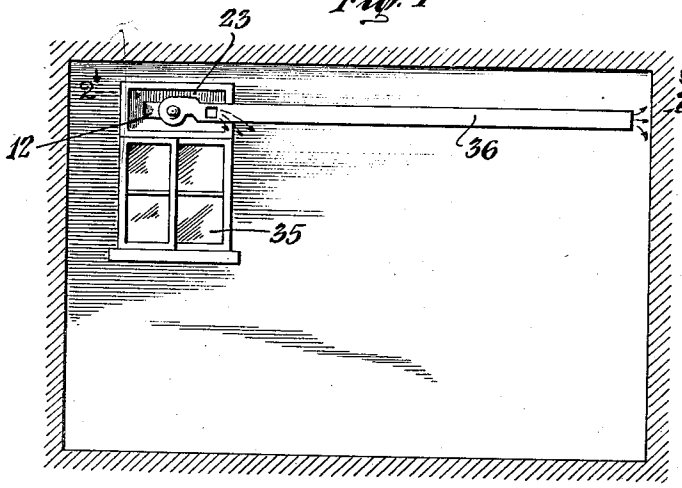
Dec. 17, 1940. C. E. MEYERHOEFER 2,225,070

VENTILATING SYSTEM

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Fig. 1



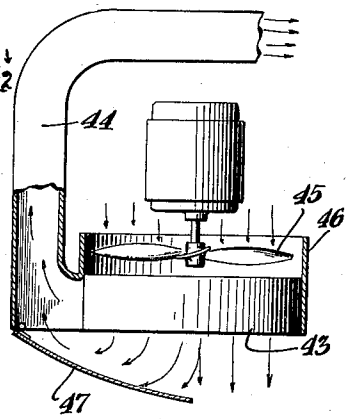


Fig. 7

Fig. 2

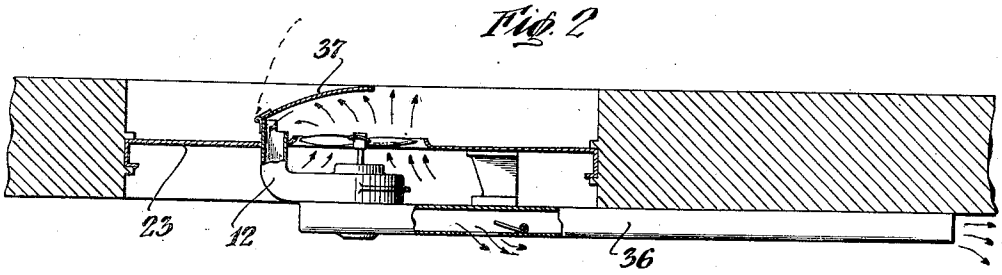


Fig. 5

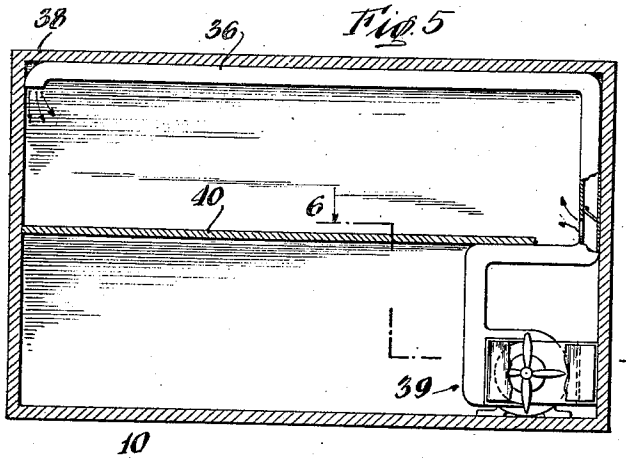
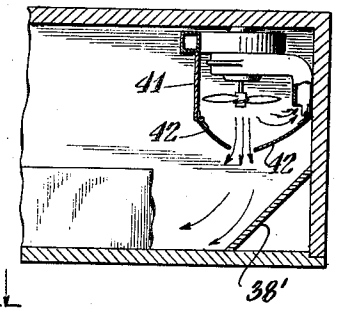


Fig. 6



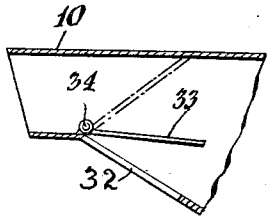


Fig. 8

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Fig. 3

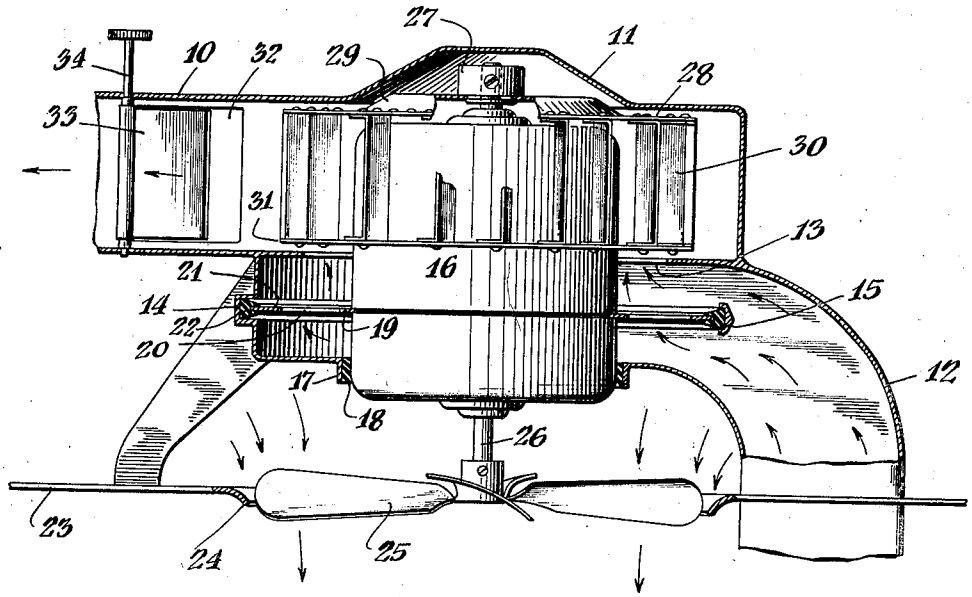
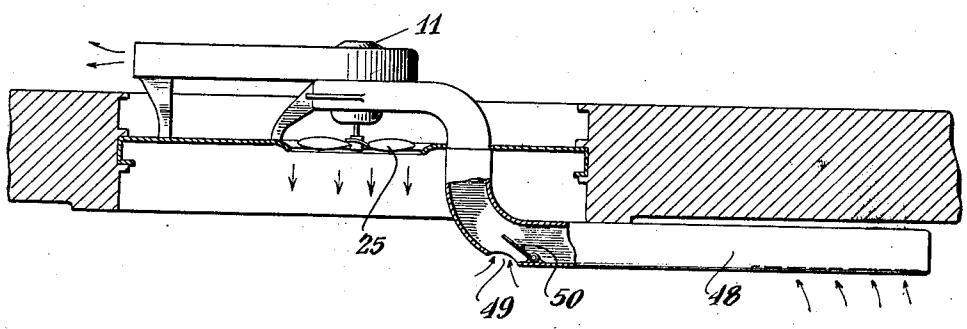


Fig. 4



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VENTILATING SYSTEM

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Renewed May 28, 1940

5 Claims. (Cl. 98—33)

This invention relates to a novel and improved form of ventilating and air circulating system.

It is an object of the invention to provide such a system, and by means of which stale air may be discharged from an enclosure and/or fresh air may be introduced into the same. Moreover, the present system is ideally suited for agitating, circulating, and, if desired, conditioning air within an enclosure, and without necessarily either removing therefrom or introducing thereto any quantities of air.

A further object of the invention is that of furnishing an improved apparatus for use in such a system, and my means of which the desired functions may be readily and economically achieved.

A still further object of the invention is that of furnishing a system and apparatus, the component parts of which will be relatively simple and rugged in construction, and which apparatus may readily be assembled to function over long periods of time with freedom from all difficulties.

An additional object is that of providing a ventilating system and apparatus within which there will preferably be included an electric motor which will serve to drive fans or equivalent impelling elements, the parts being arranged in such manner that but a minimum amount of space will be necessary for their accommodation, aside from the fact that an unskilled person may efficiently operate the system.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating practical embodiments of the invention, and in which:

Fig. 1 is a fragmentary perspective view of a room with a system of the present type associated therewith;

Fig. 2 is a sectional plan view, taken along the lines 2—2 and in the direction of the arrows as indicated in Fig. 1;

Fig. 3 is a sectional plan view of one form of unit which may serve to operate the system;

Fig. 4 is a view similar to Fig. 2, but showing the apparatus reversed;

Fig. 5 is a front elevation of a case or enclosure, and showing the system applied thereto;

Fig. 6 is a sectional view taken along the lines 6—6 and in the direction of the arrows as indicated in Fig. 5;

Fig. 7 shows a form of operating unit slightly different from that illustrated in the preceding views; and

Fig. 8 is a fragmentary side elevation of one of the ducts forming a part of the system and of the control valve which may conveniently be used in connection therewith.

It is believed that the present system will be most readily understood by referring primarily to the main operating unit or apparatus, which serves to cause a functioning of the system. With this thought in mind, reference is initially had to Fig. 3, in which it will be observed that there is illustrated a casing which, as shown, preferably includes a duct 10, a housing 11 to the rear of the same, and from which housing portion a further duct 12 extends. The rear wall of duct 12 is formed with an opening 13, so that fluid may readily flow from duct 12 into housing 11 and thence through duct 10. The forward wall of duct 12 is also formed with an opening in line with opening 13, while the end wall of this duct may be channeled as indicated at 14. Additionally, a bracket portion 15 may extend within duct 12 and be provided with a channel in line with the channeled portion 14.

A motor, including casing sections 16, may have its rear end extending within housing 11, while its body extends through opening 13 and through the opening formed in the forward or outer face of duct 12. The latter may be formed with a flange 17 defining such latter opening, and a ring 18, of suitable shock-absorbing material such as rubber, may be interposed between this flange and the adjacent casing section 16. A ring 19 may have its inner edge extending between the adjacent edges of casing sections 16, with its side faces in intimate contact with such edges. Arms 20 may project from ring 19 and have their outer ends connected to a ring 21. A channeled shock-absorbing strip 22 receives the edge of ring 21, and may have its body disposed within the channel 14 as well as the channeled portion of bracket 15. In this manner, the motor will be supported against damage, and, conversely, such motor will transmit but a minimum amount of vibration and sound to the ducts 10 and 12, or housing 11. Any such contingency may, of course, be even further guarded against if the arms 20 are formed of flexible and/or resilient material. This entire structure may be supported upon a plate 23, which has an opening adjacent thereto and which is extended outwardly as indicated at 24. A fan 25, of more or less conventional construction, is arranged substantially in line with the edges defining this opening and is secured to the motor shaft 26. The opposite ends of this shaft preferably mounts the hub portion 27 of a disk 28, which may be centrally dished or bulged as at

29, to accommodate rearwardly extending portions of the motor. Disk 28 supports adjacent its periphery an annular series of vanes or blades 30, the outer ends of which are connected by a ring 31.

The blades 30 are spaced from the exterior face of the motor casing, and it will be obvious as this blower wheel is rotated, air will be drawn through duct 12, opening 13, and past the surfaces of the motor casing through housing portion 11, and will then discharge through duct 10. In flowing in contact with the exterior surfaces of the motor casing, this air—if having a proper temperature differential—will serve to cool such casing, and it will be appreciated that in this manner but a minimum amount of space will be necessary for the assembly. Finally, referring to Fig. 3, it will be noted that, if desired, duct 10 may be provided with a discharge opening 32 at a point conveniently adjacent the housing 11. The purpose of this opening (if employed) will be hereinafter more particularly set forth, but at this time it will be noted, as shown in Fig. 8, that flow of fluid therethrough may be controlled by a valve 33, mounted upon a shaft 34 to be operated thereby.

Now referring to Figs. 1 and 2, the numeral 35 indicates a window or other suitable opening within which plate 23 is mounted. Connected to conduit 10 is a tube or conduit 36, which may be conveniently terminated in a discharge end or nozzle at a point relatively remote from the point at which window 35 is located. As shown in Fig. 3, conduit 12 is preferably continued beyond the exterior face of plate 23. Immediately beyond this point, and especially as shown in Fig. 2, the inner edge of this conduit (i. e. that edge which is most closely adjacent fan 25) terminates, while the exterior or opposite portion of the same may be continued for a slight distance. Adjacent the outer edge of this exterior portion, a panel 37 may be swingingly mounted. This panel preferably has an area such that it may be extended well beyond the inner edge of conduit 12, but even under an extreme condition should not obstruct more than one-half of the air column produced by fan 25.

Accordingly, with panel 37 swung to the position indicated by the dotted lines in Fig. 2, it is obvious that with the motor shaft 26 operating, the fan 25 will discharge stale air from the room. However, fan or blower wheel 27—31 will be drawing air from the outside, and if valve 33 is adjusted to the position indicated in dotted lines in Fig. 8, this fresh air will be injected through opening 32 into the room, as indicated by the arrows in Fig. 2. Should valve 33 occupy the position indicated in full lines in Fig. 8, merely a portion of the fresh air will pass from conduit 12 and housing 11 through opening 32, and the remainder will pass through conduit 36 and be discharged through the outlet or nozzle end thereof. Of course, if valve 33 is adjusted to completely close opening 32, then all air drawn in by the blower 30 will be discharged through conduit 36 at a point relatively remote from the window or other opening 35.

Under extreme conditions of temperature differential, or for other reasons, it may be desirable to dilute the incoming air with a certain amount of the air which is being discharged. In such cases, panel 37 will be swung to the position shown in full lines in Fig. 2, or even beyond such a position. Under these circumstances, it will act as a scoop to deflect a greater or lesser amount of air discharged by fan 25 towards conduit 12, so that fresh air entering the conduit will have its condition modified to a greater or lesser extent.

From the foregoing, it is apparent that a ventilating system is furnished which will be ideally suited for the discharge of stale air from the enclosure and the introduction of fresh air into the same. While not essential, it is desirable that, as indicated, the blower or fan 27—31, be of more limited capacity than the capacity of fan 25, in that, under the conditions described, it is presumed to be more desirable to introduce a lesser amount of outside air into an enclosure, than stale air, which is evacuated therefrom.

Reference is next had to Figs. 5 and 6, which are intended to illustrate, in a diagrammatic manner, an enclosure 38, in the nature of a case to contain merchandise, or an enclosure within which a number of animal or bird receiving pens or compartments are located. Disposed within this enclosure, and, for example, to one side of the same, is a unit indicated generally at 39, and which may correspond substantially to the unit heretofore described in connection with Fig. 3. It may be assumed that this enclosure is, for example, partially or wholly subdivided by a shelf or partition 40, and the problem accordingly arises of, for example, circulating the air in relatively large volume through the lower portion of the enclosure, while circulating the air in smaller volume through the upper and smaller portion of the space. Thus, again, by adjusting valve 33, the portion of the enclosure immediately adjacent unit 39 may receive air discharged from the blower wheel or fan contained within casing portion 11, while if the valve is adjusted to a different position, all or a portion of such air will be distributed through conduit 36 to the nozzle outlet end of the same.

It will, of course, be understood that the enclosure might be of any desired type, it being intended, when considering this embodiment, to merely exemplify the system as operating to primarily circulate air within an enclosed space and without necessarily exhausting air from that space or introducing fresh air into the same. Also, as shown in this view, a baffle 38' might, if desired, be arranged in line with the main fan so as to more expeditiously deflect air throughout the enclosure.

As shown in Fig. 6, and similar to the construction shown in Fig. 2, side walls 41 may be continued beyond plate 23, and these may swingingly mount panels or shutter members 42. Accordingly, the blast emanating from fan 25 may be deflected and modified, as desired. Additionally, by having conduit 12 terminating in advance of these shutter members, and as generally described in Fig. 2, it will be understood that the more the right-hand shutter member (as viewed in Fig. 6) is closed, the greater will be the amount of air deflected from the column discharged by fan 25. This deflected air will, of course, move into conduit 12, and accordingly a greater volume of air will be delivered from opening 32 and/or conduit 36.

As shown in Fig. 7, there may be arranged, conveniently adjacent fan 45 and preferably in advance of the same, a unit 43, which may filter, cool, wash, or otherwise condition air, in accordance with well known practice. This unit may be connected with any necessary or desirable system in any number of manners well known to those skilled in the art. As also shown in this figure, the blower 27—31 may be dispensed with,

and conduit **44**, corresponding to conduit **12**, may be continued without interruption by housing **11**, or otherwise. In such event, fan **45**, corresponding to fan **25**, will discharge a column of air through a casing **46**, and this casing may be divided by a partition defining conduit **44**, or the latter may be continued to provide such partition. A deflector panel **47** is conveniently pivoted adjacent the edge of the casing, and by simply swinging this panel to more or less closed position, a greater or lesser amount of air delivered by fan **45** will be delivered into conduit **44** for delivery to a relatively remote point.

Finally, referring to Fig. 4, it will be observed that there has been illustrated substantially the same arrangement of apparatus as has been shown in Fig. 1, excepting that the parts have been reversed, so that a major portion of fresh air is introduced into the space by fan **25**, while only a relatively small amount of air is withdrawn through conduit **48** or the opening **49** thereof, and discharged to the outer atmosphere. The operation of this unit will, of course, readily be apparent, it being understood that, according to the position of adjustment of valve **50**, a greater or lesser amount of air will be drawn either through opening **49** or through the end of conduit **48**.

From the foregoing, it will be understood that a ventilating and/or circulating system is provided which will, for example, efficiently distribute air at a number of different points within an enclosure. Moreover, the volume of air distributed at the several points may be regulated with nicety, and this air may be conditioned, if desired, and, additionally, the air supplied by the blower wheel, or otherwise, through the conduits, may be modified by the air delivered by the primary fan. As will be apparent, the system and apparatus may readily be operated by a relatively inexperienced person.

Thus, it will be appreciated that, among others, the several objects of the invention as specifically noted are achieved, and it will be appreciated that numerous rearrangements of the system and the apparatus therefor might be made, aside from the fact that the system could be applied to virtually any type of enclosure, for the purpose of ventilating and/or circulating air therein, it being merely necessary to rearrange the component elements of the system according to the particular problem and type of enclosure involved.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A system of the character described including an impelling member for the axial distribution of air, a second impelling member for the radial distribution of air, a motor shaft, said impellers being secured to said shaft and spaced from each other, a duct extending to one side of the first of said members and in a direction substantially parallel to the movement imparted to the air thereby, said duct terminating in an open end at a point adjacent and to one side of said first named impeller, the second impeller being interposed within said duct and drawing air through such open duct end to deliver air at a point relatively remote from the first named impelling member, said duct being formed with an opening beyond the interposed impelling member, means for mounting said duct, impelling members, and motor shaft and formed with an opening through which the first named impelling member may cause air to flow, such air flow being in a direction reverse to that of the air flow as induced by the second impelling member interposed within said duct and a valve arranged adjacent said opening duct for controlling the flow of air therethrough and through said duct at a point beyond said opening.

2. A system of the character described, including a fan, a blower wheel, a motor, a shaft extending beyond the opposite ends of said motor and mounting on its respective ends said wheel and fan, a duct extending to one side of said fan and terminating in an open end at a point adjacent the same, said blower wheel being interposed within said duct and drawing air through such open duct end to deliver air at a point relatively remote from said fan and means for mounting said motor, fan, blower wheel, and the duct portion adjacent said fan, said mounting means being formed with an opening through which air impelled by said fan flows, and such air flow being in a direction reverse to that induced by said blower wheel through the duct extending adjacent said fan.

3. A system of the character described, including a fan, a blower wheel, a motor, a shaft extending beyond the opposite ends of said motor and mounting on its respective ends said wheel and fan, a duct extending to one side of said fan and terminating in an open end at a point adjacent the same, said blower wheel being interposed within said duct and drawing air through such open duct end to deliver air at a point relatively remote from said fan, and a deflector panel mounted adjacent the open end of said duct and movable to a position partially obstructing the column of air flowing from said fan whereby said fan may assist the air flow within said duct and as induced by said blower wheel.

4. A system of the character described, including a fan, a blower wheel, a motor, a shaft extending beyond the opposite ends of said motor and mounting on its respective ends said wheel and fan, a duct extending to one side of said fan and terminating in an open end at a point adjacent the same, said blower wheel being interposed within said duct and drawing air through such open duct end to deliver air at a point relatively remote from said fan, said fan discharging air outwardly and in a direction opposed to the direction of air flow into the open end of said duct and as induced by said blower wheel, said duct being formed with an opening beyond said blower wheel, a valve movably mounted adjacent said opening for controlling the amount of air delivered therethrough and through said duct at a point beyond said opening and means for mounting said motor fan and blower wheel and the duct adjacent said fan, said means being formed with an opening through which air discharged by said fan may flow.

5. A system of the character described including a pair of fluid impelling members, a motor for driving both of the same, a duct extending to one side of one of said members and terminating in an open end at a point adjacent the same, the second of said members being interposed within said duct and drawing air through such open duct end to deliver air at a point relatively remote from the first named impelling member, and a deflector panel movably mounted adjacent the open end of said duct and in line with the air blast emanating from said first named fluid impelling member.

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