(No Model.) 3 Sheets—Sheet 1.

W. M. DECKER.

VENTILATION OF BUILDINGS.

No. 514,309. Patented Feb. 6, 1894.

Fig. 1.

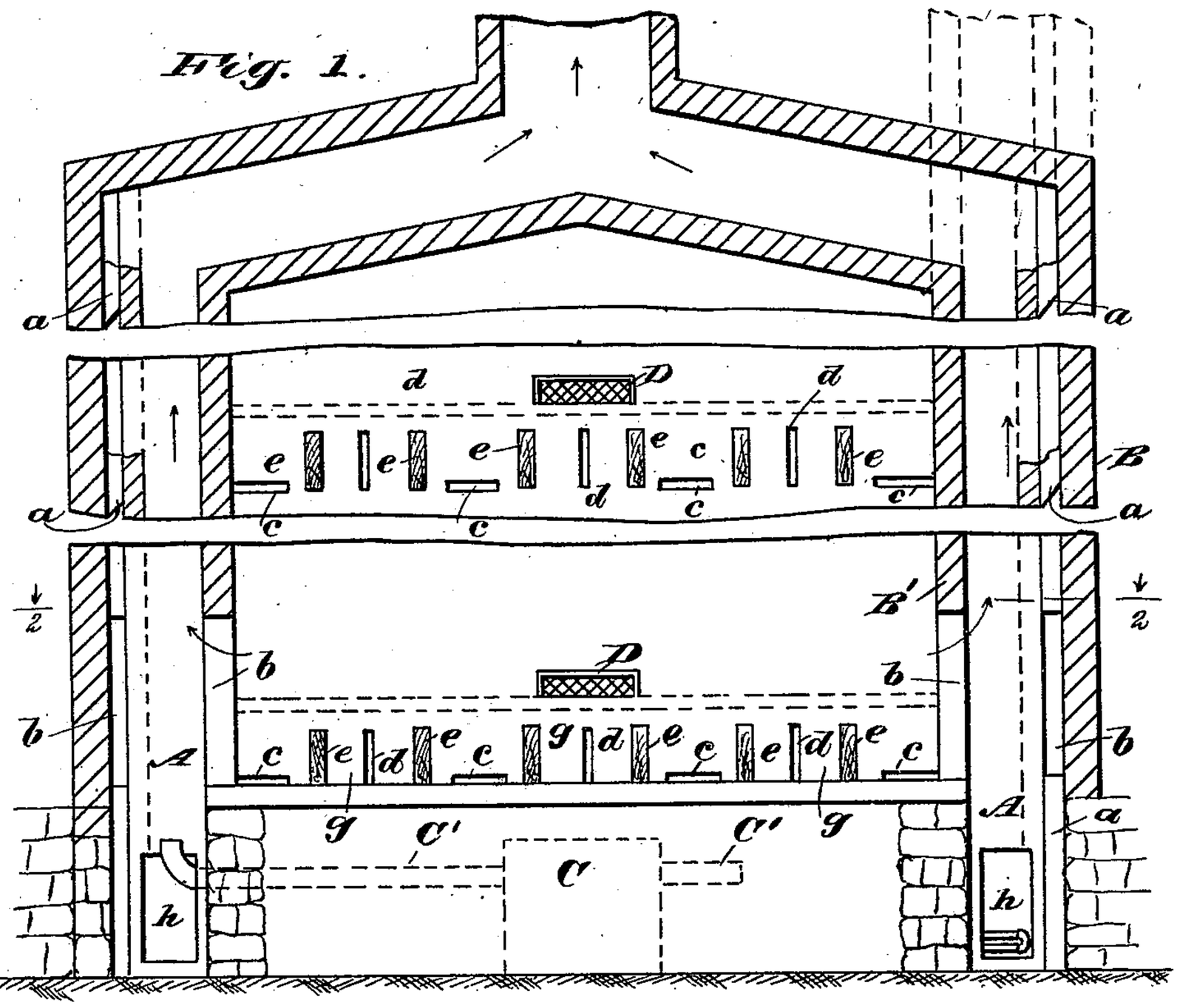
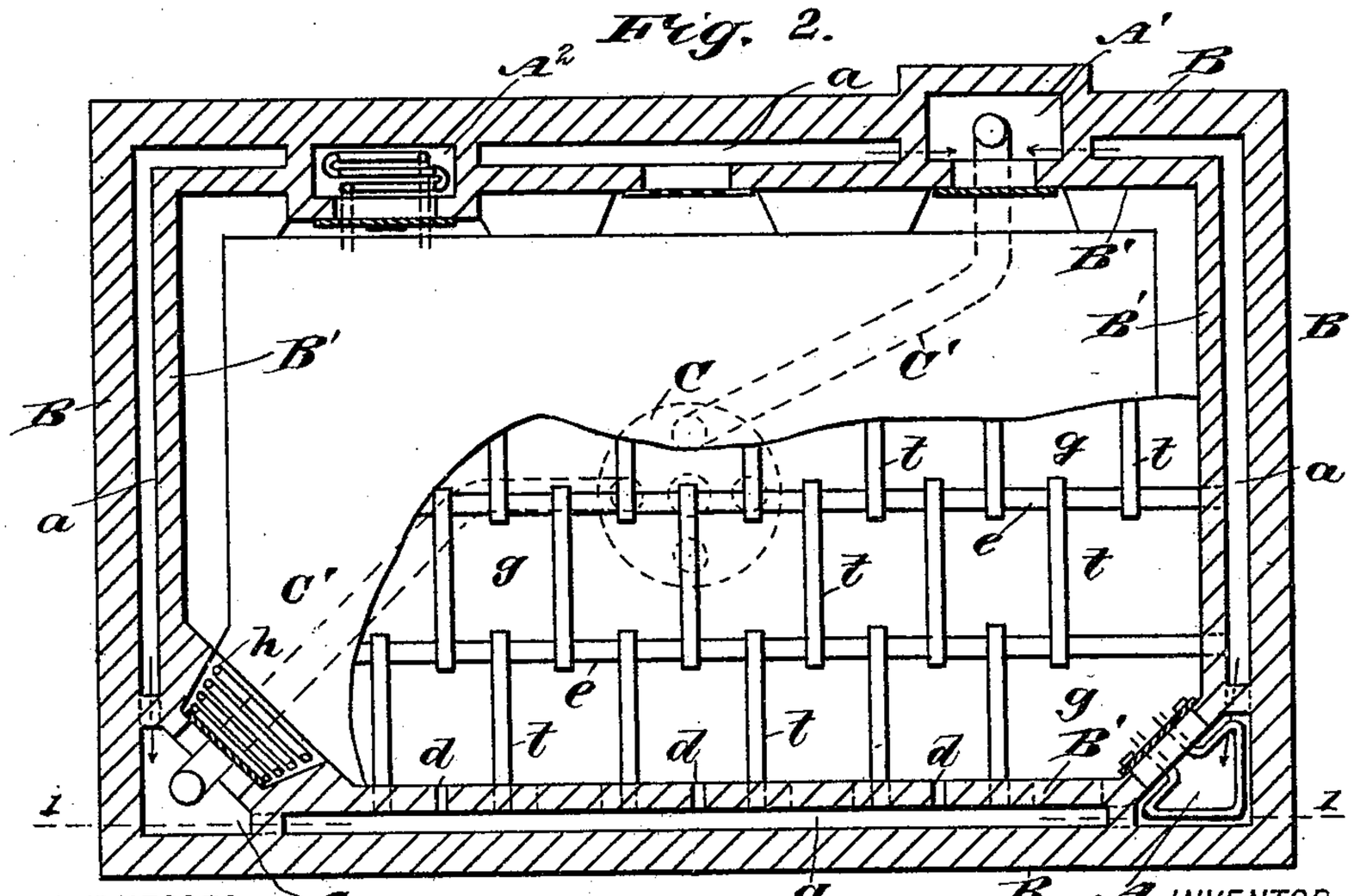


Fig. 2.



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No. 514,309. Patented Feb. 6, 1894.

Fig. 1.

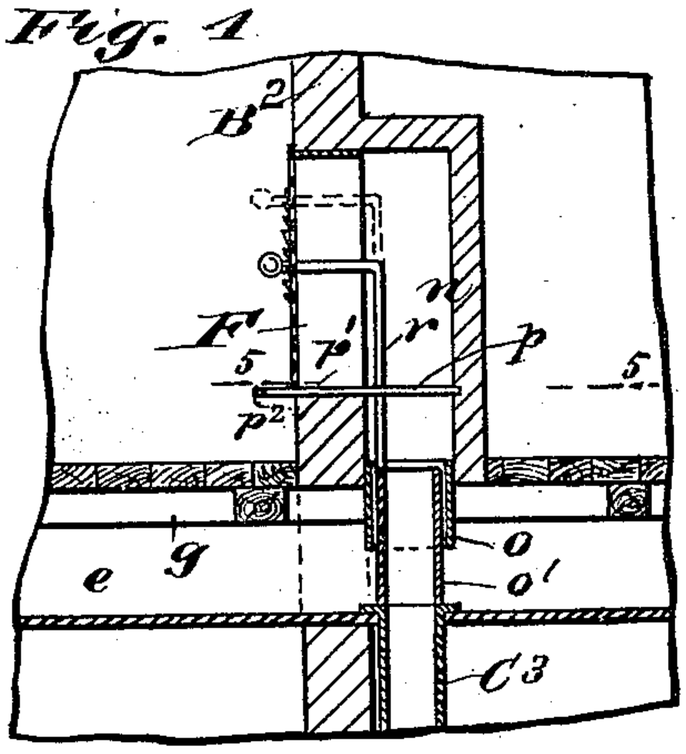

Fig. 3.

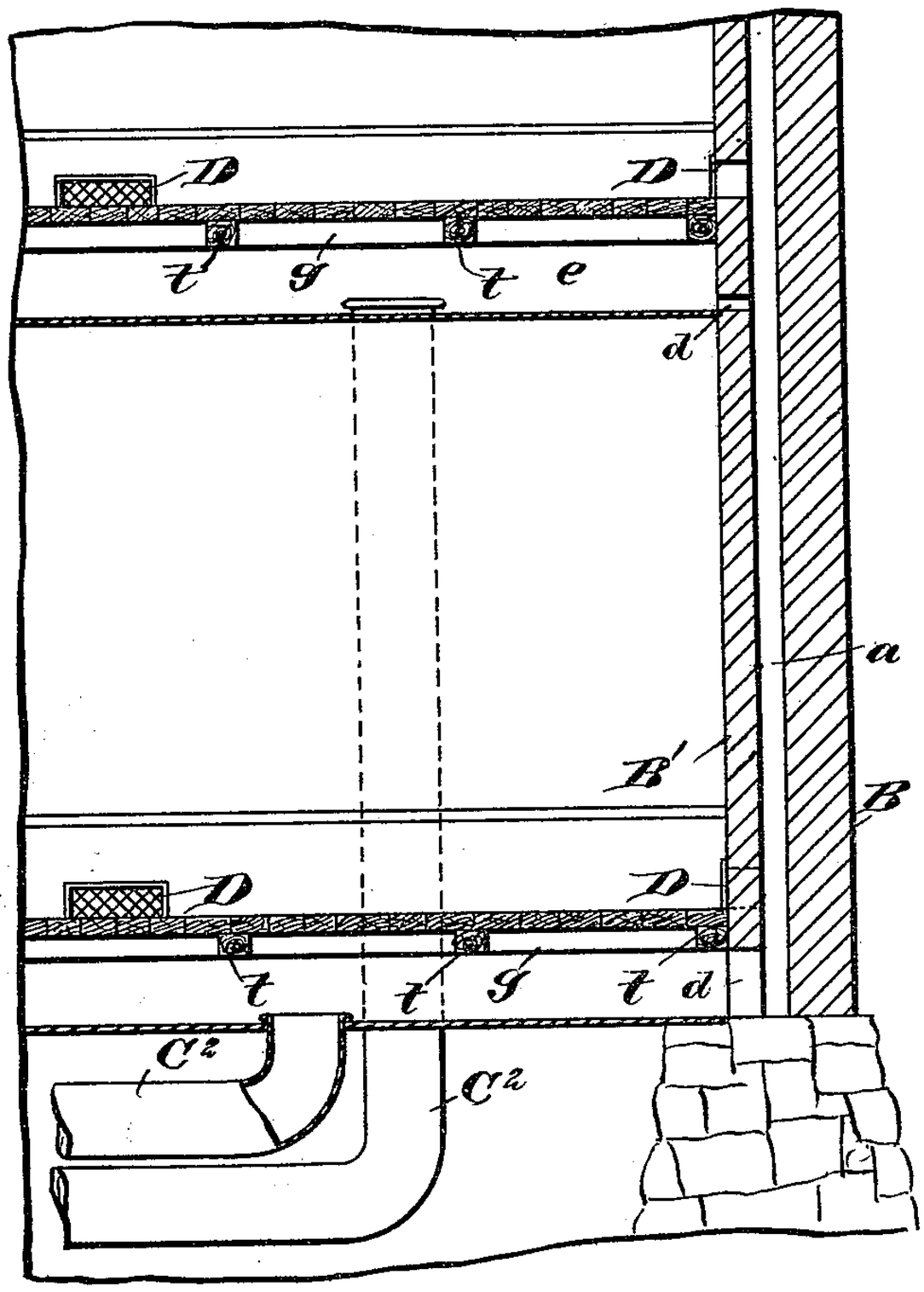

Fig. 5.

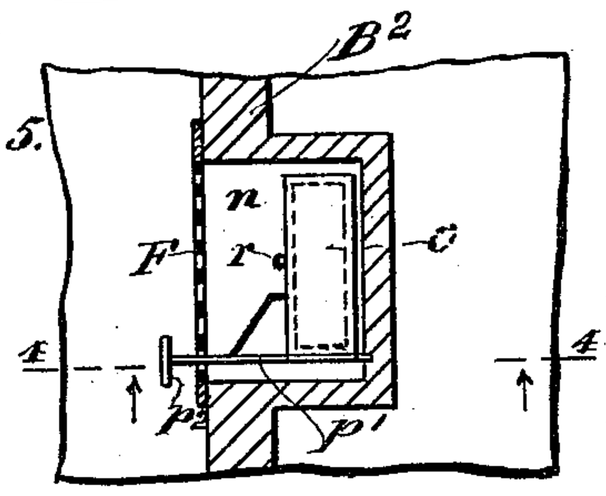

Fig. 6.

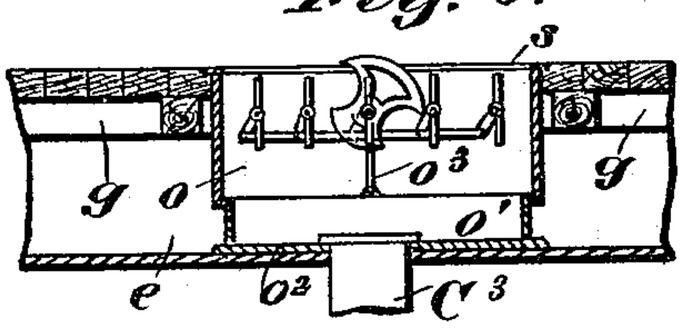

Fig. 8.

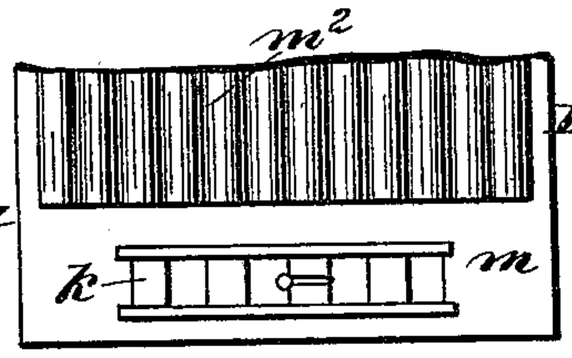

Fig. 7.

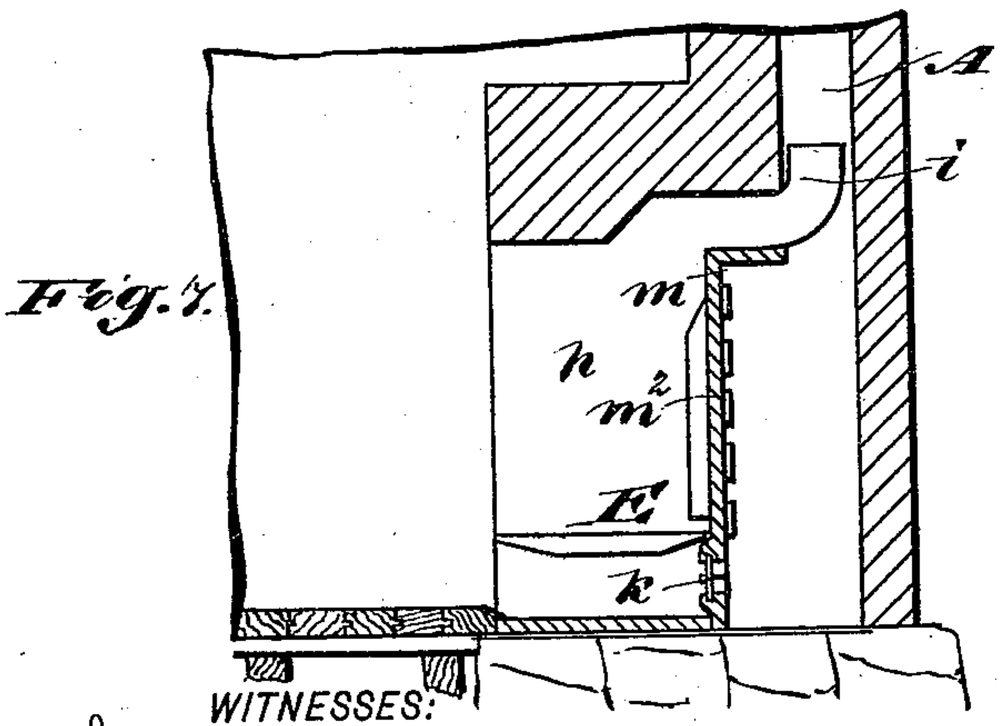

Fig. 9.

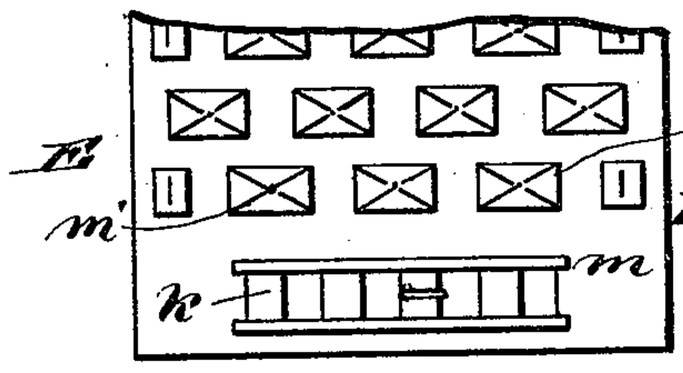

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Fig. 10.

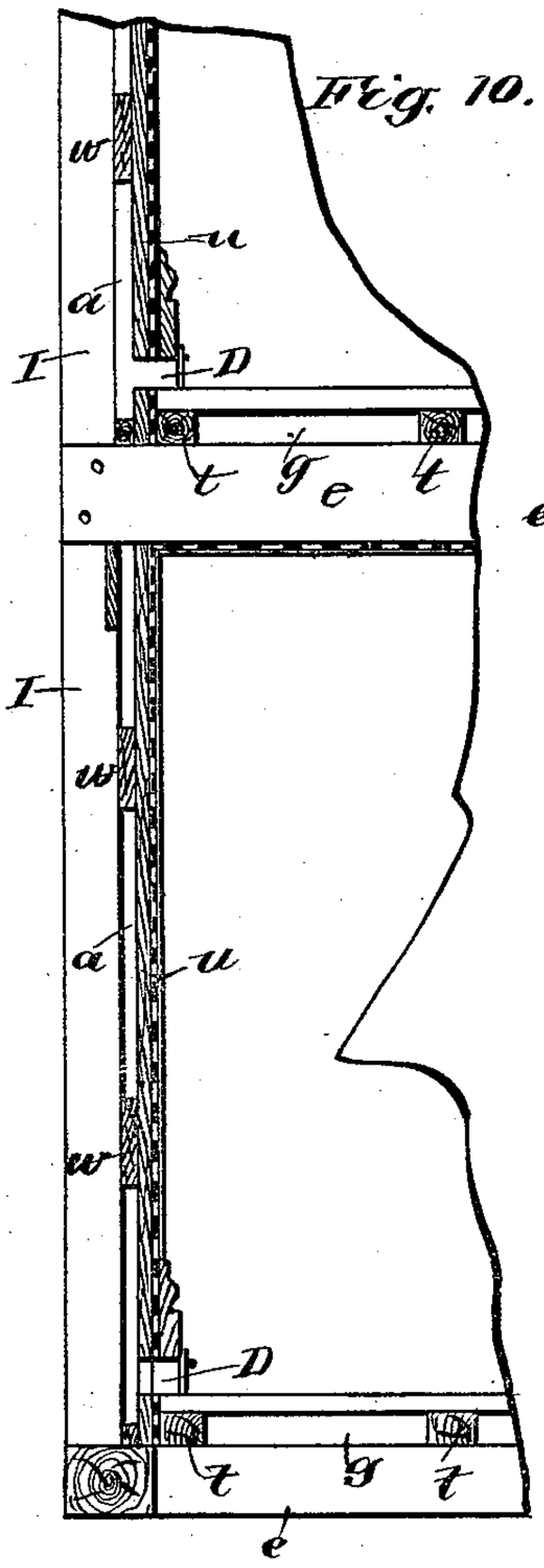


Fig. 11

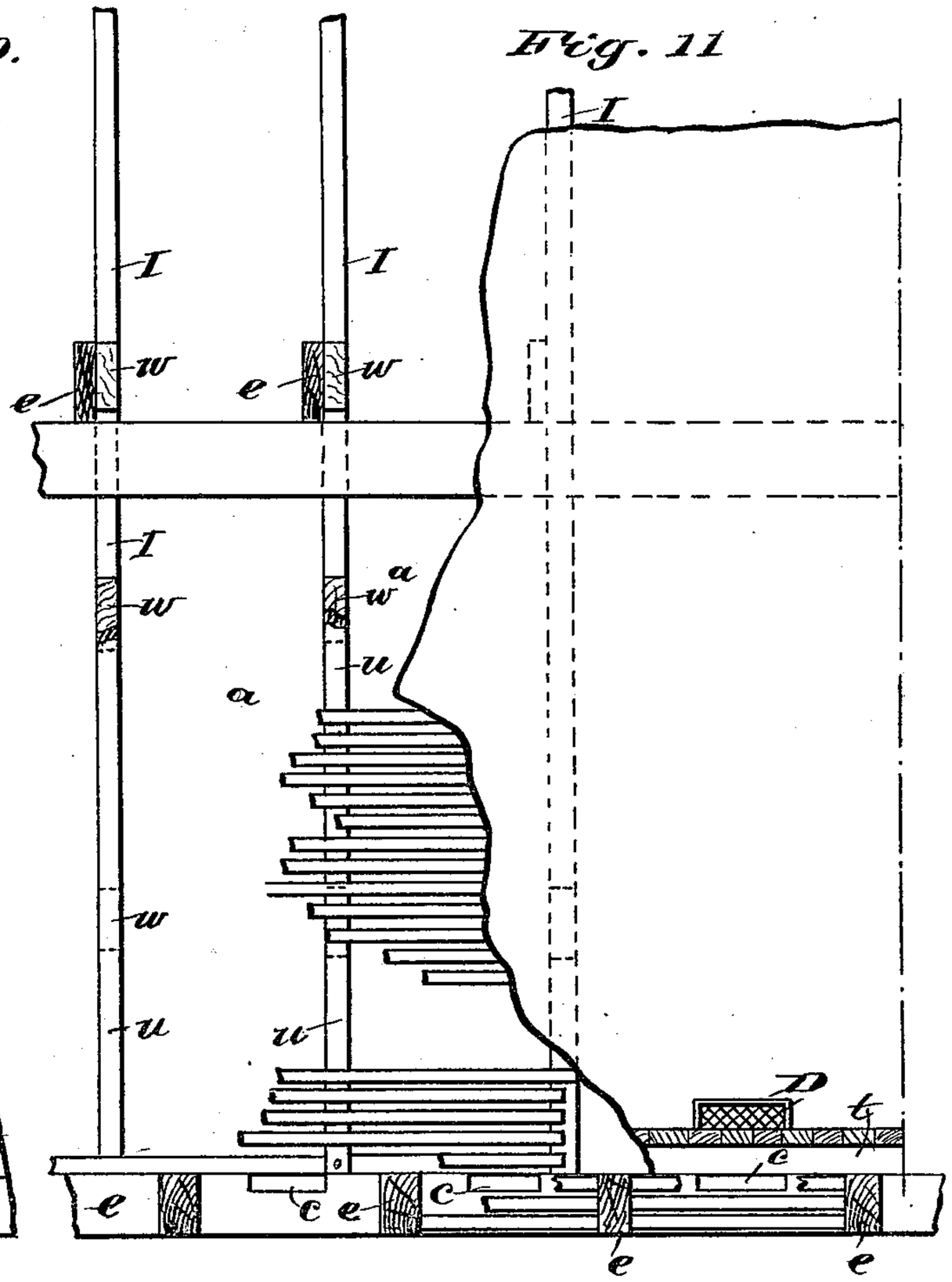
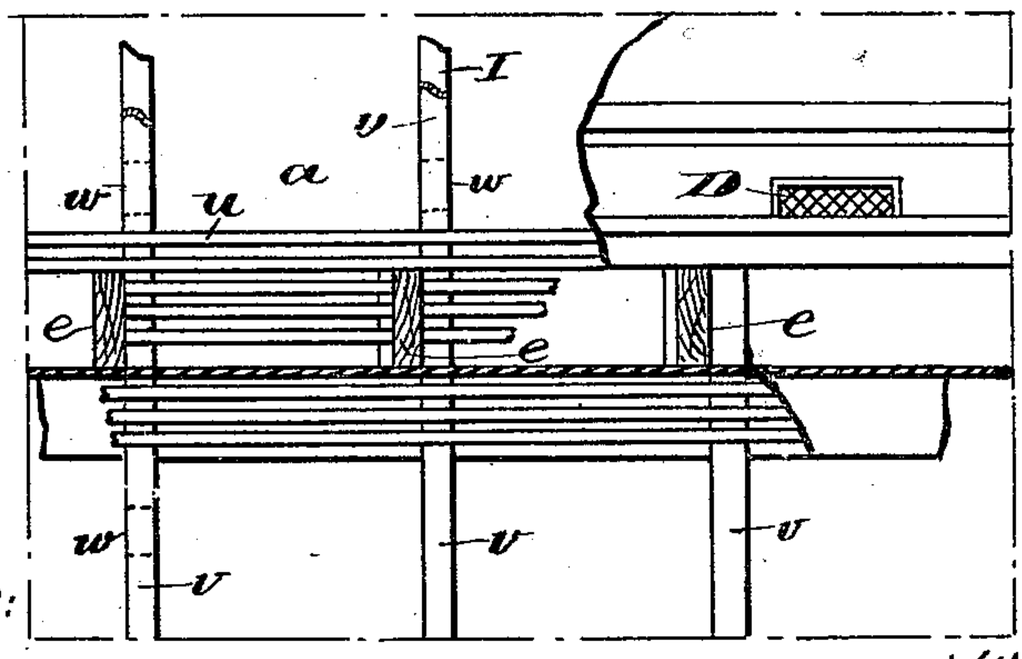


Fig. 12.



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UNITED STATES PATENT OFFICE.

WILLIAM M. DECKER, OF KINGSTON, NEW YORK.

VENTILATION OF BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 514,309, dated February 6, 1894.

Application filed June 8, 1892. Serial No. 435,925. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. DECKER, of Kingston, in the county of Ulster and State of New York, have invented a new and useful Improvement in the Ventilation of Buildings, of which the following is a full, clear, and exact description.

The invention consists in a building constructed as hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of a building, showing some of the features of improvement, the section being taken on the line 1—1 in Fig. 2. Fig. 2 is a sectional plan view of a building, embodying different features of the improvement, taken on the line 2—2 in Fig. 1. Fig. 3 is a broken sectional side view of a building showing some of the improvements in position therein. Fig. 4 is a broken sectional view of a building wall and floor on the line 4—4 in Fig. 5, showing details of construction of heat and air controlling devices connected therewith, that are preferably employed to carry into effect the novel system of ventilation and heating. Fig. 5 is a sectional plan view of the parts shown in Fig. 4, taken on the line 5—5 in said figure. Fig. 6 is a broken vertical section of a building-floor and the ceiling below it, showing another form of heat controlling device adapted to suit the improved system of ventilation and heating. Fig. 7 is a broken sectional side elevation of one corner of a building and a grate therein adapted to aid ventilation of the building in accordance with the improved system. Fig. 8 is a broken front view of the device shown in Fig. 7. Fig. 9 is a broken rear view of the device shown in Figs. 7 and 8. Fig. 10 is a broken sectional side elevation of a wooden building adapted for ventilation by the improved method. Fig. 11 is a broken inner side elevation of a wooden building partly in section; and Fig. 12 is a broken and partly sectional inner side view of a wooden building embodying features of the improved system of ventilation and heating.

In Figs. 1 and 2, A, A′, A², indicate different forms and positions of vertical ventilating shafts one or more being provided as may be required to secure the best results; their number and dimensions being conditioned upon the area to be ventilated. When the structure permits, it is preferred to locate the vertical shafts at corners of the building, as shown at A, in Fig. 2. If this is not convenient, the upright shafts may be located on the side or end walls of the house, and be projected partly beyond the general surface of the outer wall face as at A′, or be extended within the room as shown at A², such projections being only provided in case the entire thickness of the house wall is less than is necessary to receive the shaft and have its walls coincide with those of the house. (See Fig. 2.)

Continuous intercellular spaces *a*, are formed in the upright walls B, of the building, which spaces are joined to the upright shafts A, by slots or openings *b*, of suitable dimensions, to freely transfer air from the spaces *a*, to the shafts.

Through the inner shell B′ of the hollow walls B, horizontal slots *c*, and upright slots *d*, are, by preference, alternately formed, and afford passages between the intercellular spaces *a*, and between the floor joists *e*, thus establishing communication for the sub-floor spaces *g*, indirectly with the vertical ventilating shafts; the horizontal passages *c*, being near to the ceiling of the room below the floor space or if a lower room, said slots are adjacent to the foundation wall, thus tapping the spaces *a*, at their lower terminals.

As it is essential in this method of ventilation that heat be introduced within the vertical shafts A, A′, A², several means for heat production are shown; that which is preferred by the constructor may be adopted.

Should the building be provided with a furnace to heat the rooms, such as shown at C, by dotted lines in Fig. 2, the draft or smoke pipe C′ leading therefrom may be extended to the shafts A, A′, A², or any of such shafts, and thus transfer waste heat and the products of combustion from the fire chamber of the furnace to the shafts, that will convey it upwardly and facilitate combustion, while the heating of the shaft causes sufficient draft to withdraw foul air from the rooms through the spaces *a*, as before mentioned; the heat being conveyed through other pipes C², to the sub floor spaces (see Fig. 3); or by special

pipes or conduits C^3 that are conductors from the source of heat to registers F, and thence to the rooms, as will be further explained.

The shafts A, A′, A^2, or either form, may be vertically extended above the building as indicated by dotted lines in Fig. 1, or there may be two or more flues laterally extended above, to tap a single upright conduit as represented by full lines in the same figure.

One or more of the hot air pipes C^2 may extend upwardly from the furnace C, or other similar heater, and pass through the several stories of the building, each pipe of a length to tap the ceiling of a room and transmit heat into the space *g*, between the ceiling and floor above it, as indicated in Fig. 3, thereby heating the floor spaces and also the floors, other pipes being employed to transmit heat currents from a source of supply to the rooms through registers, as will be further explained.

Steam or hot water coils of various forms as shown in Fig. 2, may be utilized to furnish heat for the upright shafts A, A′, A^2 or either of such ventilators. Preferably such coils are located in fireplaces or niches *h*, that open from the rooms or cellar of the building into the vertical flues as represented in Fig. 1. It is also contemplated to employ open grates as shown in Figs. 7, 8, and 9, at E, which grates occupy the niches *h*, and close them at the rear, a short pipe *i* extending from above the grate into the vertical flue A (see Fig. 7), so as to transfer heat and products of combustion from the fire in the grate to the flue A. There is a register *k*, provided for the fire-grate E, which is a part of the rear wall *m* of said radiator, and is located below the grate proper, said register affording means to control the draft through the vertical flue A.

The radiator wall *m*, is preferably made of metal, and preferably embossed as at *m*′, in Fig. 9, or corrugated as at m^2 in Figs. 7 and 8, which increases heat radiating surface on the plate on each side, so that heat volume will be projected therefrom into the room having the grate, and also within the flue A to increase its draft, as the back plate *m*, when heated becomes an excellent radiator to effect such a result.

Preferably there is a special form given to the heat controlling registers for hot air currents from a furnace or like heat generator C, these being shown in Figs. 4, 5 and 6.

In Fig. 4, the side view shown indicates in section a form of register well adapted to transfer heat from the heat conductor pipe C^3 into a room above, through an aperture in the side wall B^2 that is a partition wall of the room near the floor line, there being a niche *n*, provided for each register F, wherein the latter is located. The side wall registers F and their adjuncts, each consists of a substantially rectangular box *o*, secured in the floor so as to depend through a properly shaped aperture therein, and form a guide for a similarly shaped gate valve *o*′, which may be slid vertically. The gate valve mentioned, when in lowered adjustment, encompasses the upper end of the special heat conduit C^3, and directs all heat therefrom upwardly into the niche *n*, and thence through the register frame and its adjustable gates, the box *o* thus forming a continuation of the hollow gate valve *o*′, preventing any heat from passing into the sub-floor space *g*, directly from the pipes C^3, which latter are each secured at the upper terminal to a flat plate. A lifter rod *r* is attached to the hollow gate *o*′, which rod is bent above so as to project through a slot in the register frame on the upright wall B′, and afford means to elevate said gate, any suitable means being furnished for detachably locking the rod so as to hold the gate in elevated adjustment and afford space below for the diffusion of heat currents from the pipe C^3 throughout the sub-floor space *g*.

In Figs. 4 and 5, another means for controlling the direction of heat from the pipe C^3, is shown, which consists of a flap valve *p* that is secured on a rod at one end, and is thereby pivoted transversely in the niche *n*, and lies on top of the guide box *o*, normally sealing its upper end; when the gate valve *o*′ is raised as before explained, the flap valve may be lifted and the heat from the pipe C^3 allowed to pass upwardly and through the register as well as laterally throughout the sub-floor space *g* or the gate valve may be left in its normal position. The valve *p* is preferably adapted for manipulation through a slot in the register frame by provision of a lateral rocking shaft *p*′, that is pivotally engaged with the wall of the niche *n* and register frame, and a short arm or knob p^2 is formed or affixed on the end of the shaft, so that it can be vibrated manually and the flap valve adjusted to open or close it and thus allow heat to enter the niche *n*, or exclude it therefrom.

In Fig. 6, the register frame shown is of a type usually employed to control heat currents through a floor, such a frame *s* being provided, which is located in the top of the guide box *o*, the rocking sectors used to control the opening or closing of the register slots being so connected by link rods o^3 with the hollow gates *o*′, that a rocking movement of the sectors by the foot of an operator, will lower the hollow gate and direct heat from the pipe C^3 upwardly, when the register is opened as shown, or elevate said gate when the register slats are closed, and thus permit the heat to all flow throughout the sub-floor space. It will be seen, that the pipe C^3, is inserted through and is connected with the base plate o^2 so that the hollow gate *o*′, will form a close box below when seated on said plate.

To facilitate the free circulation of heat in the sub-floor spaces between and over the joists, furring strips *t* are secured on the latter in "staggered" order, as shown in Fig. 2, the flooring being laid upon said strips so that

passages are formed between the joists and floor, through which heat currents may freely pass.

In Figs. 10, 11 and 12, the method of applying the system of heating and ventilation to wooden buildings is shown, the only changes necessary being the provision of furring strips *u* that are secured upon the inner sides of the vertical studding I at proper intervals, the furring strips serving as a foundation for the lath and plaster coating, that is the inner wall surface of such buildings, there being spacing blocks *w* secured on the studding to afford spaces *a* between the strips *u* and said pieces, so that heat currents from the sub-floor spaces *g* will pass through the horizontal slots or passages *c* into the continuous intercellular wall spaces afforded by the use of the furring strips *u*. It will be seen that the described construction of parts will afford means for the accurate control of heat currents from a source of supply into rooms to be heated, or to direct all or part of such heat volume into the sub-floor spaces *g* and thence into the vertical surrounding spaces *a*, from which the air passes into one or more flues A, A′, A², in buildings having wooden walls or exterior walls made of other material than wood. The gratings D and the passages they cover, will also serve to transfer foul air from the rooms near the floor line into the wall spaces *a* and thence to the flues A. The enveloping of the interior areas of a building with heated air spaces *a* and *g*, and the provision of the vertical communicating flues A, A′, A², serve to thoroughly and economically warm and ventilate houses provided with these improvements.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A building having sub-floor spaces which are in communication with each other, inlet pipes leading directly to such sub-floor spaces, inlets leading to the apartments of the building from the sub-floor spaces, and gates serving to establish communication between the inlet pipe and the sub-floor spaces or to connect the main inlet pipes with the inlet leading to the rooms, substantially as described.

2. A building having intercellular spaces in its several side walls, vents leading from the rooms of the building to such air spaces, uptake air shafts, lateral openings leading from the spaces of the several walls to such air shafts, and an outlet flue to which said air shafts lead, substantially as described.

3. A building having communicating sub-floor spaces, formed by the floor joists and staggered furring strips on such joists, intercellular spaces in the several side walls of the building, air shafts leading from the basement or cellar and having an outlet at the top, lateral openings leading from such wall spaces, at the several floors, to the air shafts, and openings establishing communication between the said wall spaces and the sub-floor spaces, substantially as described.

4. A building having communicating sub-floor spaces formed by the floor joists and staggered furring strips thereon, inlet pipes leading directly to such sub-floor spaces inlets leading from such sub-floor spaces to the rooms of the building, means for establishing communication between the inlet pipes and either the sub-floor spaces or the inlets to the rooms, as desired, air spaces in the several side walls of the building, outlets from the rooms to such wall spaces, air shafts having outlets at the top, and lateral openings leading from the several wall spaces to the air shafts, substantially as described.

5. A building having air shafts leading from the base or cellar and having an outlet at the top, communicating sub-floor spaces, pipes leading from the cellar or basement to the sub-floor spaces of each floor, the pipes having means for inducing an upward flow of air therein, air spaces in the several walls of the building, lateral openings leading from the floor spaces to the wall spaces, and lateral openings from the wall spaces to the air shafts, substantially as described.

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Witnesses:
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