

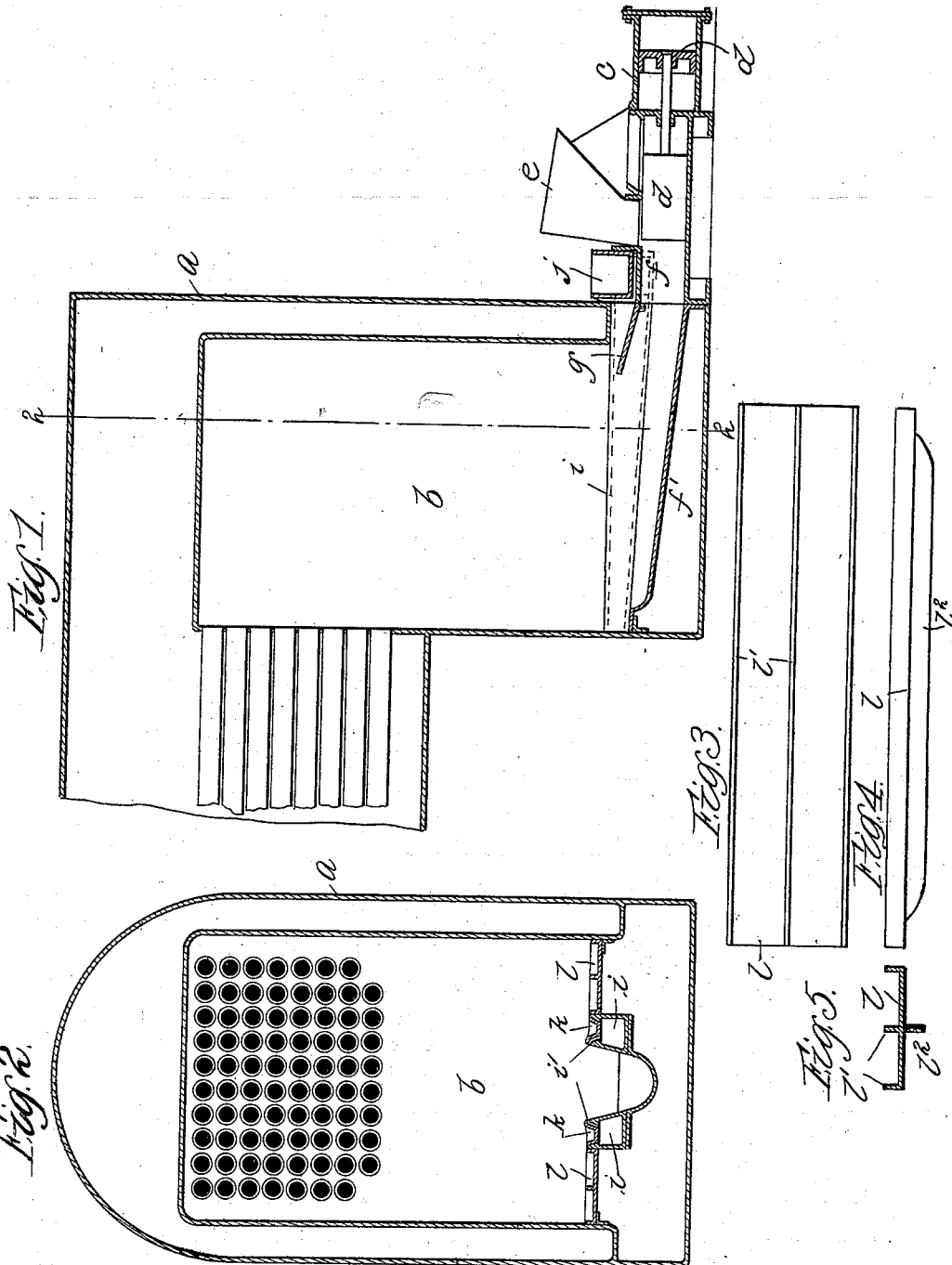
No. 648,251.

Patented Apr. 24, 1900.

**J. GARDEN.
FURNACE.**

(Application filed Oct. 20, 1894.)

(No Model.)



Witnesses.
 Wm. M. Rheem.
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UNITED STATES PATENT OFFICE.

JAMES GARDEN, OF PORTLAND, OREGON, ASSIGNOR TO M. S. PHILLIPS, OF
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FURNACE.

SPECIFICATION forming part of Letters Patent No. 648,251, dated April 24, 1900.

Application filed October 20, 1894. Serial No. 526,520. (No model.)

To all whom it may concern:

Be it known that I, JAMES GARDEN, of the city of Portland, in the county of Multnomah and State of Oregon, have invented certain
5 new and useful Improvements in Furnaces, (for which I have obtained a patent of Great Britain, No. 4,367, dated February 28, 1895,) of which the following is a full, clear, and exact
10 description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding letters of reference in the different figures indicate like parts.

The primary object of my invention is to so
15 construct a furnace, in combination with an underfeed mechanical stoker, that the air may be supplied to the furnace at the point of combustion, while at the same time the
20 gases formed may be prevented from returning or escaping otherwise than through the flue or stack designed therefor.

To these ends my invention consists in the combination of elements hereinafter more particularly described and definitely claimed.
25 In the drawings, Figure 1 is a longitudinal vertical sectional view of a furnace embodying the features of my invention. Fig. 2 is a transverse vertical sectional view of said furnace, taken upon the line 2 2, Fig. 1. Fig.
30 3 is an enlarged plan view in detail of a dead-plate employed in said furnace. Fig. 4 is a side view of the same, and Fig. 5 is a transverse sectional view thereof.

Referring to the drawings, *a*, Figs. 1 and 2,
35 represents what is commonly known as a "water-leg" boiler, to which is applied my improved furnace, having the usual fire-box *b*. In front of the furnace and beneath the fire-level is placed a feeding-ram *c*, Fig. 1,
40 which consists of the usual plunger or pusher *d*, inclosed within a suitable cylinder and connected by means of a rod, as shown, with a steam-piston or other suitable means for reciprocating the same. A hopper *e* is placed
45 above and in communication with the cylinder or fuel-conduit *f*. That portion *f'* of the fuel-conduit which is within the furnace is preferably of a concave or trough shape in cross-section and is extended back through
50 the middle of the fire-box to a point at or near the rear of the latter. The fuel-conduit, for

which I make no claim, may be made of cast-iron, fire-brick or other suitable material.

Upon each side of the fuel-conduit is an air-chamber *i*, (better shown in Fig. 2,) the
55 two uniting at the front in a common passage-way *j*, which is connected in turn with a suitable fan or air-compressor. Openings are formed in the top of the casing, into which are fitted a series of removable twyers *k*, leaving
60 an outlet-opening *i'*, the construction of which and the manner of securing the same in place are well known. By means of this device air may be forced into and thoroughly
65 mixed with the fresh fuel at the point of combustion.

As the air is forced into the furnace through the means described a back or downward pressure is produced which is sufficient to force the air and gas downwardly through
70 the ordinary grate heretofore employed and thence into the furnace-room. This objectionable feature often becomes so serious as to destroy the grate-bars in a few moments, besides causing the escape of the noxious
75 gases in such a way as to cause inconvenience if not positive injury to the attendants. In order to obviate this objection, I have in my improved construction dispensed with the
80 usual grate, and in lieu thereof I have sealed or closed the space occupied thereby preferably by placing upon each side of the twyers a dead-plate *l*, of cast-iron, which is supported
85 upon suitable flanges or lugs in such manner as to enable it to be readily removed. Each dead-plate is provided with ribs *l'* *l''*, which
90 serve to strengthen the plate, while those upon the top permit a sufficient amount of ashes to accumulate to protect the plates from the heat of the furnace. By means of suitable
95 doors in the front of the furnace upon a level with the dead-plates the ashes may be readily removed.

In lieu of the cast-metal dead-plates the bottom of the furnace may be built up solidly
100 with fire-brick, except the air-passages leading to the twyers, thus leaving no opening corresponding to the usual ash-pit beneath; but I prefer the construction shown, as it may the more readily be repaired.

As a result of the construction described, it will be observed that the flat ledge or shelf

is formed upon each side of the conduit corresponding to the ordinary grate-surface over which the fuel spreads as it is fed into the conduit, and as sufficient air is admitted through the twyers to support combustion the fuel is not only entirely consumed, but as no air is admitted in the usual way through the front of the furnace the fire may be more perfectly controlled.

10 I have found in practice that by closing the furnace to the admission of air except through the twyers the most satisfactory results may be obtained.

My improved device is especially applicable to marine work, and may be used to excellent advantage by sealing the front of the furnace and employing an overblast in connection therewith.

20 Having thus described my invention, I claim—

1. A sealed or grateless underfeed-furnace in which is combined a fuel-conduit adapted to feed the fuel from beneath, means for introducing the fuel thereto, air-openings within or in operative proximity to said conduit, means for forcing air into the furnace through said openings, laterally-projecting sealed or air-tight ledges over which the fuel may spread and be consumed when forced up-

wardly through the conduit, and means for preventing the admission of air except through said air-openings within or adjacent to the conduit, whereby air may be introduced under pressure, a backflow of gases prevented and combustion insured, substantially as described.

2. The combination with a furnace of the class described, of an underfeed-conduit, means for introducing fuel thereto, means for introducing a blast of air to openings adjacent to the conduit and dead-plates forming laterally-projecting air-tight ledges for the reception and support of the fuel, substantially as set forth.

3. The combination with a furnace, of an underfeed-conduit, means for introducing fuel thereto, means for introducing a blast of air to openings adjacent to the conduit, the bottom of said furnace being entirely closed adjacent to the sides of said conduit.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 14th day of October, 1894.

JAMES GARDEN.

Witnesses:

D. H. FLETCHER,
FLORENCE KING.