

Sept. 29, 1936.

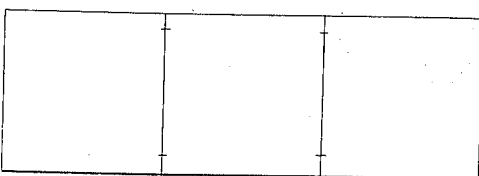
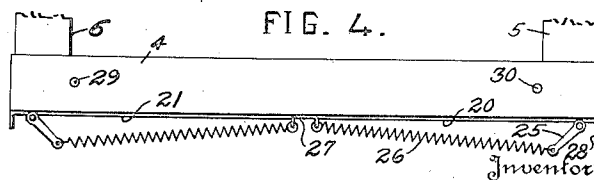
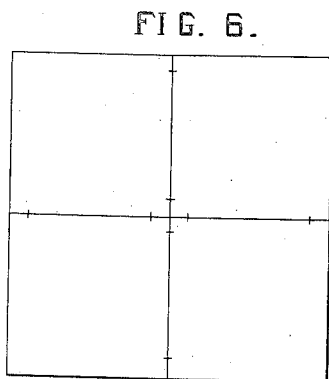
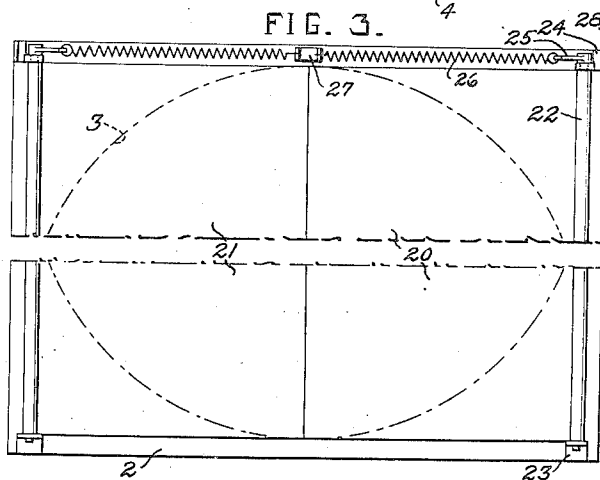
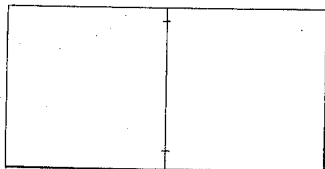
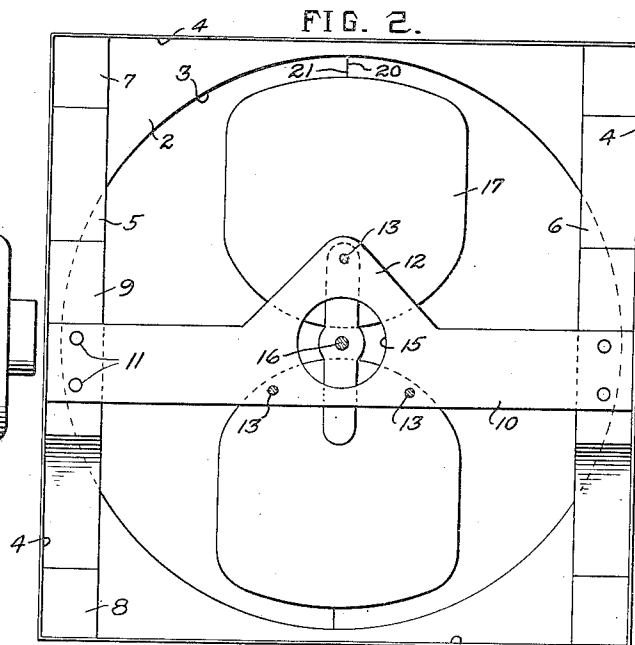
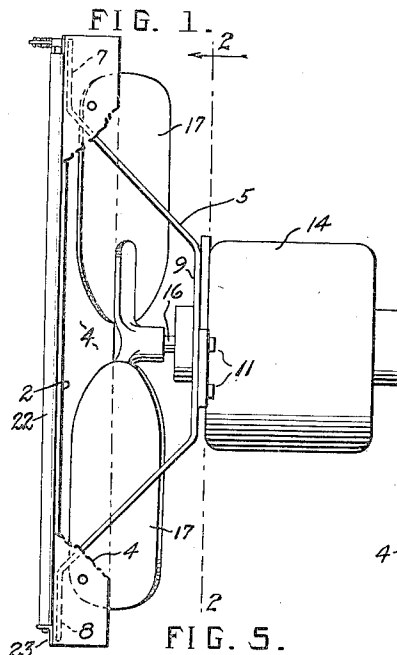
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2,055,592

VENTILATION SYSTEM

Filed Sept. 10, 1934

2 Sheets-Sheet 1



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VENTILATION SYSTEM

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2 Sheets-Sheet 2

FIG. 8.

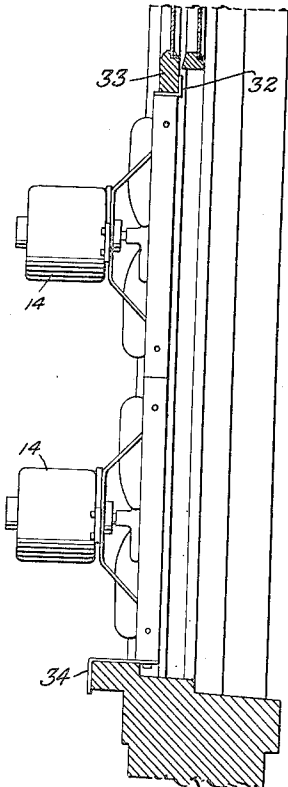


FIG. 9.

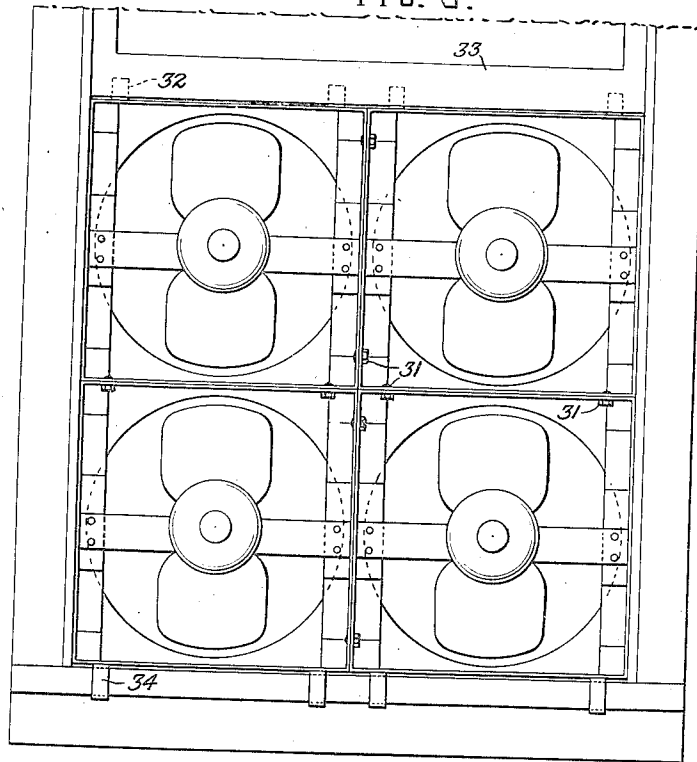


FIG. 10.

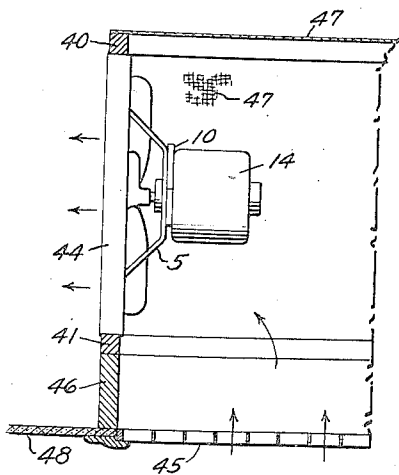
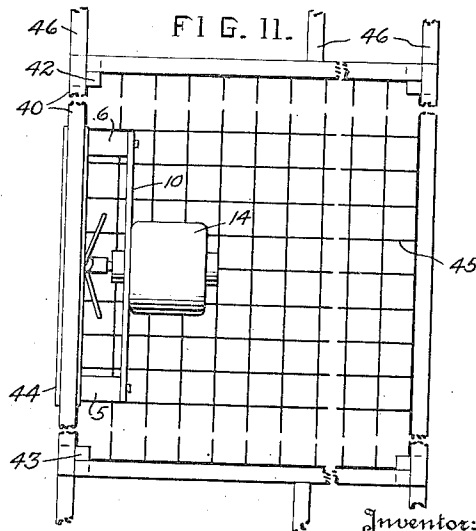


FIG. 11.



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UNITED STATES PATENT OFFICE

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VENTILATION SYSTEM

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Application September 10, 1934, Serial No. 743,450

3 Claims. (Cl. 98—39)

This invention relates to an apparatus for, as well as to a method of, ventilating spaces and has for its object to provide a construction and a method of operation more efficient in use than those heretofore contemplated, and cheap in manufacturing costs.

With these and other objects in view the invention resides in the novel details of construction and combinations of parts constituting the apparatus, as well as in the novel steps and combinations of steps constituting the method, all as will be disclosed more fully hereinafter and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification and in which like figures designate like parts in all the views,—

Fig. 1 is a side elevational view, with parts broken away, of one of the units contemplated by this invention;

Fig. 2 is a vertical sectional view of the parts shown in Fig. 1 taken as on the line 2—2 thereof and looking in the direction of the arrow;

Fig. 3 is a broken front elevational view of the unit;

Fig. 4 is a top plan view of the parts shown in Fig. 3;

Figs. 5, 6 and 7 are diagrams illustrating flexibility of assemblage of the units constituting this invention;

Fig. 8 is a vertical sectional view through a window showing the installation therein of an assemblage of units;

Fig. 9 is an elevational view looking through the window and showing an assemblage of four units therein;

Fig. 10 is a view illustrating the mounting of a unit as for example when used in attic ventilation; and

Fig. 11 is a top plan view of the parts shown in Fig. 10.

In order that this invention may be the better understood it is desired pointed out that heretofore the ventilation of spaces such as rooms of houses, attics, and larger spaces such as factory work-shops, and storage areas, has been accomplished by the installation of a single ventilating fan selected for the maximum amount of ventilation required for the space to which it was fitted, necessitating not only a high initial cost, but expensive operating and control including speed regulators or rheostats whereby the fan could be operated at various speeds other than the maximum. Further, prior known devices when once installed became a fixed feature in the building construction because of its weight, and therefore

if and when additional ventilation was required, or the direction of the ventilating air currents was desired changed, then it was necessary to duplicate and/or transfer the original fan installation at or to the desired points, thereby adding to the initial cost.

By this invention these difficulties are overcome in that there is now provided a fan unit of very cheap manufacturing costs, which is light in weight, and which is adapted to be grouped with others of equal size and capacity to establish an assemblage, such grouping being permitted in various combinations to suit the needs and demands of the space to be ventilated, as well as the size of the wall openings already existing in the building structure and with which the assemblage will be associated. This assemblage is flexible to the extent that the group of units may be applied substantially permanently to a wall opening, or it may be applied in a semi-permanent manner, or the assemblage may be portably mounted for movement to the particular wall opening where it was most needed at the time.

Also, this assemblage contemplates independent electric operation of each contained unit fan so that one or more of said units may be operated simultaneously in the assemblage. Therefore it will be apparent that by this invention there is permitted a flexibility in the volume of air controlled by an assembly, with minimum volume when but one fan unit is operating, and maximum volume when all are operating; thus it is not necessary to have, as heretofore, separate fans of various capacities to take care of the ventilation of large spaces. This independence of unit fan operation also permits ready repair to any one fan unit, and if necessary a very quick replacement. That is to say, should any one fan require repair, its operation could be cut out of the assemblage without disturbing the operation of the others, and the repair if slight can be made with the fan unit remaining in its position in the assemblage. On the other hand, if the needed repair so required, the unit fan could be detached from the assemblage and removed to a position where such repair could be made, and while this was being done, if desired, a substitute fan unit could be inserted for operation in the place left by the one just removed.

Referring to the drawings, 2 designates a square metallic plate provided with the circular cut-out portion 3 through which the air is driven. Each outer edge of said plate has associated therewith a rearwardly extending flange such

as indicated at 4 to provide respectively a top, bottom, and two sides, the corner junctions of which are secured whereby the complete structure will constitute a box-like frame for supporting the fan. Two opposite sides of this frame are provided each with a bracket member indicated at 5 and 6 preferably of strong but thin strap metal and bent into shape shown particularly in Fig. 1 so that the two end portions 7 and 8 may be welded, riveted, or otherwise securely fixed into two corners of the fan frame whilst the middle portion 9 of the bracket will lie in a plane spaced from and substantially parallel to the plane of the plate 2 of the frame.

There is provided a fan support 10 of material similar to the brackets 5 and 6 and positioned to bridge the space between the latter; that is to say the support 10 has each of its ends adapted to be bolted or otherwise attached as at 11 to the middle portion 9 of each of the brackets whereby the support may be readily removed from said brackets without disturbing the brackets and the frame to which they are secured. This support 10 may be, and is preferably, enlarged laterally as at 12 midway its ends so that three or more bolts or the like may be accommodated for securing the electric motor 14 to said support and there is provided a central opening 15 through which the shaft 16 of said motor may pass, the fan blades 17 being secured as usual on the end of said shaft and positioned to lie partly within the fan frame as shown in Fig. 1 and to force the air through the circular opening 3 of said frame. It will be understood that each motor 14 is provided with suitable binding posts or the like to which electric current conductors may be attached, these not being shown in the drawings for the sake of clearness.

On what may be considered the front or discharge side of the fan frame there is provided a pair of vertically pivoted doors or louvres indicated at 20 and 21 each mounted upon a hinge such as 22 whose lower end is pivoted within the bracket 23 and whose upper end is not only pivoted within the bracket 24 but carries at its extremity an arm 25 to the outer end of which is secured one end of a light-weight spring 26 the other end of which is secured to a bracket 27 fixed to the plate 2 at substantially its vertical center line. Further the bracket 24 is preferably provided with a stop lug 28 for limiting the arcuate movement of the arm 25.

By this construction it will be understood that when the fan is operating the force of the air blast produced thereby will be sufficient to open the doors or louvres 20-21 turning them about their hinges against the tension of the light weight spring 26, and that when the fan ceases to operate, the spring 26 will be sufficient in strength to close the doors. These doors are therefore purely automatic in their operation and are provided to prevent cross feed air currents as from an operating fan to an adjacent non-operating fan in the same assemblage, and also to serve as closures of the fan frame when the contained fan is not operating. The brackets 23 and 24 are preferably of the socket type wherefore the doors may be readily removed.

In each of the flanges such as 4 of the fan frame, there is provided a pair of bolt holes such as 29 and 30 which are equidistantly and exactly spaced from the corners of the frame so that an assemblage of any desired number of such frames can be readily built up, since the bolt holes of any one frame will register with the bolt

holes of any flange of any other fan unit frame. By this construction it is possible to secure two such fan frames together as shown in Fig. 5 to create an assemblage of two units, or three can be joined as shown in Fig. 7, or four can be bolted together as indicated by Fig. 6. In like manner it will be evident that assemblages of square, round, oblong or irregular contour may be built up to suit the needs and requirements of any space to be ventilated.

In Figs. 8 and 9 there has been shown a practical assemblage of four fan units, the frames of which have been made of such dimensions that said assemblage will readily fit the width of the open window, the four units being bolted together as clearly indicated at 31. Short angle fasteners 32, secure to the bolt holes in the upper flanges of the assemblage, are adapted to engage the bottom of the window sash 33 when lowered thereonto, and longer fasteners 34, similarly bolted to the lowermost flanges of the assemblage, are adapted to engage the sill of the window frame, said fasteners being provided to keep the assemblage in position in what may be termed a semipermanent manner within the window opening. Screws or other fasteners could be put through the bolt holes in the vertical side flanges of the assemblage to engage the side portions of the window frame to make the securement permanent. It will be understood that instead of the four unit assembly here shown such assembly could be of two units or could be of any number of units bolted together to fit the capacity of the window opening.

Figs. 10 and 11 show a modified form of mounting which is perhaps better suited to installations involving attic openings, or ventilating wells such as are often found in some building construction. Two horizontal members such as 40 and 41 are provided and spaced by a pair of vertical members 42 and 43 so as to receive therebetween one or more unit fan frames generally indicated by the numeral 44. The members 40, 41, 42 and 43 constitute the sides of a skeleton frame placed vertically adjacent a ceiling opening covered by a grille 45, and are joined to similar members surrounding the ceiling opening in the attic space. 46 indicates the usual floor or ceiling joists upon and to which the skeleton framework members are secured, and 47 indicates a canvas or other suitable material applied to said members as a covering of the framework to insure the air flow, generated by the fan, from the space below the ceiling 48 through the grille 45 and boxed framework and out into the attic space, as indicated by the arrows.

From the foregoing it will therefore be apparent that by this invention there is provided a ventilating fan unit comprising the structure shown in Figs. 1 and 2 which may be of any desired shape; i. e. the frame may be square, as shown or it may be in the form of a regular pentagon, hexagon or other plural sided construction, or it may be circular with bolt holes provided at the intended points of contact with a similar circular unit, it being understood that all of the flat sides of the fan unit frame will be equal as to dimensions in order to permit the grouping or assembling of a plurality of these frames to provide the assemblage necessary to give the maximum required air flow. Hence when plural unit frames are bolted together the entire assemblage will be integral and self-supporting in the sense that only one support will be necessary for the entire assemblage.

In the operation and functioning of the appa-

ratus contemplated by this invention, there is first determined the maximum amount of air flow necessary to completely ventilate the space or room in which the apparatus is used and then the required number of ventilating fan units is calculated to give this total air flow when all the units are operating. The units are assembled and then the assemblage is either placed in a wall opening of the room, or mounted upon a portable stand or carrier so that it may be moved into close cooperating association with a desired wall opening, and then one or more of the ventilating fan units will be actuated to give the amount of air flow required at that particular time for ventilating the room. In this connection it should be understood readily that not all of the fan units must be operated at some one time, whereas at other times the need for ventilation will be so great that all of said units must be operated. The installation of such an assemblage in a chemical laboratory or chemical work shop is a good example of the needs at various times of operating all of the fan units or only some thereof. As an example of the desirability of making the assemblage portable, it is stated that many work shops or factories consist of a space bounded by walls open on two or more sides to the outside atmosphere and in the case of a work shop with two opposite side walls containing openings to the atmosphere, the condition of prevailing winds must be taken into consideration in the ventilation of such a shop. In other words, with a heretofore proposed ventilating fan installation in a north window opening, and a wind blowing from the north with considerable velocity, the action of the ventilating fan will be greatly impaired if not entirely negatived, whereas such a fan would be practical and more or less efficient in said window opening if the wind was blowing from the south. By the present construction herein proposed, the assemblage, mounted upon a portable carrier, can be moved to any window or door opening of the room to give at all times maximum and absolute efficient ventilating operation. Hence the assemblage can be selectively established or disposed at any single desired zone in a room, and the individual fan units independently operated to give the necessary volume of air flow required for ventilation of the room at any specified time.

It is obvious that those skilled in the art may vary the details of construction and arrangements of parts constituting the apparatus, as well

as the steps and combinations of steps constituting the method, without departing from the spirit of the invention and therefore it is not desired to be limited to the foregoing disclosures except as may be required by the claims.

What is claimed is:

1. In a ventilating fan unit the combination of a frame comprising a plate and a plurality of sides extending laterally therefrom, the sides joined together at the frame corners, and the plate having an aperture constituting an air passage; a pair of spaced brackets whose ends are secured to said plate, each bracket having a portion disposed substantially parallel to the plane of said plate; a fan for causing air flow through the plate aperture; a member for supporting said fan, the opposite ends of said member detachably secured to said bracket portions; and means in a side of said frame for joining the unit to a side of a similarly formed unit.

2. In a ventilating fan unit the combination of a frame of regular polygonal shape and comprising a plate and a plurality of sides extending laterally therefrom, the sides joined together at the frame corners, and the plate having an aperture constituting an air passage; a pair of spaced brackets whose ends are secured to said plate, each bracket having leg portions bracingly contacting a frame side as well as having a central portion disposed substantially parallel to the plane of said plate; a fan for causing air flow through the plate aperture; a vertical plate member for supporting said fan, the opposite ends of said member detachably secured to the central portions of the spaced brackets; and means in each side of said frame for joining the unit to any side of a similarly formed unit.

3. In a ventilating fan unit the combination of a frame comprising a plate and a plurality of sides extending laterally therefrom, the sides joined together at the frame corners, and the plate having an aperture constituting an air passage; a pair of spaced brackets carried by said frame, each bracket having a portion disposed substantially parallel to the plane of said plate; a fan for causing air flow through the plate aperture; a member for supporting said fan, the opposite ends of said member secured to said bracket portions; and means in a side of said frame for joining the unit to a side of a similarly formed unit.

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