April 5, 1927. 1,623,286

J. L. STRAHAN

AIR CONTROL FOR VENTILATING SYSTEMS

Filed June 1, 1926 3 Sheets-Sheet 1

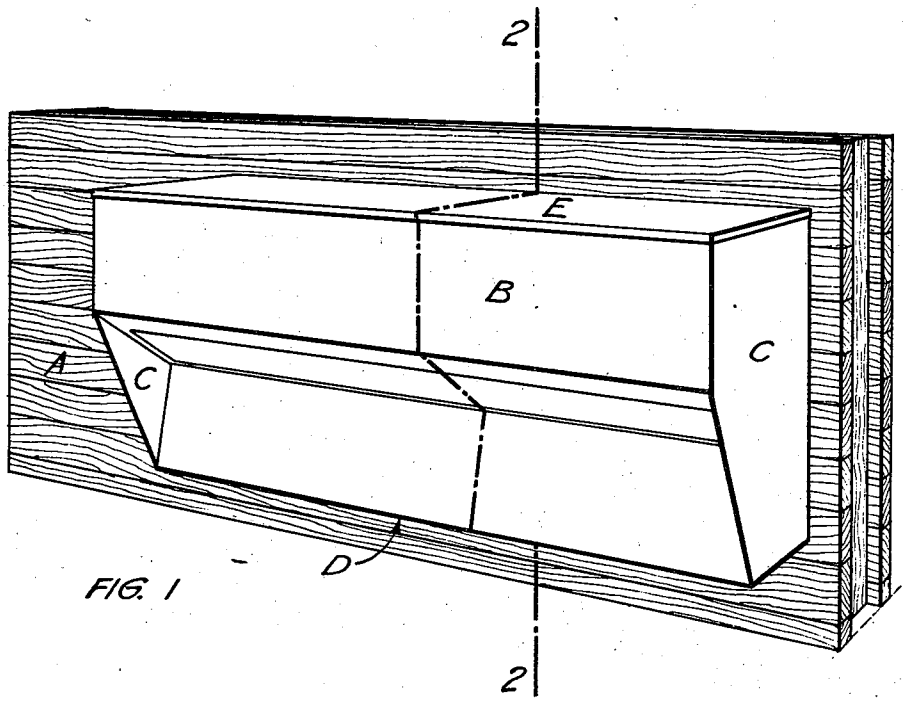

FIG. 1

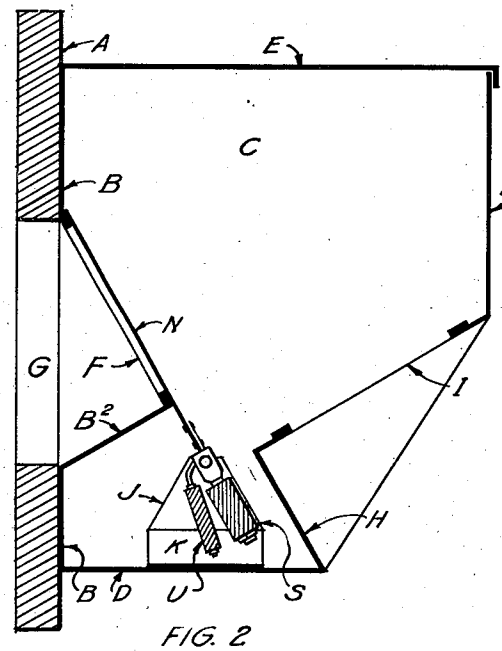

FIG. 2

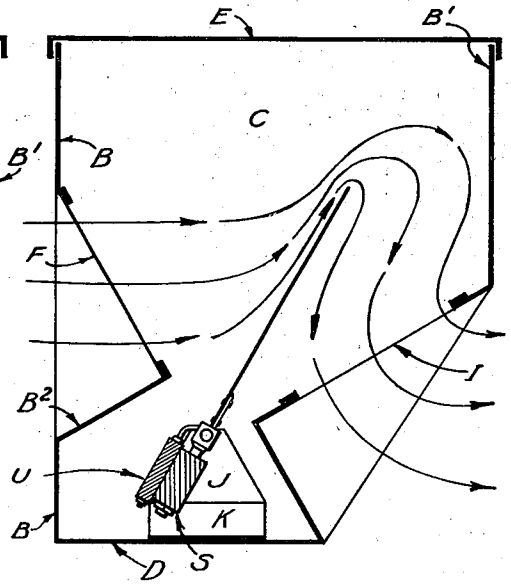

FIG. 3

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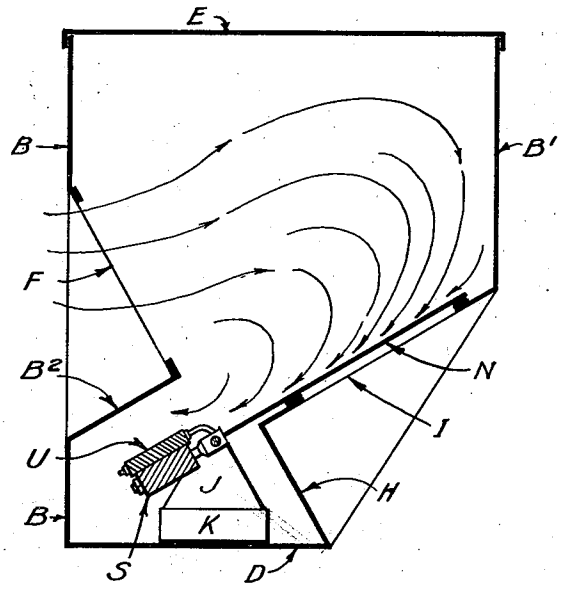

FIG. 4

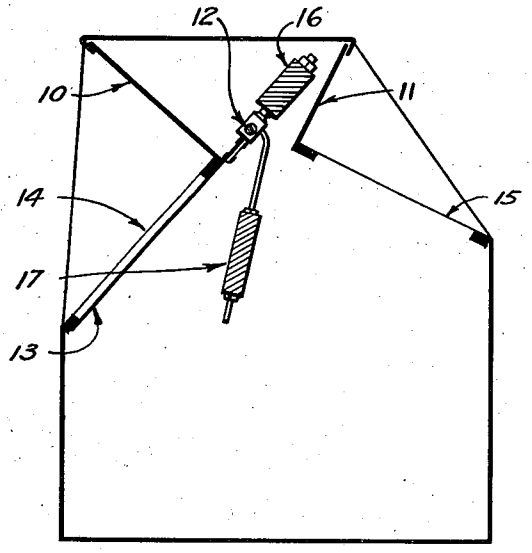

FIG. 9

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AIR CONTROL FOR VENTILATING SYSTEMS

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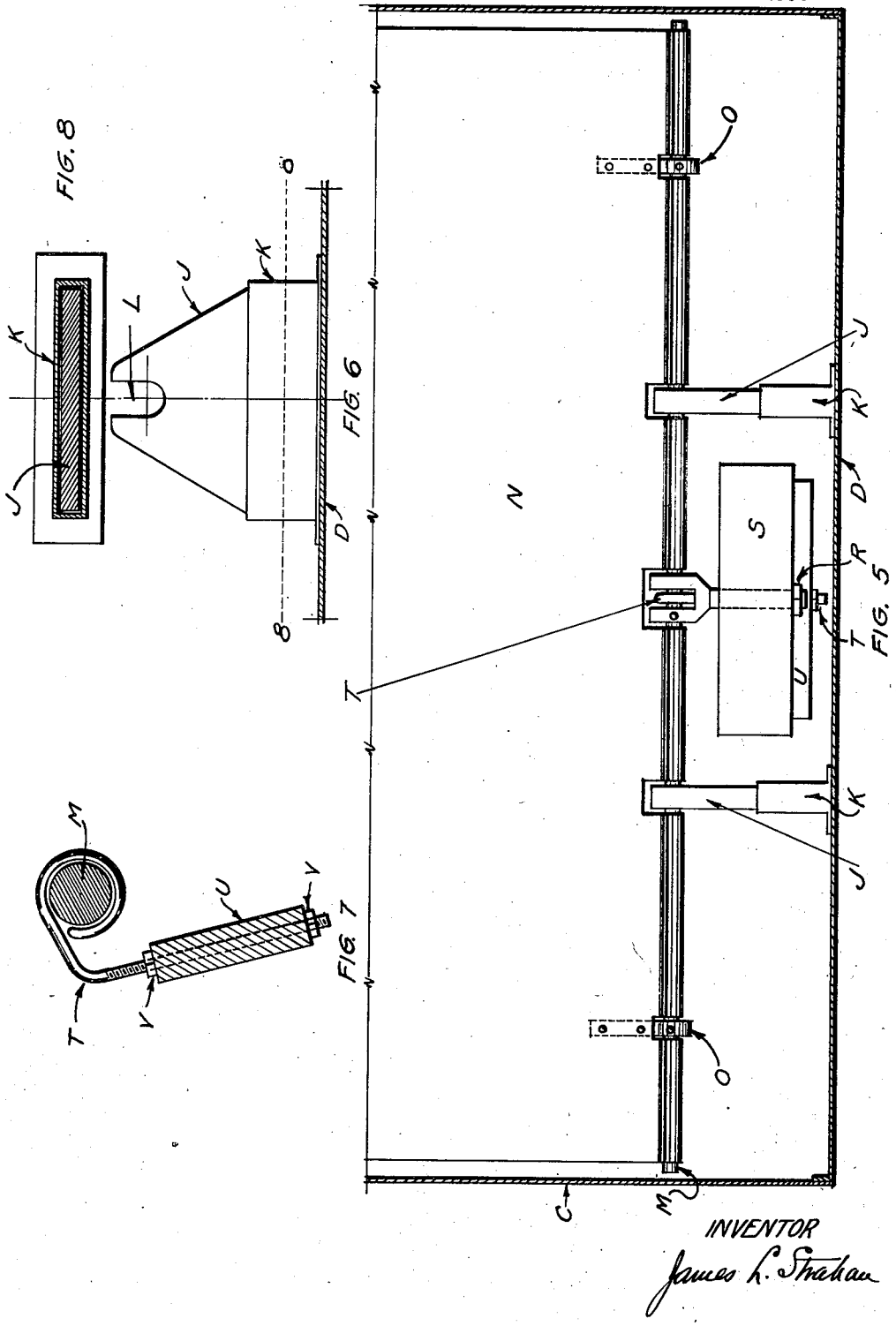

Patented Apr. 5, 1927. 1,623,286

UNITED STATES PATENT OFFICE.

JAMES L. STRAHAN, OF FAIRFIELD, IOWA, ASSIGNOR TO THE LOUDEN MACHINERY COMPANY, OF FAIRFIELD, IOWA, A CORPORATION OF IOWA.

AIR CONTROL FOR VENTILATING SYSTEMS.

Application filed June 1, 1926. Serial No. 113,035.

My invention relates to means for admitting air into a building or other place in which a ventilating system is installed, especially, a system of natural draft ventilation in which differences of temperature and wind pressures are the principal operative forces; and it consists of means for automatically regulating the admission of the outside air into the building, and also, for automatically preventing back-draft, or the outlet of air from the building through the intake openings, which back-draft is liable to interfere with the proper operation of the ventilation. It also consists of other improvements in the construction and arrangement of the control mechanism which will be described in the specification, and more definitely set forth in the claims.

In the accompanying drawings, forming a part of this specification, Fig. 1 is a perspective of a housing for an air control for a ventilating system, as it appears when attached to the wall of a building, the construction shown embodying my invention. Fig. 2 is a transverse section on line 2—2 of Fig. 1, the control mechanism appearing at rest, or when preventing back-draft, or the passage of air out of the building through the intake openings. Fig. 3 is the same as Fig. 2, with the exception that the control mechanism is shown in an operative position and the section of the wall of the building is omitted. Fig. 4 is the same as Fig. 3, except that the control mechanism is shown closed to prevent the admission of air into the building or other place to be ventilated, which will be explained later on. Fig. 5 is an elevation of the operative control mechanism as it appears when looking at it from the inside of Fig. 2. Figs. 6 and 7 are detail views which will be hereafter explained. Fig. 8 is a transverse section on line 8—8 of Fig. 6. Fig. 9 is a transverse section of a modified form of the air control.

Referring to the drawings, A represents a portion of the outside wall of a building to which, as shown in Fig. 1, the housing of the control mechanism is attached. The housing is essentially a hollow structure, preferably made of sheet metal. It has side enclosures B and B′, ends C, a bottom D, and a top E, preferably made in the form of a removable lid or cover. A distance from the bottom of the housing on the outer side adjoining the wall of the building the side B is deflected inwardly so as to form the obliquely disposed portion B^2 and then it is deflected outwardly until it joins an upper portion of the vertically disposed side B.

In this outwardly deflected portion of the side B there is a large opening F and there is also a corresponding opening G in the wall A. On the inner side B′ of the housing, there is a more pronounced inward deflection. A considerable portion of the bottom D on this side is cut away, and the upper end of the inwardly deflected portion H is extended inward laterally to nearly the central part of the housing. The outward deflection on this side is equally pronounced but it does not rise quite so high as on the other side, and in this portion there is also an opening I equal in size to the opening G. Through these openings, F, G and I, the admission of the outside air into the building is controlled by the operative mechanism hereinafter described.

On the bottom D, two standards J are mounted preferably about an equal distance from each end of the housing and from each other. These standards are preferably of wood set in sheet metal sockets K which are soldered or otherwise secured to the housing bottom D. In the upper ends of these standards are bearing recesses L, as most plainly shown in Fig. 6 which is an enlarged side view of one of the standards J and the socket K in which it is inserted together with a transverse section of a small portion of the bottom D, to which the socket is secured. A pivot rod or shaft M is placed in the recesses of these standards and a plate N, preferably of aluminum or other light material, has its lower edge wrapped or encircled around the rod or shaft M, the encircling edge of the plate N being cut away at the standards J, and also where other attachments are connected to the shaft M, as shown in Fig. 5.

To prevent the plate N from slipping or twisting on the shaft M, clips O, each having an extended upper end are secured to the shaft by rivets or otherwise, and their extended upper ends are likewise secured to an adjoining part of the plate. On a central part of the shaft is secured by rivets or otherwise, a member having a downwardly extending threaded stem R and a threaded lock nut thereon. A weight member S is

fitted with a threaded central perforation the proper size to admit the threaded stem R and the lock nut being placed on the lower end of the stem, the weight S will be firmly held thereon as shown in Fig. 5. The function of the weight S is to approximately balance the plate N on the pivot shaft M and by turning the weight up or down on the threaded stem R and adjusting the lock nut thereon this may be varied as desired. The upper end of the member having the threaded stem R is broadened where it encircles the shaft M and is preferably bifurcated as shown.

In this bifurcation is the upper end of a rod or wire T bent so as to encircle the shaft M and to freely swing thereon in the bifurcation. The lower end of the rod or wire T is straight and is also threaded and fitted with two threaded nuts V. Another weight member U is shown in Fig. 5 behind the weight S. This weight member U is fitted with a central perforation through which the lower threaded end of the rod or wire T is passed. The weight is held in place by the upper and lower nuts V placed thereon, and it may be adjusted up or down by adjusting the nuts V. Transverse sections of these weights and their connections are shown in Figs. 2, 3 and 4, and to give a still plainer view of the weight U and swinging rod or wire T which carries it, Fig. 7 has been added which is a transverse section of the shaft M and weight U immediately in front of the rod or wire T, the latter being shown in full lines except where it passes through the weight U and there it is shown in dotted lines. All the other parts of the mechanism have been removed in Fig. 7 to give an unobstructed view of the parts shown.

As stated, the object of my invention is to control the air currents through the intake openings both into and out of the building or other place to be ventilated. To accomplish this result the plate N connected to the pivoted shaft M, which may be called the damper, is caused by the currents of air to oscillate between the opposite sides of the housing, and under certain conditions to close the opening F on one side, and under other conditions to close the opening I on the other side. To insure proper closure of the openings F and I the deflected portions of the housing sides containing these openings are disposed at substantially right angles to each other and the pivot of the damper plate is so placed that it will fit closely on either deflected side containing the openings.

The downward tilting tendency of the damper plate N on the pivot shaft M is usually slightly greater than that of the weight S and when there are no currents of air entering the opening F the greater downward tendency of the plate will raise the weight S sufficiently to permit the plate to close the opening F, as shown in Fig. 2. When in this position the weight U has no effect because the rod or wire T on which it is supported will turn freely on the shaft M and the weight will hang directly under it. When in this position there can be no back draft, or passage of air out of the building through the intake opening, which is generally detrimental to the proper operation of a ventilating system.

When a moderate current of air enters the opening F it will move the plate or damper N inward as shown in Fig. 3. When in this position air will be admitted through the openings F, G and I into the building in varying amounts according to the pressure of the air current. When the current increases, as in the case of a storm or a very high wind, the plate N will be moved inward until it will completely close the opening I and will effectually prevent the admission of strong current of air through the opening into the buildings. As soon as the plate N is moved to a central position the weight U will begin to have an effect and the farther the plate is moved toward the opening I the greater its effect will be. As soon as the pressure of the air current is lessened the weights S and U will swing the plate outward to a central position, and when the air pressure is removed the plate N will be permitted to close the opening F against back draft. The tilting effect of the weights S and U on the plate N can be made less or more by adjusting them up or down on the threaded rods on which they are hung, and by this means, either a smaller or larger amount of air can be admitted into the building, as desired.

In the usual natural draft ventilating systems, the air intake is placed in the outer wall of the building near the ceiling of the room or the apartment to be ventilated. A preferred plan is to place the intake opening in the wall between adjacent joists, and then to enclose the space between the lower edges of the joists so as to form a flue to conduct the air to a central part of the room or apartment. In either case the housing for my air control is to be placed either in or adjoining the intake opening. When that opening is placed between the joists and especially when the space between the joists is enclosed to form a flue, an opening in the ceiling or the floor above should be provided, so that the lid or cover E can be taken off the housing to make any adjustments that may be necessary in the operative mechanism.

It is well known that atmospheric conditions have considerable effect on natural draft ventilating systems. Especially is this true of adverse air currents which in the

form of high winds may force an undue amount of air into the building. On the other hand a strong air current on the opposite side of the building may force a considerable amount of air out through an unguarded intake opening, which is detrimental to systems of natural draft ventilation. My invention is intended to overcome these difficulties, which it does completely, the operative mechanism being extremely sensitive and acutely responsive to the various air currents. It is also simple in construction, inexpensive in production and convenient to install in any building or other place having a system of natural draft ventilation.

The modified form of my invention shown in Fig. 9, operates in substantially the same manner as the preferred form heretofore described, but the detailed construction is somewhat different. The housing is substantially the same with the exception that the deflected portions 10 and 11 are in the upper instead of the lower part of the sides of the housing. The shaft 12 is pivoted at each end to the ends of the housing instead of being centrally pivoted on standards secured to the bottom of the housing. The damper plate is attached below the pivot shaft 12 and operates below it instead of above it. The openings to be closed by the damper plate 13 are on the under sides of the deflected portions of the sides of the housing instead of on the upper sides.

Also, the rigid weight 16 is above the pivot shaft 12 instead of below it, and the swinging weight 17 comes in contact with the damper plate 13 when a strong current of air causes it to close the inside opening 15, instead of coming in contact with the rigidly attached weight 16, as it does in my preferred form. Furthermore, in closing the openings 14 and 15, the damper plate 13 has to be raised to a certain extent instead of lowered, as in my preferred form. In all other respects the construction of both forms is substantially alike, and the operation of the damper plate 13, in controlling the admission of air into the building and in preventing its escape therefrom, is practically the same.

What I claim is—

1. In an air control for a ventilating system, a housing, comprising an essentially rectangular hollow structure having an outer and an inner side with an opening in each side, the opening in the outer side to be placed adjoining an air intake opening, and a damper plate centrally pivoted in the housing so as to oscillate between the openings and to be normally adapted to close the outer opening, but also adapted when subjected to the pressure of a strong air current to close the inner opening.

2. In an air control for a ventilating system, a housing, comprising an essentially rectangular hollow structure having an outer and an inner side with an opening in each side, the opening in the outer side to be placed adjoining an air intake opening, and a damper plate centrally pivoted in the housing so as to oscillate between the openings and to be normally adapted to close the outer opening, but also adapted when subjected to the pressure of a strong air current to close the inner opening, the damper mechanism being susceptible of adjustment to admit varying amount of air when subject to varying normal air pressures.

3. In an air control for a ventilating system, a housing comprising an essentially hollow structure having an outer and an inner side with an inwardly and outwardly deflected portion on each side, an opening in each of the outwardly deflected portions, and a damper plate pivoted between them and adapted under different conditions to close the opening on either side.

4. In an air control for a ventilating system, a housing comprising an essentially hollow structure having an outer and an inner side with an inwardly and outwardly deflected portion on each side, said outwardly deflected sides being disposed at substantially right angles to each other, and each side having an opening therein, and a damper plate pivoted between said outwardly deflected sides in such position that it will closely fit each side when in contact with it, and will thereby completely close the opening in the side with which it is in contact.

5. In a device of the character described, a housing for an air control mechanism having inner and outer sides, each of said sides having inwardly and outwardly deflected portions, openings in the outwardly deflected portions, a centrally pivoted damper adapted to alternately close said openings, said damper being balanced to normally close the opening on the outer side and thus prevent the outward passage of air through said outer opening, said damper being susceptible of being moved into a central position by a moderate current of air from the outside, and to thereby permit the inward passage of a moderate amount of air from the outside, but when the inward current of air becomes excessive the damper will be moved thereby to close the inner opening and thus prevent the inward passage of an excessive amount of air through the inner opening.

6. In a device of the character described, a housing for an air control mechanism having inner and outer sides, each of said sides having inwardly and outwardly deflected portions, standards mounted in central positions on the bottom of the housing and having bearing recesses on their upper edges, a

pivot shaft placed in said bearings, a plate forming a damper having its lower edge connected to the pivot shaft, said damper being adapted to oscillate in said bearing and in its normal position to close the opening in the outer side of the housing while being susceptible of being opened by an inward current of air, and when the air current becomes excessive to close the opening in the inner side of the housing, and when said air current ceases, to swing back to its normal position.

7. In a device of the character described, a housing for an air control mechanism, said housing being provided with inwardly and outwardly deflected side portions, an opening in each of the outwardly deflected portions, sockets affixed to central portions of the bottom of the housing member, standards having bearing recesses on their upper edges set in said sockets, a pivot shaft placed in said bearings and a plate forming a damper having its lower edge connected to the pivot shaft, said damper being adapted to operate as shown and described.

8. In a device of the character described, a housing for an air control mechanism, said housing being provided with inwardly and outwardly deflected side portions, an opening in each of the outwardly deflected portions, sockets affixed to central portions of the bottom of the housing member, standards having bearing recesses on their upper edges set in said sockets, a pivot shaft placed in said bearings and a plate forming a damper having its lower edge encircled around the pivot shaft and bracing clips attached to the shaft and the adjoining portion of the plate to hold it in place on the shaft, said damper being adapted to operate as herein set forth.

9. In a device of the character described, a housing for an air control mechanism, said housing being provided with inwardly and outwardly deflected side portions, an opening in each of the outwardly deflected portions, sockets affixed to central portions of the bottom of the housing member, standards having bearing recesses on their upper edges set in said sockets, a pivot shaft placed in said bearings and a plate forming a damper having its lower edge connected to the pivot shaft, and a balancing weight arrangement secured to the pivot shaft, said weight arrangement being adapted to operate as set forth.

10. In an air control for a ventilating system, a housing having inner and outer sides, said sides being provided with inwardly and outwardly deflected portions, the latter portions, each having an opening therein, standards, each having a bearing recess on its upper edge, affixed to the bottom of the housing, a shaft mounted in said recesses a plate forming a damper connected to the shaft and weight mechanism secured to the shaft in an opposite direction from the plate, the weight mechanism and the plate being adapted to be operated as and for the purpose set forth.

11. In an air control for a ventilating system, a housing having inner and outer sides, said sides being provided with inwardly and outwardly deflected portions, the latter portions each having an opening therein, standards, each having a bearing recess on its upper edge, affixed to the bottom of the housing, a shaft mounted in said recesses, a plate forming a damper connected to the shaft, a member affixed to a central portion of the shaft, said member having a stem extended in the opposite direction from the plate, and a weight adjustably secured to said stem, as and for the purpose set forth.

12. In an air control for a ventilating system, a housing having inner and outer sides, said sides being provided with inwardly and outwardly deflecting portions, the latter portions each having an opening therein, standards, each having a bearing recess on its upper edge, affixed to the bottom of the housing, a shaft mounted in said recesses a plate forming a damper connected to the shaft, a pair of members affixed to a central portion of the shaft each having a stem extended from the shaft in a direction substantially opposite from the plate, one of said members being rigidly secured to the shaft and the other secured rotatably, its stem being set over to one side of the shaft, and a pair of weights adjustably secured to said stems, as and for the purpose set forth.

In testimony whereof I affix my signature.

JAMES L. STRAHAN.