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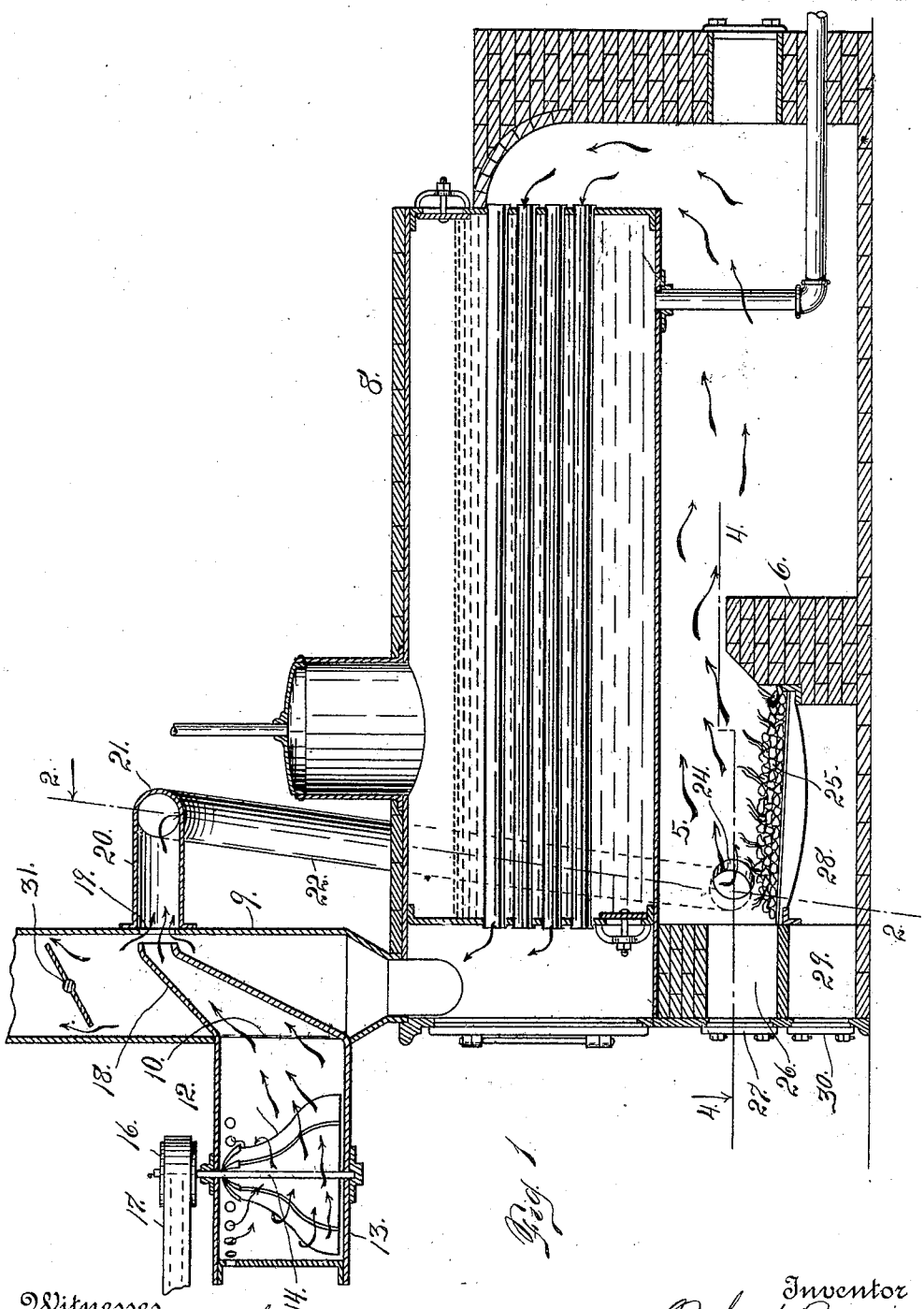
SMOKE CONSUMING FURNACE.

APPLICATION FILED APR. 20, 1908.

916,910.

Patented Mar. 30, 1909.

3 SHEETS—SHEET 1.



Witnesses

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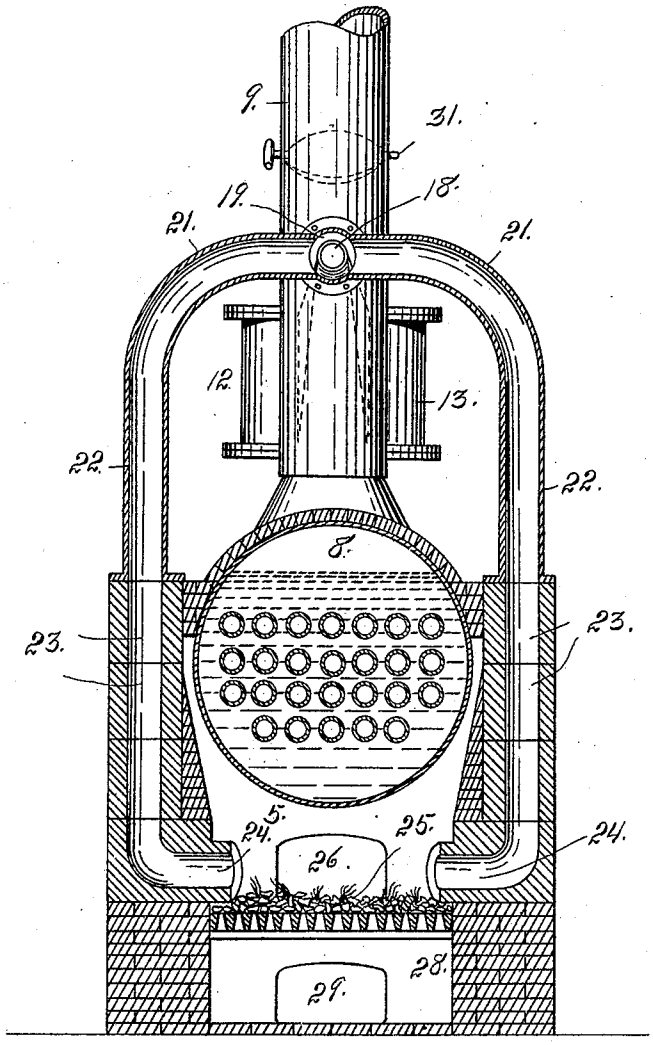


Fig. 2.

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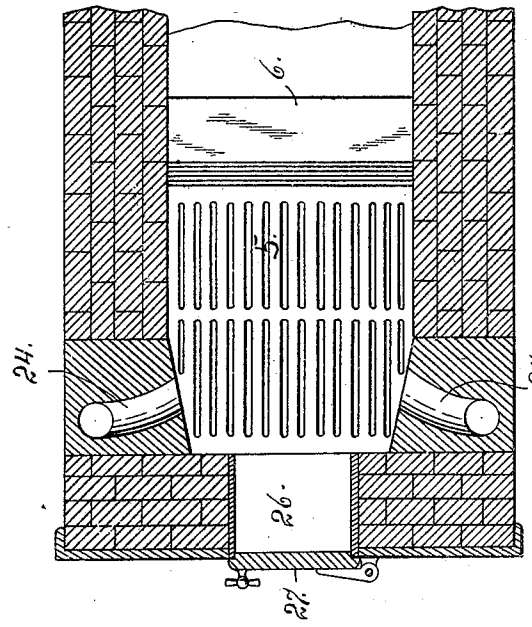


Fig. 4.

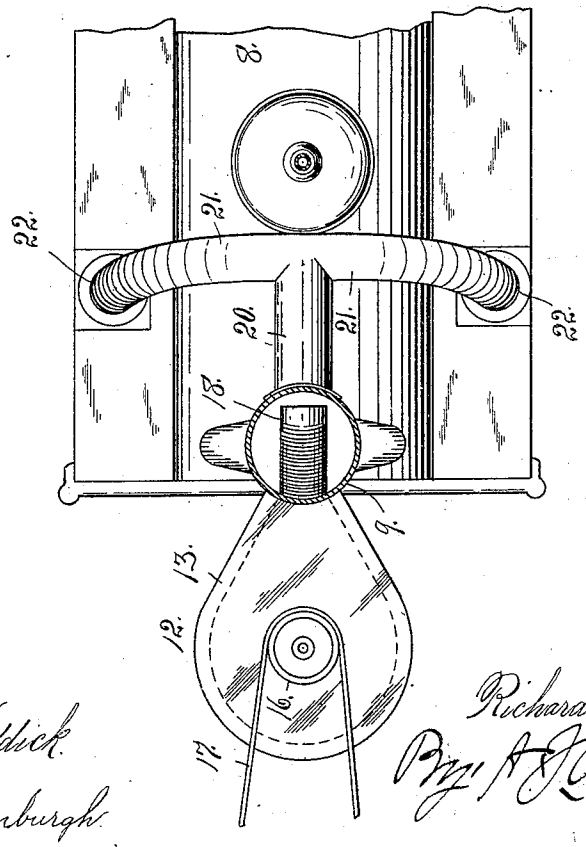


Fig. 3.

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UNITED STATES PATENT OFFICE.

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SMOKE-CONSUMING FURNACE.

No. 916,910. Specification of Letters Patent. Patented March 30, 1909.

Application filed April 20, 1908. Serial No. 428,048.

To all whom it may concern:

Be it known that I, RICHARD BOERSIG, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Smoke-Consuming Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in smoke consuming furnaces, my object being to consume as far as practicable all the combustible portion of the fuel, and to this end, I make provision for returning the products of combustion, or a portion of them after they have entered the smoke stack or flue, to the fire-box, whereby they are re-subjected to the action of the combustion influence within the fire-box, thus making it practically impossible for any of the combustible fuel elements to escape. With this end in view, I introduce fluid as air or steam under pressure, into the smoke pipe or flue, at a point directly opposite an opening leading to one or more conduits which passes downwardly and communicates with the fire-box. The passage of this fluid from the nozzle, or other suitable device which protrudes into the smoke flue, creates a partial vacuum within the said flue and adjacent to the outlet port or opening, whereby the smoke is drawn from the flue and delivered under the influence of the compressed fluid into the said conduits, and is carried downwardly aided by the draft of the furnace and discharged into the fire-box, thus utilizing the unconsumed combustible fuel elements that may be contained therein. The fluid under pressure and through whose instrumentality the smoke is removed from the flue and redelivered to the fire-box, may be given its pressure in any suitable manner, and it may consist of compressed air or steam, or a combination of these elements, or of any other suitable fluid that may be found practicable.

In the drawings I have illustrated a special construction of blower. It is arranged in a chamber provided with openings communicating with the atmosphere, whereby atmospheric air under pressure is delivered into a nozzle, which enters the smoke flue on one side and terminates near its opposite side and in front of an opening through which the products of combustion to be returned to the fire-box from the smoke flue are drawn.

Having briefly outlined my improved construction I will proceed to describe the same in detail, reference being made to the accompanying drawings in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a vertical longitudinal section taken through a furnace equipped with my improvements. Fig. 2 is a section taken on the line 2—2, Fig. 1. Fig. 3 is a top plan view of the front part of the furnace showing my improvements, the smoke flue being shown in the horizontal section. Fig. 4 is a section taken on line 4—4, Fig. 1, looking downwardly or in the direction of the arrow.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a fire box, 6 a bridge wall, and 8 a boiler, all of which may be of ordinary or any suitable construction. Communicating with the forward extremities of the fire tubes of this boiler, is a smoke flue 9 having an opening 10 communicating with a blower 12, which, as shown in the drawing, consists of a box 13 through which passes a spindle 14, provided with wings 15 for generating an air current as the spindle is rotated. This spindle is journaled in the box and its upper extremity is provided with a pulley 16 which may be connected by means of a belt 17 with a pulley not shown, mounted on a line shaft and used in connection with any suitable motor for operating the blower.

Surrounding the opening 10 in the smoke flue, is a nozzle 18 which extends upwardly and crosses the smoke flue, its opposite extremities terminating near the wall of the flue opposite the blower, the said wall adjacent to the open extremity of the nozzle having an opening 19 communicating with a short pipe 20, which leads to a conduit 21 whose upper portion is curved and merges into two downwardly extending conduits 22 which communicate with flues 23 formed in the opposite sides of the furnace wall, their lower extremities 24 leading inwardly and communicating with the fire box on opposite sides of the furnace and just above the fuel bed 25.

The so called nozzle 18 consists of a sort of

hood relatively large at one extremity and tapering toward its opposite end. This hood has its base, or larger end, in communication with the air box or blower, and extends upwardly as it crosses the stack on the inside, and, therefore, occupies an inclined position, whereby the force of the air current is increased as compared with a hood or nozzle crossing the stack in a horizontal direction. Moreover, the inclined position of the hood is advantageous, since the products of combustion are allowed to fill the stack immediately in the rear of the discharge extremity of the hood, whereby the products of combustion are more effectively acted upon by the air current issuing from its smaller end, in a horizontal direction, thus setting up an induced air current crosswise of the stack, and carrying the products of combustion out through the opening 19 into the pipe 20, and thence to the conduits 21 and 22.

From the foregoing description the use and operation of my improved smoke-consuming furnace will be readily understood. The fuel to be consumed is to be delivered to the fire box through an opening 26, normally closed by a door 27. Below the fuel bed is an ash pan 28 communicating with an opening 29 closed by a door 30 through which the ash is removed from the furnace. The products of combustion as they leave the fire box 5, pass rearwardly over the bridge wall and thence upwardly and forwardly through the fire tubes of the boiler, and thence upwardly into the smoke flue 9. It will be assumed that the blower is in operation and that air or other suitable fluid under pressure is forced through the nozzle 14 and delivered into the short pipe 20. As this fluid leaves the free extremity of the nozzle 18, which is located directly opposite an opening 19 in the flue which is heretofore explained, a partial vacuum is produced whereby the products of combustion are drawn from the smoke flue and discharged into the pipe 20, whence they are carried downwardly through the conduit members 21 and 22, and through the passage 23, 24, and delivered into the fire box just above the fuel bed where they are again subjected to the heat of the fire box, and further opportunity given for the consumption of the combustible fuel elements contained therein. By virtue of this construction practically any desired portion of the products of combustion may be returned to the fire box, leaving only the non-combustible products to pass upwardly through the smoke flue and out at the top of the stack.

For the purpose of regulating the passage of the products of combustion upwardly through the flue 9, a damper 31 is employed, and this may be adjusted as circumstances may require.

Having thus described my invention, what I claim is:

1. The combination with a fire box and a source of compressed air, of a smoke flue or stack provided with a hood relatively large at the base where it is in communication with the source of compressed air, and extending upwardly across the stack, occupying an inclined position and terminating in front of an outlet opening with which the stack is provided, the said hood tapering from the base to its upper extremity, a short pipe leading from said outlet opening and occupying a horizontal position, and two downwardly extending conduits communicating with the said pipe at their upper extremities and with the fire box above the grate at their lower extremities, substantially as described.

2. The combination with a fire box and a blower, of a smoke flue or stack provided with a hood relatively large at the base where it is in communication with the blower, and extending upwardly across the stack, occupying an inclined position and terminating in front of an outlet opening in the stack, a space being left to allow the products of combustion to escape through the outlet opening, around the discharge extremity of the hood, the said hood tapering from its base to its upper extremity, and a downwardly extending conduit communicating at one extremity with the fire box, and at its opposite extremity with the outlet opening of the stack, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD BOERSIG.

Witnesses:
A. J. O'Brien,
P. J. Edwin Robinson.