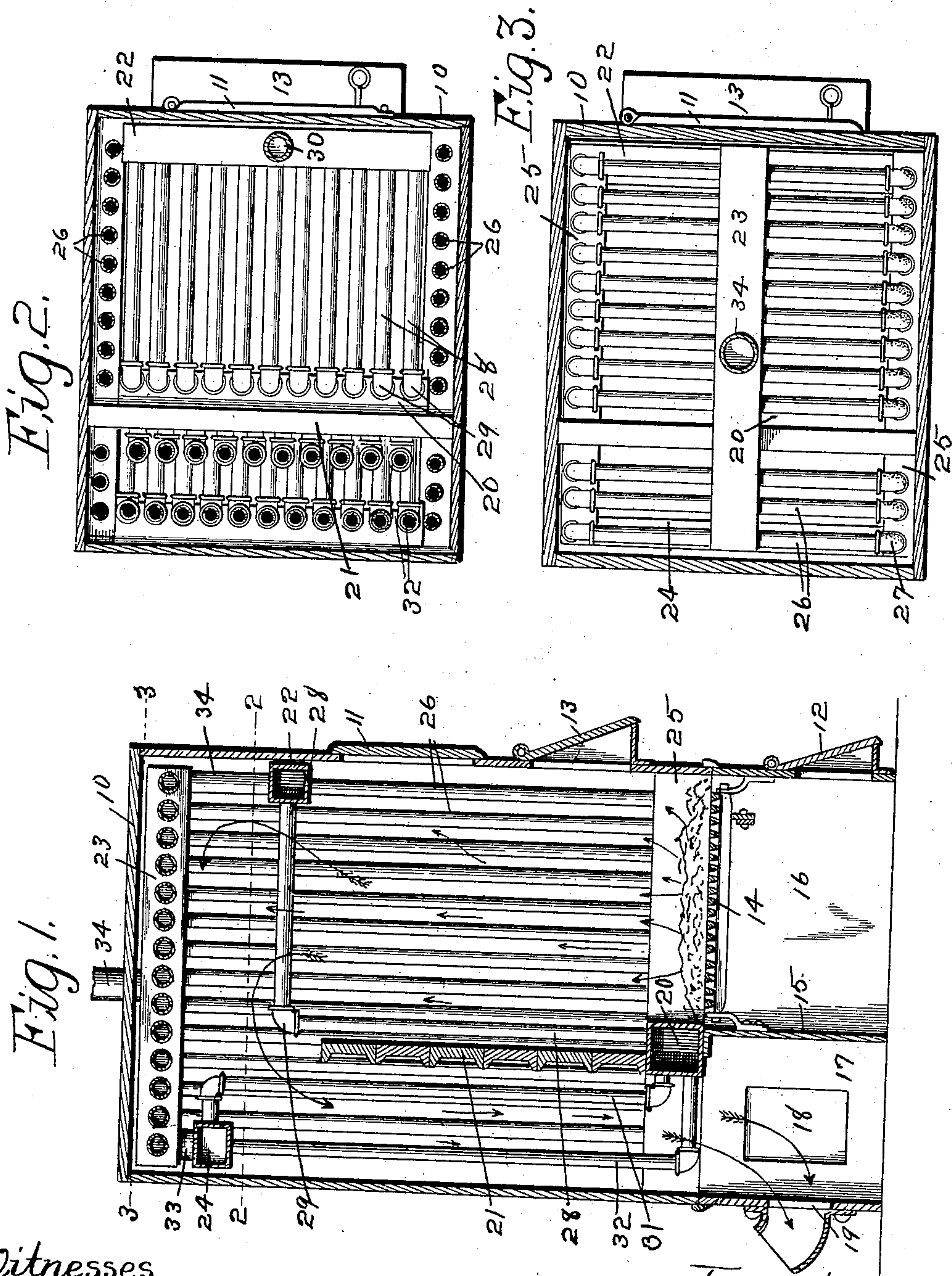


No. 885,950.

PATENTED APR. 28, 1908.

C. PHELPS.
SMOKE CONSUMING FURNACE.
APPLICATION FILED JAN. 22, 1907.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES PHELPS, OF OSKALOOSA, IOWA.

SMOKE-CONSUMING FURNACE.

No. 885,950.

Specification of Letters Patent.

Patented April 28, 1908.

Application filed January 22, 1907. Serial No. 353,424.

To all whom it may concern:

Be it known that I, CHARLES PHELPS, a citizen of the United States, residing at Oskaloosa, in the county of Mahaska and State of Iowa, have invented a certain new and useful Smoke-Consuming Furnace, of which the following is a specification.

The object of my invention is to provide a furnace of simple, durable and inexpensive construction, especially designed for use in connection with bituminous coal and designed to consume the smoke, soot and gases arising from the burning fuel before it passes to the flue.

A further object is to provide a furnace to heat water and so arranged that it will utilize the maximum amount of the heat from the fire and to utilize the water pipes for the purpose of commingling and mixing the air, smoke and gases arising from the fire in such manner as to cause them to ignite and burn before passing through the flue.

My invention consists in certain details of the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which,—

Figure 1 shows a central, vertical, sectional view of a furnace embodying my invention. Fig. 2 shows a horizontal, sectional view on the line 2—2 of Fig. 1, and Fig. 3 shows a like view on the line 3—3 of Fig. 1.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate the furnace casing provided at its front with the fuel door 11, an ash-pit door 12 and a door 13 directly above the grate to provide access to the grate. Arranged above the ash-pit is a grate 14 of ordinary construction extending from the furnace front rearwardly about two-thirds of the distance to the rear wall. A transverse partition 15 is provided extending from the rear of the grate downwardly and transversely of the furnace forming the ash-pit 16 and a dust pit or chamber 17 at the rear of said partition, a door 18 is provided through which access may be had to the dust pit. At the rear of the dust pit is the flue opening 19. Above the partition 15 is a water chamber 20 extending transversely of the furnace. Arranged at the rear of the fire box, on top of said water

chamber is a fire brick partition 21 extended across the furnace and upwardly to a point spaced apart from the top of the furnace. The chamber in front of said partition is the fire box, the chamber above the partition and in the rear of the partition is the mixing and combustion chamber. Extended transversely of the furnace directly in the rear of the furnace front and substantially in line with the top of the partition 20 is a water chamber 22. Extended longitudinally of the furnace at the central portion of its top is a water chamber 23 and extended across the rear of the furnace below the water chamber 23 is a water chamber 24. Two water chambers 25 extend from front to rear of the furnace in the same horizontal plane as the water chamber 20.

At each side of the interior of the furnace, I have provided a series of water pipes 26 with their lower ends connected to and communicating with the water chambers 25 and their upper portions provided with elbows 27 and extended inwardly and connected to and communicating with the water chamber 23.

In the back of the part designated as the fire box is a series of water pipes 28 connected to and communicating with the water chamber 20 extended upwardly in front of the partition 21 and provided with elbows 29 and extended horizontally to the water chamber 22 with which they communicate. This water chamber 22 is provided with a pipe 30 connecting to the water chamber 23 and providing communication between said chambers.

Attached to and communicating with the rear of the chamber 20 is a series of water pipes 31 extending upwardly adjacent to the rear of the wall 21 and communicating at their upper ends with the water chamber 24. A second set of pipes 32 is provided, with their lower ends connected to and communicating with the chamber 20 and their upright portions arranged adjacent to the rear furnace wall and their upper ends attached to and communicating with the water chamber 24. The space between and surrounding the pipes 31 and 32 forms the lower part of the combustion chamber and all of the products of combustion must pass through this space in close contact with said pipes before passing to the flue. A short pipe 33 connects the water chambers 23 and 24 and provides communication between them.

The hot water supply pipe 34 communicates with the central portion of the water chamber 23.

In practical operation and assuming that a fire is burning upon the grate 14 and that large quantities of smoke, soot and gases are arising therefrom, these products of combustion will pass upwardly through the fire box. When they strike the horizontal portions of the pipes 28, said pipes will serve as deflectors and cause the currents of smoke, gas and air arising from the fire to be thoroughly commingled. This commingling of the products of combustion and air is materially aided on account of the fact that the deflector tubes 28 are only a short distance from the top of the furnace and all of the products of combustion are turned to travel backwardly toward the rear of the furnace and then downwardly. It is well known that by thoroughly mixing smoke, gas and air when at the proper temperature, the products of combustion will ignite and burn. After being thus burned they will pass downwardly and out through the flue opening 19.

One of the important features of my invention is that the horizontal portions of the deflectors 28 are so positioned within the furnace that the area of the combustion chamber above them will be from about one-fifth to two-fifths of the area of the fire box. I have discovered that when a furnace is constructed having substantially the proportions referred to, the fire will burn readily and the smoke, gases and air passing through the grate will fill the fire box and be somewhat retarded therein before passing to the combustion chamber. Therefore, when these products of combustion pass out of the fire box they will be given an opportunity to expand and they will also be thoroughly mixed and commingled with each other. It is this commingling and mixing of the products of combustion occurring at the same time that they are expanding that puts them in proper condition for igniting and burning.

Another one of the important features of my invention is the relative arrangement of the water chambers and the water pipes. These are so arranged that they may be readily, quickly and easily assembled and are so disposed that they will utilize the heat arising from the fire and passing through the fire box and combustion chamber to the maximum amount. Furthermore they are so arranged as to produce a rapid circulation of water when subjected to the heat arising from a fire.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, therefore is—

1. In a furnace, the combination of a casing, a grate, two water chambers extended along the sides of the casing adjacent to the sides of the grate, a water chamber extended

across the furnace above the rear of the grate, and spaced apart from the rear of the casing, a fire wall above said latter water chamber extended upwardly and spaced apart from the top of the casing, a water chamber extended across the top of the casing at the rear upper corner thereof, a water chamber extending from the front to the rear of the casing near the top thereon, a series of pipes fixed to and communicating with each of the chambers at the sides of the grate, extended upwardly and then inwardly and fixed to and communicating with the chamber at the top of the casing, a series of pipes fixed to and communicating with the water chamber at the rear of the grate, extended upwardly adjacent to the rear of the fire wall, and then rearwardly and connected to and communicating with the water chamber at the rear upper corner of the casing, a second series of pipes fixed to and communicating with the rear of the water chamber in the rear of the grate, extended first horizontally to a point near the rear of the casing, and then upwardly and fixed to and communicating with the chamber at the rear upper corner of the casing, a pipe for providing communication between said water chambers at the top of the casing, and a water service pipe communicating with the water chamber at the top of the casing:

2. In a furnace, the combination of a casing, a grate, two water chambers extending along the sides of the casing adjacent to the sides of the grate, a water chamber extended across the casing at the rear of the grate and spaced apart from the rear of the casing, a fire wall on top of said chamber extended upwardly and spaced apart from the top of the casing, a water chamber at the front of the casing above the fire box, a water chamber extending from the front to the rear of the casing near the top thereof, a series of pipes fixed to and communicating with each of the chambers at the sides of the grate, and extended upwardly and then inwardly and fixed to and communicating with the chamber at the top of the casing, a series of pipes fixed to and communicating with the chamber at the rear of the grate, extended upwardly and then horizontally and fixed to and communicating with the chamber at the front of the casing, a pipe for providing communication between said water chamber at the front of the casing, and said water chamber at the top of the casing, and a water service pipe communicating with the chamber at the top of the casing.

3. In a furnace, the combination of a casing, a grate, two water chambers extending along the sides of the casing, adjacent to the sides of the grate, a water chamber extended across the furnace at the rear of the grate and spaced apart from the rear of the casing, a fire wall on top of said chamber extended

upwardly and spaced apart from the top of the casing, a water chamber at the front of the furnace above the fire box, a water chamber extended across the top of the casing at 5 the rear upper corner thereof, a water chamber extending from the front to the rear of the furnace near the top thereof, a series of pipes fixed to and communicating with each of the chambers at the side of the grate and 10 extended upwardly and then inwardly and fixed to and communicating with the chamber at the top of the furnace, a series of pipes fixed to and communicating with the chamber at the rear of the grate extended upwardly and then horizontally and fixed to 15 and communicating with the chamber at the front of the furnace, a pipe providing communication between said water chamber at the front of the furnace and said water chamber at the top of the furnace, a series of pipes 20 fixed to and communicating with the rear of

the water chamber at the rear of the grate extended upwardly adjacent to the rear of the fire wall and then rearwardly and connected to and communicating with the water 25 chamber at the rear upper corner of the furnace, a second series of pipes fixed to and communicating with the rear of the water chamber in the rear of the grate, extended first horizontally to a point near the rear of 30 the casing and then upwardly and fixed to and communicating with the chamber at the rear upper corner of the furnace, means for providing communication between said water chamber and the water chamber at the 35 top of the furnace and a water service pipe communicating with the water chamber at the top of the furnace.

CHARLES PHELPS.

Witnesses:

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ANNA PHELPS.