near the top and the bottom thereof. The frame members 2 and 3 are of substantially rectangular shape and each has parallel sides 4 and 5 of greater length than the parallel sides 6 and 7. The frame members 2 and 3 have coincident housing or outside peripheries exhibiting rounded corners 8 to 11, FIG. 9. The frame members 2 and 3 are preferably fabricated of thin-walled channels of stainless steel with the web of the channel facing outwardly, FIG. 9, and the channel ends 11' joined together, such as by welding, to form a unitary frame-like structure.

A hood body 12 is formed of an integral piece of flexible, corrosion resistant, sheet material, for example, stainless steel approximately 30 gauge, of rectangular shape, having a top edge 13, a bottom edge 14 and parallel side edges 15 and 16. The body 12 is wrapped around the frame members 2 and 3 and the top edge 13 and bottom edge 14 are respectively secured to the top and bottom frame members 2 and 3 by suitable fastening devices such as rivets 17; however, spot or seam welding may be used if desired. The hood body 12 covers the coincident outside peripheries of the parallel sides 6 and 7, and the sides 4, and partially covers the sides 5. The side edges 15 and 16 respectively terminate on the sides 5 near the lateral extremities 18 and 19 of the sides 5, FIG. 3. The side edges 15 and 16 are rolled upon themselves forming spaced, parallel, vertical, rolled members 20 and 21 which open outwardly of the fume hood (FIG. 3).

An integral, substantially rectangular top 25, of a material similar to the hood body 12, is deformed so as to exhibit sloping ends 26 and 27 and sloping sides 28 and 29 in the manner of a hipped roof. The top 25 exhibits an edge periphery coincident with the frame members 2 and 3 and is secured to the top frame member 2 by means of rivets or the like 30.

The hood body 12 and the top 25, when assembled as disclosed above and placed upon a table as illustrated (FIGS. 1 and 2), surface 31 forms the bottom wall of the fume hood, but obviously a bottom could be placed therein to act as a working bottom surface if desired. The hood body and top form a hollow chamber 32 which is

accessible from the outside between the vertical roller members 20 and 21. A front panel 33, of rectangular sheet material similar to that forming the hood body 12, has an upper edge 34, a lower edge 35 and side edges 36 and 36'. The front panel upper edge 34 is secured by suitable fastening devices such as rivets 17 or by welding to the top frame member 2 on the outer periphery of the side 5, and extending between the side 5 of frame member 2 and the parallel side edges 15 and 16 of the hood body 12. The side edges 36 and 36' of the front panel 33 respectively lie behind the parallel side edges 15 and 16 of the hood body 12, but terminate prior to reaching the rounded corners 8 and 11 of the upper frame member 2. The overlapping portions of the front panel 33 and the hood body 12 are secured together by suitable fastening devices such as rivets 17 or by welding. The front panel lower edge 35 is rolled inwardly and upwardly of the chamber 32 forming a trough 37 having lower outside portion 37' and open ends 38 and 39 respectively extending past the spaced, vertical, tubular members 20 and 21, FIG. 1.

The lower outside portion 37' of the trough 37, the vertical rolled members 20 and 21 and the side 5 of the bottom frame member 3 form an access opening 40 into the hollow chamber 32. If desired, a vertically sliding door (not shown) may be mounted, by the side edges thereof, in the open tubular members 20 and 21 to cover the access opening 40.

The side 29 of the top 25 has formed thereon an exhaust opening 41 in which an exhaust stack 42 is retained by suitable securing devices such as rivets 42' or by welding. A conventional exhaust blower 43 may be connected to the upper end of the exhaust stack 42. A suitable flexible hose (not shown) may be connected to the exhaust outlet of the exhaust blower 43 and vented to the outside of the laboratory to carry off the fumes.

A baffle plate 44 is located between the access opening 40 and the exhaust opening 41 but near the upper and rear portions of the chamber 32. The baffle plate 44 is fabricated of a rectangular elongated sheet of flexible, corrosion resistant, sheet material which may be of the same or lighter gauge than the hood body 12 and has a top end or edge 45, a bottom end or edge 46 and parallel side edges 47 and 48. The distance between the side edges 47 and 48 is slightly less than the distance between the respective side walls 49 and 50 of the chamber 32 in order that the baffle plate 44 is movable in a curved path longitudinally upwardly and downwardly within the chamber 32 with only slight clearance for the side edges 47 and 48. The top edge 45 and bottom edge 46 of the baffle plate are reversely turned on the baffle plate 44 to form reversely turned portions 51 and 52 which act both as strengthening members and as adjusting grips for the baffle plate 44 in a manner which will be explained hereinafter.

The baffle plate 44 is mounted by supporting devices extending inwardly of the fume hood for movement upwardly and downwardly in a curved path, and in the structure shown in FIGS. 1 to 4 this mounting is accomplished by twelve rollers 55 which are mounted in selected positions on the side walls 49 and 50. The rollers 55 contact the inside surface 56 and outside surface 57 of the baffle plate 44, along the side edges 47 and 48 thereof. The rollers 55 are disposed in sets of two rollers, each roller in a set being on opposite sides of the baffle plate 44 and offset from each other to produce a slight bend of the baffle plate therebetween for better retention. Three sets 58, 59 and 60 of the rollers 55 are located along the edge 47 of the baffle plate and three sets 61, 62 and 63 are located along the edge 48 of the baffle plate.

Referring to FIG. 5, a bolt 64 composed of a head 65, a shank 66 and a threaded end 67 rotatably mounts some of the rollers 55. The rollers 55 contain a longitudinal bore 68 therethrough for rotatable mounting on the shank 66. A threaded nut 68' is screwed past the threaded end 67 which extends through a hole 69 in the side wall of the fume hood and is there mated with another threaded nut 70. By holding the nut 68' stationary and rotating the nut 70, the side wall is clamped therebetween, rigidly mounting the bolt 64 thereon. The rollers 55 contacting the inside surface 56 in the sets 58, 60, 61 and 63 and the rollers contacting the outside surface 57 in the sets 59 and 62 are mounted as indicated in FIG. 5. The rollers 55 contacting the outside surface 57 in the sets 58, 60, 61 and 63 and the rollers contacting the inside surface 56 in the sets 59 and 62 are mounted as indicated in FIG. 6, wherein a rod 71 extends between and through the side walls 49 and 50 with the rollers 55 mounted thereon.

The rollers 55 are rotatably mounted on the rod 71 in the same manner as on the bolt 64 and each end 72 of the rod 71 is threaded and inserted through holes 73 in the respective side walls 49 and 50. Opposing nuts 74 and 75 on the threaded ends 72 securely mount the rod 71 in the fume hood. Collars 76 having set screws 77 maintain the rollers 55 in their respective positions on the shaft 71 near the side edges 47 and 48 of the baffle plate 44. Intermediate the ends of the rod 71 a floating roller 78 is rotatably mounted and serves as a support to prevent buckling of the baffle plate 44. Suitable collars 79 and 80 having set screws 81 and 82 respectively, retain the floating roller 78 in the desired intermediate position. It is to be noted that if baffle plate 44 is fabricated of sufficiently heavy gauge sheet material, the rods 71 and floating rollers 78 may be dispensed with and all the rollers 55 mounted as indicated in FIG. 5. Satisfactory results can be obtained by substituting stationary pegs or open guides for the rollers 55, relying on the spring quality of the baffle plate to produce sufficient pressure against the pegs to retain the plate in adjusted position. The rollers 55, if desired, may be rotatably frictionally retarded on their respective mounting shafts to aid in baffle plate adjustment retention.

The rollers 55 may be fabricated of plastic such as polyethylene, Teflon or nylon or treated or plastic coated wood may be used. The spool supports are preferably of stainless steel.

Referring to FIG. 2 the baffle plate 44 is of such length and the rollers 55 are so located that the top reversely turned portion 51 is disposed close to the top of the fume hood and near the front panel 33, forming an adjustable discharge opening or passageway 83 therebetween for communication between the access opening 40 and the exhaust opening 41. The bottom reversely turned portion 52 is disposed close to the bottom edge of the rear wall 84 but spaced from the rear wall to the extent necessary to provide an adjustable discharge opening or passageway 85 therebetween for additional communication between the access opening 40 and the exhaust opening 41. The sets of rollers 58, 60, 61 and 63 are spaced from the respective reversely turned portions 51 and 52 to support the ends of the baffle plate while permitting the baffle plate to be moved in a curved path parallel to the side edges 47 and 48, to adjust the effective sizes of the passageways 83 and 85. The sets of rollers 59 and 60 are located near the median point between the top and bottom reversely turned portions 51 and 52 of the baffle plate 44 and serve the purpose of maintaining the baffle plate 44 in rearwardly curved relation through an angle of approximately 90° with the angle opening toward the access opening 40 in order to define a large working space within the hollow chamber 32. In the form shown in FIG. 2, the angle of the curve remains constant regardless of the positions of the baffle plate 44.

In using the fume hood, the chemical apparatus 86 which generates the unwanted fumes may be placed upon any laboratory table surface 31, which acts as the bottom wall of the fume hood. If the fumes generated are heavier than air, they will tend to sink downwardly in the hood and efficient exhaustion will require a suction in the passageway 85. By merely pushing upwardly on the lower reversely turned portion 52 of the plate, the pas-

sageway 85 is rendered larger and the upper passageway 83 is rendered smaller, or if desired, substantially closed. These adjustments are simultaneous, eliminating the need for separate adjustments of the top and bottom passageways. It is apparent that if the upper passageway 83 is desired larger and the lower passageway 85 smaller, this may be accomplished by merely pushing the upper reversely turned portion 51 of the baffle plate rearwardly of the chamber 31. Note that there are no thumb screws or the like which must be loosened to perform these adjustments. The rollers 55, by bearing against the surfaces of the baffle plate, prevent an unwanted change in baffle plate position during the operation of the hood.

The above described configuration has been found to be highly satisfactory when a substantially constant total cross sectional area of exhaust passageway is desired so as to provide a particular velocity of gas exhaustion from the chamber whether exhausting from the top or bottom exhaust openings or part of both openings. However, if it is desired to vary the total cross sectional area of exhaust passageway or to be able to adjust the top and bottom exhaust openings independently, the modification indicated in FIGS. 7 and 8 may be utilized. Referring to FIG. 7, the baffle plate 89 is mounted at points spaced from the top and bottom edges thereof with clamping members 90. The clamping members 90 are in groups of two with one member of each group disposed on opposed sides of the baffle plate 89 in clamping engagement therewith. The clamping members 90 are of semicylindrical shape with the rounded periphery in contact with the baffle plate 89. The clamping members 90 are mounted on the respective side walls of the fume hood in the same manner as the rollers 55. The rods 91 and shanks 92 are inserted in longitudinal bores 93 which are offset towards a corner of the clamp members 90. On the end of the clamp members 90 adjacent the respective side edges of the baffle plate 89, and in the opposite corner from the bores 93, pins 94 or the like on opposite sides of the baffle plate 89 retain a spring 95 which urges the opposing clamping members 90 together, frictionally retarding the longitudinal movement of the baffle plate 89. It can be seen that when mounted in the manner shown in FIG. 7, the top and bottom edges of the baffle plate may be adjusted in relation to the fume hood independently of each other, causing bowing of the baffle plate and changing the angle subtended by the baffle plate.

The trough 37 formed from the front panel 33 prevents condensate which forms thereon from dripping on the hands and arms of the fume hood user by directing it away from the access opening 40.

It is evident that other materials may be employed in the construction of the fume hood than those outlined above. For example, less resistant metals such as tin, aluminum or steel with a protective coating applied before or after construction will produce satisfactory results. Some sheet plastics exhibit excellent corrosion resistance and can be formed like sheet metal to form the walls, top and baffle if desired.

It is to be understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown except insofar as such limitations are included in the claims.

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

1. In a fume hood having a front wall, rear wall, and oppositely disposed side walls and a top wall forming a hollow chamber, said rear wall having a bottom edge; means in said front wall forming an access opening into said chamber, means forming an exhaust opening into said chamber, a baffle between the access and exhaust openings said baffle being of flexible sheet material and having top and bottom edges, means disposed on the respective side walls and inside of said chamber for supporting said baffle in a curved condition and adapted to permit selective positioning of said baffle top and bottom edges, the baffle top edge being disposed close to said top wall and the baffle bottom edge being disposed close to the bottom edge of said rear wall, said baffle top and bottom edges and said chamber defining variable top and bottom openings for the passage of air and fumes toward the exhaust opening, the size of said top and bottom openings being respectively determined by the positions of said top and bottom edges with respect to said chamber.

2. In a fume hood having a front wall, rear wall and oppositely disposed substantially parallel side walls and a top wall forming a hollow chamber, said rear wall having a bottom edge, means in said front wall forming an access opening into said chamber, means forming an exhaust opening into said chamber through said top wall, a baffle structure between the access and exhaust openings, said baffle structure comprising: an elongated sheet of flexible material having top, bottom and side edges, the horizontal distance between said sheet side edges being slightly less than the distance between the respective side walls to permit longitudinal movement of said sheet therebetween, a plurality of means secured to said side walls for supporting said sheet adjacent said sheet side edges in a curved condition through an angle opening toward said access opening and for selective positioning of said sheet top and bottom edges, the sheet top edge being disposed close to said top wall of the hood and the sheet bottom edge being disposed close to said rear wall bottom edge, said sheet being spaced from said rear wall, said sheet top and bottom edges and said chamber defining variable top and bottom openings for the passage of air and fumes toward the exhaust opening, the size of said top and bottom openings being respectively determined by the longitudinal positions of said bottom and top edges with respect to said chamber.

3. A portable fume hood adapted to use a laboratory table surface as the bottom wall thereof comprising: vertically spaced horizontally disposed parallel top and bottom frame members having coincident, substantially rectangular peripheries exhibiting rounded corners, a hood body of one-piece sheet material having top, bottom and parallel side edges, said top and bottom hood body edges being secured respectively to three coincident peripheral sides of said top and bottom frame members and part of the fourth side of said frame members, a one-piece sheet material top having sloping ends and sides secured to said top frame member, said body and top forming a hollow chamber having oppositely disposed substantially parallel side walls, said hood body side edges being rolled upon themselves forming spaced, parallel vertical rolled members, a front panel of rectangular sheet material having upper, lower and side edges, the distance between said front panel upper and lower edges being less than the distance between said top and bottom frame members, said front panel upper edge being secured to said top frame member periphery substantially between said vertical rolled members, and said front panel side edges being respectively secured to said hood body adjacent said hood body side edges, the front panel lower edge and said vertical rolled members, and part of the bottom frame member cooperating to form an access opening into said chamber, means forming an exhaust opening in one of said sloping top sides, exhaust means communicating with said exhaust opening, a baffle structure between the access and exhaust openings, said baffle structure comprising; an elongated sheet of flexible material having top, bottom and side edges, the horizontal distance between said side edges being slightly less than the distance between the respective side walls for longitudinal movement of said sheet therebetween, means disposed on the respective side walls and inside of said chamber for supporting said sheet adjacent said sheet side edges in a curved condition through an angle of approximately 90° opening

toward said access opening and for selective longitudinal positioning of said top and bottom edges in a direction parallel to said side walls, the top edge of said sheet being disposed close to said top of the chamber and the bottom edge of said sheet being disposed close to the bottom of the chamber and defining variable top and bottom openings for the passage of air and fumes toward the exhaust opening, the size of said top and bottom openings being respectively determined by the longitudinal positions of said top and bottom edges with respect to said chamber.

4. In a fume hood having front, rear and oppositely disposed side walls and a top wall forming a hollow chamber, said rear wall having a bottom edge, means in said front wall forming an access opening into said chamber, means forming an exhaust opening in said chamber, a baffle structure between the access and exhaust openings, said baffle structure comprising, an elongated sheet of flexible material having top, bottom and side edges, the horizontal distance between said sheet side edges being slightly less than the distance between the respective side walls for movement of said sheet therebetween, clamping members disposed on the respective side walls and inside of said chamber at points spaced from the sheet top and bottom edges, said clamping members supporting said sheet adjacent said sheet side edges for selected longitudinal positioning of said sheet top and bottom edges in a direction parallel to said side walls, said sheet being supported in a curved condition but being unsupported intermediate said clamping members, the top edge of said sheet being disposed close to said top wall of the hood and the sheet bottom edge being disposed close to the bottom edge of said rear wall and defining variable top and bottom openings for the passage of air and fumes toward the exhaust opening, the size of said top and bottom openings being independently determined by the longitudinal positions of said sheet top and bottom edges.

5. A fume hood comprising, front, rear and oppositely disposed substantially parallel side walls of sheet material and a top wall forming a hollow chamber, said rear wall having a bottom edge, means in said front wall forming an access opening into said chamber, means forming an exhaust opening in said chamber, exhaust means communicating with said exhaust opening, a baffle structure between said access and exhaust openings, said baffle structure comprising an elongated sheet of flexible material having top, bottom and side edges, the horizontal distance between said side edges being slightly less than the distance between the respective side walls for longitudinal movement of said sheet therebetween, means disposed on the respective side walls and inside of said chamber for supporting said sheet for selected positioning of said sheet top and bottom edges in directions parallel to said side walls, said sheet being supported in a curve, said sheet supporting means permitting said sheet to move through said curve during said longitudinal movement, the top edge of said sheet being disposed close to the top wall of said hood and the bottom edge of said sheet being disposed close to the bottom edge of said rear wall and defining variable top and bottom openings for the passage of air and fumes toward the exhaust opening, the size of said top and bottom openings being respectively determined by the longitudinal position of said sheet with respect to said chamber.

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