

(No Model.)

W. F. STEELE.

HYDROCARBON VAPORIZER AND BURNER.

No. 387,929.

Patented Aug. 14, 1888.

Fig. 1.

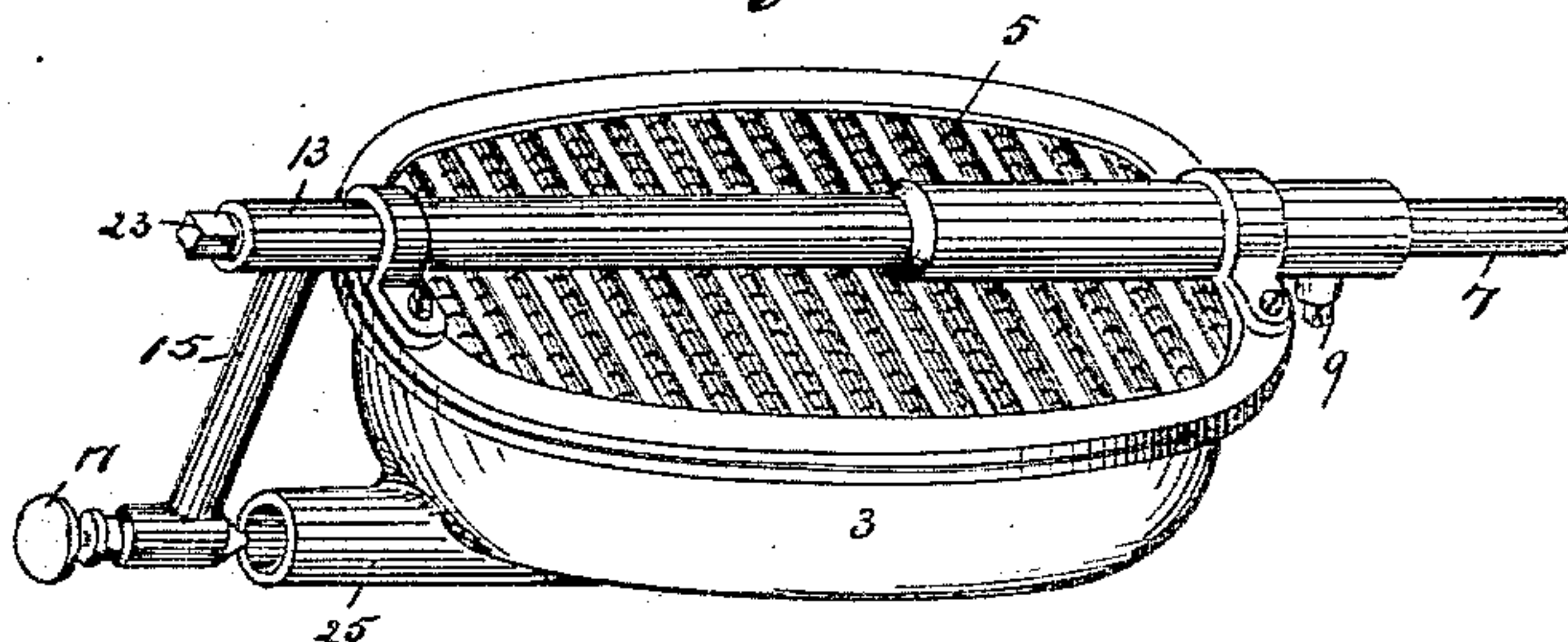


Fig. 2.

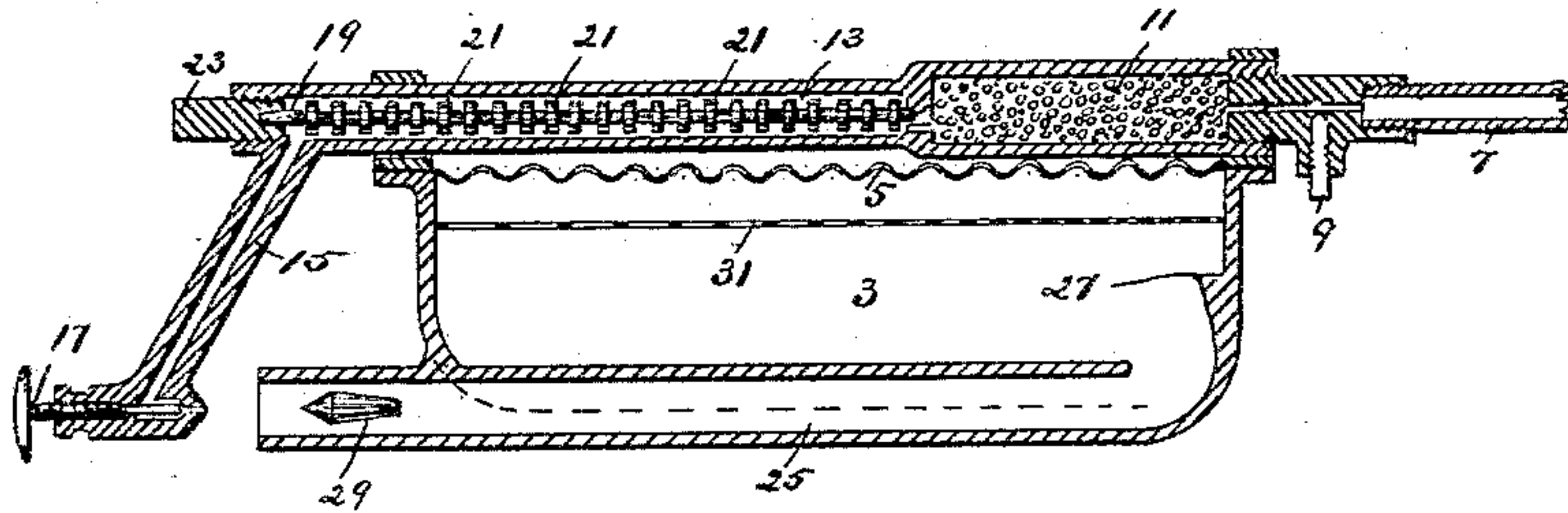


Fig. 3.

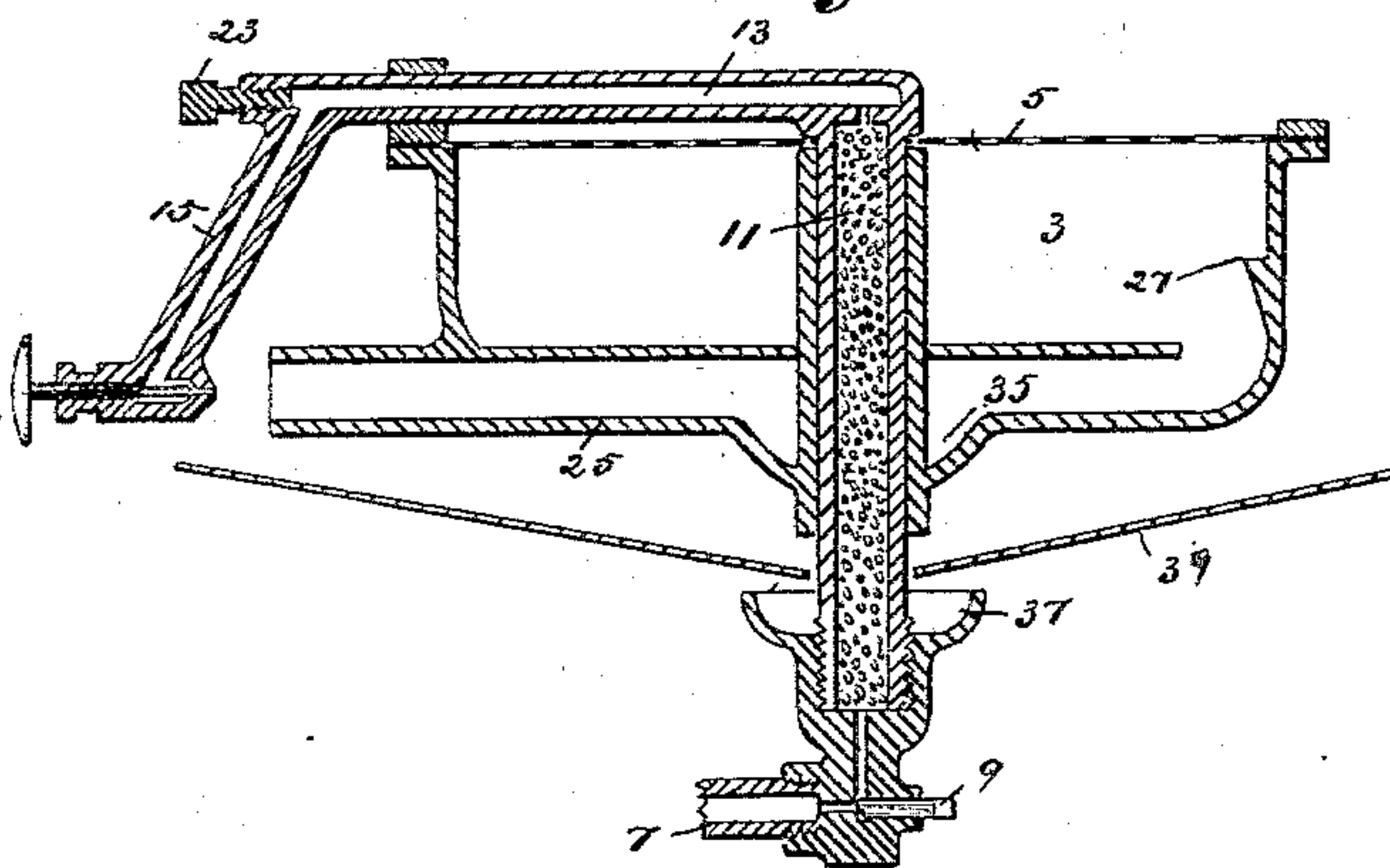
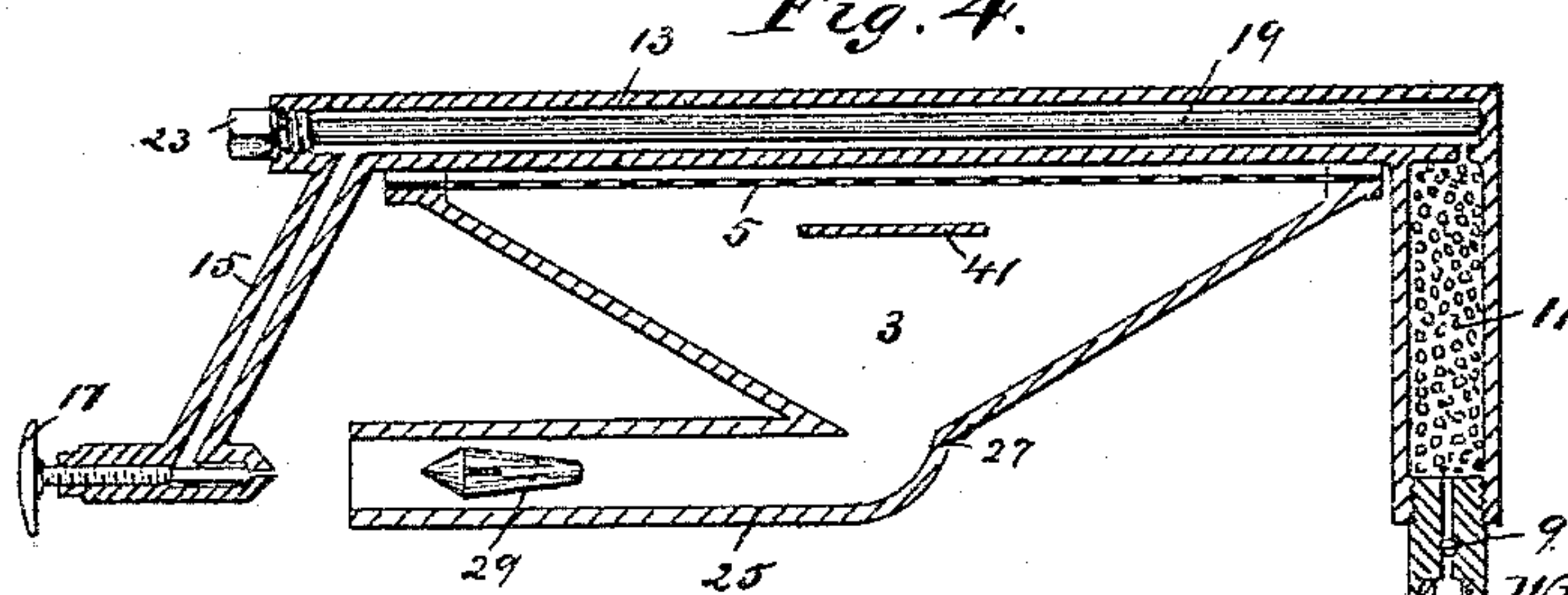


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE

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HYDROCARBON VAPORIZER AND BURNER.

SPECIFICATION forming part of Letters Patent No. 387,929, dated August 14, 1888.

Application filed May 7, 1888. Serial No. 273,106. (No model.)

To all whom it may concern:

Be it known that I, WILBUR F. STEELE, of Steele, in the county of Kidder and Territory of Dakota, have invented certain new and useful Improvements in Hydrocarbon Vaporizers and Burners, of which the following is a full, clear, and exact description.

My invention relates to improvements in hydrocarbon vaporizers and burners, by the use of which liquid hydrocarbon may first be converted into gas, then mingled with a suitable amount of air, and then burned; and the objects I have in view are to produce a hydrocarbon vaporizer and burner of the improved construction hereinafter disclosed.

My invention consists, generally, in the construction and arrangement or combination of parts hereinafter disclosed in the description, drawings, and claims.

In the accompanying drawings, forming a part of this specification, and in which the same reference-numerals indicate the same or corresponding parts, Figure 1 represents a perspective view of my improved burner; Fig. 2, a longitudinal vertical section of the same; Fig. 3, a longitudinal vertical section showing a slightly-modified construction thereof, and Fig. 4 a similar view of another modification of the same.

The vaporizer and burner consists of the burner proper, in which the gas and air are consumed; the supply-pipe, through which the liquid hydrocarbon is conducted from any suitable reservoir; the vaporizer and the retort or superheater, which are arranged horizontally over said burner, so as to be surrounded by the flame therefrom and cause the liquid hydrocarbon passing therethrough to be converted into gas; the pipe and the needle-valve, through which the gas passes from said retort, the pipe or tube into which the gas is received with a sufficient amount of air, which will be carried by the current of gas into said pipe or tube; and the mingling-chamber, in which the air and gas are intimately or thoroughly mixed.

In the drawings, the numeral 3 represents a mingling-chamber of any suitable size and shape, in which the air and gas are thoroughly mixed before passing to the burner, which is provided over its top with a perforated plate of

metal, 5, which constitutes a cover for the mingling-chamber, and through which the air and gas pass and are burned.

7 represents the supply-pipe, through which the liquid hydrocarbon is delivered to the vaporizer and burner, said pipe being furnished with a suitable regulating-valve, 9, by means of which the amount of hydrocarbon to be delivered to the burner may be predetermined or regulated. This supply-pipe is connected to a vaporizer, 11, which is preferably filled with small tacks, pebbles, or other suitable obstructions, as shown in Figs. 2, 3, and 4. This vaporizer is formed of a short length of pipe or tubing, which is preferably arranged horizontally and directly over the perforated metal plate 5, and communicates with the retort or superheater 13, which is formed of a smaller tube or pipe than said vaporizer, and is also arranged horizontally and directly over said perforated plate 5. An inclined tube, 15, is connected to said retort or superheater 13, preferably at a point near its delivery end, extends downward to a point below the bottom of the mingling-chamber 3, and the lower end is provided with a suitable needle-valve, 17.

By constructing the vaporizer 11 of a larger piece of pipe than that forming the superheater or retort 13 the liquid is allowed sufficient space to expand and become fully vaporized before being delivered into the smaller pipe constituting the retort, where it is more confined and superheated and converted into gas.

I prefer to provide the retort or superheater 13 with a core, 19, extending lengthwise thereof and leaving a small narrow annular space between the same and the interior of said superheater, whereby the vapor or gas is caused to pass therethrough in a thin annular stream or sheet, and thus be in proper condition to be subjected to an intensely high heat from the flame of the burner passing around the pipe or tube of said retort or superheater. This core is preferably provided with a series of rings, 21, which serve to retard the progress or flow of the gas through the superheater or retort, for the purpose of holding it for a longer time in contact with the heated walls thereof. The burner shown in Fig. 4 is provided with a smooth core in the superheating-chamber,

while the burner shown in Fig. 3 has no core; but I prefer to provide and use said core in all instances, since there will be merely a thin sheet or film of gas between the same and the retort or superheater, and therefore, as the latter is exposed directly and closely to the flame issuing from the perforated plate 5, the gas passing through said superheater or retort will be raised to a much higher temperature than usual. A threaded plug, 23, is placed in the rear end of said superheater or retort, and may be removed when it is desired to remove or replace the core 19.

A tube, 25, is arranged beneath the mingling-chamber 3, has its open end in line with the needle-valve 17 and but a short distance therefrom, extends substantially the full length of said mingling-chamber, and is preferably made in one piece therewith. This chamber is also provided with a slightly-curved abutment or retarding projection, 27, which is arranged above the inner open end of the tube 25 and forms a deflecting-surface for the air and gas passing through said tube 25, causing them to be thrown backward through the mingling-chamber, where said air and gas become thoroughly mixed before they pass through the perforated metal plate. I also prefer to arrange a conical spreader, 29, in the open end of the tube 25, so that the gas will strike against it and be spread out and thereby become better mixed with the air passing into said tube. A distributing-plate, 31, is also preferably arranged within the mingling-chamber at a point a short distance below the perforated metal plate 5, for the purpose of equalizing and distributing the gas within said chamber. This distributing-plate is provided with a series of perforations of different degrees of fineness, those along the end thereof which is nearest the gas-inlet opening of the chamber being smaller than those toward the other end thereof. The smaller perforations in the plate will not permit at the same pressure as much gas to pass therethrough as passes through the larger perforations along the other end thereof. Thus, while the upward pressure of gas along the end of the plate toward the inlet-opening of the chamber is considerably stronger than it is along the other end thereof, a substantially equal flow of said gas through all parts of the perforated plate will be secured.

In the modification shown in Fig. 3 of the drawings the vaporizer 11 passes up through the mingling-chamber 3, and the tube 25 is provided with the cup or depression 35 for catching any unvaporized oil that may pass through said tube; also, in this instance of my invention a drip-cup, 37, is arranged beneath the mingling-chamber and surrounds the vaporizer, and I also employ a catch-basin, 39, for conveying into said drip-cup 37 any oil that may escape from any part of the burner.

In Fig. 4 of the drawings I have shown the vaporizer 11 arranged at one side of the burner proper, and the superheater or retort 13 ex-

tending the full length of said burner and provided with a closely-fitting smooth core, 19, which extends from end to end thereof. The mingling-chamber 3 in this instance is of conical form, and is provided with an inlet at its bottom and with a retarding-plate, 41, between the end of the tube 25 and the perforated plate 5. The air and gas passing through the tube 25 strike the under side of this plate and are deflected outward equally in all directions within the chamber, and, being thus retarded and equalized, they will pass upward through the perforated metal plate 5 in a substantially uniform manner.

It will be evident from the foregoing that the liquid hydrocarbon is first vaporized in the vaporizer 11; that in its vaporized state it will then pass into the retort or superheater 13, where it will be raised to a higher temperature, and that it will then pass through the tube 15, through the valve 17, with considerable force, and into the tube 25, carrying with it a sufficient amount of air to cause perfect combustion. The air and gas as they enter the tube 25 impinge against the cone-shaped deflector 29, are thrown outward against the wall of said tube, and become thoroughly commingled. The air and gas thus mixed together then pass along the tube 25 and strike against the curved abutment 27 at the end of the mingling-chamber, whereby they are thrown back into said chamber, where they become intimately mingled, then pass upward through the perforated equalizing-plate 31, and then through the perforated metal plate 5, where they are ignited. A perfect combustion of the gas is thus obtained and the intensity of the flame rendered very high.

Having thus fully described the construction, arrangement, and operation of the several parts of my invention, what I claim as new is—

1. In a hydrocarbon vaporizer and burner, the combination, with a burner and a valve for regulating the supply of vapor or gas thereto, of a superheater or retort, which is straight from end to end, arranged horizontally over and close to said burner and provided with a closely-fitting internal core, whereby the vapor or gas is spread out in a thin sheet or film and adapted to be readily superheated, substantially as described.

2. In a hydrocarbon vaporizer and burner, the combination, with the mingling-chamber 3, provided with the perforated metal plate 5, of the superheater or retort arranged horizontally over said chamber and provided with a closely-fitting core, 19, the tube 15, the needle-valve 17, and the tube 25, arranged opposite said valve and communicating with the lower part of said mingling-chamber, substantially as described.

3. In a hydrocarbon vaporizer and burner, the combination, with the mingling-chamber 3, provided with the perforated metal plate 5, of the vaporizer 11, and the superheater or retort 13, communicating with said vaporizer

and provided with an internal closely-fitting core, 19, and arranged horizontally over said chamber, substantially as described.

4. In a hydrocarbon vaporizer and burner, 5 the combination, with the mingling-chamber 3, provided with the perforated plate 5, the vaporizer 11, formed of an enlarged piece of pipe, the superheater or retort 13, formed of a smaller pipe than that of said vaporizer and 10 arranged horizontally over said chamber and provided with an internal closely-fitting core, 19, substantially as and for the purpose described.

5. A hydrocarbon vaporizer and burner 15 provided with a mingling-chamber, 3, a tube, 25, arranged horizontally beneath and communicating with the interior of said chamber, and the curved abutment or deflecting-surface 27, arranged within said chamber near the inner 20 end of said tube, substantially as and for the purpose described.

6. In a hydrocarbon vaporizer and burner, the combination of the mingling-chamber 3, the tube 25, arranged horizontally beneath 25 and communicating with said chamber, the perforated retarding-plate 31, arranged within said chamber and formed with perforations decreasing in size toward the end of said chamber which is nearest the inner open end of 30 said tube, substantially as described.

7. In a hydrocarbon vaporizer and burner, the combination of a mingling-chamber provided with a curved abutment or deflecting-surface on its interior surface, a tube communicating with said chamber and arranged with 35

its open inner end in proximity to said abutment, and a perforated retarding-plate formed with perforations decreasing in size toward the end of said chamber which is nearest the end of said tube, substantially as described. 40

8. A hydrocarbon vaporizer and burner provided with a mingling-chamber, 3, a tube, 25, a spreader, 29, an abutment or deflecting-surface, 27, a retarding-plate, 31, formed with different-sized perforations, and a perforated 45 burner-plate, 5, substantially as described.

9. In a hydrocarbon vaporizer and burner, the combination of the mingling-chamber 3, the vaporizer 11, the superheater or retort 13, arranged horizontally over said chamber, the 50 tube 15, provided with the valve 17, the tube 25, arranged horizontally beneath and communicating with said chamber and having its outer open end arranged opposite said valve, and the spreader 29, arranged within said 55 tube, substantially as and for the purpose set forth.

10. In a hydrocarbon vaporizer and burner, the combination, with the mingling-chamber 3, of the superheater or retort 13, which is 60 straight from end to end and arranged horizontally over said chamber, and provided with the core 19, having the series of rings 21, substantially as and for the purpose described.

In testimony whereof I have hereunto set my 65 hand this 2d day of May, 1888.

WILBUR F. STEELE.

In presence of—

WM. GRIMSHAW,
A. C. PAUL.