(No Model.) 2 Sheets—Sheet 1.

W. KENT.

FURNACE.

No. 320,563. Patented June 23, 1885.

Fig 1

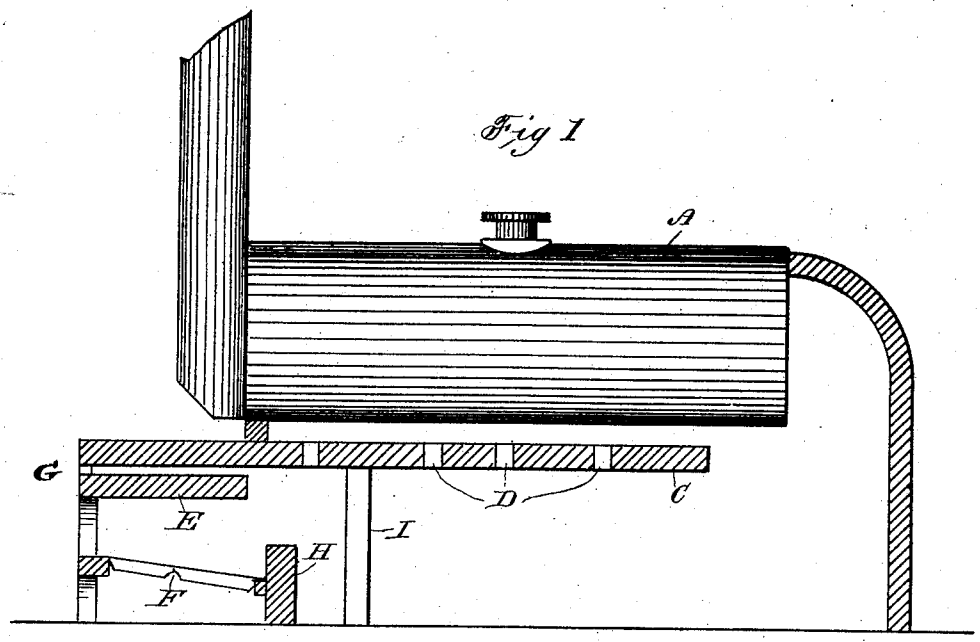


Fig 2

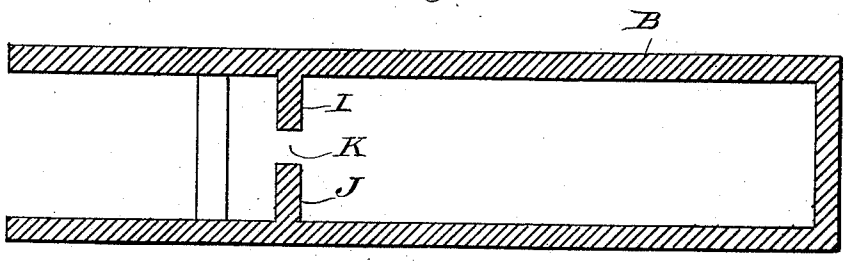
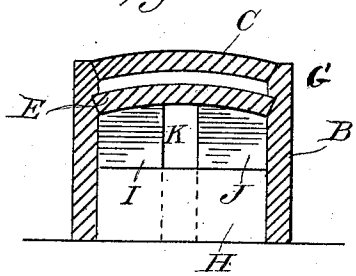


Fig 3



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(No Model.) 2 Sheets—Sheet 2.

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Fig 4

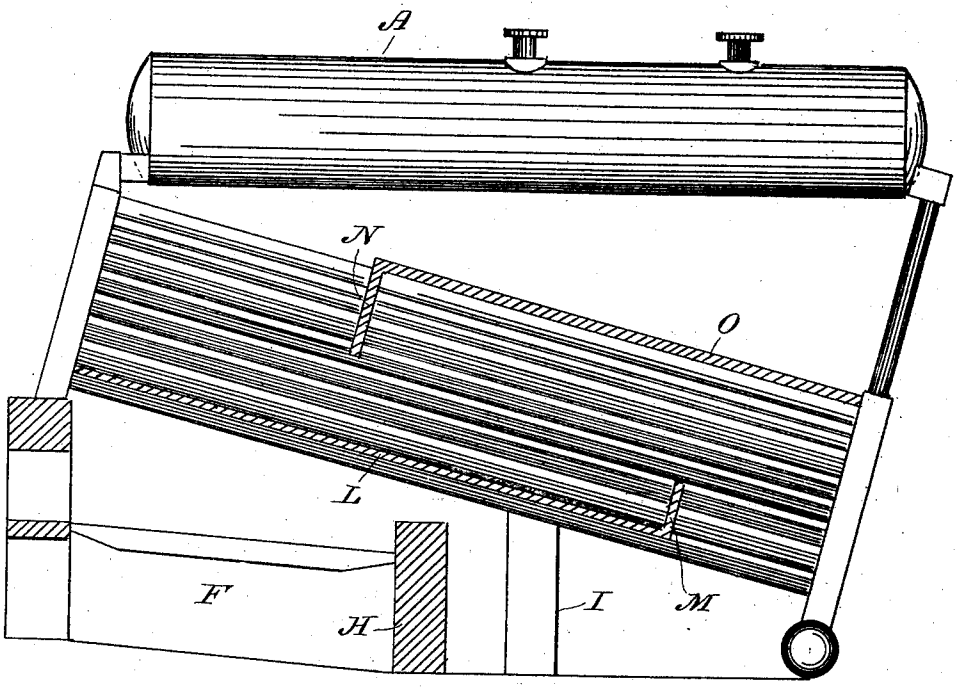
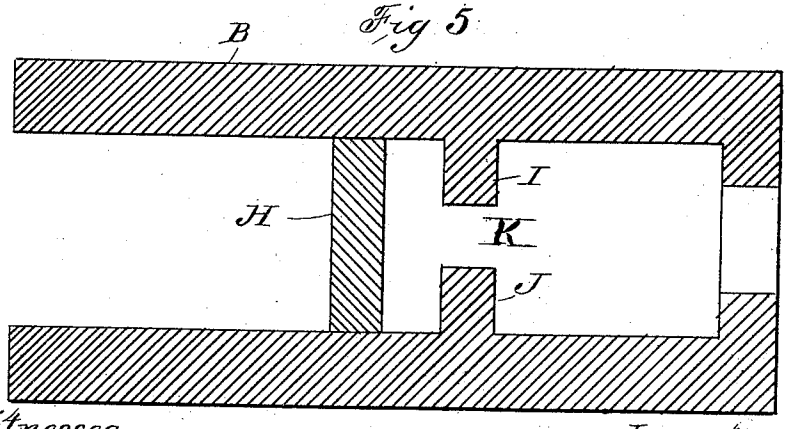


Fig 5



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UNITED STATES PATENT OFFICE.

WILLIAM KENT, OF JERSEY CITY, NEW JERSEY.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 320,563, dated June 23, 1885.

Application filed August 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KENT, 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 certain new and useful improvements in furnaces and the method of setting steam-boilers; but more especially to those furnaces which use bituminous coal, lignite, peat, wood, or other fuel which contains large quantities of tarry or gaseous matter, and in burning distils a large amount of combustible gas, and has for its object to so construct and arrange the furnace that all of said gases will be consumed and the heat generated thereby utilized to the best advantage in the generation of steam; and with these ends in view my invention consists in the details of construction and combination of elements hereinafter fully and in detail explained, and then specifically designated by the claims.

In order that those skilled in the art to which my invention appertains may more fully understand its construction and adaptation, I will proceed to describe the same in detail, referring by letter to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical section of my furnace as applied to an ordinary return tubular boiler, the latter being in elevation; Fig. 2, a ground plan; Fig. 3, a cross-section; Fig. 4, a section of my furnace as applied to a Babcock and Wilcox or other water-tube boiler, and Fig. 5 a ground plan of the same.

Similar letters denote like parts in the several figures of the drawings.

Referring to Figs. 1, 2, and 3, which show my improved furnace in connection with a return tubular boiler, A is the boiler, which is surrounded by a wall, B, of brick or other non-conducting material.

C is a roof of fire-brick, which extends just below the boiler nearly its entire length, and which has perforations D, forming communication between the lower chamber of the furnace and the space next the boiler.

E is a roof of fire-brick extending over the fire-box, and against which the direct rays of heat are projected from the fire-bed on the grate F.

G is a passage formed by the roofs C and E, by which direct communication is formed between the outer atmosphere and the furnace. The capacity of this passage may be regulated by any suitable sliding gate. It will be understood that air passing through said passage will be heated before it reaches and mingles with the gases of combustion.

H is the bridge-wall, which is made just high enough to prevent any coal being accidentally thrown over it.

I J are flame-walls extending from the bottom of the furnace to the roof C, and forming a passage, K, equal to one-sixth of the grate-surface. Instead of these walls a single wall may be used having a sufficient opening.

In boilers as now set, especially those which have a large amount of heating-surface in proximity to the grate, a large quantity of the gases distilled from the fuel becomes chilled below the temperature of ignition by contact with the surfaces to be heated, and therefore pass off unconsumed, entailing a great waste as well as annoyance in choking the tubes and chimney. To avoid this waste and annoyance, it is necessary to insure the perfect ignition of the gases before they are allowed to touch the heating-surfaces of the boiler. This may be accomplished by igniting all the gases inside the combustion-chamber and giving them a long distance to travel, requiring some length of time for such travel, and this is accomplished by my invention, the operation of which is as follows:

In Figs. 1, 2, and 3 the furnace proper, with its grate-bars, is set some distance in front of the boiler, and is covered by the two fire-brick roofs C E. The gases rising from the fire-bed, together with the air which passes through the grate-bars and that which is admitted through the passage G between the roofs C E, after passing over the bridge-wall H, meets an obstruction in the flame-walls I J, and are compelled to change their direction in the com-

bustion-chamber and pass through the narrow vertical passage K between the flame-walls. After passing through this passage they are still prevented from reaching the boiler by the inner extension of roof C. By thus causing the gases to travel a circuitous route through the chambers surrounded with fire-brick they are thoroughly burned, and are in proper condition to give up all their heat of combustion to the water in the boiler.

The perforations D serve to insure the heating of that portion of the boiler just above the roof C by allowing a portion of the gases to pass through to said boiler.

Figs. 4 and 5 show a modification of my improvement as applied to water-tube boilers, and it differs from the above-described construction in that the fire-box is placed directly under the front end of the boiler, the gases of combustion being kept from immediate contact with the heating-surfaces by means of a layer of fire-brick, L, which forms a roof for the furnace, and compels the gases to pass over the bridge-wall H, through the passage K, and around the baffle-plate M, which projects up at right angles from the roof L, and from thence in the direction of the arrows around the baffle-plate M, projecting down at right angles from the upper layer of fire-brick O, which is supported by the upper row of tubes, and, finally, under the water-drum to the chimney.

Having thus described my invention, what I claim as new and useful is—

1. The combustion-chamber in the rear of the furnace, covered by the roof C, in combination with the flame-walls I J, placed in said combustion-chamber, substantially as shown and described.

2. In a water-tube steam-boiler setting, the combination of the roof C of the furnace, extending from the front to a point beyond the bridge-wall, the low bridge-wall H, and the flame-walls I J, substantially as shown and specified.

3. In a water-tube steam-boiler, the arrangement of the roofs L and O and the baffle-plates M and N, so as to cause the products of combustion to travel under nearly the whole length of the boiler before entering the nest of tubes, as shown and specified.

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

WILLIAM KENT.

Witnesses:
ALBERT P. MORIARTY,
ISAAC SIMONSON.