April 7, 1942. MacDOUGALD DEXTER 2,278,581

ATTIC VENTILATOR

Filed Feb. 16, 1940 2 Sheets-Sheet 1

Fig. 1

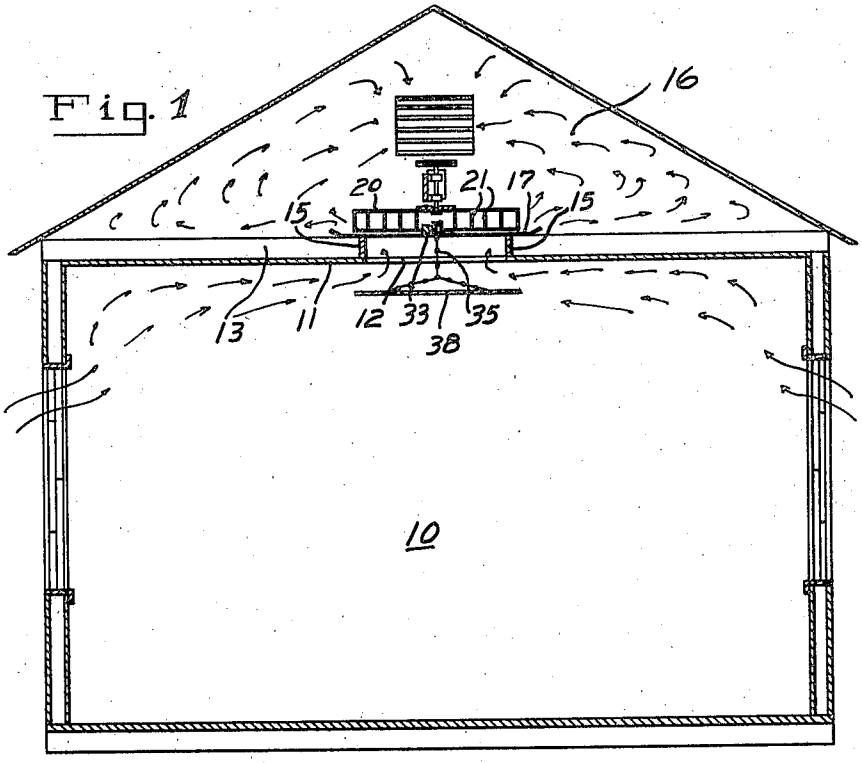
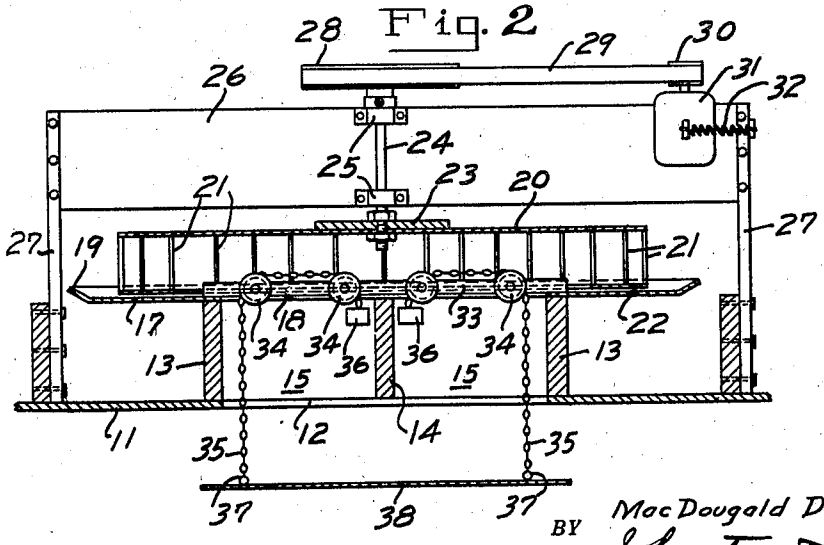


Fig. 2



INVENTOR

MacDougald Dexter

BY Johnston & Jennings

ATTORNEYS

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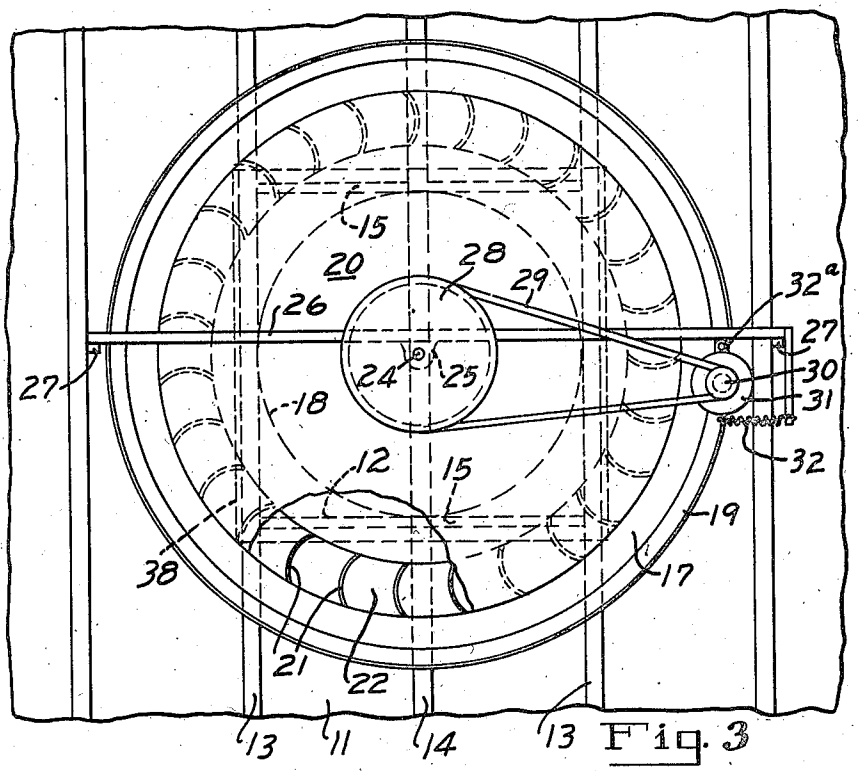


Fig. 3

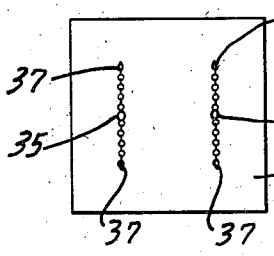


Fig. 4

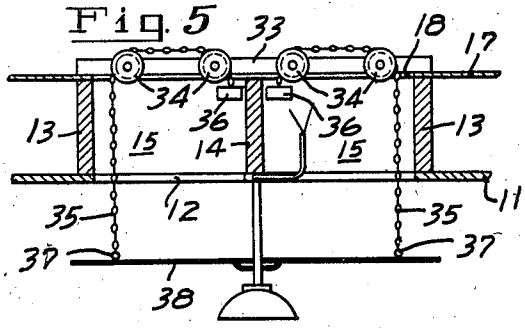


Fig. 5

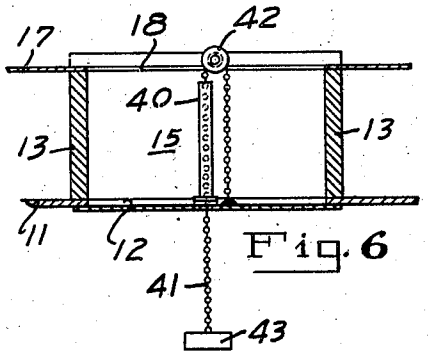


Fig. 6

INVENTOR

MacDougald Dexter

BY Johnston & Jennings

ATTORNEYS

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2,278,581

UNITED STATES PATENT OFFICE

2,278,581

ATTIC VENTILATOR

MacDougald Dexter, Columbus, Ga.

Application February 16, 1940, Serial No. 319,198

1 Claim. (Cl. 98—43)

My invention relates to a house ventilating and/or cooling system wherein it is proposed to exhaust the heated or vitiated air near a ceiling, drawing in fresh and cooler air through windows or other openings, and to produce a turbulence throughout the overhead receiving chamber, such as an attic, from which the exhaust air escapes through one or more external outlets.

One distinctive feature of my invention consists in the provision of an overhead room ventilating opening with an adjustable damper designed and adapted to cause the converging air currents to flow along under the ceiling radially into an annular ventilating opening, whereby I more effectively cool the room ceiling from below.

A further distinctive feature of my invention is to cause the ventilating air current, drawn in regulated volume through said overhead opening, to be diffused through the attic by means of a centrifugal fan designed and adapted to produce a radial dispersion of the ventilating air current horizontally above, and in juxtaposition to, the upper elements of the room ceiling, thus tending to cool the latter more effectively from above.

A further distinctive feature of my invention is to so design and mount the centrifugal fan that it will produce a turbulent condition of the air throughout the attic or overhead compartment whereby I both lower and equalize its temperature.

My invention has as a further distinctive feature the provision of a centrifugal fan of substantial diameter, closed overhead by a top plate comprising a marginal ring of depending impeller blades, running in close coaction with a stationary bottom plate which preferably has its marginal edge extending substantially beyond the fan blades and there upturned slightly to prevent a back lash of the horizontal radial dispersion of air and to better establish a condition of turbulence throughout the attic.

It is a feature of advantage of my invention that the centrifugal fan used can have a much larger diameter than the ceiling opening and it can be driven with a relatively low R. P. M., and yet have a sufficiently high peripheral velocity at the blades to induce the requisite flow of air for ventilating purposes. The slow rotation required in such a construction will eliminate any sound from the fan and by using a speed-reduction drive, such as a belt with large and small pulleys, a very small and silent motor can effectively drive a very large centrifugal fan and induce, at small expense, ample ventilating air flow and attic air turbulence to accomplish the objects of my invention.

Another distinctive feature of my invention has relation to the manner of shutting off the outflow of air through the ventilating opening by the manipulation of a counterweighted pendant plate damper whereby the latter can be readily set to allow or interrupt the outflow of the ventilating current into the attic.

My invention further comprises the loose mounting of the damper plate on a standard carrying a lighting fixture as a guide, so that it will permit the central disposition of the ventilating opening in the room without interfering with the center placement of a lighting fixture.

My invention further contemplates the mounting of all moving parts of the ventilator on a suitable frame adapted to be set into the attic and secured to the ceiling joists over the ventilating opening, so that skilled labor is not required to set up my ventilating equipment.

My invention will be better understood by reference to the accompanying drawings and detail description that follow, it being understood, however, that the same constitute typical embodiments of my invention.

In the drawings:

Fig. 1 is a conventional showing of a room and attic in cross section equipped with my improved ventilating system with the arrows indicating the plane of flow of the air currents with reference to the room ceiling, both above and below, and the turbulent condition induced in the attic.

Fig. 2 is a vertical sectional view enlarged, taken on a central plane through the impeller fan, and damper assembly showing the motor drive in elevation.

Fig. 3 is a plan view of the fan assembly as shown in Fig. 2.

Fig. 4 is a plan view of the damper showing a suspension chain attachment for a thin damper plate.

Fig. 5 is a view of the ventilating duct and damper shown with a lighting fixture serving as a guide for the damper.

Fig. 6 is a view corresponding to Fig. 5 showing a further modification of the damper carrying a single chain support, with a rigid guide for the chain to hold the damper against vibration.

Similar reference numerals refer to similar parts throughout the drawings.

In the embodiment of my invention illustrated in Figs. 1 to 4, I show conventionally a room or compartment 10 to be ventilated having a ceiling 11 with a central ventilator opening 12 therein

between the ceiling joists 13—13. I show the opening 12 as subtending the space between the joists 13 which stand in vertical alignment with the opposed side edges of the opening 12 while the intermediate joist 14 extends centrally across the ventilating opening. Baffle plates 15 are set in place between the joists so that they and the joists 13—13 enclose a vertical subdivided passageway leading from the ventilating opening 12 into the attic 16. I mount on top of the joists 13, 14, and on the baffle plates 15 a bottom plate 17 having an annular central opening 18 (Fig. 3), the diameter of which equals the crosswise dimensions of the rectangular air flue above the ventilating opening 12. The main body of the plate 17 is horizontally disposed, but about its outer marginal edge it is flared upwardly at 19.

I mount immediately above this plate a centrifugal impeller fan which, as shown, is made up of an annular top 20 having a marginal row of depending, rigidly attached, impeller blades 21, connected at their bottom ends to a ring plate 22 disposed to travel in close juxtaposition to the plate 17. The outer periphery of the blades is to set inwardly from the flared edge 19 of the plate 17 and the clearance between the plates 17 and 22 is so close that any back lash of air from the attic to the intake side of the fan is prevented. The plate 20 has a top stiffener plate 23, and a drive shaft 24 for the fan is inserted centrally through the plates 23 and 20 and made fast thereto. The shaft turns in spaced bearings 25 mounted on a cross plate or timber 26, which is preferably long enough to be supported from the joists 13 by means of uprights 27 spiked or otherwise attached to said joists and member. A grooved pulley 28 is mounted fast on the upper end of shaft 24, and is driven by a V-belt 29 from a smaller grooved wheel pulley 30 driven by an electric motor 31, pivoted to swing horizontally by its mounting 32*a* on the plate 26 and having a tension spring 32 connected thereto and to the adjacent upright 27 in position to maintain the requisite tension on the belt 29.

A cross bar 33 extends centrally across the ventilating opening and is made fast at its ends to the plate 17, or to the joists 13, or to both. Idler pulleys 34 are journalled on the side of this bar 33 and a chain 35 passes over the rollers lying between each adjacent pair of joists 13, 14, each chain being connected at one end to a counterweight 36 and at the other end branched, as indicated in Fig. 4, for attachment to elements 37 near the corners of the damper plate 38 that will thus be hung free of distortion below, and adapted in raised position to close, the ceiling opening 12. The counterweights will balance the damper plate 38 and thus leave it free for adjustment to any desired working position.

Where a thin light damper plate of substantial area is used it is preferable to dispose the chain attachments 37 near the center of area of each of the four quadrants of the damper as is indicated in Fig. 4, as thereby I equalize the support afforded to the plate and eliminate its distortion.

In Fig. 6 I illustrate a modified method of support which is applicable to dampers small enough to be suspended by a single support, but which is obviously applicable for use with dampers large enough to require a plurality of such supports. For each support I rigidly attach to the upper surface of the damper plate, adjacent to its respective chain attachment element 37, a tubular guide 40 through which I lead the chain or flexible support 41 for the damper as it passes downwardly from the overhead pulley 42 through the damper to a point below the damper where it carries the counterweight 43. The tubular member is sufficiently elongated to take a purchase against the chain support 41 and restrain the damper from tilting even though suspended from its center by a single hanger chain and guide.

While I prefer the counter-balanced plate damper, because it can be ornamentally treated and when closed will look like a decorative center panel in the ceiling, it is to be understood that other types of dampers or closable louvers may be employed.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claim.

What I claim is:

A ventilating system for structures, comprising a room to be ventilated having an apertured ceiling and an overhead attic forming a plenum chamber with vents to the outer atmosphere, and a centrifugal suction fan assembly mounted in the attic over the ceiling aperture and comprising a horizontal stationary bottom plate mounted on the ceiling joists with a center opening registering with said aperture to admit air from the room to the attic and having its outer marginal edge upturned slightly away from the top of the ceiling, and a rotatable impeller suction fan having a motor driven top disc carrying marginal dependent blades disposed to travel close to said plate and inwardly from its marginal upturned edge, whereby a dispersion of the induced room ventilating current throughout the attic is effected to establish therein a turbulent plenum of air with movement over said ceiling to cool its attic side.

MACDOUGALD DEXTER.