

(No Model.)

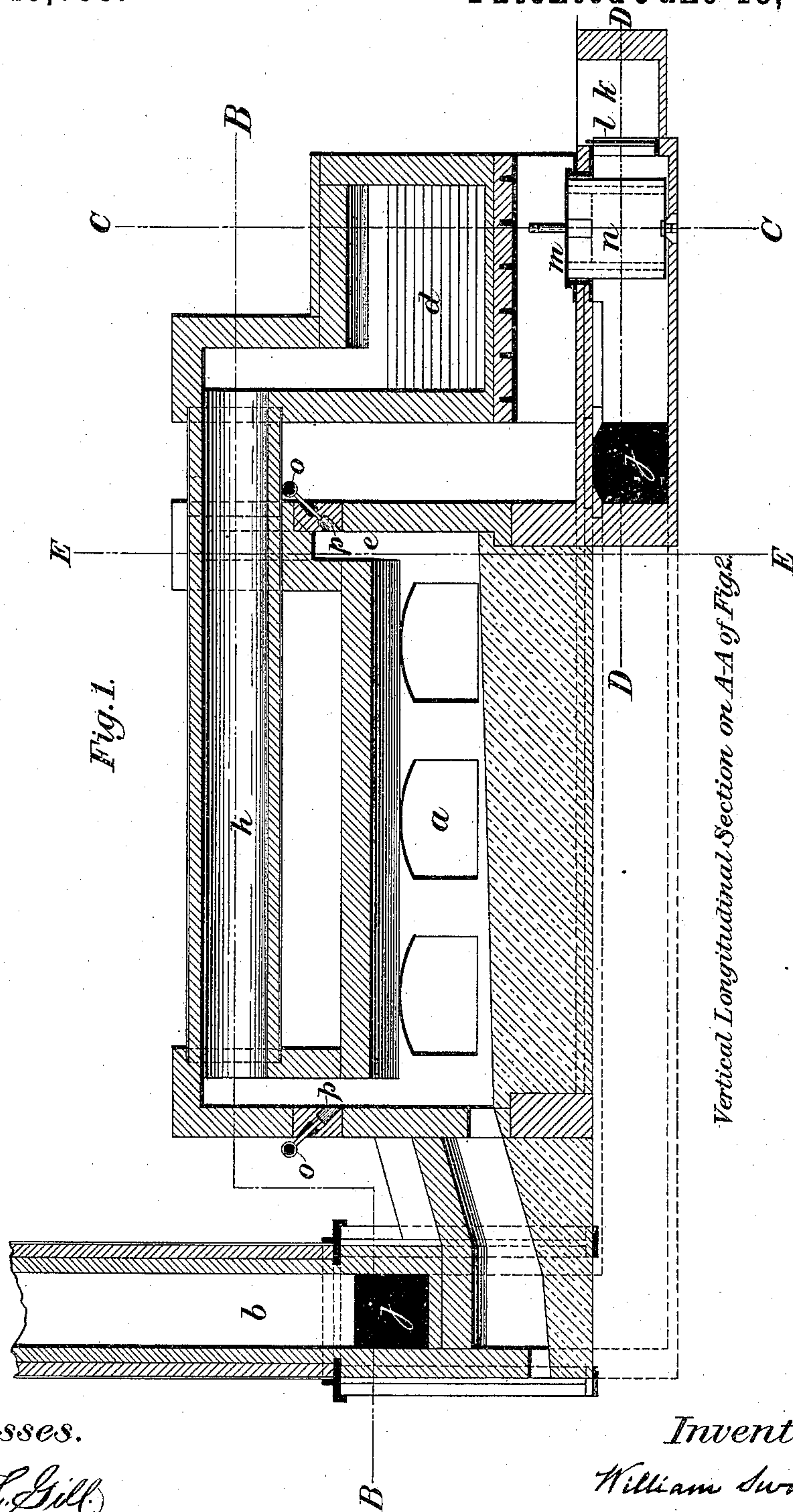
3 Sheets—Sheet 1.

W. SWINDELL.

GAS FURNACE.

No. 343,865.

Patented June 15, 1886.



Witnesses.

Harry L. Gill

W. T. Corwin

Inventor.

William Swindell

By his attys.

Bakerwell & Kerr

(No Model.)

3 Sheets—Sheet 2.

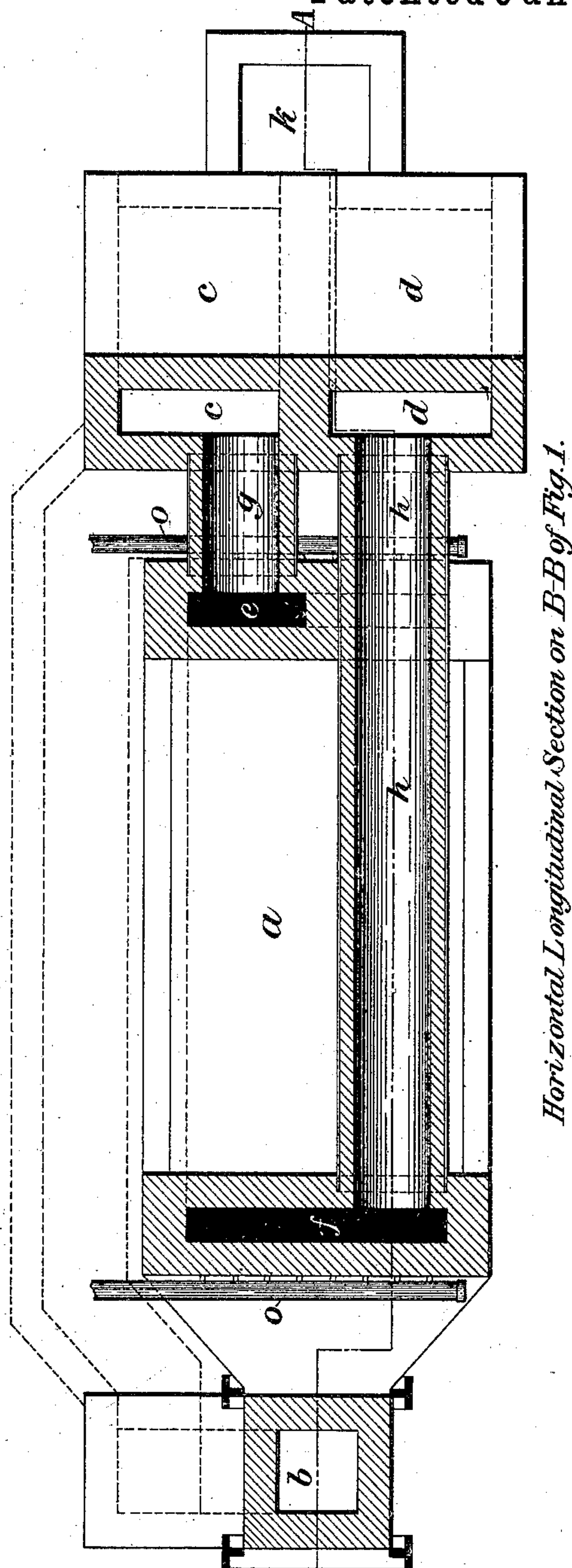
W. SWINDELL.

GAS FURNACE.

No. 343,865.

Patented June 15, 1886.

Fig. 2



Horizontal Longitudinal Section on B-B of Fig. 1.

Witnesses.

Harry L. Gill

W. D. Conner

Inventor.

William Swindell

by his attys.

Bakewell & Kerr



(No Model.)

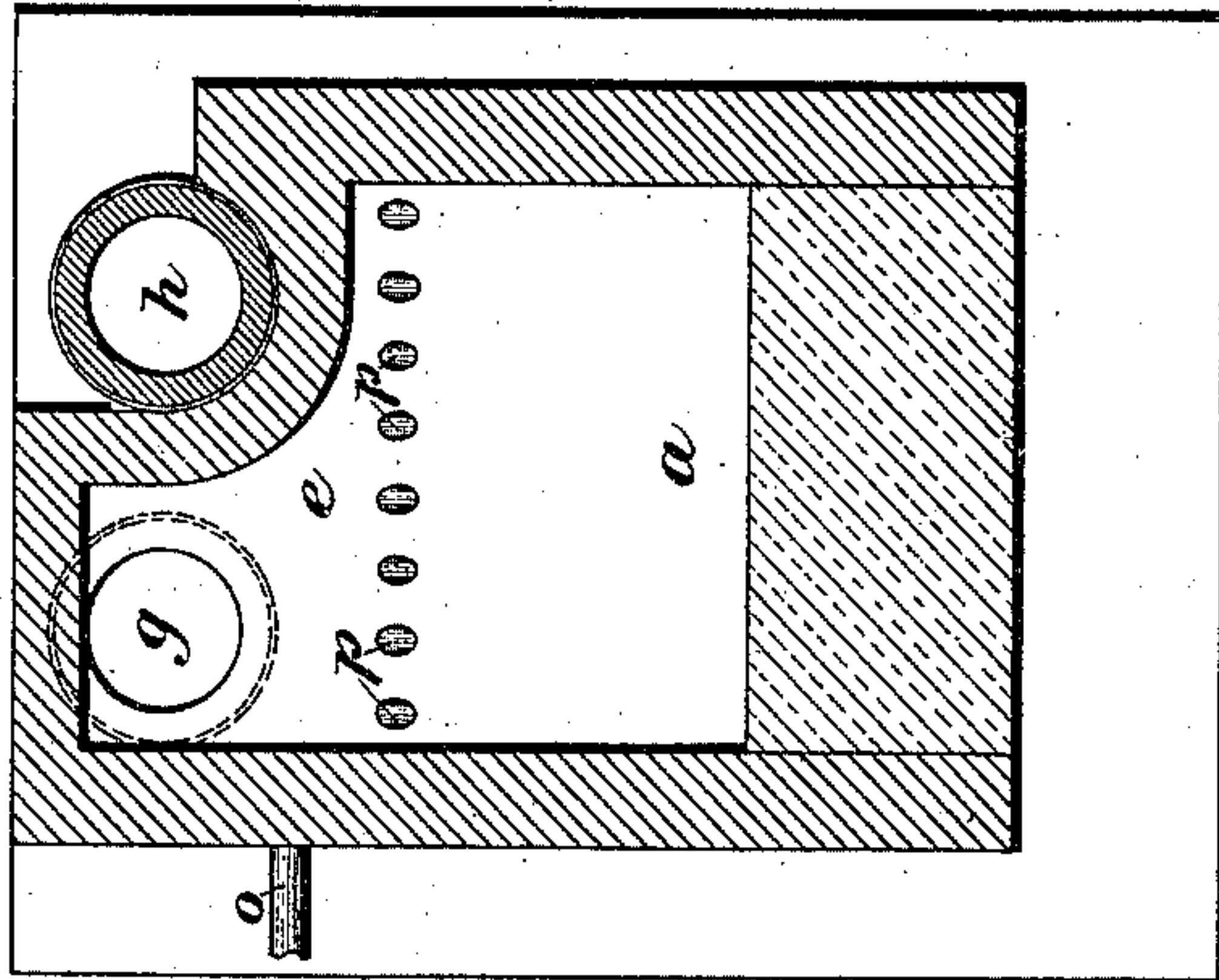
3 Sheets—Sheet 3.

W. SWINDELL.  
GAS FURNACE.

No. 343,865.

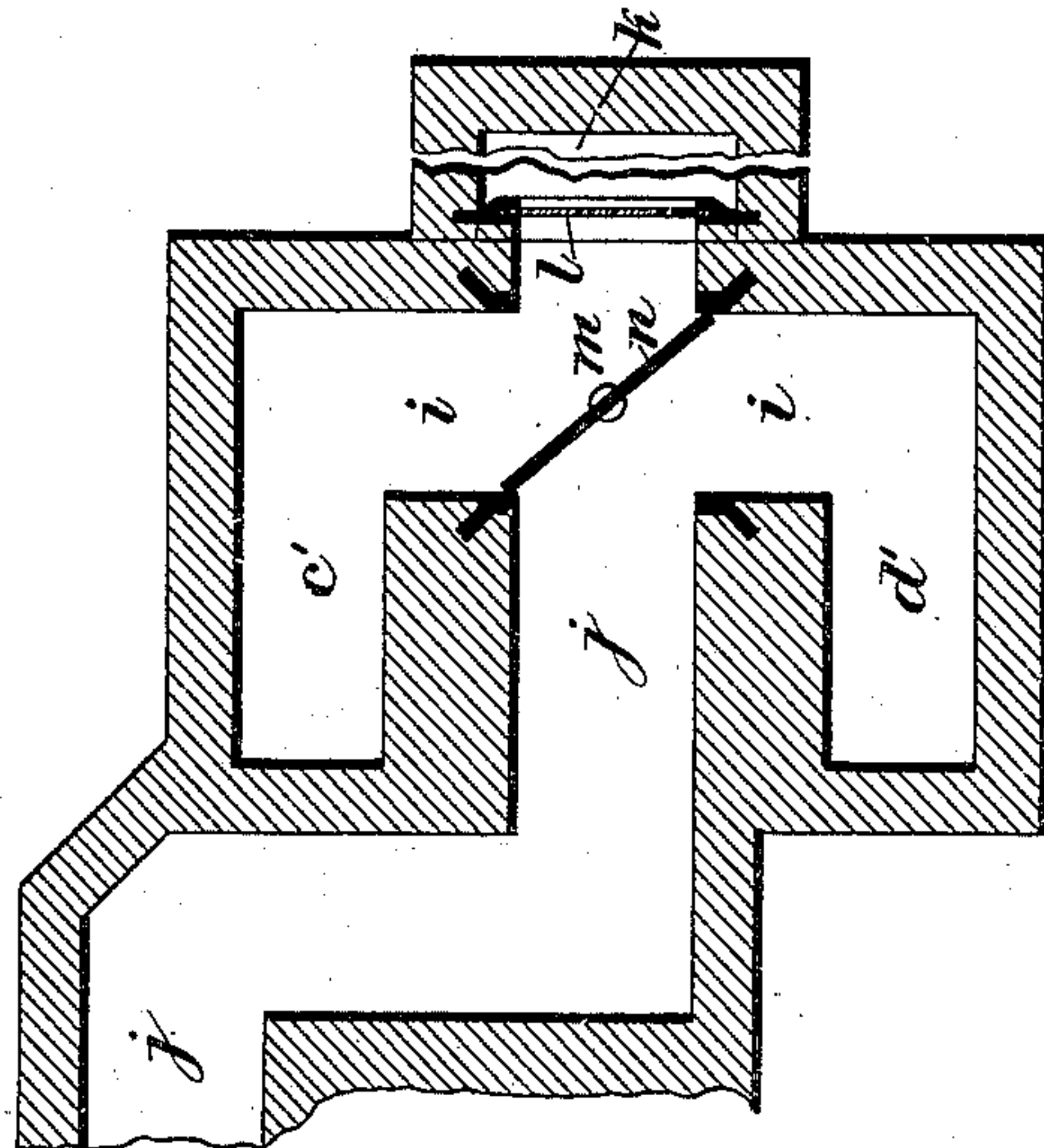
Patented June 15, 1886.

Fig. 5.



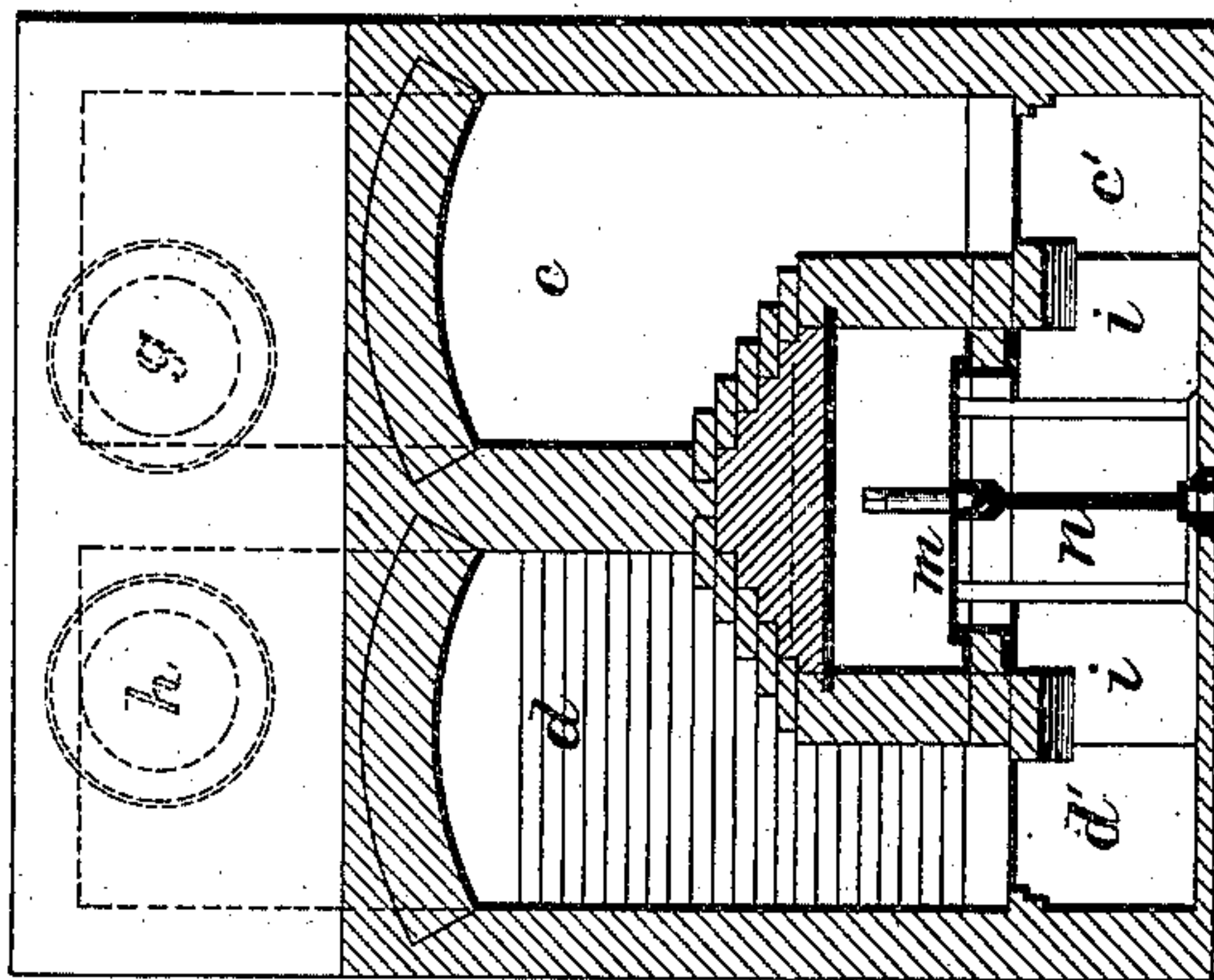
Vertical Cross Section on E-E of Fig. 1.

Fig. 4.



Horizontal Section on D-D of Fig. 1

Fig. 3.



Vertical Cross Section on C-C of Fig. 1.

Witnesses.  
Harry L. Gill  
W. D. Corwin

Inventor.  
William Swindell  
by his attys.  
Bakewell & Kerr



# UNITED STATES PATENT OFFICE.

WILLIAM SWINDELL, OF ALLEGHENY CITY, PENNSYLVANIA.

## GAS-FURNACE.

SPECIFICATION forming part of Letters Patent No. 343,865, dated June 15, 1886.

Application filed July 10, 1885. Serial No. 171,167. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM SWINDELL, of Allegheny City, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Gas-Furnaces; and I do hereby declare the following to be a full, clear, and exact description thereof.

The regenerative principle is possessed of so many advantages over other methods that its use is being generally extended in the arts. Many attempts have been made to apply it to old forms of furnaces without expensive modifications of the same; but, as a rule, these attempts have been attended with such indifferent success that they have now become rare, manufacturers preferring to build new furnaces because of the greater certainty of success, even though the expense is greater. There is, however, a wide field for the efforts of the furnace builder and inventor in adapting the regenerator principle economically to existing furnaces constructed for use with fire-grates and direct draft.

This is one of the objects of my invention; but it is not confined thereto, because it contemplates the construction of a very much cheaper form of gas-furnace with reversing-regenerators than that of the usual form which is generally in use. One of the present difficulties in the introduction of such regenerator-furnaces is that there is often not room for placing the regenerators under or directly alongside of the furnace. With my improvement this difficulty does not exist, because the regenerators can be placed at any reasonable distance from the furnace, so that thereby the ability to apply them is greatly increased.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying three sheets of drawings, in which—

Figure 1 is a vertical longitudinal section of a heating-furnace of ordinary construction, adapted by me for use with gaseous fuel and regenerators, the section being on the line A A of Fig. 2. Fig. 2 is a horizontal section on the line B B, Fig. 1. Figs. 3, 4, and 5 are sections on the lines C C, D D, and E E of Fig. 1.

Like letters of reference indicate like parts in each.

In the drawings, *a* indicates the bed, and *b* the stack.

Arranged at any convenient place outside of the furnace is a pair of checker-work regenerators, *c d*, which communicate with vertical flues *e f* at opposite ends of the bed by means of flues or pipes *g h*, the pipe *g* extending from the top of the regenerator *c* to the upper end of the flue *e*, at one end of the bed, and the pipe *h* extending from the top of the regenerator *d* to the upper end of the flue *f*, at the other end of the bed. Below the checker-work of the regenerators are clear spaces *c' d'*, which communicate by lateral flues *i i* with two opposite sides of the reversing-valve chamber *m*. One of the remaining two sides of the chamber *m* communicates with the air-inlet *k*, and the other with the stack-flue *j*. The air-inlet passage is provided with a suitable door, *l*. The reversing-valve *n* has a vertical axis, and is arranged to bring the opposite regenerators alternately into communication with the air-inlet and stack-flues. The stack-flue *j* leads around the furnace, or by any other convenient course, to the stack *b*.

I show the furnace adapted for use with natural gas. The gas-pipes *o* extend along the end walls of the furnace, and are each provided with the desired number of discharge-nozzles *p*, which open into the vertical flues *e f* above the bed.

In using converter-gas larger pipes of the ordinary construction of gas-flue would be required, and if it should be desired to heat such gas a second pair of regenerators would be necessary, as will be understood. Natural gas does not need to be heated.

I can use purified manufactured gas.

The operation of the furnace is as follows: The drawings show the furnace with the air entering the furnace through the regenerator *c*, pipe *g*, and flue *h*, and the waste products of combustion passing from the bed to the stack-flue by the flue *f*, pipe *h*, and regenerator *d*. The gas is entering the flue *h* from the nozzles *p*, but is turned off on the opposite side. When the heated waste products of combustion from the bed, in passing out through the regenerator *d*, have heated its checker-work up to the proper degree, and the cold air, entering through the previously-heated regenerator *c*, has cooled the same, the currents are reversed in the usual way by turning the valve *n*.



As before stated, the drawings illustrate an old furnace adapted to use with gas-fuel and reversing-regenerators. In this case the stack *b* remains in its original position at one end, 5 and the regenerators have been placed on the surface near the other end. The position of the regenerators, however, is entirely governed by the circumstances of each case, as they may just as well be located at the rear side, or at a considerable distance from the furnace, the only difference being that the communicating-pipes *g h* would need to be extended to suit.

In building new furnaces the location of the stack *b* would be governed by considerations of convenience and room.

The principal advantages of my invention are due to the fact that the regenerators are detached from the furnace, and can be placed in any desired or convenient position with relation thereto. This not only enables me to apply them to many furnaces where there is not room for such application in the old manner of constructing and applying checker-work regenerators, but enables such application to be made by simply connecting the communicating flue-pipes to the opposite ends of the bed, thereby reducing the cost of adapting the furnace to a minimum.

While I have illustrated the invention as applied to a single heating-furnace, I do not limit myself thereto, because several small

heating-furnaces—such as are used for heating tool-blanks of various forms—or other furnaces, may be grouped around and receive their heated air, or heated air and gas, from one set of regenerators of adequate size, by simply providing suitable flue pipes or ducts, *g* and *h*, leading from a common set of regenerators to all such heating or other furnaces. I furthermore do not limit myself to heating-furnaces, but intend to apply my invention to puddling, steel, glass, and other furnaces.

I am aware that detached regenerators, as described in English Letters Patent No. 1,157 of 1883, are not new, and I do not desire to claim the same.

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

The combination, with a gas-furnace, of reversing-regenerators *c d*, detached from the furnace, flues *e f*, situate at opposite ends of the furnace, and communicating-pipes *g h*, extending between the regenerators and the flues *e f*, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 1st day of July, A. D. 1885.

WILLIAM SWINDELL.

Witnesses:

THOMAS B. KERR,  
W. B. CORWIN.