

No. 724,974.

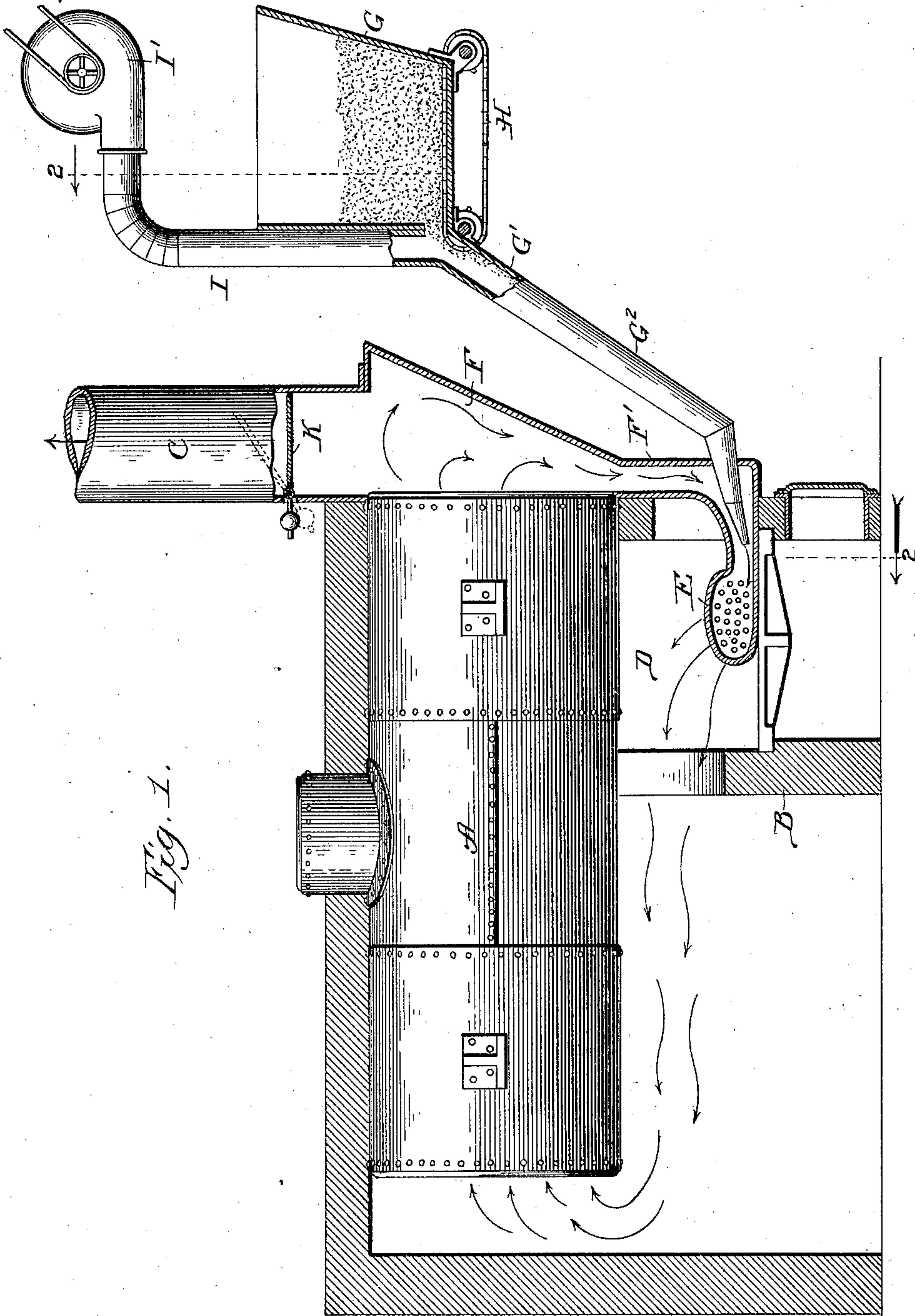
PATENTED APR. 7, 1903.

A. J. VAUGHAN.  
FURNACE.

APPLICATION FILED MAR. 14, 1902.

2 SHEETS—SHEET 1.

NO MODEL.



Witnesses:  
Edw. C. Taylor,  
John Enders Jr.

Inventor:  
Arthur J. Vaughan,  
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Att'ys in Law

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2 SHEETS—SHEET 2.

Fig. 2.

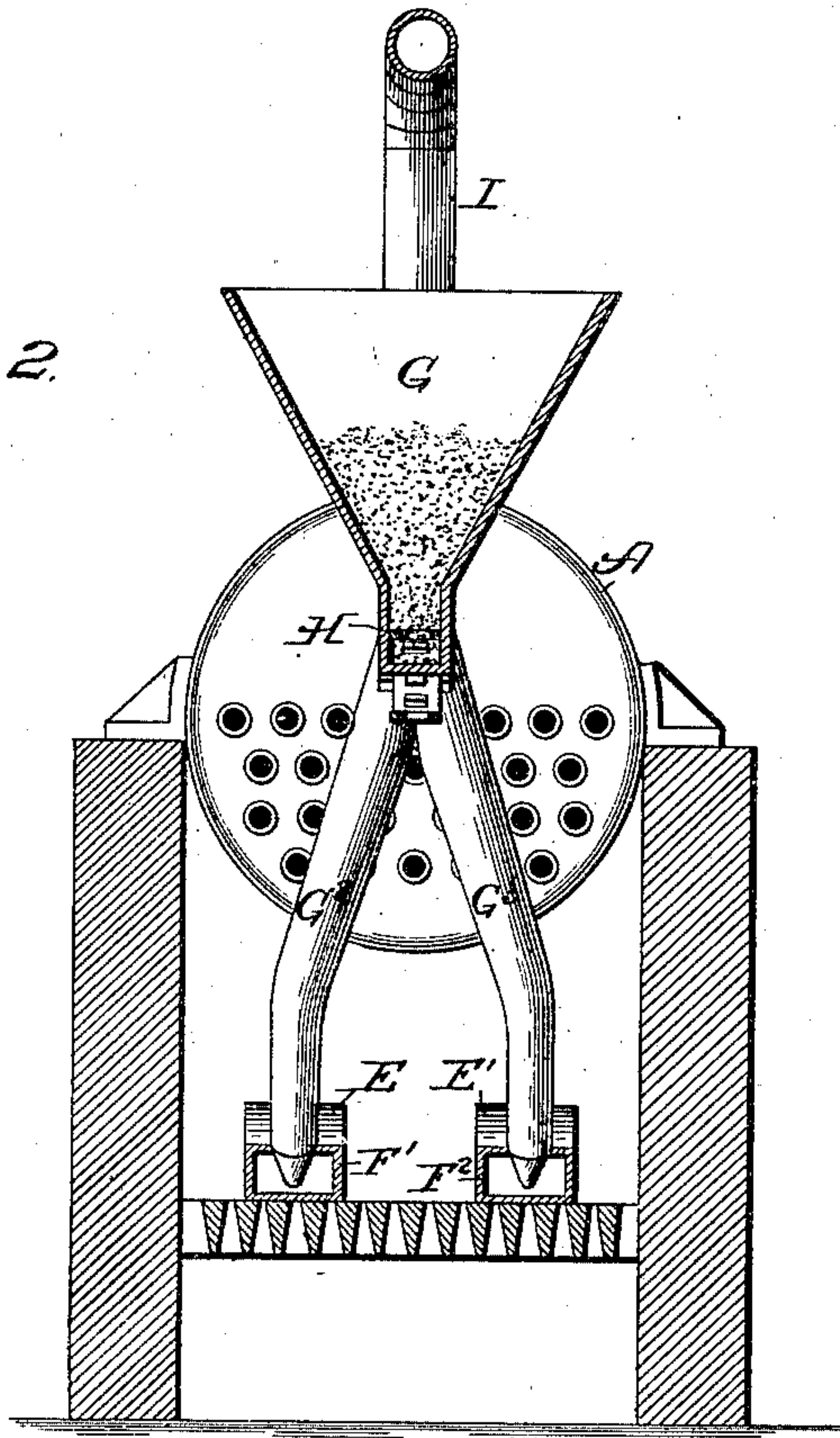
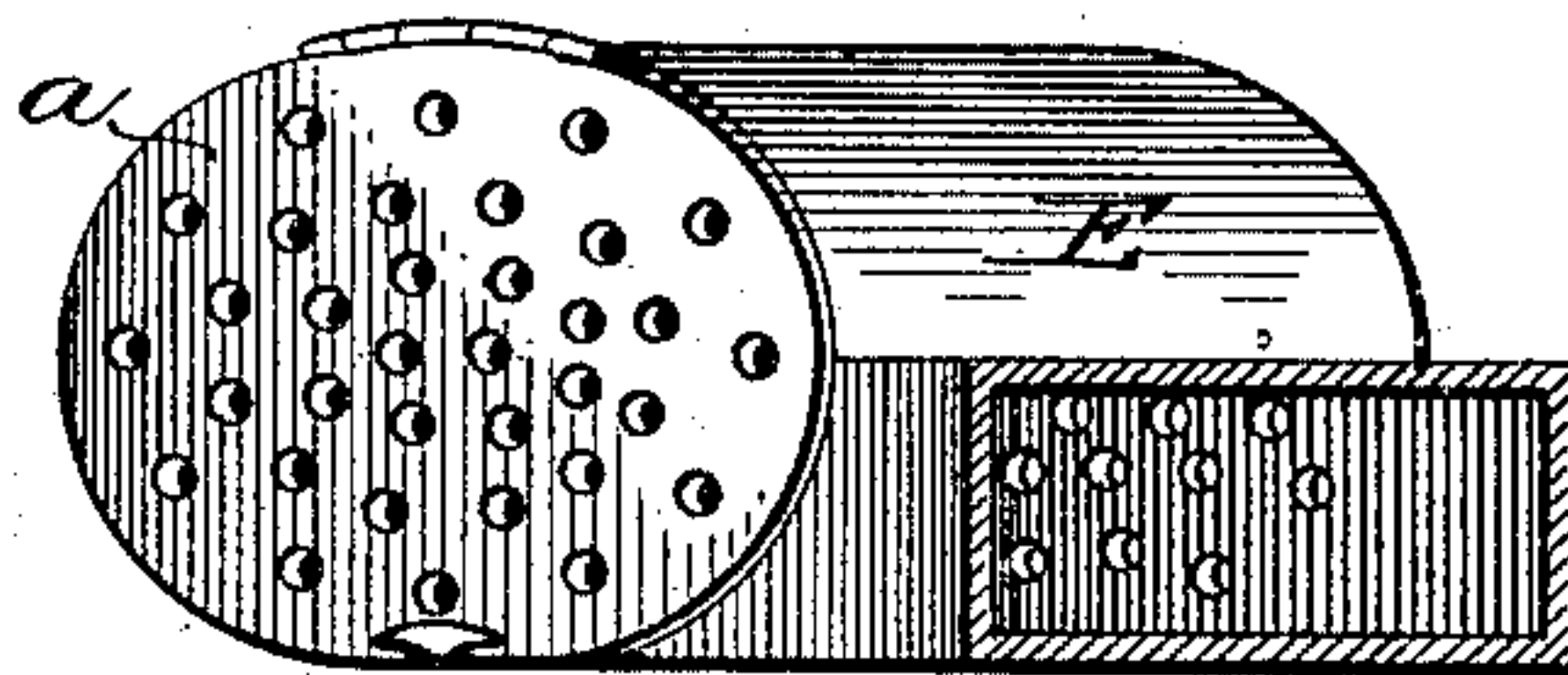


Fig. 3.



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# UNITED STATES PATENT OFFICE.

ARTHUR J. VAUGHAN, OF CHICAGO, ILLINOIS.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 724,974, dated April 7, 1903.

Application filed March 14, 1902. Serial No. 98,247. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR J. VAUGHAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Furnaces, of which the following is a specification.

My invention relates particularly to furnaces wherein pulverulent fuel is employed; and my primary object is to provide a furnace of simple construction and operating under conditions intended to insure perfect combustion.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a longitudinal sectional view of my improved furnace; Fig. 2, a transverse section taken as indicated at lines 2 of Fig. 1, and Fig. 3 a perspective sectional view showing one of the retorts employed.

A represents a boiler of a furnace; B, a bridge-wall thereof; C, a smoke-stack with which furnaces are usually provided; D, a chamber which corresponds with the fire-chamber of the ordinary furnace; E E', retorts located in the chamber D; F, a smoke-return flue which divides into branches F' F<sup>2</sup>, communicating with the retorts E E', respectively; G, a receptacle for pulverulent fuel provided with a discharge-chute G', which connects through branch pipes G<sup>2</sup> G<sup>3</sup> with the passages F' F<sup>2</sup> adjacent to the retorts E E'; H, an endless link chain or link belt; I, a conduit communicating with the passage G, and I' a fan for supplying air to the furnace under such pressure as may be required.

The retorts comprise hollow bodies of somewhat oval cross-section, the bodies of the retorts being imperforate and the ends supplied with a series of perforations. As shown in Fig. 3, each retort has one hinged end *a*, through which waste or other inflammable material may be introduced for starting the fire. The passages F' F<sup>2</sup> communicate with the lower portions of the retorts at the front side thereof, so that when the air-current carrying the powdered fuel enters the retort a whirling movement is produced. Combustion takes place within the retorts and flames shoot from the ends of the retorts, the combustion being completed in the chambers be-

neath the boiler and in the flues of the boiler. Where the combustion is incomplete, the gases return through the passage F to pass again through the retorts.

The retorts may be supported in any suitable manner and where employed in connection with the old type of boiler may rest upon the grate, as indicated in the drawings.

I have shown the chimney C provided with a balanced damper K, which is self-adjusting, according to the pressure upon it. Normally when there is no pressure upon it it assumes a horizontal position.

As shown, the chain H is supported upon sprocket-wheels having their axes below the level of the floor of the hopper G, one portion of the conveyer-chain passing above the floor of the hopper and the other portion beneath said floor. The conveyer-chain may be suitably geared to be operated from the source of power which operates the fan.

The operation will readily be understood. In starting the furnace fire is introduced into the retorts in any desirable manner, as by introducing waste or other inflammable material and setting fire to the same. The fan and conveyer-chain are operated from any suitable source of power, the fan producing a current which carries the fuel (usually pulverized coal) through the passage G' and branch passages G<sup>2</sup> into the retorts. As the fuel enters the retort it impinges against the highly-heated rear walls of the retorts, and a whirling movement is produced, resulting in an intimate intermingling of the fresh fuel with the burning particles, as well as reduction of the fuel by mutual attrition of the particles. As the flames or tongues of fire shoot from the adjacent ends of the retorts they meet and are deflected upwardly to the boiler. The outer ends of the retorts are sufficiently removed from the walls of the furnace to prevent injury thereto.

The usual ash-pit is commonly provided, as well as ash-pit doors, and where desired air may be admitted through the ash-pit.

It readily will be understood that only one retort may be employed or that any number of retorts may be employed, according to the size of the furnace.

Changes in details of construction within



the spirit of my invention may be made. Hence no undue limitation is to be understood from the foregoing detailed description.

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

1. In a furnace, the combination of a suitable chamber, a retort therein provided with an imperforate body and perforate ends, a smoke-stack, suitable flues and return-flues  
10 leading from said smoke-stack, a fuel-supply chamber for pulverulent fuel, a passage leading from the fuel-supply chamber to the retort, means for conveying pulverulent fuel to said passage, and means for producing an  
15 air-current through said passage, substantially as described.

2. In a furnace, the combination of a boiler, a chamber beneath said boiler, a transversely-disposed retort in said chamber provided with  
20 an imperforate body and with perforate ends, a return-flue from the boiler discharging into said retort at the front side thereof, a fuel-chamber, a passage leading therefrom and communicating with the retort, means for  
25 supplying fuel to said passage, and means for producing an air-current through said passage.

3. In a furnace, the combination of a suitable chamber, a retort of substantially oval  
30 cross-section therein, having an imperforate body and perforate ends, a combined air and fuel duct leading to said retort and having tangential communication therewith, means for supplying fuel to said duct, and means  
35 for supplying air under pressure to said duct.

4. In a furnace, the combination of a boiler provided with suitable flues, a fire-chamber beneath said boiler and in communication

with said flues, a retort within said fire-chamber, a return-flue communicating with said  
40 retort, a combined air and fuel duct leading to said retort, means for supplying pulverulent fuel to said duct, and means for producing an air-current through said duct.

5. In a furnace, the combination of a fire-  
45 chamber, two retorts within said fire-chamber provided with perforate adjacent ends, a smoke-stack, flues leading from the fire-chamber to said smoke-stack, return-flues communicating with said smoke-stack, ducts leading  
50 to said retorts, means for supplying pulverulent fuel to said ducts and means for producing an air-current through said ducts.

6. In a furnace, the combination of a fire-  
55 chamber, a retort therein communicating with said fire-chamber, a duct for supplying pulverulent fuel and air to said retort, a direct flue, a return-flue, a chimney in communication with said return-flue and said direct  
60 flue, and balanced damper for said chimney, substantially as described.

7. In a furnace, the combination of a boiler provided with suitable flues, a smoke-pipe, a fire-chamber beneath said boiler, a flue leading from said fire-chamber to said smoke-pipe,  
65 two retorts within said fire-chamber in alignment with each other and provided with perforate ends, a return-flue communicating with said retorts and with said smoke-pipe, a fuel-chamber, a fuel-conveyer, ducts leading  
70 from said conveyer to said retorts, and means for supplying air under pressure to said ducts.

ARTHUR J. VAUGHAN.

In presence of—

ALBERT D. BACCI,  
W. B. DAVIES.