J. M. HANSEN.

HYDROCARBON BURNER.

APPLICATION FILED NOV. 16, 1911.

1,049,851.

Patented Jan. 7, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

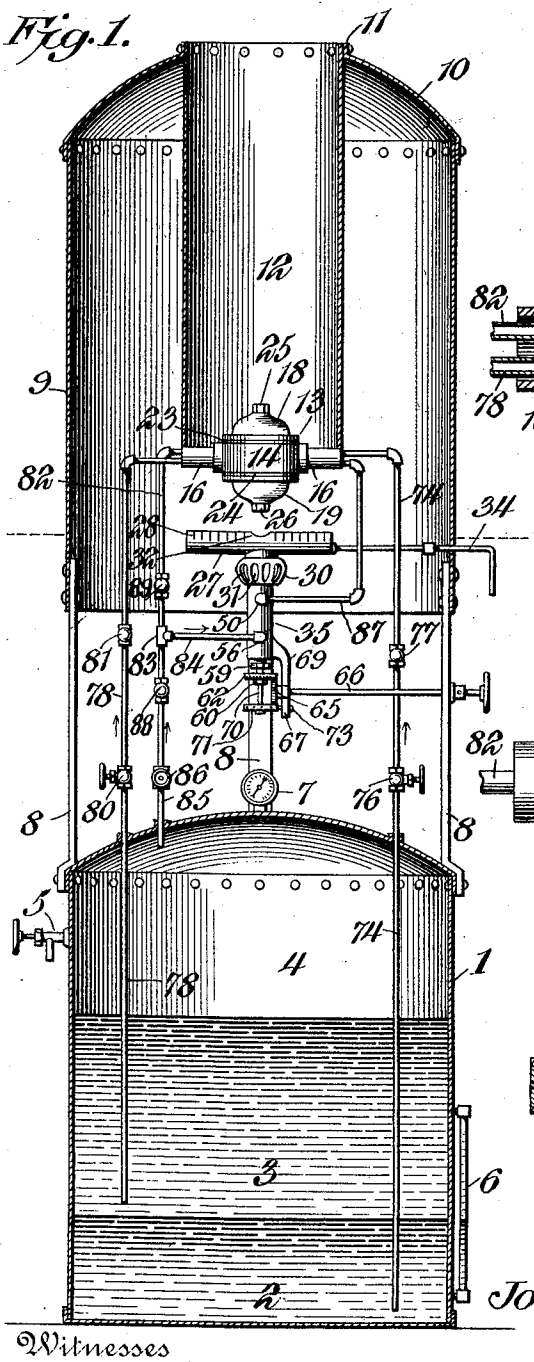


Fig. 2.

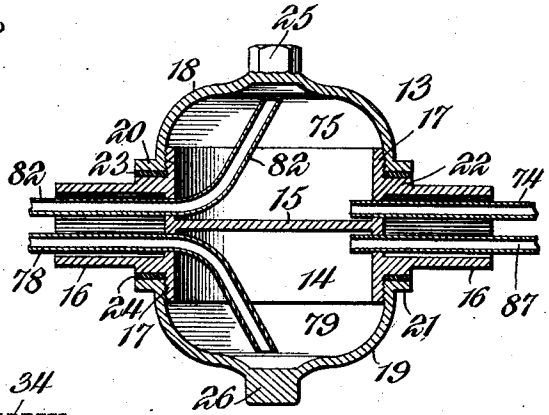


Fig. 3.

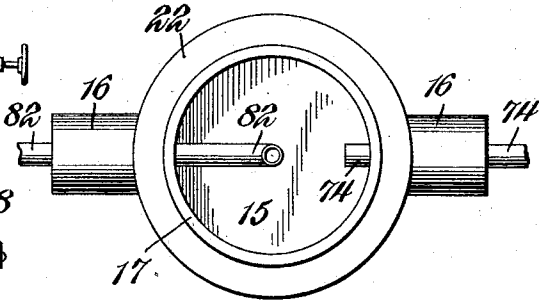
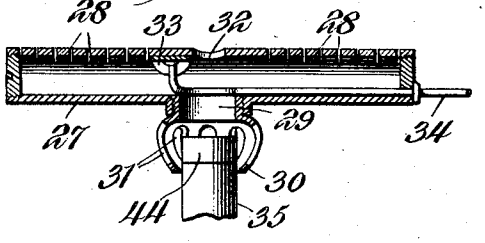


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 5.

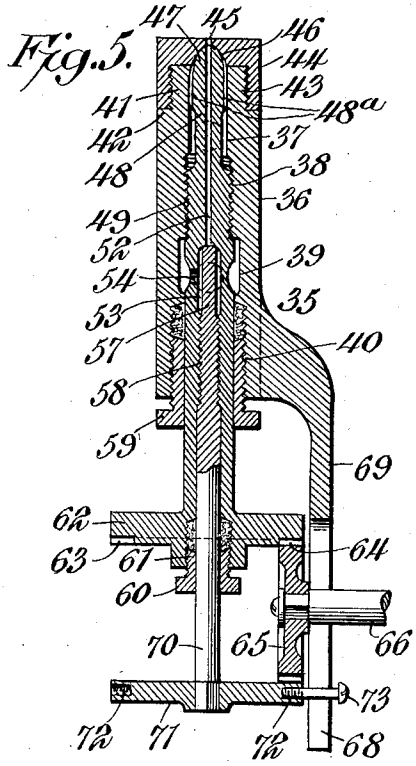


Fig. 7.

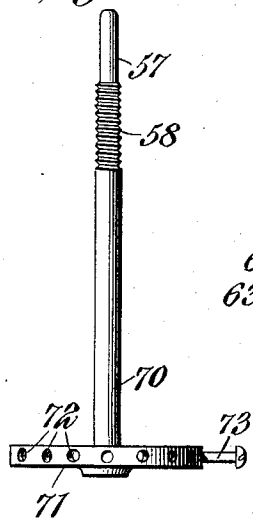


Fig. 6.

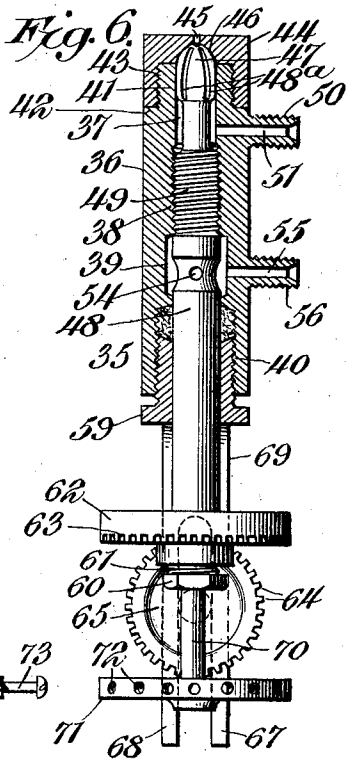


Fig. 8.

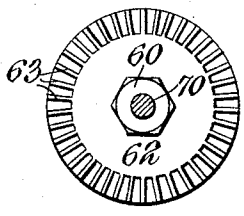
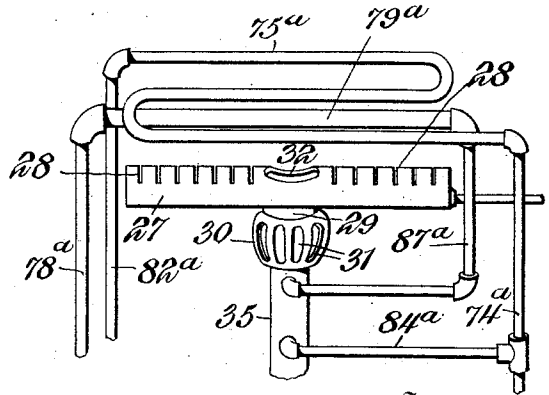


Fig. 9.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

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Application filed November 16, 1911. Serial No. 660,638.

To all whom it may concern:

Be it known that I, JORGEN M. HANSEN, a citizen of the United States, residing at North Chicago, in the county of Lake and State of Illinois, have invented a new and useful Hydrocarbon-Burner, of which the following is a specification.

This invention has reference to improvements in hydrocarbon burners and particularly to a burner which may be fed with fuel by means of compressed air or steam.

The object of the invention is to compact and simplify the burner and the container for fuel, whereby the structure may be made in the form of a compact portable unit.

The invention as particularly set out in the appended claims will be readily understood from the following detail description based upon and taken in connection with the accompanying illustrative drawings, wherein:

Figure 1 shows the preferred embodiment of the invention in central vertical section. Fig. 2 is a similar section through the retort. Fig. 3 is a plan view of the retort with the cover plate removed. Fig. 4 is a longitudinal vertical section through one form of the burner. Fig. 5 is a longitudinal section through the jet device. Fig. 6 is a side elevation partly in vertical section of the same device from a different viewpoint. Fig. 7 shows in elevation one of the valves of the jet device. Fig. 8 is an end view of the other valve of the jet device, showing the operating disk. Fig. 9 is a fragmentary view, showing a modified form of the retort.

The complete furnace illustrated as embodying the invention comprises a tank 1, constituting a joint reservoir for the water 2, the oil 3 and air 4, the latter being introduced under pressure at 5 by means of an air pump or other suitable pressure device. A sight gage 6 is arranged in the lower portion of the tank in order to indicate the dividing line between the water and oil. This tank is hermetically sealed and provided with a pressure gage 7 by means of which the pressure therein can be readily determined.

Upon suitable standards 8 extending upwardly from the tank is supported a drum 9 open below and closed above by the dome-shaped cover 10, having a centrally arranged annular upstanding flange 11 to which is bolted or otherwise suitably secured the flue 12, which depends therefrom centrally within the drum 9. This flue, which is open above and below, supports in its lower end a retort 13, which comprises a thimble 14 divided by a transverse web 15 and provided with diametrically arranged bosses 16. Each end of the thimble is threaded as at 17 for engagement with the interior threads of top and bottom cover plates 18 and 19, these plates having marginal flanges 20 and 21, which overlie an annular flange 22, which surrounds the thimble midway of its length and of which the bosses 16 are radial extensions. Gaskets 23 and 24 are arranged between the marginal flanges 20 and 21 and the annular flange to effect a tight closure when the cover plates are screwed down by means of polygonal projections 25 and 26. Beneath the retort is disposed a burner 27, of any suitable shape though shown in the form of a bar or pipe, closed at each end and provided with apertures preferably in the shape of transverse slots 28, spaced apart along one face of the burner. About the central portion of the burner is arranged a fuel inlet 29, which may be formed integral therewith or threaded into the same as illustrated. This fuel inlet has depending inwardly converging walls 30, provided with slots 31 for the admission of extraneous air, thus forming a mixing chamber. Upon the opposite side of the burner co-axial with the fuel inlet is a larger gas orifice 32, controlled by the valve 33 carried by the stem 34.

The fuel inlet 29 of the burner is arranged to receive the upper end of a jet device 35, comprising a casing 36 provided with the central longitudinal bore 37, having an interiorly threaded portion 38 and an enlargement or chamber 39, and also interiorly threaded at 40. The forward end of the casing is reduced at 41 forming a shoulder 42 and exteriorly threaded at 43 to receive the interiorly threaded cap 44, having a central opening 45 corresponding co-axially with the bore of the casing. The inner face of this cap is coned at 46 to receive the correspondingly exteriorly coned end 47 of a valve 48, said valve being exteriorly threaded at 49 for engagement with the threads 38

to provide for longitudinal adjustment of the valve within said casing. The valve 48 is provided with spaced grooves 48ª extending longitudinally of the head 47 and connecting the annular space at 37 (Fig. 6) with the opening 45 when the valve is unseated. The casing 36 is also provided with a nipple 50 and with a radial bore 51 extending therethrough into communication with the interior bore 37, said nipple being screw threaded to effect a coupling to the supply pipe, as will be hereafter described. The valve 48 is likewise provided with an axial bore 52, alining with the opening 45 of the cap. This bore is enlarged to form an interior chamber at 53, which is in communication through radial ports 54 with the chamber 39 formed by the enlargement in the bore of the casing previously referred to. This chamber is also provided with a radial channel 55, passing through the wall of the casing and the nipple 56 and also threaded similarly to the nipple 50 for the reception of a coupling.

The valve 57 is disposed within the chamber 53 to seat upon the bore 52 and control the same, said valve having its stem in threaded engagement with the first valve at 58 for longitudinal adjustment relative thereto. Packing glands 59 and 60 are disposed about the valve stems, one in threaded engagement with the casing at 40 and the other threaded into the stem of the first valve at 61. The outer valve member 48 is provided with an operating wheel 62, formed as a crown pinion with teeth 63 in its face in mesh with the teeth 64 of a pinion 65, mounted upon the operating shaft 66 journaled between the two forks 67 and 68 of the bifurcated arm, 69, formed integral with the casing 36. The stem 70 of the inner valve is provided with a hand wheel 71 in which are formed peripheral sockets 72 for the reception of a pin 73, which projects between the forks 67 and 68 and is guided thereby for axial movement while angular movement of the same is prevented.

The water pipe 74 extends from the lower part of the reservoir upwardly and discharges into the right hand side of the upper chamber 75 of the retort. This water pipe is provided with a manually operable valve 76 and a check valve 77.

An oil pipe 78 extends from the oil space of the reservoir upwardly and discharges at the bottom of the lower chamber 79 of the retort, this pipe being provided with a manually operable valve 80 and a check valve 81. A steam pipe 82 extends from the upper part of the chamber 75 downwardly to a point opposite the jet device to a T 83, and thence through the pipe 84 coupled to the nipple 56 into the chamber 39 of the jet device. An air pipe 85 provided with a manually operable valve 86 extends from the upper portion of the air space of the reservoir to the T 83, whence the air is also conducted by means of the pipe 84 to the chamber 39. The gas pipe 87 leads from the upper portion of the retort chamber 79 to a coupling with the nipple 50, and thence by the channel 51 to the interior chamber 37.

In some cases it may be found desirable to provide an upwardly opening check valve 88 in the air pipe 85 above the valve 86 and a downwardly opening check valve 89 in the steam pipe 82 above the T 83, although not ordinarily needful.

The operation of the device is as follows: The tank 1 of the reservoir having been supplied with water, oil and air under pressure, the valve 80 is opened permitting the oil to fill the retort and flow by means of the pipe 87 to the chamber 37. The valve 86 is then opened to admit compressed air to the chamber 39 and by operating the shaft 66 or by direct application of the hand to the disk 62, the valve 48 is retracted within the casing 36 so as to withdraw said valve from its seat 46 and permit the oil to flow from the chamber 37 through the nozzle 45. It will be noted from an inspection of Figs. 6 and 7 that the threaded connections between the valve 48 and the casing 36 at 38 is by a right hand thread, while the engagement between the valve 57 and the exterior valve 48 at 58 is by a left hand thread. As the valve disk 62 and the valve 48 are rotated anti-clockwise to open the same, a relative contra-movement is imparted to the valve 57 by reason of its left hand thread and from the fact that it is held against actual rotation by the pin 73, thus the opening of the valve 48 operates simultaneously to open in a corresponding degree the valve 57, the ratio of such opening depending upon the relative pitch of the threads at 49 and 58. The relation between the two valves is also made adjustable by the position of the plurality of sockets 72 for the alternative reception of the pin 73. The oil is by the compressed air atomized at the nozzle 45 and injected through the fuel inlet 29 into the burner 27. At this time the burner valve 33 is removed from the opening 32, so that gas on being ignited burns at the opening 32 immediately beneath the retort. As soon as the retort becomes sufficiently heated water is admitted thereto through the pipe 74, which flashes into steam and is conducted by the pipe 82 to the chamber 39, where it takes the place of compressed air, which is then shut off by the closing of the valve 86, and the supply of oil to the chamber 37 is substituted by a supply of gas as the oil within the retort chamber 29 becomes vaporized. Thereupon the valve 33 is closed by its stem 34 and thereafter the

gas injected into said burner by the steam is burned in conjunction therewith at the slots 28, the combustion being practically perfect and resulting in an intense heat available for use in the heating of a room by means of the flue 12 and drum 9, or the device may be placed within a stove or the like and employed to heat articles above the same.

It will be understood that while the drawings illustrate a practical form of the invention, the latter is susceptible of various changes and modifications so long as such changes do not mark any material departure from the salient features of the invention.

In Fig. 9 is shown a modified form of retort, wherein the body 13 is dispensed with and the upper water chamber 75 is replaced by a water coil 75^a fed by the water pipe 82^a and in turn supplying the steam pipe 74^a. The oil vaporizing chamber 79 is also in this case substituted by the oil vaporizing pipe 79^a, which is fed by the oil pipe 78^a and supplies in turn the gas pipe 87^a. The steam pipe 74^a leads by way of the pipe 84^a to the steam chamber of the jet device 35 and the gas pipe to the gas chamber as in the former case.

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

1. The combination with a burner, of a common container for water, oil and air under pressure, a retort associated with the burner to be heated thereby, a jet device connected with the burner to discharge thereinto, water and oil pipes leading from the common container to the retort, steam and gas pipes leading from the retort to the jet device, an air pipe leading from the container to the jet device, and manually operable valves in the oil, air and water pipes.

2. The combination with a burner, of a reservoir adapted to contain superposed supplies of water, oil and air under pressure, a retort associated with the burner to be heated thereby, a jet device arranged to discharge into the burner and provided with interior steam and gas chambers, water and oil pipes leading from the reservoir to the retort, steam and gas pipes leading from the retort to the steam and gas chamber of the jet device, an air pipe leading from the reservoir to the steam chamber of the jet device, and independently operable valves in the oil, air and water pipes.

3. A hydro-carbon burner comprising a gas burning element, a retort in operative relation thereto to be heated by the gas burning element and divided into oil and water chambers, a jet device arranged to discharge into the gas burning element and containing steam and gas chambers, pipes for supplying water and oil and leading to the respective retort chambers, pipes for steam and gas leading respectively from the water and oil chambers of the retort to the steam and gas chambers of the jet device, an air supply pipe leading to the steam chamber of the jet device, and independently operable valves in the supply pipes.

4. A means for burning hydro-carbon fuel comprising a mono-chambered reservoir adapted to contain supplies of water, oil and air under pressure, a bi-chambered retort connected with the oil and water containing parts of the reservoir, and a burner provided with jet producing means and having connections with both chambers of the retort and with the air containing portion of the reservoir.

5. In a hydro-carbon burner, a jet device comprising an interiorly threaded casing inclosing a gas chamber having an inlet port and an outlet port, a valve threaded into the casing and controlling the outlet port and having intersecting longitudinal and transverse bores constituting a steam chamber, the longitudinal bore being interiorly threaded and extending coaxially to the outlet port of the casing, a second or interior valve threaded into the longitudinal bore of the first or outer valve and controlling said bore, the mounting of the two valves being by dissimilar threads, means for rotating the outer valve, whereby a longitudinal movement is imparted to both valves, and means for preventing rotation of the inner valve.

6. In a hydro-carbon burner, a jet device comprising an interiorly threaded casing inclosing a gas chamber having inlet and outlet ports, a gas valve threaded into the casing and controlling the outlet port, said valve having intersecting longitudinal and transverse bores and reduced in cross section adjacent the transverse bores to form a steam chamber, the longitudinal bore of said valve being interiorly threaded and extending coaxially with the outlet port of the casing, a steam valve threaded into the longitudinal bore of the first valve and controlling the outlet from the steam chamber, the mounting of the two valves being one by right hand threads and the other by left hand threads, means for rotating the gas valve whereby a longitudinal movement is imparted to both valves, and means for preventing rotation of the steam valve.

7. A hydro-carbon burner comprising a single tank adapted to contain supplies of water, oil and air under pressure, a burner structure mounted on the tank, a retort in operative relation to the burner structure and communicating with the oil and water portions of the tank for converting water and oil into steam, and gas, respectively, said retort having means of communication

with the burner structure, and the latter having communication with the air containing portion of the tank, controlling means for the supplies of water, oil and air to the burner structure and retort, and controllable means for the burner structure for regulating the flame produced thereby.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JORGEN MARINS HANSEN.

Witnesses:

WILLIAM JAMES BOWN,

H. HAUSSMAN.