W. F. FLAGG.
Furnace.

No. 199,529. Patented Jan. 22, 1878.

Fig. 1

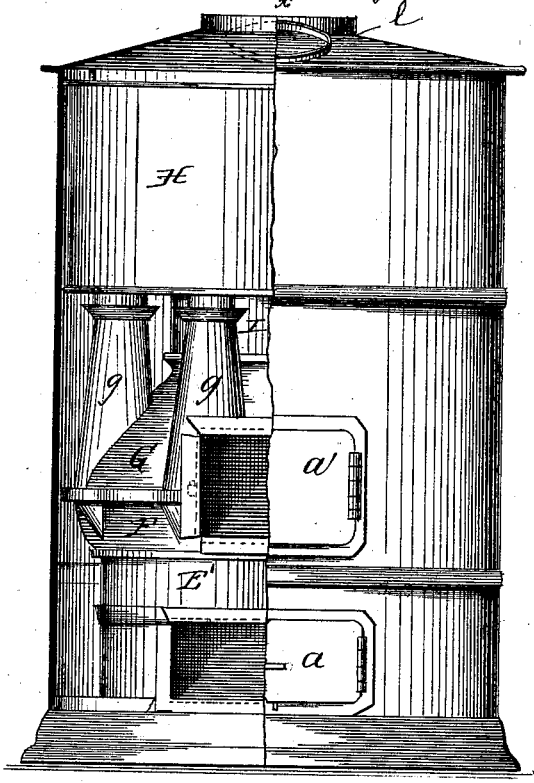


Fig. 2.

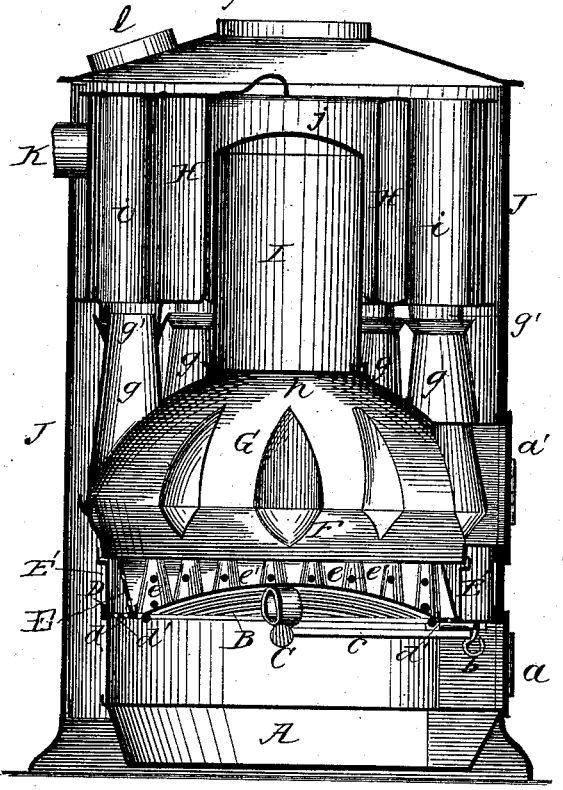


Fig. 3.

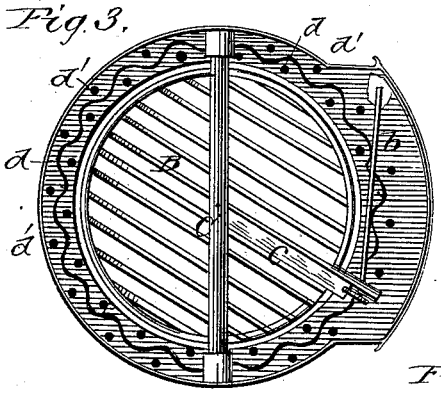


Fig. 4.

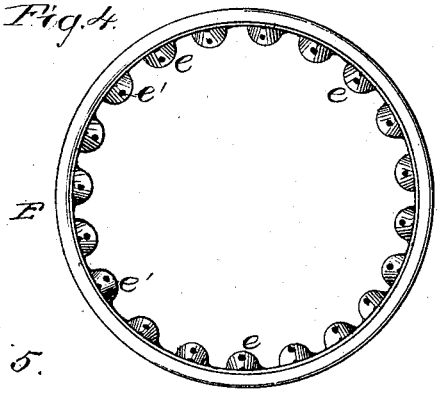
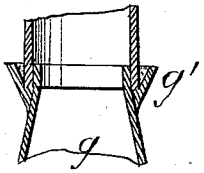


Fig. 5.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM F. FLAGG, OF BLOOMINGTON, ILLINOIS.

IMPROVEMENT IN FURNACES.

Specification forming part of Letters Patent No. **199,529**, dated January 22, 1878; application filed September 12, 1877.

To all whom it may concern:

Be it known that I, WILLIAM F. FLAGG, of Bloomington, in the county of McLean, and in the State of Illinois, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

Figure 1 of the drawings represents a front elevation of my improved furnace with part of casing broken away; Fig. 2, a vertical section of the same. Figs. 3, 4, and 5 are detail views.

This invention relates to improvements in the class of hot-air furnaces; and the invention consists in the general construction and arrangement of parts, as will be hereinafter fully described.

In the drawings, A represents the ash-pit of my improved furnace, the outer case or jacket being provided with a large door or doors, *a*, communicating therewith, which enables me to use said furnace in connection with my improved method of heating and ventilating buildings for which a patent was granted to me June 12, 1877, No. 191,952. In said method of heating and ventilating buildings the air was drawn from the heated room or rooms to be heated, through foul-air flues, back into the furnace-room, and the heavier and fouler portions of the air were exhausted out of the building through an exhaust-shaft communicating with the furnace-room, while the lighter and purer portions of the air were heated by the pipe, drum, and other radiating heating-surfaces of the furnace.

By my present construction of furnace the large ash-pit door or doors will, when open, supply an exhaust-shaft through the same, the burning fuel, and smoke-pipe of the furnace and the chimney, thereby dispensing with an auxiliary exhaust-shaft, as in my improved method of heating and ventilating buildings.

B represents a convex grate, made in one piece, which obviates the dead-center of the common horizontal grates, whereby the fuel does not readily burn up, and consequently allowing an accumulation of cinders and ashes, as in my improved construction of grate the dead-center comes near the surface of the burning fuel.

The grate B is centrally pivoted to the cross-rod C, journaled in the sides of the ash-pit A, and said rod C is secured in position by an angular branch rod, *c*, and spring-catch *b*; and the spring-catch, when released from contact with the branch rod *c*, allows the grate to be tilted, for cleaning out the fire-pot of the furnace. The bottom D of the fire-pot is provided with an annular rim surrounding the grate, having two series of holes, *d d'*, the inner series of holes, *d*, allowing the air to pass directly into the fire-pot and into the burning fuel, supplying it with air between the corrugations *e* of the lower section E of the fire-pot, while the outer series of holes, *d'*, admits of the passage of air direct from the ash-pit into the corrugations *e* of the lower section of the fire-pot, and thence, through one or more holes, *e'*, in each corrugation, into the burning fuel, thus making a gas-burner, as the air passing through the holes of the corrugations makes just so many jets of flame, which consume smoke, &c.

The lower corrugated section E of the fire-pot is surrounded with an auxiliary wrought or sheet iron band, E', thus forming a double wall for the lower section of fire-pot. The inner sides of the section E are made nearly perpendicular, so that the fuel is more exposed to the draft from below than if it were made in the common pot shape generally given to the fire-pot.

The second or middle section F of the fire-pot is made flaring outwardly toward the top, as shown in Fig. 2, and in which the heating-tubes *g* of the upper section G commence. The tubes *g* (eight or more in number, as desired) are extended or projected above the outside of the circumference of the top section G, thereby increasing the heating-surface of the furnace, as the farther the flues or tubes *g* are removed from the top of said section G the more heating-surface will be obtained on said top section, the tubes having the same amount of heating-surface in any position they may occupy.

The section G rests upon the top of section F, and after said section G is placed in position the grooved space around and between said

sections F G is filled with dry sand, which prevents the escape of soot or smoke. The upper portions of the tubes *g* and the large opening *h* in top of section G have also circular sand trenches surrounding them, to receive the upper portions *g'* of the tubes *g*, communicating with the heating-drum H and the dome I.

The drum H is provided with a series of vertical air tubes or flues, *i*, extending entirely through the drum, and which are arranged between the connecting portions *g'* of the heating-tubes *g*, and said air-tubes *i*, in connection with the large central opening *j* in the drum H, and within which the dome I fits, greatly increase the heating-surface of said drum. The dome I also prevents the top of the fire-pot from burning out.

J represents the case or jacket surrounding the furnace, which is provided with the doors *a a'*, communicating, respectively, with the ash-pit and fire-pot. K represents the smoke-flue of the drum H.

It will be observed that in my improved construction of furnace I have the following heating-surfaces: The entire fire-pot proper, consisting of the three sections E F G, the eight or more connecting-tubes *g*, the dome I, and the entire outer surface of drum H, and the inner surface of the large central air-flue *j*, mostly filled with the dome I and the series of small air-flues *i*.

It will also be observed that all the heated air, in its passage upward, is confined close to the furnace and heating-surfaces until it escapes through any desired number of openings, *l*, communicating with the conducting-pipes leading to the room or rooms to be heated.

I claim as my invention—

1. The combination, with the lower corrugated section E *e* of the fire-pot, having holes *e'*, of the auxiliary wrought or sheet iron band E' and rim of the bottom D, provided with the two series of holes *d d'*, substantially as and for the purpose described.

2. The combination, in a furnace, of the outer case or jacket, having the large door or doors *a*, ash-pit A, lower section D of fire-pot, having the annular perforated rim, corrugated section E, wrought or sheet iron band E', outwardly-flaring section F, section G, connecting heating-tubes *g g'*, drum H, having the series of vertical air-tubes *i* and central opening *j*, and the dome I, the several parts constructed and relatively arranged substantially as herein shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 4th day of September, 1877.

WM. F. FLAGG.

Witnesses:
THOS. SLADE,
RANDOLPH A. PIKE.