J. H. ELWARD.

VENTILATING APPARATUS.

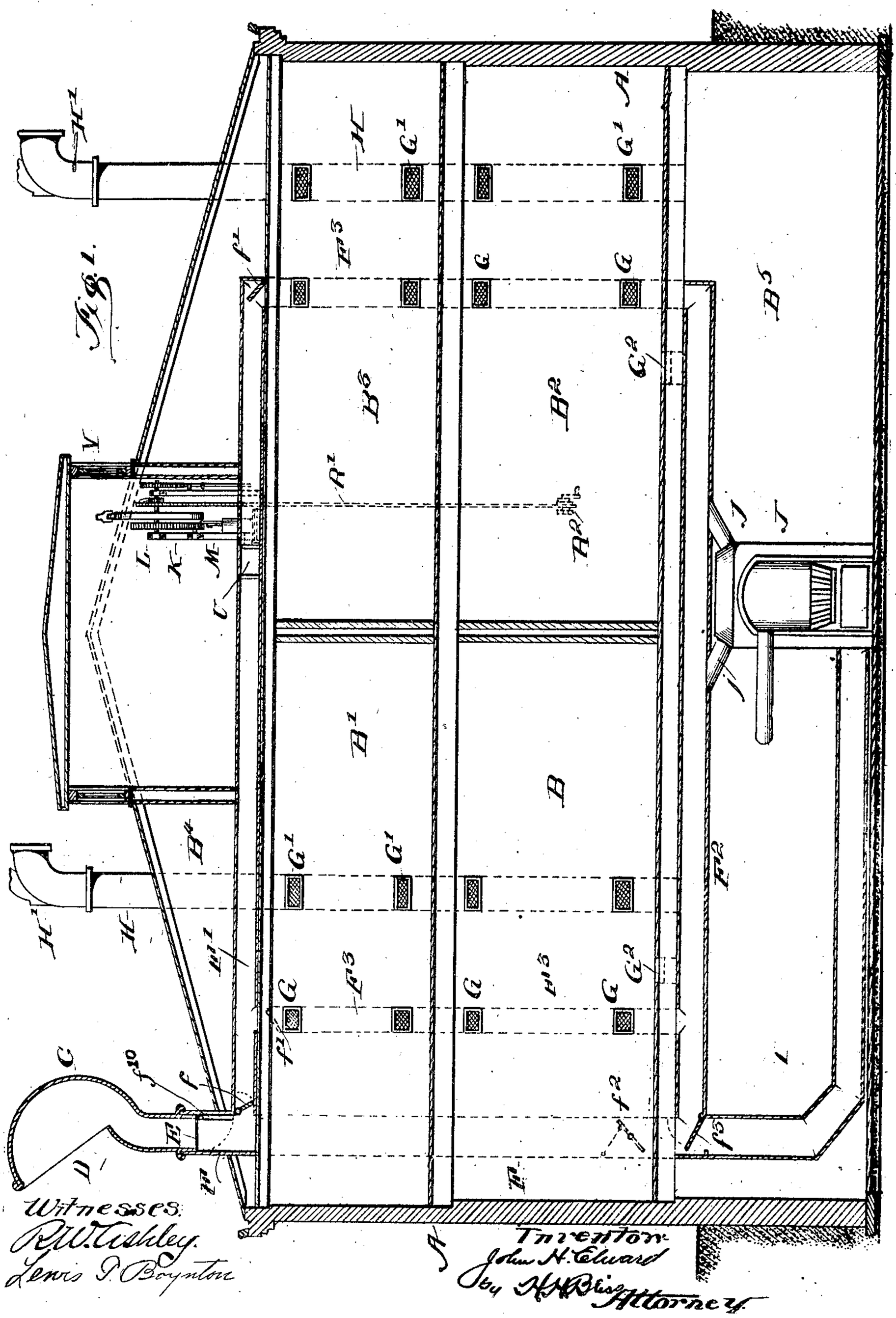
APPLICATION FILED FEB. 8, 1904.

921,966.

Patented May 18, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
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Lewis P. Boynton

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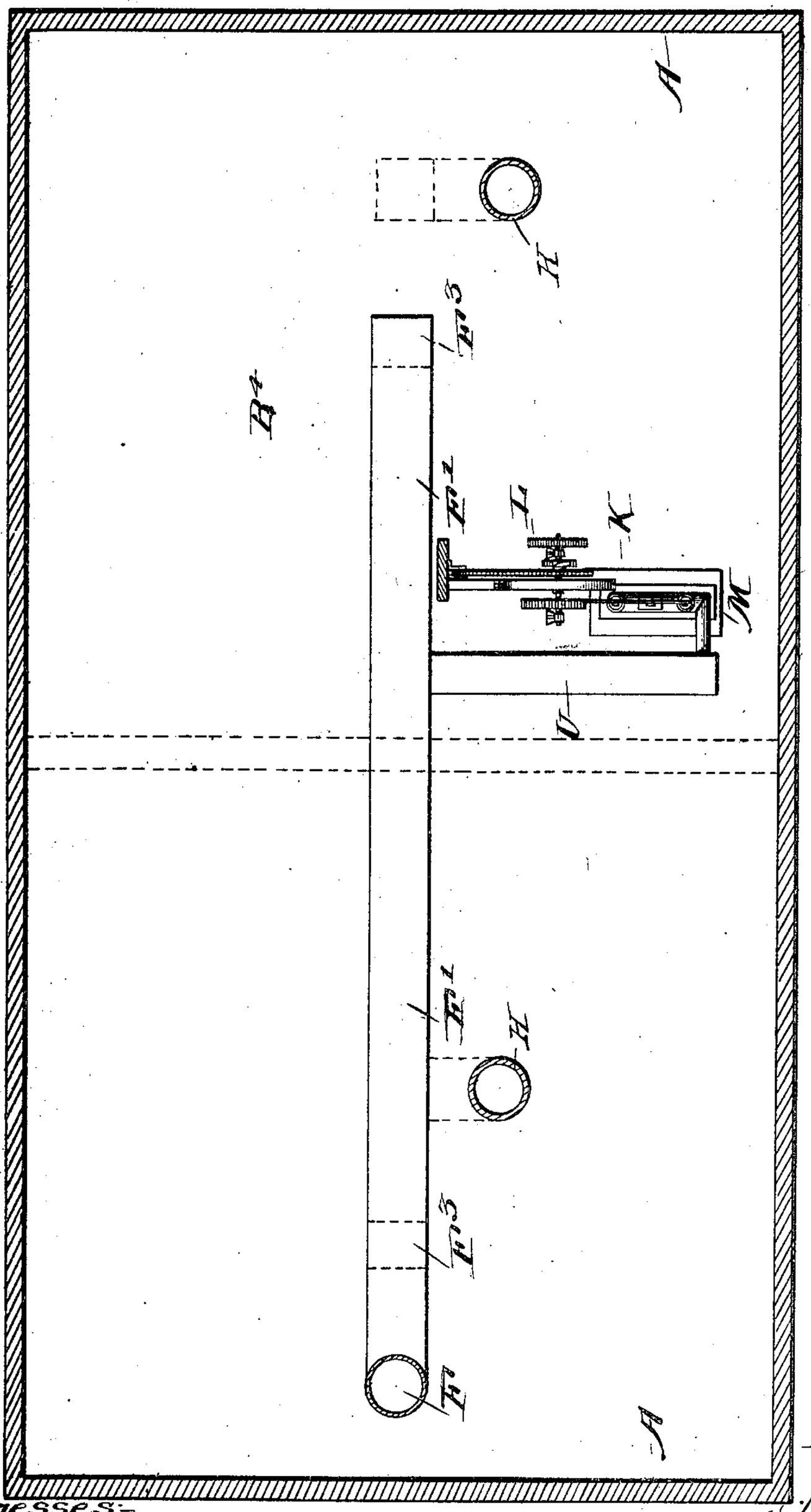

Fig. 2.

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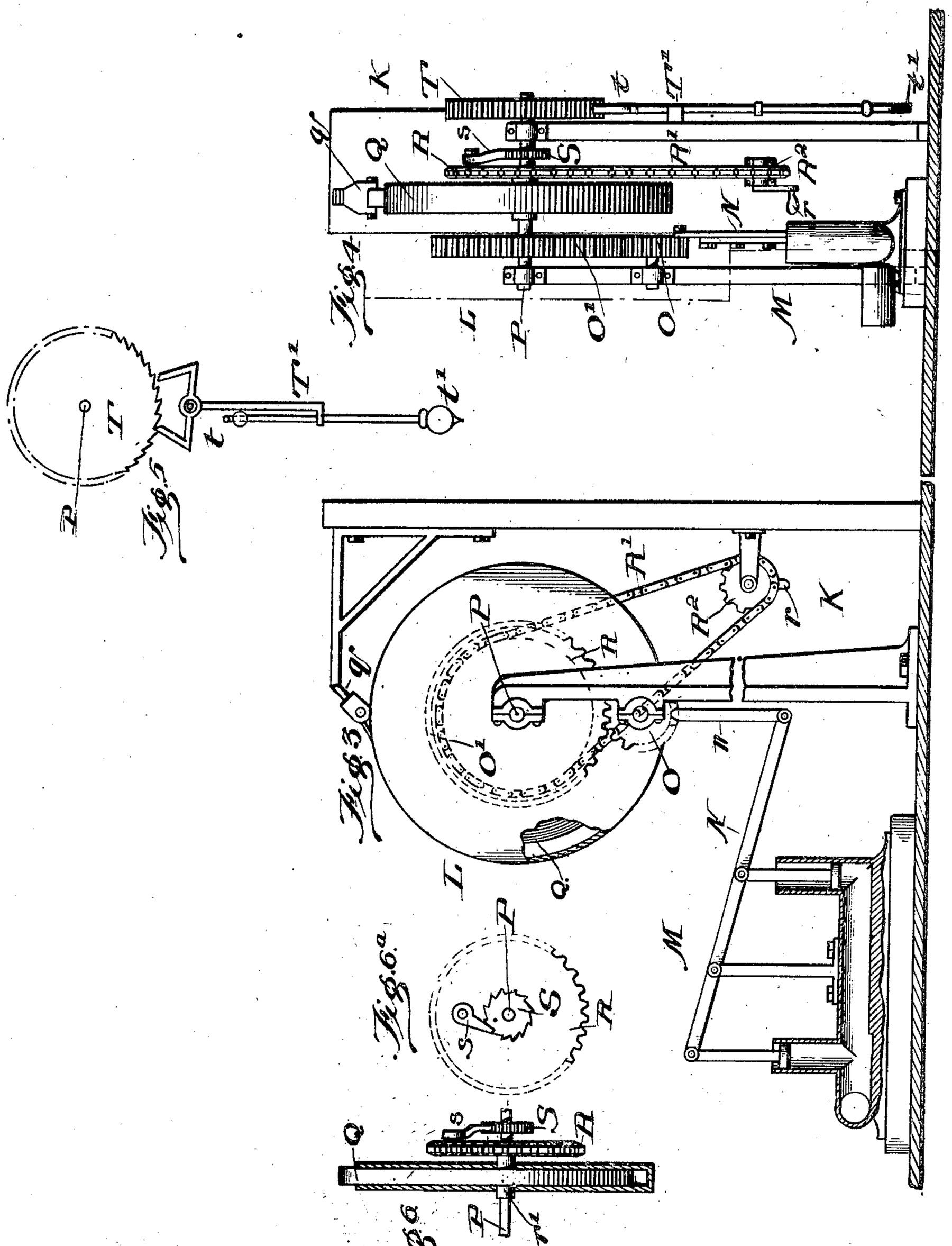

WITNESSES

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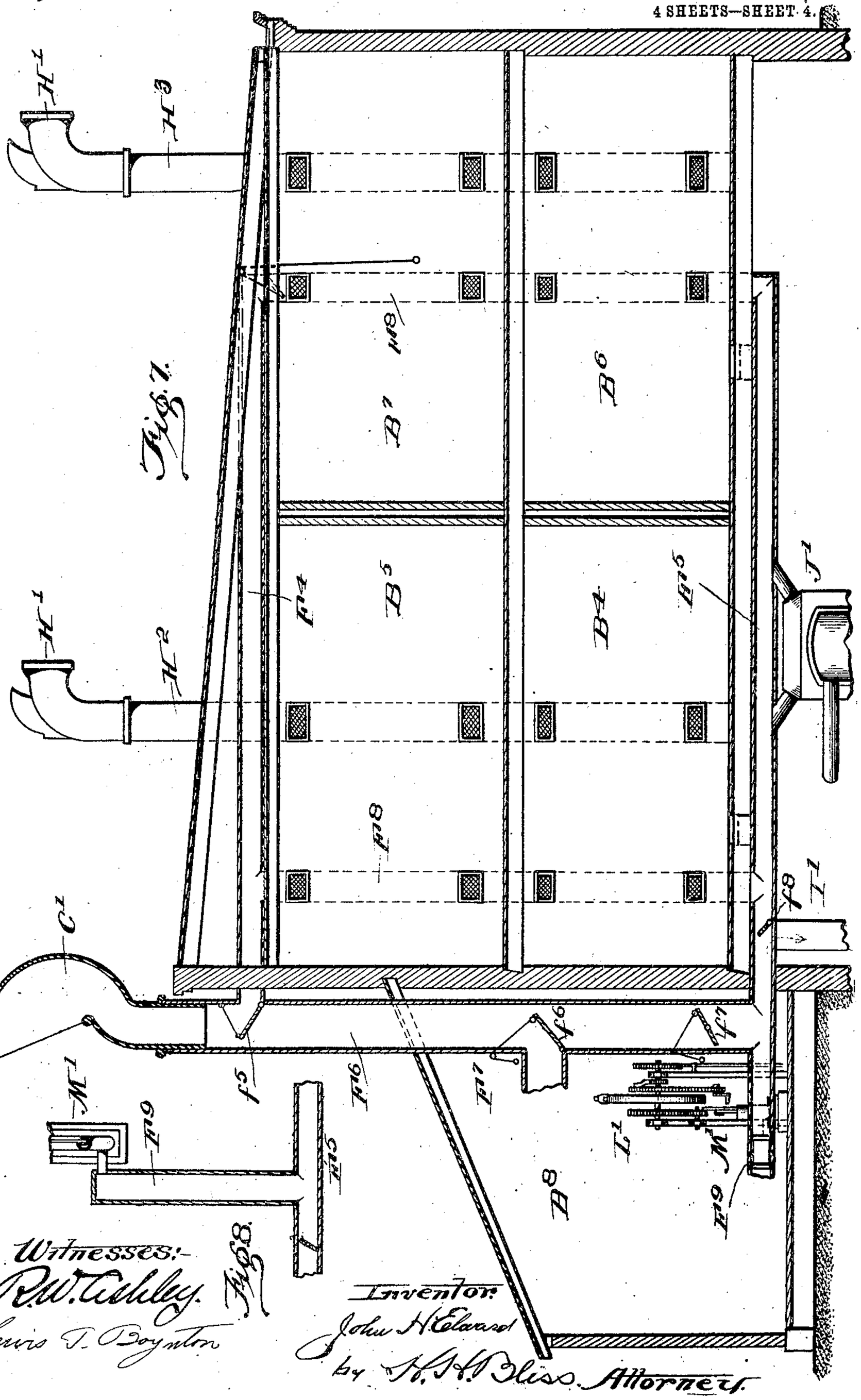

Fig. 7.

Fig. 8.

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UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF CASTLETON, KANSAS.

VENTILATING APPARATUS.

No. 921,966. Specification of Letters Patent. Patented May 18, 1909.

Application filed February 8, 1904. Serial No. 192,411.

To all whom it may concern:

Be it known that I, JOHN H. ELWARD, a citizen of the United States, residing at Castleton, in the county of Reno and State of Kansas, have invented certain new and useful Improvements in Ventilating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to an improved apparatus for supplying air to dwellings and other buildings and structures, and for introducing the air either under the influence of natural pressure or by pressure caused artificially; for tempering the air as may be required and for rapidly and effectively withdrawing the vitiated and impure air from the same structures.

It is now well known that the air along the surface of the earth and that which collects in the earth near the surface, and particularly in large towns and cities is charged with noxious gases and vapors. Notwithstanding this it is the common and accepted practice to supply the interiors of buildings with currents of air from that part of the external atmosphere which is adjacent to or below the earth's surface. The air trunks or ducts which supply the furnaces of dwellings and other structures communicate with the atmosphere through apertures in the foundations, or at points near the surface of the earth.

One of the objects of the present invention is to provide an apparatus which will insure a copious supply of air from elevated horizontal planes, which air, when of the proper temperature, may be taken through the apartments which it is necessary to ventilate, or may be conducted to heating apparatus or to a cooling mechanism as circumstances demand.

Figure 1 is a view partly in elevation and partly in section of a building having interior compartments, and a ventilating apparatus which is adapted to supply bodies of air in the manner and for the purposes above referred to. Fig. 2 is a plan view illustrating the parts in the upper part of the structure. Fig. 3 is a front elevation of a set of air devices which can be employed for artificially creating pressure upon the incoming body of air. Fig. 4 is a side elevation of the same. Figs. 5, 6 and 6^a are details. Fig. 7 is a sectional view of a building showing a modification in construction and arrangement of the apparatus. Fig. 8 is a sectional detail of the ducts communicating with the pump in Fig. 7.

It will be understood that the essential parts of my invention are in no way restricted or limited to any particular form of building, or with respect to its purpose. My improvements in ventilating apparatus can be applied to dwellings, factories, store houses, or any other structure where ventilation is required.

In order to illustrate how the invention may be carried out I have, in the drawings, shown, more or less conventionally, the buildings to which the application may be made.

Referring to Fig. 1, A indicates the vertical or side walls of a building having interior compartments B, B′, B^2, B^3, also having an upper compartment B^4 and a basement or cellar B^5. As shown in this figure the air for ventilating the compartments B to B^3 is taken in at a receiver C which is put in a position as elevated as possible. It is arranged to rotate around a vertical axis, and is so constructed that the wind or air in motion will tend to hold the aperture D in the direction from which the wind or air is moving. Its downwardly extending stem or axial part E is of the nature of a duct which is mounted in a stationary vertically arranged duct F. The latter is carried down through or outside of the building and communicates with one or more lateral ducts, as shown at F′, F^2. At f, f', f^2 and f^3 there are valves or dampers in these trunks or ducts of such nature that the air can be shut off from the duct F′ or that at F^2 at will. If the valves at f, f' be open and that at f^2 be closed, the air entering the receiver C will be compelled to travel downward and then inward along the duct F′ until it reaches one or more vertical ducts F^3. These are arranged adjacent to the apartments B, B′, B^2, B^3 which it is desired to supply with fresh air. If it is desired to have the air travel upward through these, the damper or valve f is moved to close the duct F′, that at f^3 is moved to open the duct F^2 and close the vertically arranged duct F, while the damper f^2 is opened, whereupon the air that is sent inward and downward by natural pressure will reach the lower ends of the ducts F^3 and will pass upward from them into the apartments.

When the temperature of the external atmosphere is below that which is required in the apartments B to B^3, the vertical duct F

is cut off from the lateral ducts F′, F² by means of the valves *f*, *f*³, and, at the same time, communication is opened with a duct or trunk I. This extends to the air heating chamber of a heating apparatus, preferably placed in the basement or cellar B⁵. A heater of any well known form can be used. One is conventionally illustrated at J. It receives the cold air from the trunk I and delivers it through the flues *j*, *j* to the duct F². And the latter delivers it, as above described, to the ducts F³ leading to the apartments B to B³. But reliance cannot be placed at all times upon natural draft or air pressure due to non-artificial causes. I supplement the air receiving and conducting devices, above referred to, by means of a pressure apparatus and power devices for operating it. K indicates as a whole such a power delivering and pressure generating mechanism. It may be of any well known or suitable form. I have devised a spring power mechanism which I find adapted for this purpose, and with it combine a double acting pump. These are illustrated more or less conventionally, as entireties, at L and M.

The pump pistons are connected to and operated by a walking beam lever N which is connected to a link or pitman *n* pivoted to a crank wheel O. The latter is toothed and is driven by a gear wheel O′. This wheel is secured to a shaft P which is mounted in bearings carried by a suitable framework. The shaft is rotated by means of a spring Q which is adapted to be wound up by means of a train of sprocket gear consisting of a wheel R, chain R′, and a sprocket pinion R². The latter is placed at any suitable point where an operator can get access to the crank *r* of the pinion R².

The spring Q is loose in relation to the shaft P, but is secured rigidly to the hub *r*′ of the sprocket wheel R. The outer end of the spring is stationary and is secured to a holder at *q* which may be fastened to the framework or may be secured to the wall or fixed part of the building.

After the spring has been wound up and it commences to unwind, it causes the rotation of the shaft P by means of a ratchet wheel S, which is fixed to the shaft, and a pawl *s* which is pivoted to the face of the sprocket wheel R. But rapid unwinding, however, is prevented by an escapement mechanism, consisting of the escapement wheel T, the double pawl *t*, the pendulum rod T′ carrying the pawl and having the bob or weight *t*′. When the apparatus is in motion the pump at M acts to force air into the duct U. This air may be supplied to the apartment in which the pressure mechanism is placed through windows or air apertures V, or it may be supplied from the receiver C, if a branch duct be provided to conduct the air from the receiver into the apartment B⁴.

The trunk or duct U communicates with the trunk F′, above described, and the air may be forced either directly to the apartments B to B³, through the ducts F³, or if the dampers *f*′ be closed, the damper *f* set to open communication between ducts F′ and F, damper *f*² set to leave the duct F free for the passage of air and that at *f*³ be adjusted so as to cut off communication with duct F² and open it with the duct I, it (the air) can be forced down to the heating apparatus and carried thence upward through the ducts F³ and delivered warmed to the chambers of the building. To enable the air to be directed from the course just described, a damper *f*¹⁰ is provided in the duct F above the point at which the duct F′ opens into it; and by closing this damper, air is prevented when passing from duct F′ into duct F from passing upwardly through the latter duct and is compelled to follow the desired downward course.

Air coming into either of the apartments from the vertical ducts F³ can be controlled directly by means of registers at G. Use may also be made of ducts having floor registers at G² of suitable number and location. The vitiated air escapes from these apartments through the flues H having automatically rotating cowls H′. Communication with the flues is controlled by means of registers, dampers, or the equivalents at G′.

In Fig. 7 I have shown a modification of the apparatus. Here the horizontal ducts are indicated by F⁴, F⁵, and the main vertical intake duct by F⁶. The latter is provided with an automatically rotary or self-adjusting receiver C′ for taking air at a high line above the ground and directing it downward under natural pressure to the duct F⁶. *f*⁵, *f*⁶, *f*⁷ are valves or dampers in the ducts. That at *f*⁵ is adapted to shut off communication between the vertical duct F⁶ and the horizontal duct F⁴. That at *f*⁶ is adapted to close and open the lateral duct F⁷ leading into a supplemental apartment B⁸; the one at *f*⁷ cuts off the upper part of the duct F⁶ at a line near the bottom. With this construction the air can be taken downward through the duct F⁶, then inward through the duct F⁴ and downward through those at F⁸ into the apartments; in such case the damper at *f*⁵ being placed in its lowest position so as to shut off the upper part of the duct F⁶. Or, if the valves *f*⁵ and *f*⁶ be put in their upper positions, and if the valve at *f*⁸ be turned down, the air can be taken downward and inward through the duct F⁵, and upward into the apartments through the ducts F⁸. Or, again, if the valve *f*⁸ be turned upward so as to lie across the duct F⁵, the air can be taken through the branch duct at I′ and the heater at J′ and thence to the apartments B⁴, B⁵, B⁶ and B⁷. The supplemental apartment B⁸ is here utilized for

the air forcing apparatus at L′, M′. The detail parts of this mechanism can be the same as those above described and shown in Figs. 3 and 4. Fresh air is supplied to this apartment through duct F^7 when the valve f^6 is properly adjusted. The air forced from the pump or blower at M′ is carried through the duct F^9 to the duct at F^5, and it can be either taken directly to the apartments or can be caused to travel downward through the duct at I′ through the furnace and thence to the apartments. Here the vitiated air is taken from the apartment through the uptake flues or ducts H^2, H^3.

What I claim is:

1. In a ventilating apparatus for a building having one or more compartments, the combination of an initial air receiving device situated in a position elevated above the ground, a vertically arranged air duct leading from one compartment to the next and having openings in each compartment, an air duct communicating with said vertically arranged duct at either end and with said air receiving device, valves for controlling the passage of air either downward or upward through said vertical duct, and means for exhausting the air from said compartments.

2. In a ventilating apparatus for a building having one or more apartments, the combination of an initial air receiver situated in a relatively elevated position, a vertically arranged air duct having openings into said apartments, an air duct connecting the upper end of said vertical air duct with said air receiving device, an air duct connecting the lower end of said vertical duct with said air receiving device, valves for controlling the passage of air either downwardly or upwardly through said vertical duct, and means for exhausting the air from the apartments.

3. In a ventilating apparatus for a building having a plurality of compartments arranged at different levels, the combination of an initial air receiving device situated in a position elevated above the ground, a vertically disposed air duct connected with and receiving air from the said initial receiver, a vertically disposed distributing air duct communicating with the compartments to be ventilated, connecting air ducts arranged between the said vertically disposed ducts, one located in a relatively elevated position and the other at a lower level and valves for controlling the passage of air through the said connecting ducts whereby the movements of the air through the distributing duct may be either upward or downward accordingly as the valves are set.

4. In an apparatus for ventilating a building having one or more apartments, the combination of an automatically rotated air receiver situated in a relatively elevated position and adapted to receive the air under motion, ducts communicating with the said receiver and adapted to conduct air therefrom under natural pressure directly to the said apartments while it is moving downward, ducts for conveying air from the said receiver to points below the said apartments and conducting it upward into them, power mechanism supplemental to the said air-receiver adapted to force air into said ducts, and dampers or means for controlling the passage of the air through the ducts, substantially as set forth.

5. In a ventilating apparatus, for a building having one or more apartments, the combination of a vertical duct extending from the top of the building to the bottom, a rotary air receiver at the upper end of the said duct, a horizontally arranged lateral duct extending from the said vertical duct on lines above the apartments to be ventilated, a horizontally arranged duct extending laterally from the vertical duct on lines below the apartments to be ventilated, the vertically arranged ducts communicating at either end with one of said horizontally arranged ducts and having openings communicating with said apartments to which they are to deliver air, power devices for forcing the air into the said vertical and lateral ducts, and dampers or shut-off devices for controlling the passage of the air through said ducts, substantially as set forth.

6. In an apparatus for ventilating a building having one or more apartments, the combination of an elevated horizontal rotary air receiver, a series of vertical ducts adapted to receive air from said receiver, and ducts communicating with the apartments to be ventilated, a horizontal duct above the said apartments communicating with all of the aforesaid vertical ducts, a horizontal duct below the apartments to be ventilated communicating with all the aforesaid vertical ducts, power devices adapted to force air through all of the said ducts, and dampers or cut-off devices for controlling the passage of the air through said ducts, either from said air receiver under natural pressure, or from said power devices, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:
T. J. O'Leary,
Frank Kemp.