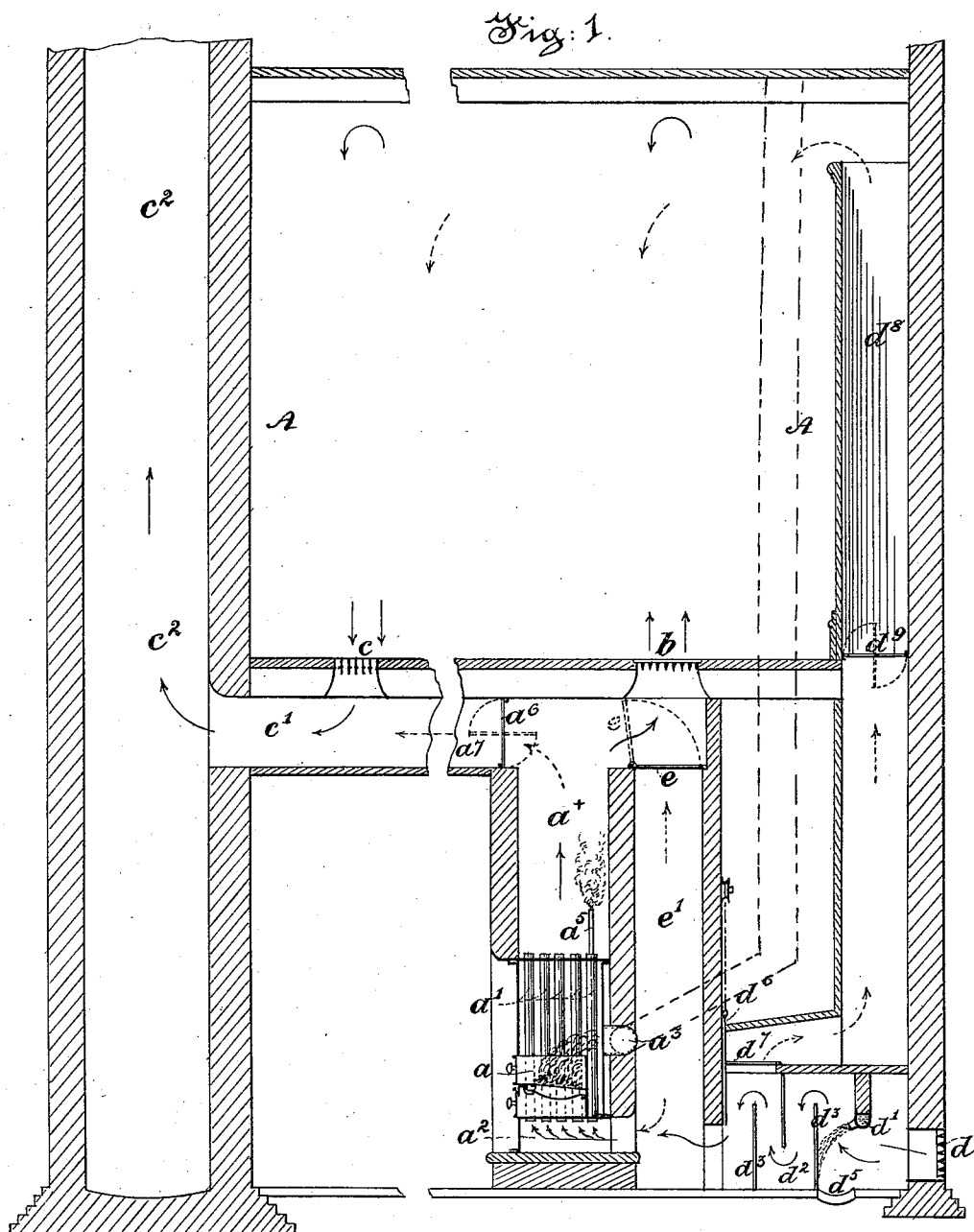


(No Model.)

2 Sheets—Sheet 1.

J. LANGFIELD.
APPARATUS EMPLOYED FOR HEATING, DRYING, AND VENTILATING.
No. 549,517.
Patented Nov. 12, 1895.



Witnesses
George Baumann
Th. M. Keller

Inventor
John Langfield
By his Attorneys
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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

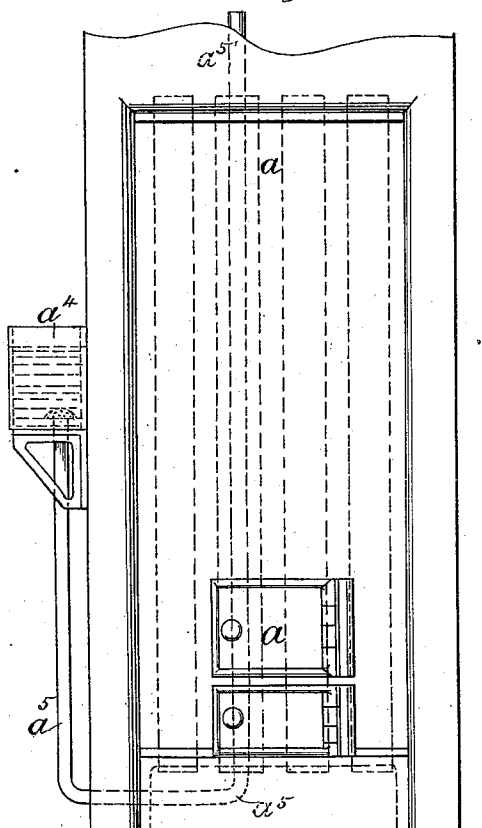


Fig. 3.

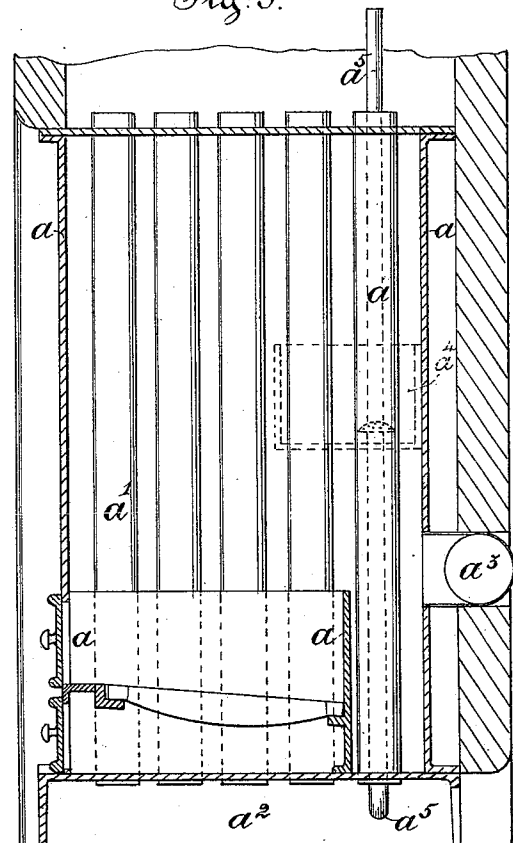
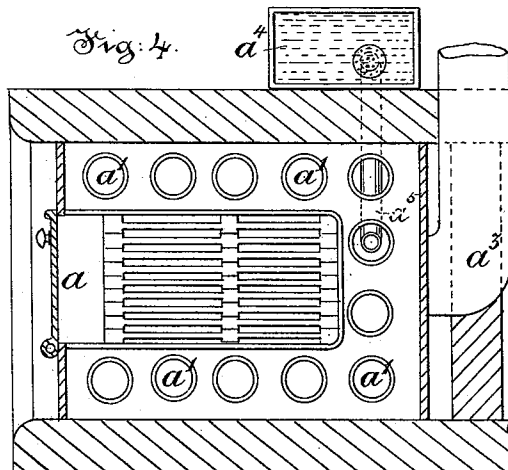


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN LANGFIELD, OF MANCHESTER, ENGLAND.

APPARATUS EMPLOYED FOR HEATING, DRYING, AND VENTILATING.

SPECIFICATION forming part of Letters Patent No. 549,517, dated November 12, 1895.

Application filed December 27, 1893. Serial No. 494,878. (No model.)

To all whom it may concern:

Be it known that I, JOHN LANGFIELD, a subject of the Queen of Great Britain and Ireland, residing at Manchester, in the county of Lancaster, England, have invented Improvements in Apparatus to be Employed for Heating, Drying, and Ventilating, of which the following is a specification.

The object of this invention is to construct an apparatus which can be employed for heating and ventilating an apartment or other inclosed space in cold weather, and which will also serve for cooling and ventilating the same in hot weather.

The invention is also applicable especially to hospital wards and surgical operating-rooms, where warm still air is so necessary and (as in the former case) where it is desirable to purify the air before it leaves the premises.

My invention will be readily understood on reference to the accompanying drawings, on which—

Figure 1, Sheet 1, is a sectional view of a single apartment fitted according to my invention; and Figs. 2, 3, and 4, Sheet 2, are detached views of my improved air-heating stove, drawn to a larger scale.

According to my invention I employ a hot-air stove, preferably as seen at *a*, Fig. 1, Sheet 1, illustrated by Figs. 2, 3, and 4, and described hereinafter.

The heating apparatus when used for heating the room *A* supplies its hot air to the same by an inlet or grid *b* in the floor of the said room *A* at one end or side thereof, (see Fig. 1,) and instead of having an exit in or near the roof or ceiling I use an outlet or grid *c* in the floor at the farther end or side of the said room *A* and an exit-passage *c'* below the floor, leading to a vertical shaft or uptake *c''*, opening to the atmosphere outside the building at a height so much above the roof or top of the room or apartment *A* that it acts as a kind of air-siphon, and the effect in the room will be as follows: The pure hot air admitted at one end of the apartment *A* through the grid *b* from the hot-air stove *a* or other suitable, air-heating apparatus immediately expands and rises to the ceiling or roof, where it commences to accumulate, gradually taking

the place of and driving downward the cold air, as shown by the arrows, and all deleterious gases which are heavier than the heated atmosphere. The fresh heated air will thus gradually fill the apartment *A*, like an inverted reservoir, until it reaches the exit-opening *c*, by which the cold or impure air will be escaping into the passage *c'* and uptake *c''*. The warm air will then escape through the said uptake *c''*, which, being higher than the room or apartment, will act as an inverted siphon and cause the heated air at the lower part of the room *A* to be drawn out with any heavy impure gases without creating any draft or appreciable current, although a constant circulation of air is kept up.

The room or apartment *A* may now be heated up to any required degree without producing any apparent draft even at the outlet opening or openings *c*, although the atmosphere is constantly changed and renewed in proportion to the degree of hot air admitted at *b*, and a strong draft will be formed in the uptake or ventilating-shaft *c''* without the aid of a fan or other mechanical appliance. By this means, also, the heat in the room *A* will be equal from the top to the bottom thereof.

I prefer, as before stated, to make use of the hot-air apparatus shown on the drawings, but which I do not claim here, this furnace being the subject of another application filed of even date herewith under Serial No. 494,877. This hot-air apparatus consists of a furnace *a*, around which are a number of vertical air-heating pipes or tubes *a'*, leading from an air-space *a''* beneath the furnace to the flue *a'''*, for leading to the inlet *b* to the room or apartment *A*. The air, becoming heated in the vertical pipes or tubes *a'*, will expand and attain a considerable velocity sufficient to conduct it in the desired volume into the room or apartment *A* above. The inlet *b* is considerably larger than the total area of admission of all the heating-tubes *a'*, (say double the said area,) and the exit *c* is rather less than the inlet *b*, and thus, although the air is rapidly changed, no current or draft is felt in the room *A*. The number of the tubes *a'* can be increased or diminished, according to the capacity of the space to be heated, and the

height of the said tubes will be greater or less accordingly as a quicker or slower change of the air in the room A is required.

The smoke and products of combustion will escape from the furnace *a* at a low level therein through the horizontal (or other) flue *a*³ to any suitable chimney.

The heated air rising from the tubes *a'* is too dry for ordinary living-rooms. In order, therefore, to make the hot air suitable for breathing, I fix a small cistern *a*⁴ at one side of the furnace (see Figs. 2, 3, and 4) and carry down a pipe *a*⁵ therefrom into the space *a*² and up through one of the tubes *a'*, and the water in this tube will become heated and converted into steam, which will issue in a jet from the upper end of the said pipe *a*⁵, and, mingling with the heated air in the flue *a*^x, will moisten the same before it enters the room A through the inlet *b*.

The air to be heated enters from outside the building from a grid or opening *d*, Fig. 1, and when required I propose to wash or purify the air by a spray of cold water from a pipe *d'* at the inlet end of a passage *d*², provided with baffle-plates *d*³, as shown, so that the said air will part with its impurities as the shower of water passes through it, and the said impurities will collect in and be carried away by a trough or duct *d*⁵.

My apparatus may be used for ventilation without heating by diverting the cold-air inlet by closing the damper *d*⁶ and opening the dampers *d*⁷ and *d*⁸, and in this case the cold air will enter the room, as shown by the dotted arrows, through the ventilating-shaft *d*⁸, open at or near the top of the room A.

The damper *e*, which usually closes a vertical shaft *e'* beneath the inlet *b* and leading to the air-space *a*², is now opened and set in the position shown dotted on Fig. 1, so that the air supplied to the pipes *a'* will now come from the room A. (See dotted arrows.) The damper *a*⁶, hitherto closed, is now opened, and the hot air will escape from the flue *a*^x through the passage *a*⁷ to the shaft *c*². (See dotted arrows.) In this case, also, it is preferable

to cover or close the outlet or grid *c*, so that all the air from the room A must pass through the tubes *a'*, in which any infectious germs or other impurities will be destroyed. This is evidently most important for hospitals and similar places. In this case the renewal of the air in the room A is caused by the rising of the air through the tubes *a'* and the escape thereof through the shaft *c*².

I would remark in conclusion that the vertical tubes *a'* may be heated otherwise than as shown, if preferred.

I claim as my invention—

1. The combination of a series of air heating tubes conducting a current of heated air, a passage leading therefrom to a grid, *b*, in the floor of the compartment, and a high vertical shaft for the escape of air opening above the apartment, and another grid, *c*, in the floor of the apartment, and a passage leading from the heating tubes to the vertical shaft and communicating with the grid, *c*, and dampers in said passages, leading from the heating tubes, substantially as set forth.

2. The combination of a series of vertical air heating tubes conducting a current of heated air, a passage leading therefrom to a grid, *b*, in the floor of the apartment, a vertical air inlet shaft also leading to the same grid, a high vertical shaft for the escape of air opening above the apartment, and another grid, *c*, in the floor of the apartment, with a passage leading from the heating tubes to said high vertical shaft, and communicating with the grid, *c*, and dampers in the two passages leading from the heating tubes and in the air inlet shaft, by means of which the said apartment can be supplied with fresh heated air or fresh cold air and thus ventilated.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN LANGFIELD.

Witnesses:

CHARLES A. DAVIES,
JNO. HUGHES.