Jan. 8, 1963 E. S. CORNELL, JR 3,071,828

APPARATUS FOR PURIFYING AIR

Filed Oct. 12, 1959 4 Sheets-Sheet 1

Fig. 1.

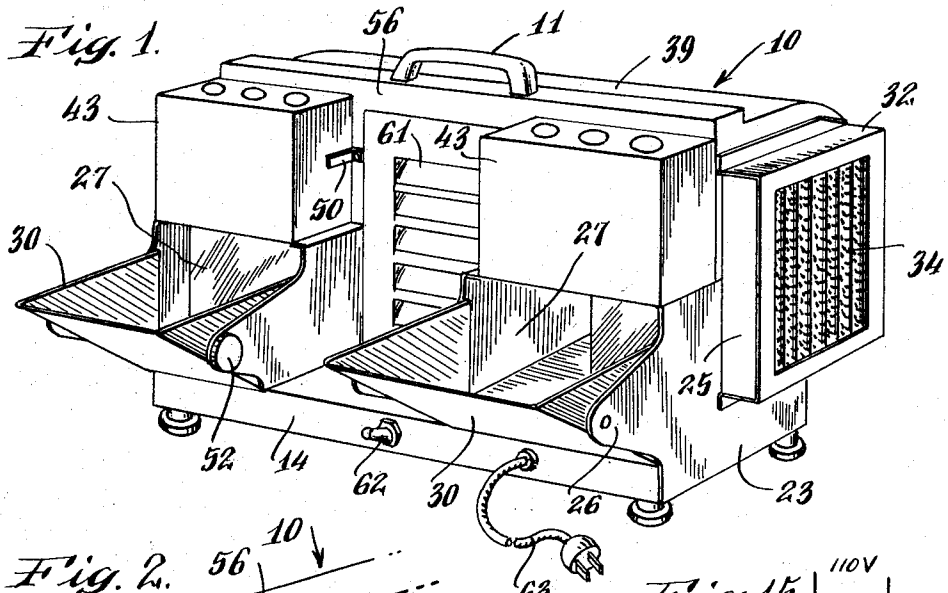


Fig. 2.

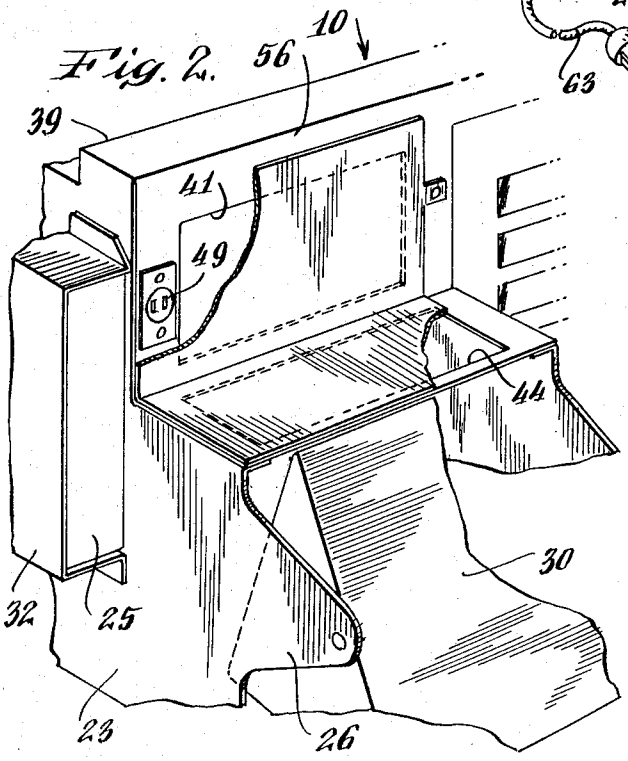


Fig. 15.

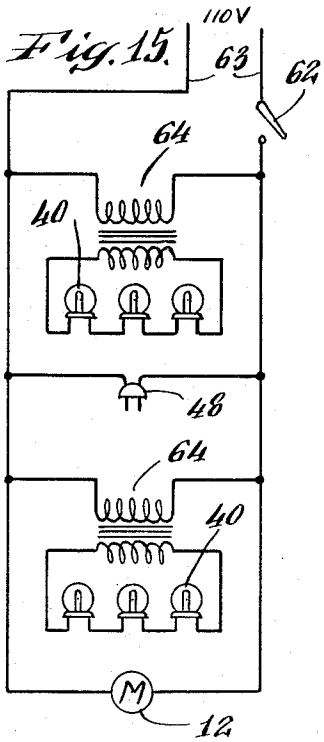
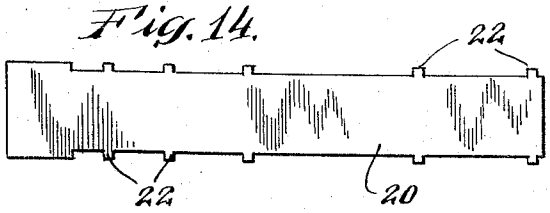


Fig. 14.



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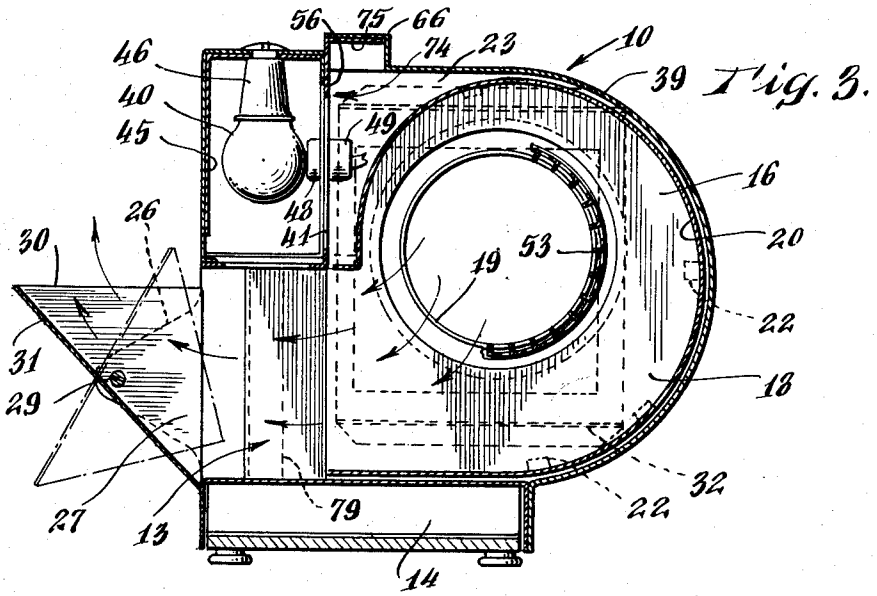


Fig. 3.

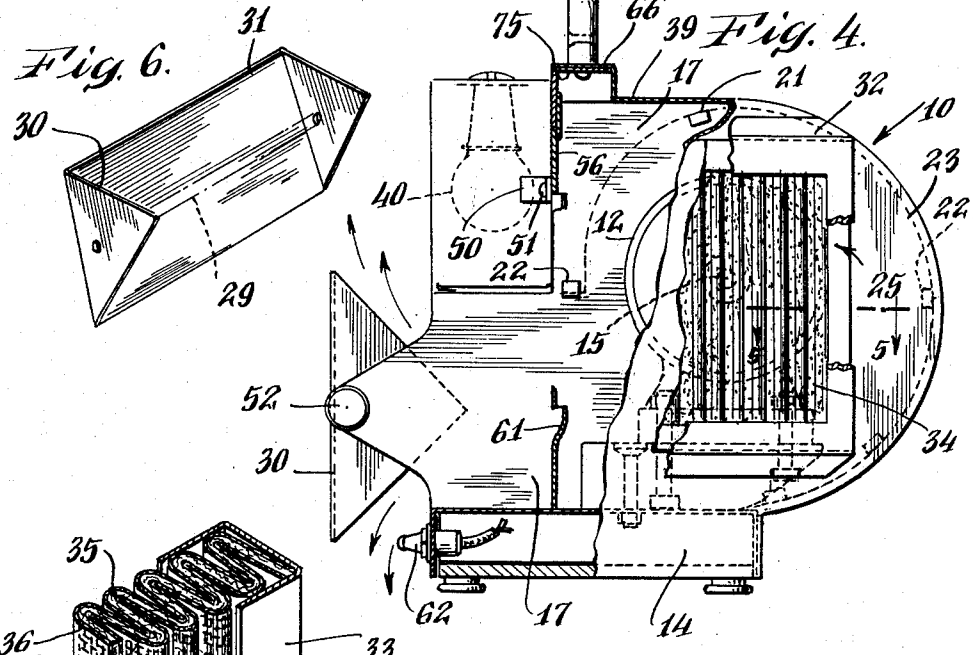


Fig. 4.

Fig. 6.

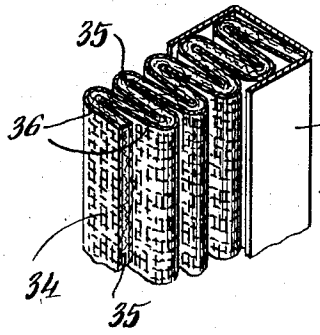


Fig. 5.

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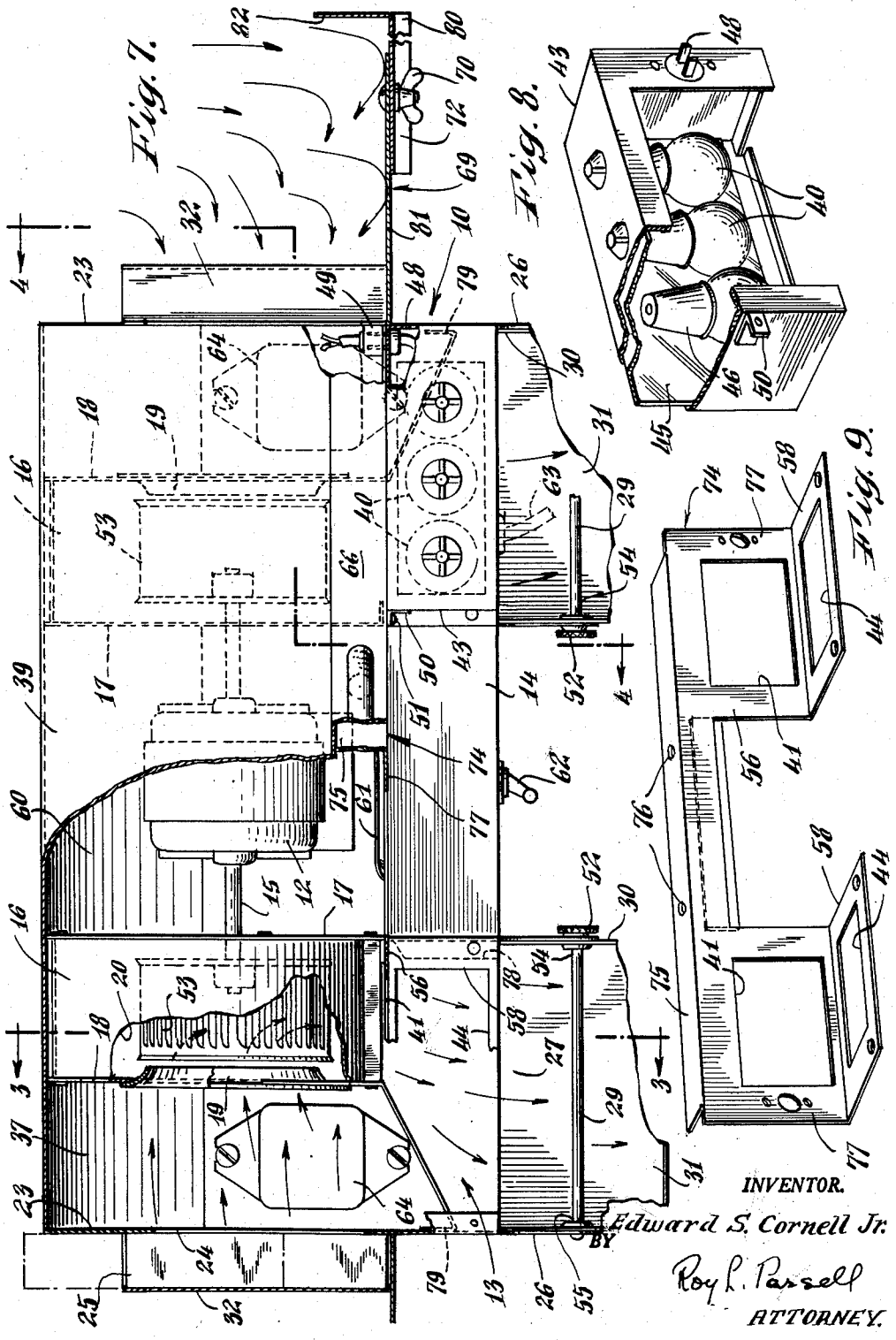


Fig. 7.

Fig. 8.

Fig. 9.

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Fig. 13.

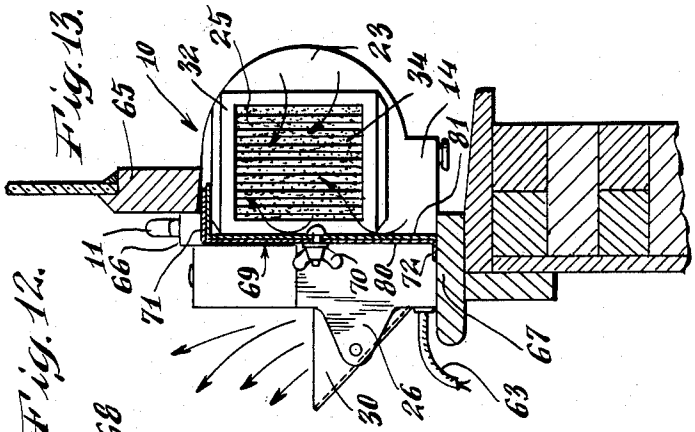


Fig. 12.

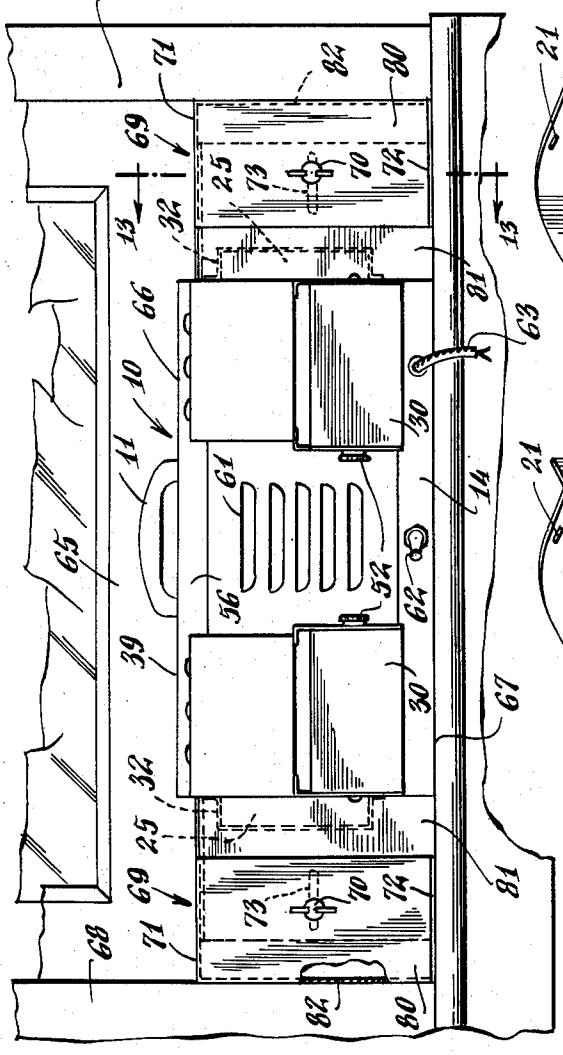


Fig. 11.

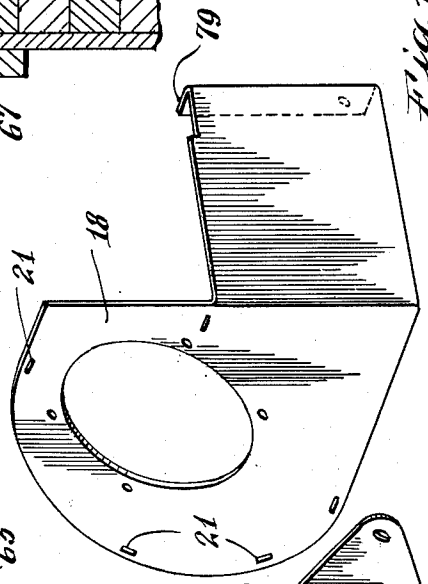
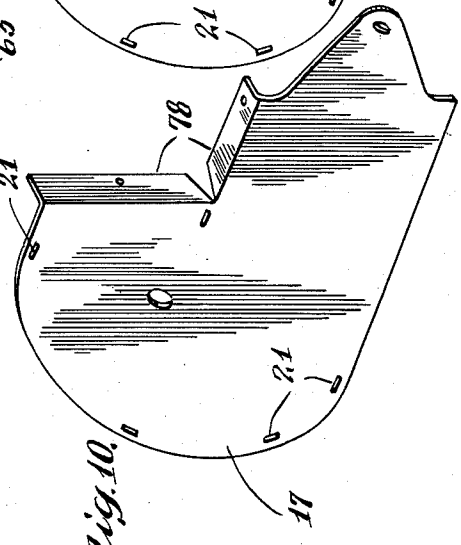


Fig. 10.



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APPARATUS FOR PURIFYING AIR

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Filed Oct. 12, 1959, Ser. No. 846,025
5 Claims. (Cl. 21—74)

The invention relates to an air purifier and more particularly to a light weight, portable, self contained and easily accessible apparatus for cleaning, electronically treating and circulating the air contents of a room in a dwelling or office.

One object of this invention is to provide a light weight, self contained portable apparatus which may be placed on a table, shelf or in a window opening.

Another object is to provide an apparatus which may be connected to an electrical outlet with which rooms or offices are usually equipped.

Another object, through its dual unit design, is to effect the maximum of complete air changes in a given period of time.

Another object is to provide flexible direction and circulation of air without deleterious eddy currents and air flow noises in a substantially solid air stream.

Still another object is to provide effective filter means for thoroughly cleaning air water which is circulated through the apparatus.

Another object is to provide easily accessible and removable filter units for purposes of cleaning, washing or replacement.

Another object is to provide selective electronic means for treating the air with ozone or germicidal rays or both in order to properly conform to the contents of the particular room in which the apparatus may be situated.

Still another object is to construct the apparatus of component parts of such design as to permit low cost fabrication and maintenance.

Another object is to construct an apparatus which is compact and decorative in appearance.

Other and further objects of this invention will appear from the specifications and from the claims thereto annexed and from the accompanying drawings,

FIG. 1 is a front, top and one end view of the apparatus.

FIG. 2 shows the discharge side of one of the units.

FIG. 3 is a vertical section taken on line 3—3 of FIG. 7.

FIG. 4 is a partial vertical section taken on line 4—4 of FIG. 7 showing part of the filter and end wall of the unit, the latter cut away to reveal the inner side of the impeller housing.

FIG. 5 shows a portion of the filter structure.

FIG. 6 illustrates the tilting member of the air projector.

FIG. 7 is a plan view with one end of the top cut away to show the interior of one of the units.

FIG. 8 illustrates the lamp compartment.

FIG. 9 is the top front side prior to assembling.

FIG. 10 is the inner side of the impeller housing prior to assembling.

FIG. 11 is the outer side of the impeller housing of the same unit.

FIG. 12 is the unit placed in a window.

FIG. 13 is a vertical section on line 13—13 of FIG. 12.

FIG. 14 is the scroll before assembling.

FIG. 15 is a schematic wiring diagram.

In the following description and in the claims various details will be identified by specific names for convenience, but they are intended to be as generic in their application as the art will permit.

In the drawings (where like reference characters denote like parts in the several figures) and in this description, certain specific disclosure of the invention is made for purposes of explanation, but it will be understood the details may be modified in various respects without departure from the broader aspects of the invention.

The apparatus comprises an elongated cabinet **10** as shown in FIG. 1 having a handle **11** for convenience in carrying. A louvred door **61** closes a motor compartment **60** containing a driving motor **12**. At each end of the cabinet **10** is a unit for treating and moving the air to be purified as will be subsequently described.

As shown in FIG. 7, the electric motor **12** is mounted at the approximate center of the chassis **14** with drive shafts **15** extending longitudinally on each side on which are mounted the impeller **53** or squirrel cage type of fan, forming a duplex air moving means of relative large capacity yet occupying relatively small space.

The impeller shroud or housing **16** (FIGS. 3 and 7) is of unique construction. The inner vertical side **17** of the housing **16** forms one wall of the motor compartment **60** and extends forwardly to form the rear portion of the wall of the discharge passage **27** and supports the inner end **54** of axle **29**. The other vertical side **18** of the housing **16** carries the suction orifice ring **19** and extends forwardly to form the other vertical wall of the discharge passage **27**.

The involute cover or scroll **20** (FIGS. 3 and 7) surrounding circumferentially the impeller **53** closes the space between the two vertical walls of the impeller housing and completes the impeller chamber. This scroll **20** is secured to the vertical side walls **17** and **18** by tongues **22** cooperating with slots **21** in the two vertical side walls **17** and **18**.

Both vertical walls **17** and **18** are stamped from sheet metal (FIGS. 10 and 13) and are secured to the chassis **14** by spot welding (FIG. 7).

Each end wall **23** of the cabinet **10** (FIGS. 2 and 7) has a portion **26** extending forwardly to form the forward portion of the outer side wall of the discharge passage **27** and acts as the support for the other end **55** of axle **29**.

Each end wall **23** (FIGS. 4 and 7) has an aperture **24** through which room air to be purified is drawn in through a filter unit **25** detachably secured to the outer side of each end wall **23**.

To hold the filter unit in place (FIGS. 1 and 4) an open frame or bracket **32** is attached to the outer side of the end wall **23** having a channel cross section top and bottom in which the filter unit **25** slides. The latter is held in place by detent means not shown.

Each filter unit **25** (see FIGS. 4 and 5) comprises a channel shaped frame **33** enclosing the filtering media **34** subsequently described. The frame **33** of the filter unit cooperates with the intake opening **24** in the end **23** and supporting bracket **32**, secured thereto so that the air passes through the filter and does not by-pass through the joint between the filter unit frame **33** and the intake aperture **24**.

The filter (FIG. 5) consists of a highly inert bonded synthetic fiber medium **35** retained between two layers of plaited screen cloth **36**. The plaited construction presents the maximum area to the air stream and the woven screening holds the filter medium in place. A gain in filter efficiency can be realized by coating the media with a water soluble oil. The unitary construction enables the filter panel to be easily removed for cleaning, washing or replacement.

After passing through the filter unit **25** from which substantially all dust, foreign particles and pollen are removed down to three microns and smaller depending on the particular filter medium, the air passes into an intake chamber **37** (FIG. 7) formed by the front wall **56** of the cabinet **10**, the end wall **23**, the cover **39**, the chassis **14**

and the wall 18 of the impeller housing 16. From this chamber 37 the air is drawn through suction orifice ring 19 in the housing wall 18 by the rotation of the impeller.

A lamp compartment 43 (FIG. 8) is mounted exteriorly on the front wall 56 above the discharge passage 27 and contains a battery of electronic lamps 40 for treating the air circulating through the unit. The lamp compartment 43 is removable for inserting or removing the lamps and is provided with electrical coupling means comprising a plug 48 mounted on the compartment wall which cooperates with a socket 49 (FIG. 2) located on the front wall 56 of the cabinet 10.

The lamps 40 are screwed into sockets 46 mounted on the top wall of the compartment 43. While the electrical diagram (FIG. 15) shows the lamps in series with a common ballast 64 they may be connected in other ways according to the characteristics of the particular lamps used. These lamps may all be ozone producing lamps or all germicidal lamps or a combination of both or omitted entirely, depending on the size and circulating conditions of the room in which the apparatus is used.

Reflector means 45 (FIG. 4) mounted inside the compartment on the front and top walls reflect the lamp rays to increase their efficiency.

The rear and bottom walls of the lamp compartment 43 are cut away (FIGS. 3 and 8) so that lamp rays pervade the chamber 37 through opening 41 in front wall 56 and pervade the discharge passage 27 through the opening 44 in the top of the passage 27 as shown in FIG. 3.

Since the lamp compartment 43 is open to both intake chamber 37 and discharge passage 27 a slight amount of discharging air may be drawn through this compartment 43 and back to the chamber 37. This recirculation tends to further purify the air and any loss in discharge velocity is negligible.

The discharge passage 27 (FIGS. 2 and 7) terminates in an air projecting means formed by the side walls 26 and 18 and a transverse tilting member 30 movable on axle 29. A thumb nut 52 can be tightened to hold the tilting member 30 in any desired position.

The discharging air is held in a substantially solid stream by the projector and does not dissipate in the immediate vicinity of the apparatus and as a result no uncomfortable drafts are noticeable unless one moves directly into the air stream. With a setting of the tilting member to project the air stream upwards toward the ceiling or downwards toward the floor the entire contents of the room may be circulated in a very short time and the purified air maintained constantly throughout the room.

It is known that heavy concentrations of ozone may be injurious. Hence this type of air projector insures that the ozone is quickly distributed throughout contents of the entire room and heavy concentrations in spots is avoided.

For the most efficient operation of the apparatus the room windows usually remain closed but when it is desired to bring in outside air, the apparatus is placed in a window opening as shown in FIG. 12. To seal off the open space surrounding the apparatus, the window sash 65 is lowered to rest on the cover 39 of the cabinet (FIG. 13) abutting the longitudinal rib 66 formed in the cover 39 for this purpose and telescoping filler members 69 (FIGS. 7 and 12) are placed in position between the ends 23 of the cabinet and the window casings 68.

The telescoping filler 69 (FIG. 13) comprises a set of plates 80 and 81 held together by clamping means 70 comprising a wing nut and bolt and having their top edges 71 bent outwardly to form wide flanges to receive the window sash 65. The telescoping filler plate 80 also has a wide vertical side flange 82 extending outwardly to abut casing 68 and an inwardly extending horizontal flange 72 to abut the sill 67. These wide flanges 71 and 72 and plates 80 and 81 form a scoop to direct outside air currents into the intake filter unit. A horizontal slot 73 in plate 81, through which passes the bolt member of the clamping means 70, permits sliding adjustment of plate 81. Tightening of the wing nut on the clamping member 70 holds the telescoping filler members 71 in operating position.

The panel section 74 (FIG. 9) forming the front wall 56 of the cabinet is blanked out of sheet material and the top edge 75 bent rearwardly to form a flange to adjoin the front top edge of the cover 39. The holes 76 are provided for securing the handle 11. The two lower portions 77 of this panel are bent forwardly as shown in FIG. 9 to form a shelf for the lamp compartment and the top side 58 for the discharge passage 27. In the preferred embodiment, the openings 41 and 44 to permit lamp rays to enter chamber 37 and passage 27 respectively may be blanked out when the sheet is formed.

In blanking out the side walls 17 (FIG. 10) of the impeller housing 16 flanges 78 are provided for securing side wall 17 to front panel 74. In a like manner flange 79 (FIG. 11) is provided on inner side wall 18 of impeller housing 16 to secure it to the end wall 23 of the cabinet (FIG. 7).

The lamp compartment 43 is detachably secured to the front wall 56 of the cabinet 10 by means of an angle 50 welded to the wall of the compartment and held against the front wall 56 by screw 51. The use of screw means tends to reduce unintended opening of this compartment but in the event opening does take place, the electrical connection will be broken due to the separation of the coupling means and the lamps will not be energized. This is a desirable safety feature since the lamp rays might be injurious if directly viewed by a person.

While certain novel features of the invention have been disclosed herein, and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In an air purifying apparatus the combination of a cabinet having a longitudinal rear compartment with an open air intake end and a front wall provided with a ray exposure opening; a blower housing mounted in and closing the other end of said compartment to leave an air-intake chamber extending to said air-intake end; said housing having an air-intake aperture providing communication between it and said intake chamber and a discharge opening toward the front thereof; a front compartment adjacent to and of the same length but of less height than said rear compartment; said front compartment having an air discharge end at the front thereof and having a rear wall separating said rear and front compartments; said rear wall having an opening therein defining said discharge opening in said housing; a power-driven impeller in said housing to force air from said intake chamber into said front compartment; a ledge projecting forwardly from said front wall at said height thereof and having therein a ray exposure opening in communication with substantially said entire front compartment; a closed conduit on and formed in part by said ledge and providing communication between said ray exposure openings and said front compartment and air discharge end thereof extending the entire length of said rear compartment; and lamp means in said conduit.

2. In the apparatus of claim 1 which further comprises a unitary conduit structure mounted on said ledge and contiguous to said front wall and closed on all walls except for openings providing communication between said ray exposure openings in said front wall and said ledge respectively; and containing lamp means mounted therein.

3. In the apparatus of claim 1 which further comprises a unitary conduit structure removably secured to said cabinet and having electrical companion plug and socket members of which one member is carried by said

front wall for access from outside of said cabinet and the other member is in circuit with said lamp means and is carried by said conduit structure externally thereof for connection and disconnection of said members on locating said conduit structure on and removing it from said cabinet respectively.

4. In an air purifying apparatus the combination of a cabinet having a longitudinal rear compartment with an open air-intake end wall and a front wall provided with a ray exposure opening; a blower housing having a pair of spaced parallel side walls mounted in and closing the other end of said compartment to leave an air-intake chamber extending to said air-intake end wall; one of said housing walls provided with an air-intake aperture which establishes communication between said housing and said intake chamber and a discharge opening between said side walls toward the front thereof; a front compartment adjacent to and of the same length but of less height than said rear compartment and having an air discharge end at the front thereof; a portion of said housing wall extending forwardly and longitudinally from said housing discharge opening toward said air-intake end wall to constitute the rear wall of said front compartment; a power-driven impeller in said housing to force air from said intake chamber into said front compartment; a ledge projecting forwardly from said front wall at said height thereof and having therein a ray exposure opening in communication with substantially the entire front compartment; a closed conduit on and formed in part by said ledge and providing communication between said ray exposure openings and said front compartment and air discharge end thereof extending the entire length of said rear compartment; and lamp means in said conduit.

5. In an air purifying apparatus the combination of a cabinet having a longitudinal rear compartment with an open air-intake end wall and a front wall provided with a ray exposure opening; a blower housing having a pair of spaced parallel side walls mounted in and closing the other end of said compartment to leave an air-intake

chamber extending to said intake end wall; one of said housing walls provided with an air-intake aperture which establishes communication between said housing and said intake chamber and a housing discharge opening between said side walls toward the front thereof; a front compartment adjacent to and of the same length but of less height than said rear compartment and having an air discharge end at the front thereof; a portion of said housing wall extending forwardly and longitudinally from said housing discharge opening toward said air-intake end wall to constitute the rear wall of said front compartment; a portion of the other said housing side wall extending forwardly to constitute one side wall of said front compartment; a portion of said air-intake end wall extending forwardly to constitute the other side wall of said front compartment; a power-driven impeller in said housing to force air from said intake chamber into said front compartment; a ledge projecting forwardly from said front wall at said height thereof and having therein a ray exposure opening in communication with substantially the entire front compartment; a closed conduit on and formed in part by said ledge and providing communication between said ray exposure openings and said front compartment and air discharge end thereof extending the entire length of said rear compartment; lamp means in said conduit; and a damper adjustably mounted between said side walls of said front compartment at said discharge end thereof whereby air emerging from said discharge end is diverted unidirectionally as desired.

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