

L. E. & G. W. DUDLEY.

Device for Burning Liquid Hydrocarbons.

No. 237,504.

Patented Feb. 8, 1881.

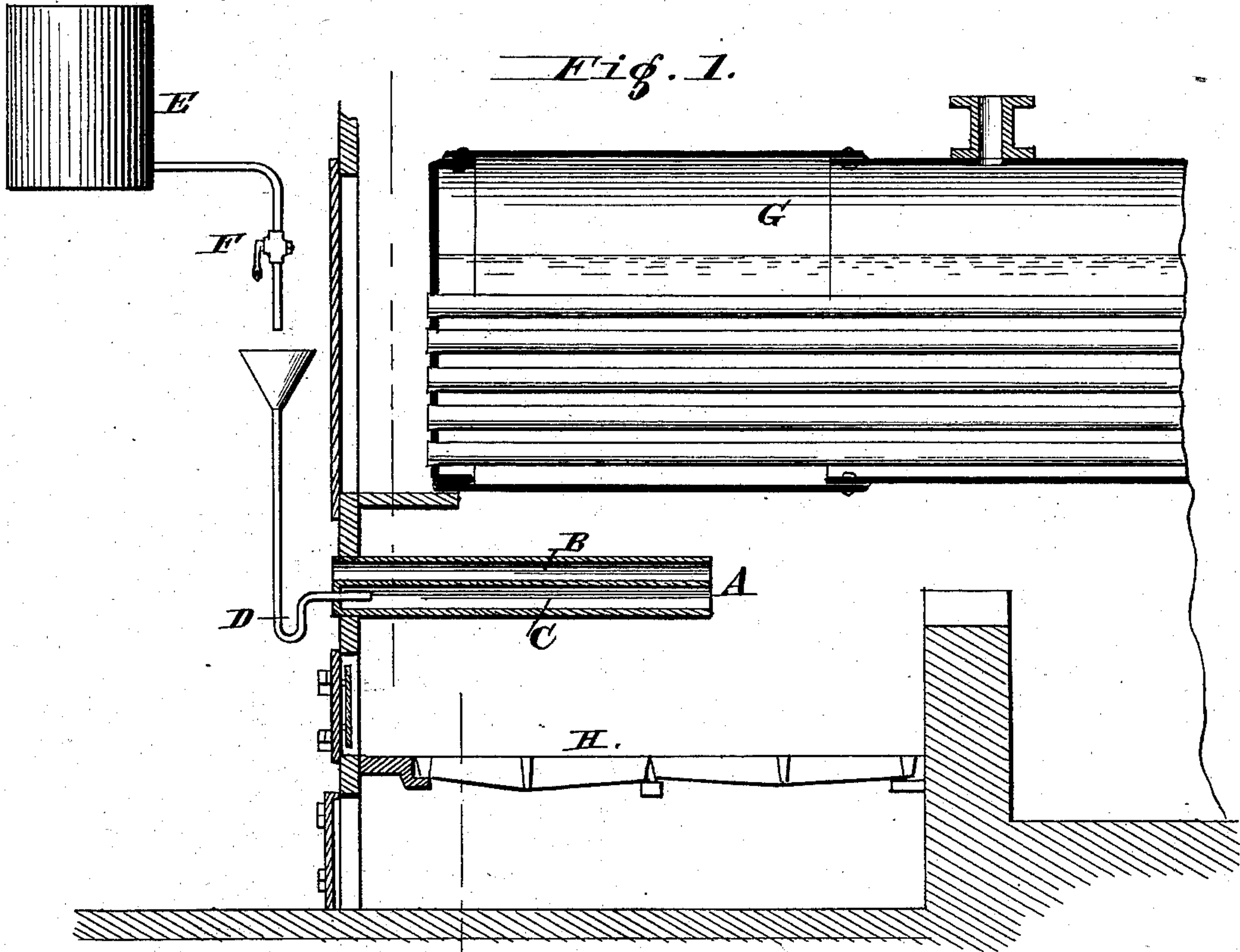
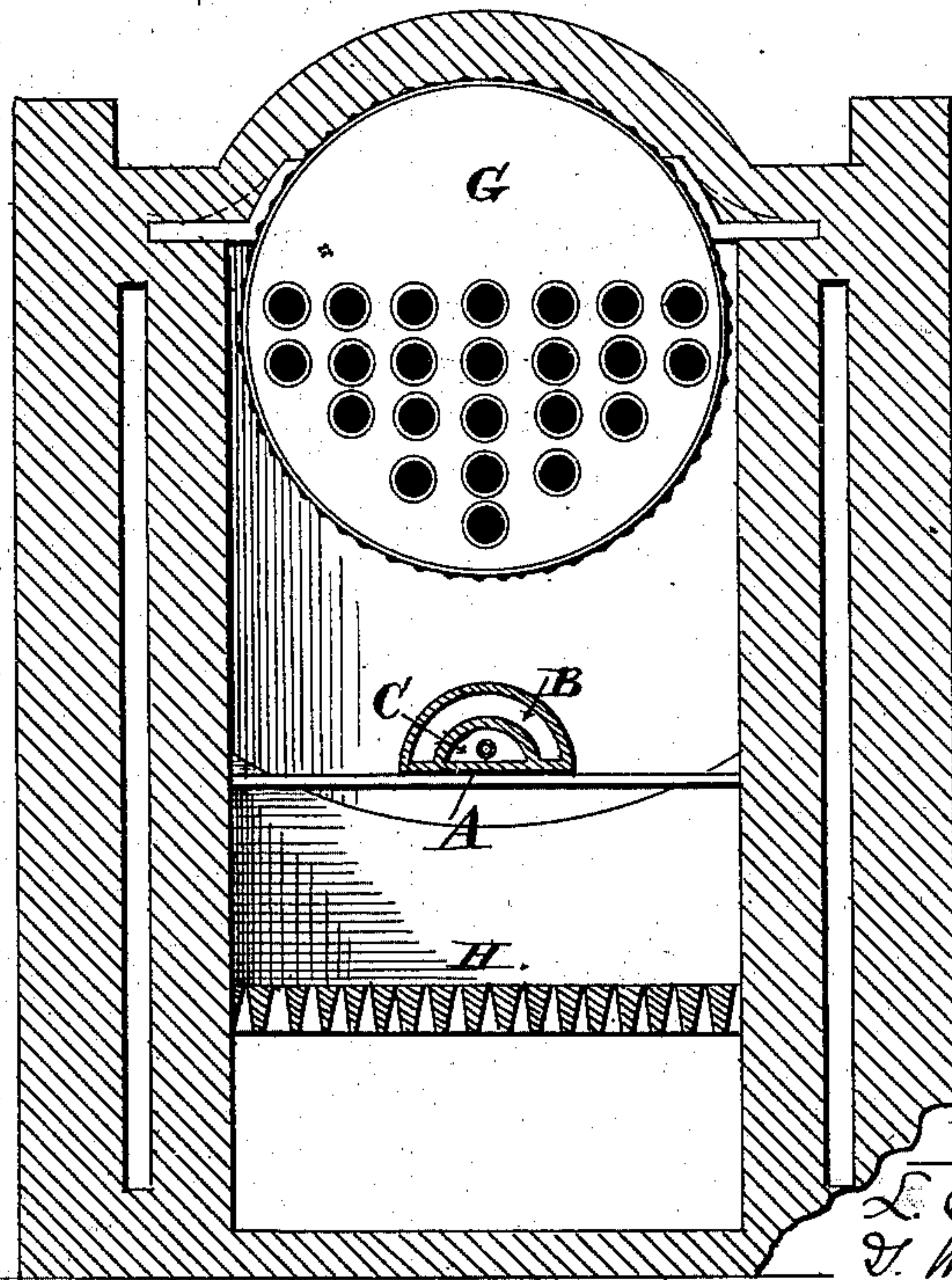


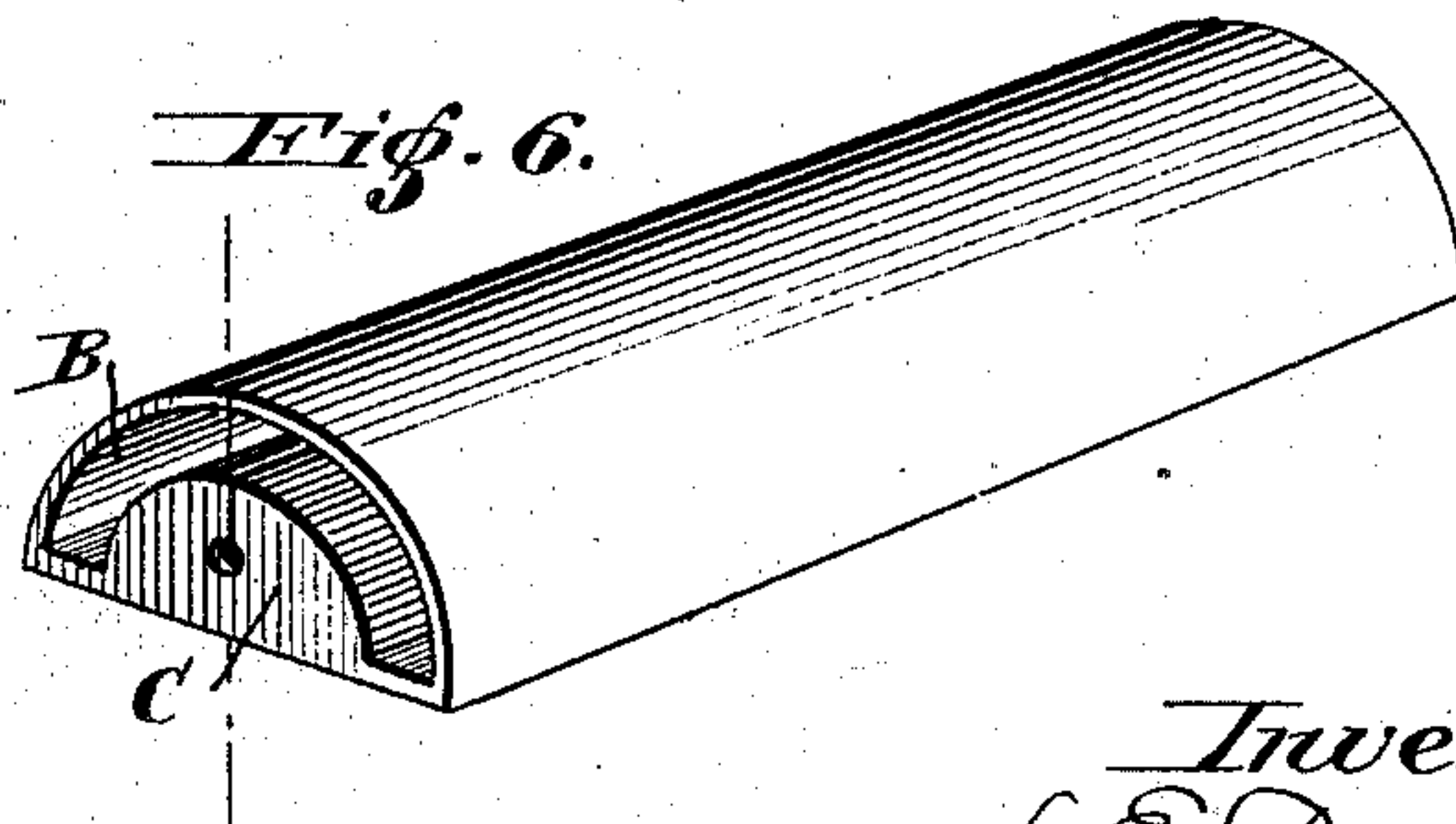
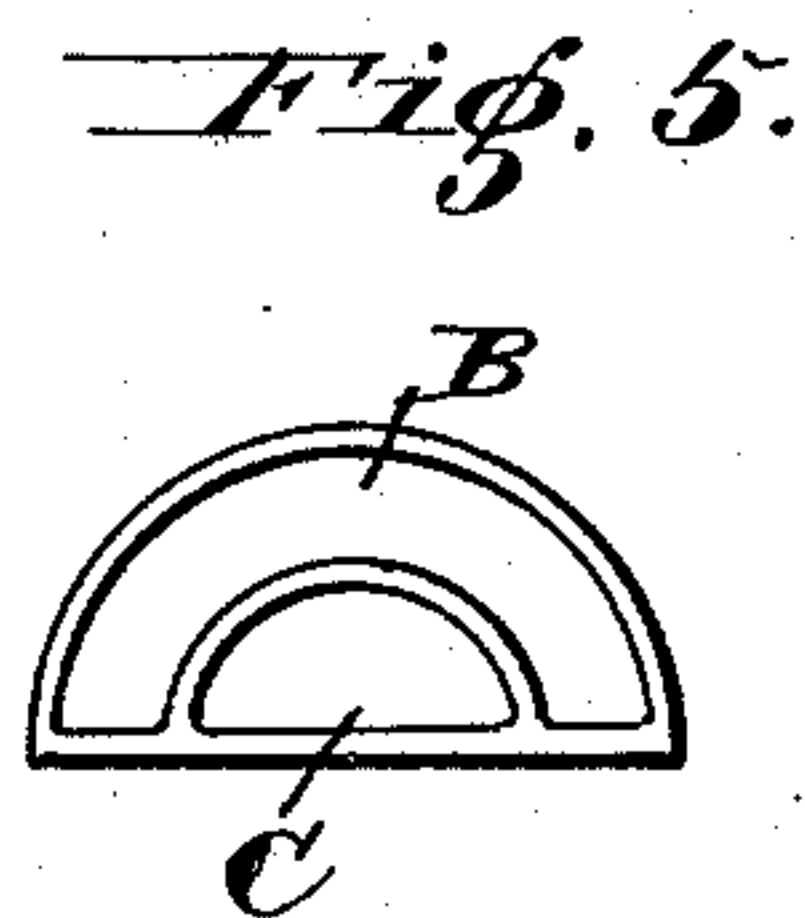
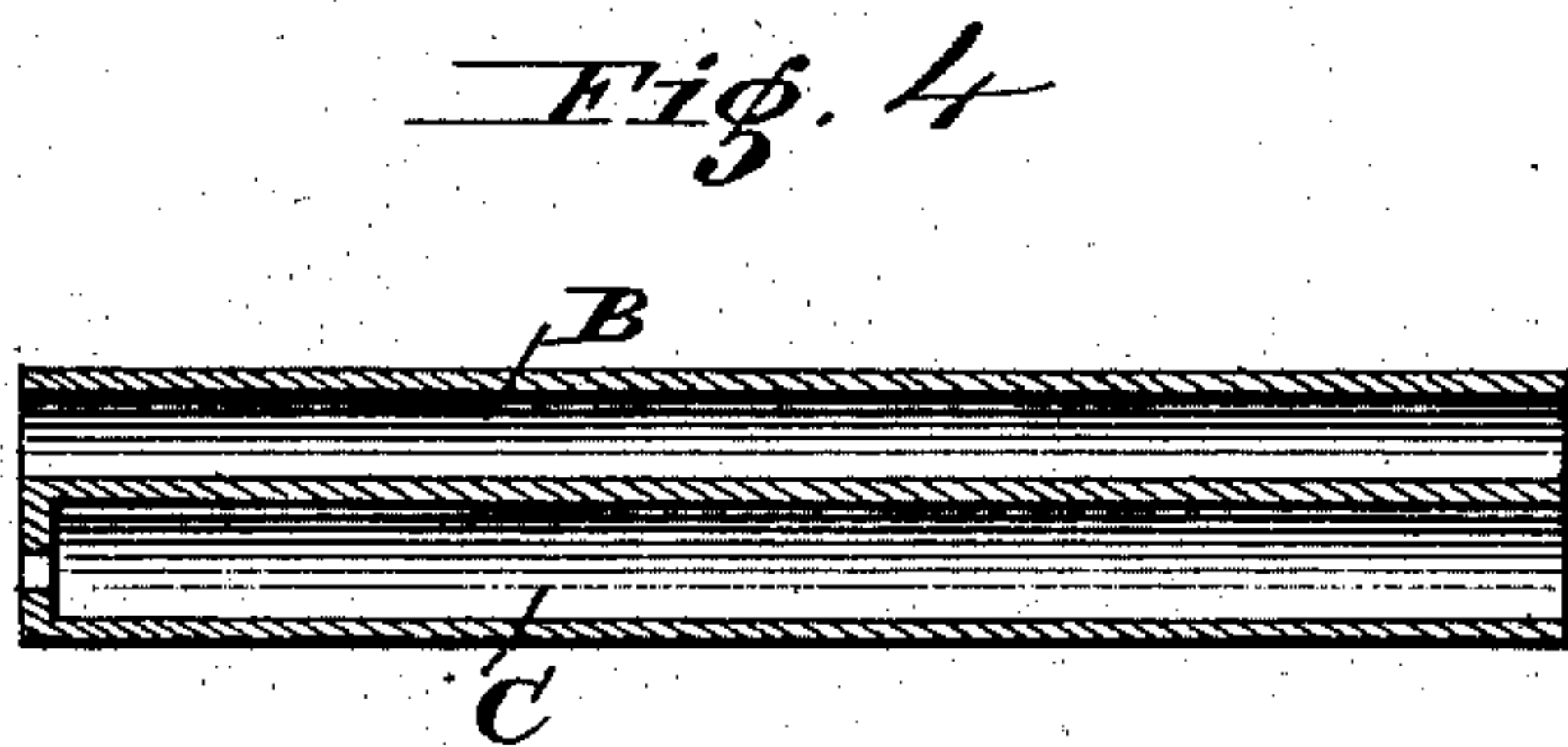
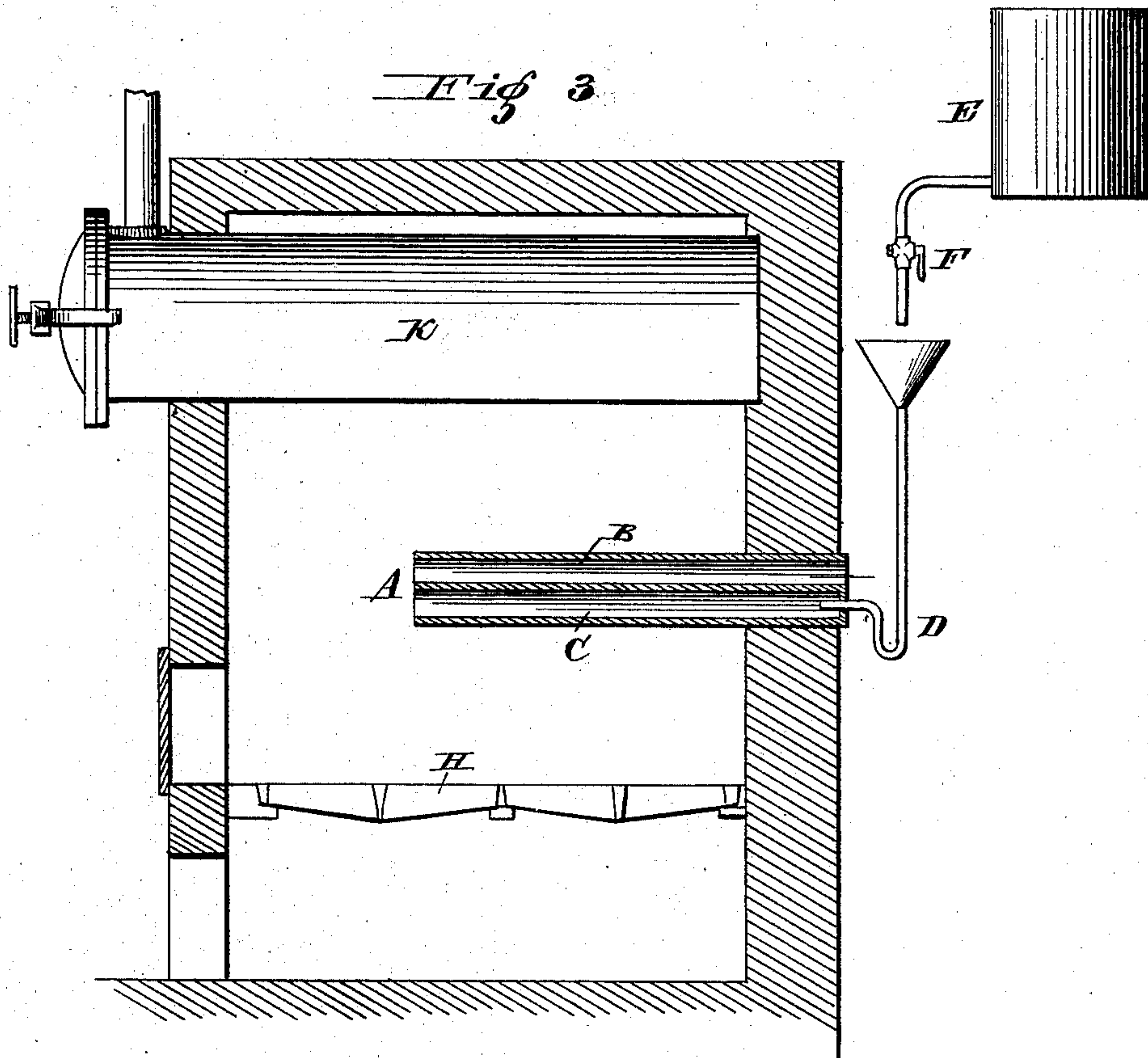
Fig. 2.



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UNITED STATES PATENT OFFICE.

LEVI E. DUDLEY AND GEORGE W. DUDLEY, OF DANVERS, MASS.

DEVICE FOR BURNING LIQUID HYDROCARBONS.

SPECIFICATION forming part of Letters Patent No. 237,504, dated February 8, 1881.

Application filed February 5, 1879.

To all whom it may concern:

Be it known that we, LEVI E. DUDLEY and GEORGE W. DUDLEY, of Danvers, in the county of Essex and State of Massachusetts, have jointly invented a new and useful device for burning liquid hydrocarbons, such as petroleum, the residual products of gas-works, and other liquid hydrocarbons, as fuel, for heating furnaces for generating steam, gas-furnaces, metallurgic and other furnaces, and also for the purpose of promoting and assisting the complete combustion of coal, coke, or other carbonaceous fuel used for heating such furnaces, of which the following is a specification.

Our invention consists in the combination, with the fire-box of a steam-boiler furnace, gas-furnace, metallurgic or other furnace, of a retort of iron, clay, or other suitable material, located within said fire-box, said retort being divided longitudinally into two chambers, whereof the upper and larger chamber is open at both ends, at one end opening into the fire-box and at the other end to the outer air, and whereof the lower and smaller chamber is open at its inner end and closed at its outer end.

The lower and smaller section of this retort is connected with a pipe, which leads the liquid hydrocarbon from the tank or other receptacle into it. In passing through the retort the hydrocarbon will be converted into vapor or gas and be discharged at the opening over the fire, and there burned in connection with the gases arising from the combustion of the ordinary fuel, assisted by the induced current of heated air mentioned below.

The upper and larger section of this retort is for the purpose of admitting a current of air from outside the furnace to meet the vapor or gas which is discharged from the lower section. The air thus admitted will be heated in its passage through its section of the retort, and arrive at its destination at a proper temperature to most advantageously unite with the vapor or gas discharged by the lower section of the retort and the gases arising from the ordinary fuel in the process of combustion. The heat will promote the passage of the air through the retort, which will enter in the nature of an induced current.

In the use of this device for burning liquid hydrocarbons a flame will be constantly main-

tained above the fire, which, in connection with the induced current of heated air, will ignite the gases arising from the ordinary fuel in the process of combustion, thereby producing a complete combustion of the coal, coke, or other carbonaceous fuel, a valuable portion of which is now carried up the chimney unconsumed.

The complete combustion of the coal, coke, or other carbonaceous fuel thus produced and the flame from the gases will produce such an additional amount of heat that the combustion of the ordinary fuel can be carried on more slowly than at present, so that the consumption will be much less and the combustion more complete, so that the saving in fuel will greatly exceed the cost of the liquid hydrocarbons used.

This device will be especially adapted for use in the furnaces of works for making illuminating-gas from petroleum and other liquid hydrocarbons, as there is in such works a considerable amount of residual product in the form of an oily tar, which is now valueless, or nearly so, and often troublesome to dispose of. By means of our device this residuum can be burned as fuel in the gas-furnace through our open retort, in which it will be vaporized, thereby utilizing it to promote the combustion of the ordinary fuel, and as an auxiliary thereto in heating the retorts in which the petroleum or other liquid hydrocarbons are decomposed in the process of manufacturing illuminating-gas. This device will be especially useful in such gas-furnaces as have an upper combustion-chamber, as the flame arising from the burning vapor will secure at all times the desired combustion in such upper chamber. What is said above of petroleum gas-works is also applicable, to some extent at least, to coal and other gas-works.

Heretofore great labor and considerable expense have attended all attempts to burn the liquid hydrocarbons as fuel, for previous inventors have proceeded upon the idea that it was necessary to convert them into vapor or gas outside of the fire-box, either in separate combustion-chambers or outside of the furnace altogether, thereby necessitating the demolition of furnaces now in use and their reconstruction upon new plans. We propose a de-

vice which can be easily applied to all kinds of furnaces for generating steam, gas-furnaces, metallurgic and other furnaces, without tearing them down or building them over, and by which the vapor or gas shall be produced within the fire-box and be there used to promote the complete combustion of coal, coke, or other carbonaceous fuel, as well as for the purpose of an auxiliary thereto in furnishing the required heat for the furnace.

The form of retort we propose, and its position in the fire-box, may both be changed without interfering with the general principle of our invention, for any means by which liquid hydrocarbons may be converted into gas or vapor within the fire-box of a furnace, to be there burned in connection with heated air introduced by any means, and the gases arising from the ordinary fuel, for the purpose of promoting the more complete combustion of coal, coke, and other carbonaceous fuel, and as an auxiliary to the same, will fully carry out our invention.

The use of our invention will not only result in a great saving of ordinary fuel, but will also render the labor of firing much less, thereby economizing both fuel and labor.

We will now proceed to describe our invention more particularly, so that others skilled in the art may be able to construct and use the same, reference being had to the accompanying drawings, in which similar letters of reference indicate like parts.

Figure 1 represents a vertical section of a boiler-furnace, showing our retort introduced from the front over the furnace-door. A is the retort; B, the upper section or air-passage; C, the lower section or retort for the conversion of the liquid hydrocarbons into vapor or gas; D, a siphon for arresting the escape of the gases; E, a tank or other receptacle for the storage of the liquid hydrocarbons; F, a cock in the pipe leading from the tank for governing the stream; G, the boiler, and H the grate.

Fig. 2 represents a transverse or cross section of a boiler-furnace, showing an end view of our retort. A represents the retort; B, the upper and larger section or air-passage; C, the lower and smaller section or retort for the conversion

of the liquid hydrocarbons into vapor or gas; G, the boiler, and H the grate.

Fig. 3 is a vertical section of a furnace for the manufacture of illuminating-gas, showing the introduction of our retort from the rear. A represents the retort; B, the upper and larger section or air-passage; C, the lower and smaller section or retort for the conversion of the liquid hydrocarbons into vapor or gas. K represents the retort for decomposing the material of which the illuminating-gas is made, and H the grate.

Fig. 4 is a sectional view of our retort. B represents the upper and larger section or air-passage; C, the lower and smaller section or retort for the conversion of the liquid hydrocarbons into vapor or gas.

Fig. 5 represents a cross-section or end view of our retort. B represents the upper and larger section or air-passage; C, the lower and smaller section or retort for the conversion of the liquid hydrocarbons into vapor or gas.

Fig. 6 represents a perspective view of our retort. B is the upper and larger section or air-passage, and C the lower and smaller section or retort for the conversion of the liquid hydrocarbons into vapor or gas.

The following is what we claim:

The combination, with the fire-box of a furnace, of a retort located within said fire-box and divided into two compartments or chambers, one of which is open at both ends, into the fire-box and to the outer air, respectively, and the other of which is open at its inner end and closed at its outer end, being there connected with a hydrocarbon-supply pipe, whereby air is heated in the former chamber and hydrocarbon liquid vaporized in the latter, the heated air or oxygen and the hydrocarbon vapor escaping into the fire-box simultaneously, and mingling with each other and with the unconsumed gases arising from the combustion of the solid carbonaceous fuel, substantially as described.

LEVI E. DUDLEY.
GEO. W. DUDLEY.

Witnesses:

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J. W. PIERCE.