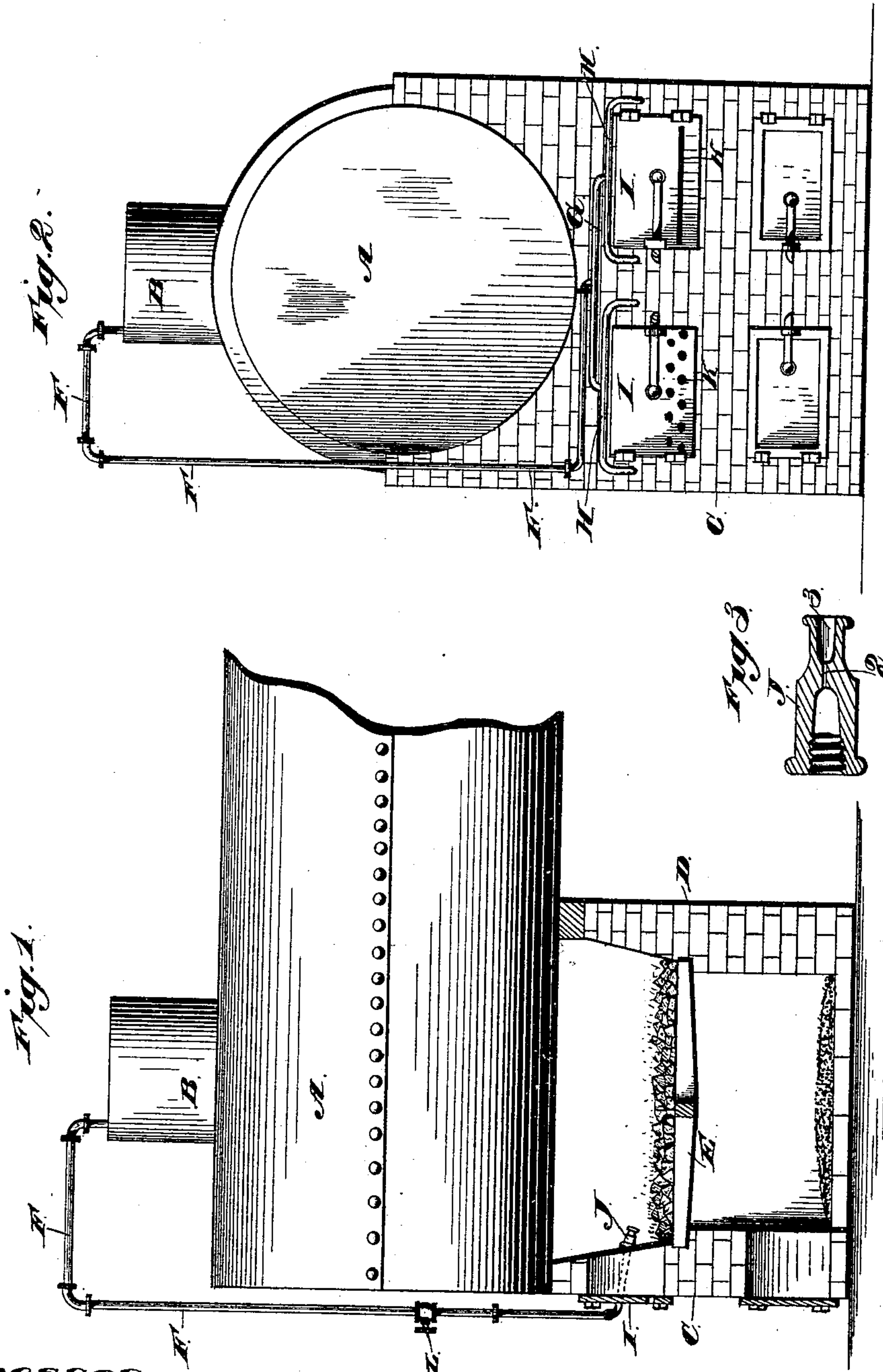


(No Model.)

C. B. DAVISON.
BOILER FURNACE.

No. 329,539.

Patented Nov. 3, 1885.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES B. DAVISON, OF ANN ARBOR, MICHIGAN.

BOILER-FURNACE.

SPECIFICATION forming part of Letters Patent No. 329,539, dated November 3, 1885.

Application filed May 12, 1885. Serial No. 165,216. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. DAVISON, a citizen of the United States, residing at Ann Arbor, in the county of Washtenaw and State of Michigan, have invented certain new and useful Improvements in Boiler-Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an improvement in steam-boiler furnaces; and it consists in the construction and arrangement of the parts more fully hereinafter described, and pointed out in the claims.

The object of my invention is to obtain a more perfect combustion of fuel than has hitherto been accomplished without material change or alteration of the furnaces now in use and by means simple and inexpensive in construction and readily understood and operated.

A further object of my invention is to consume the smoke and other gases arising from combustion, thereby doing away with the obnoxious odors and the inconveniences resulting therefrom, and at the same time securing a great saving in the consumption of fuel.

Many attempts have been made to accomplish these objects, and by a variety of means and methods, but so far as I have been able to learn with only partial success. The failure so to do has been due to the fact that certain necessary conditions have not been observed, and also that the means or methods employed have been complicated and cumbersome or difficult to operate or carry out.

To secure perfect combustion, the following conditions must be observed, viz: First, the furnace must be supplied with a sufficient quantity of air to furnish the needed oxygen; second, this air must be thoroughly mixed with the products of combustion arising from the bed of fuel; third, the gases arising from combustion must be kept at a high degree of heat—not less than 800° Fahrenheit. These conditions may be maintained by my improvement with ease and entire uniformity, and when so maintained perfect or nearly perfect combustion is secured.

I attain these objects by the means shown in the accompanying drawings, forming a part

of this specification, wherein like letters of reference indicate similar parts, and in which—

Figure 1 is a longitudinal vertical section of a furnace, and a side elevation of a part of a boiler, showing the steam-chamber and pipes for conducting the steam to the furnace. Fig. 2 is a front elevation of a furnace and boiler, showing the arrangement and connections of the steam-pipes and the air-inlets in the furnace-doors; and Fig. 3 is a longitudinal vertical section of a nozzle for the steam-pipes in the furnace.

A represents a steam-boiler set over a furnace and provided with a steam-dome, B. C represents the front wall of the furnace, and D the bridge-wall, between which walls the fire-grate E is supported. The doors I I are hinged in the usual manner and slotted or perforated, as shown at K in Fig. 2, for the purpose of admitting a current of air into the furnace just over the surface of the fuel. These perforations or slots may be closed in whole or in part by suitable registers, as desired.

A pipe, F, connected with the dome B or the top of the boiler, or any pipe from the top is brought down in front of the furnace, where it joins a distributing-pipe, G, connecting with branch pipes H H, for conducting steam into the furnace. The pipes H H are placed over the doors, and are bent at right angles near the ends, and carried through the front wall, the ends projecting through the wall being bent at such an angle as to cause the steam forced through them to come in contact with the current of air coming in through the slots or perforations K K, about two-thirds of the distance back from the front end of the furnace. The ends of said pipes are screw-threaded, on which are screwed the nozzles J. The nozzle J is about one and one-half inch long and three-fourths of an inch in diameter at the largest end. It has a throat, 2, from one-sixteenth to one twenty-fourth of an inch in diameter. The throat is reduced in diameter, so that the jet or current of steam can be more perfectly regulated. The mouth 3 is hollowed out so that the jets of steam may spread out and form a sheet reaching from one side of the fire-chamber to the other. By means of this nozzle the steam is brought into the fire-chamber with such force as to thoroughly agitate

the gases arising from combustion and mix them with the incoming current of air. The force imparted to said gases also carries them back along the bottom of the boiler, thus distributing the heat more uniformly, and at the same time greatly increasing the draft. The pipe F is provided with a cock, L, for letting on and shutting off the steam.

The operation of my invention is as follows:

10 The fuel on the grate having been brought to an incandescent state, a current of air is brought into the fire-chamber through the slots or perforations in the doors I I, just above the level of the fuel. The cock L having been
15 turned, jets of steam are forced into said chamber through the nozzles J J at such an angle as to strike the current of air about two-thirds the depth of the furnace back from the doors. The air being heated by passing over
20 the incandescent fuel gives off its oxygen, which, becoming thoroughly mixed with the gases arising from combustion by the jets of steam, the requisite amount of oxygen is brought in contact with said gases and the
25 unconsumed particles of carbon to insure complete combustion. The force of the jets of steam is such as to drive the heat in the fire-chamber back under the boiler, and thereby better distribute the same. The fine particles
30 of carbon being consumed, the flues are not clogged thereby. The draft is greatly improved by the force of the steam, thereby aiding in the distribution of the heat.

The advantages of my invention are, first,
35 simplicity and cheapness of construction and operation; second, the facility with which it can be adapted for furnaces now in use; third, its durability; fourth, the saving of fuel and consumption of smoke and other gases; fifth,
40 the use of cheaper grades of coal is by it made possible and profitable.

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

45 1. In a steam-boiler furnace, the combina-

tion of doors having slots or perforations about on a line with the upper surface of the fuel, as described, for the admission of air into the fire-chamber, with steam-pipes having distributing-nozzles set at such an angle that the steam forced therethrough will strike the current of air coming in through the doors at a point about two-thirds the distance back from said doors, substantially as described. 50

2. In a steam-boiler furnace, the combination of a pipe leading from the steam-dome and one or more branch pipes provided with nozzles extending into the fire-chamber at such an angle as to bring the currents or jets of steam in contact with the air entering through slots or perforations in the doors, about on a line with the upper surface of the fuel, and the gases arising from combustion, about two-thirds the distance back from the doors, substantially as described. 55 60 65

3. In a steam-boiler furnace, the combination of slotted or perforated doors, as described, steam-pipes entering the furnace through the front wall at such an angle that the steam will come in contact with a current of air coming in through slots or perforations in the doors, about on a line with the upper surface of the fuel and the incomplete products of combustion arising from the fuel, about two-thirds of the depth of the furnace back from the front wall, substantially as described. 70 75

4. In a steam-boiler furnace, the combination of the pipe F, having cock L, distributing-pipe G, branch pipes H H, nozzles J J, doors I I, provided with slots or perforations K K, grate E, and front and bridge walls C and D, constructed and arranged substantially as described. 80

In testimony whereof I affix my signature in presence of two witnesses. 85

CHARLES B. DAVISON.

Witnesses:

JUNIUS E. BEAL,
F. H. BELSER.