

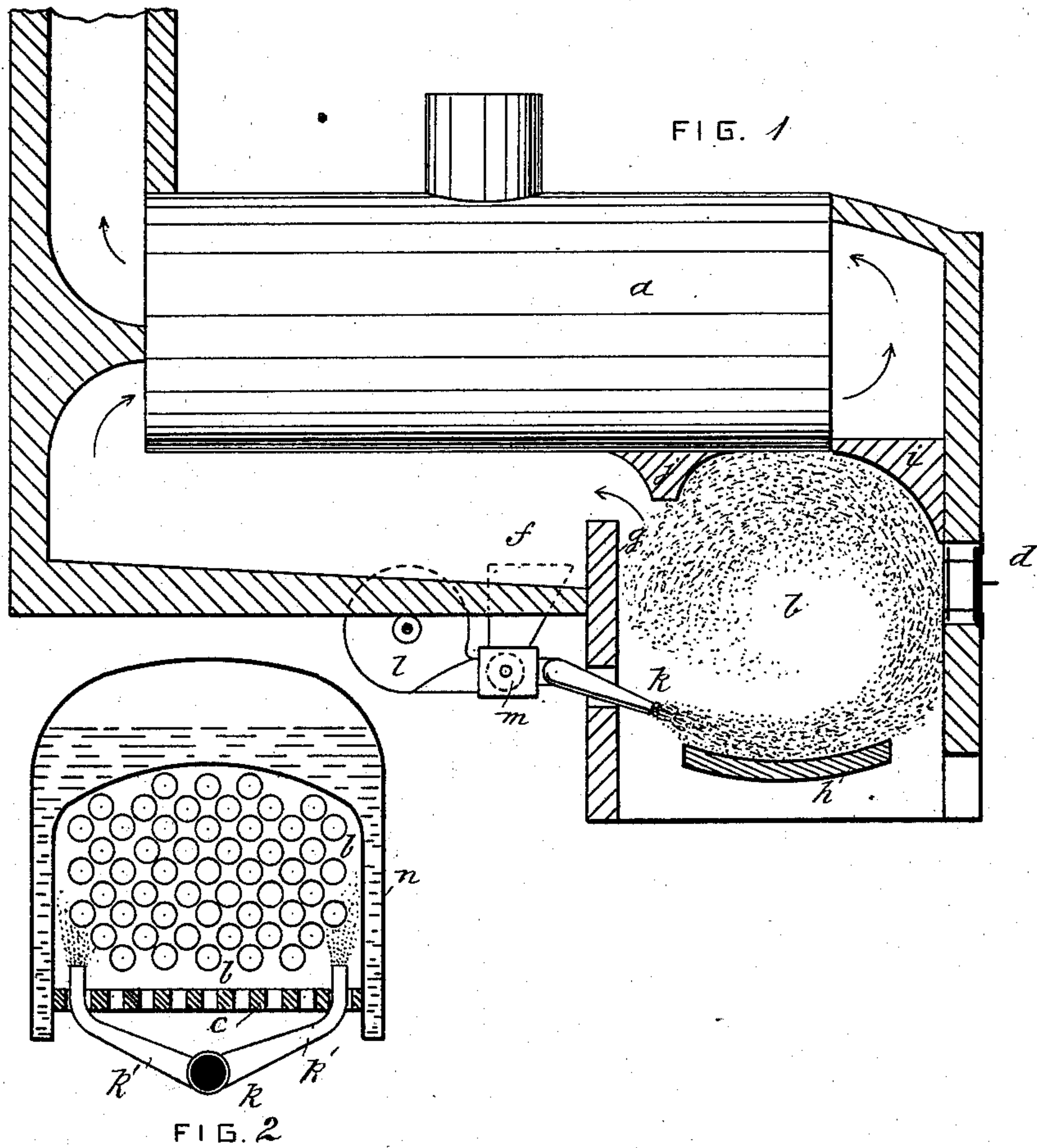
(No Model.)

A. MASON.

APPARATUS FOR BURNING CULM OR PULVERIZED COAL.

No. 406,659.

Patented July 9, 1889.



WITNESSES

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APPARATUS FOR BURNING CULM OR PULVERIZED COAL.

SPECIFICATION forming part of Letters Patent No. 406,659, dated July 9, 1889.

Application filed March 8, 1888. Serial No. 266,556. (No model.)

To all whom it may concern:

Be it known that I, ALLAN MASON, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Burning Culm or Pulverized Coal; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My improved apparatus for burning pulverized coal consists of contrivances for maintaining the particles in suspension and general distribution throughout the combustion-chamber, together with the air for effecting the combustion, so that the mixture and union of atoms is in process of operation among and throughout the moving particles in all the space and in far greater amount and intensity than as burned in a mass or bed on the grate, with correspondingly more effective or perfect combustion and greater production and intensity of heat in a given space, all as hereinafter described, reference being made to accompanying drawings, in which—

Figure 1 is a longitudinal sectional elevation of a boiler-furnace, showing one contrivance of apparatus that may be employed for maintaining the suspension and distribution by the cycling currents produced in the furnace by an injecting-blast of air laden with the atoms of coal. Fig. 2 is a transverse section of a locomotive-boiler furnace with the injecting apparatus adapted for that kind of furnace.

In Fig. 1, *a* represents an ordinary return-flue boiler; *b*, the combustion-chamber of the furnace; *d*, the fire-door; *f*, the flue back of the bridge-wall *g*. In such a furnace I provide a pan-shaped deflector *h*, and when required others *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, but leaving a comparatively still air-space below for reception of the ashes. Then it is turned upward violently by the deflector *h*, diffusing in the upper space, where it is held up in cycles by the incoming jet below, repeatedly coming in contact with deflectors *i* and *j*, which turn it downward into the incoming blast, which takes along with it any yet unconsumed particles and prevents them from falling onto pan *h* or over its edge into the ash-pit, said pan being narrower and shorter than the width and length of the chamber. It will also be seen that these appliances may be readily fitted to a common boiler-furnace already in use without material expense of fitting and may be as readily removed. For adaptation of the same process to the combustion-chamber *b* of a locomotive-boiler fire-box *n* the injecting-nozzle *k* may have branches *k'* entering near each side from below the grate *c*, and being suitably upwardly curved to constitute deflectors for projecting the coal upward into the opposite angles, and be thereby deflected so as to meet over the center of the chamber and produce gyrating cycles by their counter-action, adapted to maintain the suspension of the coal atoms until consumed. To begin with, fire may be started on the pan *h* or the coal-grate to produce the heat necessary for igniting the coal-dust, or a torch may be introduced through the fire-door.

For the subsequent continuance of the fire the high temperature within the chamber is to be depended on for reigniting the fine particles of coal in case of any temporary suspension due to irregularity in the feeding of the coal; but it is intended that the coal shall be so fine and shall feed with such regularity that when properly adjusted no interruption will occur.

By this method all the combustible matters in the coal will be effectually consumed with greater economy of fuel, and an especial advantage is gained in the total prevention of clinker and slag. What ash is developed may

fall in part into the ash-pit through some localities where the eddies favor it, while some may be carried over the bridge-wall and descend where the cycles have less suspending effect.

I am aware that a fan has been employed as a feeder merely to inject pulverized coal into the furnace upon the fire-bed; but my invention is distinguished from such a device in that it is specially contrived for projecting the coal into the space above and maintaining it in suspension for combustion in the atmosphere of the furnace.

I disclaim herein the process of burning coal and hydrocarbons in combination described in my application filed March 5, 1888, Serial No. 266,282; also the process of burning culm or pulverized coal, filed the same date, No. 266,281.

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

1. The combination, with a furnace-chamber, of an air and pulverized-coal injector upwardly projecting the injected coal into the chambers provided with deflecting-surfaces, as shown, thereby maintaining the coal in suspension during combustion above a still air-space in the lower part of the furnace-chamber for reception of the ashes, substantially as described.

2. The combination, with a furnace-cham-

ber, of an air and pulverized-coal injector and deflectors in the chamber upwardly projecting and maintaining the coal in suspension during combustion above a still air-space in the lower part of the furnace-chamber for reception of the ashes, substantially as described.

3. The combination, with a furnace-chamber, of an air and pulverized-coal injector and a concave-pan deflector in the lower space, on which the impinging jet is diffused upwardly and backward over the incoming jet, substantially as described.

4. The combination, with a furnace-chamber, of an air and pulverized-coal injector that injects the coal and air, the deflector *h*, located above a comparatively still air-space below for reception of the ashes, in the lower space whereon the incoming jet impinges, and one or more deflectors in the upper space that direct, diffuse, and, with the currents of injected air, maintain the coal in suspension during combustion, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ALLAN MASON.

Witnesses:

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A. P. THAYER.