No. 99,570. PATENTED FEB. 8, 1870.

J. B. HOYT.

FURNACE.

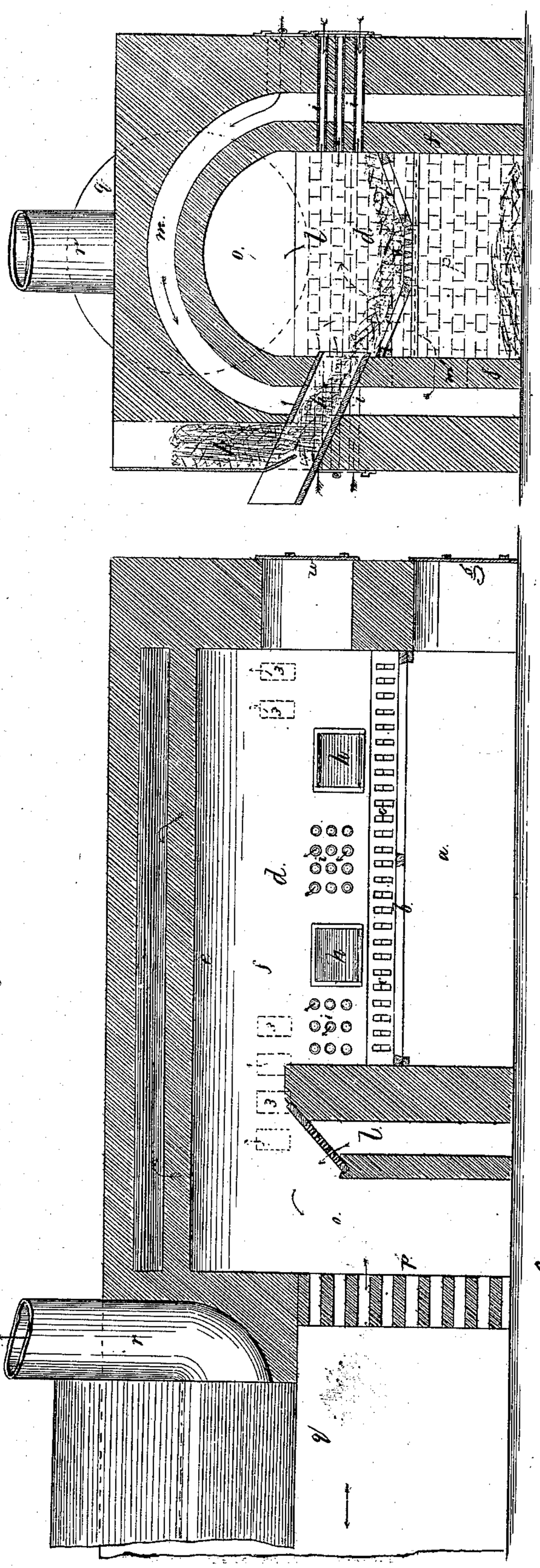

Fig. 2.

Fig. 1.

Witnesses

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JOSEPH B. HOYT, OF STAMFORD, CONNECTICUT.

IMPROVEMENT IN FURNACES.

Specification forming part of Letters Patent No. **99,570**, dated February 8, 1870.

To all whom it may concern:

Be it known that I, JOSEPH B. HOYT, of Stamford, in the county of Fairfield and State of Connecticut, have invented an Improvement in Furnaces for Burning Bituminous Coal, &c.; and I do hereby declare the following to be a correct description of the same.

In the consumption of bituminous coal and similar substances, owing to the imperfect combustion of the gases, there is a great waste of fuel and much annoyance from the accompanying smoke. The chief causes that produce this waste and annoyance are the irregular supply of fuel, which is generally fed at long intervals and in large quantities, thus setting free at once large volumes of carbonaceous gases, and the sudden reduction of the temperature in the furnace below the point at which the combustion of the gases is possible, and, still further, the attempt to utilize the heat before the process of combustion is completed.

My invention relates to the fire-bed, and to the combination of devices, as hereinafter set forth, whereby the fuel can be supplied gradually and uniformly distributed over the grate, and the gases are so confined and commingled with the requisite proportion of atmospheric air, in the presence of a high degree of temperature, that a very perfect combustion is secured, so as to effect a saving in fuel and avoid smoke.

In the drawing, Figure 1 is a longitudinal sectional of my improved furnace, and Fig. 2 is a cross-section of the same.

The furnace is made with an ash-pit, *a*, fire-bed *b c*, and fire-chamber *d*, beneath the arch *e* and between the walls *f*.

The ash-pit is closed by a door, *g*, and any desired character of blast or air-supplying apparatus may be used to regulate the inlet of air to said ash-pit.

The fire-bed is formed of ranges of grate-bars, the bars *c c* being set at an inclination along the sides, and the bars *b* occupying the middle of the fire-bed. The object of the inclined sides to the fire-bed is to facilitate the uniform spreading of the fuel upon the bars and the moving of any clinker down to the lower part of the bed, where it may be broken up by a poker inserted from below, or drawn to an opening provided in said bed for delivering such clinker into the ash-pit. For this purpose a movable section may be provided in the bars *b*.

The inclined bars *c c* have their openings running up and down the incline toward the center of the fire-bed, and in the level central portion of the fire-bed the openings in the bars run lengthwise, to allow of the introduction of a poker.

The fuel is fed through one or more chutes, *h*, over which are hoppers *k*, for containing the coal, and the fuel is forced into the furnace by a poker or other instrument passed into the chute and carrying with it the coal, so as to spread it upon the fire as it burns upon the bed *b c c*. I prefer that the ends *h* be made flaring, so that the poker can be moved freely in spreading the charge.

Several of these charging-chutes may be placed around the furnace or fire-chamber *d*, so that the fuel will be supplied gradually and successively by the attendant.

The furnace is made with a hollow bridge-wall, *l*, having a number of perforations, through which air is allowed to pass.

I supply a hot-blast through these holes by making an opening, *m'* from the space *m* into the hollow bridge-wall *l*. (See dotted lines, Fig. 2.)

The space *m* connects with the air-space over the arch *e*, and into this space air is admitted by openings or a register at any suitable space. I have shown a register at 3, Fig. 2, and by dotted lines in Fig. 1.

I also admit numerous small currents of air into the fire-chamber. I have shown the tubes *i i* coming in through the side walls, and fitted with registers or regulating-slides. A hot-blast, however, might be admitted through these tubes from the air-spaces *m*.

There is a combustion-chamber, *o*, beyond and above the bridge-wall *l*, and the heated gases are shown as passing through a perforated wall, *p*, formed of fire-bricks laid up with spaces between the ends of the bricks. The heat passes off below a boiler, *q*, with a return-flue, *r*, or is employed for any other useful purpose.

It is now to be understood that after the fire has been kindled the fuel is fed in pro-

gressively, so as not to cause the evolution of large quantities of carbonaceous gases suddenly and the checking of the fire.

The attendant, in feeding the fire, passes from one opening to the next, at short intervals of time, and in pushing in the fresh coal the fire is loosened and the coke broken up and forced toward the middle of the fire, where the combustion is always clear and perfect, and the coal thus supplied becomes gradually heated, so as to evolve gas in a comparatively uniform flow, and the entire operation is rendered very uniform, because the carbonaceous matters evolved are in proportion to the atmospheric oxygen supplied for producing a perfect combustion.

The combustion progressing regularly, there is a high degree of heat maintained in the fire-chamber *d* and combustion-chamber *o;* hence any gases and carbonaceous vapors thrown off by the coal are detained and consumed by the heat and atmosphere admitted at the openings *i* and through the hollow bridge-wall *l;* hence, as each particle of carbon is retained under circumstances where it can combine freely with its equivalent of oxygen, there is no opportunity for the escape of unconsumed carbon, the entire product of the coal is utilized, smoke is avoided, and the gases, passing off at a high temperature, are more effective for heating purposes than heretofore.

A door may be provided at *w* to give access to the fire-chamber for repairs or other operations, and eye-holes may be made in convenient location, to enable the attendant to watch the operations, the intention being to keep the interior of the fire-chambers in a highly-heated condition, so as to burn the gases perfectly.

The linings of the fire-chamber *d*, combustion-chamber *o*, and other parts that are exposed to great heat should be made of fire-brick or other non-conducting substance or material suitable to withstanding such heat.

I claim as my invention—

1. The inclined grate-bars *c c*, having openings running up and down such incline, in combination with the grate-bars *b*, having longitudinal openings, as and for the purposes set forth.

2. The inclined grate-bars *c c*, in combination with the chutes *h* and hoppers *k*, substantially as and for the purposes set forth.

3. The chutes *h* and hoppers *k*, for effecting a gradual supply of fuel upon the fire-bed, in combination with air-inlets *i i*, adjacent to the fuel, as applied, for the purposes specified.

4. The perforated bridge-wall *l* and combustion-chamber *o*, in combination with the fire-chamber *d* and means, substantially as specified, for feeding the fuel gradually to the fire.

Dated this 10th day of November, A. D. 1869.

JOS. B. HOYT.

Witnesses:

CHAS. H. SMITH,

GEO. T. PINCKNEY.