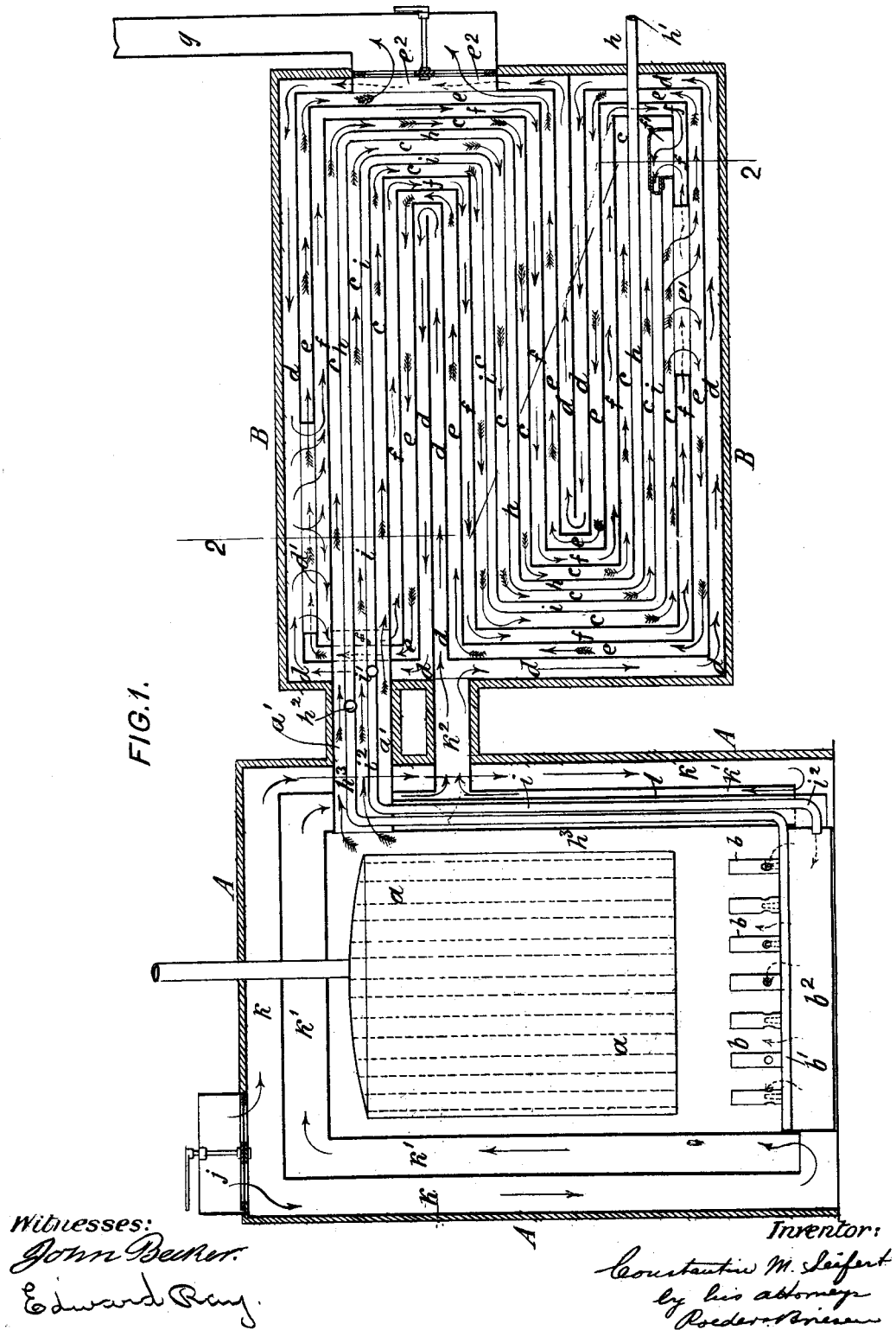


C. M. SEIFERT.  
GAS AND AIR HEATER FOR BURNERS.

(Application filed Jan. 10, 1901.)

3 Sheets—Sheet 1.

(No Model.)



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3 Sheets—Sheet 2.

(No Model.)

FIG. 2.

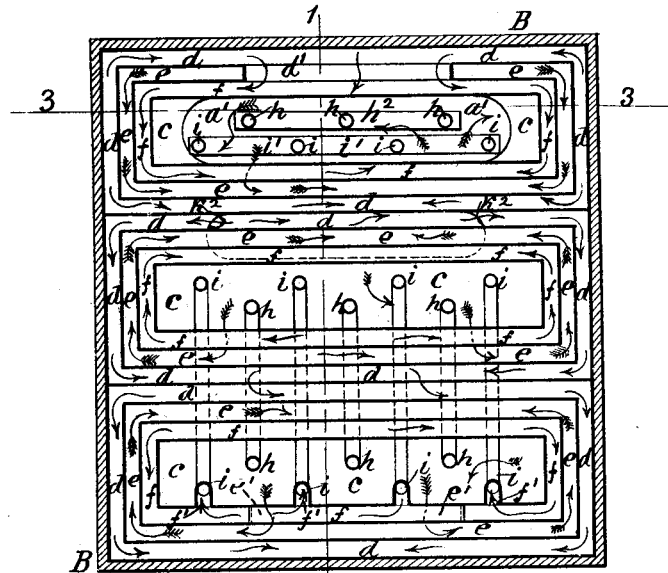
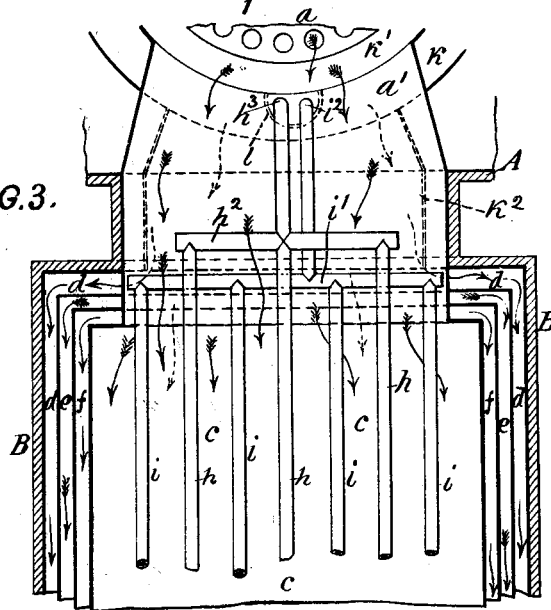


FIG. 3.



Witnesses  
John Becker.  
Edward Gray

Inventor:  
Constantin M. Seifert  
by his attorneys  
Coeders & Sieren

**No. 675,981.**

**Patented June 11, 1901.**

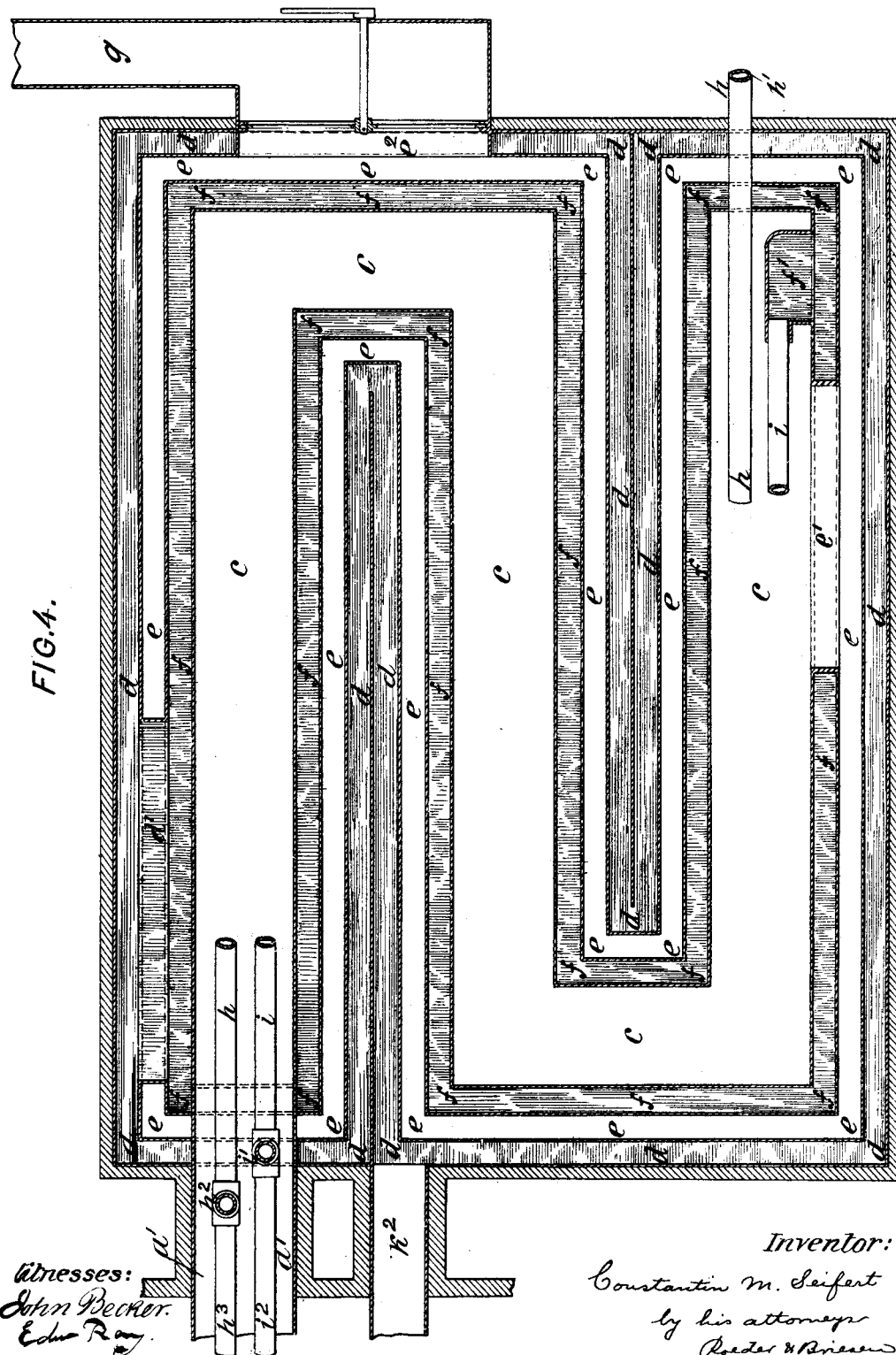
**C. M. SEIFERT.**

### GAS AND AIR HEATER FOR BURNERS.

(No Model.)

(Application filed Jan. 10, 1901.)

**3 Sheets—Sheet 3.**



Witnesses:  
John Becker.  
Edna Ray.

Inventor:  
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# UNITED STATES PATENT OFFICE.

CONSTANTIN M. SEIFERT, OF NEW YORK, N. Y.

## GAS AND AIR HEATER FOR BURNERS.

SPECIFICATION forming part of Letters Patent No. 675,981, dated June 11, 1901.

Application filed January 10, 1901. Serial No. 42,758. (No model.)

*To all whom it may concern:*

Be it known that I, CONSTANTIN M. SEIFERT, a citizen of the United States, and a resident of New York city, (Bronx,) county of Westchester, and State of New York, have invented certain new and useful Improvements in Gas and Air Heaters for Burners, of which the following is a specification.

This invention relates to an apparatus for preheating the gas and air supply of a gas-burner by means of the waste gases escaping from said burner, so that such waste gases are effectively utilized.

The invention is applicable to burners used for generating steam, heating air or water, superheating steam, and for other purposes and in which a large portion of the heat given off is generally lost.

By my invention substantially all the heat not used up by the boiler, &c., is utilized or regenerated, so that great economy and increased efficiency result.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a boiler provided with a heater constructed according to my invention on line 1 1, Fig. 2. Fig. 2 is a vertical transverse section of the heater on line 2 2, Fig. 1; and Fig. 3, a horizontal section on line 3 3, Fig. 2, showing the connection between the heater and boiler. Fig. 4 is an enlarged section through jacket B, with the pipes *h* and *i* partly broken away.

The letter *a* represents a boiler, steam-generator, or other body to be heated, and *b b* are suitable burners supplied with gas through pipe *b'* and with air through chamber *b*<sup>2</sup>. The products of combustion pass through a flue *a'* into a tortuous flue or passage *c*, shown to be made S-shaped, though it may have a greater or less number of turns. The flue *c* is surrounded on all sides by a series of chambers *d*, *e*, and *f*, incased by a non-conducting jacket B and arranged one within the other, three series of chambers being shown. Near its outer end the flue *c* communicates with the central chamber *e* by port *e'*, and thus the products of combustion issue from flue *c* through port *e'* into chamber *e* and thence through outlet *e*<sup>2</sup> into the chimney *g*.

Within the flue *c* are inclosed two sets of pipes *h* and *i*, Fig. 2, of which the pipes *h* serve to conduct heated gas to the burner-

pipe *b'*, while the pipes *i* serve to conduct heated air to the burner-chamber *b*<sup>2</sup>.

The pipes *h* receive their supply of heating-gas from a suitable source (not shown) at *h'* and conduct it through the heater in a direction opposite to the flow of the waste gases passing through the flue *c*. Thus the heating-gas is delivered to the burners by connection *h*<sup>2</sup> and pipes *h*<sup>3</sup> *b'* in a highly-heated condition.

The air necessary for the combustion enters through register *j* and thence flows through a return-flue *k k'*, surrounding boiler *a* and inclosed by a non-conducting shell A. The passage *k'* delivers the air thus primarily heated, through duct *k*<sup>2</sup>, into the outermost chamber *d*, which it fills and from which it flows, through port *d'*, into the innermost chamber *f*. Thus the air also fills the chamber *f* and thence flows, through ports *f'*, into the outermost ends of pipes *i*. These pipes convey the hot air within the flue *c* to the burner-chamber *b*<sup>2</sup> by means of the connection *i*<sup>2</sup> and pipe *i*<sup>3</sup>. Thus it will be seen that the hot gases within the chamber *e* and also those within the flue *c* surround the air and that the latter is highly heated before being delivered to the burners.

In order to prevent the cold air in passage *k* from cooling the pipes *h*<sup>3</sup> *i*<sup>2</sup>, the latter are incased by a jacket *l*.

The drawings indicate the flow of the waste gases by arrows and the flow of air by darts, so that their course may be readily traced. The pipes may be made serpentine or corrugated, if desired, to present a greater heating-surface, and thus increase the efficiency of the heater.

The operation of the heater will be readily understood. The waste gases will flow from the fire-chamber of the boiler through tortuous flue *c* and the central chamber *e* to the stack *g*. The heating-gases will flow in an opposite direction within the pipes *h*, and thus they are highly heated by the waste gas flowing through the flue *c*. The air will flow successively through flues *k k'*, chambers *d f*, and pipes *i*, so that it is subjected, first, to the heat given off from the boiler, then to the heat given off from chamber *e*, and finally to the heat given off from flue *c*. Thus the air as well as the heating-gases will reach

the burners in a highly-heated condition, and the heat from the products of combustion is consequently effectively utilized.

What I claim is—

- 5 The combination of a combustion-chamber, a burner therein, of a heater comprising a plurality of intercommunicating chambers having communication with said combustion-chamber, and a plurality of intercommuni-  
10 cating chambers for air, the several chambers of said heater being assembled one within the other, and the chambers for the products of combustion arranged alternately with respect to the air-chambers, means for supplying air

to said air-chambers, and pipes leading from 15 the exit of the series of air-chambers and from a source of gas-supply respectively through one of the chambers for the products of combustion to the burner, substantially as specified. 20

Signed by me at New York city, county and State of New York, this 9th day of January, 1901.

CONSTANTIN M. SEIFERT.

Witnesses:

F. V. BRIESEN,  
WILLIAM SCHULZ.