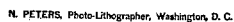


W. N. GRAVES.  
OIL BURNER.

Patented Jan. 14. 1890.



# UNITED STATES PATENT OFFICE.

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## OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 419,515, dated January 14, 1890.

Application filed April 9, 1889. Serial No. 306,529. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIS N. GRAVES, of the city of St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Oil-Burners for Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This is a device for the burning of coal-oils, a jet of steam or air being used to project the oil into the furnace.

Figure I is a side view of the device. Fig. II is an axial section showing part of the oil-pipe and valve-tube in side view. Fig. III is a top view of the nut for adjusting the position of the valve-tube. Fig. IV is a longitudinal section of the steam-nozzle at IV IV, Fig. I, giving an inside view of the nozzle. Fig. V is a transverse section at V V, Fig. I. Fig. VI is a transverse section at VI VI, Fig. I. Fig. VII is a transverse section at VII VII, Fig. I.

1 is the steam-pipe in connection with a steam-generator.

2 is the steam-nozzle, which is shown with a hole 3 opposite the steam-pipe, stopped by a screw-plug 4. The nozzle is contracted at the front end 5, and within it is the tapering end 6 of the tube 7, said end forming a valve in conjunction with the end 5 of the nozzle, there being between them an annular port or passage 8, whose size may be varied by the movement of the tube 7. The steam passes through this annular passage 8 into the furnace-chamber (not shown) when the device is in position and in operation. The nozzle has a cylindrical part 9 9, in which are spiral grooves 10 between the spiral ribs 11, which ribs fit snugly against the tube 7, so that the steam or air passes through the spiral grooves or chambers and gets a spiral motion, which continues after it leaves the port 8, and which motion is imparted to the jet of oil, and much assists in converting it into a spray, and thus assists materially in its thorough combustion. The tube 7 fits so snugly the interior of the nozzle that its tapering end 6 is held exactly in a concentric position in the end 5 of the nozzle, and thus the annular orifice 8 is

even all around. The rear part of the tube 7 passes through a stuffing-box 12, the bottom of which is seen at 13, having a bore in which the tube fits snugly. The interior of the tube 7 fits the oil-pipe 14, so that while the said tube and pipe have endwise movement in the nozzle and on each other the parts are always concentric.

15 is the packing preventing the rearward passage of steam.

16 is the gland, which is screwed into the rear end of the nozzle. The gland has a part 17 of reduced diameter, on which fits the front part 18 of the nut 19.

20 are screws, which pass through the part 18 of the nut, and whose points enter a circumferential groove 21 of the gland, so that while the nut may be freely turned on the gland it has no endwise movement thereon. The nut fits the screw-threaded portion of the tube 7, so that as the nut is turned the tube is advanced or retracted and the steam or air jet passage 8 reduced or enlarged. The oil-pipe 14 has a screw-threaded portion or sleeve 22, on which is a nut 23, whose front portion 24 fits around a reduced part 25 of the nut 19, and is held thereon by screws 26, which pass through the part 24 and enter a circumferential groove 27 of the part 25 of the nut 19. The construction is such that the nut 23 may be freely turned on the nut 19, but has no endwise movement thereon.

It will be seen that by the turning of the nut 23 the oil-pipe 14 is advanced or retracted in the tube 7, while the turning of the nut 19 causes the tube and oil-pipe to be advanced or retracted simultaneously. The part 22 of the oil-pipe may be in one piece with the oil-supply pipe 28, or may connect with the same through a cock or valve 29, by which the supply of oil is regulated. The steam or air pipe may have a regulating cock or valve, so as to shut off steam from the device.

It will be seen that the distance of the focus of the steam-jet from the jet-orifice 8 will be governed by the position of the valve 6, the focus being thrown farther outward by the advance of the valve.

The flame produced may be much modified in length and volume by the position of the

end 6 of the tube 7 and the discharging end of the pipe 14, and also by their relative position. As the focal distance is lengthened the distance which the flame is projected into the furnace is increased to a much greater degree. It has been found that the position of the discharge end of the oil-pipe must be changed with the change of focus to produce best results. These changes may be easily made while the device is in full operation.

I claim as my invention—

1. An oil-burner consisting of an outer or steam nozzle provided with an internal spiral groove, a tube 7, having endwise movement within said nozzle and having the tapering end 6, forming a valve with the discharge end of said nozzle, and an adjustable oil-pipe 14 within the pipe 7, substantially as set forth.

2. The combination, in an oil-burner, of the steam-nozzle 2, having a contracted discharging end 5 and spiral groove 10, an oil-pipe concentric with the nozzle, and a tube 7, inclosing the oil-pipe, having a tapering end concentric with the oil-pipe, and whose exterior fits the grooved part of the nozzle, so as to form with the nozzle a spiral steam-passage, substantially as set forth.

3. The combination, in an oil-burner, of the tube 7, tapering at the end, forming a valve-plug 6, the gland 16, having a groove 21, and nut 19, turning on the gland and held thereto by screw 20, engaging in said groove 21 of the gland, the said nut engaging on a screw-thread of the tube 7, substantially as and for the purpose set forth.

4. The combination, in an oil-burner, of the steam-nozzle 2, the oil-pipe 14, the valve-tube 7, having a tapering end 6, forming a valve

and adapted to project through the end of the nozzle, said pipe and tube each having a threaded end, the gland 16, having a peripheral groove, a nut fitting on said gland and engaging the threads of the tube 7, and also having a peripheral groove, a second nut fitting over the first nut and engaging the threads of pipe 14, and screws projecting from said nuts into said grooves, substantially as set forth.

5. The combination, with the nozzle 2, having stuffing-box 12, provided with a grooved gland 16, of the tube 7, passing through said nozzle and stuffing-box and having a tapering end 6, forming a valve, the oil-pipe 14, fitting in said tube 7, said tube and pipe having each a threaded end, a nut engaging the threaded end of the tube 7 and having a reduced portion provided with a groove, a second nut fitting on said reduced portion and engaging the threads of pipe 14, and screws projecting from said nuts into said grooves, substantially as set forth.

6. The combination of steam-nozzle 2, having a contracted discharge end, spiral grooves 10, and ribs 11, a tube 7, movable endwise in the nozzle and having a tapering end 6, concentric in the discharging end of the nozzle, the outside of the tube fitting snugly against the edges of the ribs 11, and an adjustable oil-supply pipe extending through said tube 7 and adapted to be projected beyond the latter, substantially as set forth.

WILLIS N. GRAVES.

Witnesses:

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EDW. S. KNIGHT.