

No. 697,093.

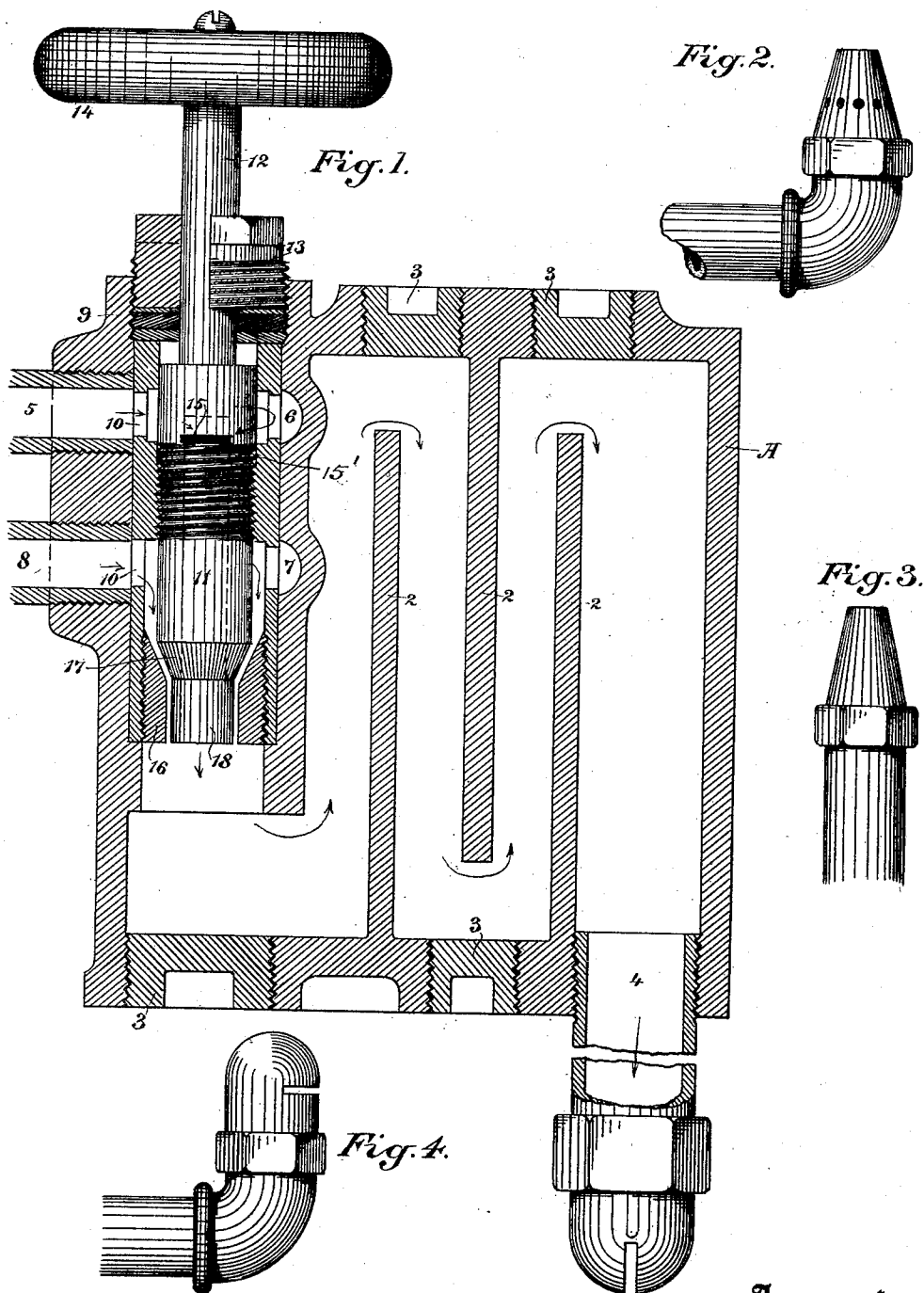
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G. H. LARKIN.

VAPORIZER, MIXER, AND REGULATOR FOR OIL BURNERS.

(Application filed July 30, 1901.)

(No Model.)



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UNITED STATES PATENT OFFICE.

GEORGE H. LARKIN, OF SAN FRANCISCO, CALIFORNIA.

VAPORIZER, MIXER, AND REGULATOR FOR OIL-BURNERS.

SPECIFICATION forming part of Letters Patent No. 697,093, dated April 8, 1902.

Application filed July 30, 1901. Serial No. 70,202. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. LARKIN, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Vaporizers, Mixers, and Regulators for Oil-Burners; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus which is designed for use in conjunction with burners for hydrocarbon oils.

It consists of a chamber having diaphragms formed therein to produce tortuous passages through the chamber, steam and oil inlets connecting with one side of the chamber, and a burner-pipe discharging from the opposite side.

In conjunction with the inlet-passages is a peculiar valve, through and around which the oil and steam, respectively, pass and are intermingled and mixed at their discharge beyond the valve. This valve also serves to regulate the amount and proportion of steam and oil.

My invention also comprises details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a sectional view of my apparatus. Figs. 2, 3, and 4 are forms of burners which may be used in conjunction therewith.

A is a chamber, which is here shown as rectangular in shape, and this chamber is cast with diaphragms 2, which alternately extend from one end and the other, these diaphragms being united with or forming a part of one end of the chamber and having a space at the opposite end, which forms a passage around that end. The next adjacent diaphragm is connected with the end of the chamber adjacent to the openings or channels formed around the ends of the first-named diaphragms, while its opposite end is correspondingly shortened to make a passage around it, so that this arrangement of the diaphragms forms a tortuous passage from one side to the other of the chamber.

In order to obtain access to the interior of the chamber for purposes of inspection or cleaning, I have shown screw-plugs 3, fitting

threaded openings in the ends of the chamber and opposite to the diaphragms and passages.

The discharge from the apparatus takes place through a pipe or passage 4, connecting with the last portion of the tortuous passage at one side of the chamber, and this discharge-pipe may be of any desired length and be provided with any desired form of burner. If used in conjunction with a boiler or similar furnace, the pipe may pass through the wall of the boiler-furnace, so that the chamber A is entirely outside thereof.

Various forms of nozzles, such as shown in Figs. 1, 2, 3, and 4, may be used in conjunction with the apparatus, being removably attached to the end of the discharge-pipe 4.

Oil may be contained in any suitable tank at a sufficient height to provide for the necessary head, and the oil is delivered through a pipe or passage 5 into the valve-chamber, which is situated at the extreme opposite side from the discharge. This chamber is here shown as cylindrical, having annular grooves or channels 6 and 7 made around it, the channel 6 coinciding with the position of the oil-inlet pipe 5 and the channel 7 being coincident with the steam-inlet pipe 8, which lies near to the pipe 5. Within this valve-chamber is fitted the valve, which in the present case has a casing or sleeve 9, within which it is turnable and adjustable, said casing fitting within the cylindrical grooved chamber previously described. The sleeve 9 has channels or openings, as at 10, coincident with the grooves 6 and 7 and the inlet-pipes 5 and 8, so that oil and steam are readily admitted through these openings. Intermediate between the passages 5 and 8 the sleeve is interiorly screw-threaded, and the body 11 of the valve has corresponding interior threads fitting thereto, so that when the valve is turned it is advanced or retracted by the movement of these threads, and this threaded portion between the oil and steam inlets serves to separate the steam from the oil at this particular point. The stem 12 of the valve passes through a stuffing-box 13 of any suitable description and is turnable by means of a hand-wheel or equivalent device 14. The valve 11 is made hollow, having a central cylindrical chamber which extends from near the rear

end out through the front end, as shown in dotted lines. 15 is a port opening into this interior chamber in a transverse plane of the opening 10 and the annular groove 6, so that oil entering through the pipe 5 will readily pass through the opening 10, and as the annular groove or channel 6 surrounds the sleeve and valve at this point the oil will flow freely around the valve and can easily enter the port 15, whatever its position.

The front end of the sleeve 9 has a conical seat 16 removably fitted to it. It is here shown as being screw-threaded and fitting corresponding threads in the sleeve. This seat is made conical or convergent interiorly, and the valve 11 has a corresponding conically-shaped portion 17, which is adapted to close upon the seat 16. Beyond this portion 17 is a reduced cylindrical portion 18, which extends through the corresponding cylindrical interior of the seat 16. It will thus be seen that by turning the valve in one direction the central screw-threads will act to retract it, so as to bring the port 15 into line with the pipe 5, and at the same time the conical portion of the valve 17 will be withdrawn from the seat 16, so that steam entering through the pipe 8, the passages 10, and the surrounding groove or channel 7 will freely pass between the valve and its seat and be discharged in an annular jet around the cylindrical portion 18 of the valve. When the valve is turned in the reverse direction, the port 15 will be occluded by the smooth surface 15' on the intermediate portion of the sleeve and the communication with the passage 5 will be cut off. The oil at the same time escaping through the central opening in the discharge end of the valve will be caught by the steam-jet and impelled forward with an action similar to that of an injector. This serves to finely atomize and spray the oil, and mixing it with the hot steam its temperature is at once raised to a point where it will be vaporized. The tortuous passages formed in the chamber A provide for such a continuous mixing and movement of the oil and steam that it will be in the best condition for ignition when it passes out of the jet-pipe and nozzle. The body of the chamber is preferably made of cast-iron and of sufficient thickness to retain and equalize the heat when its temperature has been raised by the passage of the hot steam through it, and this will largely compensate for any fluctuations which may take place in the supply.

The seat 16 being removable and adjustable longitudinally within the interior sleeve, it will be seen that the seating of the valve and the closure of the port may be adjusted to suit, and coincidently with this change of the seating of the valve the position of the port 15 relative to the inlet-passage 5 will be correspondingly changed. The valve and its adjustable seat thus enable the operator to regulate both steam and oil inlets with a single adjustment.

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

1. A hydrocarbon vaporizer and mixer, consisting of a chamber having tortuous passages formed therein, a discharge tube and jet connecting with one end of the passage, a valve disposed within the other end, said chamber having independent oil and steam inlet passages opening against the side of the valve, and said valve having a threaded portion intermediate of the oil and steam passages and a port opening into the interior coincident with the oil-inlet passage, an annular chamber exterior to the valve into which the steam is delivered, and a seat against which the front end of the valve is closable.

2. A hydrocarbon vaporizing and mixing apparatus, consisting of a chamber having a tortuous passage therethrough with a discharge at one end, parallel steam and oil inlet pipes opening into the side of a valve-chamber and transverse to its axis, a hollow valve turnable in said chamber to advance or retract, and having a lateral port opening into the hollow interior of the valve in line with the oil-inlet pipe, an annular chamber surrounding the valve into which the steam-pipe opens, a seat interposed between said chamber and the annular steam-discharge by which the flow is regulated.

3. In a hydrocarbon-oil vaporizer and mixer, a vaporizing and mixing chamber, a valve-chamber located in one side thereof, oil and steam inlet pipes opening into the side of said chamber, screw-threads formed in said valve-chamber between the inlet-passages, said chamber having a smooth surface portion between the screw-threads and the oil-inlet pipe, a valve having corresponding threads fitting and turnable in said threaded portion, a stuffing-box at one end of the valve-chamber, a stem connected with the valve passing through said stuffing-box having a means at its outer end by which the valve is turnable, said valve having a port opening to the interior coincident with the oil-inlet, an annular chamber surrounding the valve opposite the steam-inlet and separated from the oil-inlet by the screw-threaded portion of the valve, and a seat against which the end of the valve is closable simultaneously with the port being occluded by the said smooth surface portion of the chamber.

4. A hydrocarbon-oil vaporizing and mixing chamber, a valve-chamber having annular interior grooves, oil and steam inlet pipes opening into the valve-chamber at right angles with its axis and coincident with the grooves, a hollow cylindrical valve screw-threaded and turnable in corresponding threads between the oil and steam pipes whereby the latter are separated and the valve is opened or closed, a conical seat near the discharge end of the valve-chamber, a corresponding cone upon the valve closable against said seat, a cylindrical extension beyond the seat of smaller diame-

ter and a corresponding cylindrical extension
of the valve, and a chamber surrounding the
valve in rear of said seat and connecting with
the annular space around the front of the
5 valve, said valve having a port opening into
the interior of the valve in line with the oil-
inlet and said valve-chamber having a por-
tion intermediate of the inlet-pipes which oc-
cludes the port in unison with the seating of
10 the valve.

5. A hydrocarbon vaporizing and mixing
chamber, a valve-chamber with oil and steam
inlet pipes opening into one side thereof, said
chamber having annular interior grooves co-
15 incident with said inlet-pipes, a hollow valve
screw-threaded and fitting corresponding
threads between the inlet-pipes, said valve
having a port opening to the interior coinci-
dent with the oil-inlet pipe, and said cham-
20 ber having an annular chamber surrounding
the valve in line with the steam-inlet, a con-
ical seat and means for adjusting it within
the discharge end of the valve-chamber, a
cone on the valve closable against said seat,
25 and a cylindrical extension of the seat and
the valve in front of the seat, with an annu-
lar space for the discharge of steam between
the two.

6. The combination of a hydrocarbon-oil

vaporizing and mixing chamber, a cylindrical 30
valve-chamber having oil and steam inlet
passages opening into the side thereof and
annular interior grooves coincident with said
passages, an interior cylindrical sleeve fitting
said chamber having openings corresponding 35
with the grooves and the steam and oil inlet
passages, screw-threads interior to the sleeve
located between the oil and steam inlets, a
hollow cylindrical valve having screw-threads
to fit those of the case and means by which 40
it may be rotated to advance or recede, said
valve having a port opening into it in line
with the oil-inlet, said sleeve having a cham-
ber surrounding the valve in line with the
steam-inlet, an independent seat, means for 45
adjusting it in the discharge end of the sleeve,
and a corresponding formation of the valve
closable against the seat, said sleeve having
an annular steam-discharge passage exterior
to the seat and surrounding the oil-discharge 50
in the end of the valve.

In witness whereof I have hereunto set my
hand.

GEO. H. LARKIN.

Witnesses:

S. H. NOURSE,

H. F. ASCHECK.