W. H. DAVIDSON.

VENTILATOR.

APPLICATION FILED APR. 10, 1908.

898,838.

Patented Sept. 15, 1908.

Fig. 1.

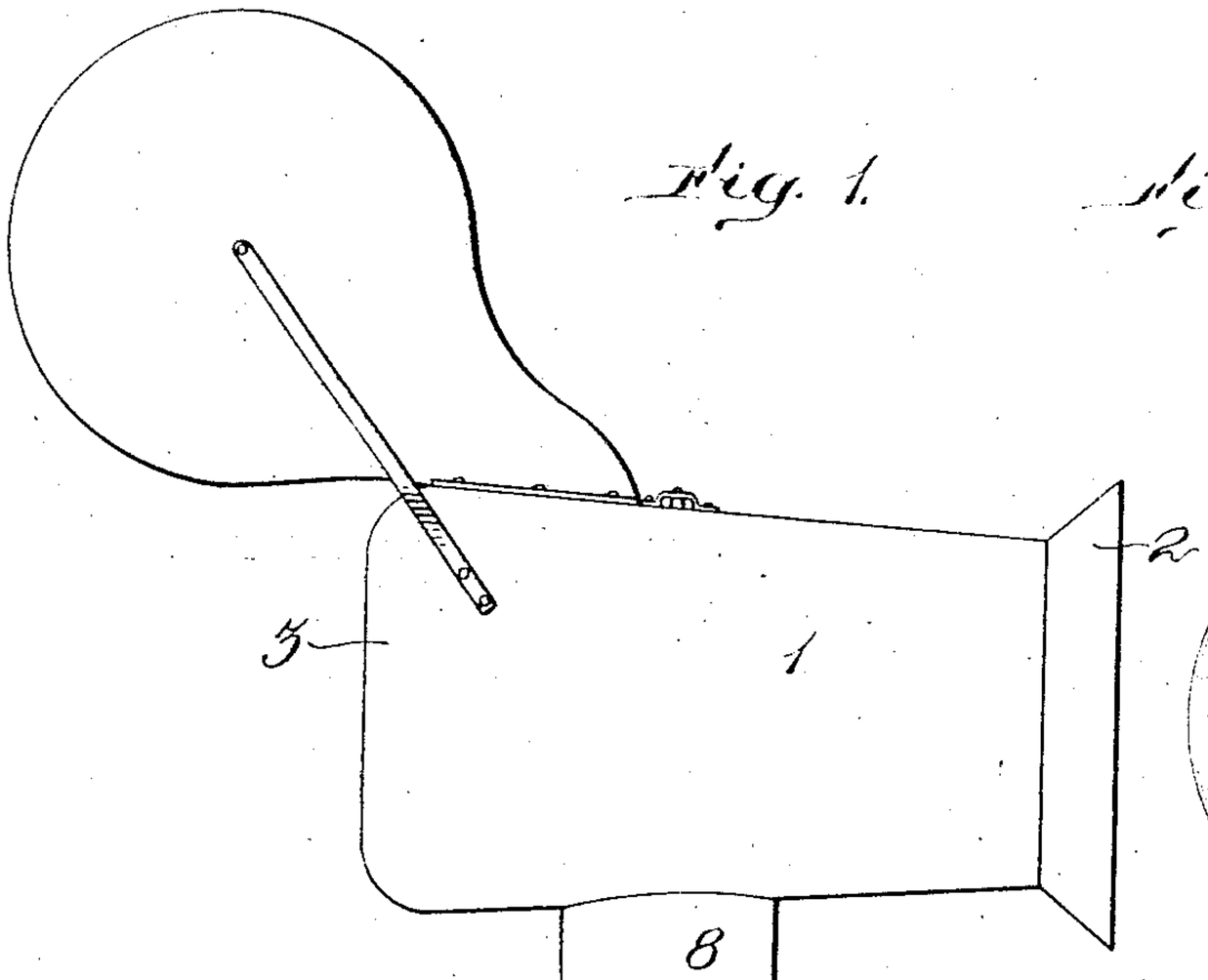
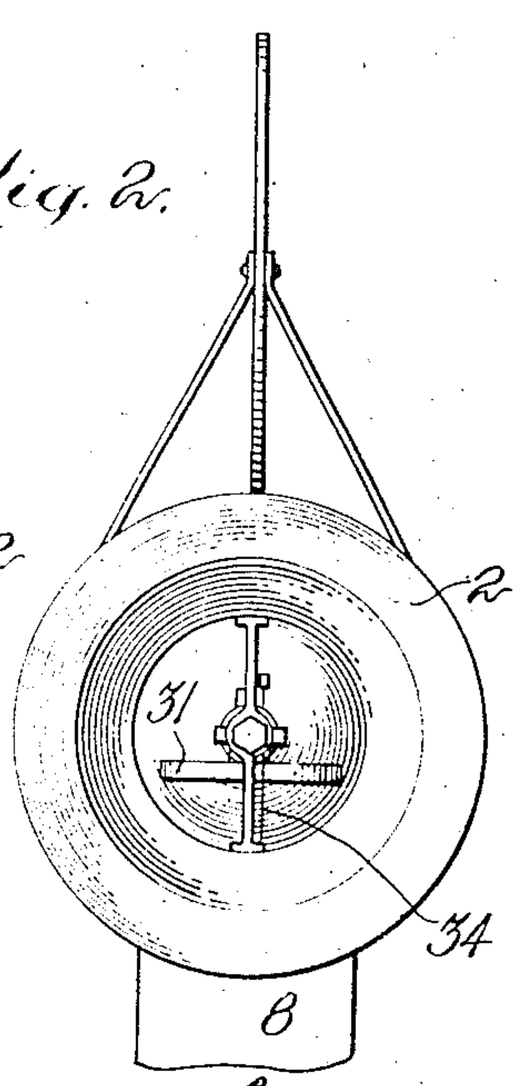


Fig. 2.



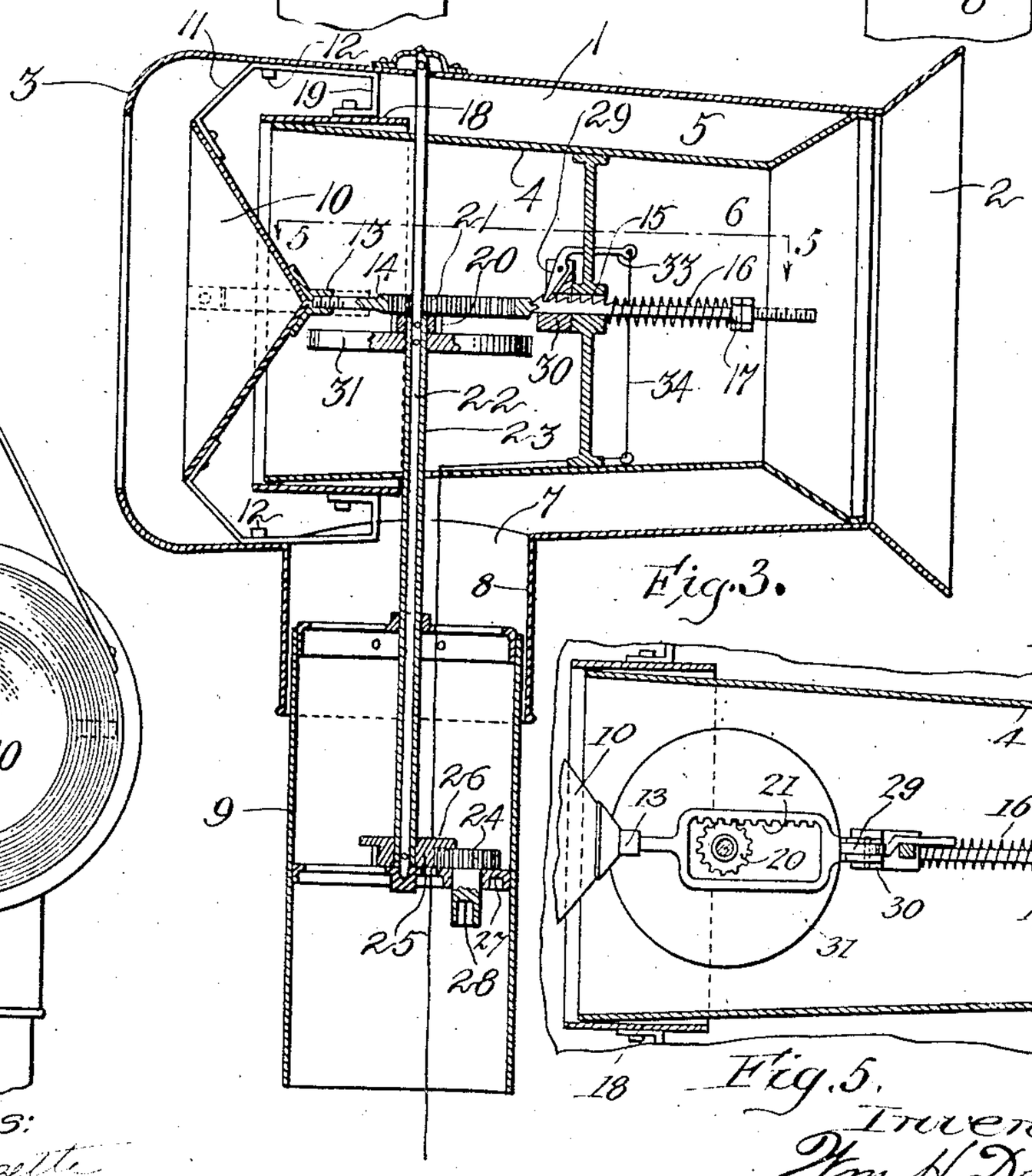


Fig. 3.

Fig. 4.

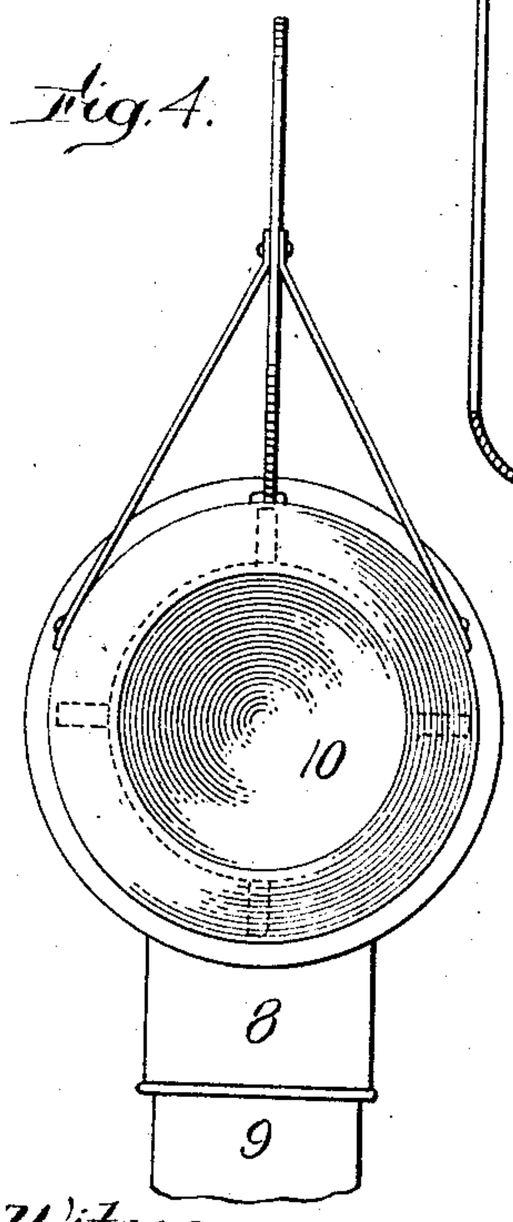


Fig. 5.

Witnesses:
P. L. Tazelle
F. R. Middleton.

Inventor:
Wm. H. Davidson
by Wright, Brown, Quinby & Ray
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM H. DAVIDSON, OF BOSTON, MASSACHUSETTS.

VENTILATOR.

No. 898,838. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed April 10, 1908. Serial No. 426,247.

To all whom it may concern:

Be it known that I, WILLIAM H. DAVIDSON, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Ventilators, of which the following is a specification.

This invention relates to ventilators to be placed upon chimneys or outlet flues of dwellings and other buildings, to cause an induced draft whereby to draw the foul air from a building or produce a draft in a furnace.

The present invention is particularly adapted for use as a ventilator to draw the air from the rooms of a building and allow it to be replaced by fresh air.

The principal object of the invention is to enable a ventilator of this kind to be automatically governed by the force of the wind, so that approximately the same amount of air will be withdrawn when the wind is light as when it is high. To this end the ventilator is provided with a movable closure which limits the draft opening more or less, according to the velocity of the wind.

Another object is to permit regulation of the closure so as to make it sensitive in any required degree.

Still another object is to provide a shield for preventing the production of eddy currents, which would tend to impair the efficiency of the draft, under high-wind conditions when the draft outlet is materially reduced in area.

A further object is to permit additional regulation of the ventilator under different conditions of external temperature so that in cold weather the amount of induced draft may be diminished to guard against too great an inflow of cold air being brought about.

In the drawings I have illustrated an embodiment of the invention.

Figure 1 represents a side elevation of this embodiment. Fig. 2 represents a rear end elevation of the same. Fig. 3 represents a vertical longitudinal section on an enlarged scale. Fig. 4 represents a rear end elevation. Fig. 5 represents a plan view in detail of the mechanism for adjusting the ventilator to varying temperature conditions.

The same reference characters indicate the same parts in all the figures.

The ventilator consists of a main body or outer casing 1 which is provided with an outwardly flaring flange 2 at the front end, and is contracted at the rear end by turning in a lip 3. Within the outer casing is an inner casing 4 which is open from end to end, and at its front end is flared outwardly to the outer casing, being peripherally connected thereto so as entirely to close the front end of the space between the two casings. This provides an annular space or chamber 5 between the casings. The inner casing 4 is of less length than the outer casing, and terminates a considerable distance short of the contracted end of the latter. Thus the chamber 5 and the passage 6 through the inner casing, which passage may conveniently be called the "draft passage", join together in advance of the outlet. There is an opening 7 in the lower side of the main casing which communicates with the annular chamber 5, and to which leads a tube 8 secured to the main casing. This tube telescopes over a flue 9 leading from the interior of a building. The rear end of the inner casing preferably extends beyond the rear limit of the opening 7 which constitutes an inlet to the chamber 5. When air flows through the passage 6, it draws air from the chamber 5, and thereby induces a flow through the inlet 7 into the chamber, drawing vitiated air from the interior of the building through the flue 9. The flue 9, tube 8, inlet 7 and chamber 5 thus constitute an induction passage.

Extending across the ventilator between the ends of the casing is a conical baffle or valve member 10 which is mounted so as to be movable toward and from the contracted outlet end of the ventilator to more or less close the latter. When moved to its fullest extent toward the contracted end, it serves as a closure to obstruct more or less the outlet space. The baffle is always held so that it does not close the end of the inner casing, but the latter is always open and a draft through the passage 6 is permitted as long as the baffle is sufficiently removed from the outlet 3 to permit flow therefrom. The external diameter of the baffle is approximately equal to the outlet diameter of the main casing, and the rear end of the inner casing is also shown as being of approximately the same diameter. The baffle is

provided with a number of guides 11 which bear against the inner surfaces of the outer casing, and are held by bolts 12, being longitudinally slotted to receive such bolts and permit the necessary movement. At its center or apex the baffle is provided with a socket 13 into which is threaded the end of a bar 14 which passes through a guide 15 fastened within the inner casing. A spring 16 surrounds the rear end of the bar and bears between the guide 15 and adjusting nuts 17, whereby its tension may be regulated. The spring normally holds the baffle in the position illustrated, at the inner limit of its travel, so that the space between its outer edge and the ventilator outlet is as great as that between the baffle and the adjacent walls of the main casing, thereby giving the maximum induced draft. When the wind increases beyond a certain amount, the tension of the spring 16 is overcome and the baffle moved toward the outlet of the main casing, reducing the area of the outlet and diminishing the force of the draft. However, the dimensions and power of the spring are such as to prevent the baffle from moving quite to the end of the main casing, and so entirely shutting off the flow of air. By adjustment of the nuts 17, the tension of the spring may be made so as to balance the force of the highest wind which is liable to be met with, and to arrest the closing movement of the baffle before the outflow from the induction passage is entirely shut off. The regulation may be of such an amount that the baffle automatically adjusts itself to winds of all degrees of force, so that the quantity of air drawn out through the induction passage may be maintained constant, whatever the conditions as to velocity of the wind may be. When the outlet is thus restricted and the space between the baffle and end of the inner casing at the same time enlarged, there is a tendency of the air blowing into the draft passage to set up eddy currents and be blown back into the chamber 5, thus producing a draft in the wrong direction. To guard against this result, I provide a shield 18 which surrounds the rear end of the casing 4 and is connected to the baffle through the guides 11 by means of brackets 19. These brackets are slotted so as to permit an adjustment of the shield with respect to the baffle, by allowing the bolts by which the shield is held to be slipped longitudinally in the slots. The adjustment thus governs the width of the space between the end of the shield and the baffle, and as the shield is in effect a continuation of the inner casing, it governs the space between this casing and the baffle. When once adjusted, this space is invariable, because the shield travels with the baffle, and therefore the inner casing is lengthened when the outlet from the main casing is restricted.

It will be evident that by reason of the action of the baffle, approximately the same amount of air will be sucked out under all varying atmospheric conditions, there being not much greater removal of air on windy and blustering days than when the atmosphere is comparatively still. Thus an excessive air circulation, causing drafts, is not set up in a building when the wind is very high, as would be the case if no provision were made for automatically governing the draft opening.

It is desirable also to limit the draft opening in cold weather so that a less amount of warm air will be withdrawn, whereby to prevent the building becoming chilled to too great an extent. To effect this result, I provide means capable of being manipulated to move the baffle into partially closed position, and a retaining device for preventing it from withdrawing from this position, while allowing it to be further closed by excessive air pressure. The means for so setting the baffle consists of a pinion 20 which is adapted to mesh with a series of rack teeth on the bar 14, which is connected with the baffle. This bar is widened and centrally slotted so as to embrace the pivot rod 22 on which the ventilator is swiveled, and the pinion 20 is carried by a sleeve 23 which surrounds this rod. Normally the pinion is below the rack and offers no hindrance to the back and forth movement of the baffle and bar, but when it is raised, its teeth engage those of the rack, and when rotated, moves the baffle backward toward the outlet. The pinion is raised and turned by a driving pinion 24 meshing with a gear 25 on the base of the sleeve 23. The latter gear has a flange 26 projecting somewhat over the pinion 24, and this pinion is mounted so that it can be lifted in its bearing 27. It has a hub provided with a socket 28 into which an operating rod may be inserted. When the pinion 24 is raised, it lifts pinion 20 into mesh with the rack, and when rotated, it turns the rack and moves the baffle. Upon withdrawal of the operating rod, the pinions drop and release the rod 14. Retraction of the baffle is prevented by a pawl 29 which is pivoted to a collar 30 and engages teeth on the tail of the rod 14. This collar is enabled to slip freely upon the rod, and is ordinarily held against the guide 15 by the spring 16 acting through the teeth and pawl. A disk 31 is fastened to the sleeve 23 and acts as an abutment to prevent the collar 30 being carried with the rod 14 during adjustment of the baffle. This disk 31 is lifted simultaneously with the pinion 20 so as to lie beside the lower part of collar 30, thus causing the collar to remain stationary while the rod is drawn through it. The pawl 29 is spring or gravity actuated so as to engage the teeth automatically. It has a handle 33 from which a line 34 extends, the latter running down through the flue 9 into

the interior of the building where it is accessible. By operating the pinion 20, the ventilator may be more or less closed in cold weather, and when the weather becomes warm, it may be opened by the spring 16, by simply disengaging the pawl by a pull on the line 34.

I claim:—

1. A ventilator consisting of a body having a longitudinal draft passage, an internal partition dividing off an induction chamber or passage which is closed at the front and open at the rear or outlet of the ventilator, a side opening for the admission of an induced current to the induction chamber, and a baffle in the draft passage movable by the force of the current flowing through such passage toward the outlet to restrict the same.

2. A ventilator consisting of an outer casing, an inner casing open from end to end to provide a longitudinal draft passage and joined at its front or inlet end to the outer casing, thereby providing an outer annular chamber, an opening through the side of the outer casing, and a baffle between the adjacent ends of the casings movable by the force of the current flowing through the ventilator to obstruct more or less the outlet therefrom.

3. A ventilator consisting of an outer casing, an inner casing open from end to end to provide a longitudinal draft passage and joined at its front or inlet end to the outer casing, the latter being contracted at its rear or outlet end and extending beyond the inner casing, thereby providing an outer annular chamber joining with the draft passage, an opening through the side of the outer casing, and a baffle between the adjacent ends of the casings movable by the force of the current flowing through the ventilator toward the contracted end of the outer casing to obstruct more or less the outlet therefrom.

4. A ventilator consisting of a body having a longitudinal draft passage, an internal partition dividing off an induction chamber or passage which is closed at the front and open at the rear or outlet of the ventilator, a side opening for the admission of an induced current to the induction chamber, a baffle in the draft passage movable by the force of the current flowing through such passage toward the outlet to restrict the same, and means for preventing back draft in the induction passage when the outlet is restricted.

5. A ventilator consisting of a body having a longitudinal draft passage, an internal partition dividing off an induction chamber or passage which is closed at the front and open at the rear or outlet of the ventilator, a side opening for the admission of an induced current to the induction chamber, a baffle in the draft passage movable by the force of the current flowing through such passage toward the outlet to restrict the same, and a member, operable upon movement of said baffle in restricting the outlet, to extend said partition and prevent back draft in the induction chamber.

6. A ventilator consisting of an outer casing, an inner casing open from end to end to provide a longitudinal draft passage and joined at its front or inlet end to the outer casing, thereby providing an outer annular chamber, an opening through the side of the outer casing, a baffle between the adjacent ends of the casings movable by the force of the current flowing through the ventilator to obstruct more or less the outlet therefrom, and a tube telescopically arranged with respect to said partition and connected to said baffle so as to be moved by the latter, in its outlet-obstructing movement, to increase the effective length of the partition and thereby prevent back draft in the induction chamber.

7. A ventilator consisting of a body having a longitudinal draft passage, an internal partition dividing off an induction chamber or passage which is closed at the front and open at the rear or outlet of the ventilator, a side opening for the admission of an induced current to the induction chamber, a baffle in the draft passage movable by the force of the current flowing through such passage toward the outlet to restrict the same, and non-automatic provisions for setting said baffle in accordance with various weather conditions.

8. A ventilator having a draft passage and an induction passage with an inlet opening into which air is drawn by flow of air through the draft passage, an obstructing device automatically movable by the force of the air flowing through the draft passage to restrict the velocity of outflow from the induction passage, yielding means tending to return said device, and a manually controlled stop for limiting the return thereof.

9. A ventilator having a draft passage and an induction passage with an inlet opening into which air is drawn by flow of air through the draft passage, an obstructing device automatically operated by pressure of the wind blowing through the draft passage to check the velocity of outflow from the induction passage, and a detent manually operable to permanently restrict such outflow, while permitting further restriction automatically by wind pressure.

10. A ventilator having a draft passage and an induction passage, and a valve member actuated by the wind pressure for limiting the outflow from the induction passage under high wind conditions, together with means for opposing the wind-caused movement of said valve member and preventing complete stoppage of the outflow.

11. A ventilator having a draft passage and an induction passage, and a valve member actuated by the wind pressure for limiting the outflow from the induction passage under high-wind conditions, together with

adjustable yielding means tending to move said valve member oppositely to its wind-caused movement, and to prevent complete stoppage of the outflow, whereby an automatic regulation is effected, enabling the same quantity of air to be withdrawn through the induction passage under all conditions.

In testimony whereof I have affixed my signature, in presence of two witnesses.

WILLIAM H. DAVIDSON.

Witnesses:
F. R. ROULSTONE,
P. W. PEZZETTI.