

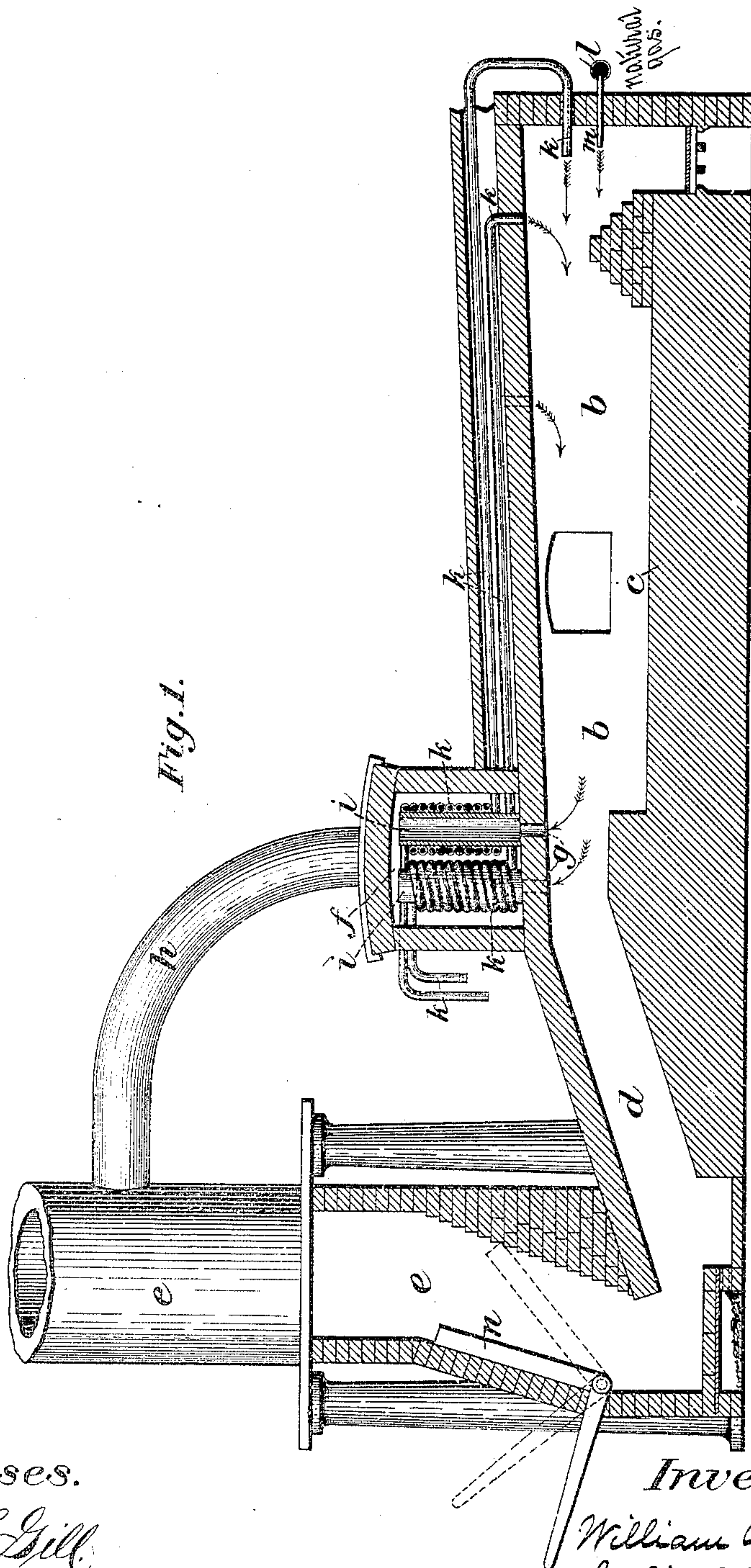
(No Model.)

2 Sheets—Sheet 1.

W. ACHESON.  
METALLURGICAL FURNACE.

No. 338,907.

Patented Mar. 30, 1886.



Witnesses.

Harry L. Gill.

W. B. Corwin

*Inventor.*

William Acheson

by his Attorneys

Bakewell &amp; Son

(No Model.)

2 Sheets—Sheet 2.

W. ACHESON.  
METALLURGICAL FURNACE.

No. 338,907.

Patented Mar. 30, 1886.

Fig. 3.

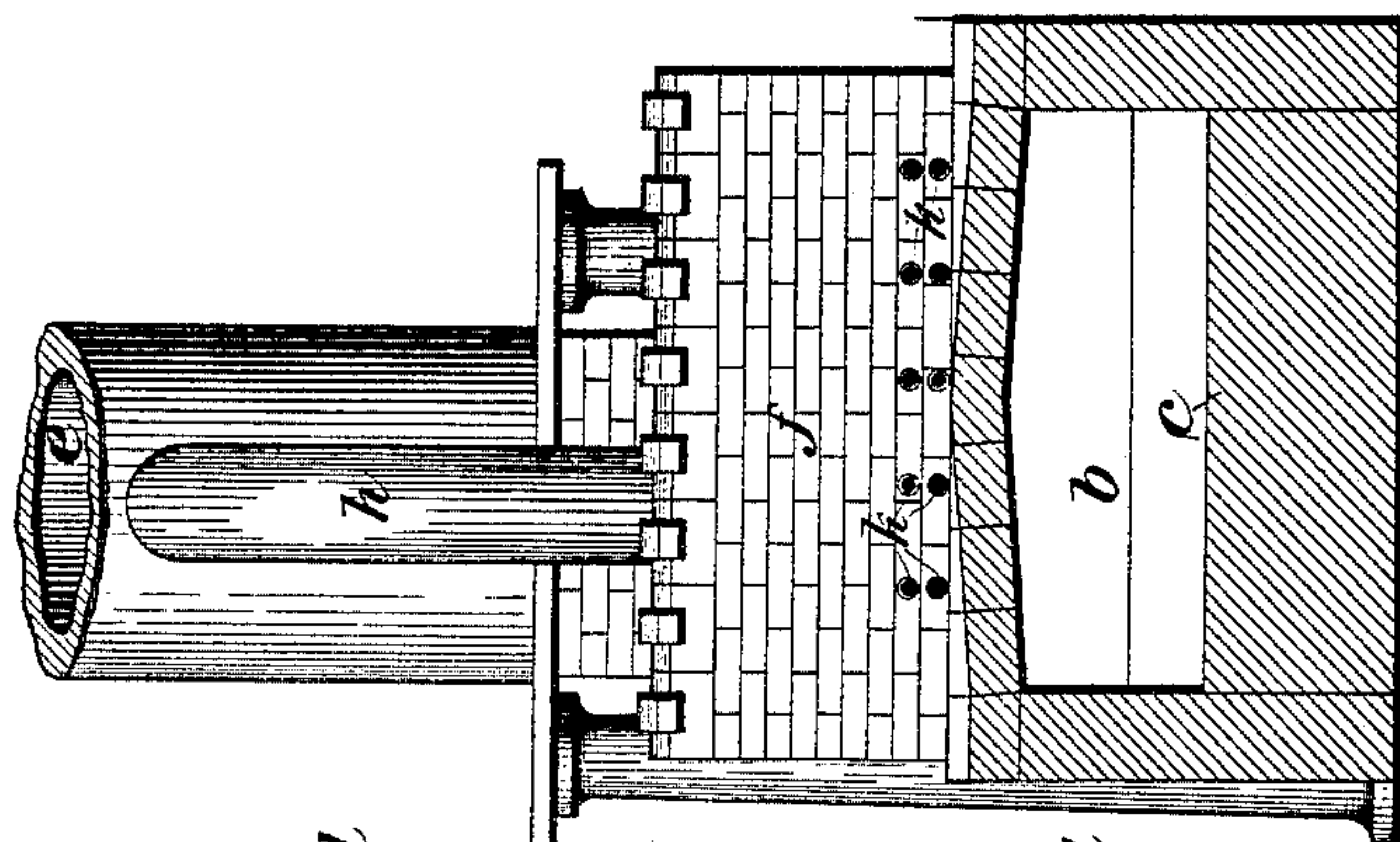
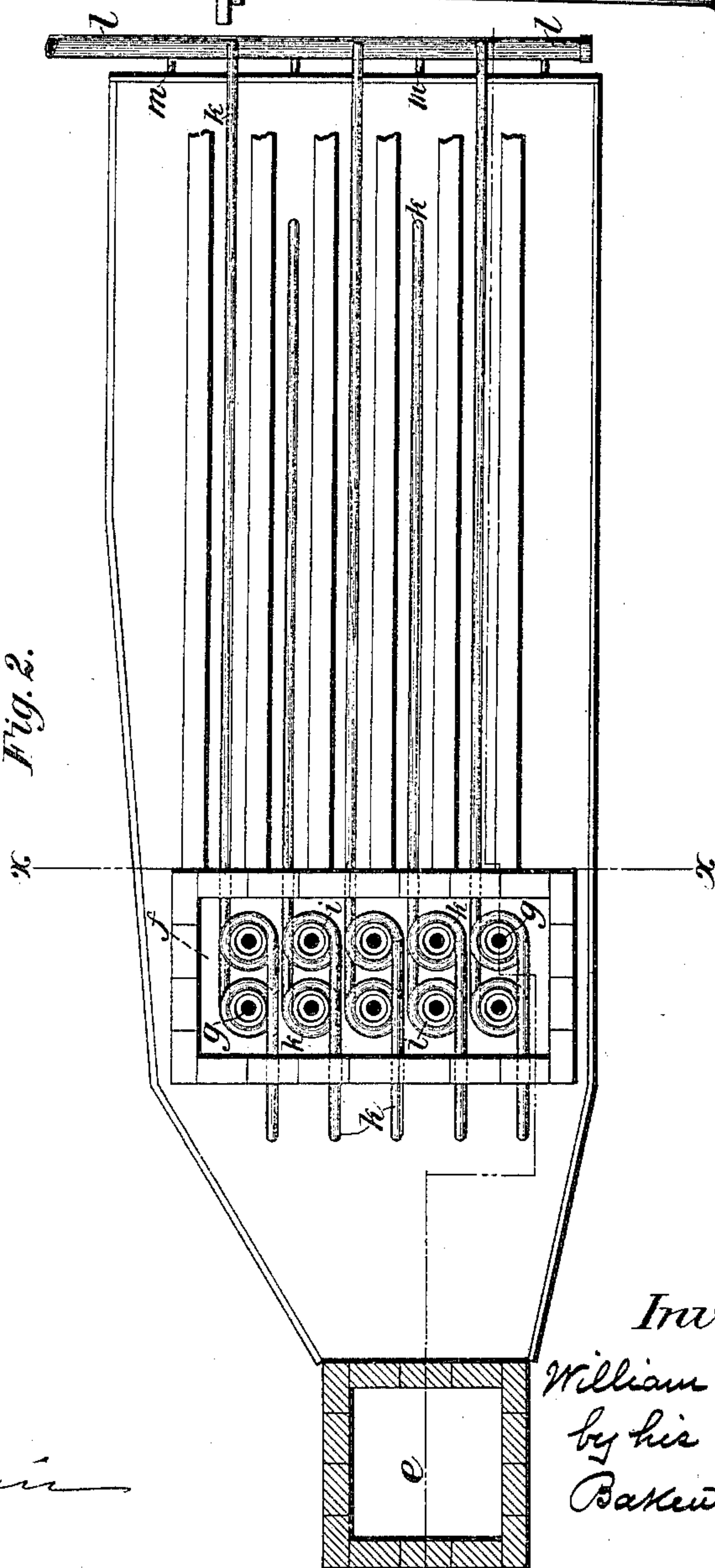


Fig. 2.



Witnesses.  
Harry L. Gill  
W. H. Corwin

Inventor.  
William Acheson  
by his Attorneys  
Bakewell & Kerr



# UNITED STATES PATENT OFFICE.

WILLIAM ACHESON, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO WILLIAM D. YOUNG, OF SAME PLACE.

## METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 338,907, dated March 30, 1886.

Application filed July 24, 1885. Serial No. 172,535. (No model.)

*To all whom it may concern:*

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

My invention consists of an improved means of heating air for use in the combustion-chamber of a furnace, and of supplying such heated air to the proper point or points to create and sustain or complete the combustion of gases therein.

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

Figure 1 is a longitudinal section of a puddling-furnace embodying my improvements. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section on the line *x x* of Fig. 2.

Like letters of reference indicate like parts in each.

The furnace has a combustion-chamber, *b*, bed *c*, neck *d*, and stack *e*, of the usual construction. Placed on top, at or near the neck, is a chamber, *f*, which communicates with the interior of the furnace by means of vertical ports or openings *g* through the roof of the latter, and with the stack by a suitable pipe or flue, *h*. Placed over each port *g*, of which there is any desired number, is a tube, *i*, made of refractory clay or other fire-resisting material, and around the tube *i* is a coil of pipe, *k*. One end of each coil extends through the side of the chamber *f* and is open for the admission of air, while the other end, passing also through the side of the chamber, extends to the combustion-chamber *b*, or any other desired point in the interior of the furnace *a*.

The furnace I have described and illustrated is designed to be used with natural gas, which may be supplied by means of a pipe, *l*, provided with branches *m*, which discharge at various points in the combustion-chamber. While the air-heating pipes *k* may discharge at any desired point, I prefer in the present instance to have a portion of them discharge directly over the point at which the pipes *m* discharge gas into the combustion-chamber,

another portion to discharge at the bridge of the furnace, and a third in the bed itself, as illustrated in Fig. 1.

The furnace is provided with a damper, *n*, placed below the point where the pipe *h* enters the stack, whereby a greater or less amount of the draft of the furnace may be caused to pass through the ports *g*, chamber *f*, and pipe *h*, and thus the temperature of the air from the pipes *k* regulated at pleasure. The purpose of the tubes *i* is to protect the coils *k* from the cutting action of the flames passing up through the ports *g*. There may be as many coils *k* as is desired, and the size of the chamber *f* will depend upon such number. The effect of the passage of the heat through the ports *g* and chamber *f* is to heat the pipes *k* up to a very high temperature, and the heat is imparted thereby to the air which is passing through them. If desired, a forced blast may be sent through the pipes *k* by a blower or other means suitable for the purpose, as will be understood.

In the combustion of the gaseous fuel, and particularly of natural gas, a large quantity of highly-heated air is necessary to effect perfect combustion, and various appliances have been adopted to secure this result, such as regenerators, hollow walls, boshes, &c. My improved method of accomplishing this result by the direct application of the waste heat of the furnace to the pipes without interfering with the draft of the furnace or necessitating the addition of costly and intricate appliances has the merit of great cheapness, simplicity in operation and construction, and of not interfering with the ordinary and proper operation of the furnace.

While I have described and shown the furnace as applied to use with gaseous fuel, I do not limit myself thereto, as my invention may be used with furnaces having the ordinary fire-grate. Nor do I limit myself to the use of my invention with puddling-furnaces, as it may be applied to boiler and other furnaces with equally good results.

I am aware that heating-chambers situate within the stack forming a by-pass for the products of combustion for the purpose of heating air are not new, and also that such chambers having coiled pipe and situate on a flue



leading from the furnace are not new, and I do not desire to claim the same, as my improvement differs in that the heating-chamber is situate upon the neck of the furnace (the strongest part,) where the heat is greatest, and does not tend to weaken the stack (the weakest part;) nor is the coil subjected to merely the vitiated heat as it passes through the stack, but to the direct heat of the furnace.

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

1. The combination, with a furnace, of a chamber arranged upon the neck between the neck and the stack and communicating with 15 both of said parts, so as to form a by-pass for the passage of the products of combustion from the furnace to the stack, and air-heating pipes arranged in said chamber and opening into the furnace, substantially as and for the purposes described.

2. The combination of a furnace with an air-heating chamber arranged upon the neck

between the neck and the stack, so as to afford a by-pass for a portion of the products of combustion, and a damper arranged in the stack below the point where said air-heating chamber communicates therewith, substantially as and for the purposes described. 25

3. The combination of the furnace with the chamber *f*, placed over the neck of the same, ports *g*, communicating therewith, pipe *h*, leading therefrom to the stack, and coils of air-pipe arranged in said chamber around the tubes *i* and communicating at one end with the open air and at the other end with the interior of the furnace, substantially as and for the purposes described. 35

In testimony whereof I have hereunto set my hand this 11th day of July, A. D. 1885.

WILLIAM ACHESON.

Witnesses:

THOMAS B. KERR,  
CHARLES S. CRAWFORD.