F. GREAVES.

APPARATUS FOR VENTILATING BUILDINGS.

No. 180,868. Patented Aug. 8, 1876.

Fig 1.

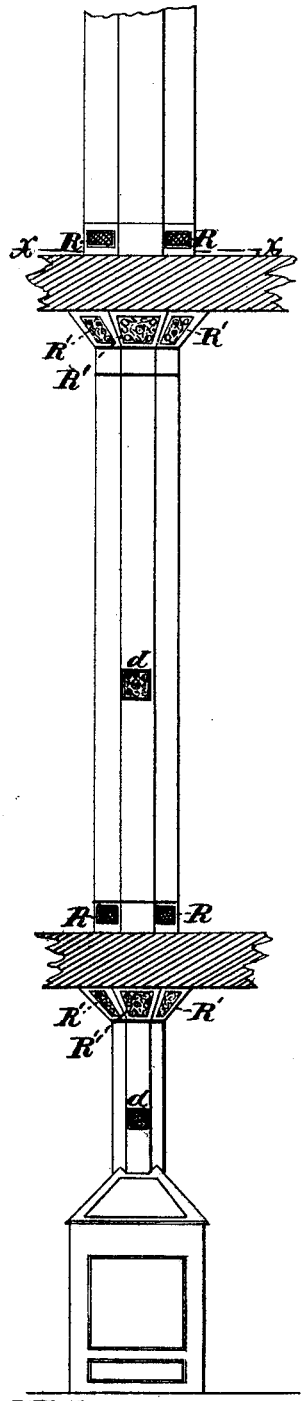


Fig 3.

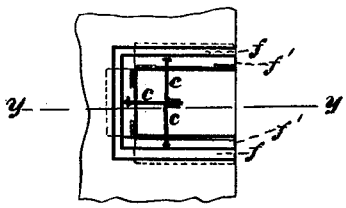


Fig 2.

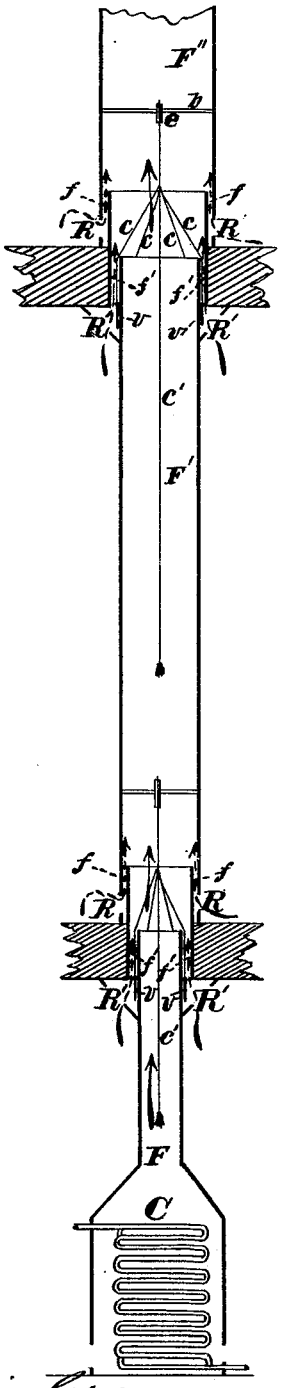
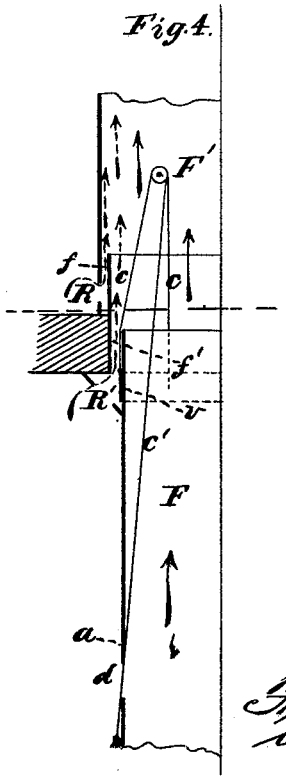


Fig 4.



Witnesses:
Michael Ryan
Fred Haynes

Francis Greaves
by his Attorneys
Brown & Allen.

UNITED STATES PATENT OFFICE.

FRANCIS GREAVES, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN APPARATUS FOR VENTILATING BUILDINGS.

Specification forming part of Letters Patent No. **180,868**, dated August 8, 1876; application filed May 19, 1876.

To whom it may concern:

Be it known that I, FRANCIS GREAVES, of Brooklyn, in the county of Kings and State of New York, have invented an Improved Apparatus for Ventilating Buildings; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

My invention has for its object the more perfect ventilation of apartments in buildings, by means of induced currents drawn from such apartments through openings into ventilating-flues, by ascending currents of warm air in such flues.

The invention consists, partly, in means whereby the main ascending currents of warm air are maintained in the centers of the main ventilating-flues, and the currents of air in flowing from the apartments ventilated are directed upward before coming in contact with the said ascending warm currents, which, when so meeting the said inflowing currents previously directed upward, cause said inflowing currents to rise on the outside of the main currents in said flues without suddenly commingling with the said main central heated currents, and without forming eddies, which would otherwise obstruct the flow of air through the main flows, and greatly retard the ventilation.

The invention also consists in means whereby the warm air from the top of an apartment is carried into the main ventilating-flue, and directed in an upward current nearer the center of the said main flue than the colder current drawn from the bottom of said apartment.

The invention, moreover, consists in valves for controlling the said inflowing currents, whereby, when the said valves are opened to their fullest extent, the said inflowing currents are permitted to enter through the registers without any obstruction from said valves.

Figure 1 in the drawing is an outside view of ventilating-flues comprising my invention. Fig. 2 is a vertical section through the same. Fig. 3 is a cross-section through the line *x x*, Fig. 1. Fig. 4 is a partial vertical section on the line *y y*, Fig. 3.

The drawing shows the invention applied to a basement and two other floors only, but it may be applied to any number of floors. The drawing shows the apparatus as placed at the side of a building or a partition, but it may be arranged in the center of a building, if desired.

F, Fig. 2, represents one of the main ventilating-flues, which opens into an enlarged flue, F′, each successive story in the building, as shown at F″, having a larger main ventilating-flue than the story next below it, in order to afford space for the increased volume of air, swelled by air drawn from the apartments through the openings R R′, and by the somewhat lessened velocity of the ascending warm current, indicated by the solid arrows, Figs. 2 and 4, in the central part of the flue. The flues F F′ F″ form a continuous passage, and the main warm current, indicated by the said solid arrows, is generated by steam-pipes C, or other heating apparatus, at the bottom of the lower flue F, air being freely admitted to the bottom of said flue, and the heating apparatus, through an opening, D, in the side of the bottom of said flue.

The upper end of the flue F″, which opens into the air exterior to the building, may be protected by any suitable cap or hood, to prevent the obstruction of the ascending air by winds, and to prevent the entrance of snow and rain into said flue.

Near each floor and ceiling above that on which the steam-pipes C are placed, openings into the flues are provided, the openings marked R being near the floor of the apartment to be ventilated, and the openings marked R′ being near the ceiling of the said apartment; but the openings R or R′ may be used separately. I prefer, however, to make the flue of rectangular cross-section, and to place a valve on each of the three sides thereof, which project into the apartment, arranging the valves in each system of said valves to be opened and closed simultaneously, in the manner hereinafter described.

The openings R R′ open into short ascending flues, each of which is separated by vertical walls from the main flue and from the flue of the nearest adjacent openings, the inner walls of the short flue *f*, into which the open-

ings R near the floor of the apartment open, rising somewhat higher into the main flue than the inner walls of the flue f', into which the openings R′ near the ceiling in the next lower apartment open. The entrance of air through the openings R′ is controlled by valves v, Figs. 2, 3, and 4, consisting of plates hinged to the inner walls of the flue f'. These valves are preferably closed by cords c, which connect with a single cord, c', the cord c' being passed through an eye, e, attached to a cross-bar, b, or other support in the main flue F′, above the said valves v, from whence the cord descends in the flues F′ F sufficiently to be reached by the hand through either of the small doors d, Fig. 1, provided for that purpose. When the cord c' is drawn downward, the eye e in the bar b acts after the manner of a pulley to close the valves v, and by fastening the cord c' by means of a dog, a, or other suitable fastening, the said valves may be kept closed, or held at any desired extent of opening; but other means of opening the said valves may be employed.

When the cord c' is released from its attachment to the dog a the valves v turn downward on their hinges away from the registers R′, and against the inner walls of the flue f', as shown in Fig. 4. In this position they do not interfere with the ascending currents through the said openings, thus obviating a serious objection to valves which, when open, project into the interior of flues of ventilating apparatus. The flues f are preferably not provided with valves, as it is generally best to keep them constantly open to draw off the foul air which collects at the bottom of rooms; but they may be provided with valves of the character described, if desired.

In apparatus constructed as described the air flows from both the upper and lower parts of the apartments ventilated, or from the lower part only of said apartments, according as the flues f' are opened or closed. The flow is uniform and constant, being free from the interruptions caused by conflicting currents and eddies, and the heated air drawn from the tops of the rooms is conducted toward and into the center of the main ascending current, thus assisting by its levity the primary central heated current, which would be retarded were the cold currents from the bottom of apartments conducted toward the center of the ascending air-column instead of being directed and retained toward and near the outer walls of said main flue, and separated from the said primary current by the warm current from the top of the room.

I claim—

1. The combination of the lower flue F, one or more upper flues, F′ F″, of larger capacity, and the short intervening flues f, substantially as and for the purpose specified.

2. The combination of the lower flue F, one or more upper flues, F′ F″, and the short intervening flues f', substantially as and for the purpose specified.

3. The combination of the lower flue F, one or more upper flues, F′ F″, and the short intervening flues f f', the flues f' being placed between the flues f and the main flues F F′ F″, substantially as and for the purpose specified.

4. The hinged valves v in combination with the flues f', placed between the flues f, and the flues F F′ F″, and opening downward and away from the openings R′, substantially as and for the purpose specified.

F. GREAVES.

Witnesses:

MICHAEL RYAN,

FRED. HAYNES.