L. F. BETTS.

Heater.

No. 41,051. Patented Jan. 5, 1864.

Fig. 1.

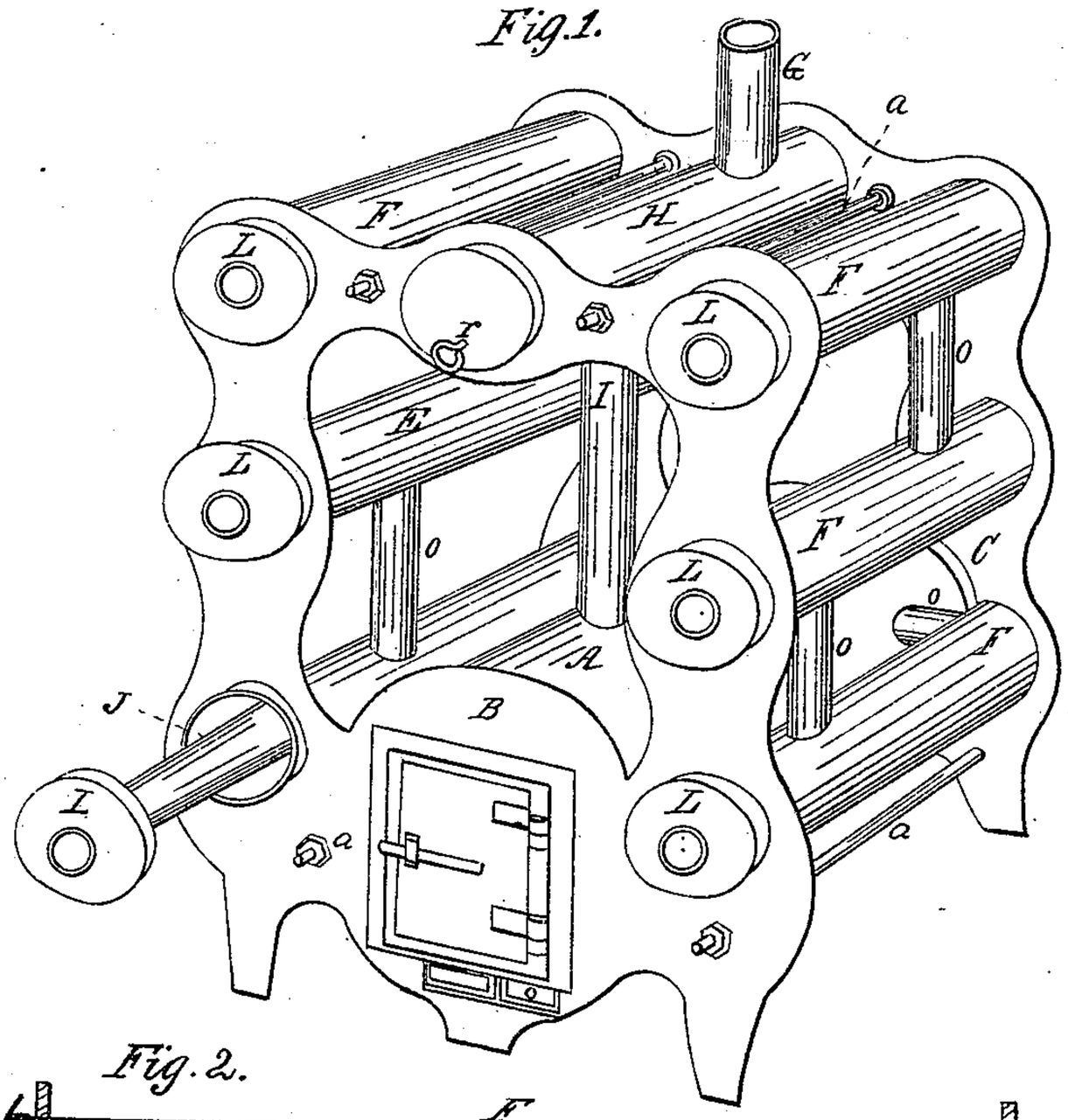
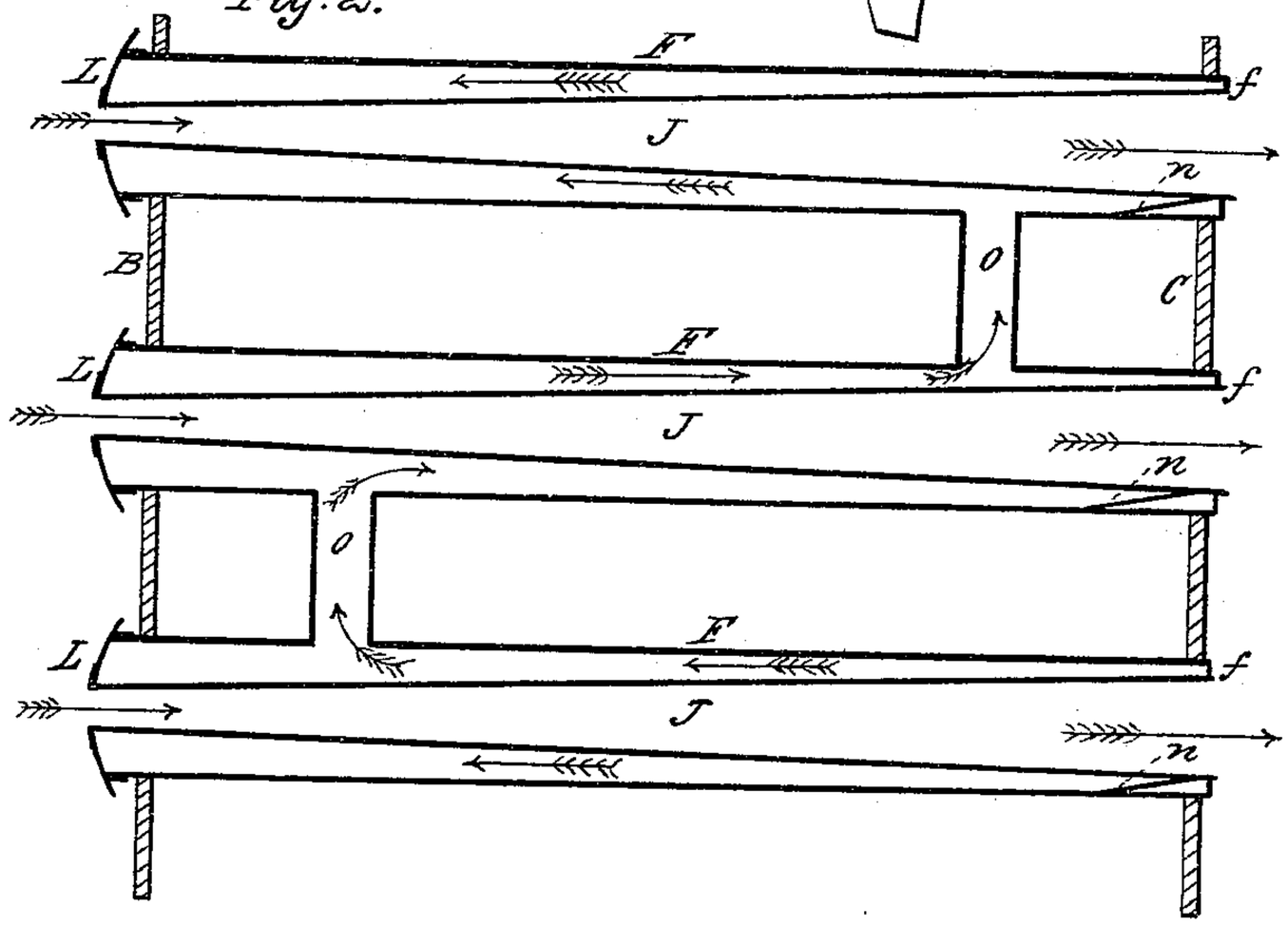


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

LEWIS F. BETTS, OF ALBION, MICHIGAN.

IMPROVEMENT IN HEATERS.

Specification forming part of Letters Patent No. **41,051**, dated January 5, 1864.

To all whom it may concern:

Be it known that I, LEWIS F. BETTS, of the village and township of Albion, in the county of Calhoun and State of Michigan, have invented a new and useful Improvement in Flues for Radiating Heat from Furnaces or Stoves for Warming Buildings; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view. Fig. 2 is a vertical section.

To enable others skilled in the art to construct and use my invention, I will now proceed to describe it as applied to what is generally known as a "hot-air furnace" surrounded with brick-work.

As the application of my invention requires no change in the mode of "setting" or arrangement and distribution of the hot-air pipes, registers, &c., I do not deem it necessary to illustrate the same in the drawings, or to describe it, but will confine myself to such variations as I may deem necessary in connection with my improvement.

My usual method of constructing and connecting the furnace and radiator-flues is as follows:

The furnace, represented at A, is made of heavy boiler-plate, and resembles, in all respects, a short open section of an ordinary "cylinder steam-boiler" from four to five feet long and of such diameter as to equal its requirements, and it is secured in a proper position at each end within a circular flanged recess, (not shown,) which is formed on the inner sides of the cast-iron front and back plates, B and C, by the rods *a a*, &c.

The plates B and C are constructed of such a form and size as to receive any required number of radiator-flues F F F, &c., ranged in tiers around the furnace and secured snugly in openings cast for their reception.

The products of combustion pass in the ordinary manner from the furnace A to the smoke-pipe G through the series of flues F F F, &c., by means of side and vertical connecting-pipes *o o o*, &c.; but for the purpose of procuring a strong draft when starting the fire I connect the furnace directly with the smoke-pipe G by the central vertical and horizontal pipes, I and H. When the fire is well started, a damper (not shown) connected with the rod *r* is pushed over the opening through the pipe I, and the circulation through the flue is established.

Each radiator-flue F is composed of two separate parts—viz., the external flue, marked F, (which is simply an open sheet-iron pipe, resembling an ordinary "stove-pipe,") and an internal taper sheet-iron pipe or "conical air-tube," marked J. The tube J is suspended centrally within the flue F and connected with it, as follows: The small end, (usually about one-third of the size of the large,) which projects a little from the front plate, B, has a disk-cover, L, firmly riveted to it, which is provided with a rim, made to fit snugly over the front end of the flue F. The large end of the tube J is usually made a little smaller than the caliber of the flue, the intervening space being filled by a narrow sheet-iron flange, *f*, which may be attached either to the inside of the flue or to the outside of the tube, as may be deemed most convenient. If to the flue, a sloping guide-plate, *n*, is provided to enter the tube in its seat. This arrangement forms a tight annular chamber (which gradually narrows toward the back end) between the tube J and flue F, and leaves an open conical bore in the center, which communicates at the large end with the hot-air chamber and at the small with the external air. The hot gaseous products from the furnace pass successively through the annular chambers, in a direction indicated by the red arrows, until they escape through the smoke-pipe G into the chimney. As the hot currents are circulating in this way heat is radiated, not only from the exterior surfaces of the flues F F, &c., but from the interior surfaces of the conical air-tubes J J, &c., where the contained air becoming heated is compelled, by the force of expansion, to move toward and escape through the large ends of the same into the hot-air chamber, while cold external air is continually rushing in through the small ends to fill the partial vacuum thus made with a velocity due to the volume of expansion or the intensity of the heat evolved by the firing.

This improved combination of straight and conical flues, besides presenting a large increase of heating-surface in a highly compact and favorable form, furnishes a self-adjusting

supply of cold air under conditions which insure its being heated with the greatest possible rapidity.

The superior facility which this arrangement gives for cleaning out the soot and ashes from the flues does not leave a shadow of an excuse for any neglect in the performance of that important duty, for the tubes J J, &c., can be removed in a few moments by taking hold of the cover L and pulling out the tube J, (see Fig. 1, where one is exhibited as partially drawn out,) and then there is nothing to do but brush out the inside of the open pipe or flue F and brush the soot from off the the outside of the withdrawn tube.

I do not wish to confine the application of these compound flues to furnaces for heating air in a chamber, for I believe them to be very efficient and far superior to any of the known "drums" when used in connection with an open stove.

The cold air which enters the tubes J J, &c., when they are used in an air-heating furnace inclosed in brick-work, is only intended to be auxiliary to the supply furnished in the ordinary way.

I do not claim, broadly, radiating heat from an annular chamber, as that is done by an ordinary stove-drum composed of a large cylinder inclosing a smaller one of parallel bore, for in such case there is no tendency for the air in the central open cylinder to expand in one direction more than another; but

What I claim as my invention, and desire to secure by Letters Patent, is—

The use of an open flue, F, in combination with the open detachable conical air-tube J, connected, arranged, and operated substantially in the manner and for the purposes herein specified.

LEWIS F. BETTS.

Witnesses:

T. I. O'BRIEN,

GEORGE JOHNSON.