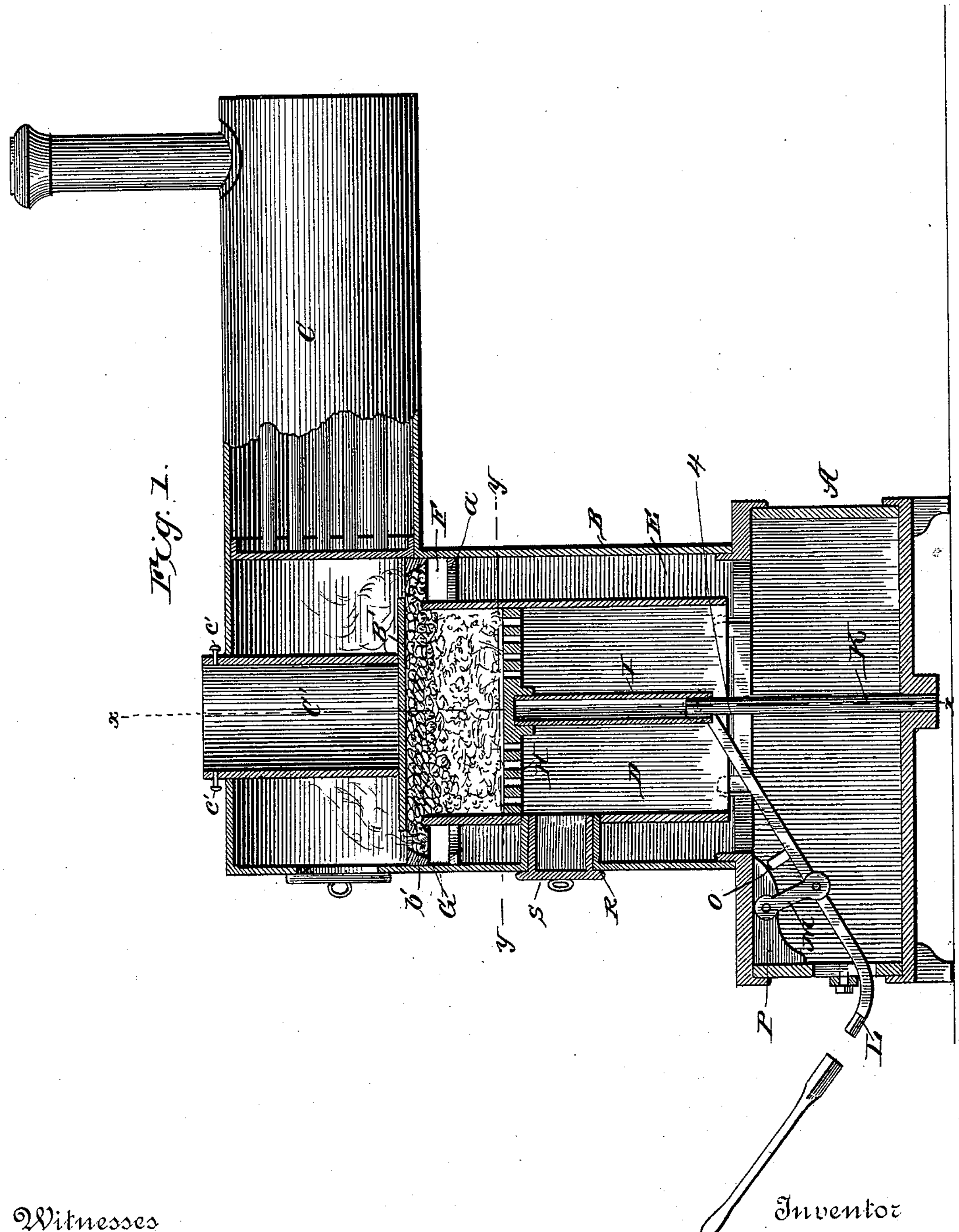
(No Model.)

3 Sheets—Sheet 1.

E. FALES.

FURNACE FOR STEAM ENGINES AND OTHER PURPOSES.

No. 342,590. Patented May 25, 1886.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

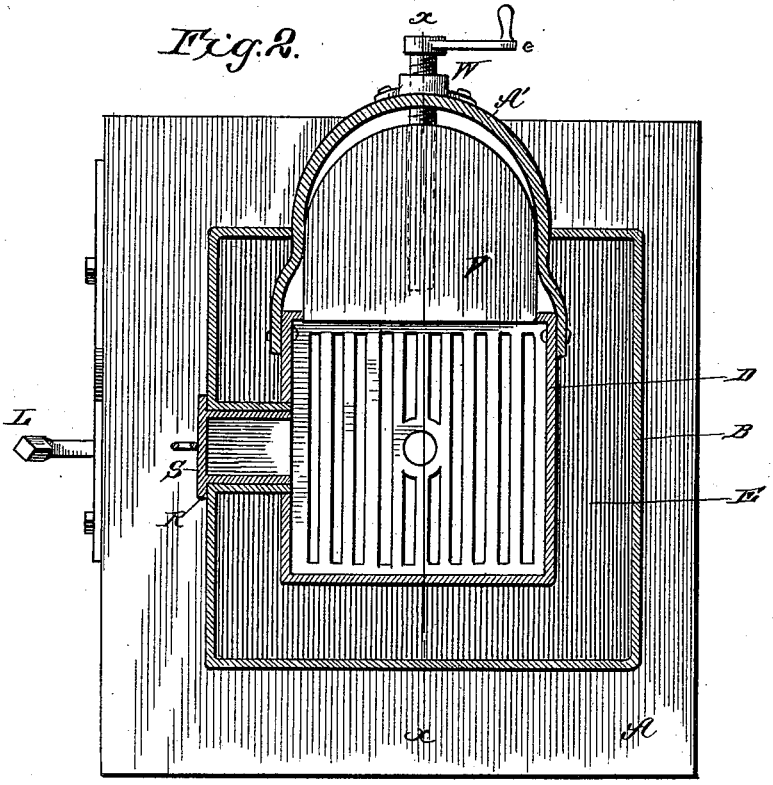
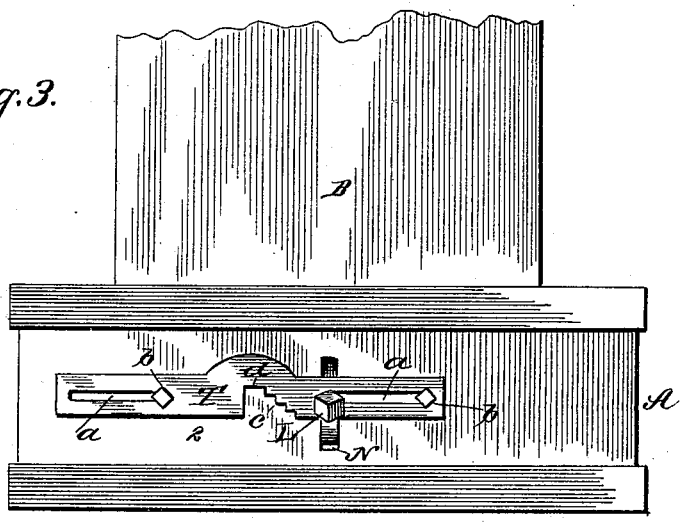


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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FURNACE FOR STEAM ENGINES AND OTHER PURPOSES.

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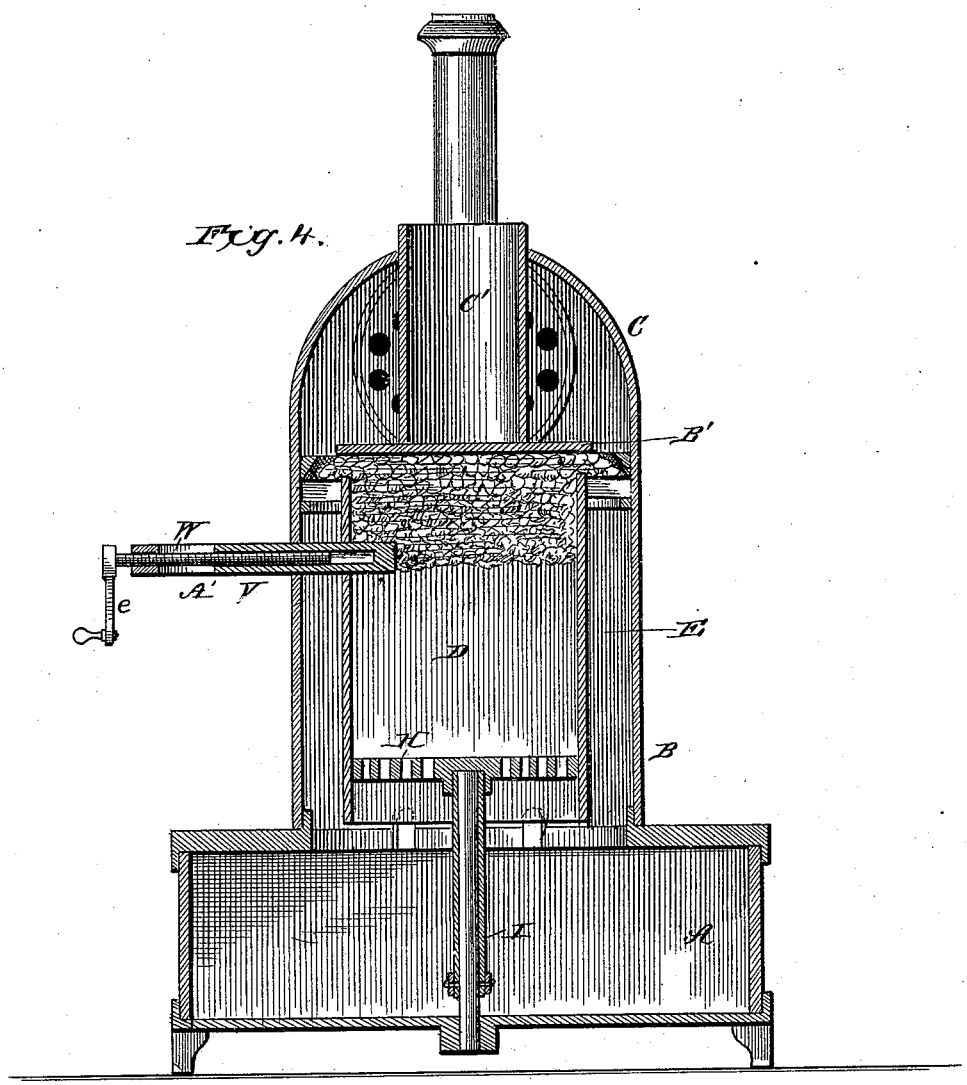
Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWARD FALES, OF CHICAGO, ILLINOIS.

FURNACE FOR STEAM-ENGINES AND OTHER PURPOSES.

SPECIFICATION forming part of Letters Patent No. 342,590, dated May 25, 1886.

Application filed April 20, 1886. Serial No. 199,505. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FALES, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Furnaces for Steam-Engines and other Purposes, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in smoke-consuming furnaces for steam-engines and other purposes.

My invention consists in certain details of construction and method of operation, which are designed as improvements on the furnace described and claimed in an application filed by me September 28, 1885, Serial No. 178,418.

In the application above referred to the fire pot or chamber is provided with radial arms which serve as grate-bars, and on which the live coals are supported. The air for supporting and effecting a complete combustion of the smoke and gases passes up through the outside grate-bars and through the bed of live coals, thus heating it to the proper temperature before it comes in contact with the gases. The same features are embraced in this application, and the parts will be simply referred to by letters, the novel features or improvements only forming the basis of claims.

Referring to the drawings, Figure 1 is a vertical sectional view of the furnace as applied to a steam-boiler. Fig. 2 is a top or plan view of the feeding device, with the bottom or hearth of the furnace on the line *y y*, Fig. 1. Fig. 3 is a front view of the adjustable slide for holding the operating-lever. Fig. 4 is a sectional view of the furnace on the lines *x x*, Figs. 1 and 2.

A indicates the base, on which are mounted the chamber B and the boiler C. The base A may be made of any suitable form or size, and the chamber B may be round, square, or of any suitable or desirable construction.

D is the fuel-chamber, made somewhat smaller than the chamber B, so as to leave an air-space, E, between the two walls of the chambers. Near the upper end of the cylinder or chamber D are radial arms F, which serve as grate-bars, and on which the live coals rest, the upper end of the cylinder D being raised a short distance above these bars, so as to leave a chamber, G, for the reception of the live coals, through which the air passes from the air-space E, and is heated prior to being mingled with the gases from the main body of the fuel.

A′ is a flange or ring secured to the inner wall of the chamber B, on which the radial arms or grate-bars of the chamber D rest, and holds the same in position.

b′ is a flange or ring secured to the inner walls of the chamber B, above the radial arms or bars F, the function of which is twofold—first, to deflect the hot air from the walls of the combustion-chamber toward the center of said chamber, so as to mingle it with the gases and insure perfect combustion, and, second, to hold the chamber in position and prevent it from being displaced when the charge of coal is being raised in the same.

The chamber D is provided with a plunger or moving bottom, H, said plunger being provided with apertures through which a certain amount of air passes to support combustion. To the under side of the plunger is rigidly secured a tube, I, which is adapted to slide over the bar K, said bar K being rigidly secured to the base A and adapted to guide the plunger in its upward and downward movement, so that said plunger will not impinge on the sides of the chamber D.

L is an operating-lever pivoted to the lower end of the bar M, the upper end of said bar being pivoted to any desired or convenient point in the base A. The inner end of the lever L is bifurcated and pivotally secured to the lower end of the tube I, so that when the outer end of the lever is depressed the plunger will be raised to the position shown in Fig. 1. The outer end of the lever L is made square, so as to receive the square socket of a suitable handle, by which the leverage is increased and the lever operated.

The lever L works in a slot, N, in the base A, and is provided with a lug, O, which impinges against the bracket P, secured in the base A, and which supports the lever, said lug serving as a stop to prevent the inner end of the lever from being raised too high. T is a bar of metal provided with slots *a*, adapted to receive the bolts *b*, on which said bar is free to slide back and forth over the opening N. The bar or slide T is provided with a series of notches or offsets, *c*, adapted to receive the handle L, so that when the notches are moved

over the slot N, and the lever permitted to impinge against any one of the notches, the plunger or movable grate H will be held at any desirable point in the chamber, and when it is desired to lower the grate or plunger to the bottom of the chamber D the slide T is moved over, so that the handle will enter the lowest notch, *d*, in the slide T.

R is an opening formed in the walls of the chambers B and D, through which the fuel is fed onto the plunger H, said opening being closed by a suitable door, S.

V is a slide adapted to be moved back and forth in an opening in the walls of the chambers B D by means of the screw W, said screw being seated in the bracket A′, secured to the walls of the chamber D or B, and provided with a suitable handle, *e*, by which it is operated. The office or function of this slide is to hold the body of the fire and unburned coal in the top of the chamber D until the plunger is lowered and a fresh charge of coal placed thereon and raised up so as to come in contact with the fuel in the top of the chamber D. When the screw W is turned, it presses the coal against the opposite wall of the chamber D, and holds the same by compression or impingement, as shown in Fig. 4. This is an important feature of my invention, as by this method the supply of air for supporting combustion is not cut off, as would be the case if the slide extended clear across the chamber D.

The operation of this portion of my invention is as follows: When it is desired to furnish the furnace with fresh fuel, the slide V is forced in a short distance, as shown in Fig. 4, until this portion of the fuel is compressed against the side of the chamber D with sufficient force to hold the body of fire and coal in the upper part of the chamber. The plunger or movable grate H is then lowered to the position shown in Fig. 4, and the fresh coal placed on the top thereof. After the desired quantity of fuel has been placed on the plunger, the lever L is operated to raise the plunger to the position shown in Fig. 1, and the slide T moved over, so as to engage the lever L and hold it any desired point. When the plunger or movable grate has been raised, the slide V is moved back, and the main body of the fire, with the fresh supply of fuel, is held by the plunger or movable bottom H.

B′ is a plate adapted to rest in the top of the bed of the incandescent or live coals in the furnace, to the upper side of which is secured the pipe C′, which projects beyond or outside of the combustion-chamber. The object of this plate is to prevent the too rapid burning of the coal, and to divert the gases from the center of the fire toward the sides of the furnace, where they meet with the hot air coming up through the space E and through the live coals on the outside grate-bars, as before indicated. The pipe C′ is for the purpose of conveying the heat of conduction through the plate B′ and the walls of the pipe C′ to the apartment in which the furnace is located; or other pipes may be attached to the pipe C′, and the heat conducted to adjacent rooms.

As just intimated, the plate B′ rests on the top of the fire-bed, and can be raised or lowered therefrom by means of the pins or lugs *c*′, secured to the pipe C′.

Instead of having the pipe secured to the plate B′, as described, I may simply attach thereto a solid rod, so that the plate can be raised off of the fire when it is desired to revive the same; but when it is desired to reduce the intensity of the flame the plate is lowered and allowed to rest on top of the fire. This plate, when used with the fire pot or chamber described, will have a tendency to reduce the intensity of the fire, but will not smother it, for the reason that the gas generated in the main body of the fire-pot will find its way out around the edges of the plate and mingle with the hot air coming up through the outer grate, and in this way effect a great saving of fuel.

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

1. In a smoke-consuming furnace, the fire pot or chamber provided with the outer grate-bars, as described, in combination with the adjustable plate B′, as and for the purpose set forth.

2. In a smoke-consuming furnace of the character described, the movable grate bottom or plunger H, provided with the tube I, adapted to slide over the standard K, in combination with the lever L, whereby the plunger is raised and lowered and guided in its movements, as set forth.

3. In a furnace of the character described, the plunger or grate bottom adapted to be raised and lowered in the fuel-chamber by means of a suitable lever, in combination with a graduated slide, substantially as described, for holding the plunger at any desired height in the fuel-chamber, as set forth.

4. A furnace for steam-engines and other purposes, in which the fuel is fed from the bottom, the method herein described of holding the live coals in position while the plunger or grate bottom is being lowered for a fresh charge of fuel, the same consisting in compressing or impinging the lower portion of the coals or fire-bed against the side of the fuel-chamber, as set forth.

5. In a furnace of the character described, the slide V, adapted to enter the side of the chamber D, in combination with the bracket A′ and screw W, whereby the bed of live coals is held in the upper part of the chamber D by compression or impingement on the side of the chamber while the grate bottom is being lowered for a fresh charge of coal, as set forth.

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

Witnesses: EDWARD FALES.

L. W. SINSABAUGH,

N. D. ADAMS.