

E. VARNEY.
HOT-AIR FURNACE.

No. 188,211.

Patented March 6, 1877.

Fig. 2.

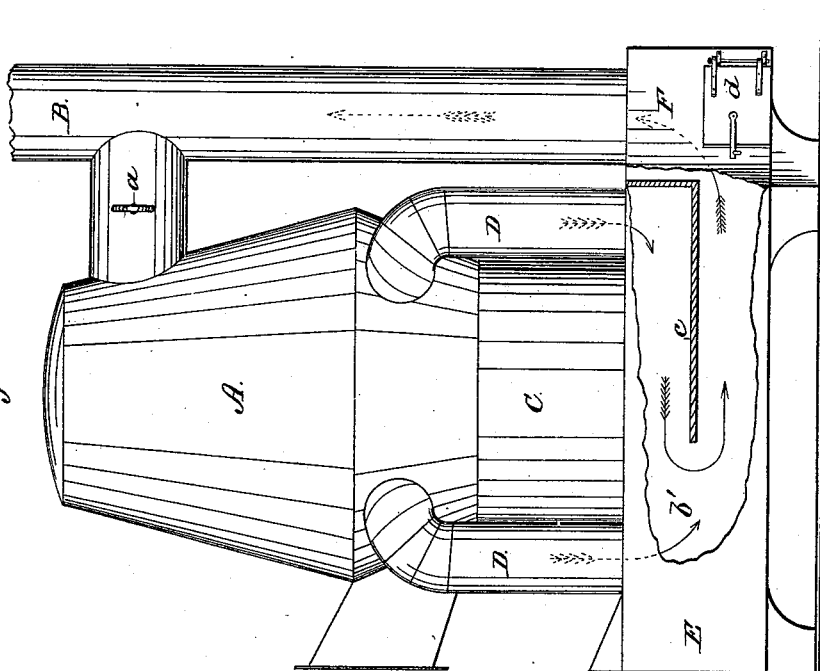
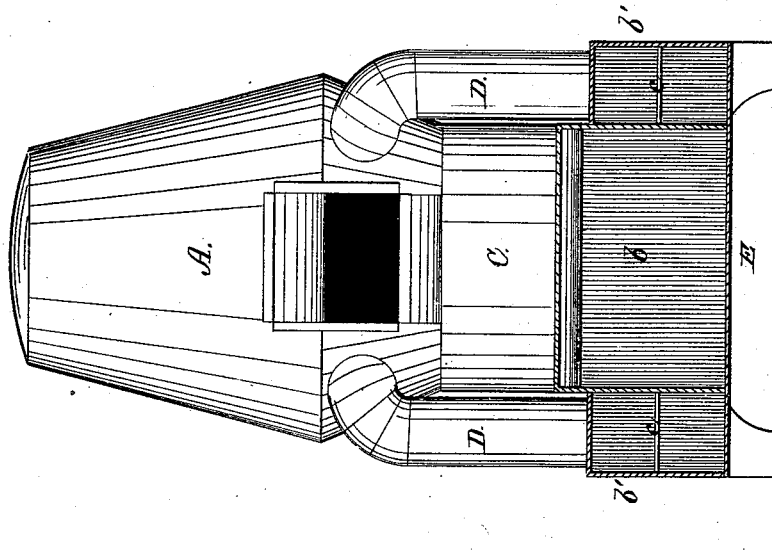


Fig. 1.



WITNESSES:

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IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **188,211**, dated March 6, 1877; application filed January 24, 1877.

To all whom it may concern:

Be it known that I, EDWIN VARNEY, of the city and county of Leavenworth, and State of Kansas, have invented a new and Improved Hot-Air Furnace; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a vertical front elevation, with the base in section; Fig. 2, a vertical side elevation, with portion of base broken away.

My furnace belongs to the class of base-heaters or those in which pipes communicating with the combustion-chamber conduct the flame and smoke down to the base to heat the same, from whence they pass through the exit smoke-pipe to the chimney-flue.

The invention consists in constructing the combustion-chamber in a double conical form, and combining it, by means of down-draft fire-flues, with the base, having side compartments provided with partitions, whereby the smoke and flame are made to emerge from the swelled or enlarged portion of the combustion-chamber, and pass down the fire-flues to the side compartments of the base, and by means of the partition in the same are first directed forward and then backward, as in a return-flue, and thence pass to the exit smoke-pipe, which arrangement serves to produce a stronger and more compact form of furnace, a better distribution of heat, and a larger radiating-surface.

In the drawing, A represents the combustion-chamber, which is made of a double conical shape, in order to spread out the flame as much as possible, and thereby prevent the metal from becoming so intensely hot, which is an objection that applies to most furnaces of this kind. This combustion-chamber is formed at the top into a closed dome, having communication through a short pipe and damper, *a*, with the exit smoke-pipe B, and communicates, at the bottom, with the fire-pot C. Said fire-pot is provided, preferably, with heavy cast-iron linings, in eight pieces, (not shown in the drawing,) which stand nearly perpendicular, and extend nearly up to the openings of the several fire-flues. The said plates are grooved so that they lap upon each other and hold

themselves in, sufficient intervening space being left to allow for expansion. These plates rest upon a cast-iron bottom plate, (not shown,) which also supports an ordinary shaking and dumping grate, and is bolted to the sheet-iron, an air-space being left between the lining, as thus described, and the outside cylinder, with a pipe and holes for ventilation. (Not shown.) D are the fire-flues, which are four in number, communicating with the combustion-chamber at the lower conical or converging portion thereof, which flues are bent downwardly, and extend to the base E, with which they communicate, and into which, when desired, they conduct the flame and smoke from the combustion-chamber. The base E is constructed with three main compartments, *b*, and *b' b'*, of which the middle and larger one, *b*, is immediately below the grate of the fire-pot, and forms the ash-pit, while *b' b'* are returning-flues, forming heating and radiating compartments of great efficiency. These side compartments are divided each by a horizontal partition, *c*, into an upper and lower flue, which partition extends nearly to the front fire-flue D, or within about the distance of the diameter of the said fire-flues from the said front fire-flue. The upper one of these base-flues communicates with the fire-flues D from the combustion-chamber, while the lower one communicates at the rear with a rear compartment, F, and through said rear compartment with the smoke-exit pipe B.

In making use of the furnace, as thus described, when the fire is first started the direct-draft damper *a* is opened, which gives a strong draft. As soon as the fire is fairly started, the damper is closed, and the smoke and blaze pass through the four fire-flues D into the returning side flues of the base, the current moving forward in the upper flue above the partition; then, turning the partition, moves to the rear through the lower flue, and passes from thence through compartment F to the exit smoke-pipe B.

It will thus be seen that I avoid a too great heat in the combustion-chamber by its peculiar form, and, while prolonging the life of the casing, secure also a stronger and better furnace, possessing a greater radiating-surface. By thus increasing the surface of the fire-heated portion of the casing and the area of the

combustion-chamber at this point a more even distribution of heat is also secured, for the increased area effects a more even passage of the down-draft currents, and while the base and fire flues are heated more the combustion-chamber is heated less.

The ashes, dust, or soot left in the furnace-flues are removed either from the front of the base or from the rear through doors *d*.

The furnace, as thus described, is to be provided with the usual outer casing of sheet metal or brick, to contain the heated air, which casing is to inclose the whole furnace, and be flush with the outer face of the furnace-door.

I am aware that it is not broadly new to construct the combustion-chamber in a double-conical form and connect the fire-flues with the

tion in the base to form a return-flue; and I therefore do not claim these features separately.

Having thus described my invention, what I claim as new is—

The hot-air furnace herein described, consisting of the double-conical combustion-chamber A, fire-pot C, the base E, having side compartments *b' b'*, with partitions *c*, the smoke-pipe B, and the down-draft fire-flues D, forming communication between the enlarged portion of the combustion-chamber and the side compartments *b'*, all combined and arranged substantially as shown and described.

EDWIN VARNEY.

Witnesses:

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