

No. 681,456.

Patented Aug. 27, 1901.

H. E. PARSON.

SMOKE CONSUMING FURNACE.

(Application filed Feb. 21, 1900. Renewed Jan. 29, 1901.)

(No Model.)

Fig:1.

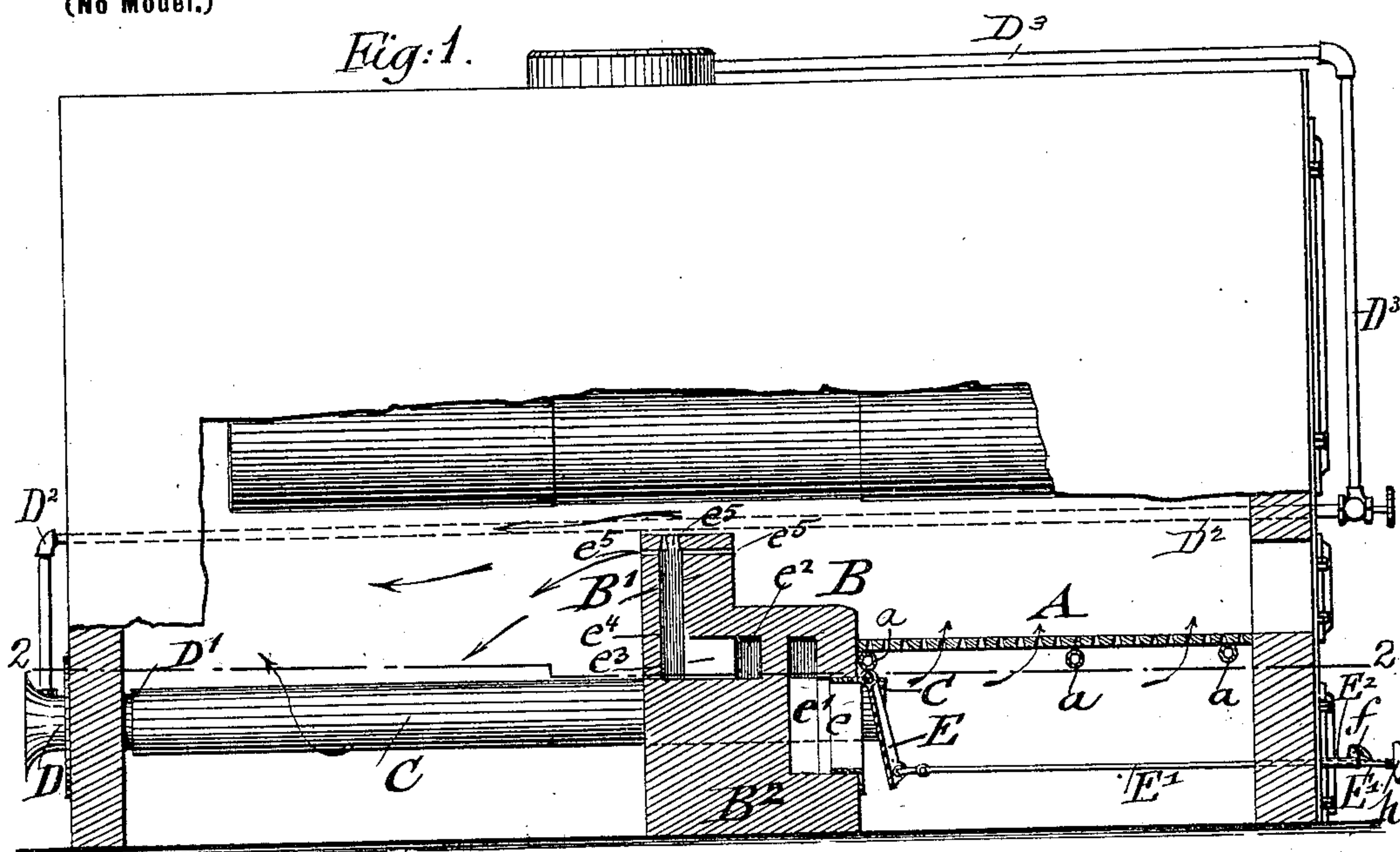


Fig:2.

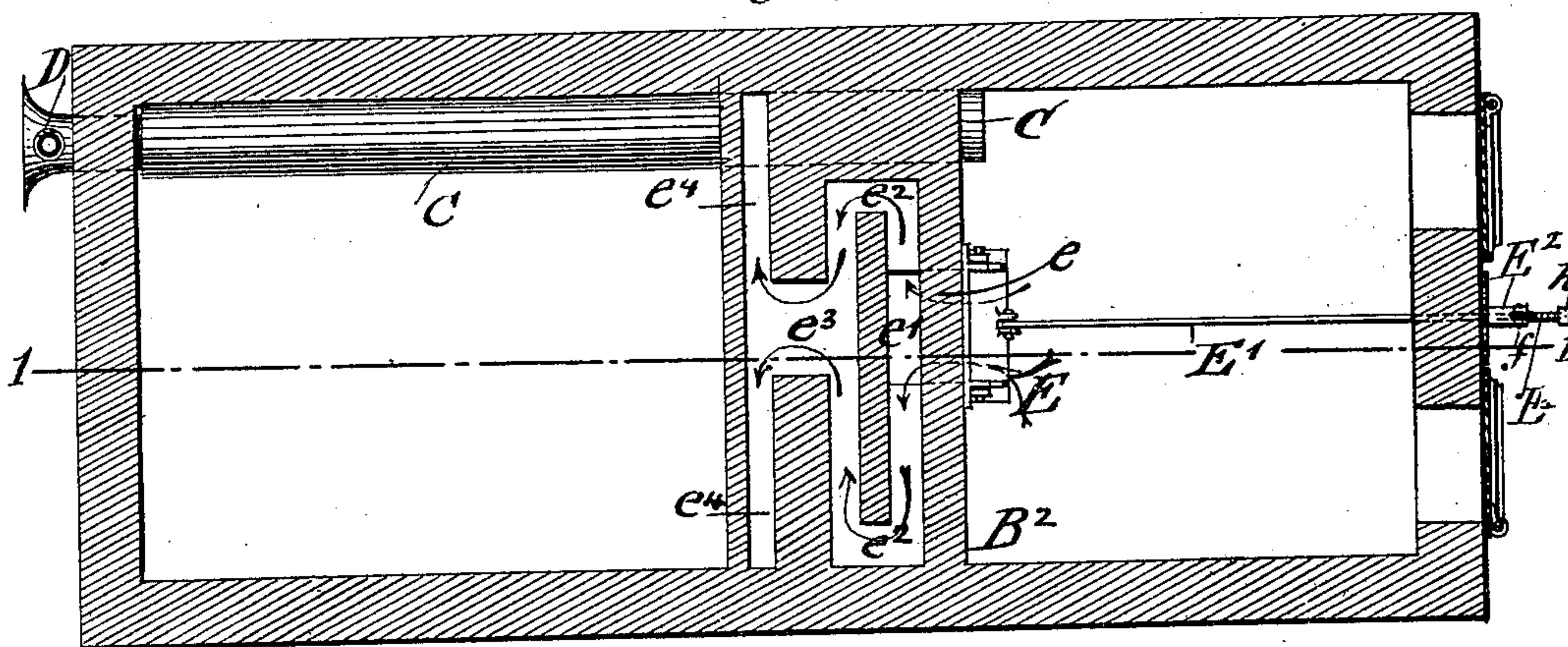
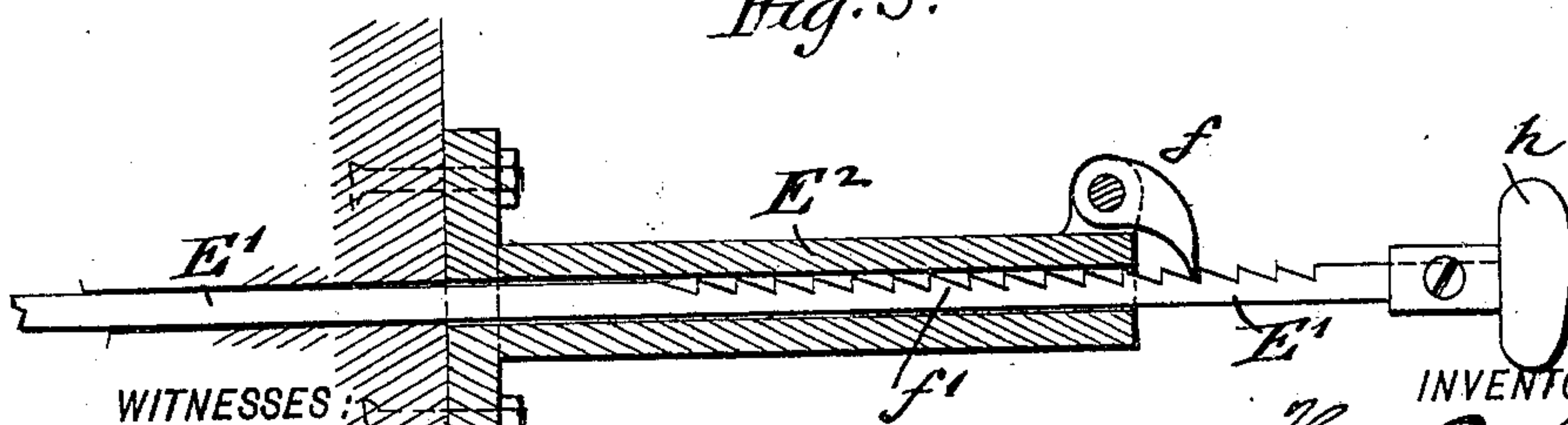


Fig:3.



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## SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 681,456, dated August 27, 1901.

Application filed February 21, 1900. Renewed January 29, 1901. Serial No. 45,249. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY E. PARSON, a citizen of the United States, residing in New York, in the borough of Brooklyn and State of New York, have invented certain new and useful Improvements in Smoke-Consuming Furnaces, of which the following is a specification.

This invention relates to certain improvements in smoke-consuming furnaces of that class in which the fuel is burned on a perforated grate under artificial draft supplied below the grate, so as to produce the perfect combustion of the fuel while the carbon particles contained in the products of combustion are mingled with hot air and steam supplied through flues and outlet-openings in the fire-bridge, so that not only the more perfect combustion of the fuel on the grate, but also the more perfect combustion of the fire-gases, and consequently a considerable saving in fuel, is obtained.

The invention consists of a smoke-consuming furnace in which a supply of heated air and steam mingled together is furnished, by means of a suitable blower arranged in the rear wall of the furnace, through a longitudinal tube connecting the rear wall with the fire-bridge into the ash-pit and from the same to the fuel on the grate.

The invention consists, further, of suitable flues arranged below the banking-platform and fire-bridge, and openings extending through the front, top, and rear of the fire-bridge, so that mingled air and steam is supplied in highly-heated condition to the fire-gases passing over the fire-bridge.

The invention consists, further, of the combination of a hinged door for opening or closing the inlet-opening leading to the flue arranged below the banking-platform and fire-bridge, a connecting-rod leading from said door through the front wall of the furnace, and means for locking said rod in position so as to permit the adjustment of the door and the supply of mingled steam and air to said flue, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my improved furnace on line 1 1, Fig. 2, part of the furnace being shown, however, in side elevation. Fig.

2 is a horizontal section on line 2 2, Fig. 1; and Fig. 3 is a detail vertical section of the mechanism for adjusting the door for opening or closing the flues arranged in the banking-platform and fire-bridge.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the grate of my improved smoke-consuming furnace. The grate is constructed of grate-bars having a number of conical holes tapering from the bottom toward the top of the bar. The grate-bars rest on transverse tubes *a a*, which are supported at their ends in the side walls of the furnace. The front wall of the furnace is provided with fire and ash-pit doors in the usual manner, both doors being kept tightly closed, so that the fuel on the grate can be burned in the combustion-chamber under forced draft.

At the rear of the grate A are arranged a banking-platform B and a fire-bridge B', said platform serving for banking up the burning fuel when the ashes and cinders are to be removed from the top of the grate, the fuel being returned to and spread on the grate when the ashes and cinders are removed through the fire-doors. The banking-platform B and fire-bridge B' are supported by a transverse masonry wall B<sup>2</sup>.

The draft for burning the fuel is supplied to the grate through a longitudinal tube C, which connects the rear wall of the furnace with the ash-pit, said tube passing through the supporting-wall of the banking-platform and fire-bridge, preferably near one of the side walls of the furnace, as shown in Fig. 2. The rear end of the tube C communicates with the casing D' of a steam-blower D, of any approved construction, to which superheated steam is supplied by a steam-pipe D<sup>2</sup>, which is located in the side wall of the furnace and to which steam is supplied by a pipe D<sup>3</sup> from the steam-dome of the boiler, a suitable regulating-valve and automatic regulator (not shown) being used in connection with the steam-supply pipe D<sup>3</sup>. The steam-blower D is provided with a number of nozzles, through which steam is admitted into the casing D', said jets of steam sucking in the air and heating the same in its passage through the casing D' and tube C. The tube C is heated by



the fire-gases on their way from the fire-bridge through the space between the same and the rear wall of the furnace, so that the mingled steam and air are reheated on their way to the grate. The steam-and-air mixture is discharged at the front end of the tube C in a highly-heated state into the ash-pit and is then supplied through the tapering openings in the grate to the small-sized fuel on the same. In the tube C the temperature of the mingled steam and air drawn in by the steam-blower is raised considerably over the temperature imparted to the air by the superheated steam supplied to the blower, so that the air-and-steam mixture is conducted in a very favorable condition to the grate and to the glowing body of fuel on the same, and thereby the almost complete combustion of the small-sized fuel on the grate obtained. Notwithstanding the heating up of the mingled steam and air and the supplying of the same at a high temperature to the body of glowing fuel on the grate the carbon particles contained in the products of combustion are not entirely burned, which is necessary for rendering the smoke invisible. For burning the carbon particles still contained in the products of combustion of the fuel they are conducted over the banking-platform B and fire-bridge B' and mingled with another highly-heated quantity of air and steam that is drawn from the ash-pit through an inlet-opening *e*, arranged in the front of the base-wall of the banking-platform, and through a vertical flue *e'* to horizontal branch flues *e''*, through a short rear flue *e'''* to a vertical flue *e''''*, which extends transversely in the fire-bridge and supplies the highly-heated steam-and-air mixture through suitable jet-openings *e'''''* in the front, top, and rear of the fire-bridge to the fire-gases that are drawn over the same, so that by the proper intermingling of the heated air-and-steam mixture with the fire-gases the almost complete combustion of the unburned carbon particles carried along by the same is produced, and thereby the production of visible smoke entirely prevented. The inlet-opening *e* for the heating-flues located in the base-wall of the banking-platform B and in the fire-bridge B' is closed by a door E, which is hinged at its upper end to a suitable frame in said opening and connected by a hinge-joint with a longitudinal rod E', which is conducted through a stationary guide-sleeve E<sup>2</sup>, located in the front wall of the furnace to the outside of the same, said rod being provided with a knob or handle *h* at its outermost end. A pawl *f* is pivoted to the front end of the guide-sleeve E<sup>2</sup>, the rear end

of which is secured to the front wall of the furnace by suitable screw-bolts, said pawl engaging notches *f'* in the outermost end of the rod E', as shown clearly in Fig. 3. By pulling the rod E' in the forward direction the door E can be opened more or less, so as to regulate the quantity of air and steam supplied to the flues in the base-wall of the banking-platform and in the fire-bridge, the quantity supplied being regulated according to the condition of the fire on the grate, so as to produce thereby the more effective combustion of the same. When the working of the furnace is to be interrupted, the door of the supply-flue is closed, and thereby the supply of the heated steam and air to the fire-bridge interrupted.

The two improvements described—namely, the supply of a highly-heated steam-and-air mixture to the fuel on the grate and the supply of a highly-heated air-and-steam mixture to the fire-gases passing over the fire-bridge—serve for the purpose of producing effective combustion of the fuel burned on the grate and of the carbon particles in the fire-gases, so that not only a considerable saving in fuel is obtained, but by the almost complete combustion of the carbon particles in the fire-gases the emission of visible smoke prevented.

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

1. The combination, in a boiler-furnace, with an ash-pit and combustion-chamber, of a fire-bridge, a banking-platform in front of the same, heating-flues arranged in the banking-platform, an inlet-opening connecting said flues with the ash-pit, heating-flues arranged in the fire-bridge and connected with the flues of the banking-platform, outlet-openings in the fire-bridge, and means for opening or closing said inlet-opening, substantially as set forth.

2. The combination, in a boiler-furnace, with an ash-pit and combustion-chamber, of a fire-bridge, a banking-platform in front of the same, circulating-flues in said bridge and platform, an inlet-opening connecting said flues with the ash-pit, and outlet-openings in the top of the fire-bridge, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HENRY E. PARSON.

Witnesses:

PAUL GOEPEL,  
M. H. WURTZEL.