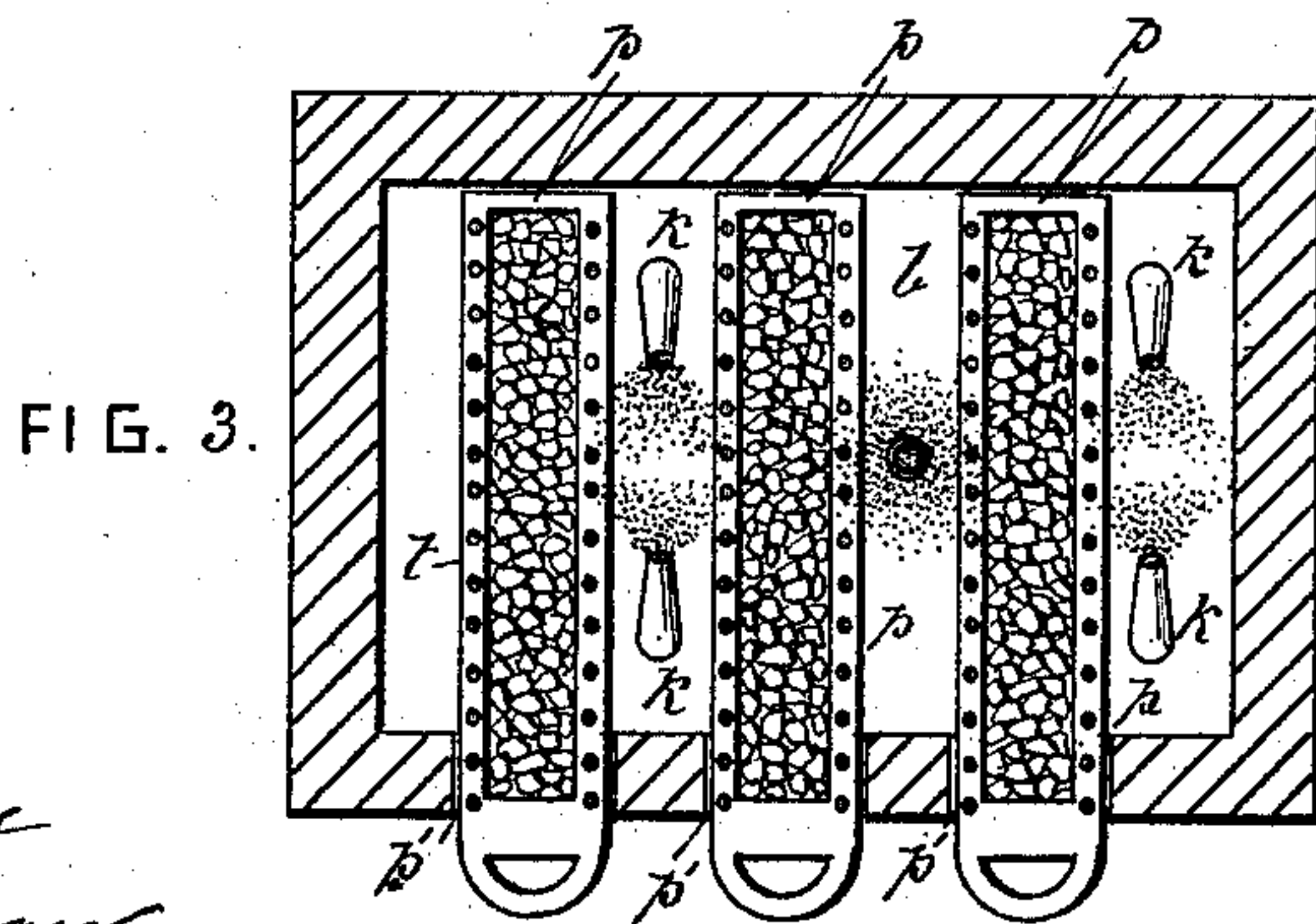
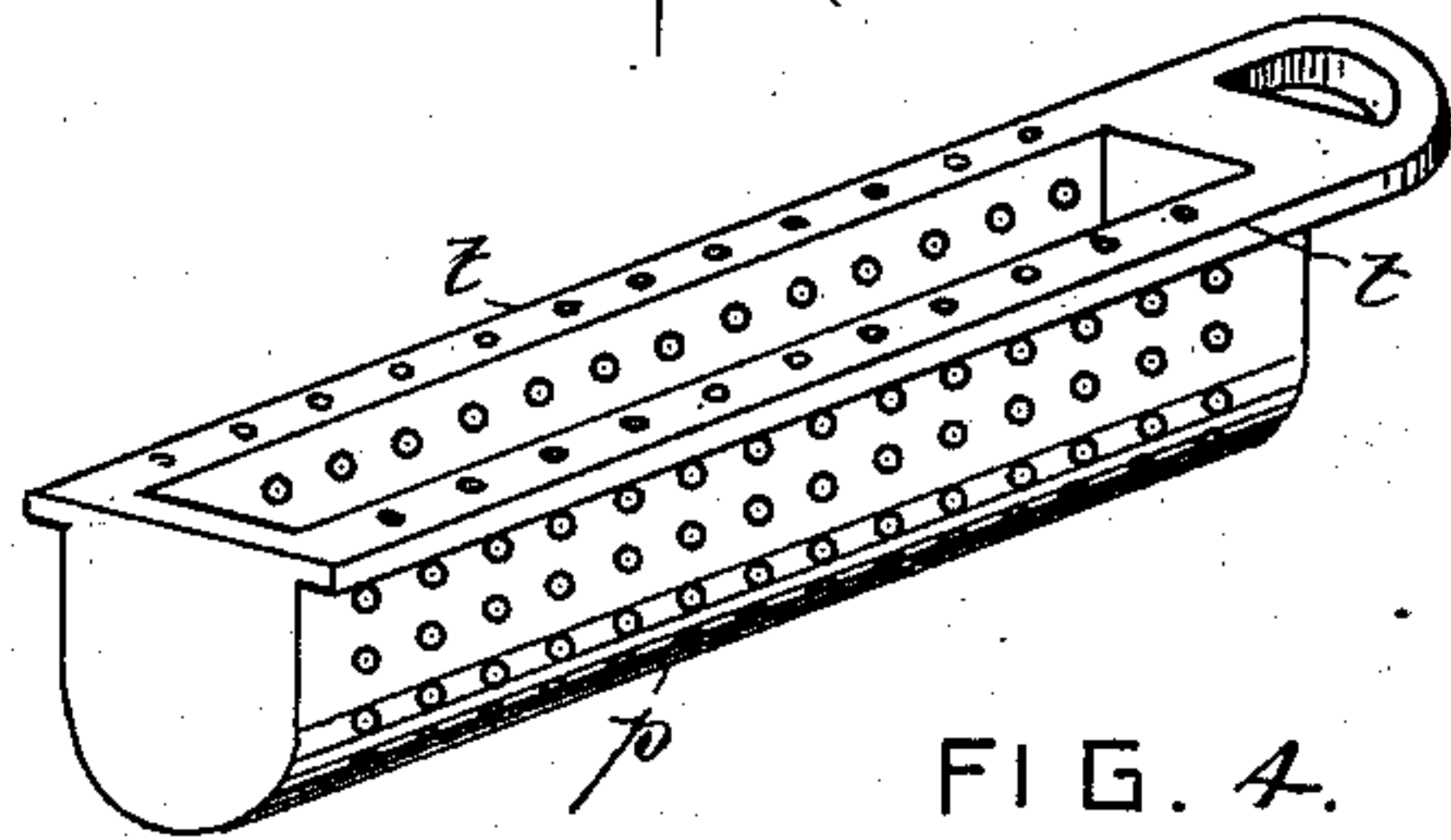
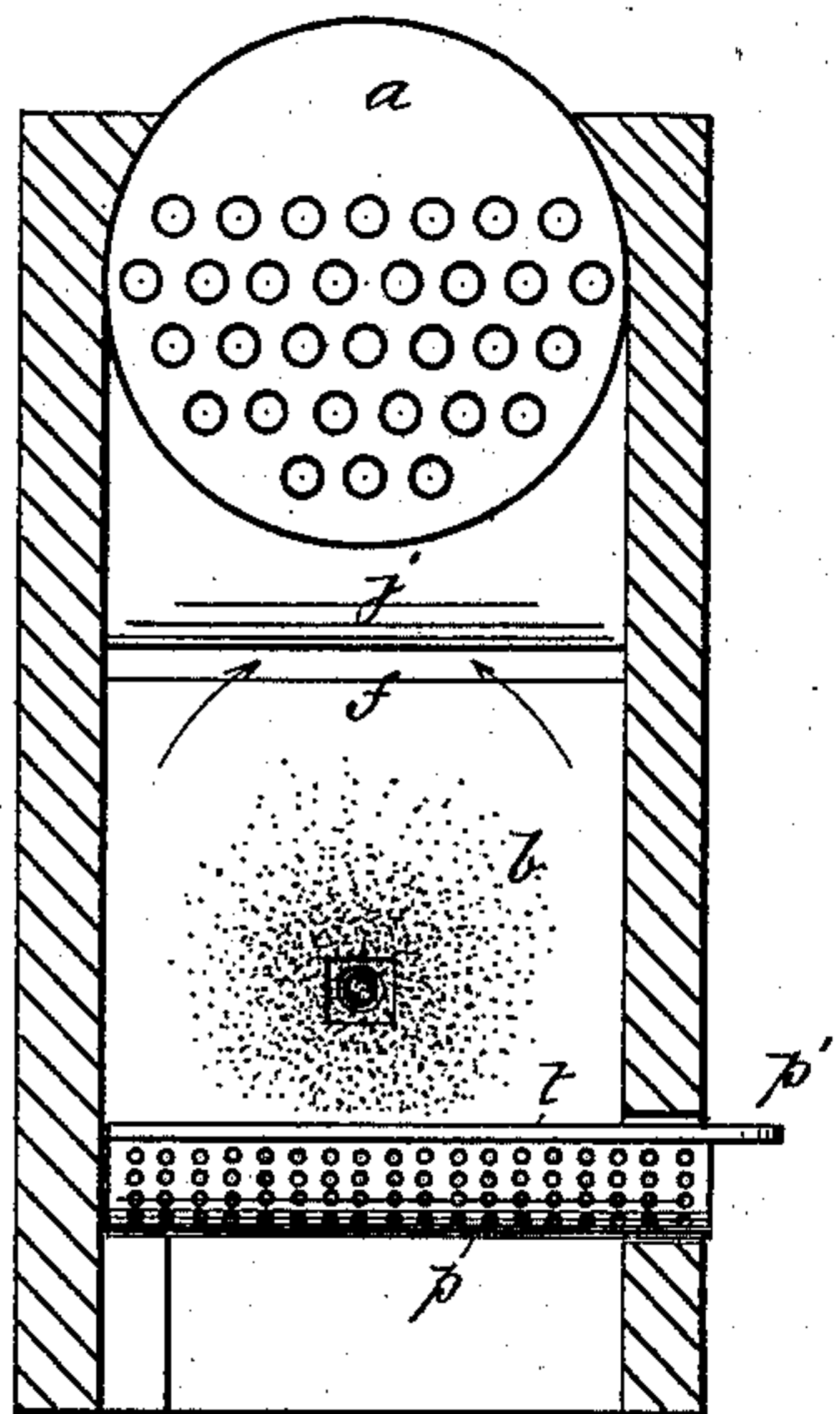
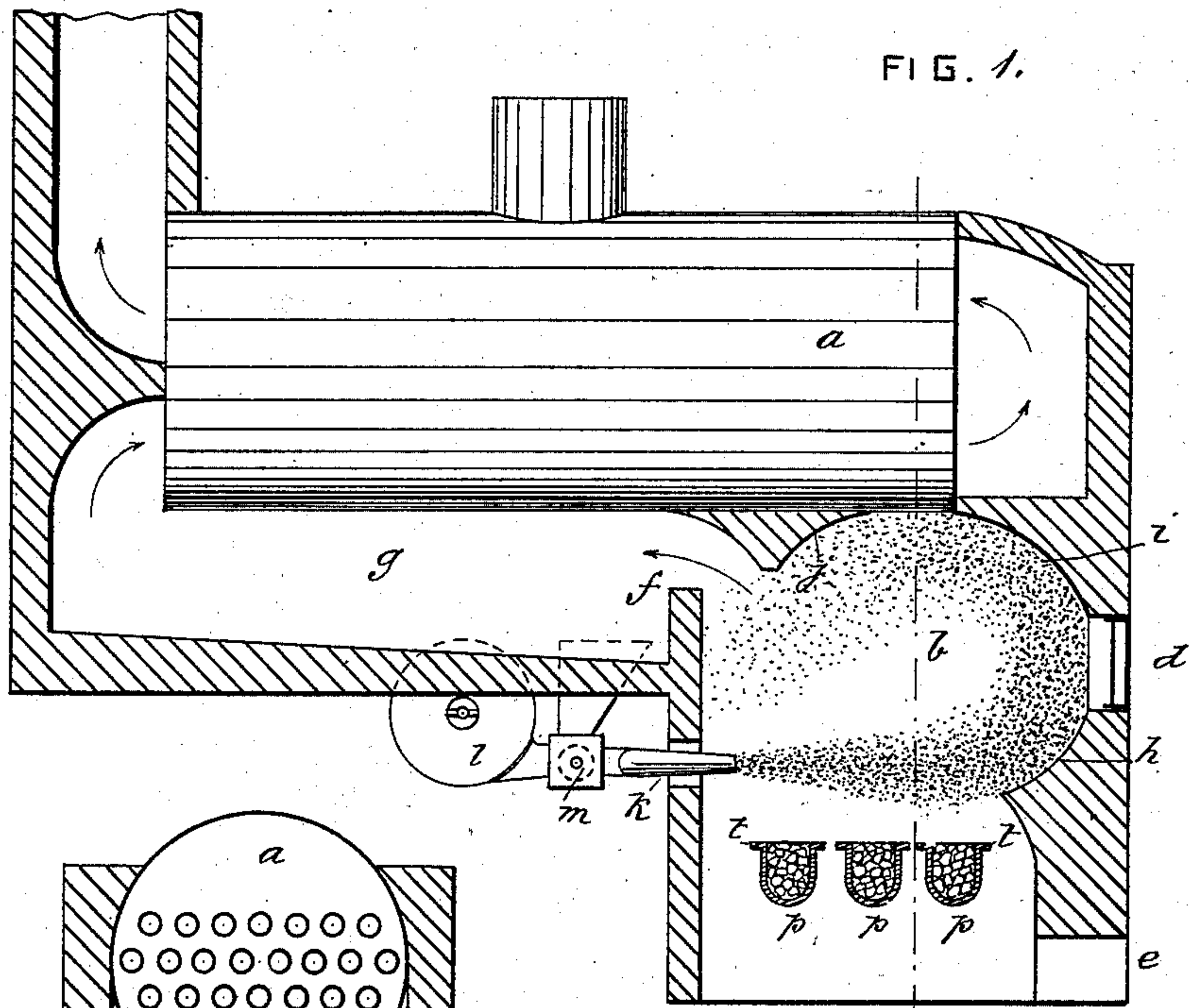


(No Model.)

A. MASON.
APPARATUS FOR BURNING CULM.

No. 406,753.

Patented July 9, 1889.



WITNESSES

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att'y

UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING CULM.

SPECIFICATION forming part of Letters Patent No. 406,753, dated July 9, 1889.

Application filed June 8, 1888. Serial No. 276,529. (No model.)

To all whom it may concern:

Be it known that I, ALLAN MASON, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Burning Culm, of which the following is a specification.

My invention consists of an improved contrivance of apparatus for burning culm or pulverized coal by injecting the pulverized coal into and for a time maintaining it in suspension in the furnace-chamber by the injecting forces, and at the same time burning lump-coal below the injected fine fuel in independent separate burners, below which the coal-ashes are precipitated, the latter being used mainly for the purpose of starting the fire to begin with and to insure the continuous burning of the fine fuel by reigniting it in case of temporary interruption, to which it is liable by various causes, all as hereinafter fully described, reference being made to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a boiler-furnace contrived with apparatus for carrying out my invention. Fig. 2 is a transverse section of the same. Fig. 3 is a horizontal section, and Fig. 4 is a perspective view of one of the burners for lump-coal.

In Fig. 1, *a* represents an ordinary return-flue boiler; *b*, the combustion-chamber of the furnace; *d*, the fire-door; *e*, the ash-pit door; *f*, the bridge-wall, and *g* the flue back of the bridge-wall. In such a furnace, or any other suitable therefor, I provide deflecting-surfaces *h i j*, of refractory material, as shown, or in any approved arrangement, with an injector *k* for air to be forced in, preferably at the back of the chamber, by a fan *l*, or other means, and coal-dust charged into the air-spout by a screw feeder *m*, or other means, to be carried along for feeding the furnace and for being mixed and combined with the air and held in suspension for combustion by it.

It will be seen that the blast first impinges on the pan *h*, located a little above the ash-pit, spreading more or less. Then it is turned upward violently by the deflecting-surface *h*, diffusing in the upper space, where it is held up in cycles by the incoming jet below, repeatedly coming in contact with deflecting-

surfaces *i* and *j*, whereby it is turned downward into the incoming blast, which takes along with it any yet-unconsumed particles, and prevents them from falling into the ash-pit, and retains them in the vortex of combustion until consumed, the resulting smoke and gases of combustion being at the same time urged along the flue *g*; but instead of using the deflecting-surfaces with the blast of coal-dust projected laterally a series of injectors *k* may be distributed in the area of the furnace-chamber and adapted for projecting the blasts upwardly from the lower space directly against the crown-sheet of the furnace or fire-box, or against the boiler, as represented in Fig. 3, with practically the same effects in maintaining the suspension of the fine fuel during the period of combustion. Together with such contrivances for the combustion of the fine fuel I also provide means for an auxiliary fire of lump-coal in the lower portion of the furnace-chamber at or about the locality of the ordinary fire-bed, mainly for the purpose of starting the fire of coal-dust in the first place and of renewing the same from time to time in cases of interruption, to which it is liable by irregularity or clogging of the feed and other causes, but also for adding to the capacity of the furnace for useful effect, for which means I employ sectional burners *p* with wide spaces between them, through which the falling ashes from the upper fire may fall into the pit, because an ordinary coal or other fire of uniform spread over the area of the chamber would fail of this purpose by being clogged with ashes from the fire above, said burners being of such limited transverse extent as that the ascending currents from them will turn away into the pit such matters as might tend to fall into them, and thus be self-protecting so far as the falling matters of the upper fire are concerned. These burners *p* may consist of trough-shaped drawers adapted to slide in and out of the furnace through suitable openings *p'* of one side wall of the furnace for receiving and introducing the coal. The troughs will be perforated in the sides and bottom for the supply of air for supporting the combustion of the coal in them and for the escape of the ashes through the bottom. The upper

edges of the troughs are flanged over horizontally and outwardly at t for bearings in the slideways in the openings p' , and also for a useful effect in distributing the air through
 5 perforations in jets from below for admixture with the gases and vapors rising from the burners, said flanges being suitably perforated for the purpose.

It will be noted that these burners can
 10 be withdrawn individually for replenishing them with coal without interrupting the burning of the fine fuel, as would be the case on opening the fire-door and replenishing the fire in the usual way, care being taken not to draw
 15 them entirely out of the openings, so that the part remaining in the opening constitutes a practicable closure thereto.

I disclaim herein the process of burning coal and hydrocarbon fuel as set forth in my application for a patent, Serial No. 266,282, filed
 20 March 5, 1888; also the process of burning culm and lump-coal as set forth in my application for a patent, Serial No. 266,281, filed March 5, 1888.

25 What I claim, and desire to secure by Letters Patent, is—

1. The combination, with a furnace-chamber, of one or more air and pulverized-coal injectors and deflecting-surfaces for injecting
 30 ing and for a time maintaining the coal in

suspension in the furnace-chamber by the injecting forces, and independent or separate burners below the injected fine fuel, between which the coal-ashes are precipitated, substantially as described. 35

2. The combination, with a furnace-chamber, of one or more air and pulverized-coal injectors and deflecting-surfaces for injecting and for a time maintaining the coal in
 40 suspension in the furnace-chamber by the injecting forces, and independent or separate burners below the injected fine fuel, between which the coal-ashes are precipitated, and consisting of trough-shaped drawers adapted for
 45 being inserted and withdrawn through the side wall of the furnace and being charged with fuel independently, substantially as described.

3. The combination, with a furnace-chamber, of the improved burner consisting of a
 50 fuel-holding trough having perforated sides and top flanges and fitted in a slideway through the furnace-wall, substantially as described.

Signed at New York city, in the county and State of New York, this 4th day of June, A.
 55 D. 1888.

ALLAN MASON.

Witnesses:

W. J. MORGAN,
 A. P. THAYER.