

(No Model.)

2 Sheets—Sheet 1.

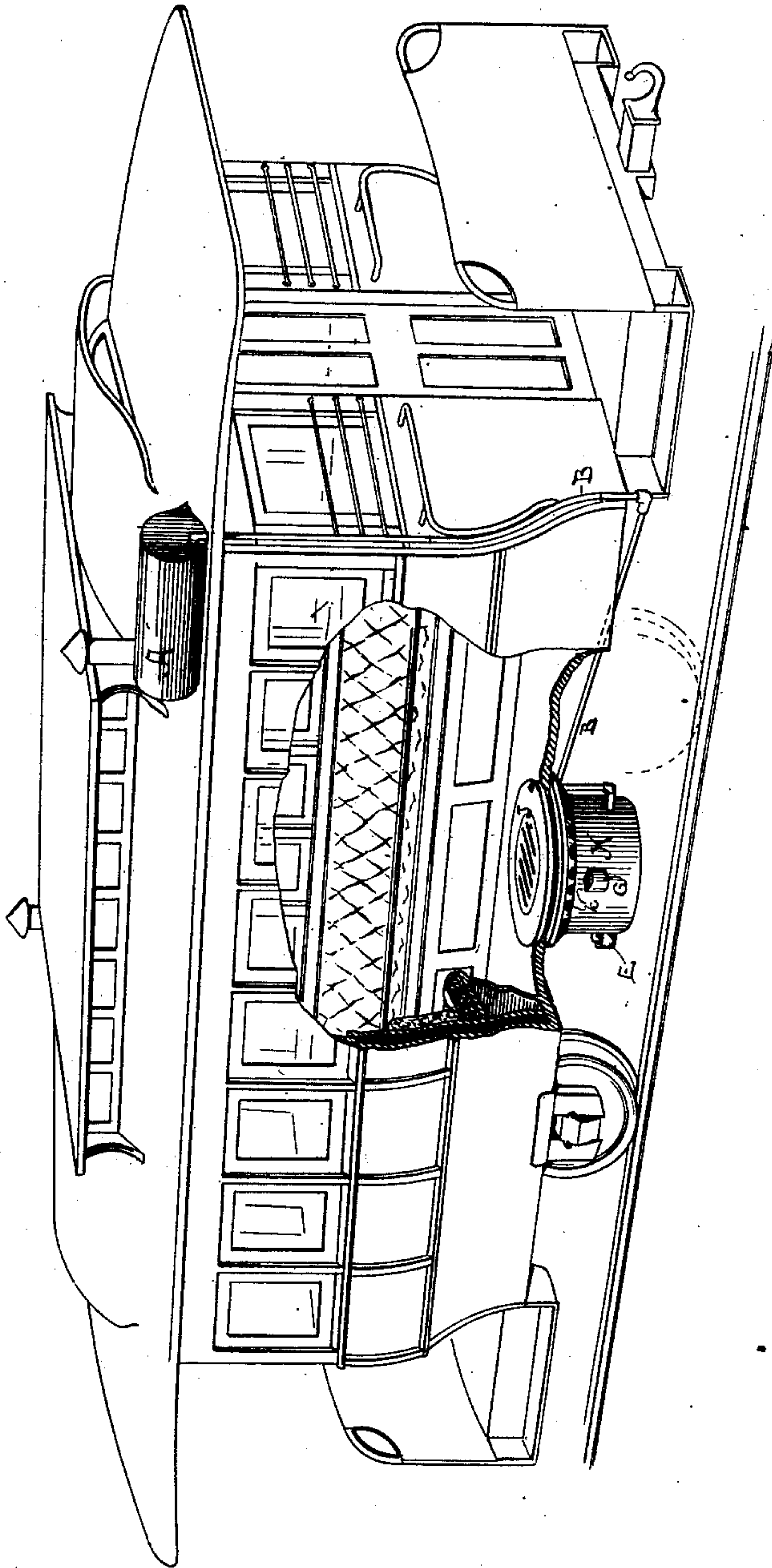
E. BAKER.

PETROLEUM BURNER AND HEATER.

No. 244,785.

Patented July 26, 1881.

Fig. 1.



Attest:

R. F. Barner
M. V. Smith

Inventor:

Elbridge Barker
By his atty R. V. Smith

(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

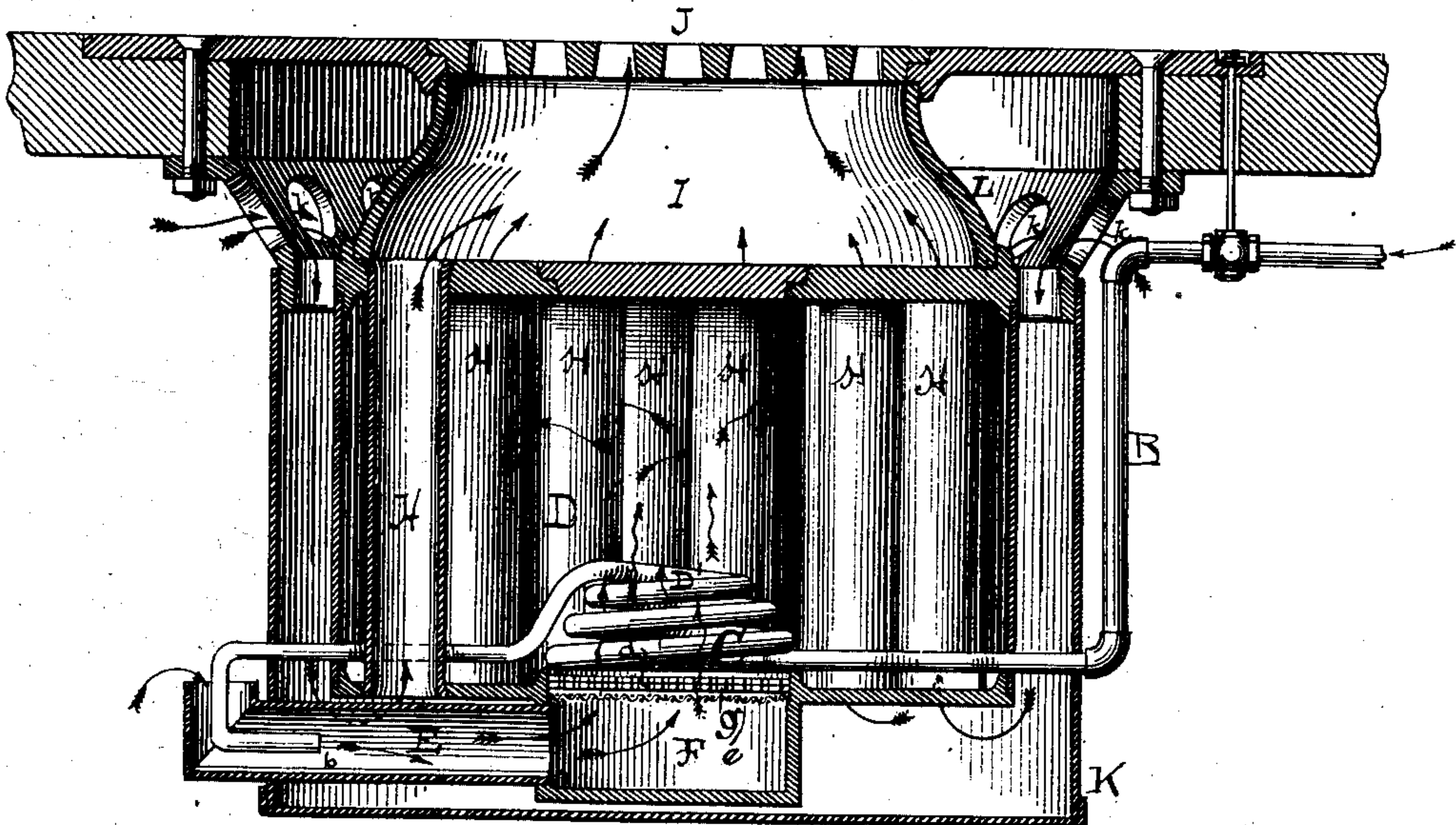


Fig. 5.

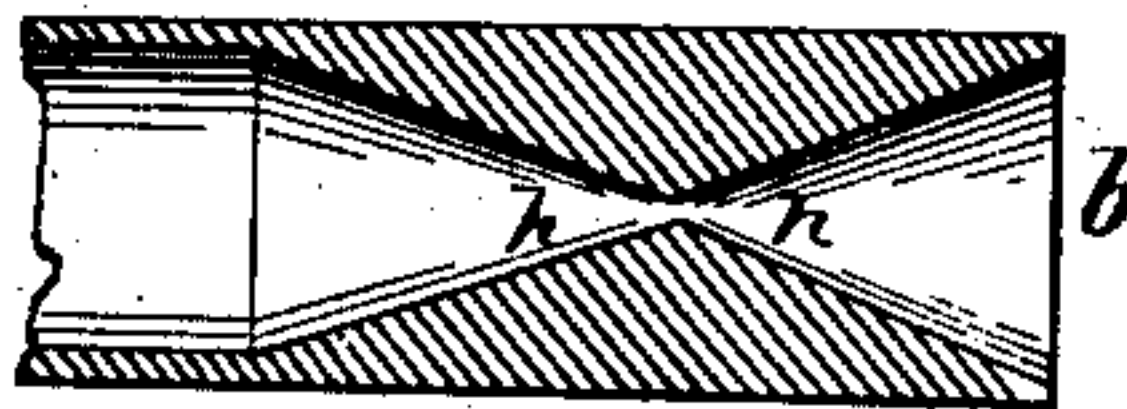


Fig. 3.

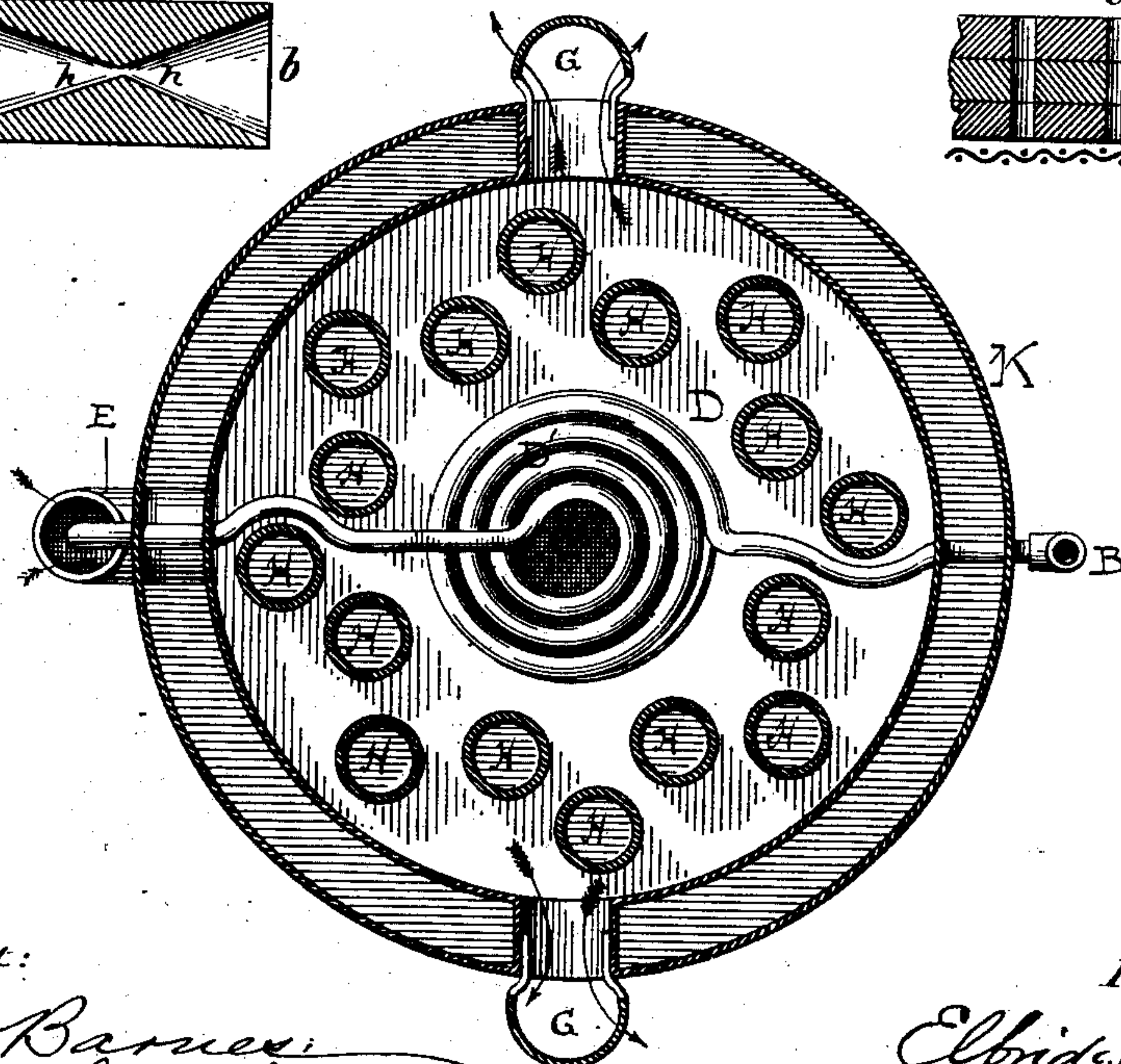
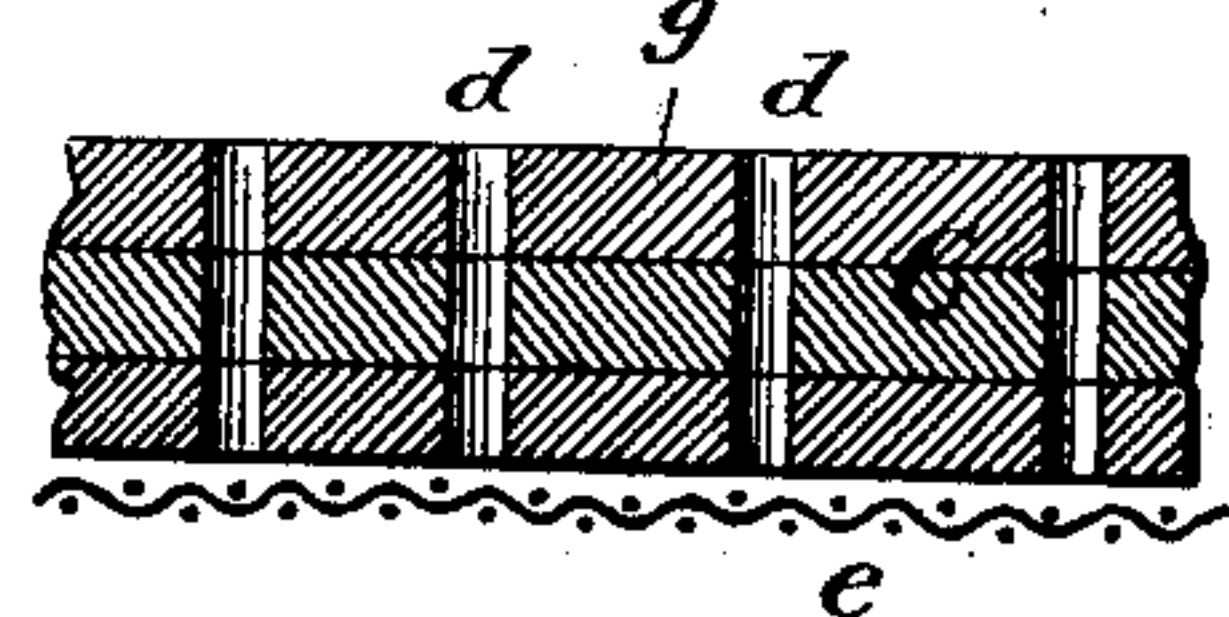


Fig. 4.



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Inventor:

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UNITED STATES PATENT OFFICE.

ELBRIDGE BAKER, OF MALDEN, MASSACHUSETTS.

PETROLEUM BURNER AND HEATER.

SPECIFICATION forming part of Letters Patent No. 244,785, dated July 26, 1881.

Application filed December 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, ELBRIDGE BAKER, of Malden, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Petroleum-Burning Heaters adapted for Heating Railway-Cars and for other Purposes; and I do hereby declare that the following is a full and exact description of the same.

I am aware that many devices for burning the light distillates of petroleum with a mode of operation in its general character similar to mine have heretofore been produced; but such devices are not generally applicable in the burning of crude petroleum or the heavier products of the distillation of the same. One of the practical difficulties encountered is the destruction of the exposed parts of the burner under the intense heat produced in the perfect combustion of petroleum. This practical difficulty has been overcome by my apparatus to such an extent that it ceases to be an obstacle to the successful use of petroleum as a fuel for the generation of heat for any purpose desired. I am also aware that heating apparatus with descending and ascending flues has been made, and therefore I do not propose such flues, broadly.

I am also aware that heaters have been placed pendent under the floors of cars or in other structures, and therefore I do not propose to claim a pendent heater, broadly.

My invention consists, first, in a burner-face of asbestos paper, having numerous perforations for the passage of the gas mixed with atmospheric air; second, in the combustion-chamber with hot-air tubes and lateral outlets for the products of combustion without destruction of the burner; third, in the structure of the heater, whereby cool air is admitted, heated during its passage, and permitted to escape; fourth, in the structure which permits my heater to be suspended below the floor of a railway-car or other structure, and discharge its heated air through proper openings in said floor.

Having now set forth in general terms the elements of my invention, I will more particularly describe an apparatus constructed in accordance therewith, and which may be considered typical of my invention. However, I do

not design to be confined to the minute details of structure shown, because to adapt it to the various special uses to which it may be applicable will require some structural variations without in any way departing from the principles or mode of operation of my invention. Reference is made to the accompanying drawings, wherein—

Figure 1 is a perspective view, showing my apparatus as a pendent heater for a railway-car. Fig. 2 is a vertical central section of the same. Fig. 3 is a horizontal section of the same. Fig. 4 is an enlarged section of the burner. Fig. 5 is a longitudinal section of the gas-nozzle.

A is the reservoir for holding the petroleum or other liquid hydrocarbon. As before stated, crude-petroleum or the heavy distillates of the same are preferred, because they hold a larger percentage of carbon. The reservoir A may be located at any proper or convenient place, and the requisite pressure in the feed-pipe near the burner may be secured by elevating the reservoir so that the gravity of the liquid will produce the requisite pressure; or, if it is not convenient to produce pressure in that way, air may be forced into said reservoir with such pressure as may be required.

B is the feed-pipe, extending from the reservoir A to the burner C.

Immediately above the burner C and within the combustion-chamber D there is a conversion or gas-generating chamber, into which the liquid-hydrocarbon is introduced, and is there converted into vapor or gas. This conversion-chamber or gas-generator is most conveniently constructed by coiling the feed-pipe, as at D', the inlet being at the bottom of the coil. From the conversion-chamber the gas is conducted and discharged at *b*, within an inspirator, E, whereby an inflow of air is produced at the open end of said inspirator, to be mingled with the hydrocarbon gas before issuing from the burner at *d*, in the combustion-chamber.

These are, in general, the essential parts of the apparatus for introducing, converting, and burning the hydrocarbon.

The particular parts of this apparatus to which important novelty is attached are, first, the inspirator; second, the burner.

The inspirator is composed of a gas-jet, which bears a particular relation to the air-inlet, to induce a regular and maximum flow of air into the mixing-chamber F. The orifice through which the gas issues presents two hollow conic frustums, as at *h*, with their smaller bases joined. The angle of divergence of the sides from the axis should be twenty-two and a half degrees, or thereabout. The diameter of the orifice will vary with reference to the specific gravity of the hydrocarbon to be employed, being larger for light oils and smaller for the heavier grades. The gas issuing from this nozzle escapes in an expanding conical jet, which at a distance from the nozzle about equal to the diameter of the air-tube will completely fill said tube, carrying forward with it all the air within the tube, and thereby maintaining a partial vacuum behind it, which the atmospheric pressure behind will tend constantly to fill. By this arrangement the jet of issuing gas will move a maximum quantity of air into the mixing-chamber F.

The second feature is the structure of the burner. Perfect combustion of petroleum-gas with proper admixture of air gives out so intense a heat that no ordinary materials are sufficiently refractory to resist it. I am aware that perforated brick or terra-cotta have been employed, but they are not adapted to use in a portable apparatus, and are too cumbersome for advantageous use. I have overcome all difficulties on this score by facing my burners with asbestos-paper, with numerous perforations, through which the mingled gas and air may issue to be burned. Asbestos in the form of paper fabric supplies the want in this respect perfectly. It may be caused to present perforations more or less numerous, as desired, and it is so refractory and so perfect a non-conductor that it resists all practicable degrees of heat and protects perfectly the less refractory substance beneath it. In my burner, therefore, I first place a piece of wire-gauze or perforated metal, *e*, and secure it around the edges to the frame or rim of the mixing-chamber; and upon this wire-gauze I place one or more thicknesses of asbestos-paper, *g*, with perforations as numerous as I find to be advantageous. The gas issues through these perforations and burns as a jet at each one, filling the combustion-chamber with flame. The products of combustion escape through one or more openings, *G*, at the sides of the apparatus. No chimney is required to produce a draft, because the gases being forced in by the entering-jet inspirator are in the same way driven out by the internal pressure in the combustion-chamber. A series of tubes, *H H*, pass up through the combustion-chamber, and, being bathed on all sides by flames and hot products of combustion, are highly heated. The cool air enters said tubes at their lower ends and escapes at their upper ends into the hot-air chamber *I*, whence it escapes either into conductors or directly into the

chamber or apartment to be warmed through the grating or register *J*.

To prevent loss of heat by radiation, I surround the heater with a jacket, *K*, and cause the fresh, cool air to enter the space between the jacket and heater at the top of the jacket through orifices *k*, which may, if desired, be provided with a register to control the entering air. The entering air therefore passes down outside the heater and takes up the heat which is being radiated therefrom. After passing downward inside the jacket *K* the air-current enters the lower ends of the tubes *H*, and, passing upward through them, issues into the chamber *I*, and is thence distributed, as set forth above.

The upper part of the heater is constructed with a plate, *L*, which is provided with a flange, whereby the whole structure may be attached by bolts to the under side of a car or other floor, and the inflow of cool air through the orifices *k* will keep the temperature of plate *L* and its flange so low that there will be no danger of injury to the wood-work which may be in contact with said flange. For the purpose of a car-heater, I propose to suspend this heater beneath the car, as shown, and it may be desirable to apply it in a similar way to other structures. It is evident, however, that if desirable the heater may be supported otherwise than by its rim *L*, and that the heat generated may be applied to other purposes than the heating of air.

Having now described my invention, what I claim as new is—

1. A refractory burner-face for gaseous fuel consisting, essentially, of a sheet or sheets of asbestos-paper having numerous perforations, substantially as described.

2. The mixing-chamber *F* and burner *d*, combined with a combustion-chamber closed at its top and provided with the lateral outlets *G G* and the heating-tubes *H*, which pass through said combustion-chamber and are open at their ends exterior to said chamber, as set forth.

3. A heater for burning liquid hydrocarbon provided with a feed-tube and inspirator and with a mixing-chamber and burner beneath a combustion-chamber, which is closed at its top, combined with heating-tubes *H*, which pass through said combustion-chamber and discharge into a hot-air chamber above the combustion-chamber, and a jacket exterior to the heater, provided with air-inlets at the top, as set forth.

4. A pendent heater for railway-cars having a top plate, *L*, provided with perforations *k*, for the admission of cool air, whereby said plate is kept cool, and a flange whereby the heater may be attached to the floor from which it is suspended.

ELBRIDGE BAKER.

Witnesses:

R. D. O. SMITH,
WM. G. SLINNEY.