

UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 741,834, dated October 20, 1903.

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To all whom it may concern:

Be it known that I, HENRY PITT ROBERTS, a citizen of the United States, residing at New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Hydrocarbon-Burners; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention has relation to hydrocarbon-burners of the steam-injector type; and it consists in the novel construction and arrangement of its parts, as hereinafter shown and described.

The object of the invention is to provide a burner for hydrocarbon oils, said burner having an attachment against which the flame is thrown for the purpose of generating steam. The steam in turn is conducted to the jacket constituting the part of the burner and which surrounds a cylinder which forms a gasifying chamber for the hydrocarbon, the heat from the steam gasifying the oil within the said chamber. The steam is introduced in the rear of the said chamber and forces the hydrocarbon toward the forward end, and at or near the point of outlet steam is conducted from the jacket and sprayed into the mixture of steam and hydrocarbon as it passes into a bell-shaped outlet, where it is ignited, said bell-shaped outlet being provided with suitable orifices or perforations for the purpose of admitting air to the mixture at or about the point of combustion. The device is further provided with a means for automatically cutting off the supply of oil as the steam-pressure decreases. Thus the burner will cease to operate if there is not sufficient water in the steam-generator. A means is also provided for straining or filtering the hydrocarbon before it enters the gasifying-chamber, said means consisting of a strainer located in the inlet-pipe, (which is preferably pitched at an angle,) a trap being located under said strainer and adapted to catch and retain particles removed from the oil by the strainer,

the device being so constructed that the burner may be washed by hot steam, which can be passed through the said strainer in the opposite direction from that in which the oil passes through the strainer, and consequently the particles of filtration can be readily removed from the strainer and deposited in the said trap.

In the accompanying drawings, Figure 1 is a longitudinal broken sectional view of the burner with parts and attachments in elevation. Fig. 2 is an enlarged sectional view of the trap and the strainer in the oil-inlet pipe. Fig. 3 is a top plan view of a steam-valve used in connection with the burner, and Fig. 4 is a sectional view of a safety-valve used in connection with the burner.

The burner consists of the cylinder 1, which is closed at its forward end by the head 2 and at its rear end by the head 3. Concentrically arranged within the said cylinder 1 is the inner cylinder 4, the ends of which are secured in openings in the heads 2 and 3, respectively. The rear end of the cylinder 4 is closed by a cap 5, and the forward end of the cylinder 4 connects with the hollow interior of the throat 6, to the outer end of which is attached the bell-shaped casting 7, which constitutes a combustion-chamber. The said casting 7 is provided with perforations 8 for the purpose of admitting air to the mixture at or near the point of combustion, and the rear end of the casting 7 is provided with the valve-seat 9. The stem of the needle-valve 10 passes through the inner cylinder 4, the said valve being adapted to engage the seat 9. The outer end of the said valve-stem passes through the cap 5 and is provided at its extreme end with a handle 11. The casting 7 enters the side of the fire-box of the boiler 12, and within the fire-box of the said boiler and directly opposite the end of the said casting 7 is located the steam-generator 13, the pipe 14 connecting the said generator 13 with the water-supply of the street, the pipe 14' leading from the top of the said steam-generator 13 and entering the upper side of the cylinder 1 at an intermediate point. The side of the steam-generator 13 facing toward the casting 7 is provided with a number of corrugations 15 for the purpose of affording a maximum

amount of heating-surface to the flame coming from the burner. The pipe 14' is provided with a safety-valve 15 of any approved pattern, of which Fig. 4 is a sectional view of one form, in which the valve 16 is adapted to rise when the steam-pressure becomes too great and permit the steam to escape through the outlet 17 of the valve-casing.

The hydrocarbon oil is conducted from the elevated tank 18 (in which the oil may be retained under pressure of about twenty-five pounds to the square inch) through the pipe 19, which passes through the cap 5 into the inner cylinder 4. The pipe 20 passes at one end through the exterior cylinder 1, then around and connects at its other end with the T 21, which in turn is connected to the central opening of the cap 5, the stem of the valve 10 passing through said T. Thus a steam connection is made between the exterior cylinder 1 and the inner cylinder 4, the steam being introduced into the interior cylinder simultaneous with the introduction of the hydrocarbon from the pipe 19, the pipe 20 being provided with a steam-valve 22. The pipe 23 connects at one end with the exterior cylinder 1 and is connected at its other end to the throat 6, which is provided with a passage 24, through which the steam is sprayed into the mixture of steam and hydrocarbon as it passes by the end of the needle-valve 10. The said pipe 23 is provided with a steam-valve 25. Fig. 3 is a top plan view of the valves 22 and 25. The stem of the valve is provided with a pointer 26, which passes over the plate 27, said plate having a number of graduations 28, the pointer passing over the same indicating the extent of the opening of the said valve, and thus affording an accurate means for regulating the passage of steam through the valve.

The means for automatically cutting off the supply of oil through the pipe 19 when the steam-pressure decreases consists of a cylinder 29, which is connected at one end by the pipe 30 with the cylinder 1. The piston 31 is located within the cylinder 29 and is adapted to move longitudinally thereof, the coil-spring 32 being interposed between the said piston 31 and the head of the said cylinder opposite to the pipe 30, the tension of the said spring 32 being to hold the piston 31 toward the end of the cylinder to which the pipe 30 is connected. The piston-rod 33 is connected at one end to the piston 31 and at its other end may be connected directly or indirectly to the valve 34, which is located on the pipe 19. The pipe 19 is provided with a trap 35, said trap having in its lower portion an opening normally closed by a plug 36. The pipe 19 is provided with a strainer 37, which is located at the upper edge of the trap 35, the orifice 38 leading from the said strainer into the said trap. The pipe 19 is also provided with a valve 39, which is located below the trap 35. The cylinder 1 is provided in its under side with a drip-cock 40.

The device operates as follows: Water is

admitted through the pipe 14 into the steam-generator 13, at which point the water is heated sufficiently to generate steam. This steam is then conveyed through the pipe 14' into the cylinder 1 and forms a steam-jacket around the cylinder 4. The steam is then conducted through the pipe 20 into the cylinder 4. The needle-valve 11 is then opened and the steam passes out through the casting 7 directly against the steam-generator 13. The hydrocarbon oil is then admitted through the pipe 19 into the cylinder 4, and the said oil is carried by the steam against the steam-generator 13. At the same time steam is sprayed into the mixture of steam and oil through the pipe 23 and the port 24. The spray of oil and steam is then ignited, the steam-generator 13 becomes red-hot, and a dry superheated steam is produced. The steam so generated is hot enough to vaporize the oil in the cylinder 4, the introduction of hot steam into the cylinder 4 assisting the process of vaporization. The combustion is complete and a blue flame is produced without smoke.

If for any reason the fire should go out or the flow of water to the steam-generator 13 should be interfered with, the valve 34 will automatically cut off the supply of oil through the pipe 19 to the cylinder 4. When the cylinder 1 is under sufficient steam-pressure, the steam passing through the pipe 30 moves the piston 31 against the tension of the spring 32, and thus the valve 34 is kept open; but should the pressure of the steam within cylinder 1 for any reason diminish the spring 32 will move the piston 31 toward the end of the cylinder 29 to which the pipe 30 is connected, and thus the valve 34 will be closed and the supply of hydrocarbon through the pipe 19 cut off.

As the oil passes through the pipe 19 it is strained or filtered through the screen 37, the heavy particles of filtration passing down through the duck 38 into the trap 35. As the screen eventually fills with finer particles of filtration, the valve 39 may be closed, the plug 36 removed from the trap, and the steam will pass down through the pipe 19 and through the screen 37 in an opposite direction from the course taken by the oil, and thus the said screen will be washed and the particles of filtration carried into the trap 35 and out of the same through the opening normally closed by the plug 36. Thus the said screen may be cleaned without being taken out of the said pipe.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A hydrocarbon-burner consisting of an outer cylinder with an inner cylinder located therein, the space between the two cylinders constituting a steam-jacket which surrounds the inner cylinder, said inner cylinder having an oil-inlet in one end and an exit at the opposite end, a steam-generator connected

to the outer cylinder at a point intermediate of the ends thereof, a steam connection leading from the outer cylinder into the forward end of the inner cylinder, a steam connection
5 leading from the outer cylinder into the rear end of the inner cylinder and valves located on each said connection.

2. A hydrocarbon-burner consisting of an outer cylinder with an inner cylinder located
10 therein, the space between the two cylinders constituting a steam-jacket which surrounds the inner cylinder, the inner cylinder having an oil-inlet at one end and an exit at the opposite end, a steam-generator connected
15 to the outer cylinder at a point intermediate

of the ends thereof, and having its discharge located opposite the side of the inner cylinder, a steam connection leading from the upper side and end of the outer cylinder into the forward end of the inner cylinder, a
20 steam connection leading from the upper side and opposite end of the outer cylinder into the rear end of the inner cylinder, and valves located in each said connection.

In testimony whereof I affix my signature 25
in presence of two witnesses.

HENRY PITT ROBERTS.

Witnesses:

FREDERICK OEHL,

WILLIAM M. SANDFORD.