

(No Model.)

2 Sheets—Sheet 1.

O. F. JONES.
STEAM BOILER FURNACE.

No. 566,862.

Patented Sept. 1, 1896.

Fig - 1 -

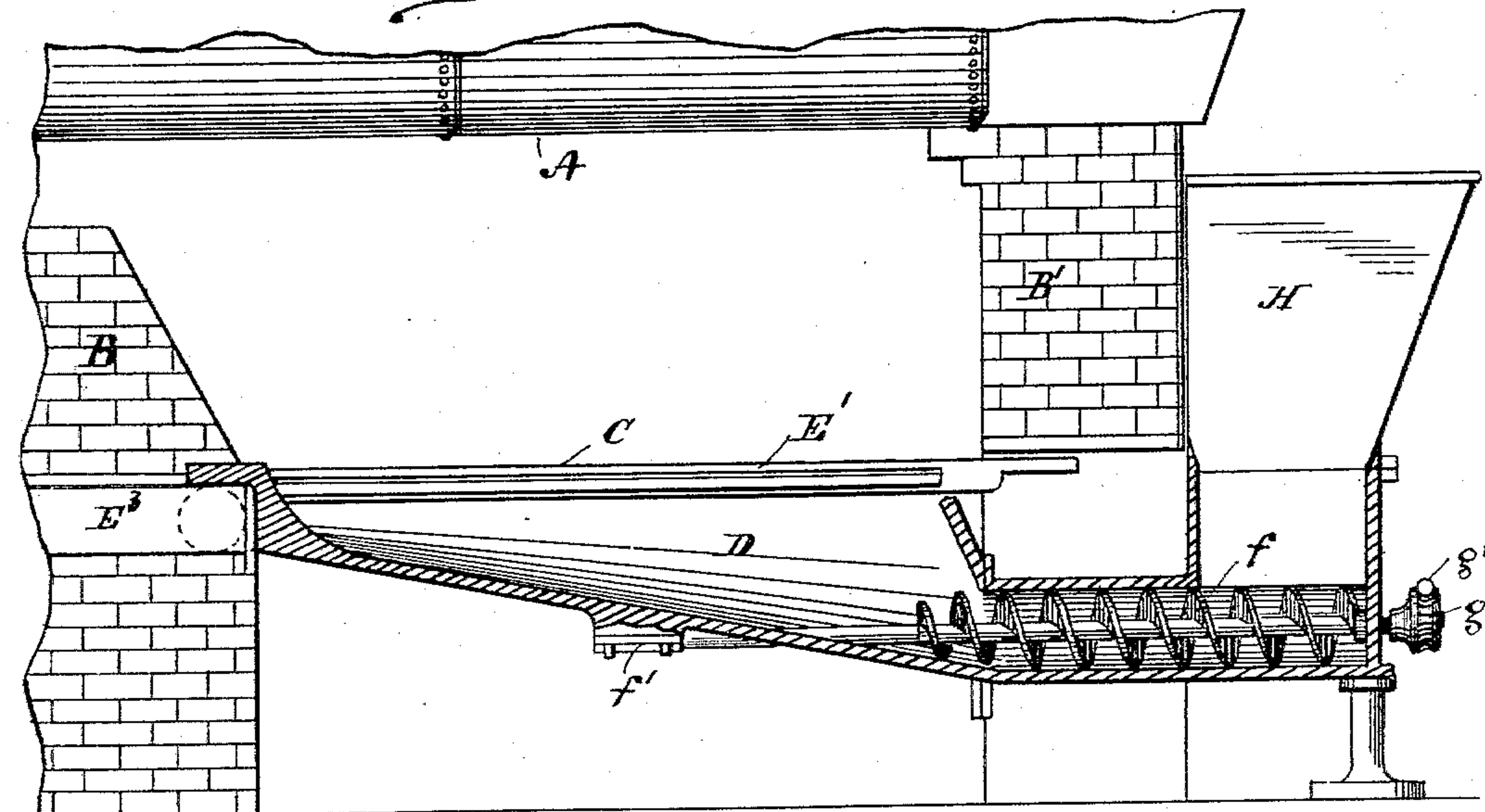
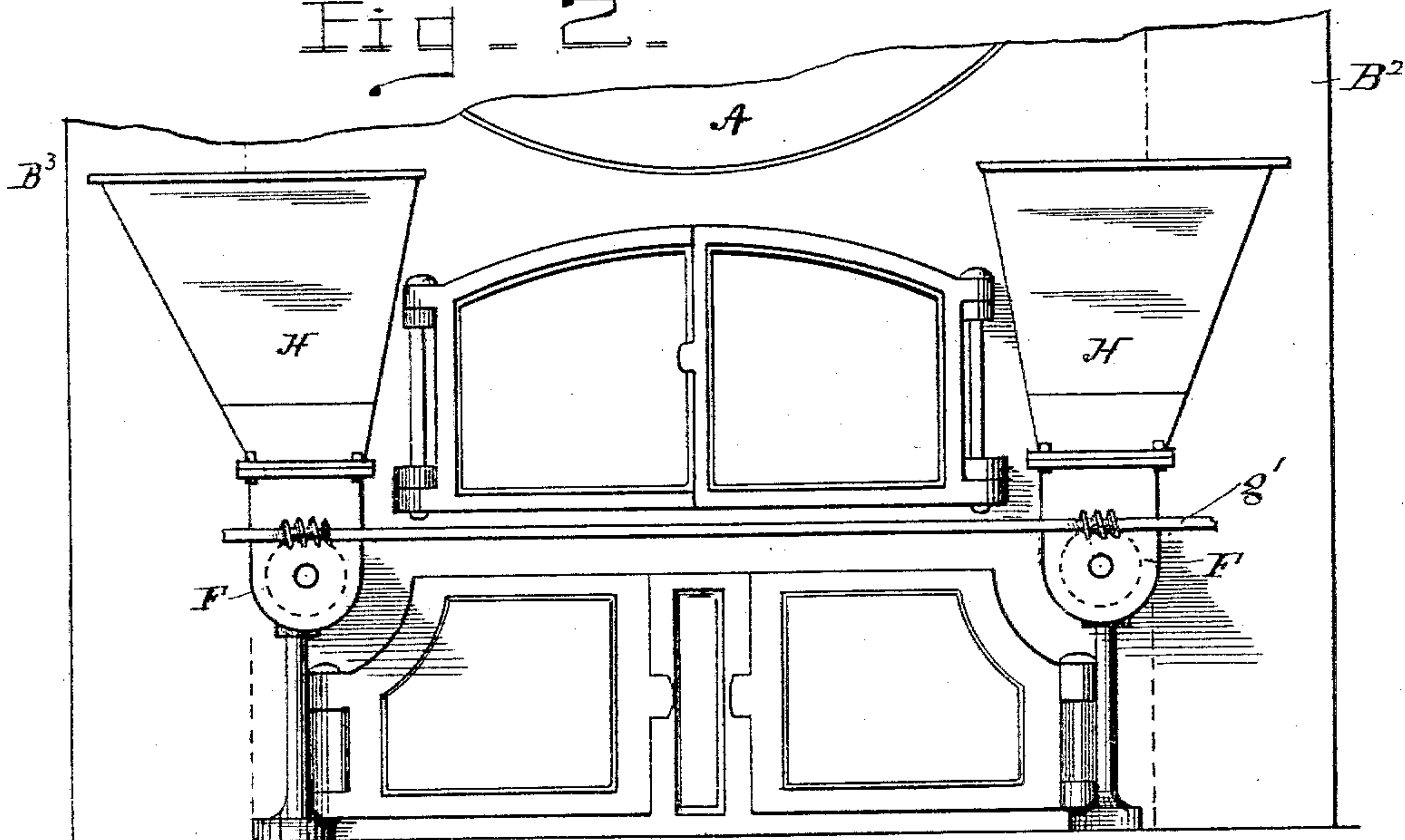


Fig - 2 -



Witnesses:

Frank H. Brumman
L. H. Thresher

Oliver F. Jones.
Inventor.

By L. M. Hesse Attorney

(No Model.)

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Fig - 3 -

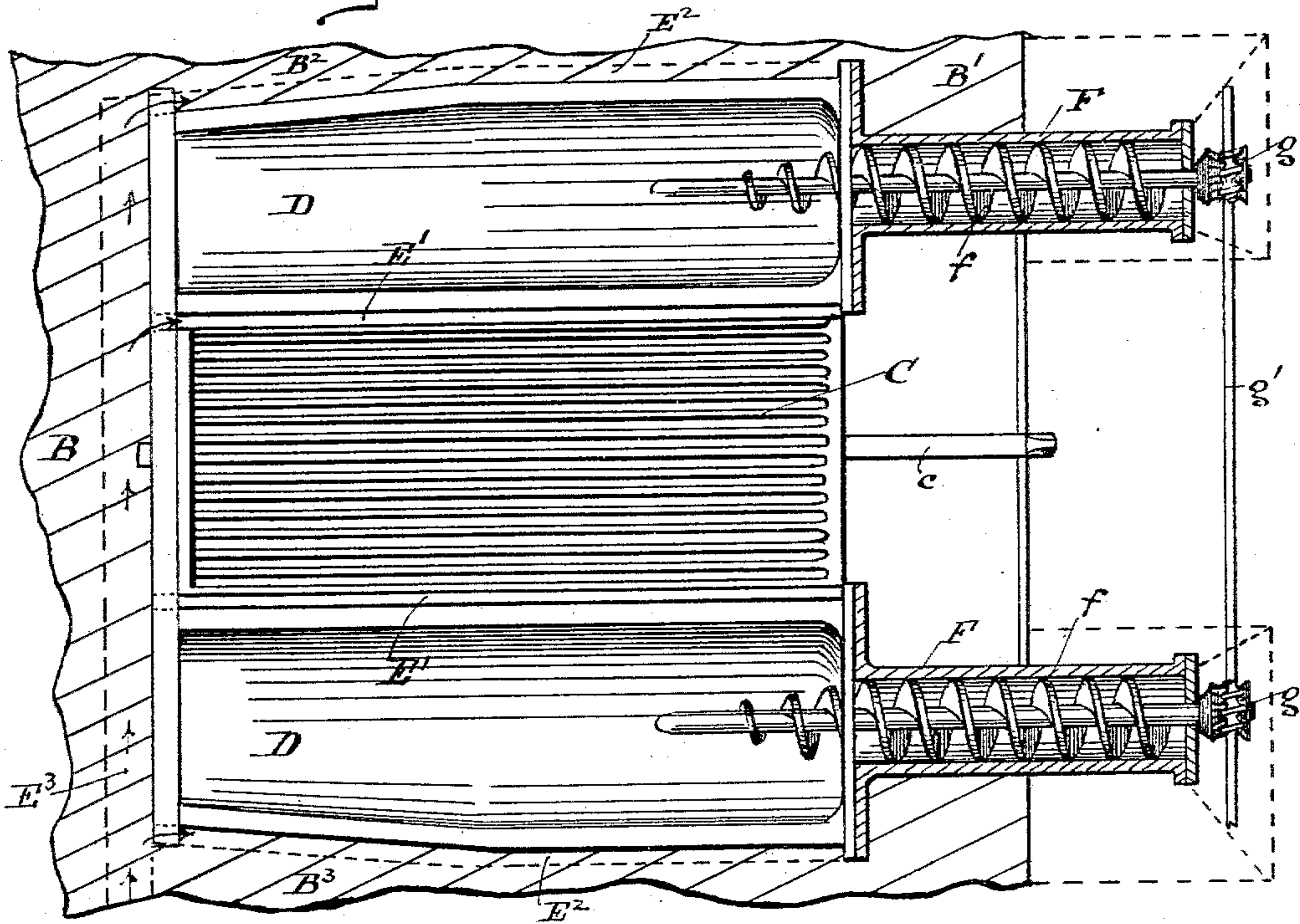
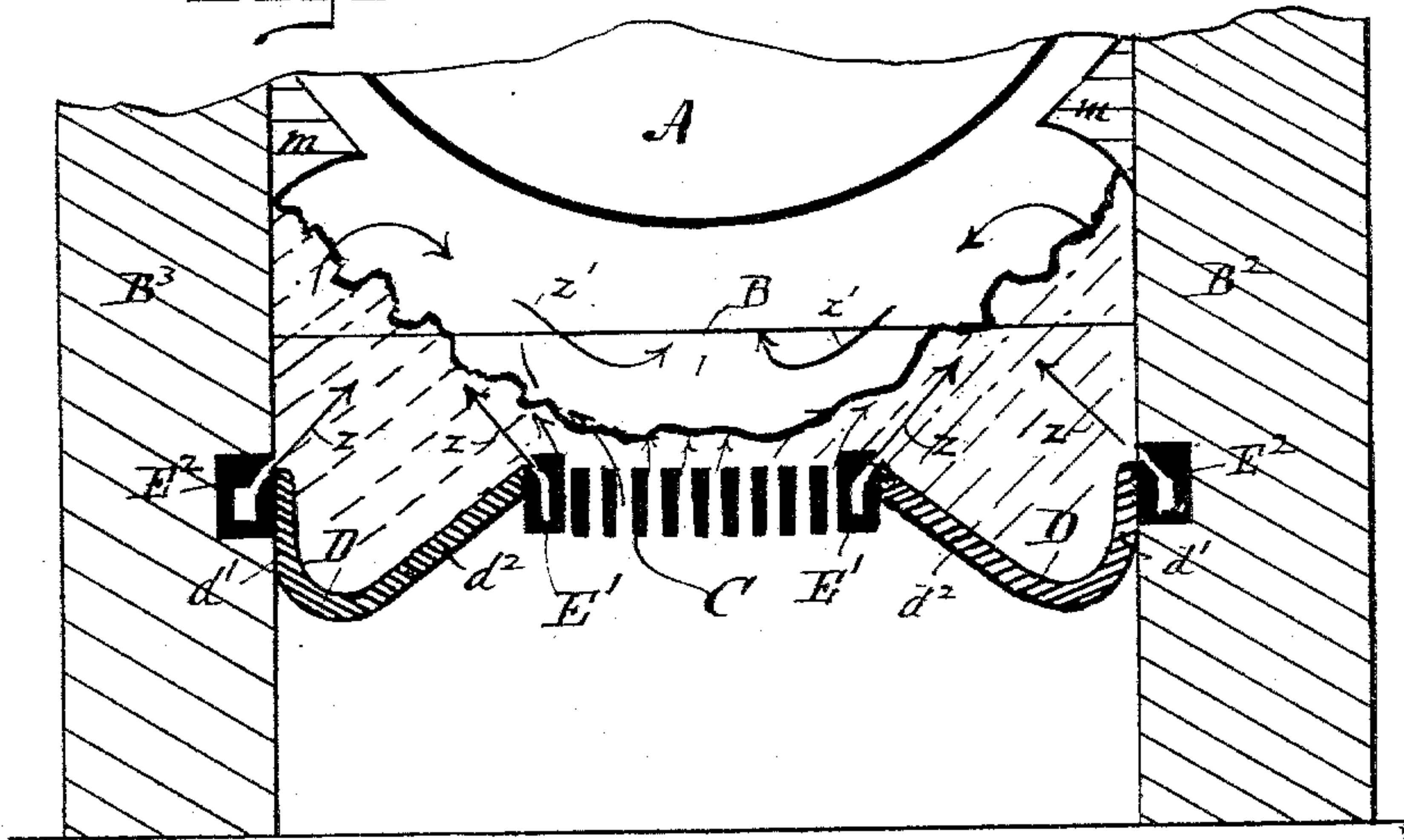


Fig - 4 -



Witnesses:
Frank K. Bowman
D. A. Thrasher

Oliver F. Jones
Inventor,
by L. M. Hovey attorney.

UNITED STATES PATENT OFFICE.

OLIVER F. JONES, OF CINCINNATI, OHIO, ASSIGNOR OF ONE-HALF TO W. P. BRUCE, OF SAME PLACE.

STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 566,862, dated September 1, 1896.

Application filed August 14, 1895. Serial No. 559,273. (No model.)

To all whom it may concern:

Be it known that I, OLIVER F. JONES, a citizen of the United States, residing at Cincinnati, Ohio, have invented new and useful
5 Improvements in Steam-Boiler and other Furnaces, of which the following is a specification.

My invention relates to steam-boiler and other furnaces, its object being to provide a
10 construction for the automatic uniform feeding of the fuel and for the perfect, uniform, and economical combustion of the same, with a view to obtain the best results in the use of bituminous coals, including the prevention of
15 smoke, &c.

To this end my invention consists in the combination, with the boiler-furnace, of a central grate extending from the fire-door rearward to the "bridge-wall" and feed-troughs
20 at each side, into which the fuel is conveyed or fed by a screw conveyer, whence it overflows toward the center upon the grate. In connection with these I employ perforated air-feeding conduits extending the length of
25 the feeding-troughs at each side, discharging at an upward inclination through the masses of fuel. These, together with the auxiliary attachments and actuating mechanism, constitute the main features of the invention
30 hereinafter more fully described.

My invention is embodied in the apparatus exhibited in the accompanying drawings, in which—

Figure 1 is a side elevation in section of the
35 improvement as applied to a steam-boiler furnace. Fig. 2 is a front elevation. Fig. 3 is a plan view showing the feeding-troughs, grate, and fuel-conveyers. Fig. 4 is a cross-section taken through the feeding-troughs.

Referring now to the drawings, A designates a steam-boiler of the ordinary cylindrical type; B, the bridge-wall; B', the front wall, and B² B³ the side walls, respectively, of the ordinary brick setting. As the ob-
45 ject of these illustrations is to show the invention as applied to existing circumstances and a familiar type of boiler-setting, it will be sufficient to say that these parts are of the ordinary construction. In lieu of the ordi-
50 nary grate occupying the entire space between the side walls B² B³, I employ a central rela-

tively narrow grate C, flanked at the sides by fuel-troughs D D, extending from the front wall B' to the bridge-wall B.

The troughs are preferably of cast-iron and
55 arranged below the general level of the grate C, are closed at the sides and bottom, and open at the level of the grate. The front wall of each trough is pierced for the passage of fuel, and the bottoms are inclined thence upwardly
60 to the rear. The troughs present a somewhat U-shaped cross-section curved at the bottom, having a substantially vertical wall *d'* at the outer side and an outwardly-inclined wall *d''* at the inner side. At the level of the grate,
65 at the sides of each trough D, are air-discharging conduits E' E², provided each with a continuous slit adapted to discharge at an upward inclination over the top of the trough. The conduits E' E² communicate at the rear
70 with a suitable passage E³, arranged, as may be convenient, in or in connection with the furnace-walls and provided with a "blower" (not shown) for forcing heated air through the discharge-conduits.
75

To the perforated front of each trough and extending through the furnace-wall B' is bolted a cylindrical extension F, provided with a screw conveyer *f* and with a feeding-hopper H, connected to a forward opening at
80 the upper side of each extension. The shaft of the conveyer extends through its bearing in the front wall of the extension, and is provided with suitable appliances for the application of driving power. In the present in-
85 stance I have shown as the driving means upon each shaft a worm-gear *g*, driven by a worm-shaft *g'*, meshing with both gears simultaneously. At the rear the shaft of the conveyer *f* is carried through the bottom of the
90 trough to a bearing *f'* at the under side.

The blower hereinbefore referred to and the worm-shaft above described are to be driven by any suitable source of power. (Not shown.)
95

I prefer to construct the grate C as a "tilting grate"—carried upon a fore-and-aft pivot *c*—which may be shaken upon occasion to discharge the accumulated refuse or turned to dump the contents into the ash-pit below.
100

The operation of the device is as follows: The "green" fuel is fed from the hoppers H

and carried into the troughs equally by the conveyers *f*. As the fuel is pushed backward it is gradually piled upward and falls over upon the grates, the slope of the inner wall of each trough assisting this distribution. The position of the fuel is indicated by the irregular lines in Fig. 4. The surface of the fuel-pile is kept ignited by the heat of the furnace, and the combustion is intensified by the action of the air-blasts through the pipes *E'* *E''*, issuing as indicated by the arrows *z*, directed outward and upward from each side of the trough, intensifying the combustion of the incandescent mass at the surface. The effect of these blasts is also to draw air through the ash-pit and grate *C* by producing a partial vacuum at the center of the furnace above the grate, tending also to produce the double return currents indicated by the arrows *z'*. It will be seen that the gases of combustion are thus brought immediately above the partially spent and hottest coals at the center of the furnace, and thus thorough combustion is effected. It will also be observed that by the form and position of the fuel-piles rising at each side a general throat or passage through the furnace, approximately parallel to the curvature of the boiler, is maintained, by which the heated gases are brought into close contact with the under side of the boiler. Thus the ordinary cooling effect of the side walls is obviated and the greatest heat maintained at the center. Moreover, by the maintenance of an incandescent surface over the fuel-piles at the sides the fuel immediately beneath is coked, so that the fuel, as it gradually works outward and downward toward the grate, is partially coked before it reaches actual combustion and is completely coked before its greatest incandescence. Thus the formation of clinkers is prevented and the entire heat-producing elements of the fuel are thoroughly utilized. I may also employ curved projections of the side walls, as shown at *m*, Fig. 4, as deflectors to assist in turning the air-currents inward and downward toward the center of the combustion-chamber in order to avoid the cooling effects of the recesses at the angle between the boiler and the side walls.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. In a steam-boiler or other furnace, in combination with a central grate, two fuel-troughs arranged one at each side adjacent to the side walls of the setting and means for

forcing fuel into the troughs below the grate-level and compelling the same to bank against the side walls and overflow upon the grate, producing a throat or passage through the furnace, having greatest depth at the center and inclining thence upward and outward to the sides, substantially as set forth.

2. In a steam-boiler or other furnace, in combination with a central grate and fuel-troughs intervening between the same and the side walls, air-blast conduits arranged alongside of each fuel-trough arranged to discharge upwardly at an inclination over the fuel-trough, substantially as set forth.

3. In a steam-boiler furnace, in combination with a central grate, fuel containing and feeding troughs flanking the grate at each side, arranged below and opening at the grate-level, each having a substantially vertical outer wall and an inner wall inclined inward toward the grate, substantially as set forth.

4. In a steam-boiler furnace, in combination with a central grate, fuel containing and feeding troughs flanking the grate at each side, arranged below and opening at the grate-level, each having a bottom inclined upward from front to rear, substantially as set forth.

5. In a steam-boiler furnace, a fuel, containing and feeding trough, adapted to rest and operate at the side of the grate, said trough having a bottom inclined upward from front to rear, substantially vertical outer side walls, and inner walls inclined outwardly, and a fuel-feeding aperture through the front wall, whereby the mass of fuel fed inward from the front tends to discharge its excess over and upon the grate adjacent to the inclined side walls, substantially as set forth.

6. In a steam-boiler furnace, in combination with a central grate and side troughs adapted to contain and accumulate the fuel in a mass whose surface is inclined outwardly and upwardly from the grate, two air-discharging conduits arranged at the sides of and parallel with each trough, one of which discharges at an inclination approximately parallel with the surface of the mass of fuel, and the other directly through said mass, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

OLIVER F. JONES.

Witnesses:

L. M. HOSEA,
FRANK K. BOWMAN.