

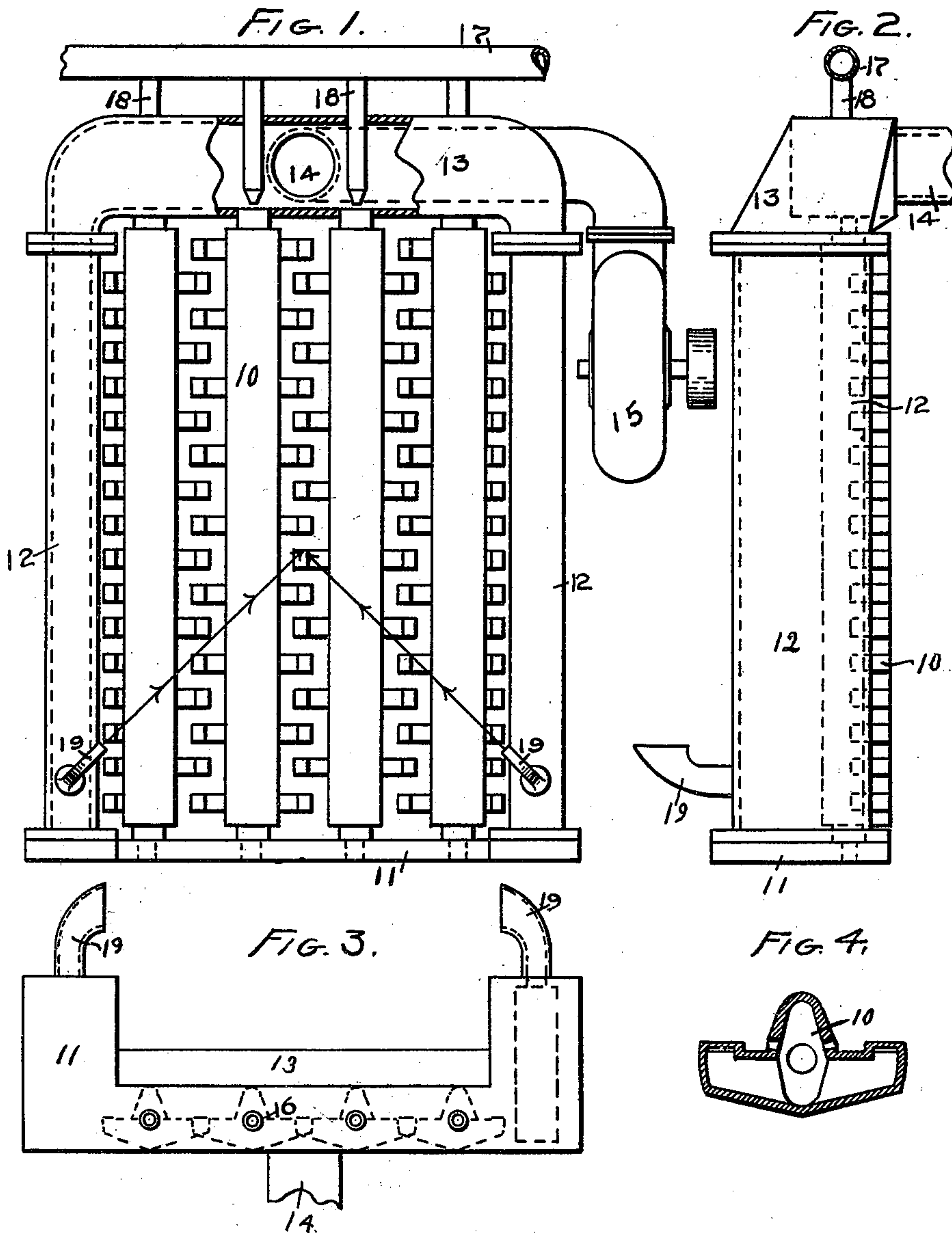
No. 652,923.

Patented July 3, 1900.

F. M. REED.
SMOKELESS FURNACE.

(Application filed Sept. 28, 1899.)

(No Model.)



WITNESSES:

G. H. Blaker.
M. C. Buck.

Franklin M. Reed. INVENTOR.

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UNITED STATES PATENT OFFICE.

FRANKLIN M. REED, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE REED SMOKELESS FURNACE COMPANY, OF SAME PLACE.

SMOKELESS FURNACE.

SPECIFICATION forming part of Letters Patent No. 652,923, dated July 3, 1900.

Application filed September 28, 1899. Serial No. 731,975. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN M. REED, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Smokeless Furnace; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

10 This invention relates to certain new features of construction intended to cause furnaces for boilers, &c., to completely consume the fuel placed in them, whereby they will not emit any smoke and also will economize fuel.
15 To that end I provide an air-box along the sides of the furnace-chamber that practically forms the side walls of said chamber. The air is forced into said air-box by a fan, and near the front end of the box on each side an
20 outlet-pipe is provided, with its outlet-opening so turned as to direct the air above the grate-bars and fuel toward the rear in line with the natural direction of the current of the air and gases in the furnace-chamber.
25 The air thus forced into the furnace-chamber has been superheated while in the air-box on the side walls of the furnace-chamber because of its proximity to the heat. The superheated air is thus introduced into the furnace-
30 chamber at the point where the smoke and unconsumed gases usually exist and take their departure from the body of the fuel, and by reason of the commingling with said smoke and gases of the superheated air they are immediately rendered combustible and are consumed, thus adding greatly to the heat produced by the furnace and preventing the issue of smoke from the smoke-stack.

Another feature consists in combining with
40 the foregoing feature hollow perforated grate-bars, with their open ends extending into a continuation of the air-box across behind the grate-bars, and steam-injectors extending into said air-box at the rear, so placed as to force
45 steam and draw air from the air-box into the hollow grate-bars. This causes the combination of steam and air to enter the grate-bars from the rear and move toward the front and issuing therefrom to join with the volume of
50 superheated air that is forced from the front toward the rear above the grate-bars, as above described.

The full nature of my invention will appear from the accompanying drawings and the description following of one form of device embodying my said invention, and the scope of said invention will be understood from the claims following said description.

In the drawings, Figure 1 represents a plan of a furnace-chamber, showing the grate-bars, front and side portions, and other parts partly broken away. Fig. 2 is a side elevation of what is shown in Fig. 1, omitting the fan. Fig. 3 is a front elevation of what is shown in Fig. 1. Fig. 4 is a cross-section of one of the grate-bars.

The connection of the parts herein shown with the furnace is not illustrated, because there is nothing peculiar in it and it will be understood by all those skilled in the art.

Supposing the walls of the furnace to be built of brick or other suitable material, as usual, the parts shown in Figs. 1, 2, and 3 are placed therein to form the furnace-chamber and ash-pit. They are the hollow perforated grate-bars 10, the front plate 11, the side extensions of the air-box 12, and the rear portion of the air-box 13. The chambers 12 and 13 are connected, forming practically one air-box, with an inlet about midway of the bottom of the rear portion 13 through the pipe 14. Said pipe 14 leads from the blast-fan 15, driven by any suitable means. The hollow perforated grate-bars 10 are mounted at their rear ends in the front side of the air-box 13 and at their front ends in the front plate 11. They are closed at their front ends, as seen at 16 in Fig. 3.

17 is a pipe supplied with steam from the boiler by any suitable means, (not shown,) with injector-pipes 18 extending into the air-box 13 and almost to the rear end of the grate-bars for injecting steam into said grate-bars. Sufficient space is left about the nozzle of said injector-pipes to cause the injected steam to draw in air from the air-box 13. The steam and air combined that enter the grate-bars is forced out through the perforations in the grate-bars by the force of the steam and mixed with the fuel immediately above the grate-bars.

A large portion of the air that is forced into the air-box 13 passes into the air-boxes 12 on each side. These extend up consider-

ably higher than the grate-bars on the side of the furnace-chamber, as is seen in Fig. 3, so that the air in the boxes is considerably heated before it issues therefrom. The outlet-pipes 19 are located at the front end of the air-boxes and are curved, as shown in Fig. 3, with their outlet-opening extending rearward at an angle to the air-boxes 12 and grate-bars, substantially as shown in Fig. 1. The angle there is about forty-five degrees. By reason of this the heated air expelled from the air-box moves in line with the direction of the current above the grate-bars and strikes the body of unconsumed smoke and gas in the furnace-chamber.

It is noted that the steam combined with the cool air is heated before it issues from the grate-bars and moves through the grate-bars from the rear toward the front, while the air superheated in the side air-boxes and which is introduced above the grate-bars is driven from the front toward the rear and therefore does not retard the blast, but aids it materially. By reason of the introduction of the elements necessary to make the smoke combustible at the point where it is formed and before it escapes it is at once totally consumed and all the heat units of which the fuel is capable are obtained.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a furnace, a series of hollow perforated grate-bars open at their rear ends, an

air-box in which the rear ends of said grate-bars are mounted and which extend beside the series of grate-bars and higher than the same, means for forcing air into said air box or chamber, outlet-pipes from the side extensions of said air box or chamber that direct the air therefrom above the grate-bars, and steam-injector pipes extending into the air-box close to the open ends of the grate-bars for driving steam and air therein.

2. In a furnace, a series of hollow perforated grate-bars open at their ends, an air box or chamber in which the rear ends of said grate-bars extend that is provided with extensions beside the series of grate-bars and higher than the same and to the front end thereof, means for forcing air into said air box or chamber, outlet-pipes at the front end of the side extensions of the air box or chamber so turned as to direct the air issuing therefrom above the grate-bars and toward the rear, and steam-injector pipes leading from the rear into the air box or chamber to the open end of the grate-bars whereby steam and air are driven therein forward.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

FRANKLIN M. REED.

Witnesses:

V. H. LOCKWOOD,
M. C. BUCK.