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J. J. McDONALD & A. D. McLEAN.

OIL BURNER.

APPLICATION FILED APR. 9, 1902.

NO MODEL.

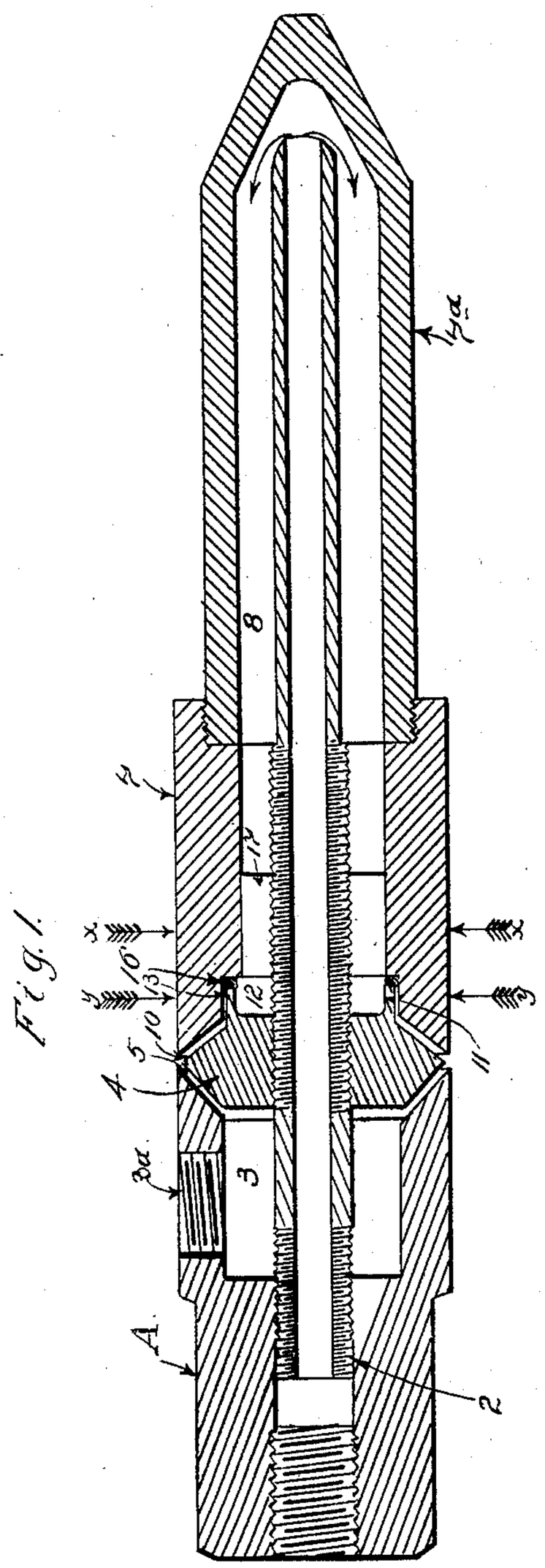

Fig. 1.

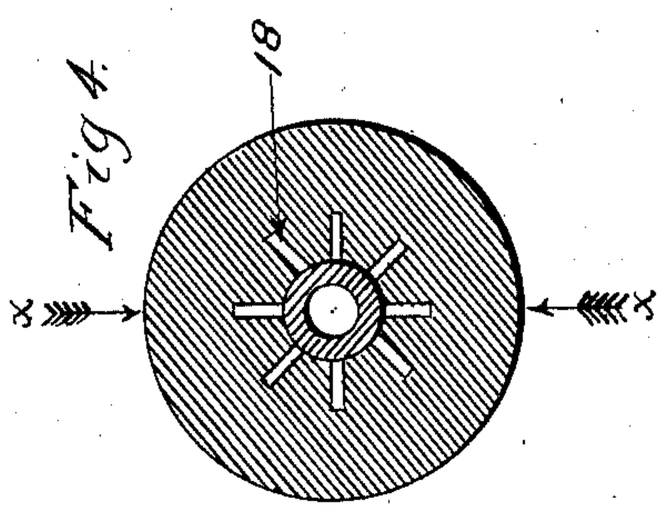

Fig. 4.

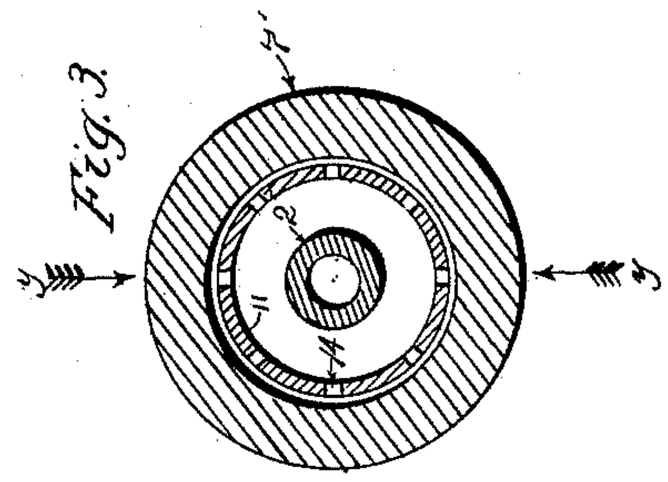

Fig. 3.

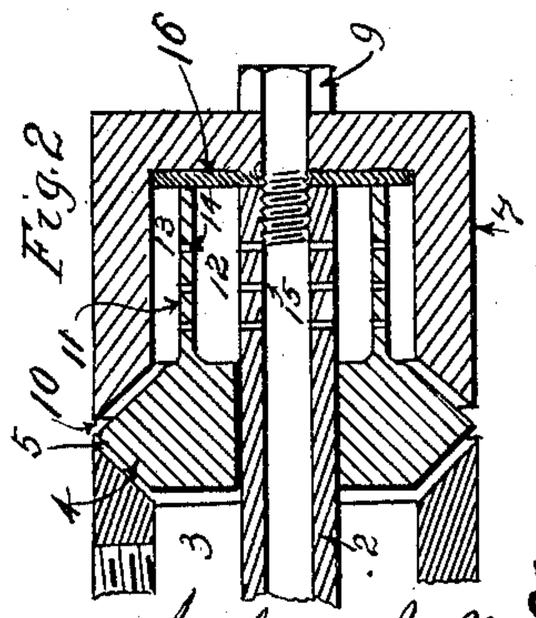

Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN J. McDONALD, OF BERKELEY, AND ANTHONY D. McLEAN, OF SAN FRANCISCO, CALIFORNIA.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 719,686, dated February 3, 1903.

Application filed April 9, 1902. Serial No. 102,007. (No model.)

To all whom it may concern:

Be it known that we, JOHN J. McDONALD, residing at Berkeley, county of Alameda, and ANTHONY D. McLEAN, residing in the city and county of San Francisco, State of California, citizens of the United States, have invented an Improvement in Oil-Burners; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to improvements in hydrocarbon-burners. Its object is to provide a burner for low-gravity oil and suitable for use particularly with marine boilers.

It consists, broadly, of a casing having oil and steam chambers separated by a partition perpendicular to the axis of the burner, outlet-passages from said chambers on either side of and adjacent to the partition, said outlet-passages converging to a common point of discharge exterior to the burner, said oil-chamber adapted to be enveloped by the flame and so act as a superheater for the oil.

More specifically, it consists in the combination of a casing or shell, an oil-pipe extending centrally therethrough and projecting beyond the front end of the casing, an annular steam-chamber formed between the casing and said pipe, an annular beveled-edge partition adjustable on said pipe and adapted to form an annular steam-passage with the end of the casing, a cap or second casing member supported on the extension of the oil-pipe, an annular oil-chamber formed between said cap and pipe, and an annular oil-outlet between the adjacent edges of the cap and partitions.

It also comprises details which will be more fully set forth hereinafter, having reference to the accompanying drawings, in which—

Figure 1 represents a longitudinal cross-section of our burner adapted as a superheater. Fig. 2 represents a modification of the burner. Fig. 3 is a cross-section on line *y y*, Fig. 1. Fig. 4 is a cross-section on line *x x*, Fig. 1.

A represents a casing having an oil-feed pipe 2 extending centrally through it and projecting beyond the burner end of the casing. Between the casing and the pipe an annular steam-chamber 3 is formed.

3^a is the steam-inlet.

A diaphragm or annular plate 4 is adjustable on the pipe extension and is adapted to fit over the end of the casing. This diaphragm may be threaded on the pipe, as shown in Fig. 1, or may fit loosely and be slidable thereon, Fig. 2. The adjacent faces of the casing and diaphragm may be correspondingly beveled at any suitable angle. The space 5 between these beveled surfaces forms an annular steam-outlet passage.

A cap 7 fits on over the pipe 2 and has an interior diameter greater than the exterior diameter of the pipe, so that an annular oil-chamber is formed between the pipe and cap. In Figs. 1 and 2 we have shown two different forms of this cap attached in different ways. In the latter case the end of the pipe 2 is threaded, and a screw 9, fitting the pipe, serves to retain the cap in place on the pipe. The diaphragm-plate 4 has an annular flange 11 projecting into the space between the cap and the pipe and dividing said space in two annular compartments 12 and 13, communicating with each other through the perforations 14 in the flange 11. The pipe 2 is perforated at 15 to admit oil to the chamber 12. A washer 16 may be interposed between the end of the flange 11 and the cap, and by adjusting the screw 9 the size of the oil-discharge orifice may be varied at will.

In operation the oil or commingled oil and steam is admitted to the pipe 2 from any suitable source of supply. Thence flowing through the pipe it issues from the perforations 15 into the oil-chamber 12, and thence through the ports 14 into the space 13 and out through the discharge-outlet 10. Simultaneously steam is admitted to the chamber 3 and passes thence through the discharge-outlet 5. It is understood that the faces of the diaphragm may be beveled at any desired angle, or we may only bevel the face adjacent to the steam-chamber. In any case the fuel-oil and the steam by which the oil is finally vaporized and driven into the furnace are kept entirely separate until they meet at the line of intersection of the annular outlets 5 and 10, exterior to the burner. Ordinarily these faces will be so beveled and the pressure in the steam-chamber 3 will be such as to cause the vapor issuing from the burner to extend in a flared or cone-shaped sheet over and enveloping

though out of contact with the cap. The effect of the perforated flange 11 is to arrest the flow of oil and give it more chance to become vaporized by tearing it or breaking up the particles, while the projecting pipe and the cap serve all the purposes of a superheater for the oil.

In Fig. 1 we have shown the burner-cap more particularly adapted as a superheater. In this case the cap is formed with a tapered prolongation 7ª, and the oil-pipe is adapted to discharge against the closed end of the prolongation. The cap has a web 17 threaded on the pipe, whereby the cap is adjustable in relation to the oil and steam discharge orifices, and the web is longitudinally slotted, as at 18, whereby the oil, either in liquid or vapor form, is admitted to the annular chamber 12 between the slotted flange 11 on the diaphragm-plate 4 and the oil-pipe. Thence it issues through the ports 14 to the space 13 and out through the annular orifice 10, where it meets the opposing face of steam from orifice 5. By having the diaphragm-plate and cap threaded on the pipe and by the interposition of a washer 16, if necessary, any adjustment of steam or oil outlet desired may be obtained.

While it is old in burners to heat oil by means of a surrounding steam-jacket, our invention goes further, and by forming a suitable projecting oil chamber or conduit beyond the burner-discharge and having this chamber or conduit subjected to the heat of the enveloping flame it is seen that the oil is heated to a degree impossible by the use of steam alone. If commingled steam and oil passes through the pipe 2, the high temperature that it is subjected to in the superheater serves not only to thoroughly vaporize the oil, but absolutely prevents condensation of the steam, and the product is a highly-inflammable dry vapor.

With this burner we have found it possible to use crude or low-gravity oil with the most satisfactory results and in connection with marine boilers, where the use of oil generally has been attended with difficulty.

The cap of Fig. 1 is tapered at the end, as shown, in order to reduce the amount of metal between the flame and the oil, as it was found that with an elongated cap, after the form of that shown in Fig. 2, the intense heat of the surrounding flame soon burned and destroyed the metal; but by tapering it the circulation of the oil keeps it sufficiently cool at this point to prevent such burning and injury.

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

1. The combination in a hydrocarbon-burner of a longitudinal supply-pipe, annular chambers surrounding said pipe, a diaphragm extending substantially at right angles with the axis of the chambers, and dividing said chambers, and discharge-outlets from said chambers adjacent to said diaphragm.

2. The combination in a hydrocarbon-burner, of a casing, a longitudinal central pipe, annular chambers between said pipe and casing, a diaphragm extending substantially at right angles with the axis of the chambers and dividing said chambers into separate oil and steam compartments, and annular discharge-outlets between each of said compartments and the diaphragm.

3. The combination in a hydrocarbon-burner, of a pipe or like tubular structure, casing members surrounding said pipe, chambers formed between said members and pipe, a diaphragm adjustable on said pipe intermediate of said casing members, vapor-outlets between the ends of said members and the adjacent faces of the diaphragm and only the chamber on one side of said diaphragm having communication with said pipe.

4. The combination in a hydrocarbon-burner, of a pipe or like tubular structure, casing members enveloping said pipe and adapted to form chambers between said pipe and casing members, a diaphragm adjustable on said pipe intermediate of said members, converging vapor-outlets on either side of said diaphragm and said pipe discharging into the space inclosed by one of said casing members.

5. The combination in a hydrocarbon-burner, of a pipe or like tubular structure, casing members enveloping said pipe, one of said members adjustable longitudinally upon the pipe, chambers formed between said members and pipe, an annular diaphragm interposed between the adjacent ends of said members, converging outlet-passages on either side of said diaphragm and communication between the pipe and one of said chambers.

6. The combination in a hydrocarbon-burner of a central pipe, concentric enveloping casing members, chambers between said pipe and casing members, ports in said pipe communicating with one of said chambers, an annular diaphragm interposed between the ends of said members, annular outlet-passages adjacent to said diaphragm, and means for regulating the size of said outlet-passages.

7. The combination in a hydrocarbon-burner of a central oil-feed pipe, a concentric enveloping shell, annular chambers between said shell and pipe, ports in said pipe communicating with one of said chambers, the other chamber adapted as a steam-chamber, and converging annular discharge-orifices from said chambers intermediate of the ends of said shell through which the oil and steam are separately discharged, commingling exterior to the shell, the commingled product enveloping the said oil-chamber which is thereby transformed into a superheater.

8. The combination in a hydrocarbon-burner, of a casing, a central oil-feed pipe extending beyond the burner end of said cas-

ing, an annular diaphragm-plate on said pipe-extension portion and adjustable in relation to the end of said casing, a steam-chamber formed between said casing and pipe and an annular discharge-orifice between the adjacent faces of said casing and diaphragm, a cap or casing member removably fitting the end of said pipe and adapted to form an oil-chamber between the cap and pipe, atomizing means in said oil-chamber, an annular discharge-orifice between the end of said pipe and diaphragm, the walls of said orifices so inclined as to commingle the product from said chambers, and cause said commingled product to be deflected forward and surround said cap.

9. The combination in a hydrocarbon-burner of a casing, an oil-feed pipe extending centrally through and beyond said casing, an annular beveled-edge diaphragm-plate on said pipe and adjustable in relation to the end of said casing, an outwardly-projecting perforated annular flange on said diaphragm and a cap enveloping the end of said pipe and flange.

10. The combination in a hydrocarbon-burner of a casing, a central oil-feed pipe, an annular beveled-edge diaphragm-plate adjustable on said pipe in relation to the end of said casing, a tapered cap enveloping said pipe and adjustable thereon in relation to the diaphragm-plate.

In witness whereof we have hereunto set our hands.

JOHN J. McDONALD.
ANTHONY D. McLEAN.

Witnesses:
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JESSIE C. BRODIE.