

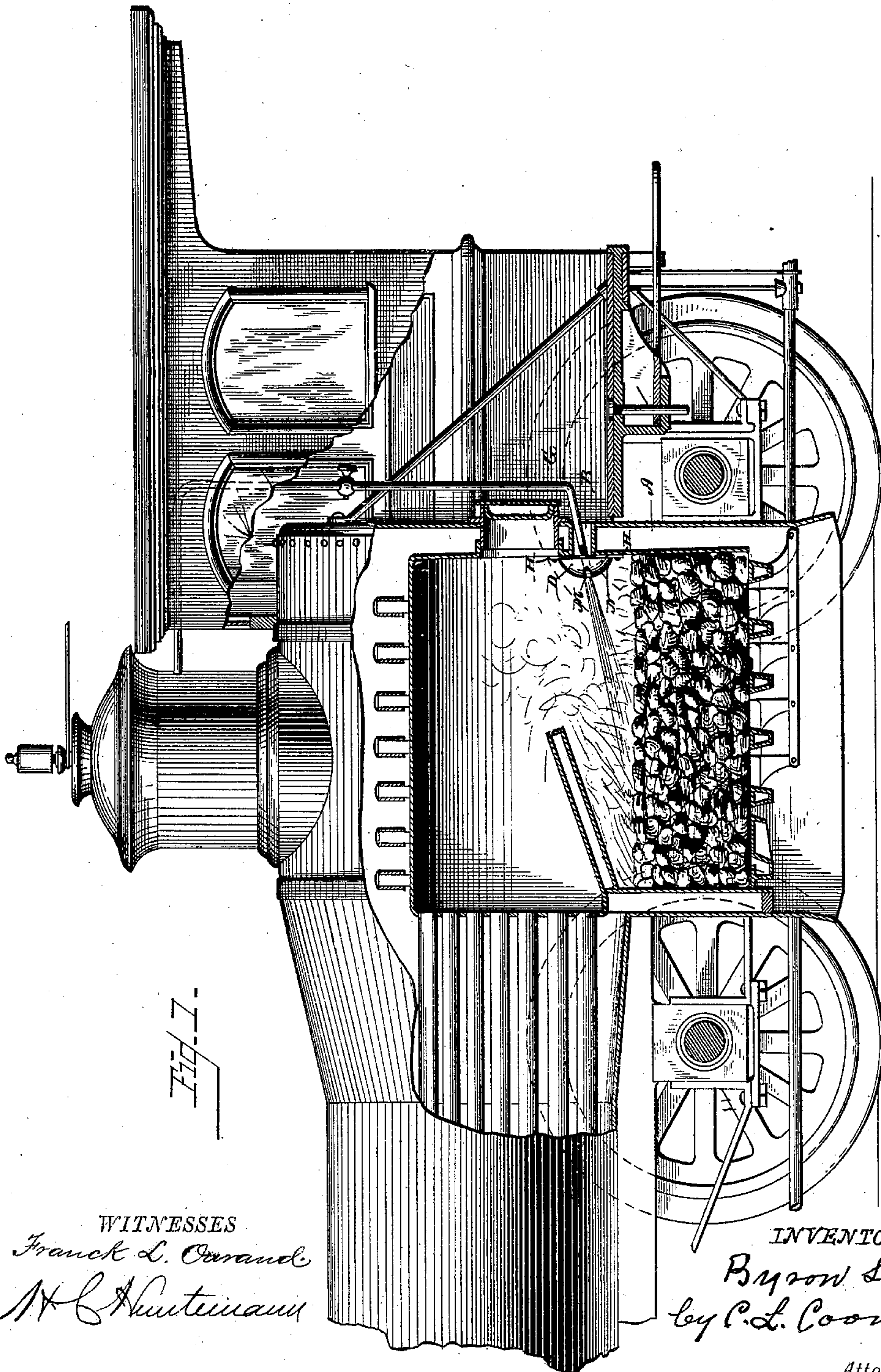
(No Model.)

2 Sheets—Sheet 1.

B. SLOPER.
LOCOMOTIVE FURNACE.

No. 298,247.

Patented May 6, 1884.



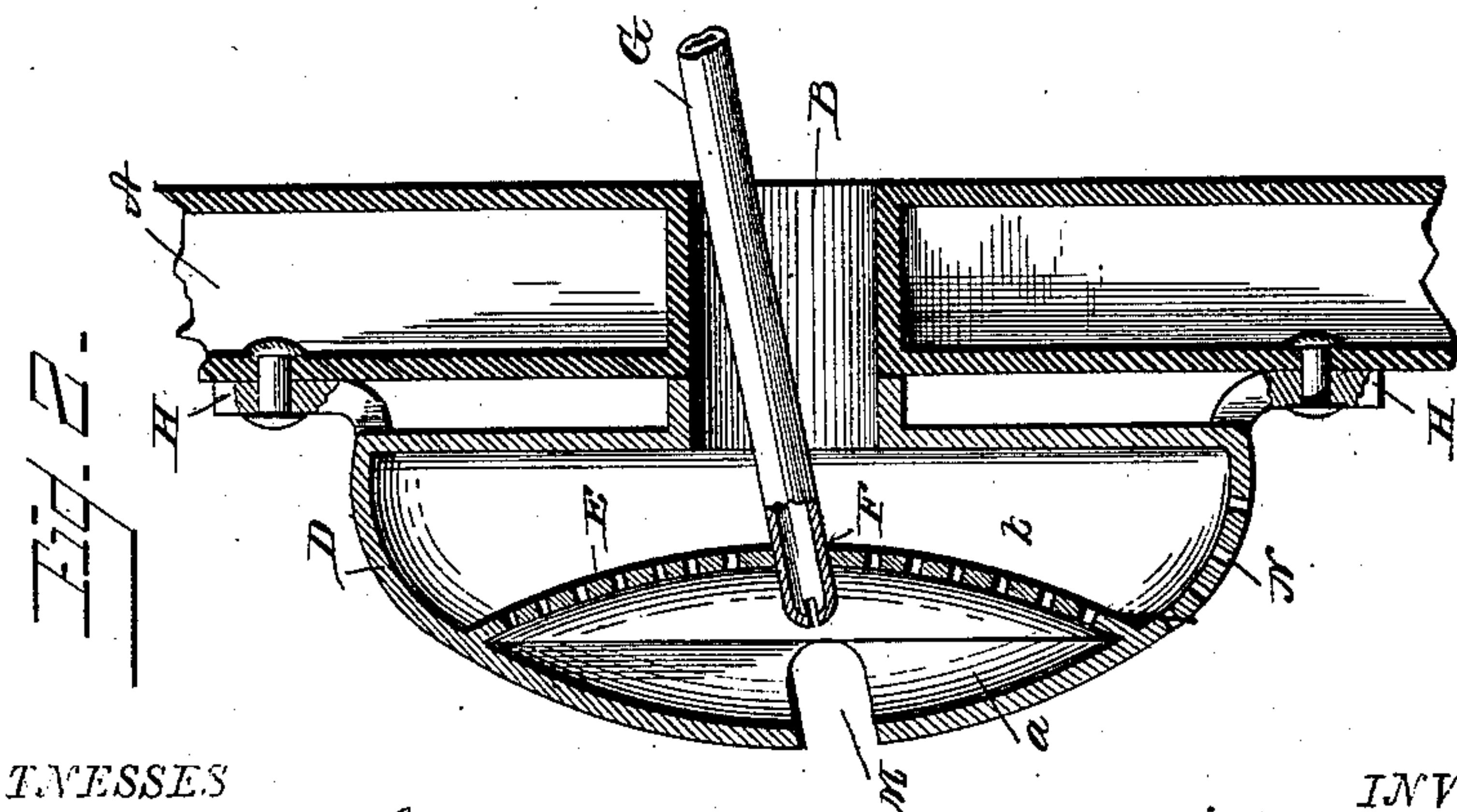
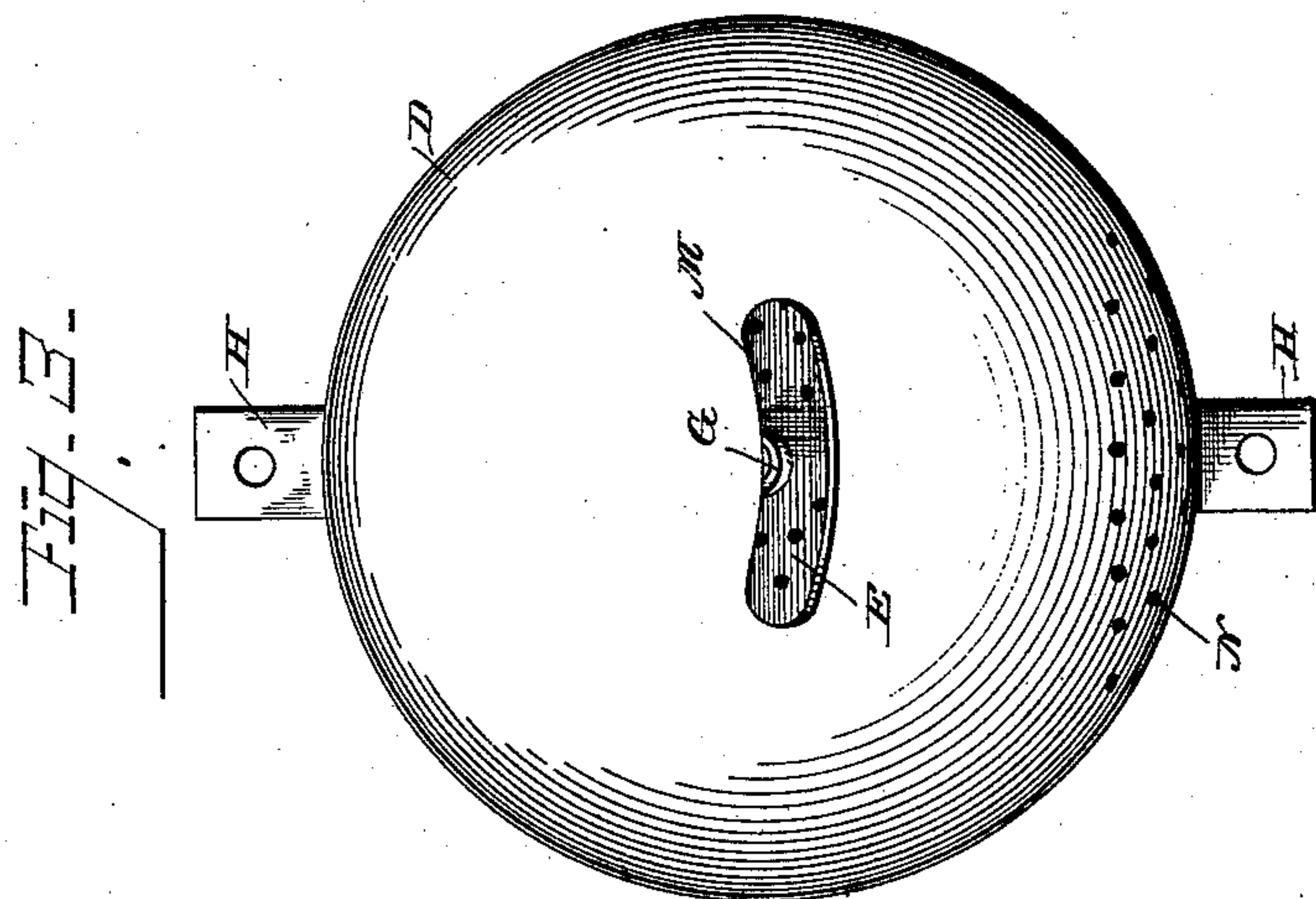
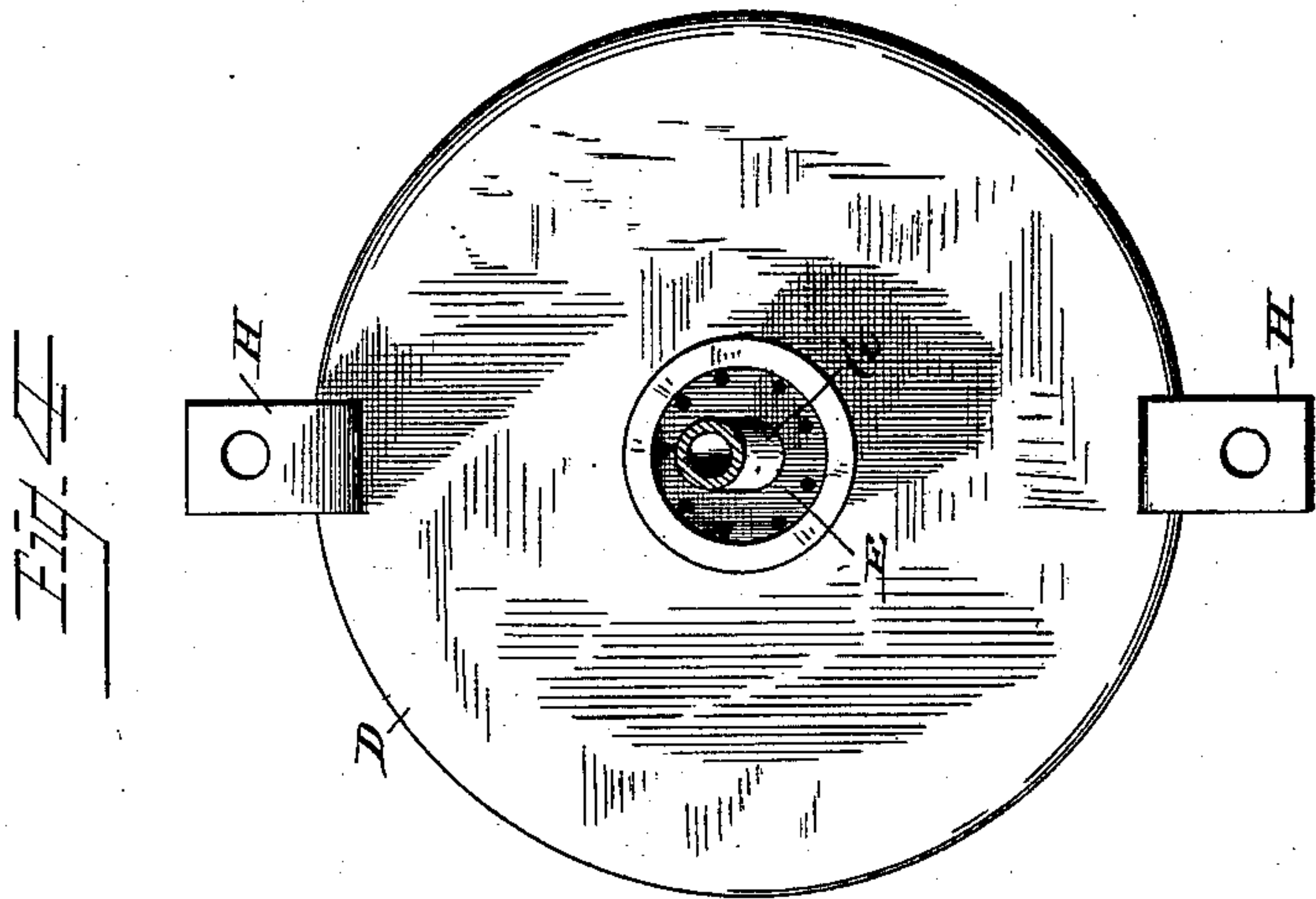
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WITNESSES

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LOCOMOTIVE-FURNACE.

SPECIFICATION forming part of Letters Patent No. 298,247, dated May 6, 1884.

Application filed February 15, 1884. (No model.)

To all whom it may concern:

Be it known that I, BYRON SLOPER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Locomotive-Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention has for its objects to provide an improved furnace and a system of combustion to be employed in connection therewith, whereby the fuel will be so perfectly consumed initially that practically no smoke, sparks, or
15 cinders will be produced, and the full and effective heating-power of the fuel will be utilized, as more fully hereinafter set forth.

My invention further relates to certain improved devices for supplying the steam and air
20 to the furnace, the same consisting in a distributor having a perforated diaphragm located within it, for the purpose of commingling the steam and air in a heated state, as more fully hereinafter specified.

25 My invention further consists in a distributor having a perforated diaphragm, for the purpose of checking the direct influx of cold air into the furnace and causing the air to be diffused and retained in a chamber until properly heated, and finally directed into or over
30 the surface of the fuel, in order to insure the thorough combustion of the same and prevent the formation of smoke, cinders, or other imperfect products of combustion.

35 In the usual furnaces, and under the heretofore-existing systems of combustion, the fuel has been subjected to an intense heat at the bottom of the fire-box, where it thoroughly unites with the oxygen of the incoming air,
40 forming carbonic acid, which passes upward through the fuel, the said acid being reconverted in its passage through the fuel into carbonic oxide, which has ordinarily been allowed to pass off with the solid fuliginous products
45 and is lost.

One object of my invention is to utilize the carbonic oxide thus formed and escaping at the surface of the fuel, as well as the solid particles of carbon, which usually escape in the

form of smoke, by rendering the initial combustion thorough and complete, as will be more fully hereinafter specified.

In carrying out my invention I have found by practical experience that the steam and hot air should be delivered into the fuel at an angle
55 of about thirty degrees, and that it should strike the fuel directly beneath the fire-bridge, so as to cover the whole surface of the fuel in such manner that the steam may come into instantaneous contact with the fuel at the most
60 highly heated part, in order that the steam may be thoroughly decomposed. I have also discovered that, when the initial draft meets the fuel at such angle, the resultant draft caused by the consumption of the fuel is not
65 retarded, but, on the contrary, is increased. The above-mentioned objects I attain by the means illustrated in the accompanying drawings, in which—

Figure 1 represents a longitudinal sectional
70 view of a locomotive-boiler, showing my invention applied thereto. Fig. 2 represents a sectional view, in detail, of the diffuser or distributor, showing the same attached to the water-legs of the boiler. Fig. 3 represents a front
75 view of the diffuser or distributor, and Fig. 4 a rear view of the distributor detached.

The letter A indicates the walls of the furnace, which may be constructed in the ordinary or any improved manner. In the present instance, however, I have shown an ordinary locomotive-boiler. At each side of the door, or at any other convenient portion, the walls or water-legs are pierced, forming openings B, in which are set the thimbles C, for the
85 purpose hereinafter described.

The letter D indicates my improved distributor. This consists of a bell-shaped or a concavo-convex shell having a curved diaphragm, E, which is perforated, as shown.
90 The said diaphragm is provided with an opening, F, at its center, through which projects the end of a steam-pipe, G, leading from the dome or dry-steam space of the boiler. The said shell is provided with lugs H, which are
95 adapted to set over ears located on the inner walls of the furnace, the said ears being provided with slots, through which may be driven

pins to hold the shell in place. The front of the shell is provided with an oblong slot, M, through which the steam and heated air are discharged into the furnace. In order to heat the incoming cold air and to prevent the condensation of the steam, which induces the current or currents of air, the shell or distributor is provided at its lower edge with a series of apertures, N, through which an induced current of hot gases is drawn in directly from the fuel, which, commingling with the air in the chamber previous to its meeting the steam, is still further heated and diffused by passing through the perforated diaphragm, so that upon commingling with the steam in the chamber *a* it will not cause condensation, and will allow the steam to be instantaneously decomposed upon striking the fuel. I prefer to deliver the steam in a broad, thin, fan-shaped stratum, so as to act like a mat upon the surface of the fuel and prevent the exhaust from lifting the cinders and carrying the same into the flues, thereby insuring their combustion in the fire-box. By thus effecting a perfect and thorough combustion of the fuel, initially, and preventing the formation of smoke, cinders, and sparks, the full and effective heating-power of the fuel is utilized, and a large saving of fuel is effected.

30 Having thus fully described my invention,

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

1. A distributor for distributing hot air and steam for the purpose of surface combustion, consisting of a bell-shaped or concavo-convex shell having a perforated diaphragm and an opening through which the steam and air may be injected into the furnace, substantially as specified. 35

2. The distributor or diffuser consisting of a bell-shaped or concavo-convex shell having a perforated diaphragm and a series of perforations at its lower edge, whereby the induced cold air is heated by an induced current or currents taken directly from the furnace, substantially as and for the purpose specified. 40 45

3. The distributor or diffuser consisting of a metallic shell having an elongated opening in front and a perforated diaphragm dividing the casing into two chambers, in which the air and heated products of combustion are induced, diffused, and commingled previous to coming into contact with the steam, substantially as and for the purpose specified. 50

In testimony whereof I affix my signature in presence of two witnesses. 55

BYRON SLOPER.

Witnesses:

CHAS. D. DAVIS,
M. P. CALLAN.