

**No. 621,665.**

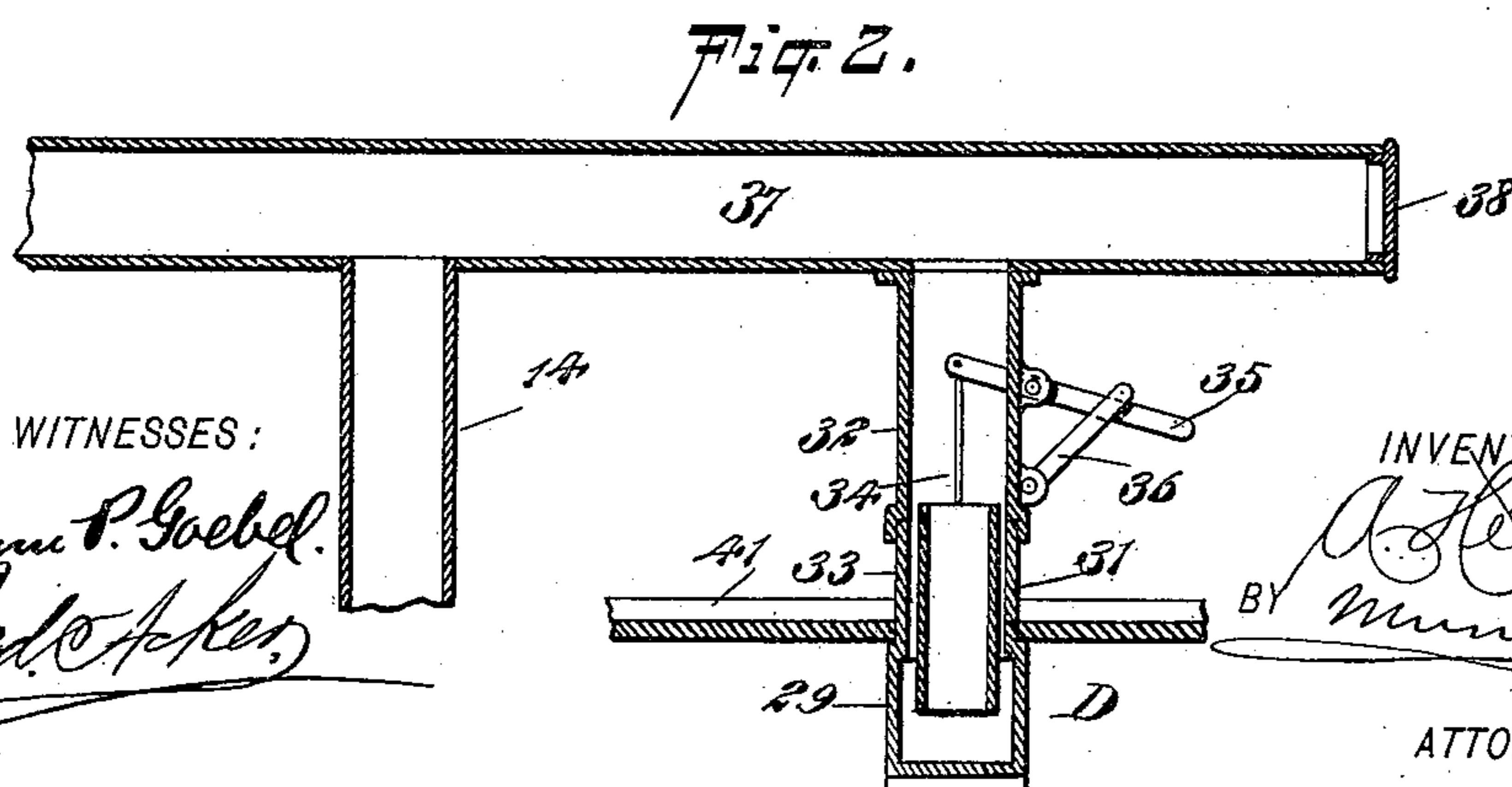
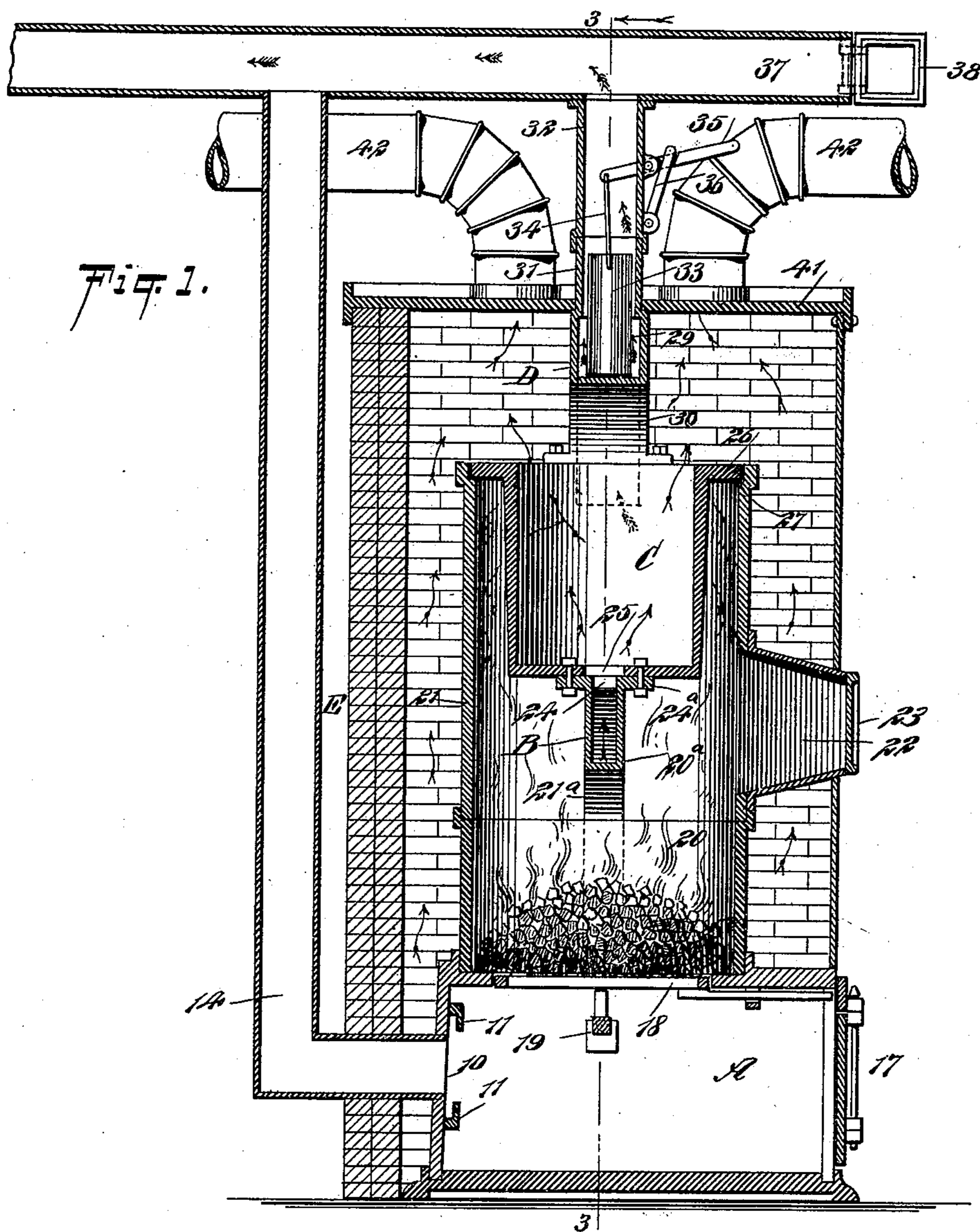
**Patented Mar. 21, 1899.**

**A. HEIL.  
FURNACE.**

(Application filed Dec. 9, 1898.)

(No Model.)

**2 Sheets—Sheet 1.**



WITNESSES:

William P. Goebel.

John Aker,

INVENTOR

BY Munir G.

ATTORNEYS,

No. 621,665.

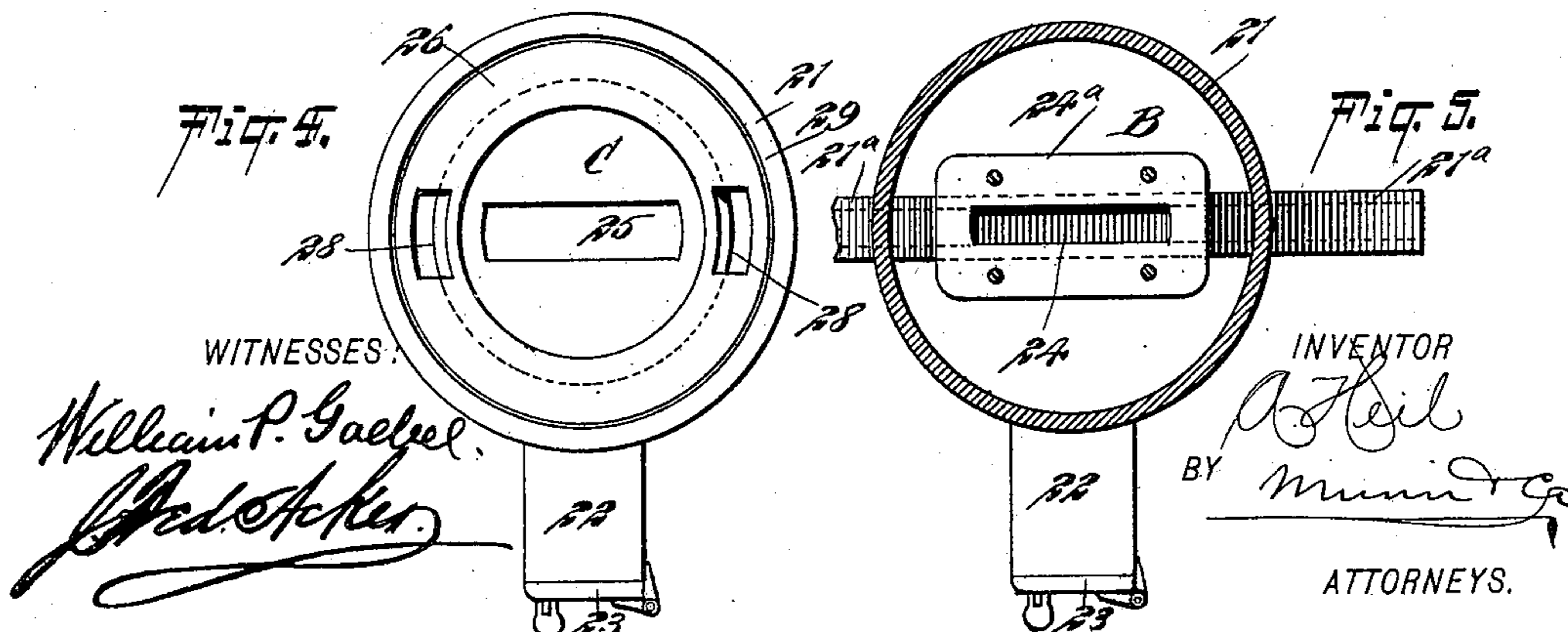
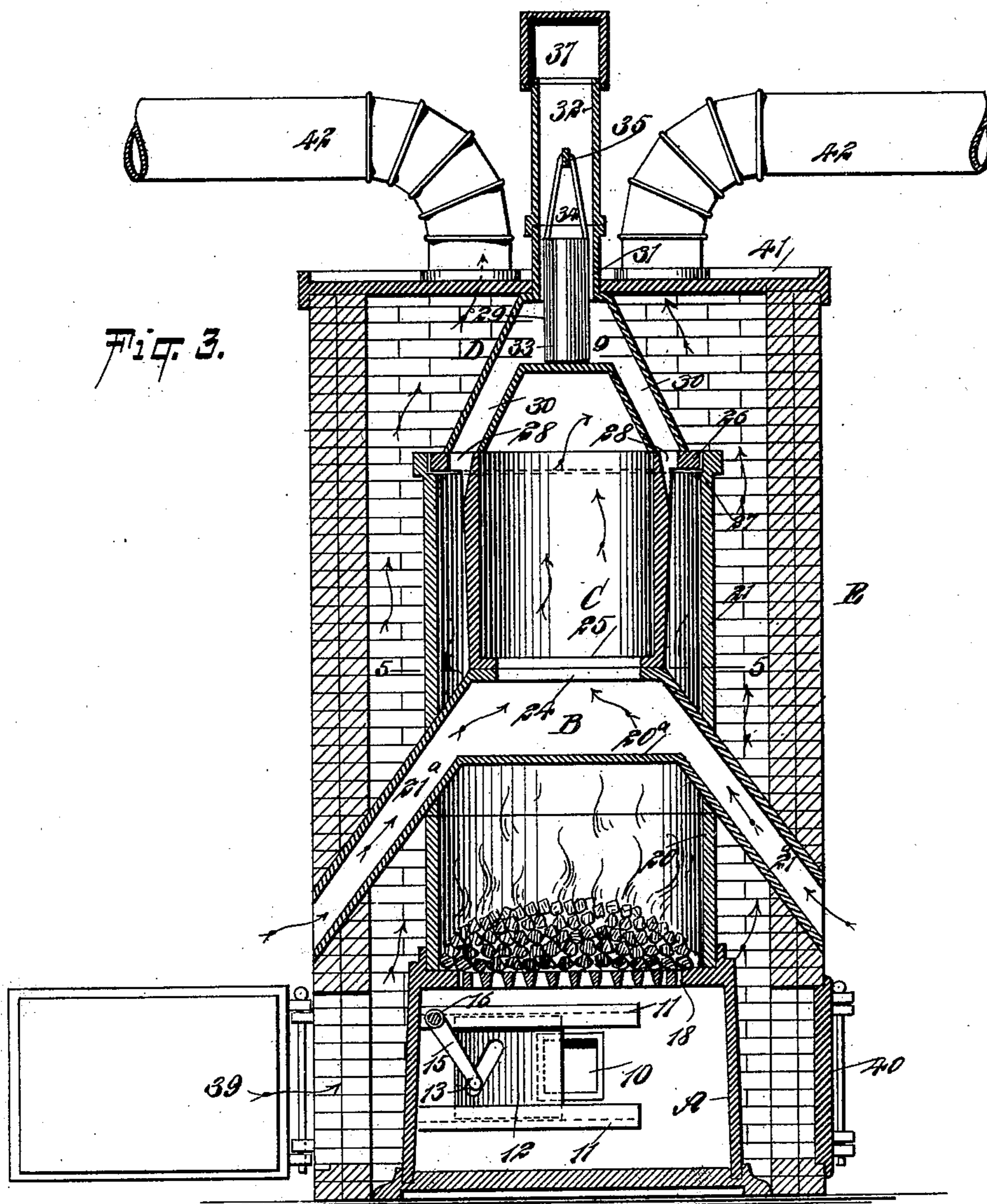
Patented Mar. 21, 1899.

A. HEIL.  
FURNACE.

(Application filed Dec. 9, 1898.)

(No Model.)

2 Sheets—Sheet 2.



# UNITED STATES PATENT OFFICE.

ALEXANDER HEIL, OF READING, PENNSYLVANIA.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 621,665, dated March 21, 1899.

Application filed December 9, 1898. Serial No. 698,733. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER HEIL, of Reading, in the county of Berks and State of Pennsylvania, have invented a new and useful Improvement in Furnaces, of which the following is a full, clear, and exact description.

The object of my invention is to so construct a hot-air furnace that a large volume of heat may be obtained from a comparatively small body of fuel and whereby the air introduced into the furnace will be conducted under all conditions of weather in a highly-heated state and free from gas and the waste products of combustion to the system of heating-pipes.

A further object of the invention is to provide a means whereby the draft may be practically shut off between the furnace and chimney or offtake-flue, ample provision at the same time being made for the escape of gases into the chimney.

Another object of the invention is to construct the furnace in a simple yet effective and economic manner.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal vertical section through the furnace and its casing, the section being taken from front to rear. Fig. 2 is a vertical section through the flue that is to be connected with the chimney and through the dust-escape flue and the flue connected directly with the furnace for the escape of the products of combustion and through the valve adapted to control the draft. Fig. 3 is a vertical section through the furnace and its casing practically on the line 3 3 of Fig. 1. Fig. 4 is a plan view of the upper portion of the body of the furnace, and Fig. 5 is a transverse section taken practically on the line 5 5 of Fig. 3.

A represents the ash-pit of the furnace, which ash-pit is provided with an opening 10 at the back, and guides 11 are located at the

top and bottom of the opening 10, in which guides the dust-damper 12 is adapted to slide, and said damper is provided with a diagonal slot 13, as shown in Fig. 3. A dust-flue 14 is introduced into the opening 10, and the said dust-flue is carried above the upper surface of the furnace. An arm 15 is attached to a shaft 16, which shaft extends from the rear out to the front of the ash-pit at one side, and the arm 15 is provided with a pin adapted to travel in the slot 13 of the dust-damper, whereby when the shaft is operated the damper 12 may be made to cover or uncover the opening 10, as desired. The ash-pit is provided with the usual front door 17, and at the upper portion of the ash-pit a grate 18 of any desired character is located. In Fig. 1 of the drawings the grate 18 is shown as mounted to revolve upon a support 19.

The fire-box 20 is preferably circular and is located above the grate, as usual, and the body 21 of the furnace corresponds in cross-section to the cross-section of the fire-box 20 and is adapted to rest thereon. A cold-air flue B extends through the body of the furnace above the fire-box, which flue consists of a horizontal body-section 20<sup>a</sup> and side sections 21<sup>a</sup>, that extend downward through the body of the furnace in opposite directions beyond the outer face of the said body, as is clearly shown in Fig. 3. The body 21 of the furnace is provided with an extension 22 at the front, through which the fuel is introduced into the fire-box, and said extension is normally closed by a suitable door 23. A longitudinal slot 24 is made in the upper surface of the body-section of the cold-air flue, as shown in Figs. 3 and 5, and at this portion of the cold-air flue a flange 24<sup>a</sup> is usually constructed, as is also shown in Fig. 5.

A superheating pot or well C is located above the cold-air flue. The bottom of the pot or well rests upon the upper or flanged surface of the body of the cold-air flue, being attached to the flange by bolts or otherwise, and the superheating pot or well C is provided with a slot 25 in its bottom, that registers with the slot 24 in the body portion of the cold-air flue, as is illustrated in Fig. 3. An outer marginal flange 26 is formed at the upper edge of the superheating pot or well,

and said flange is adapted to fit into a rabbet 27, produced in the upper end of the body of the furnace, as is shown in both Figs. 1 and 3. Ports 28 are made partly in the flange and partly in the side walls of the superheating pot or well, as is clearly shown in Fig. 3, and the said ports connect with the space between the body of the furnace and the pot or well C, since the latter is of less diameter than the former.

A tubular bridge D, adapted to receive gas and waste products of combustion, is made to rest upon the upper surface of the superheating pot or well, the legs or side members 30 of the bridge being in communication with the ports 28. The bridge D is preferably A-shaped, comprising a horizontal upper section 29 and diverging side sections 30. A collar 31 is located at the upper portion of the tubular bridge, being in communication with the interior of the bridge, and a pipe 32 is attached to the collar 31 in any suitable or approved manner. A valve 33 is located in the collar 31, which valve is in the form of a tube, as shown in Fig. 2. When it is desirable to shut off the draft and maintain a low fire, the valve is seated upon the bottom of the upper section of the tubular bridge D, as shown in Figs. 1 and 3. The valve is of slightly less diameter than the inner diameter of the collar 31, so that even when the valve is seated sufficient space is provided for the escape of gas between the valve and the collar. A link 34 is usually attached to the upper end of the valve 33, and said link is connected to the inner end of a lever 35, which extends within the pipe 32 and is fulcrumed upon the outer surface of the pipe, as shown in Figs. 1 and 2. Said lever may be held in a position that will cause the valve to be fully or partially opened by means of a lock-bar 36, having an eye through which the lever passes, the lock-bar being pivoted to the pipe 32 at a point below the fulcrum of the lever, as is also shown in Figs. 1 and 2.

An offtake-pipe 37 is connected with the upper end of the pipe 32, that is in direct communication with the interior of the furnace, and the dust-pipe 14 likewise connects with the offtake-pipe 37, as illustrated in Figs. 1 and 2. One end of the offtake-pipe 37 is connected with the chimney or flue proper, while the other end is provided with a cap or door 38. When the valve 33 is closed, the cap or door 38 is opened, and the current of air passing through the pipe 37 into the flue will carry with it practically all of the gas that may escape from the tubular bridge D through the space provided between the valve 33 when closed and the collar 31, the said current of air serving at the same time to check the draft from the fire-pot, permitting portions of the gas generated in the fire-pot to be consumed.

A casing E is provided for the furnace, the casing being of such dimensions that a space intervenes the sides of the furnace and the

sides of the casing and likewise the top of the furnace and the top of the casing. The side members 21<sup>a</sup> of the cold-air flue extend out through the side walls of the casing, as shown in Fig. 3, and opposite the ash-pit A a door 39 is provided at one side of the casing, and a door 40 is provided for the opposite side of the casing, as shown in Fig. 3. These doors 39 and 40 need be opened only during very cold weather, and the object of the openings ordinarily closed by these doors is to admit cold air at the bottom portion of the casing, so as to force the column of hot air contained in the upper portion of said casing into the pipes 42, leading into the apartments of a dwelling, the pipes 42 being fitted over openings made in the top 41 of the casing. When the doors 39 and 40 are opened, it is evident that the cold air admitted to the casing at its base is rapidly heated and mingles in its heated state with the air at the upper portion of the casing, thus quickly increasing the supply of heated air to the apartments. The cold air that is admitted to the air-flue B is quickly heated, because the upper or body portion of this flue is exceedingly hot, as all the products of combustion and the flame from the fire must pass around this portion of the cold-air flue before it passes around the superheating pot or well C. The air primarily heated in the cold-air flue passes into the pot or well C, where it is further heated, and the superheated air escapes from the pot or well at the top of the furnace and enters the heating-pipes 42.

It is evident that all the gases and waste products of combustion pass out from the furnace through the ports 28, entering the tubular bridge D, from whence the waste products of combustion find their way to the offtake-flue 37.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a furnace, a cold-air flue extending through the body of the furnace above the fire-pot, a superheating well or pot located in the upper portion of the body of the furnace, being open at the top and having communication with the cold-air flue, pipes connected with the space between the body of the furnace and the pot or well, a valve for the said pipes, and a connection between the said pipes and the offtake-flue, as and for the purpose set forth.

2. In a furnace, a cold-air flue extending through the body of the furnace over the grate and beyond its sides, a superheating pot or well, provided with a flange fitted in the upper portion of the furnace, said flange having ports, the well or pot being of less diameter than the diameter of the furnace, the said pot or well having also an open upper end and a connection between its bottom and the cold-air flue, pipes connected with the ports in the flange of the well, an offtake-flue connected with said pipes, and a valve

located between the offtake-flue and the point of connection of said pipes with said well, as set forth.

3. In a furnace, the combination, with the body of the furnace, and a cold-air flue passed through said body at a point above the grate, of a well, open at the top and having communication at the bottom with the cold-air flue, the well being of less diameter than the diameter of the body, a flange for suspending the well within the body of the furnace, said flange having ports therein, a bridge-pipe extending from port to port, an offtake-flue and a communication between the upper portion of the bridge-pipe and the offtake-flue, and a valve located where the offtake-flue connects with said bridge-pipe, as described.

4. In a furnace, the combination, with the body of the furnace and a cold-air flue passed through the said body at a point above the grate, of a well, open at the top and having communication at the bottom with the cold-air flue, the well being of less diameter than the diameter of the body, a flange for suspending the well within the body of the furnace, said flange having ports therein, a bridge-pipe extending from port to port, an offtake-flue, a communication between the upper portion of the bridge-pipe and the offtake-flue, a valve located where the offtake-flue connects with said bridge-pipe, a lever connected with said valve, and a locking device for said lever, as set forth.

5. In a furnace, the combination, with a body, a cold-air flue extending through the body at a point above the grate, a superheating well or pot of less diameter than the diameter of the body, the well having an open top and a connection at its bottom with the cold-air flue, and a projection from the upper portion of the well, resting upon the body of

the furnace, said projection having ports therein, of a tubular bridge extending from port to port, an offtake-flue provided with a device for opening and closing one of its ends, a connection between the offtake-flue and the tubular bridge, a valve adapted to have movement in the connecting medium between the offtake-flue and the said tubular bridge, entering the latter, and means, substantially as described, for operating the valve, for the purpose set forth.

6. A furnace, the body of which is provided with a cold-air flue extending through it at a point above the grate, and a superheating pot or well of less diameter than the diameter of the furnace, said pot or well having an open top and an opening in its bottom in direct communication with the cold-air flue, and a valve arranged to regulate the draft, and when closed admit of the passage of gases from the body of the furnace to the flue, as set forth.

7. In a furnace, the combination, with the body thereof, a cold-air flue passed through the body at a point above the grate, a superheating pot or well located at the top of the body, its upper portion being open and its bottom in direct communication with the cold-air flue, and an extension from the sides of the pot or well, supporting it upon the body of the furnace, the extension having ports therein, of a tubular bridge extending from port to port, a tubular valve open at top and bottom, adapted to be seated within the tubular bridge, the valve being of less diameter than that portion of the tubular bridge in which it has movement, and means for raising and lowering the valve, as set forth.

ALEXANDER HEIL.

Witnesses:

GEORGE COX,  
JAMES MILTON MILLER.