July 3, 1962 J. M. LIPTAY 3,041,957

MOBILE LABORATORY

Filed Aug. 14, 1959 2 Sheets-Sheet 1

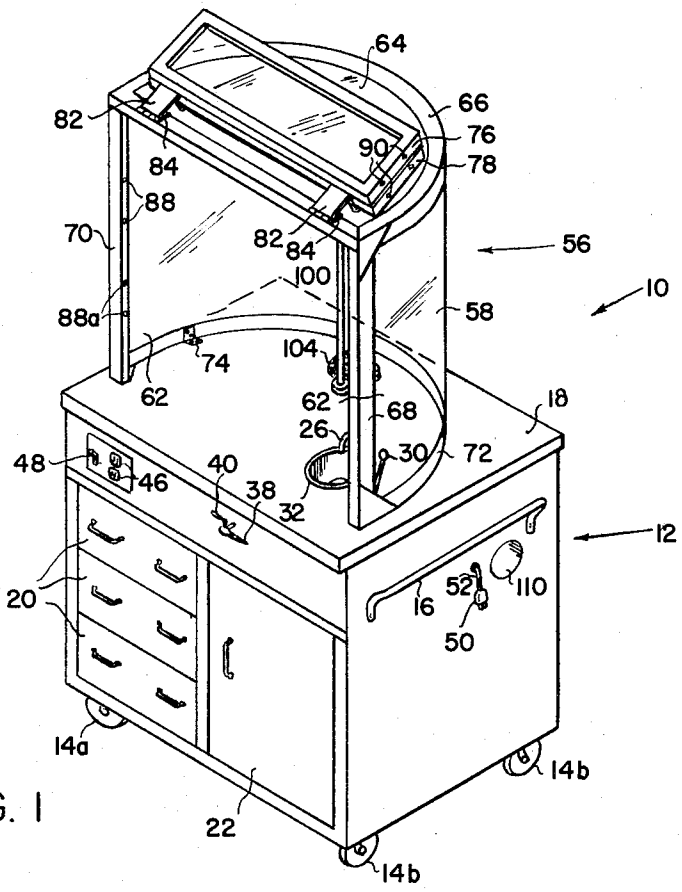



FIG. 1

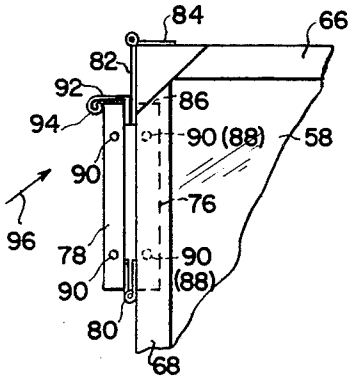



FIG. 6

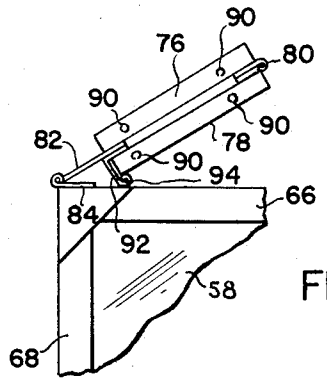



FIG. 7

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MOBILE LABORATORY

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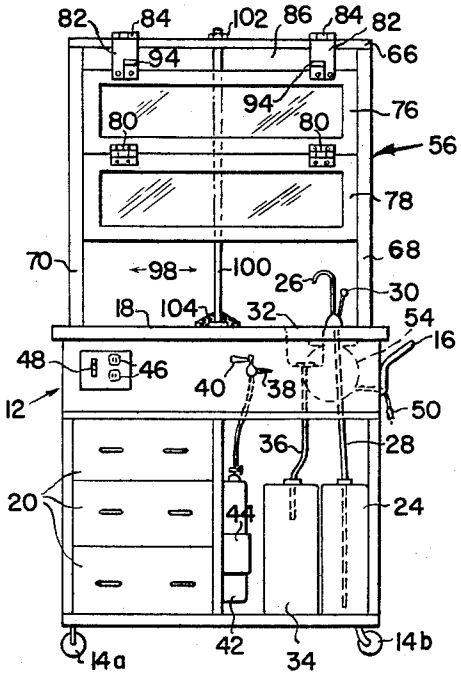



FIG. 2

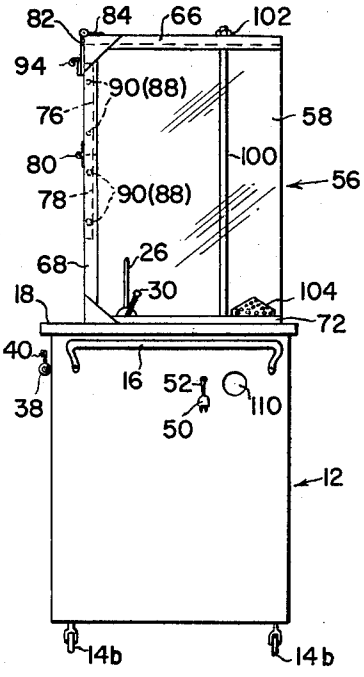



FIG. 3

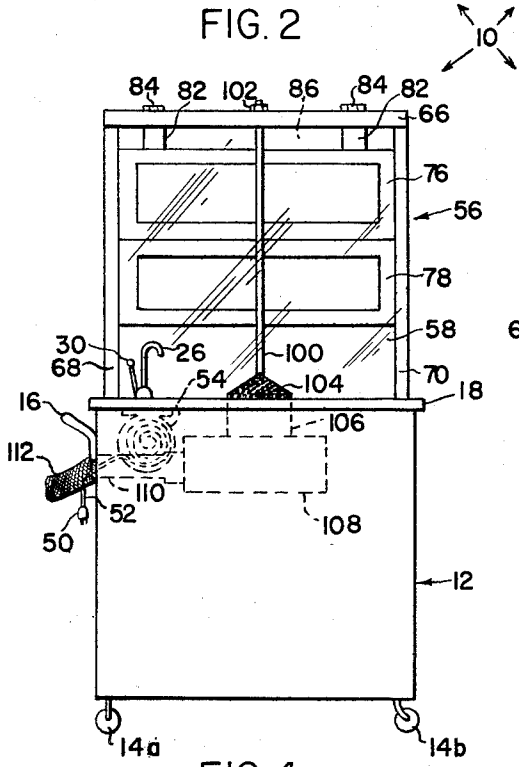



FIG. 4

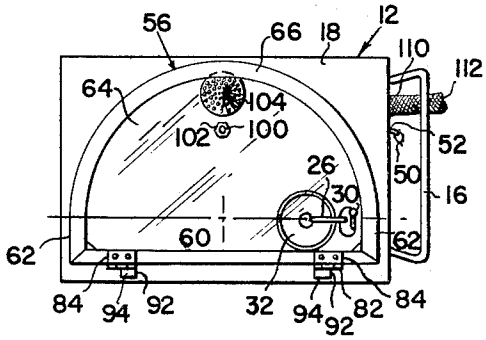



FIG. 5

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# MOBILE LABORATORY

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8 Claims. (Cl. 98—115)

This invention relates to a laboratory for conducting experiments. More particularly, it relates to a mobile laboratory in which experiments may be conveniently conducted in any desired location or place.

It is common to construct school science buildings, laboratories, and like structures with special rooms and facilities for conducting experiments including chemical experiments. Such specially designed rooms generally include an elaborate demonstration table equipped with water supply, electricity, gas outlets, and numerous other necessary features and equipment for conducting experiments. Because of their bulk and size, the demonstration tables require rooms of large area for their accommodation. They are expensive and moreover, the equipment contained in them and the special wiring and plumbing necessary for their installation and erection often place them beyond the financial capacity of institutions requiring their use.

The present invention is directed to the solution of the aforementioned problems. It is the desideratum of this invention to provide a safe yet inexpensive mobile laboratory equipped with the basic essentials to facilitate the use of electricity, liquids, and gases safely and economically, thereby eliminating the great expense of massive fixed or stationery laboratory tables that are completely immobile and therefore limit the capacity of the viewing audience. Although attempts in this direction have been made toward the solution of the aforementioned problems, these have been unsuccessful.

It is an object of the invention to provide a vehicular apparatus that is completely mobile so that it may be moved from place to place, into any desired room, classroom, auditorium, or wherever the need for its use may arise, for the purpose of demonstrating a chemical or other physical experiment.

It is another object of the invention to provide a mobile laboratory having a work area that is completely enclosed yet fully transparent and open to view about its front and sides to enable whole classes or audiences of viewers to clearly see a chemical or other physical experiment being conducted therein without the need to peer about interposed pillars, posts, or other interfering vision obstructing supports.

It is still another object of the invention to provide a mobile laboratory in which chemical or other experiments may be conducted with ease and with a complete feeling of safety on the part of the viewers and the demonstrator, both of whom are adequately protected from dangerous or noxious fumes or the spattering splash of harmful liquids. To this end certain features of the invention reside in novel arrangements of details of construction that permit the withdrawal of the noxious or dangerous fumes from the work area to exhaust them at a place where they will cause no damage to either the viewers or the demonstrator.

A further feature of the invention resides in the provision of an entranceway of novel design permitting access to the work area, and of door means that may be variably operated to provide greater or lesser access to the work area while providing the demonstrator with a full view of the conduct of the experiment.

Other and further objects of my invention reside in the structures and arrangements hereinafter more fully



described with reference to the accompanying drawings in which:

FIG. 1 is a perspective view showing a mobile laboratory construction in accordance with the teaching of the invention and with the doors thereof in open position,

FIG. 2 is a rear elevation of the mobile laboratory with the doors in closed position,

FIG. 3 is a side view of FIG. 2,

FIG. 4 is a front view of FIG. 2,

FIG. 5 is a top view of FIG. 2,

FIG. 6 is a partial view of the side of the housing showing one of the doors latched in its open position, and,

FIG. 7 is a view similar to FIG. 6 showing the doors in their fully opened position as in FIG. 1.

Referring now to the drawings, the mobile laboratory shown therein is generally identified by the numeral **10**. The laboratory comprises a vehicular body member in the form of a cabinet generally identified by the numeral **12**. The member **12** is adapted to be moved about easily from place to place, therefore, it is provided with a plurality of wheels or rollable elements. In order that the laboratory **10** may be easily moved about along corridors, twisted through doors and in and out of narrow spaces, one side set of wheels **14***a* are mounted on fixed casters to the base or bottom of the member **12**. The other set of wheels **14***b* are mounted to the base of the member **12** by swivel casters thus enabling the set of wheels **14***b* to swing freely beneath the body member **12**, thereby permitting controlled manual maneuvering of the mobile laboratory **10** as it is wheeled about. A handle **16** facilitates the manually guided movements of the vehicular structure.

The body member **12** is in the form of a cabinet having a table top **18**. The cabinet may include a plurality of drawers **20** in which various articles may be placed. These articles may include bottles or canisters containing elements or chemicals necessary in the performance of chemical or physical experiments to be conducted in the mobile laboratory **10**. Since the construction of these drawers may be of any well-known arrangement, the details thereof form no specific part of the invention. In like manner the door **22** (FIG. 1) leading to the interior of a portion of the cabinet **12** may be of any desired construction.

In FIG. 2 the door **22** is removed to expose an arrangement of elements that have been utilized in conducting experiments in the mobile laboratory **10**. In this regard, it will be noted that a water or other fluid-containing canister **24** may be positioned within the cabinet member **12** beneath a spigot **26** and connected therewith by a flexible hose **28**. The fluid from the canister **24** may be pumped or sucked therefrom to be exhausted from the spigot **26** by the pumping operation of a handle **30** forming a part of the plumbing.

The liquid dispensed at the spigot **26** is directed toward a sink or trap **32** therebeneath which is, in return, connected with canister **34** by a flexible hose **36**. Thus, before the performance of an experiment the canister **24** may be filled with a desired fluid, as water, which may be pumped therefrom to be dispensed at the spigot **26** for use by the experimenter. Waste water will drip or flow into the sink **32** beneath the spigot and will enter the waste canister **34** which may be emptied at any desired time.

If certain gases are required in the performance of an experiment for the use of a Bunsen burner or like instrument, there is provided a gas spigot **38** controlled by a handle **40**. The spigot **38** receives its supply of gas from a bottle or other container **42** that may be mounted within the interior compartment of the cabinet **12** by

straps 44 or by any other convenient means. The use of the spigot 38 is very similar to that presently employed in fixed laboratory tables having a supply of gaseous fluids. As is the practice, a flexible line or hose of sufficient length may be connected to the spigot 38 and directed into work area of the mobile labortary 10 presently to be described.

In practice, electricity is conveniently supplied for the performance of certain experiments requiring the same. In the present invention this is accomplished by the electrical outlets 46 mounted on the rear panel of cabinet 12. The supply of electricity to the outlets 46 may be controlled by the operation of a simple toggle switch 48. The outlets 46 and interposed switch 48 may be conveniently plugged into or connected with a source of electricity in any room or place into which the laboratory is wheeled by withdrawing an electrical plug 50 extending out from one side of the cabinet and connecting the same with any convenient available source of current.

The electrical cord 52 may be wound or coiled about a reel 54 mounted within the cabinet 12 so that the plug 50 can be extended varying distances from the cabinet 12 or mobile laboratory 10 and connected with a source of electricity without restricting the location or position of the laboratory. The reel 54 may be of well-known construction to rewind the cord 52 thereabout when the plug 50 is disengaged from the source of electricity into which it is adapted to be connected.

The mobile laboratory 10 is provided with an enclosure or work area (not numbered) that occupies a substantial portion of the table top 18. The work area is defined by a housing generally identified by the numeral 56. The housing 56 is of unique construction in that it provides complete uninterrupted and unobstructed vision of the work area and, consequently, the experiment conducted therein. Housing 56 is specifically designed and arranged to include a surface member 58 that fully encompasses and defines the front and sides of the work area.

Surface member 58 is completely transparent fully about its singular uninterrupted lengthwise and widthwise extent. In the drawings it is shown to be arcuate in shape to define the front and sides of the work area. In practice the arc about which the transparent surface member 58 is described has its centerpoint 60 (FIG. 5) located inward of the rear of the housing. The terminating side walls 62 of the transparent member 58 are substantially parallel and extend rearwardly beyond the centerpoint 60. Thus, the extent of the surface member 58 is sufficient to provide a viewing range of the enclosed work area that is greater than or at least not less than 180° along a horizontal plane.

Those watching the experiment being performed in the work area have an ability to view the same from at least the front and sides thereof. The ends of the surface or wall 58 terminate in an entranceway that is defined in the housing 56 and bounded by the top wall 64 thereof. To provide for substantially complete visibility of the interior of the work area of the housing 56 from the front, sides and top thereof, the top member 64 is also made of a transparent material and is suitably connected to the vertically disposed wall 58 by metallic angular connecting members 66, 68, and 70.

The connecting member 66 is joined to the top rim of the vertically disposed transparent member 58 and has secured to it the transparent top wall 64. The angularly shaped vertically disposed connecting post members 68 and 70 serve to cover the terminating edges of the member 58 and to provide supports thereat. The lower rim of the member 58 may be secured to the table top 18 by a connecting band 72 that has angled brackets 74 (FIG. 1) secured thereto at one leg thereof, while the other leg of the brackets is fixed to the table top 18. The specific details of the connecting bands and brackets 66—74 may be varied, since it has been found possible to form the side wall member 58 integral with the top wall 64 thereby eliminating the angular arcuately shaped connecting member 66.

The opening of the entranceway defined in the housing 56 providing access to the work area therein may be varied in size by the manual movement or operation of a plurality of door means mounted on the housing. Such door means comprise a pair of door members 76 and 78. For ease of description the door member 76 is referred to as the upper door, while the door member 78 is referred to as the lower door. Both doors are hingedly connected together at 80 (FIGS. 6 and 7). The upper doors 76 is secured to an elongated leg 82 of a hinge, the other leg 84 of which is secured to the top of the housing 56. In practical operation there are two such elongated hinges including the legs 82 and 84 that are spaced from each other. The elongated leg 82 permits the two doors 76 and 78 to be pivotly moved into and out of the entranceway.

In FIGS. 1 and 7 the door means is shown in its open or inactive position wherein the same are positioned fully out of the entranceway of the work area and are supported at the top 64 of the housing 56. To vary the size of the opening of the work area entranceway, the doors 76 and 78 are moved as a unit from their inactive open position as shown in FIGS. 1 and 7 toward their partial closing position as shown in FIG. 6. The upper door 76 is positioned within the entranceway but spaced from the top boundary thereof by the elongated leg 82 of the hinge means. Thus, an opening is defined in the housing between the top of the upper door 76 and the top defining wall of the entranceway facilitated by the elongated hinge leg 82. This opening between the upper door 76 and the upper wall of the entranceway may be termed a top air inlet 86 (FIGS. 2, 4 and 6).

The weight of the door 76 and of the lower door 78 latched to the outer surface thereof in a manner to be described is sufficient to retain the same within the confines of the entranceway as shown in FIG. 6. However, is has been found in practice that the use of spring pressed detents 88 provided in the upright connecting members 68 and 70 of the housing 56, cooperating with correspondingly positioned receiving openings 90 in the door 76 will serve to releasably retain the door in the entranceway until manual pressure is applied to the door to lift it out of the entranceway.

Lower door 78, being hingedly mounted at 80 to the upper door 76, may be latchingly retained out of the entranceway in the manner shown in FIG. 6 while the door 76 is releasably retained therein. This is facilitated by the provision of a substantially L-shaped latch members 92 that are secured to the outer surfaces of the elongated leg 82 of each of the upper hinge structures. Each upper leg 82 is thus provided with a latch member 92 that terminates in a spring coiled portion 94. When it is desired to retain the lower door 78 latched out of the entranceway the same is manually lifted and moved radially about the pivot of the hinge 80 toward the upper door 76 in the direction of the arrow 96 as shown in FIG. 6. Almost any forceful radial movement of the door 78 is sufficient to pass it beneath the coiled portions 94 of each latch member 92, causing the leg of the latch member to flex slightly. This flexing permits the lower trailing edge of the lower door 78 to pass beneath the coiled portions 94 and to be locked thereby beneath the latch member. Accordingly, the lower door 78 is latched to the upper door 76 and is positioned out of the entranceway.

If it is desired to lower the door 78, the same is grasped manually at its sides or intermediate the two spaced latch members 92 and pulled down to flex the coiled portions 94 out of engagement therewith. The weight of the door 78 will cause it to swing down about the hinge 80 into

the confines of the entranceway. Like the upper door **76**, door **78** is similarly provided with grooves or openings **90** for engagement with releasable detents **88***a* whereby the same will be retained within the entranceway.

It will be recognized that the unique arrangement of door structure and hinge means permits each of the doors **78** and **76** to be moved into and out of the entranceway opening either one at a time or both at the same time. Because the overall length of the two doors **76** and **78** is smaller or less than that of the opening of the entranceway into which the same move, they also provide a bottom air inlet that is defined in the housing between the lower edge of the lower door **78** and the table top **18**. The bottom air inlet is numbered **98** in FIG. 2.

Each of the doors **76** and **78** is provided with a transparent window. Since the experimenter performs the experiment in the work area by standing behind the doors, he is permitted full view of the experiment through such doors while the audience has a clear view of the experiment through the transparent work enclosure member **58**. The experimenter has the ability to conduct his experiment without lifting the doors **78** or **76** by reaching into the work area through the bottom air inlet opening **98**; however, the doors provide him with greater access to the work area if such is required.

Positioned within the work area is a vertically disposed standard or support **100** on which the experimenter may clamp test tubes or other like elements necessary in the conduct of the experiment. The standard **100** serves not only as a work support for the articles employed in the experiment, but also as a support for the top **64** of the housing **56** to which it is connected at its upper end **102** and at its lower end to the table top **18**.

The experimenter, like the audience, is protected from the danger of the spread of noxious fumes or gases which are efficiently exhausted or withdrawn from the work area during the performance of the experiment. This is accomplished by the provision of a vent **104** within the work area. The vent is conically shaped so that work elements may not be placed thereon during the course of an experiment and possibly close off or hamper the withdrawal of the fumes or gases from the work area. In practice the vent **104** is made of a mesh or perforated material.

Referring to FIG. 4, it will be seen that the vent communicates with the interior of the mobile cabinet **12** by way of a duct **106**. Positioned beneath the duct **106** is an exhaust fan **108** that has its exhaust opening **110** terminating at a side wall of the cabinet. When the mobile laboratory **10** is moved into the desired room for the performance of the experiment, a flexible hose **112** (FIGS. 4 and 5) provided with the laboratory **10** and removable from the cabinet **12** in which it is contained, may be conveniently plugged into the exhaust opening **110** at its one end. The other end of the hose **112** may be passed through a window or similar opening thereby permitting the exhaust fan **108** to withdraw the air fumes and gases from the work area and to dispense it in some non-dangerous location.

Gas, fumes and air withdrawn from the work area by the operation of the fan **108** is replaced in the work area by the suction that is created at the top and bottom air inlet openings **86** and **98** respectively. Air sucked into the work area through the top air inlet **86** causes the lighter noxious fumes or gases accumulating in the top of the housing **56** to move down through the vent **104** and out of the room by way of the flexible exhaust hose **112**. The heavier fumes or gases collecting at the bottom of the work area within the housing **56** will be displaced by the air sucked into the work area through the bottom air inlet **98**.

The novel combination of top and bottom air inlets thus prevents the accumulation of dangerous fumes or gases within the work area either at the top or bottom thereof. The audience is protected from the spattering or splashing of dangerous chemicals or other liquids by the fully transparent vertically disposed enclosure surface **58**. The experimenter is similarly protected by the movable doors **76** and **78** that may be operated to variably open and close the entranceway to the work area.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

I claim:

1. A mobile laboratory for conducting experiments comprising a cabinet, rollable means on said cabinet by which the same may be moved, said cabinet having a table top, a transparent uninterrupted enclosure on said top defining an unobstructed work area in which experiments may be conducted and viewed from without, said enclosure having an entranceway to said work area defined therein, door means on said enclosure variable in size movable to variably reduce the size of the enclosure entranceway, a constantly open air inlet defined between said door means and the top of said enclosure entranceway when said door means is moved to reduce the size of the enclosure entranceway, and means on said mobile laboratory to cause the movement of air through said air inlet.

2. A mobile laboratory for conducting experiments comprising a movable member having a top, a housing enclosing a work area above the top and in which experiments may be performed, said housing including an unobstructed uninterrupted transparent member shaped to form at least the front and side portions of said enclosed work area, said housing having an entranceway to provide access to said work area, door means on said housing variable in size and operable to reduce the size of said entranceway and being smaller than said entranceway to leave a portion thereof constantly open, and means included in said mobile laboratory to cause the movement of air through said constant opening.

3. A mobile laboratory for conducting experiments comprising a device adapted to be moved about and having a work area in which experiments may be performed, a housing defining said work area and including a transparent member permitting unobstructed vision of said work area about the enclosed sides and front thereof, an entranceway defined in said housing to provide access to said work area, door means on said housing variable in size and movable to completely open said entranceway and closable to reduce the size thereof, said door means being smaller than said entranceway to constantly leave open at least a portion at the top thereof when the same is closed, and means included in said mobile laboratory to cause the movement of air through said constant opening.

4. A mobile laboratory in which experiments may be conducted comprising a vehicle, said vehicle having a work area in which the experiments may be performed, a housing defining said work area and including at least transparent means permitting unobstructed vision of the experiment in said work area about at least the sides and front thereof, an entranceway defined in said housing, door means variable in size in said entranceway, vent means in said work area, suction means communicating with said vent means to withdraw the air from said work area, and air inlet openings defined in said housing through which air outside the work area is drawn thereinto, said door means being smaller in size than said entranceway to leave a portion thereof constantly open.

5. A mobile laboratory in which experiments may be conducted comprising a housing, including an unobstructed vertically disposed transparent member defining a work

area in which experiments may be conducted, an entranceway defined in said housing at the terminal ends of said member, door means variable in size and movable into and out of said entranceway and being smaller than said entranceway to leave a portion thereof constantly open, air inlet openings defined in said housing, a mobile member on which said housing is mounted for movement therewith, vent means in said work area, and suction means in said mobile member communicating with said vent means to withdraw the air from said work area and to draw air into said work area through said air inlet openings.

6. A mobile laboratory for conducting experiments comprising a housing including at least an unobstructed transparent surface defining a work area in which experiments may be conducted and through which surface such experiments may be viewed, an entranceway defined in said housing, a pair of doors on said housing, hinge means to enable said doors to be moved into said entranceway to define air inlet openings between said doors and the top and bottom of said entranceway and to enable said doors to be moved out of said entranceway, hinge means between said doors, and latch means on one of said doors to latch the other door out of said entranceway while the one door is moved therein.

7. A movable laboratory comprising a cabinet having wheels on which the same may be moved and a handle by which said cabinet may be manually directed in its movement, a table top on said cabinet having gas and liquid openings defined therein for communication with the interior of said cabinet, a rigid housing on said cabinet extended upwardly from the top thereof and shaped to define a substantially arcuate work area in which laboratory experiments may be conducted, said housing including a continuous uninterrupted transparent member defining the front and sides of said arcuate work area to enable the experiments in said area to be viewed from without the same thrughout an angle of at least 180° along a horizontal plane, and door means on said housing being variable in size and movable to define a greater or lesser



access opening to said work area said door means being smaller than said entranceway to leave a portion thereof constantly open.

8. In a laboratory table, a housing in which experiments may be conducted, a vertically disposed member defining at least the front and the sides of the housing, said member being transparent and of unitary construction to provide unobstructed and uninterrupted vision of the interior of said housing from the outside thereof about at least said front and said sides, an entranceway defined in said housing at the rear thereof, door means hinged on said housing and movable in said entranceway to vary the size of the opening thereof, vent means in said housing through which air in the housing may be withdrawn therefrom, and constant air inlet means defined in said housing above and below said door means through which air outside of said housing may be drawn thereinto.

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