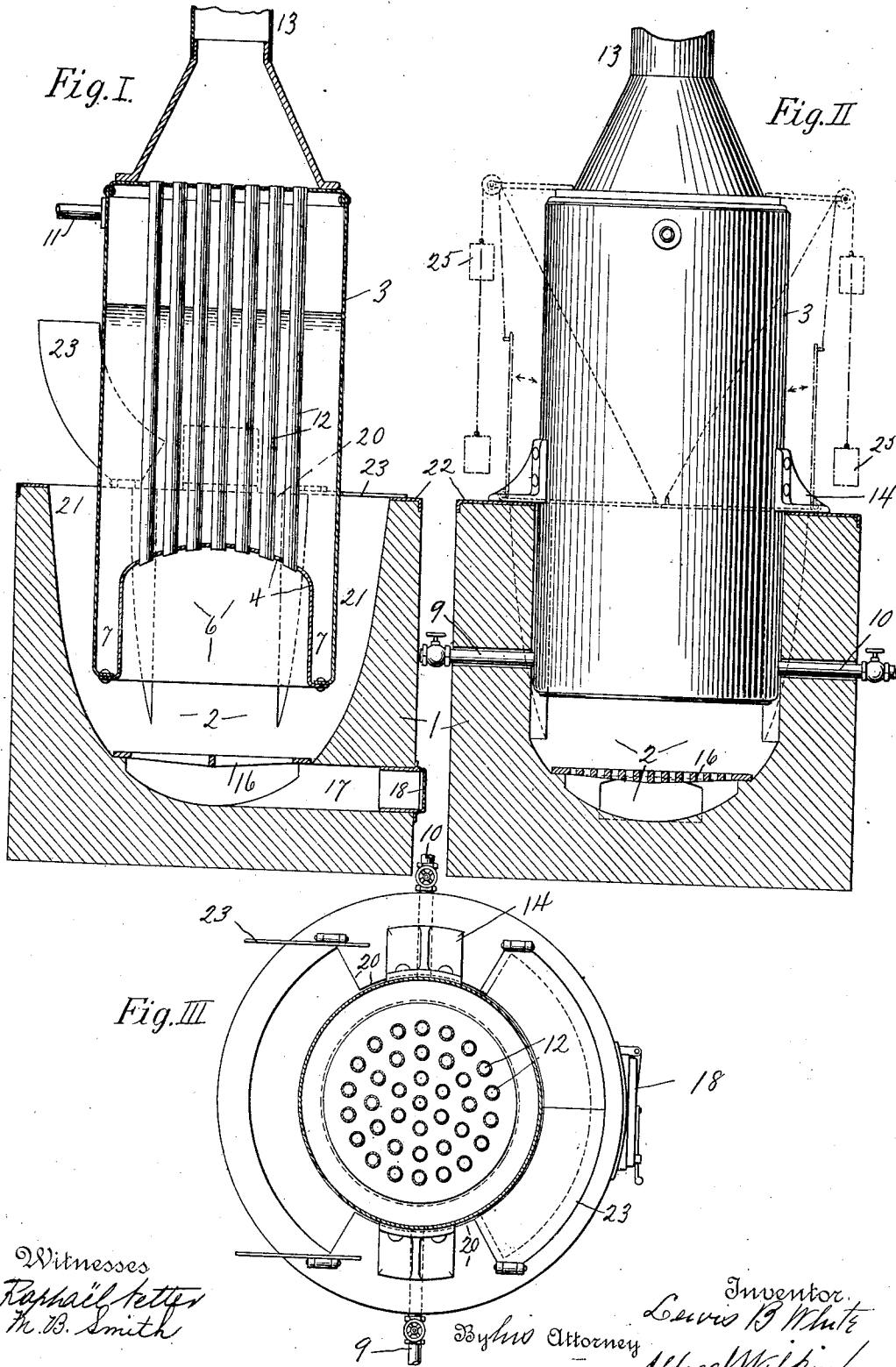


No. 829,450.

PATENTED AUG. 28, 1906.

L. B. WHITE.
FURNACE.

APPLICATION FILED JAN. 9, 1906.



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FURNACE.

No. 829,450.

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To all whom it may concern:

Be it known that I, LEWIS BOYD WHITE, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Furnaces; and I do hereby 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.

My invention relates to furnaces; and it consists in a new form of downdraft-furnace particularly adapted for house-heating in which practically perfect combustion and consumption of the smoke is effected and a high degree of heat generated in proportion to the fuel consumed.

The important features of my invention are the fuel-receptacle in the form of an enlarged pocket, which may desirably be circular. In this receptacle is arranged an upright boiler having a concave lower end surrounded by a water-leg. This boiler set down in the receptacle is there supported in any suitable manner, so as to leave an open space surrounding it, more or less, through which the fuel is supplied from the top.

I have shown a practical and desirable embodiment of my invention in the drawings herewith, in which the reference-numerals of the specification indicate the corresponding parts in all the figures.

Figure I is a vertical section of my invention. Fig. II is at a right angle thereto, showing the boiler in elevation. Fig. III is a horizontal cross-section.

In the drawings, 1 indicates the fuel receptacle or pocket of suitable construction and material, desirably built up, as here shown, of fire-brick or of brickwork with a fire-brick lining, to resist the intense heat generated and forming the coal or lower combustion chamber 2.

In the pocket is set substantially centrally the upright boiler 3, whose lower crown-sheet 4 is curved or domed, forming in the base of the boiler the gas or upper combustion chamber 6, surrounded by water-leg 7.

9 is the inlet-pipe from the injector; 10, the draw-off pipe; 11, one or more steam-pipes from the steam-space; 12, the usual tubes, and 13 the smoke-stack.

The boiler may be supported in any suitable way—for instance, by angle-irons 14, bolted to the sides of the boiler and resting on the ledge. The water-space should extend to the extreme edge of the water-leg without protruding metallic edges, which would be destroyed by the intense heat.

The grate 16 is not essential to the operativeness of my furnace, but may be used to separate the fine ashes, which are raked out through the opening 17, closed by door 18. There will be the minimum of ash.

The boiler is set substantially centrally in the receptacle to leave an annular space around it, into which the coal is fed from the top and through which the downdraft passes. It is not necessary to leave an opening entirely around the boiler, for this may be closed, more or less, as here shown, by two abutments or piers 20, which may be built up, fitting the sides of the boiler to hold it in position and afford ledges for its support. Between the abutments are the fuel and draft spaces 21.

As here shown, the upper edge of the pocket is finished and reinforced by a metallic plate 22, on which are hinged or otherwise mounted the dampers 23, adapted to close, more or less, the draft-spaces 21 to regulate the supply of air. Counterpoise-weights 25 or other means are provided to maintain dampers in position. When fuel is supplied, these dampers are of course opened and swung back.

By this simple combination of a boiler having a gas-combustion chamber formed in its base and of the fuel-pocket, I have produced a simple and economical furnace useful for any purpose where heat or power is desired, but on account of its simplicity, compactness, and efficiency particularly adapted to be made in smaller sizes and set up in houses or other buildings for heating purposes, though it may be made of any convenient size, large or small, for heating or power.

While the coal around the water-leg and the sides of the boiler generally burns up toward the top, more or less, yet it will be burning below much more intensely and at the top comparatively cool, so that the air passes down from the top openings through the coal from the coldest to the hottest part

of the furnace while the gases are being progressively generated and gradually heated, until intimately mixed together and gradually raised to a high degree of temperature
 5 the air and the gases are delivered into the upper or gas-combustion chamber, where the heat is the highest and most of the combustion takes place. This chamber within the water-leg is open and unclogged with
 10 coal or ashes, so that a high and uniform heat is therein maintained, and the smoke and all the combustible gases are there consumed without waste and with a high efficiency of fuel. As the supply of air is controllable,
 15 the speed of generation of gases and the proportion between the air and the gases may be regulated and the fuel burned under uniform conditions. The gases are consumed and the most intense heat generated
 20 in close contact with a large water-surface and immediately at the lower ends of the tubes, so that the heat is immediately applied to heating the water with great efficiency.
 25 My furnace is particularly adapted for soft coal or other of the cheaper fuels, but may successfully be used with hard coal or with any fuel.

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

1. In a downdraft-furnace, the combination with a fuel-receptacle, having an open top, and a closed lower portion to form an
 35 outer combustion-chamber, of a vertical boiler supported in the fuel-receptacle, said boiler being formed with an inner combustion-chamber in its lower end communicating with the outer combustion-chamber
 40 through an opening or openings in the bottom of the boiler, and said boiler being of smaller

diameter than the fuel-receptacle, whereby a downdraft and fuel-feed space is left around the boiler, communicating with the outer chamber.

2. In a downdraft-furnace in which the feed is fed down through the draft-spaces, the combination with a fuel-receptacle of refractory material, having an open top and a closed lower portion forming an outer
 50 combustion-chamber, of a metallic shell set down in the receptacle and leaving fuel and air spaces between the sides of the shell and the walls of the receptacle, an inner combustion-chamber below the tubes in the lower
 55 end of the shell communicating with the outer combustion-chamber through the bottom of the shell, a water-space in the shell around the inner chamber, pipes to supply water to the water-space and pipes to receive
 60 steam therefrom.

3. In a furnace, the combination with a fuel-receptacle of refractory material inclosing a circular pocket, of a circular, upright boiler set down in the pocket, said boiler having vertical tubes and an inner combustion-chamber in its lower end surrounded by a water-leg, and being of smaller diameter than the pocket to leave fuel and downdraft
 65 spaces entirely around the sides of the boiler and the water-leg communicating with an outer combustion-chamber in the bottom of the pocket, abutments in the receptacle to engage with the sides of the boiler, and movable dampers to regulate the draft.

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

LEWIS BOYD WHITE.

Witnesses:

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