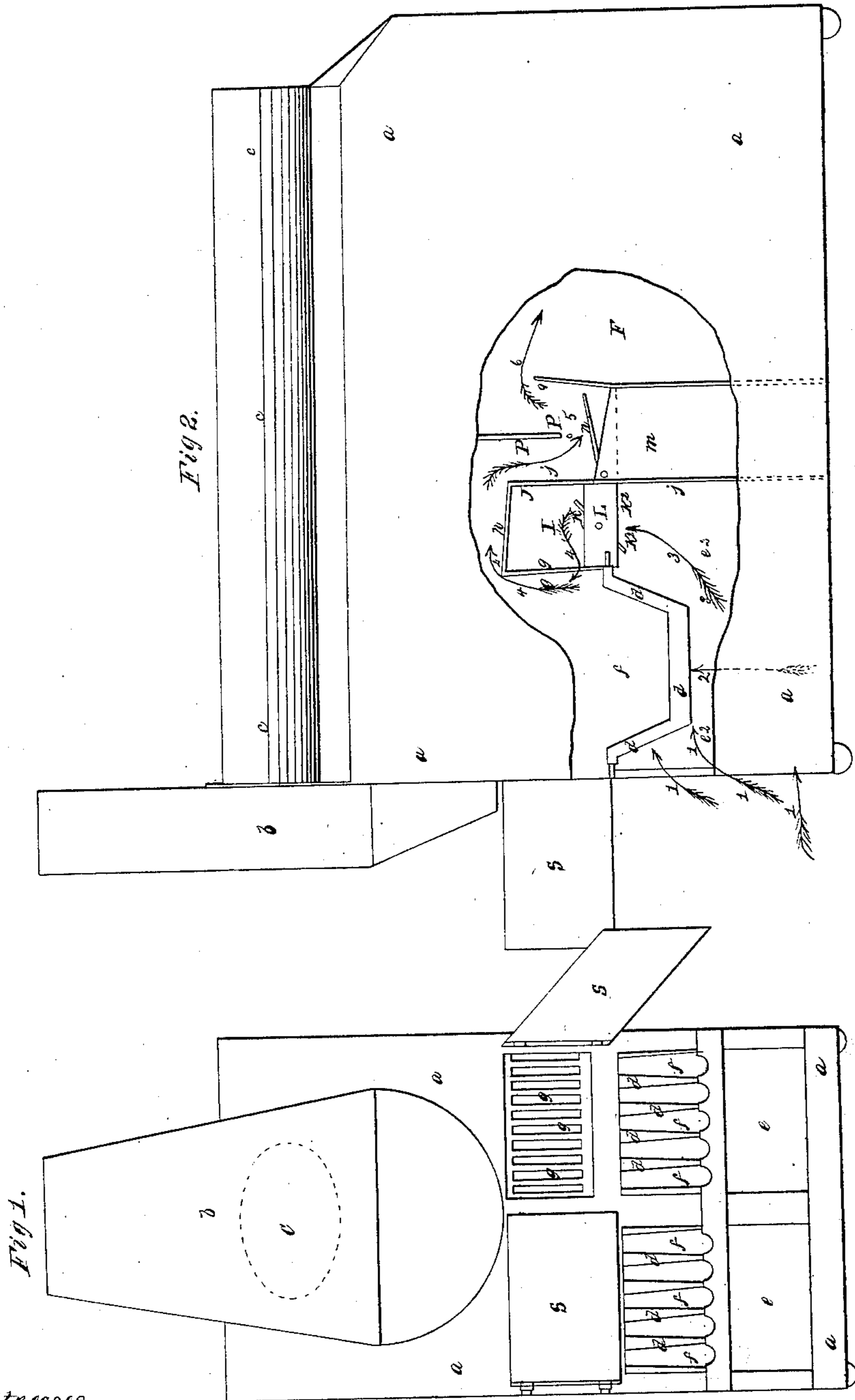


C. F. Cory,

Feeding Boiler Furnaces.

No. 30,724,

Patented Nov. 27, 1860.



Witnesses.

*Jos. S. Gallahan
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Inventor.

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UNITED STATES PATENT OFFICE.

CHARLES F. CORY, OF LEBANON, ILLINOIS.

FURNACE.

Specification of Letters Patent No. 30,724, dated November 27, 1860.

To all whom it may concern:

Be it known that I, CHARLES F. CORY, of Lebanon, in the county of St. Clair and State of Illinois, have invented and made
5 certain new and useful Improvements in Smoke-Consuming Furnaces; and I do hereby declare that the following is a full, clear, and exact description of the said improvements, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, is a front elevation of the furnace. Fig. 2 is a side elevation of the furnace, with a fragment taken out, exposing
15 to view the interior arrangement of the grate and fire back and draft walls.

The nature of my improvements, consists in the construction of a furnace, having for the desired object, economy of fuel, more
20 perfect combustion, greater equality of heat, together with greatly diminished labor in the management, and economy of time, in the employment of my improvements.

The better to enable others to construct and operate the same, I will herewith more
25 fully describe the nature and principles thereof and as applied to steamboats, and for other purposes.

In Figs. 1 and 2, the letters *a, a, a, a*, indicate the walls of a furnace; *b, b*, the smoke pipe; *c, c, c*, a horizontal boiler; *d, d, d*,
30 the grate bars of the furnace; *e, e*, the ash and cinder pit and cold air chamber or receptacle; *f, f, f, f*, the fire or fuel chamber, and at *g, g, g* are indicated the bars, and
35 openings of the inclined, perforated, and ventilating fire back.

At *h* is the cap or top of the hot air chamber *I'*, and at *J, J, J*, is the vertical solid
40 back or hot air deflector.

At *k, k*, is indicated a valve damper the whole length, and width of the hot air chamber. This valve damper is attached on
45 a longitudinal axis or turn bar *L* and arranged horizontally when closed.

At *m*, is a solid structure or wall, on the top of which is attached on an axis, a cutoff
50 *n* to close up when desired the passage or opening *o*.

At *P, P*, is a diaphragm drop guard, or check wall, and at *q* is a semi-deflecting wall, and at *r* is indicated the rarefaction
55 chamber.

The arrows 1, 2, indicate the direction of the cold current of air beneath the grate and
60 fuel. The arrow 3, 3 indicates the direction

of the cold current of air entering up into the rarefying chamber *I'*, and passing out between the open grating *g, g*, upwardly in the direction of the arrows 4, 4—4, 4, 60 around over the cap or top *h*, thence deflected downwardly by the diaphragm, drop guard *P, P*, through the passage *o*, thence upwardly, and thence out over the semi-deflecting back *q*, in the direction indicated
65 by the arrows 5, 5—6, into the rarefaction chamber, or heating space *r*, as in Fig. 2, and acting directly on and around the bottom and sides of the boiler *C, C, C*, the exhausted heat passing off through the flues *b*. 70

In the operation of my improvements, the following results ensue, all of which are deemed new and important in their character:

The first feature of improvement is the
75 great economy of fuel, and this is brought about in the following manner: By referring to the drawings Figs. 1 and 2, it will be perceived that the grate bars *d, d, d*, depend, or hang down entirely below the line
80 of the mouth or opening of the fire place, and are entirely exposed to the air, immediately in front, and also, beneath, as indicated at *e, e*, and *f, f, f*, Fig. 1; while above are the openings with their respective
85 doors *s, s*.

In firing up the furnace, the grate
90 *df, df, df, df, df*, is partly filled with fuel, or for economy, clinkers, cinders, or any refuse, may be deposited on the bottom of the grate, and then fresh fuel deposited thereon and ignited. The doors *s, s*, are closed, when the draft enters immediately through the opening beneath at *e, e*,—*f, f, f, f*,
95 Fig. 1, and in the direction of the arrows 1, 1, 1, Fig. 2, and thus the oxygen of the air being supplied to the mass of fuel, from beneath, and immediately in front, instead of on the top or over the bed of fuel, the combustion is more perfect; and inasmuch
100 as the strata or mass of cinders or clinkers beneath the fuel becomes thoroughly heated, affording a considerable amount of caloric, without loss of bulk, and as there can be no
105 deadened or partially consumed fuel therefore there can be little if any waste, in consumption, of the ignited mass, and consequently much less fuel is required at the time to afford the required volume of heat. Again in order to extract all the carbonaceous
110 properties of the reduced quantity of fuel, and to produce a more perfect combustion

of the various gases ensuing therefrom, it will be perceived that the result sought after will be fully accomplished in the following manner: When the doors *s, s*, are closed, 5 the cold current of air passes into, and through the grate bars and fuel thereon, in the direction of the arrows 1, 1, 1, 2, Fig. 2, and at the same time, a volume of cold air forces into the space *e*, at the arrow 3, 3, 10 back of the grate, and passing upwardly through the valve damper vent *k²—k²*, into the hot air chamber I, there becoming rarefied, and heated, forces out forwardly through the inclined openings of the ventilating fire back *g, g*, Fig. 1, and intermingling with the caloric and its gases at the point indicated by the arrows 4, 4, Fig. 2, supplies the required amount of oxygen; 20 the air thus first becoming heated in the chamber I, before coming in contact with the carbonaceous properties of the fuel, consequently, the gases of the fuel being set free, are taken up by the heated oxygen, and are perfectly decomposed, before escaping through the passage indicated by the 25 arrows 5, 5—6, 6. By this means of supplying the oxygen to the mass of fuel, little if any smoke results, therefore a much greater volume of heat is afforded from a given amount of fuel; and besides a much 30 greater equality or uniformity of heat can be brought about, and by carrying out fully the mode herein shown there cannot be any choking up, or coating of the flues and channels of the furnace with soot, and residuum, 35 or floating ashes.

By the aid of the valve damper *K, L*, the quantity of oxygen can be increased or diminished. And by aid of the diaphragm 40 drop guard, or suspension back *P, P*, the current or volume of hot air is prevented from forcing out too rapidly, and should any floating particles, or sparks, be thrown off from the fuel, this suspension back acts 45 as a fender, or check, and prevents their escape into the flues of the furnace. By the aid of the cut off *n*, Fig. 2, the back draft of the hot air can be increased or diminished, more or less, or regulated as 50 occasion may require.

The design of the semi-deflecting wall *f*, is to break the draft and prevent the too sudden chilling of the hot air in passing around the boiler *C, C, C*, and in mingling with the volume of air in the space *r*, as well as more 55 fully to prevent the passage out of any floating particles in form of sparks or cinders.

If desired, the portion marked *m*, instead of being solid, may be formed as an auxiliary air chamber, and likewise be made to 60 answer as a receptacle for any floating particles, or may be made as a water tank, which under some circumstances may be found very useful.

In the employment of my improved smoke 65 consuming furnace, a greatly increased economy of space and compactness of construction are brought about, and in the management thereof, great saving of manual labor is accomplished, together with 70 greater security from accident, and saving of time, as well as greatly reducing the endangerment of health to the person engaged in the management thereof.

So far as my improvements have been 75 tested they have diminished the attending expenses at least fifty per cent., and it has been found that one person can do what heretofore has required the services of three 80 employees.

Having described the nature, construction, and operation, and mode of applying my improvements in smoke consuming furnaces, and desiring to secure the same by Letters Patent of the United States, what 85 I claim is—

The special construction and arrangement of a furnace, having one or more open fronts *e, e,—f, f*, Fig. 1, and the cold-air chamber *e², e²*,—Fig. 2, with the perforated or ventilat- 90 ing fire back *g, g*,—hot-air chamber I, and valve *K, L*—the diaphragm drop guard, or suspension back *P, P*,—the cut off *n*, and check wall *q*, as hereinbefore fully set forth and described.

CHARLES F. CORY. [L. S.]

Witnesses:

MITCHELL GRAY,
WM. M. HOUSE.