

No. 758,206.

PATENTED APR. 26, 1904.

C. L. GRUNDELL & E. W. TUCKER.

CRUDE OIL BURNER.

APPLICATION FILED MAY 21, 1902. RENEWED SEPT. 19, 1903.

NO MODEL.

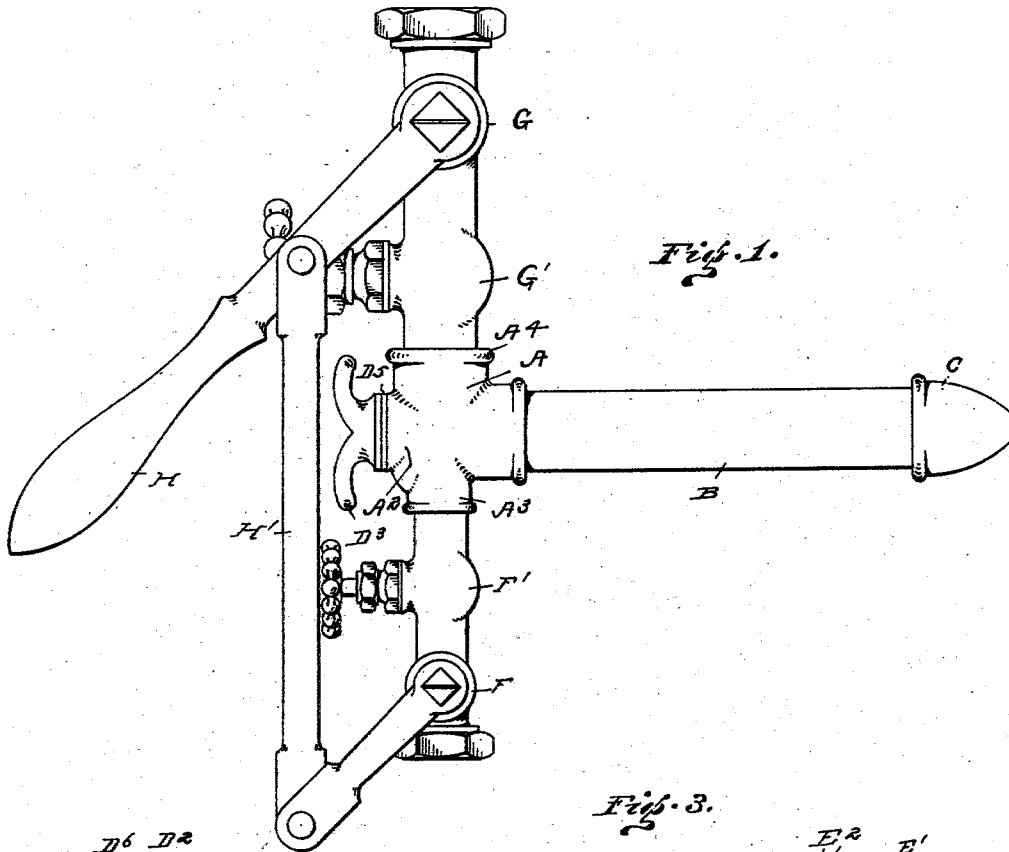


Fig. 1.

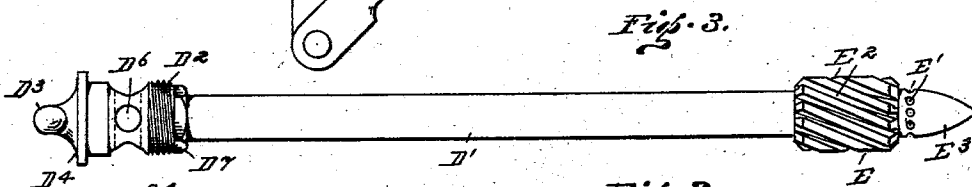


Fig. 3.

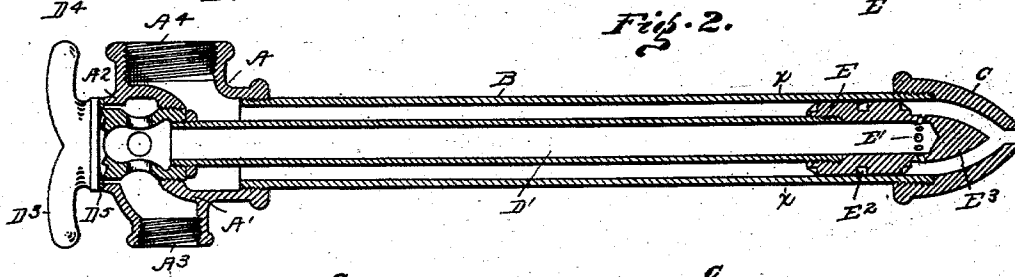
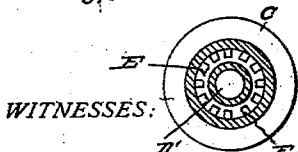


Fig. 2.



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Fig. 4.

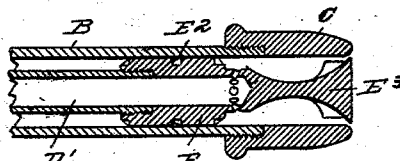


Fig. 5.

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CHARLES L. GRUNDELL AND EDWIN W. TUCKER, OF SAN FRANCISCO,
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CRUDE-OIL BURNER.

SPECIFICATION forming part of Letters Patent No. 758,206, dated April 26, 1904.

Application filed May 21, 1902. Renewed September 19, 1903. Serial No. 173,781. (No model.)

To all whom it may concern:

Be it known that we, CHARLES L. GRUNDELL, residing at 1638 Hyde street, and EDWIN W. TUCKER, residing at 818 Page street, in the city of San Francisco, county of San Francisco, and State of California, citizens of the United States, have invented certain new and useful Improvements in Crude-Oil Burners; and we do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to crude-oil burners, and more particularly to that class of burners wherein steam or air is used as a vehicle for atomizing and ejecting the oil.

The invention consists of a fitting having an internal dividing-wall, an air-pipe forming the shell of the burner screwed into the fitting and terminating in a conical tip, an oil-tube centrally located in said shell and screwed into the dividing-wall of the fitting from behind in such a manner as to be readily withdrawn and replaced, a mixing-head screwed onto the end of the oil-tube near the burner-tip adapted to entirely fill the bore of the burner-shell and having an extension extending into the bore of the tip, spiral grooves cut in the periphery of the mixing-head to give the escaping vapor a cyclonic whirl as it picks up the globules of oil squirting from the holes in the mixing-head and spattering against the adjacent walls of the tip, means for controlling and regulating the supply and proportion of oil and vapor, consisting of regulating-valves located on the respective supply-pipes adjacent the burner, and stop-valves adjacent the regulating-valves operated simultaneously by a throttle-lever.

In the drawings, Figure 1 is a side elevation of a burner and controlling mechanisms constructed in accordance with this invention. Fig. 2 is a longitudinal cross-section of the burner. Fig. 3 is a side elevation of the oil-tube complete removed from the burner. Fig. 4 is a cross-section on the line X X, Fig. 2. Fig. 5 is a longitudinal cross-section of portion of the burner, showing an alternate form of tip adapted to diffuse the flame.

In the description, with reference to the drawings, similar letters of reference designate similar parts throughout the several views.

The designs and proportions of the burner as illustrated refer particularly to its application to marine work wherein compressed air is used as the atomizing agent. The description, therefore, will be confined to this form. With slight departures in proportion and construction its application to other demands is obvious.

In construction the burner consists of the cross-fitting A, having the dividing-wall A' therein across the line of entrance and separating the air and oil within the fitting. The tubing B, screwed into the fitting, extending forward and carrying the tip C at the extreme, forms the shell of the burner. The oil-conduit consists of the plug D, having the tube D' screwed therein, locked by the nut D' and extending forward and carrying the mixer-head E. This construction divides the burner into two elements. The air-conduit, forming the shell of the burner, is the fixed element. The oil-conduit, carrying the operative parts, is the removable element. The elements are assembled by inserting the oil-conduit into the air-conduit, the threaded portion D² on the plug engaging the division-wall A' in the fitting A. When the plug is set up tight by means of the thumb-wings D³ thereon, the shoulder D⁴ on the plug jams the fiber gasket D⁵ against the faced boss A² on the fitting. This sets the threads of the plug in the engaging threads of the wall A', preventing leakage through the wall into the air-conduit and preventing escape of oil around the plug at the rear. Thus assembled the body of the mixing-head E fills the bore of the shell B adjacent the tip C. The oil enters the fitting through the inlet A³, passes through the perforations D⁶ in the plug D, enters the tube D', is carried forward into the mixing-head E, and squirting through the radiating holes E' spatters against the interior walls of the tip C. The compressed air enters the fitting through the inlet A⁴, rushes forward and enters the spiral grooves E² cut in the periphery of the mixing-head E, es-

capas with an accelerated cyclonic twist, picking up the spattered globules of oil, the mixture escaping from the tip as a highly-atomized combustible gas. The length and power of the flame emitted may be regulated by the pitch given the spiral grooves E² in connection with the form of tip used. For an attenuated flame of great length a conical tip with a quick-pitch groove is used. For a quick-diffusion flame of large volume the alternative tip shown in Fig. 5, in connection with the slow-pitch groove, is recommended. The nose E³ on the mixing-head E, extending into the tip, preserves the annularity of the flame, preventing eddies and back suction within the tip. The air-conduit being a straight passage, free from asperities and obstructions, could not under the most unfavorable conditions become clogged. By the construction and the arrangement of the parts as shown all the mechanisms subject to clogging are carried upon the oil-conduit, which is interchangeable and capable of being removed and a new one substituted in a few seconds. The experimental burners tested in developing this invention handled all grades of oil from residuum up with excellent results, the lower grades being little more than liquid asphalt. The oil-conduit may become clogged by the oil "freezing" in the holes E' during inactivity. This is readily removed by withdrawing the oil-conduit and immersing in kerosene, which dissolves the obstruction.

To get effective results from crude-oil burners, it is essential that the proportion of oil and vapor may be determined and maintained. By the arrangement of regulating-valves and throttle, forming a part of this invention, the volume of combustion may be increased or diminished without affecting the proportion of its ingredients.

In a properly-arranged oil-burning system the oil should be fed to the burner from below and by the pressure of air or vapor used in combustion. By this arrangement any drop or failure of the pressure will cause the oil to recede from the burner, preventing overflow. The oil in passing to the burner passes through the throttle-valve F and the regulating-valve F'. The air passes through the throttle-valve G and regulating-valve G'. After the proportion of oil and air has been determined by regulating the valves F' and G', the throttle-valves F and G, through the lever H and connecting-rod H', may be opened or closed without affecting the proportions of the ingredients of the flame. The advantages of this arrangement are obvious.

Having thus described this invention, what

is claimed, and desired to be secured by Letters Patent, is—

1. In a crude-oil burner, the combination with a fitting having a transverse dividing-wall adapted to separate the oil and air, an outer tube screwed in the fitting and forming the shell of the casing, of a perforated plug removably secured in said dividing-wall, an inner tube adjustably secured in said plug and adapted to form a channel for the oil, a head on said tube having spiral grooves therein, the cap on the outer tube and the head coacting to give the vaporized oil and air a spiral twist and flaring exit.

2. In a crude-oil burner the combination of a fitting having an internal dividing-wall; a tube screwed into the fitting, having a tip thereon forming the shell of the burner; an oil-conduit consisting of a hollow perforated plug screwed into the internal dividing-wall of the said fitting, having a tube capable of longitudinal adjustment screwed into the said plug, with a mixing-head thereon, filling the bore of the shell of the burner near the tip and having spiral grooves cut in its circumference, and holes radiating from its central bore in the path of said spiral grooves; supply-pipes connected with the said fitting on opposite sides of the dividing-wall therein; regulating-valves located on said supply-pipes adjacent the said fitting; throttle-valves located on said supply-pipes beyond the regulating-valves; means for causing said throttle-valves to act in unison; substantially as described.

3. In a crude-oil burner the combination of a fitting having an internal dividing-wall; a tube screwed into said fitting having a tip thereon, and forming the shell of the burner; an oil-conduit consisting of a hollow perforated plug screwed into the internal dividing-wall of the said fitting; a tube screwed into said plug, a head screwed on said tube and filling the bore of the shell of the burner near the tip, having spiral grooves cut in its circumference, escape-holes radiating from its central bore in the path of the spiral grooves; and a forward extension on said mixing-head projecting into the tip approximating in contour the internal bore of said tip; substantially as described.

In testimony whereof we have hereunto set our hands this 29th day of April, 1902.

CHARLES L. GRUNDELL.
EDWIN W. TUCKER.

Witnesses:

BALDWIN VALE,
GEORGE F. HATTON.