

(No Model.)

J. DORNAN & C. N. BRADY.

APPLYING NATURAL GAS TO GLASS FURNACES.

No. 304,303.

Patented Sept. 2, 1884.

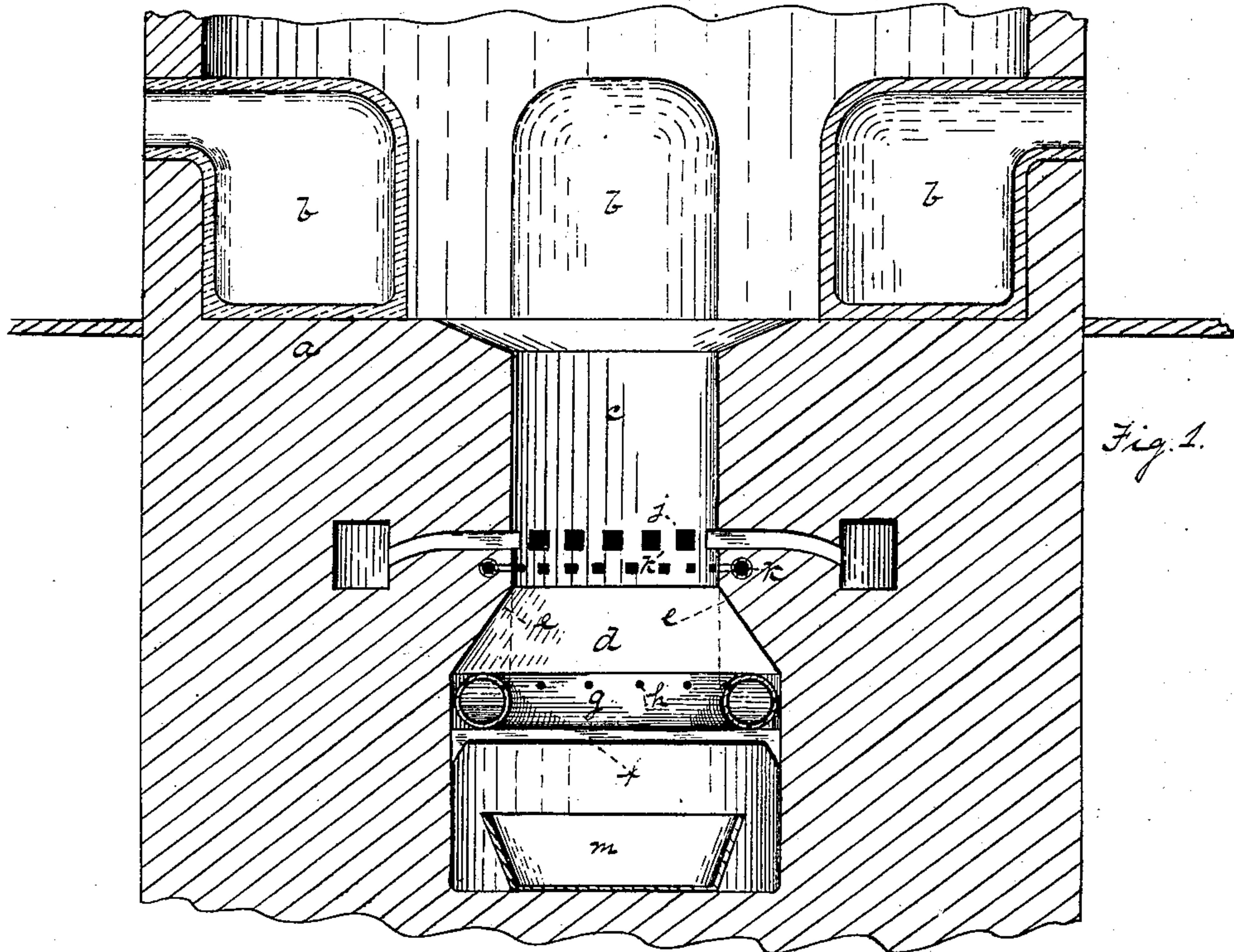


Fig. 1.

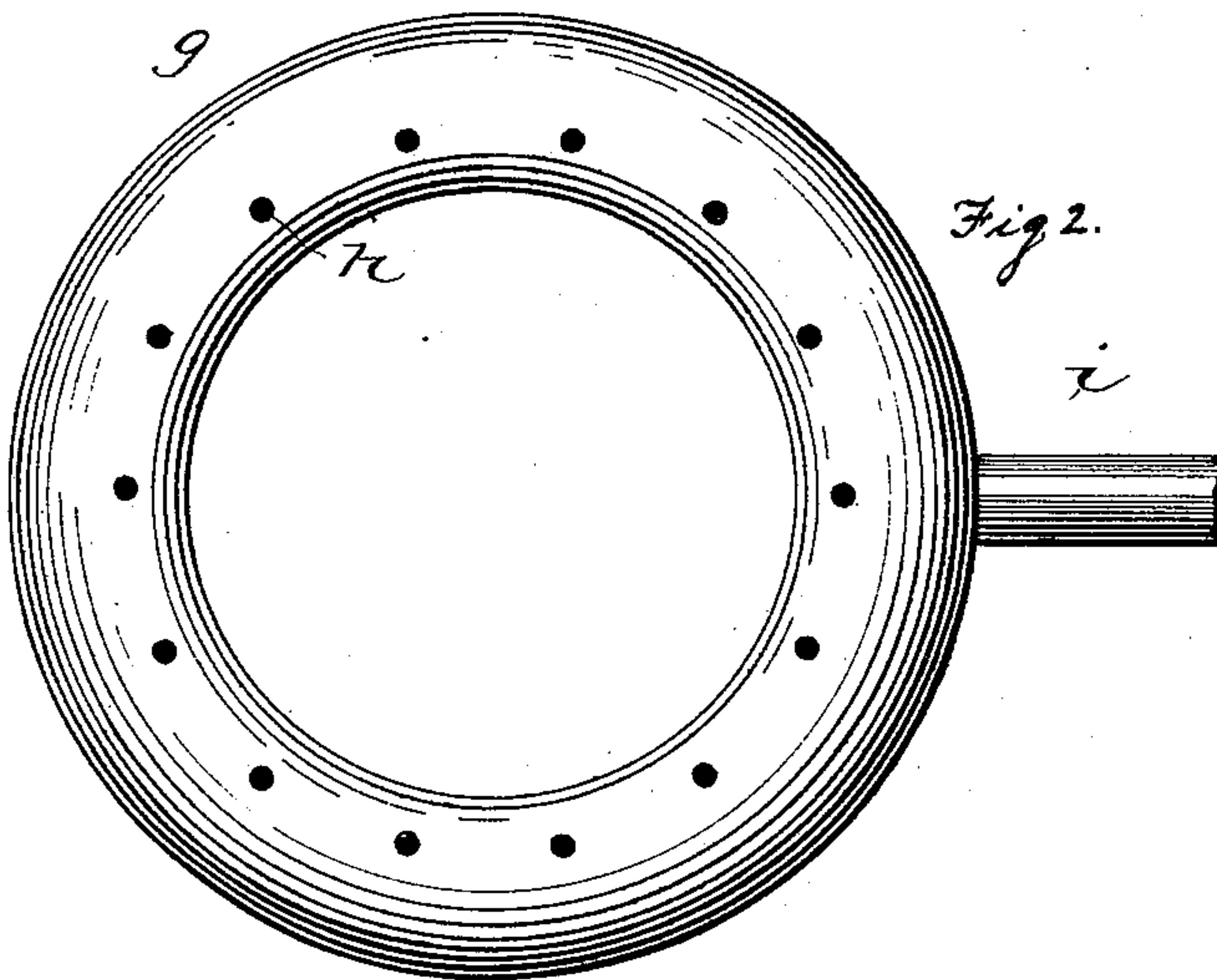


Fig. 2.

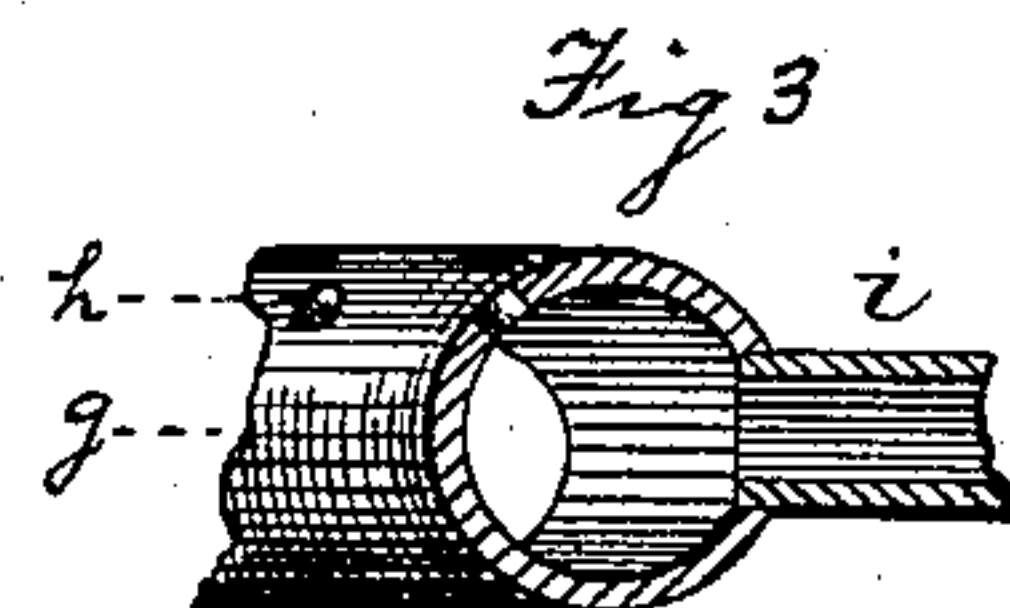


Fig. 3.

Witnesses.

Thomas W. Batewell  
W. B. Corwin

Inventor.

John Dornan  
Charles N. Brady  
by their attorneys  
Batewell & Kerr



# UNITED STATES PATENT OFFICE.

JOHN DORNAN AND CHARLES N. BRADY, OF WELLSBURG, W. VA.

## APPLYING NATURAL GAS TO GLASS-FURNACES.

SPECIFICATION forming part of Letters Patent No. 304,303, dated September 2, 1884.

Application filed August 27, 1883. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN DORNAN and CHARLES N. BRADY, of Wellsburg, in the county of Brooke and State of West Virginia, have invented a new and useful Improvement in Applying Natural Gas to Glass-Furnaces; and we do hereby declare the following to be a full, clear, and exact description thereof.

The object of our invention is the application of natural gas to the manufacture of glass. To this end we employ the devices hereinafter described, by means of which air and gas are admitted in sheets or jets into and around the eye of the furnace.

We will now describe our invention, so that others skilled in the art to which it appertains may use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view through the fire-chamber and eye of the glass-furnace. Fig. 2 is a plan view of the shoe by which the gas is supplied to the furnace, and Fig. 3 is a vertical cross-sectional view of a portion of the shoe.

Like letters of reference indicate like parts wherever they occur.

In the drawings, A represents the bench of the furnace, on which are placed the melting-pots B, arranged in a circle around the eye C, which eye extends down from the top of the bench to the fire-chamber D, the sides or walls of the eye being vertical. Below the eye is the fire-chamber D, larger in diameter than the eye, and connecting therewith by sloping walls. Extending across the fire-chamber D are the bars F, resting upon which is a hollow shoe, G, circular in form and extending around the wall of the fire-chamber under the flare of the walls E. This shoe is composed of iron, fire-clay, or other suitable material, preferably of the shape shown in the drawings, being a tubular ring having a hollow center. This shoe is perforated, so as to form the burners or gas-exits H. Extending from the gas well or reservoir to the shoe G is a gas-supply pipe, I. Arranged around the eye of the furnace, above the shoe G, are air flues or inlets J, which extend in the walls of the furnace to a suitable air-supply flue or pipe. Below the flues J is a pipe or passage, K, arranged within the wall of the furnace, commu-

nicating with the eye by suitable perforations or openings, K', and connected with the gas-reservoir by a suitable supply-pipe. The gas-supply pipe I may be connected with the air-supply pipe in such a manner as to supply gas mingled with a certain amount of air to the shoe G.

The operation is as follows: The gas, being conducted from the gas-well to the supply-pipe I and pipe or passage K by suitable pipes, or being first conducted to a gas-reservoir, passes into the eye of the furnace from the shoe G and passage K. The gas may be supplied to the eye of the furnace jointly by the shoe G and flue K, or by either of them separately. At the same time air is introduced into the eye of the furnace through the flues or inlets J by suitable devices connected therewith for producing a draft or blast. This air, being preferably heated, mingles with the gas ascending in the eye of the furnace from the passage K and shoe G. The gas being ignited, combustion takes place, producing an intense heat around the pots of the furnace.

The quantity of gas and air supplied to the furnace is regulated by suitable cocks. When both gas and air are introduced through the shoe G, they first become mingled by passing through the shoe and perforations or burners formed therein. When the gas is supplied by the shoe G or passage K and the air through the inlets J the air flows in on all sides of the sheet or column of gas and becomes intimately mixed or combined therewith, producing vivid combustion and an intense heat.

At the bottom of the fire chamber D is an open-mouthed pot, M, the purpose of which is to collect any glass which may escape from the pots by reason of a crack or overflow. As the shoe G is protected by the sloping or flaring walls E, the molten glass will flow through the eye directly into the pot M without coming in contact with the shoe.

Our invention may also be applied for the purpose of reheating, annealing, or finishing glass.

The advantages of our invention are that by the use of natural gas as a fuel in the manufacture of glass, for melting, annealing, or reheating, a much better article is produced, free from discolorations and imperfections caused by soot, smoke, ashes, or sulphurous fumes.



We are aware that it is not broadly new to utilize the natural gases as fuel in metallurgical operations. We are also aware that it has been used in furnaces to generate steam, and  
5 for other heating purposes.

We are also aware that manufactured gas from bituminous coal has been used in the manufacture of glass, and that coal-oil has been used for the same purpose; but these are  
10 objectionable on account of the sulphurous fumes of the former and the dense smoke of the latter, and such we do not claim. We are not aware, however, that the natural gases—  
15 such as we describe—have ever been utilized in the manner set forth in the art of glass-manufacture prior to our invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

20 1. As an improvement in the art of manufacturing glass, the employment of natural gas taken from subterranean deposits, combined with atmospheric air, in substantially the manner described, as a heating medium in  
25 the melting, heating, and reheating of glass, as and for the purpose set forth.

2. In a furnace for melting, annealing, and

working glass, the pipes or tubes for conveying the gas from the gas-well or source of supply, and devices, substantially such as described, for mixing or mingling atmospheric  
30 air with the gas prior to its combustion in the furnace, substantially as set forth.

3. In a glass-furnace, the combination of a gas-flue arranged around the eye of the furnace and provided with jet-orifices, and an  
35 air-flue similarly arranged above or below the gas-flue, and having jet-orifices, substantially as and for the purpose specified.

4. In a glass-furnace, a shoe or pipe for supplying gas to the furnace, said pipe being provided with orifices, and set in a recess or enlargement around the walls of the fire chamber or eye, so as to be protected by overhanging walls, substantially as and for the purpose  
45 specified.

In testimony whereof we have hereunto set our hands this 17th day of August, A. D. 1883.

JOHN DORNAN.

CHARLES N. BRADY.

Witnesses:

JAY E. RATCLIFFE,

JOHN BLUNKINSOP, Sr.