

(No Model.)

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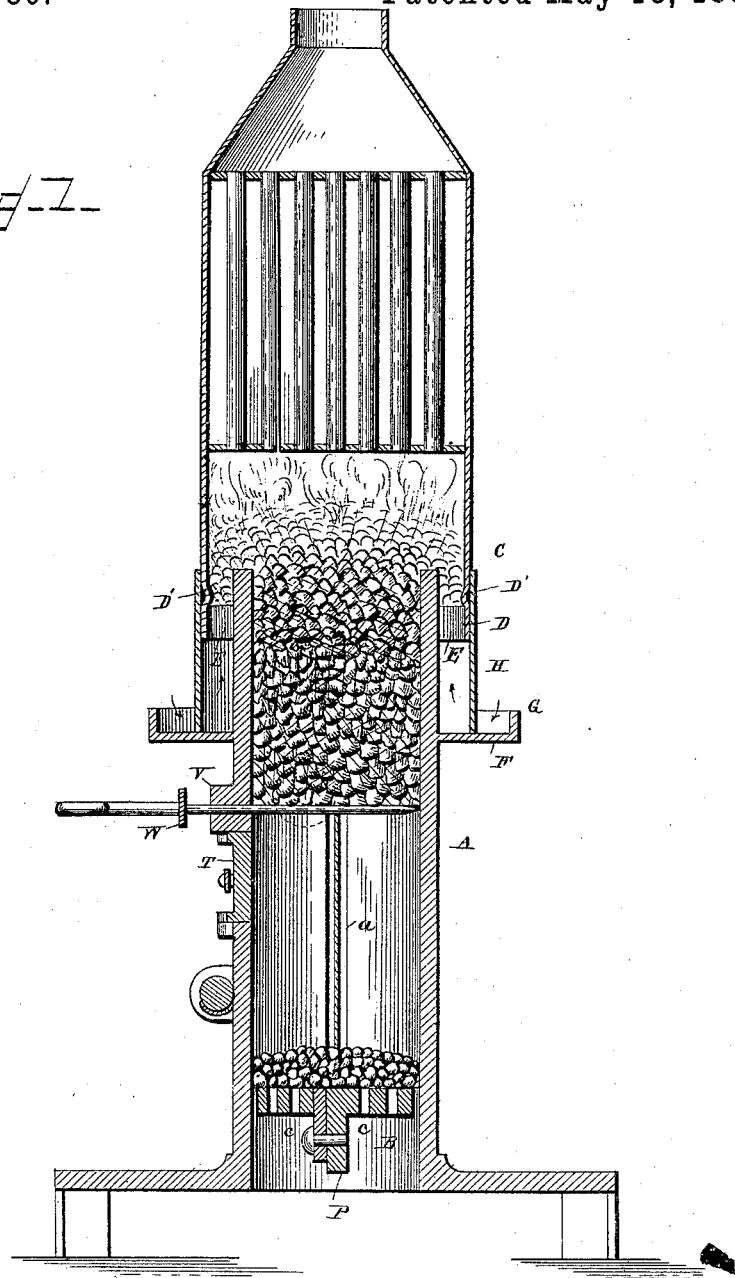
E. FALES.

SMOKE CONSUMING FURNACE.

No. 342,080.

Patented May 18, 1886.

Fig. 1.



WITNESSES

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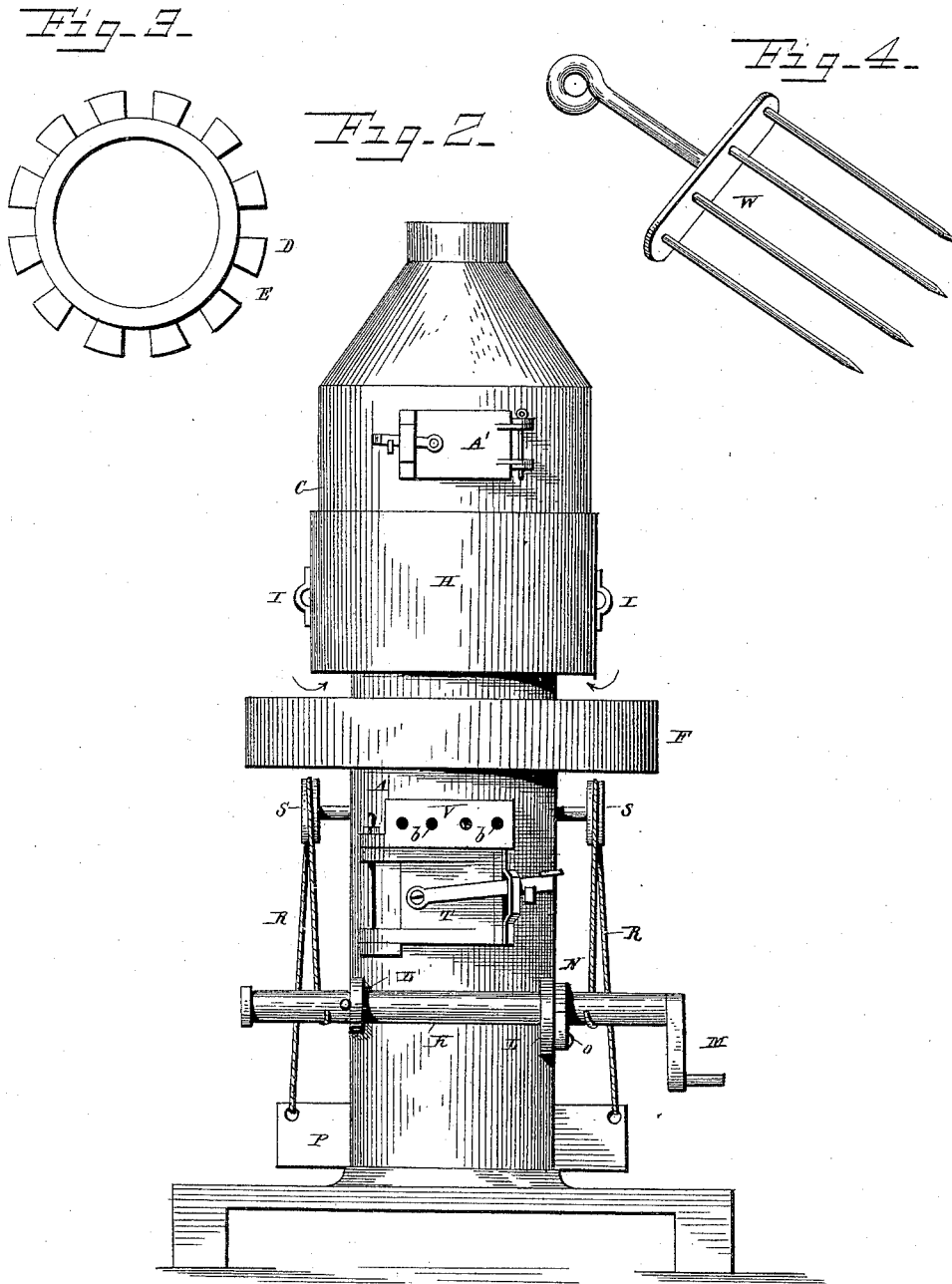
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3 Sheets—Sheet 3.

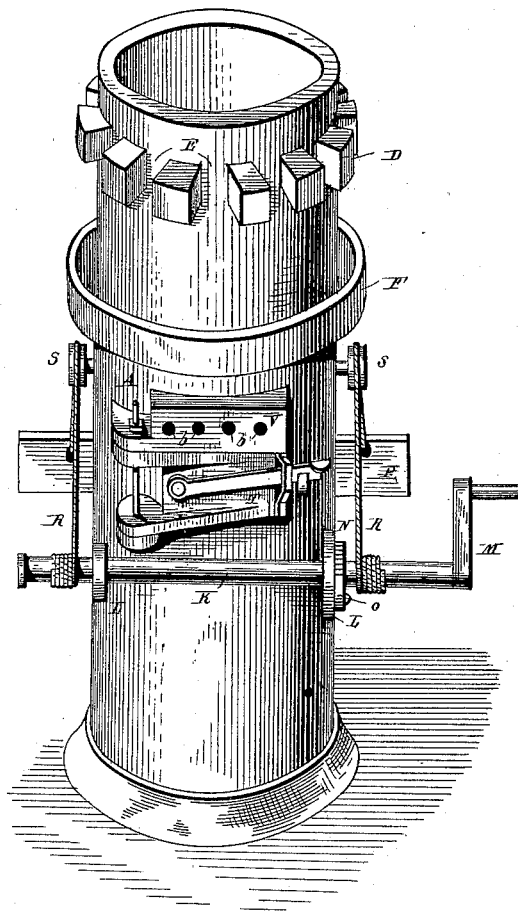
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Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD FALES, OF ST. LOUIS, MISSOURI.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 342,080, dated May 18, 1886.

Application filed September 28, 1885. Serial No. 178,418. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FALES, a citizen of the United States, residing at St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Smoke-Consuming 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-boilers and other purposes.

The object of my invention is to so construct a furnace that the smoke and gases arising from the freshly-applied fuel will be consumed, thus getting rid of the smoke, and at the same time consuming the gases which would otherwise escape, thereby effecting a great saving of fuel.

My invention consists of a central fuel-supply chamber having projections or radial arms near the top, which serve as grate-bars, on which the live coals are forced by the devices which force the fuel centrally upward against and into the bed of live coals.

My invention consists, further, in feeding the fuel to the fire from below and supplying the air necessary to effect complete combustion around the outside of the fuel-chamber and through the bed of live coals to the freshly-applied fuel, whereby the smoke and gases are consumed.

My invention consists, further, in certain details of construction, which will be more fully hereinafter described, and pointed out in the claims.

Referring to the drawings, Figure 1 is a vertical sectional view of my improved furnace. Fig. 2 is a front elevation of the same. Fig. 3 is a top or plan view of the upper portion of the cylinder which forms the fuel-chamber. Fig. 4 is a view in perspective of the grating or guard used to hold the fuel in position while the plunger or bottom is being lowered for a fresh charge of fuel. Fig. 5 is a front view of the fuel-chamber with the combustion-chamber removed.

A designates the fuel-chamber, which is mounted on a suitable base, and is by preference of cylindrical form, but may be of any other suitable configuration, said fuel-cham-

ber being supplied with a bottom or plunger, B, which is vertically movable toward and from the combustion-chamber C, as will more fully hereinafter appear.

C is the combustion-chamber, located on top of the fuel-chamber, the walls of said combustion-chamber being supported by the projections or grate-bars D, which radiate from the outside of the fuel-chamber, the spaces E between said bars or projections serving the double purpose of supplying an equal amount of air on all sides to the fire-bed to effect a complete combustion of the smoke and gases, and also as a means for removing the ashes, which are forced toward the sides of the combustion-chamber by the upward central movement of the fuel and fall down through the openings onto the hearth F, a hooked or bent poker being used to facilitate the removal of the ashes from the outside.

The projections D, which form the grate-bars of the furnace, are located on the outside and a short distance below the top of the fuel-chamber, as shown.

The object of having the fuel-chamber to extend a short distance above the grate-bars or projections D is to provide a cavity, D', between the top of the fuel-chamber and the walls of the combustion-chamber, and above the grate-bars, for holding the live coals and ashes, and thus prevent the fuel which is forced up from the bottom through the center of the furnace from crowding over to the sides of the combustion-chamber and displacing the live coals, thus causing the fire to run down, as would be the result if the top of the fuel-chamber were on a level with the projections or grate-bars D. This is an important feature of my invention, as it enables the operator to force the column of fuel directly into the center of the fire-bed, while the live coals completely surround the column or body of fuel which is projected from the top of the fuel-chamber.

The combustion-chamber C and the top of the fuel-chamber A may be lined with fire-brick, asbestos, or other fire-resisting material, such as is commonly used to protect the inside of furnaces.

F is an annular ledge or projection, which is secured to and extends around the fuel-chamber, as shown, and is designed as a hearth

to catch and retain the ashes, which are stirred through the openings E of the annular grate. The ledge F is provided with an upwardly-projecting flange, G, which prevents the ashes from falling onto the floor, and the said ledge or hearth may be provided with a removable or hinged section, or with an opening adapted to be closed by a sliding door, through which the ashes can be readily removed.

H is a sleeve or section of a cylinder adapted to slide over the outer walls of the combustion-chamber, said sleeve being provided with suitable perforated lugs, I, through which a bar of iron or other suitable material can be placed to raise or lower said sleeve, and thus regulate the supply of air, which passes under the sleeve and up through the openings E to the fire, as shown in Fig. 2. When it is desired to shut off the supply of air to the fire, and thus reduce its intensity, the sleeve or cylinder is lowered onto the hearth F, as shown in Fig. 1, and when it is desired to revive the fire the sleeve or cylinder is raised to admit the proper amount of air to the fire to insure complete combustion of the smoke and gases.

As before stated, the bottom or plunger B is movable toward and from the combustion-chamber. This movement is effected by means of the following devices: K is a shaft mounted in suitable lugs or bearings, L, secured to the fuel-chamber, said shaft being provided with a crank, M, or other suitable device for turning it. The shaft K is also provided with a ratchet-wheel, N, which is engaged by a pawl, O, secured to one of the lugs L, and by which means the shaft is held in any desired position. The shaft K is connected to the projecting ends of the cross-bar P, which pass through slots a in the fuel-chamber and form a part of the bottom or plunger B, by means of wire, cords, chains, or sheet-metal straps R, which pass up over the sheaves or pulley-wheels S. It will be noticed that by the devices just described the operator is enabled to feed the fuel gradually upward to the fire-bed and supply the fuel in desired quantities, the plunger being held up by means of the pawl O acting on the ratchet-wheel N of the shaft K.

The fuel-chamber A is provided with a door, T, through which the fuel is placed on the movable bottom or plunger B and moved up to supply fuel to the fire. The fuel-chamber is also provided with an enlarged portion, V, having perforations b, through which the tines of the fork or support W are passed. In practice, however, I may form a slot in the projection V to receive a plate of metal, having its front end rounded to conform to the interior of the fuel-chamber; but I prefer to use the device shown, for the reason that it admits of the upward passage of the air coming through the apertures c in the plunger, and through the slots a of the fuel-chamber, a limited amount of air being necessary to form a central draft through the bed of the fire.

When it is desired to lower the bottom or plunger in the fuel-chamber to receive a fresh supply of fuel, the fork W is inserted, and supports the fire and coal in the combustion-chamber and in the upper part of the fuel-chamber until a charge of fuel is placed on the plunger, and the plunger is raised against the fork or support W, when it is withdrawn.

The combustion-chamber is provided with a suitable door, A', through which the fire may be stirred.

In Fig. 1 I have shown my invention as applied to the boiler of a steam-engine of that type known as "vertical boilers;" but it may be applied to all kinds of furnaces by making slight changes to adapt it to the construction of the combustion-chamber or boiler, and it is equally valuable in its application to heating and cooking stoves and to heaters of all kinds.

The operation of my device is as follows: The bottom or plunger B having been lowered to the bottom of the fuel-chamber and supplied with the proper amount of coal, it is raised to the top of the fuel-chamber A and the fire is lighted. The air for supporting combustion enters under the sleeve H, passes up through the openings E, is heated in its passage through the live coals and by coming in contact with the heated walls of the fuel-chamber, and is equally distributed to the fire. When a fresh supply of fuel is needed, the fork or support W is inserted, as shown in Fig. 1, and the plunger or bottom B lowered to the position shown in the same figure of the drawings. When the proper or desired amount of fuel has been placed thereon, the plunger B is raised until the charge of fuel comes in contact with the support W. The support is now withdrawn, and as the fuel is consumed at the top of the fuel-chamber the shaft is turned the desired distance, and the fuel is forced upward into the center of the fire-bed. By feeding the fuel from below and forcing it up against and into the center of the hot body of live coals at the top the smoke and gases from the fresh fuel below are consumed in their passage through the bed of live coals, thus preventing the escape of the smoke and gases, and by consuming all portions or all combustible portions of the fuel in the furnace none is allowed to escape, and, as a natural consequence, a great saving of fuel is effected.

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

1. A furnace for steam-engines and other purposes having the vertically-moving plunger for supplying fuel from the bottom, and the grate-projections D near the top of the fuel-chamber, in combination with the combustion-chamber C, having the adjustable sleeve or cylinder H, and the hearth or projection F, whereby the requisite amount of air to insure a complete combustion of the smoke and gases is admitted to all sides of the fires, as set forth.

2. In a furnace for steam-engines and other purposes, the movable bottom or plunger B, provided with the projections P, extending through the walls of the fuel-chamber, in combination with the ropes R, pulleys S, shaft K, ratchet-wheel N, and pawl O, whereby the fuel can be gradually fed upward to the fire-bed, as set forth.

3. In a smoke-consuming furnace for steam-engines and other purposes, the combination, with the vertical fuel-supply chamber extending above and below the grate-bars, said bars being located outside the same, of the vertically-moving plunger located and moving within the chamber, and mechanism, substantially as described, located outside the chamber,

for drawing the plunger upward, as and for the purpose set forth.

4. A furnace for steam-engines and other purposes having the vertically-moving plunger for supplying fuel from the bottom, in combination with the combustion-chamber having the adjustable sleeve or cylinder surrounding the same, for regulating the amount of air admitted to the grate, substantially as and for the purpose set forth.

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

EDWARD FALES.

Witnesses:

N. D. ADAMS,
E. F. SAILOR.