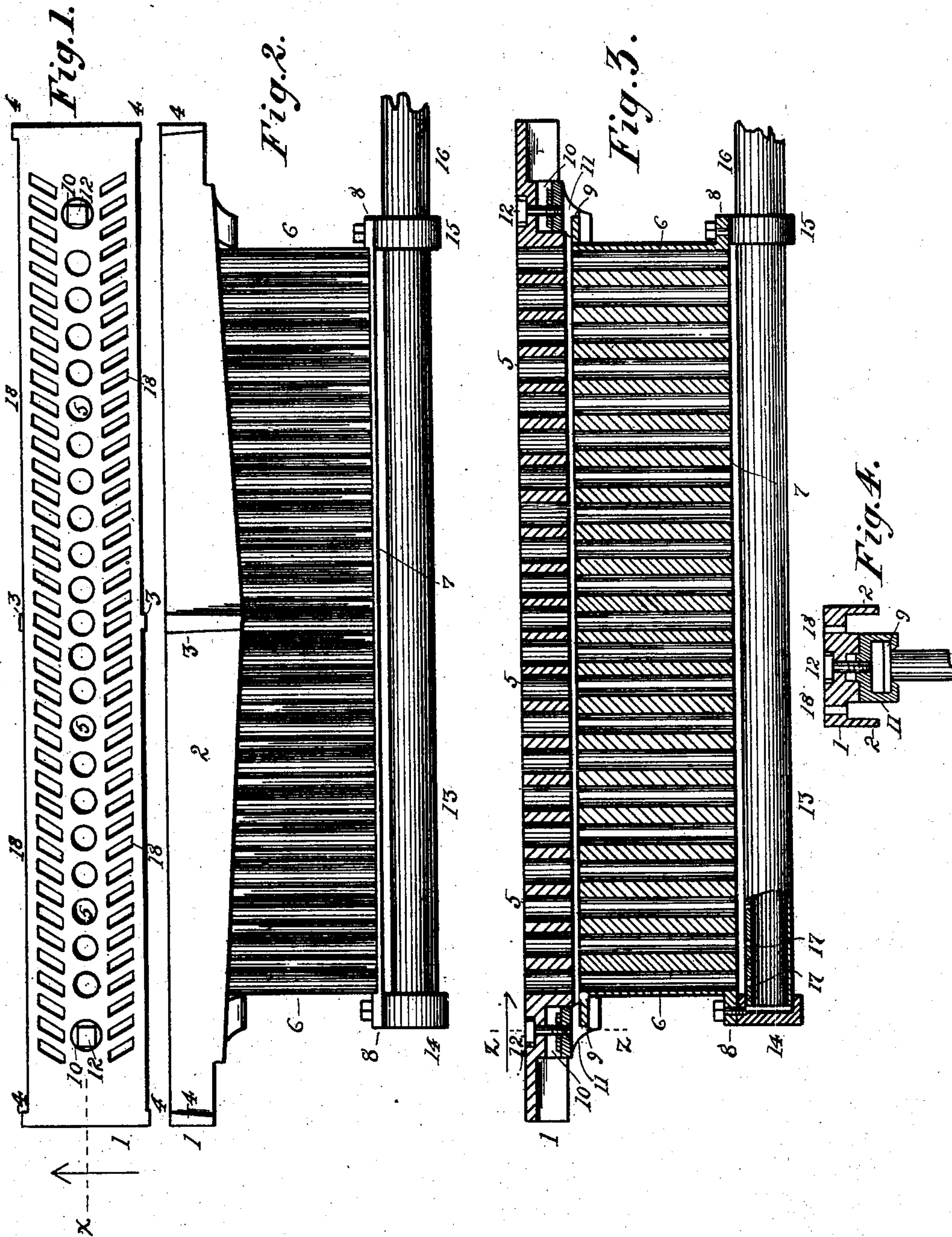


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Patented Sept. 30, 1902.

J. A. ABRAMS.  
GAS BURNING GRATE BAR.  
(Application filed Aug. 5, 1901.)

(No Model.)



Witnesses:

Maudie Girister.  
W. G. Good.

Inventor:

John A. Abrams,  
by Humphrey & Humphrey,  
Attys.



# UNITED STATES PATENT OFFICE.

JOHN A. ABRAMS, OF AKRON, OHIO.

## GAS-BURNING GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 709,951, dated September 30, 1902.

Application filed August 5, 1901. Serial No. 70,937. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. ABRAMS, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented a certain new and useful Improvement in Gas-Burning Grate-Bars, of which the following is a specification.

My invention has relation to improvements in grate-bars for that class of furnaces for steam-boilers for power purposes in which natural gas is primarily used, but in which coal may be substituted when for any reason the supply of gas may fail.

The object of my invention is to produce a gas-burning furnace in which a perfect consumption of the gas and great heating effect may be secured by a suitable admixture of atmospheric air in the burning and which may be rapidly converted into a coal-burning furnace when the gas-supply is interrupted or fails, and thus the delay and loss incident to the stoppage of the machinery dependent upon the steam-power may be avoided.

To the accomplishment of the foregoing object my invention consists in the peculiar and novel construction, arrangement, and combination of parts hereinafter described and then specifically pointed out in the claims, reference being had to the accompanying drawings, which form a part of this specification.

In the accompanying drawings, in which similar reference-numerals indicate like parts in the different figures, Figure 1 is a plan of one of my improved grate-bars; Fig. 2, a side elevation of the same with the gas-mixing tubes and gas-supply pipe; Fig. 3, a section at the line *x* of Fig. 1, and Fig. 4 a section at the line *z* of Fig. 3.

Referring to the figures, 1 is the grate-bar, having depending side flanges 2, each provided with integral, central, and end ridges 3 4 to afford the proper space between it and the next bar. From the longitudinal central lower face of this bar 1 depend a series of integral tubes 5, terminating at their lower ends in a plane parallel with the top of the bar. Below and with their central lines coincident with the central lines of the tubes 5 and with their upper ends in a horizontal plane parallel with the lower ends of said tubes and a slight distance therefrom are

the mixing-tubes 6, connected by integral lateral webs and having their lower ends united by an integral bar 7, having its ends 8 extending outward in each direction for a purpose to be stated. These tubes are of less diameter than the tubes 5, and from the upper ends of the outer ones extend horizontal lips 9.

In the under face of each end of the bar 1 is a recess 10, in which is secured a bracket 11, retained by bolts 12, the heads of which rest in the recess of the bar 1. The lower ends of the brackets 11 project toward the center of the bar 1 from each end to receive the lips 9, and thus sustain the rank of mixing-tubes 6. Below the lower ends of the mixing-tubes 6 and a short distance therefrom is the jet-pipe 13, closed with a cap at one end and having a coupling 15 at the other end, by which it is connected with a gas-supply pipe 16. In the upper side of the pipe 13 and coincident with the central line of the mixing-tubes 6 are a like number of jet-openings 17.

On each side of the bar 1 and parallel with the tubes 5 is a series of openings 18 for a purpose to be stated.

In applying my invention these bars 1 are placed in the furnace about one foot apart, with common grate-bars between them, this arrangement being sufficient to afford the necessary amount of heat, and when thus placed the ranks of side openings 18 are covered with a non-combustible material, and clean brick will be found suitable and convenient for this purpose.

If at any time the supply of gas is cut off or fails, the grate is readily adapted for coal-burning by taking off the brick and removing the mixing-tubes 6 and jet-pipe 13, by releasing the coupling 15, capping the pipe 16, and sliding the ranks of tubes 6 first toward one end until the opposite lip 9 passes the inner end of the bracket 11, the opening in under face of the bracket (shown in Fig. 4) permitting the nearest tube of the rank to pass, and the lip is then lowered, when the rank of tubes is passed in the other direction until the opposite lip 9 escapes from the opposite bracket. When the gas-supply is restored, these parts are as readily assembled and replaced.



I claim as my invention—

1. An improved gas-burning grate-bar consisting of a bar adapted to be interposed in a furnace having a line of tubes integral therewith with mixing-tubes in alinement therewith and slightly separated therefrom, and a gas-supply pipe having jet-openings coincident with the lower ends of said mixing-tubes and slightly separated therefrom, substantially as shown and described.

2. An improved gas-burning grate-bar consisting of a bar adapted to be interposed in a furnace having a line of tubes integral therewith, with mixing-tubes detachably connected, and in alinement therewith and slightly separated therefrom, and a gas-supply pipe detachably connected with said mixing-tubes having jet-openings coincident with the lower ends of said mixing-tubes slightly separated therefrom, substantially as shown and described.

3. An improved gas-burning grate-bar consisting of a bar adapted to be interposed in a furnace having a line of tubes integral therewith and lateral openings at the sides of

said tubes, with mixing-tubes in alinement with said tubes and slightly separated therefrom and a gas-supply pipe having jet-openings coincident with the lower ends of said mixing-tubes, and slightly separated therefrom, substantially as and for the purpose hereinbefore set forth.

4. An improved gas-burning grate-bar adapted to be interposed in a grate having a line of tubes united with and extending from its lower face, their openings being coincident with holes in said grate-bar, in combination with mixing-tubes in alinement therewith and slightly separated therefrom, and a gas-supply pipe having jet-openings coincident with the lower end of said mixing-tubes and slightly separated therefrom, substantially as shown and described.

In testimony that I claim the above I hereunto set my hand in the presence of two subscribing witnesses.

JOHN A. ABRAMS.

In presence of—

C. P. HUMPHREY,  
C. E. HUMPHREY.