L. STEVENS.

Improvement in Process for Burning Asphaltum.

No. 125,497. Patented April 9, 1872.

Fig 1.

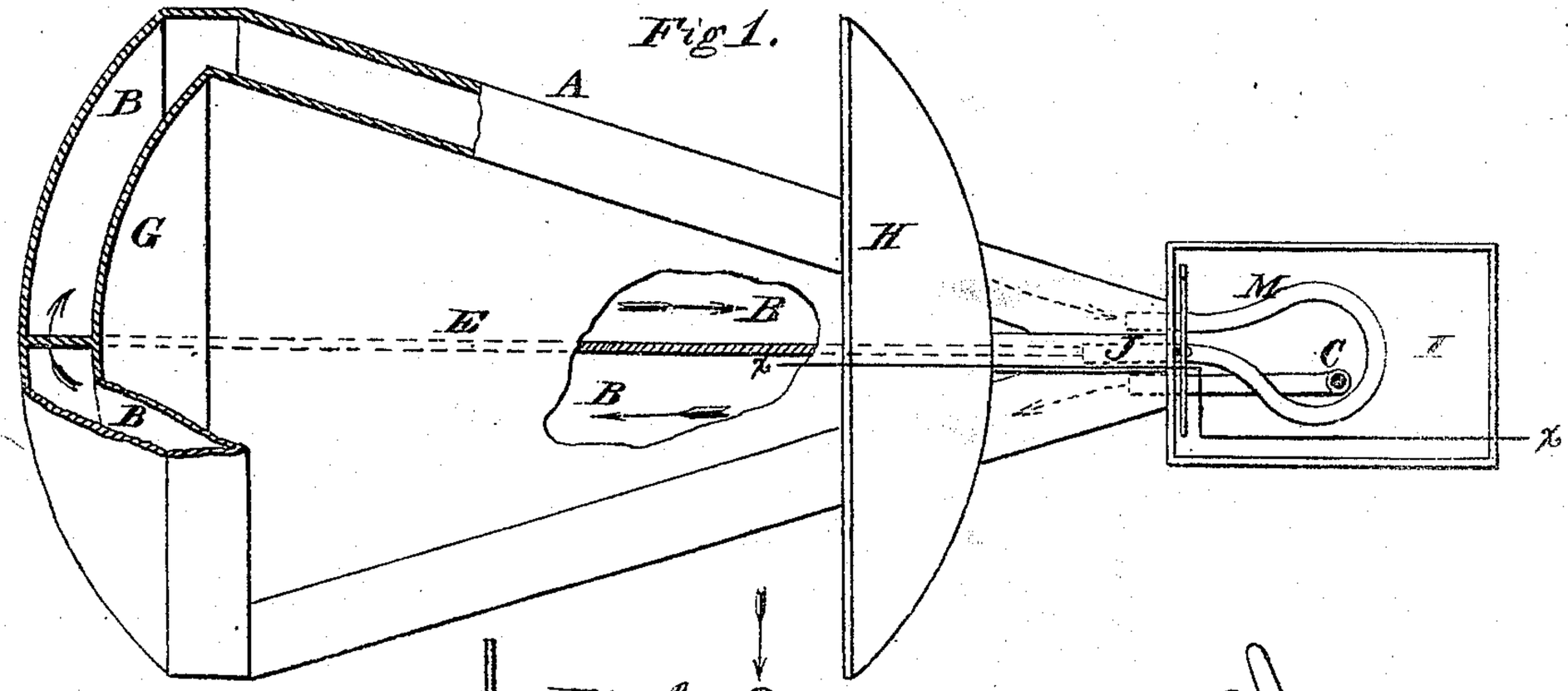


Fig 2.

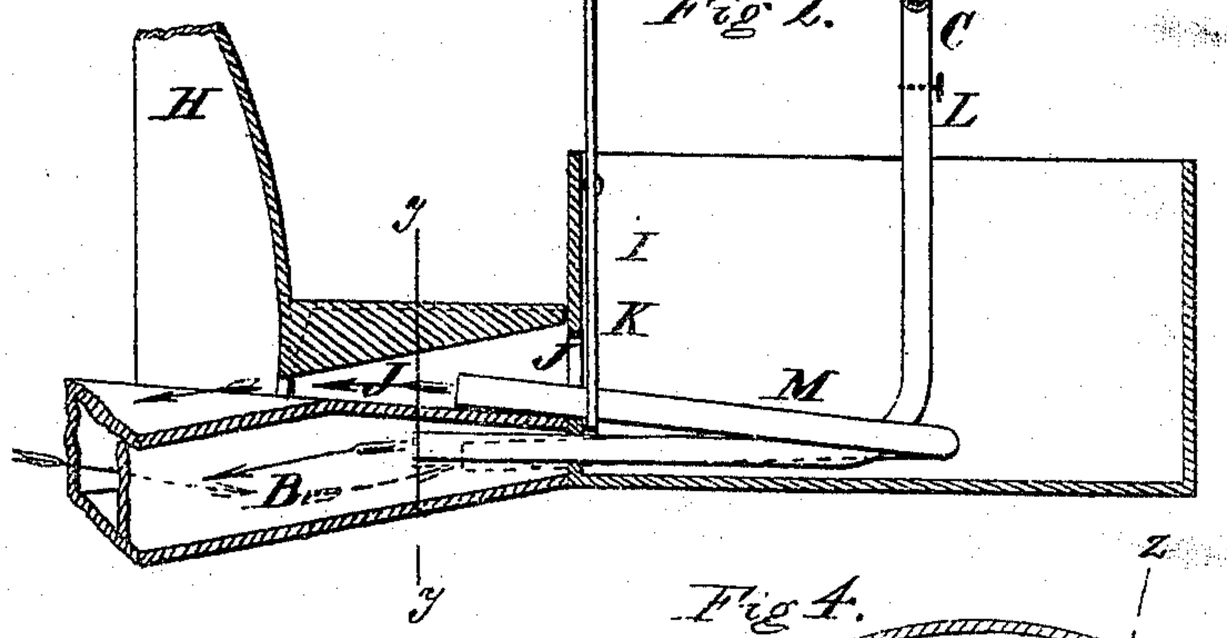


Fig 3.

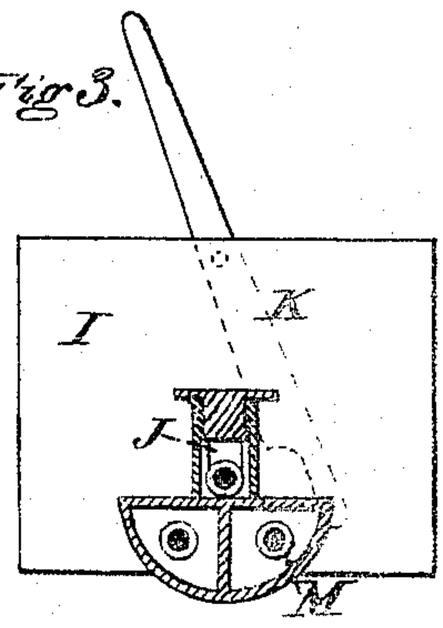
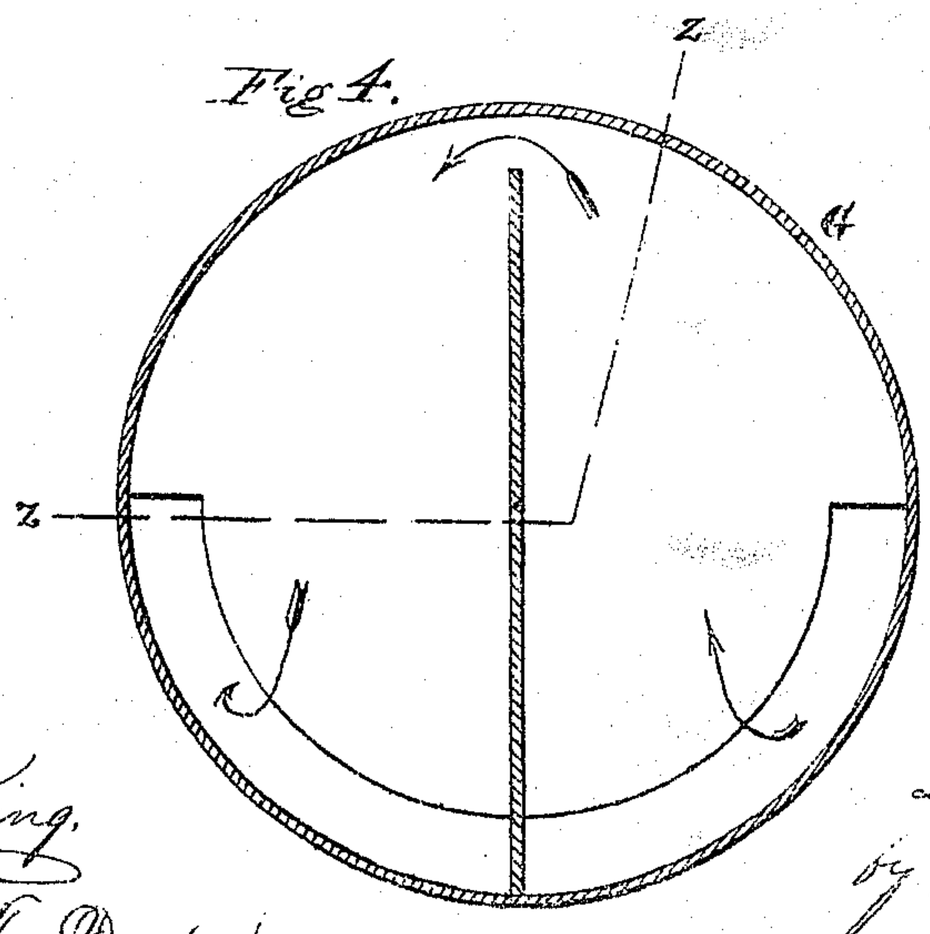


Fig 4.



Witnesses.

Harry King.

Philip S. Dodge.

Inventor.

Lor Stevens

by Dodge & Mason

his Attys.

125,497

UNITED STATES PATENT OFFICE.

LEVI STEVENS, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN PROCESSES OF BURNING ASPHALTUM.

Specification forming part of Letters Patent No. 125,497, dated April 9, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that I, LEVI STEVENS, of Washington, in the county of Washington, District of Columbia, have invented certain Improvements in Process of Burning Asphaltum, of which the following is a specification, reference being had to the accompanying drawing.

My invention consists in a novel method of atomizing or vaporizing asphaltum, and combining or mixing the same with superheated steam or air, for the purpose of producing a perfect combustion of the asphaltum, as hereinafter described.

The objects of this invention are, first, to utilize, and thus give commercial value to the large bituminous deposits of this country known as asphaltum, shale-oil, &c.; second, to furnish a flame that will desulphurize and reduce ores where other forms of fuel are expensive or difficult of access; third, to furnish a flame that, when used in smelting ordinary iron-ores, will completely desulphurize, carbonize, and convert the same into steel at one process, and at about the cost of ordinary pig-iron; and fourth, to produce a cheap heat for generating steam or other purposes.

Heretofore all attempts to utilize asphaltum as fuel have failed, because of the great amount of smoke and lamp-black formed by the imperfect combustion of the carbon; but by my process of atomizing the asphaltum and mingling it with superheated steam or air before combustion, the whole of the carbon is consumed, leaving no residue of smoke or lamp-black. In the patents which have been granted me for using petroleum and other volatile hydrocarbons as fuel, as well as in my previous experiments, I combined these hydrocarbons with steam in a close receiver under pressure and at a heat of about 600° Fahrenheit, and in this way formed a new compound which required a large amount of oxygen from the air for its perfect combustion and which would not burn if this oxygen was excluded. In using asphaltum and other hydrocarbons in which there is a large percentage of foreign matter, such as sand, clay, &c., I find that the close receiver is not practicable, and have, after many experiments, perfected an entirely different plan, by which I am enabled to burn perfectly, and without smoke, all of that class of hydrocarbons known as asphaltum, shale-oil, &c., and thus utilize them for heating, smelting, and similar purposes. To do this for ordinary steam-boilers, I construct an apparatus substantially as hereinafter described.

In the drawing, Figure 1 is a top-plan view, with portions broken away, on the line *z z* of Fig. 4, showing the bottom of the trough of the burner. Fig. 2 is a vertical section on the line *x x* of Fig. 1, enlarged. Fig. 3 is a transverse vertical section on the line *y y* of Fig. 2; and Fig. 4 is an end view of the burner with the outer shell of the end removed.

In constructing this apparatus I make a hollow concave semi-conical burner, A, with steam passages therein. These passages are made by placing a longitudinal partition, E, between its shells, and which extends nearly to the top of its larger end, G, as clearly shown in Figs. 1 and 4. This larger end G is made dish-shaped, so as to form a deflector, and opposite to it, and near the small end of the burner, is placed a corresponding deflector, H. These deflectors limit the size of the fire-box. To the small end of the burner is attached a tank, I, provided with a passage, J, opening into the smaller end of the basin of the burner and under the deflector H, as shown in Figs. 1 and 2. This passage is provided with a gate, K, arranged as shown in Fig. 3, to regulate the flow of the asphaltum from the tank. Through the tank I is passed a steam-pipe, C, provided with a cock, L, to regulate the passage of steam through the same. This pipe opens into the hollow space or steam-passage B, between the shells of the burner on one side of the partition E. This passage is continued to the large end of the burner, and then around the partition in said end, as shown in Fig. 4, and back on the opposite side of said partition to the end of the burner, and is there continued by a pipe, M, which passes into the tank and is curved therein, and then enters the passage J leading from the tank to the basin or trough of the burner, as shown in Figs. 1, 2, and 3.

In operating this apparatus, the tank I is filled with asphaltum or other similar material. The steam from a steam-boiler is introduced through pipe C and passes in the direction of the arrows through the passages in the

burner, and on through the pipe M and out into the passage J. The current of steam thus introduced melts the asphaltum in the tank, and which on opening the gate K flows into the passage J, when it is struck by the current of steam and blown into atoms or spray over the trough of the burner and against the deflector G, which sends it back against the deflector H. In this process the elements of the asphaltum and the steam become thoroughly commingled, and, upon the application of fire, burn rapidly. As soon as the fire is well lighted and the burner heated to about 600° Fahrenheit the flow of asphaltum should be regulated by means of the gate K, and when properly regulated the whole of the carbon will be consumed and there will be no smoke. The deflectors, as will be seen, serve to confine the combustion within a given space in the fire-box of a steam-boiler, and the trough or concavity of the burner serves to receive any surplus asphaltum that may escape.

I do not confine myself to this particular form of construction of a burner, although it has some special advantages, since it may be made of cast-iron and in one piece, and therefore at small expense. Any arrangement of burner that will heat steam to about 600° Fahrenheit by its own fire will produce the same result. The steam may be heated by a separate heater, and then placed in combination with the asphaltum, when equally good results will be obtained. I have found that by using heated compressed air instead of steam similar results can be produced, and that the best results are attained when the air or steam is heated to about 600° Fahrenheit. I do not confine myself to atomizing the asphaltum by a jet of steam or air before combustion, as I have found that for some purposes good results are obtained by burning the asphaltum in the trough and then passing a current of heated air or steam over it and in contact with its flame. Under these conditions I have found that all the smoke or unburnt carbon rising from the burning asphaltum would be consumed. The vapor thus formed differs from the compound formed in a close receiver under pressure at a temperature of 600° Fahrenheit in this, that the union or mixture is simply mechanical until they come to the point of combustion, when they combine rapidly, having been heated and mixed, as described.

I am aware that an apparatus has been constructed by means of which a jet of wet steam or steam at the ordinary temperature delivers the hydrocarbon in spray, by which it is atomized and mingled with atmospheric air introduced partly by the action of the steam and partly by the grate-bars or plates. This I do not claim; but

Having thus described my invention, what I claim is—

The process of atomizing or vaporizing asphaltum and combining or mixing the same with superheated steam or air, substantially as herein described, and for the purpose set forth.

LEVI STEVENS.

Witnesses:
H. B. MUNN,
J. MCKENNEY.