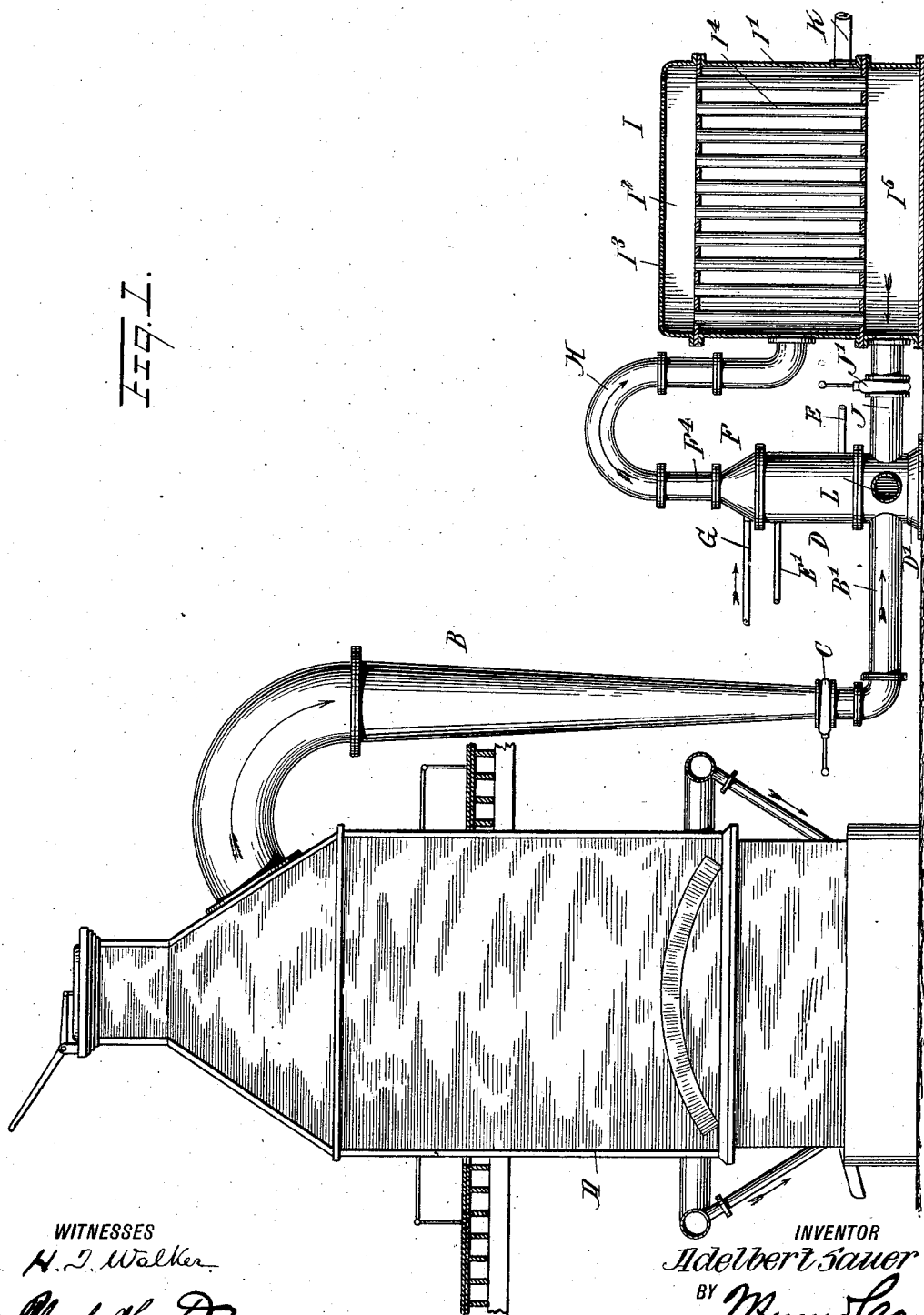


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APPLICATION FILED FEB. 6, 1911.

Patented Nov. 28, 1911.

2 SHEETS-SHEET 1.



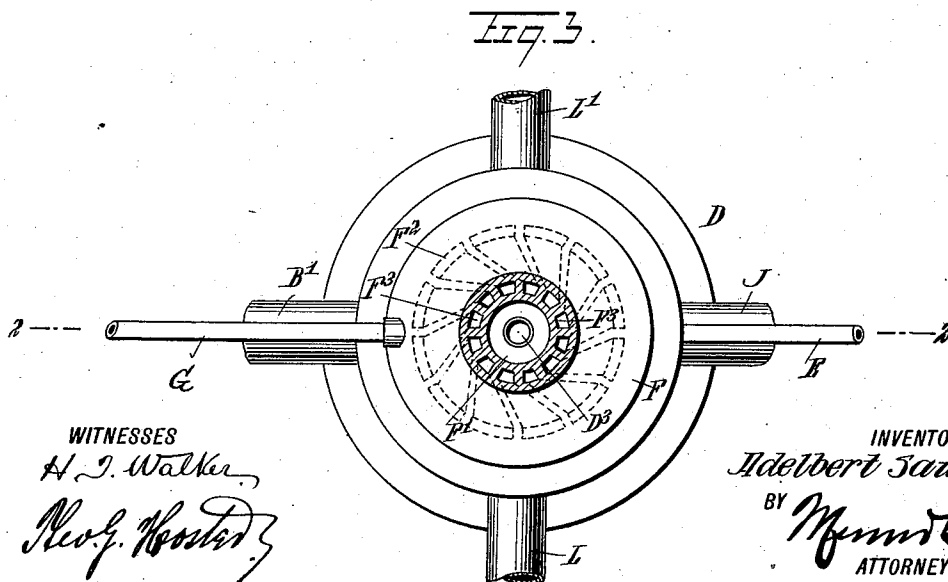
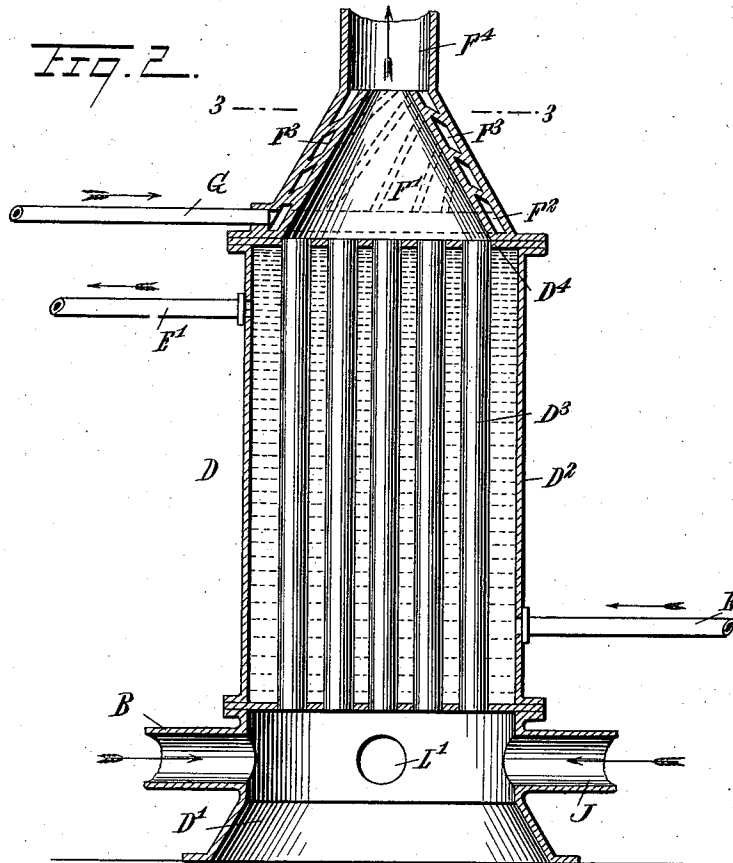
WITNESSES
H. J. Walker
Rev. J. Hoisted

INVENTOR
Adelbert Sauer
BY M. J. Leo.
ATTORNEYS

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WITNESSES
H. J. Walker
Geo. F. Hoster

INVENTOR
Adelbert Sauer
BY *M. J. Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ADELBERT SAUER, OF PITTSBURGH, PENNSYLVANIA.

FURNACE ATTACHMENT.

1,010,182.

Specification of Letters Patent.

Patented Nov. 28, 1911.

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To all whom it may concern:

Be it known that I, ADELBERT SAUER, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Furnace Attachment, of which the following is a full, clear, and exact description.

The invention relates to blast furnaces, smelting ovens and like apparatus, and its object is to provide a new and improved furnace attachment whereby the gases are rapidly drawn from the stack of the furnace and utilized to heat feed water for boiler or other apparatus, and to finally condense the gases to render the same harmless.

For the purpose mentioned, use is made of a condenser having a shell for the reception of the gases from the furnace, the condenser having flues for the passage of atmospheric air to condense the gases, and a suction device connected at its inlet with the down-comer of a furnace and with an air receiving chamber into which discharge the said tubes of the condenser, the outlet of the suction device being connected with the shell of the condenser.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the apparatus as applied to a smelting furnace, parts being shown in section; Fig. 2 is an enlarged sectional side elevation of the suction device and water heater, the section being on the line 2—2 of Fig. 3; and Fig. 3 is a sectional plan view of the same on the line 3—3 of Fig. 2.

The upper end of the stack A of a blast furnace, or similar apparatus, is connected with a down-comer B for carrying off the gases arising from the smelting operation in the stack A. The down-comer B extends downwardly and gradually diminishes in size, and the said down-comer is provided with a manually-controlled valve C for controlling the passage of the gases through the down-comer B. The down-comer B has its terminal B' connected with a hollow base D' of a water heater D, having a shell D² and flues D³ extending from the base D' through the top plate D⁴ of the heater, as plainly indicated in Fig. 2. The interior

of the shell D² of the water heater D is connected by a pipe E with a suitable water supply, and from the shell D² leads a pipe E' for carrying off the heated water to the water compartment of a boiler or other apparatus.

On the top plate D⁴ of the water heater D is set a suction device F having a suction chamber F', which is preferably of frusto conical form, and in the side wall of the said suction chamber F' is arranged an annular passage F² connected by a pipe G with the dome of a steam boiler or other suitable source of steam supply. From the annular passage F² lead a series of spiral passages F³ to the discharge or upper end of the suction chamber F', so that when the apparatus is in use and steam passes by way of the pipe G into the annular passage F² and through the spiral passages F³ then a whirling motion is given to the steam at the apex or discharge end of the suction chamber F' so that a suction is produced in the discharge end of the suction chamber F', whereby the gases arising from the smelting operation in the stack A are drawn therefrom by way of the down-comer B into the base D' and up through the flues D³ into the suction chamber F'. The smoke and gases in their passage through the flues D³ heat the water contained in the shell D², and this heated water is passed to the boiler or other apparatus by the pipe E' as required.

The discharge end of the suction device is connected with a pipe H discharging into the shell I' of a condenser I having an air inlet chamber I² provided with a perforate top I³, as plainly indicated in Fig. 1. The air inlet chamber I² is connected by tubes I⁴ with an air receiving chamber I⁵, and the said tubes I⁴ extend through the shell I' so as to cool the gases that pass through the shell I' by atmospheric air passing through the tubes I⁴. The air receiving chamber I⁵ is connected by a pipe J with the hollow base D' of the water heater D, and the said pipe J is provided with a suitable valve J' for controlling the flow of air passing from the air receiving chamber I⁵ into the base D'.

It is understood that when the suction device F is in use and the valve J' is open or partly so, then air is drawn by the suction device F from the chamber I⁵, whereby air is drawn through the tubes I⁴ from the

air inlet chamber I². The air passing by way of the pipe J into the base D' mixes with the gases from the down-comer B of the blast furnace, and the gases and air are mixed with the steam in the suction device F, and the mixture is passed by the pipe H into the shell I' to be condensed therein by the action of the atmospheric air passing through the tubes I⁴. The condensed fluid and the remaining gases in the shell I' of the condenser I are discharged through a pipe K leading to a suitable place of discharge.

A number of furnaces and like apparatus may be connected with the hollow base D' of the water heater D, and the said base D' being for this purpose connected by pipes L and L' with such furnaces as indicated in the drawings.

It is understood that when the apparatus is in use some of the heat of the gases from the furnace is given up to heat the water in the water heater D, and the gases are further cooled on being mingled with the steam and air and condensed in the shell I' of the condenser I, from which the condensed liquid is discharged by way of the pipe K.

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

1. In an apparatus of the class described, the combination with a condenser having a shell, tubes in the shell for the passage of atmospheric air, and a chamber into which discharge the said tubes, of a suction device having its inlet connected with the said chamber and with the down-comer of a fur-

nace and the like, the said suction device discharging into the said condenser shell.

2. In an apparatus of the class described, the combination with a condenser having a shell, tubes in the shell for the passage of atmospheric air, and a chamber into which discharge the said tubes, of a suction device having an inlet and an outlet connected with the said condenser shell, a valved connection between the said chamber and the said inlet, and a valved connection between the said inlet and the down-comer of a furnace and the like, the said suction device having an outlet discharging into the said condenser shell.

3. An apparatus of the class described, comprising a condenser having a shell provided with an air inlet chamber having a perforated top, an air receiving chamber, and tubes connecting the said chambers with each other, a water heater having a hollow base, a valved connection between the said base and the said air receiving chamber, a down-comer, a valved connection between the said base and the said down-comer, and a suction device superimposed upon the said water heater and having a suction chamber, spaced steam passages opening into the suction chamber, and an outlet connected with the said condenser shell.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ADELBERT SAUER.

Witnesses:

F. P. HOFFMANN,
C. J. HOFFMANN.