

Nov. 22, 1932.

P. S. MARTIN

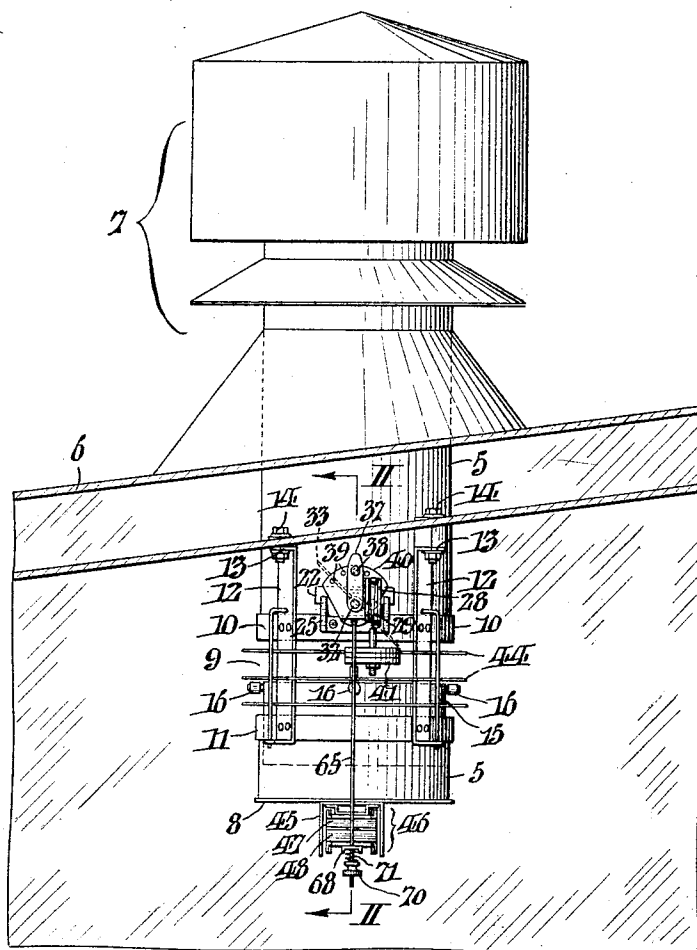
1,888,428

VENTILATING DEVICE

Filed July 8, 1930

3 Sheets-Sheet 1

FIG. I.



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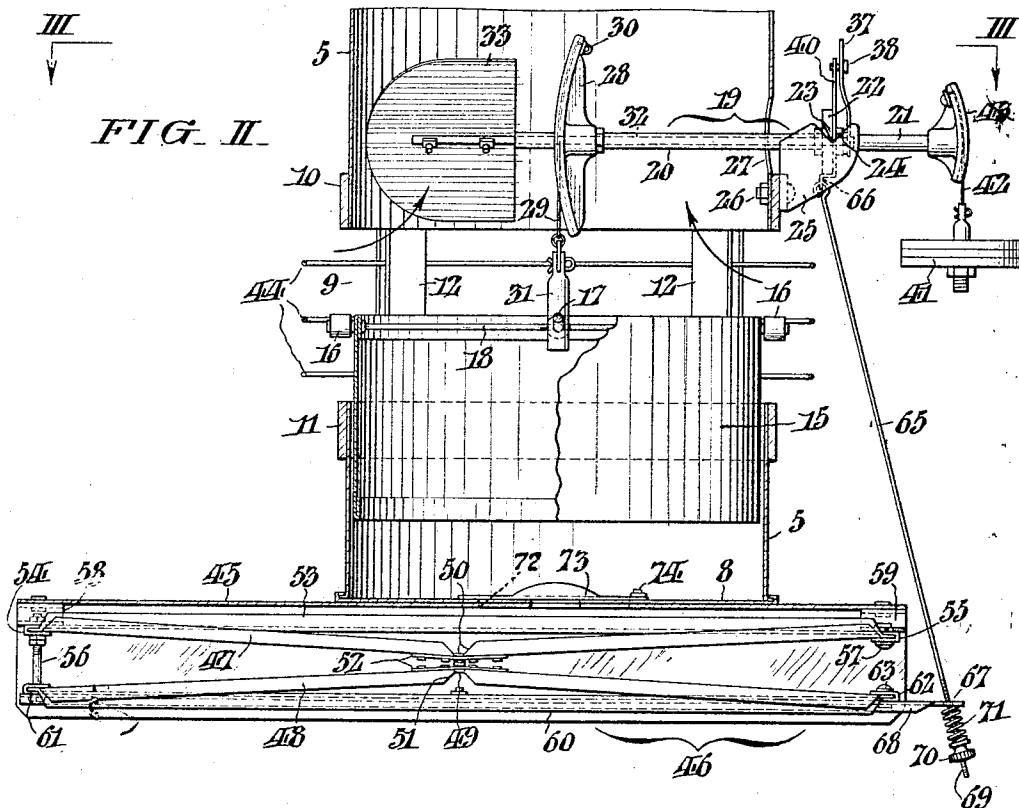
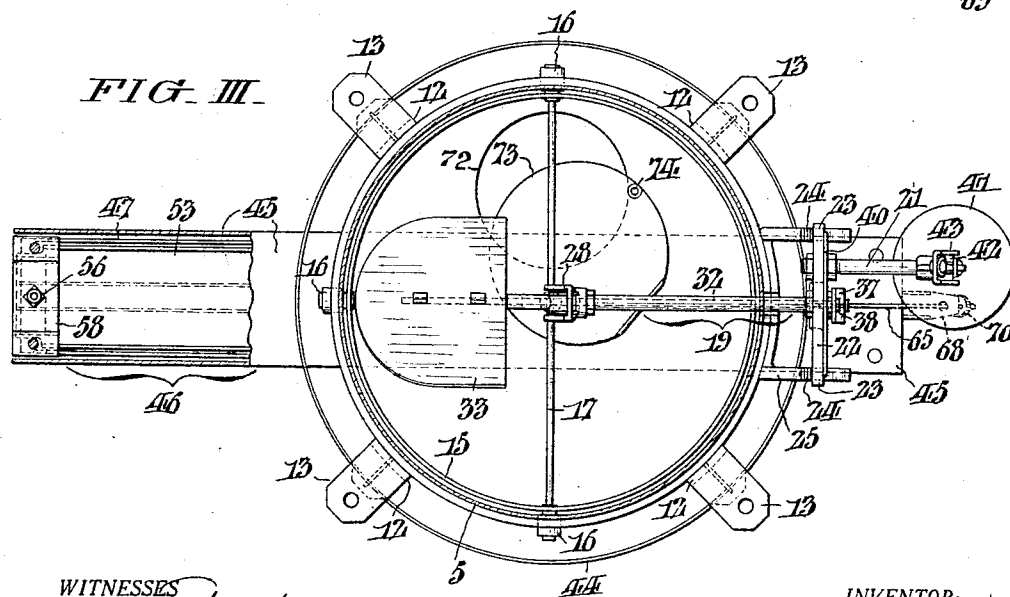
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

FIG. IV

FIG. VI

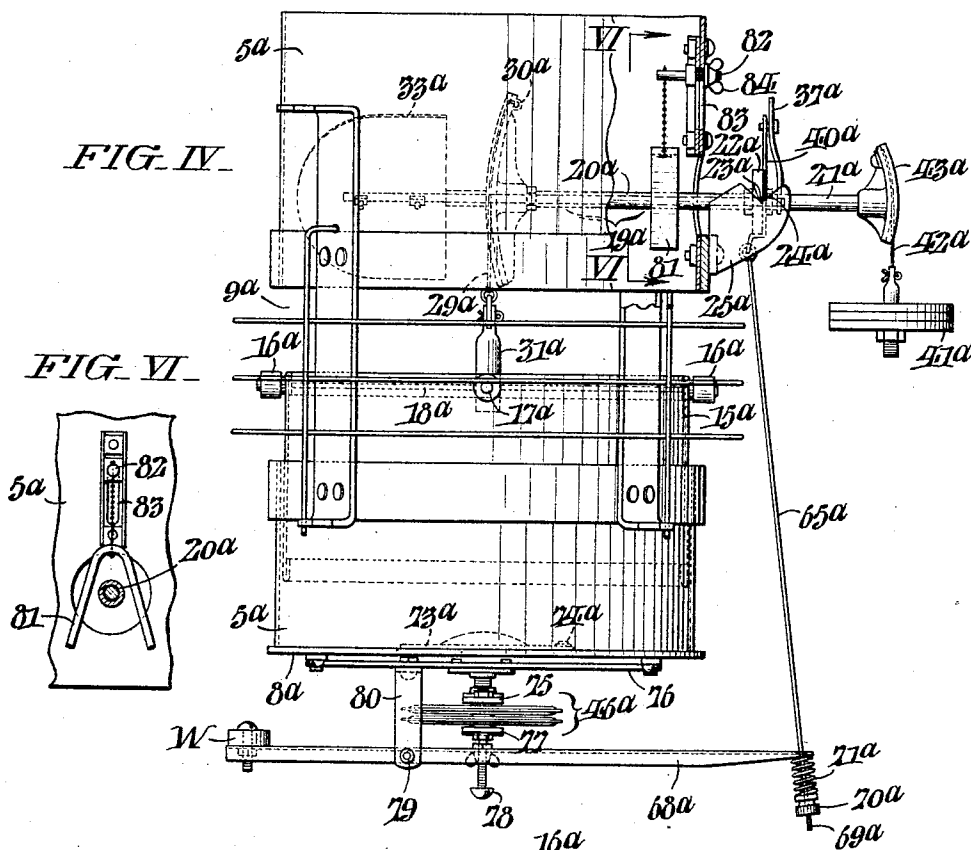
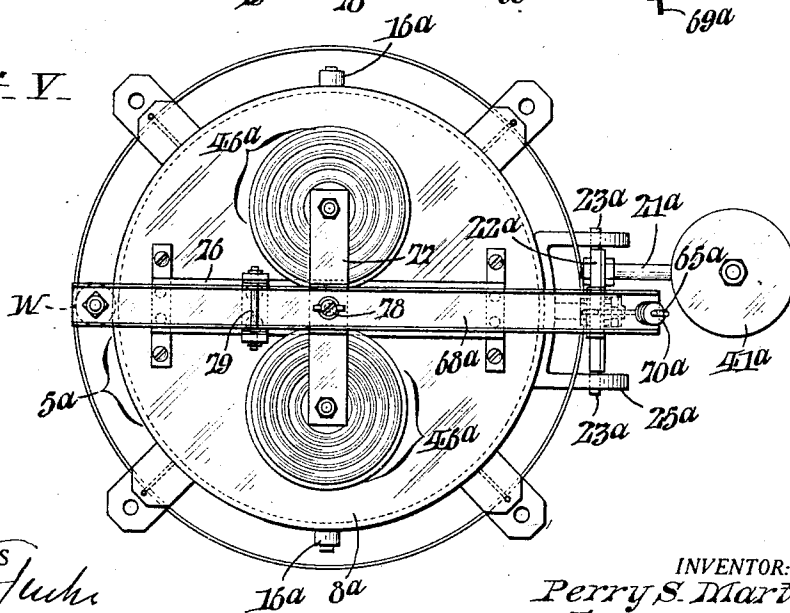


FIG. V



WITNESSES

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UNITED STATES PATENT OFFICE

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VENTILATING DEVICE

Application filed July 8, 1930. Serial No. 466,377.

This invention relates to devices for ventilating buildings of various kinds including farm buildings such as barns and enclosures devoted to incubation and brooding of poultry.

The main objects of my invention are to control the exhaust of air from buildings with a view toward maintaining within them, at all times, scientifically correct atmospheric conditions regardless of variations in climatic conditions at the exterior; and to provide a simple, compact, reliable, inexpensive and automatically operative device whereby the indicated desideratum may be readily attained in practice.

In connection with a ventilating device having the foregoing attributes, I moreover aim to provide for the regulation of volumetric displacement of the air from the buildings in accordance with special and individual considerations which are to be met in practice.

A further aim of my invention is to insure maintenance of the maximum exhaust from a building in the event of the rise in temperature therein beyond a predeterminable point through embodiment in the device of a thermostatic sub-control means.

I also aim, through provision of novel regulatable adjunctive means, to enable predetermination of the minimum exhaust of air from the building at sub-normal temperatures so that a certain definite amount of ventilation is maintained even under such conditions.

Still other objects and attendant advantages of this invention will be manifest from the following detailed description of the accompanying drawings, wherein Fig. I shows a fragmentary sectional view of the roof of a building equipped with my improved ventilating device.

Fig. II is a sectional view taken as indicated by the arrows II—II in Fig. I and drawn to a larger scale.

Fig. III is a plan sectional view taken as indicated by the arrows III—III in Fig. II.

Fig. IV is an elevation of a slightly modified form of the invention, with parts broken

away or in section to better disclose otherwise hidden features.

Fig. V is an underside plan view of the preceding illustration; and

Fig. VI is a detail illustration viewed as indicated by the arrows VI—VI in Fig. IV.

Referring more in detail first to Figs. I, II and III of these illustrations, the form of ventilating device there shown comprises a comparatively short vertical cylindric conduit 5 of a length to extend through the roof 6 of a building, with slight projection above and below it. To the upper end of the conduit 5 above the roof 6 is fitted a ventilator head 7 which may be of any approved type. At a level immediately above its lower end, which is closed by a diaphragm 8, the conduit 5 has a circumferential port 9 whereof the top and bottom edges are reinforced by externally applied bands 10, 11 of stout strip metal, said bands being connected at circumferential intervals by vertical straps 12 made from like material. From Fig. I it will be noted that the upper ends of the straps 12 are turned outwardly, and that the projections 13 thus formed are pierced for passage of screw bolts 14 whereby the device is secured at the under side of the roof 6.

Flow of exhaust air from within the building into the conduit 5 by way of the circumferential port 9, is governed by a cylindric valve sleeve 15 which is of somewhat smaller diameter than the conduit 5 so as to be freely movable up and down therein. Buffers 16 of rubber or the like on the projecting ends of diametral cross rods 17, 18 adjacent the upper edge of the valve sleeve 15, limit the up and down movement of the latter through contact with the upper and lower edges of the port 9. The mechanism relied upon for automatically actuating the valve sleeve 15 includes a compositely formed lever 19 with separately attached extremities 20, 21 projecting to opposite sides of a cross piece 22. This cross piece 22 has its ends beveled at 23 to afford knife edges which rest in V-notches 24 of a bracket piece 25 secured to the side of the conduit 5 by means of screws 26. The longer extremity 20 of the lever 19 reaches inward through a vertical slot 27 in the side of

the conduit, 5 and at its free end has an attached vertically disposed sector head 28. The curved face of this sector head 28 is tangential with the axis of the conduit 5 and is struck from the fulcrum axis of the lever 19. The valve sleeve 15 is freely suspended from the longer extremity 20 of the lever 19 by means of a strap 29 made from flexible strip metal. As shown, the strap 29 is secured at 30 to the top of the sector head 28 so that it lies flat against the curved face of the latter, while its lower end is connected to a juncture piece 31 which is pierced for passage of the diametral rods 17, 18 previously referred to. Due to determination of a constant effective radial length for the arm 20 of the lever 19 by the construction just described, the valve sleeve 15 is obviously held to true axial movement within the conduit 5. Passing axially through the longer extremity 20 of the lever 19 is a rod 32, to the free end of which is secured a vane 33. This vane 33 is subject to the influence of the upward exhaust flow of air entering the conduit 5 by way of the port 9. For the purposes of modifying the action of the valve sleeve 15, the vane 33 is made angularly adjustable by means of a spring finger 37 rigidly secured to the outer end of the rod 32. As shown, the finger 37 has a stud projection 38 capable of selective registry with index apertures 39, Fig. I, of a vernier plate 40 attached to the cross piece 22 of the lever 19. The extremity 20 of the lever 19 and its appendages are counter-balanced to a certain extent, as hereinafter more fully explained, by a weight 41 which is suspended by a flexible metallic strap 42, from a sector head 43, at the end of the shorter extremity 21 of said lever, in a manner similar to that described in connection with the suspension of the valve sleeve 15. For the protection of the valve sleeve 15, a guard 44 of stout wire is placed about the influx port 9 of the conduit 5. Secured to the bottom of the conduit 5 is a shroud 45 of sheet metal which constitutes a protective housing for a thermostat 46. This thermostat 46 comprises a pair of opposing bar elements 47, 48 fashioned to channel cross section from thermo-sensitive sheet material, said elements 47, 48 being connected medially by a screw bolt 49. To facilitate flexure of the elements 47, 48, their side flanges are cut away as at 50, 51; and plates 52 of springy sheet metal are attached crosswise of the region of the cut outs 50, 51. A rigid bar 53 made to channel configuration from sheet material having a low coefficient of expansion has its ends turned over the ends of the element 47, as at 54, 55; and the junctures thus formed are pierced for passage of screws 56, 57 by which both said bar and said element are secured to anchorages 58, 59 within the protective housing 45. A formed channel bar 60 similar to the bar 53 has its ends turned

over the contiguous ends of the element 48, at 61, 62; and here again the junctures so formed are pierced for passage on the one hand of the screw 56, and on the other hand, of a screw 63. With the described arrangement, the thermostat expands and contracts in the plane of Fig. II, and the movement derived is communicated to the lever 19 through a rod connection 65. As shown in Fig. II, the upper end of this rod connection 65 is formed into a hook to engage an aperture in a down turned ear 66 of the vernier plate 40, while the lower threaded end of said rod passes through an aperture 67 in an arm extension 68 fastened to the bar 60 of the thermostat 46 for attachment of an adjusting thumb nut 70 between which, and the arm 68, is interposed a compression spring 71. To enable removal of dirt or litter collecting in the bottom of the conduit 5, the diaphragm 8 is provided with an opening 72 which is ordinarily kept covered by a closure disk 73 swingable on a pivot rivet 74.

In the above described form of my invention, the valve sleeve 15 and the other appendages on the arm 20 of the lever 19 slightly overbalance the weight 41 on the shorter arm 21 of said lever, hence the valve sleeve 15, will therefore tend to move downwardly to full open position. Influence upon the vane 33 of upward draft in the conduit 5 induced by the aspiration of the ventilator under wind action, will however cause the valve sleeve 15 to be lifted through a distance proportionate to the magnitude of the pull. Under normal conditions of temperature therefore, the device will operate to maintain a constant rate of exhaust from the building through the head 7. In the event of an abnormal rise in the temperature within the building, the action of the vane 33 will be nullified by expansion of the thermostat 46 with a downward pull upon the rod connection 65 thereby communicating a corresponding movement of the lever 19 holding the valve sleeve 15 in wide open position with a corresponding increase in the exhaust rate until normal conditions of temperature are established. Through the separate provisions made for adjustment of the vane 33 and the thermostat 46, the device may obviously be set to maintain any predetermined rate of air displacement from the building under normal conditions of temperature and to hold the valve sleeve 15 in full open position after the manner above explained when a predetermined temperature within the building is exceeded.

In the modification of my invention illustrated in Figs. IV and V, wherein all parts corresponding with those previously explained are identified by corresponding reference characters having added exponents *a* in order to avoid repetitive description, and only the differing elements are otherwise

identified or referred to. The temperature responsive means for controlling the valve sleeve 15a comprises two spaced disk or wafer thermostat couples 46a. As shown, these wafer couples 46a are secured to a cross bar 75, Fig. IV, which is in turn supported by a bracket or bearer bar 76 attached to the bottom 8a of the conduit 5a, while their moving faces are connected by a pressure bar 77, Figs. IV and V, which is adapted to contact with a set screw 78 adjustable in one extremity of a motion-multiplying lever 68a having fulcrum support at 79 in downwardly reaching arms 80 of the bracket or bearer bar 76. The other extremity of the lever 68a is weighted, as at W so that the set screw 78 is always maintained in contact with the pressure bar 77. The movement induced in the arm 68a by action of the wafer thermostat couples 46a is communicated, through a rod 65a, to the arm 19a from which the valve sleeve 15a is suspended. The described thermostat mechanism favors greater compactness of the device as a whole and derivation of a greater extent of movement from said mechanism, while operation of this modification of my invention insofar as controlling the valve sleeve 15a is substantially the same as hereinbefore set forth in connection with Figs. I-III, inclusive, since further repetitive explanation herein is deemed unnecessary.

In certain instances of practice, it is highly important that the amount of ventilation be reduced for the purposes of heat conservation when the temperature within a building falls below a predetermined normal. This is particularly true in the case of buildings, rooms or cellars devoted to poultry brooding or incubation. In order to adapt the device for use in cases of the mentioned sort, the weight 41a is made to slightly overbalance the sleeve valve 15a so that the latter tends to move to closed position instead of to open position as in the first form of my invention. Ordinarily the valve sleeve 15a is prevented from moving to the full closed position by a supplemental weight member 81. As shown in Fig. VI, this supplemental weight member 81 is made to horseshoe configuration for capacity to straddle the longer extremity 20a of the lever 19a, and is suspended, by means of a flexible cord or chain, from a stud 82 which is adjustable up and down in a vertical slot in the side of the conduit 5a, the adjustments of the stud 82 being fixable by a wing nut 84. In operation, the auxiliary weight 81 checks the rise of the arm 20a of the lever 19a immediately upon contact of the latter with it, thereby preventing the valve sleeve 15a from fully closing. It is however to be noted that the supplemental weight member 81 is comparatively small, in fact just sufficient to effect overbalancing of the weight 41a so that the valve sleeve 15a is prevented from fully closing

the port 9a incident to spasmodic action of drafts upon the vane 33a. Obviously, by adjusting the suspension stud 82 up and down as provided for, the extent of normal closure of the valve sleeve 15a may be very accurately predetermined. As in the first described embodiment of my invention, the thermostat mechanism 46a has the power to hold the valve sleeve 15a in full open position when the temperature within the building becomes abnormally high.

Having thus described my invention, I claim:

1. A ventilating device comprising a vertical cylindric conduit to conduct exhaust air from a building for release at the exterior, said conduit having a circumferential port around its lower end; a concentric valve sleeve to govern the port; and actuating mechanism including means responsive to variations in the upward pressure of the exhaust flow in the conduit and means subject to variations in the temperature within the building to jointly control movement of the valve sleeve.

2. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve sleeve to govern exhaust flow through the conduit; and means to automatically actuate the valve sleeve including a counter-balanced lever, means subject to the upward pressure flow in the conduit to move the lever, and a thermostat to check the operation of the lever in accordance with temperature fluctuations within the building.

3. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a pendent valve sleeve to govern exhaust flow through the conduit; and means to automatically actuate the valve sleeve including a counter-balanced lever with an adjustable vane thereon subject to the upward pressure flow in the conduit, and a thermostat coordinated with said lever to check operation of the latter in accordance with temperature fluctuations within the building.

4. A ventilating device comprising a vertical cylindric conduit to conduct exhaust air from a building for release at the exterior, said conduit having a circumferential port around its lower end; a cylindric valve sleeve movable up and down in the conduit to govern the port; and means for automatically actuating the valve sleeve including a counter-balanced lever supporting the valve sleeve in free suspension and having an angularly adjustable vane thereon subject to the upward pressure flow in the conduit, and a thermostat coordinated with said lever to check operation of the latter in accordance with temperature fluctuations within the building.

5. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve

sleeve to govern flow through the conduit; means responsive to the upward exhaust pressure flow in the conduit to control the valve sleeve; and regulatable thermostat means supported below the conduit to hold the valve sleeve wide open upon rise of the temperature within the building beyond a predetermined degree.

6. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve sleeve to govern exhaust flow through the conduit; angularly movable vane means subject to the upward exhaust pressure flow in the conduit to move the valve sleeve to closed position in opposition to gravity, and regulatable thermostat means supported below and by the conduit to hold the valve sleeve wide open upon rise of the temperature within the building beyond a predetermined degree.

7. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve sleeve with a counter-balance device to govern exhaust flow through the conduit, said valve sleeve tending to seek its full open position in opposition to the counter-balance device; angularly adjustable vane means subject to the upward exhaust pressure flow in the conduit tending to move the valve sleeve to closed position; and coordinatively operated regulatable thermostatic means to hold the valve sleeve wide open upon rise of the temperature within the building beyond a predetermined degree.

8. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve sleeve to govern exhaust flow through the conduit; angularly adjustable vane means responsive to the upward exhaust pressure flow in the conduit to control the valve sleeve; and adjustable weight means to limit the extent of closure of the valve sleeve in determining a minimum of exhaust under normal conditions.

9. A ventilating device comprising a vertical conduit to conduct exhaust air from the building for release at the exterior; a valve sleeve supported at one end of a counter-balance lever, said sleeve governing flow of the exhaust through the conduit; a weight pendent from the other end of said lever tending to urge the valve sleeve toward closed position, and a positionally adjustable straddling means in the path of the lever for counter-acting the weight aforesaid and limiting the extent of closure of said valve sleeve under normal conditions.

10. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve sleeve to govern exhaust flow through the conduit; an actuating lever from which said valve sleeve is suspended; a weight on said

lever tending to cause the valve sleeve to seek its closed position; and a freely suspended positionally-adjustable supplemental weight straddling the path of the lever to counteract the weight on the lever and prevent complete closure of the valve sleeve under normal conditions.

11. A ventilating device comprising a vertical conduit to conduct exhaust air from a building for release at the exterior; a valve sleeve to govern exhaust flow through the conduit; means responsive to the upward exhaust pressure flow in the conduit to control the valve sleeve movement; regulatable weight means to limit the extent of closure of the valve sleeve in determining a minimum of exhaust under normal conditions; and thermostat means supported below the conduit and coordinated with the valve sleeve moving means to hold said valve sleeve wide open upon rise of the temperature within the building beyond a predetermined degree.

In testimony whereof, I have hereunto signed my name at Harrisonburg, Virginia, this 3rd day of July, 1930.

PERRY S. MARTIN.